



Project Status

John Cooper

Project Manager

(changes since DRAFT in red)



Overview of Project & Risks remaining

- Accelerator & NuMI upgrades have used more labor than estimated
 - The estimate was off for Shutdown work, but the effort is less/ month from now on.
 - And, we have doubled the labor estimates for remaining work based on experience from the 1st half of the shutdown.
- The Near Detector cavern (7.5 M\$) is ahead of schedule and on cost.
 - The excavation is complete two months ahead of schedule.
- The Far Detector Assembly is really underway
 - 4th block was set in place on November 14
- All the parts required for the Detectors are flowing north
 - Scintillator
 - We own 31% of the mineral oil so risk due to oil prices is reduced -- have an 8 month buffer.
 - The scintillator transportation P.O. is in place & the 1st 3 tankers moved scintillator to Ash River at on November 5 & 6. Three more tankers were qualified on Nov 13 to complete the dedicated fleet.
 - Fiber
 - We have all of the original 12,000 km order from Kuraray
 - We have an additional 387 km coming -- all that Kuraray had on hand, half price to us at 200 K\$, enough for 28 blocks
 - Extrusions
 - We have 57% of the PVC extrusions. Storing them in Minneapolis and in Manitowoc, WI
 - Waste rate is 6.4% vs. base plan of 6% when we include extrusions just slightly out of spec
 - We will use these extrusions.



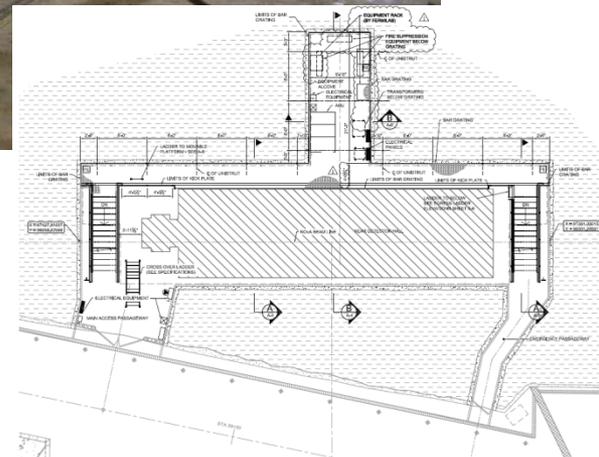
Near Cavern Progress

new slide



to
↑ MINOS

- 16 Nov 2012:
 - floor rebar done,
concrete pour in progress





Scintillator Tankers at Ash River



new
picture

- 7,000 gallons per tanker; 21,000 gallons in all.
- The “LOHSE” semi-trailer delivered PVC modules, returns packing materials to Minneapolis

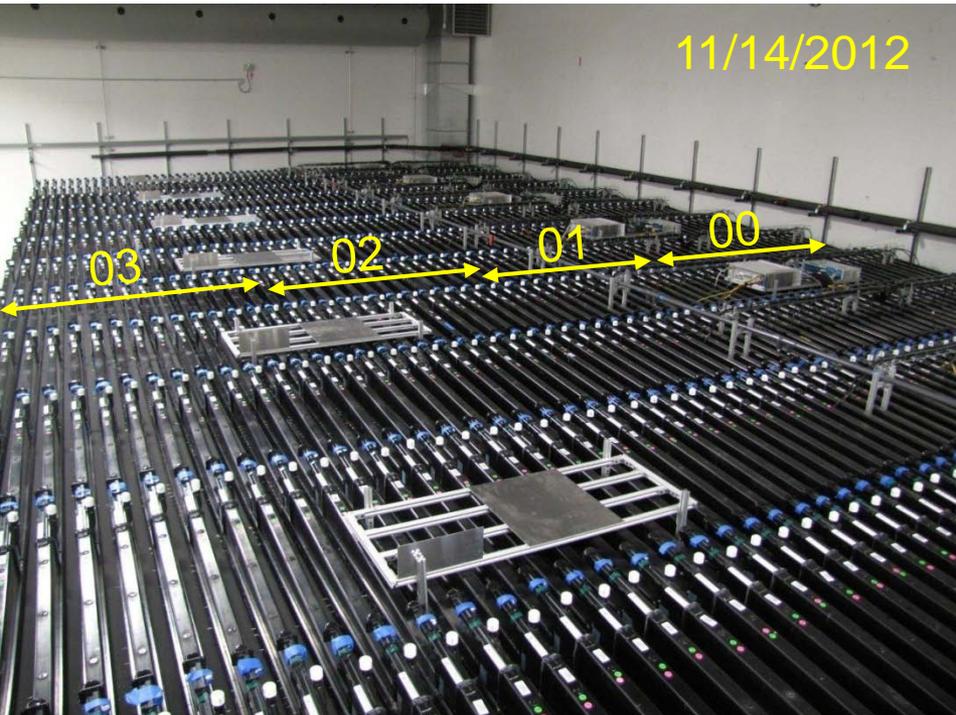


Overview of Risks remaining, slide 2

- **All the parts required for the Detectors are flowing north . . .**
 - PVC Modules
 - 3,019 good modules completed. 28% of 28 blocks.
 - Another 237 have possible fiber damage in only one cell of 32 cells & will be used. (so have 30%)
 - After including the 237 modules as good, failure rates are now ~ 1.4% vs. our base plan of 2%.
 - Failure rate still coming down as the new students this Fall Semester gain experience, but has averaged 1.4% over the last 5 week.
 - Another 282 failed modules (not fiber) will have their PVC recycled into the Near Detector
 - Fiber waste rates during production are 3 - 4%. We have enough fiber for a 4.5% fiber waste rate.
 - Electronics
 - The first 400 APDs in the production order of 12,000 have arrived from Hamamatsu
 - 12,000 allows for 13% spares
 - We have 87% of the Front End Boards in hand and tested (9,323 boards)
 - We have 100% of the Thermo-electric Cooler Controller boards in hand and tested. (12,133)
 - Data Acquisition Electronics
 - We have 100% of the final version Data Concentrator Modules in hand and tested. (212)
 - We have 100% of the Timing Distribution Units in hand and tested. (60)
 - Ash River Assembly
 - The block assembly rate is at 15 working days/block, still pushing down to 12.5 working days/block
 - Block assembly labor is right on our estimate, using 1 shift per week overtime to accelerate
 - Scintillator filling will start the week of December 3.
 - Outfitting has begun: cables, power supplies, some electronics in place on 1st diblock
 - Most of our labor estimates here appear to be dead on target



4th block in place at Ash River new slide



- Note Outfitting progress on 1st four blocks & changes in 2 days
 - Power supplies, DCMs cables, . .
- Leak checking of all modules in Block 00 in situ is complete.
 - No leaks.

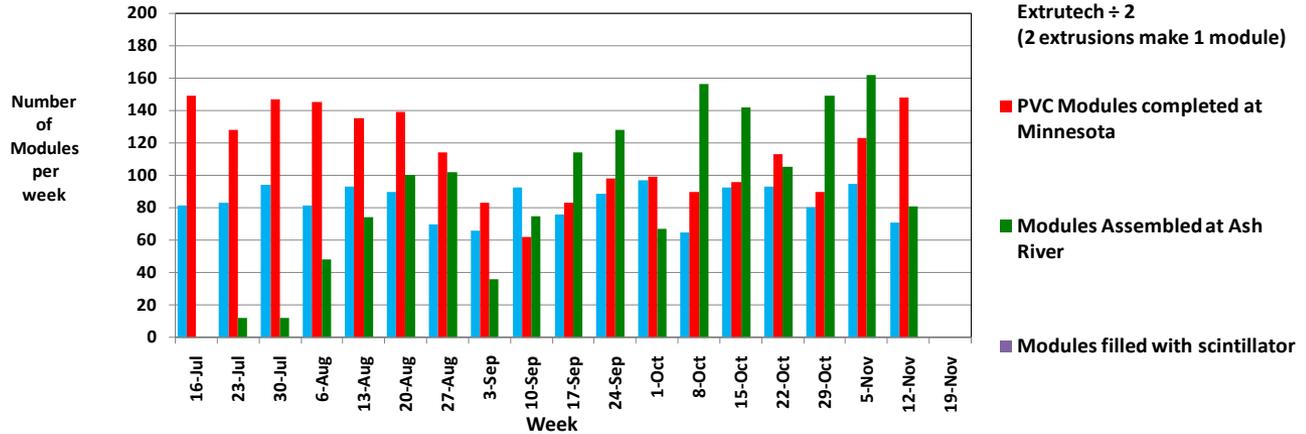


Slides updated with 2 more weeks of data

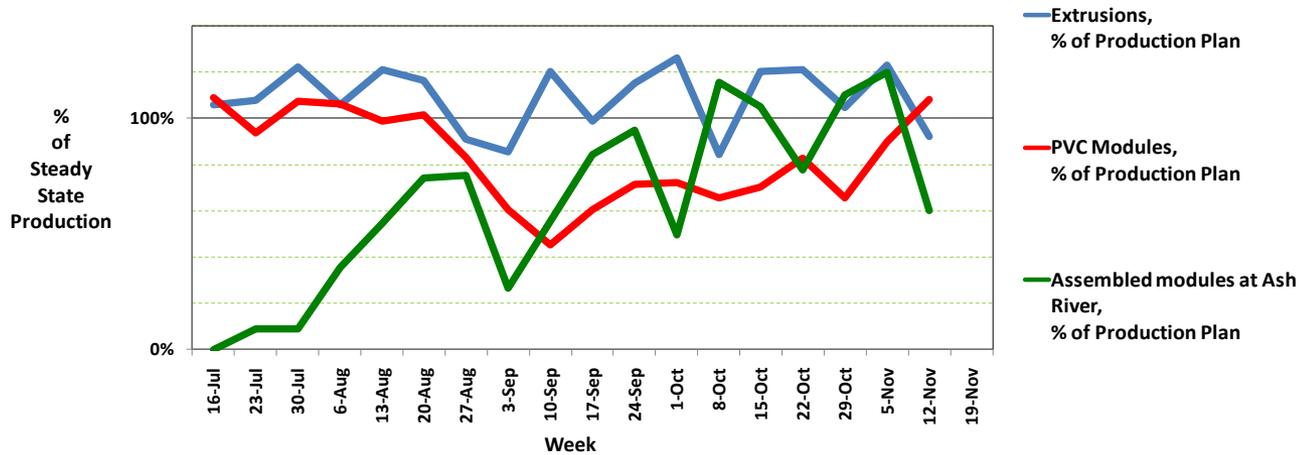
NOVA Weekly Progress

These graphs satisfy a recommendation from the 14 Aug IPR

NOVA Construction Rates per Week



NOVA Construction Rates as % of Steady State Production Plan

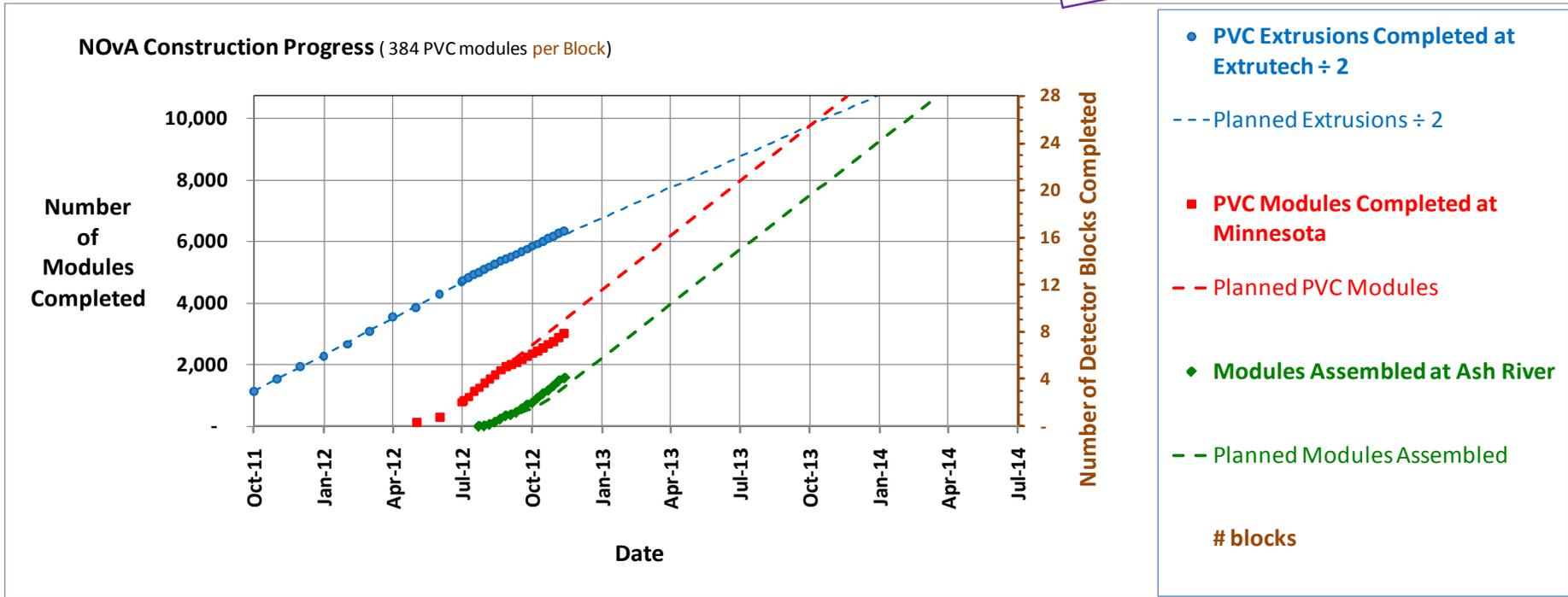


Week of 12 November

- 142 PVC extrusions = 92% of desired rate, cleaned & polished the die this week.
- 148 PVC modules = 108% of desired rate
 - Sept conversion to part-time students was difficult
 - Now back to full rate with factory work on Saturdays + 10 hr days on Mon & Wed
- 81 Ash River modules assembled = 60% of desired rate, but set 4th block & started 5th

NOvA longer view of Progress

Another graph to satisfy a recommendation from the 14 Aug IPR

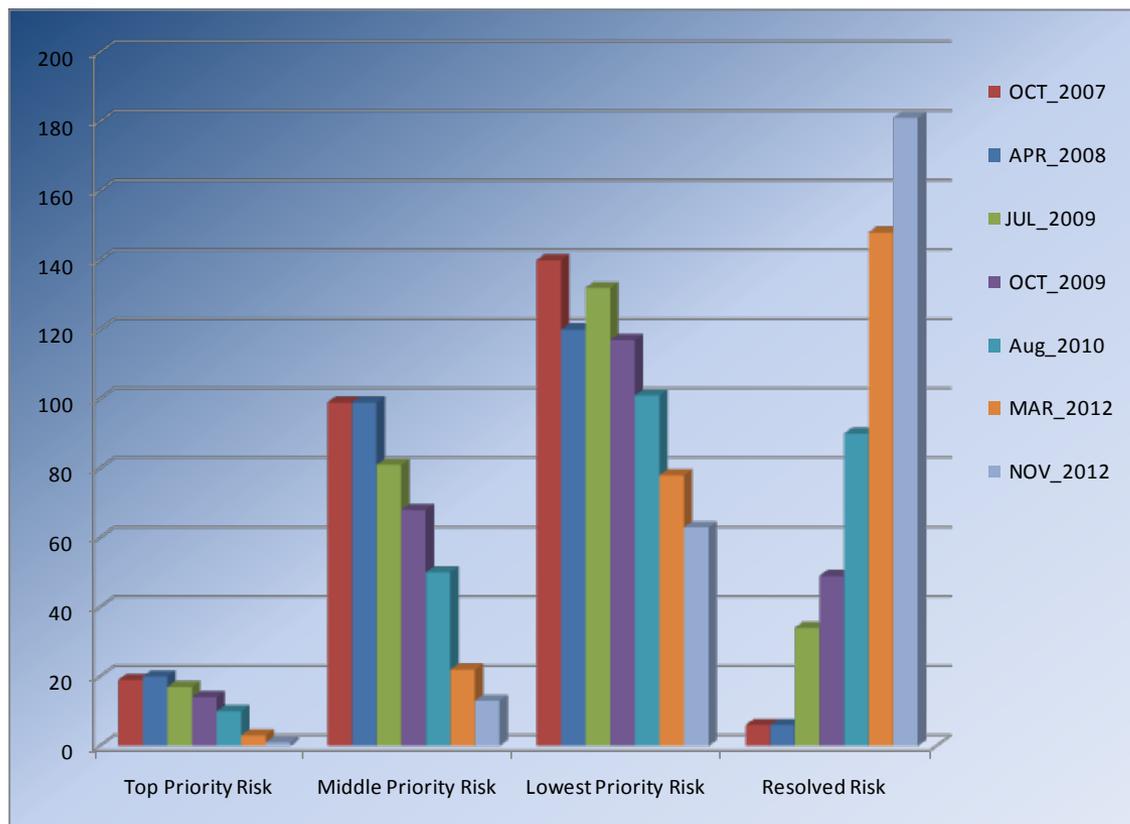


- PVC extrusions on the plan (note change in slope in July)
 - Deliberate slow-down since we ran out of storage space
- Modules lagging behind while new student workers are trained
 - Also moved sanding operation from Ash River to Minneapolis
- Assembly running ahead of plan
 - Due to a fast start. Slope is closer to the plan.



Formal status of documented Risks

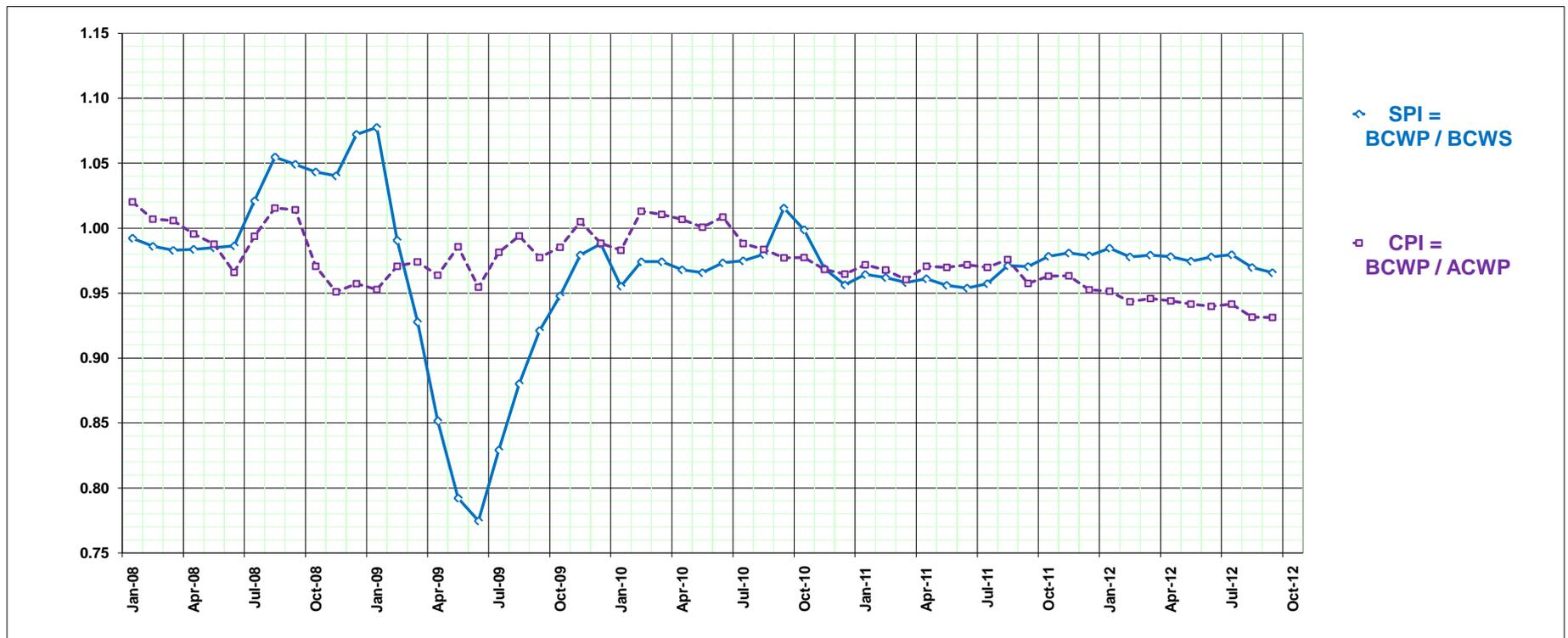
- Risks vs. time
- 180 of ~ 250 now retired
- Sum of all Risk “scores” down a factor of 6, from 39.6 to 6.8
 - Scores are assigned according to our Risk Plan
- Sum of “Top Priority” Risk scores down a factor of 24, from 9.7 to 0.4





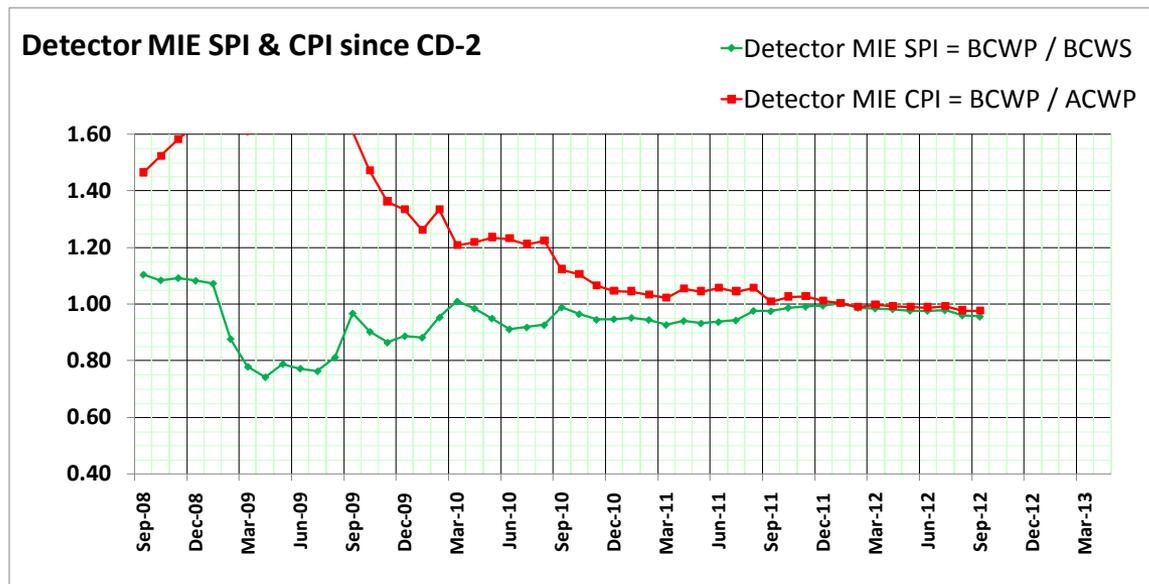
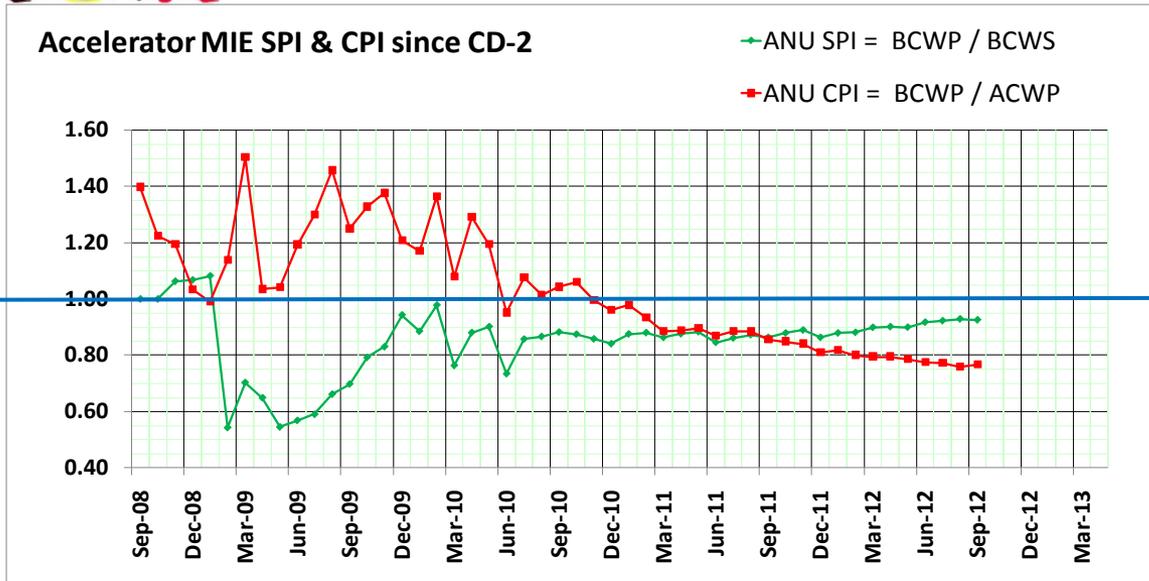
EVMS Reporting Overview

- Data now available through **September 2012**
 - SPI = **0.966**, compare to 0.970 in August, 0.980 in July, 0.978 in June
 - CPI = **0.931**, compare to 0.931 in August, 0.941 in July, 0.940 in June
- Installed a CR in September with double ANU labor for remaining unstarted shutdown tasks(except 30 section and RF installs)
 - 1.3 M\$ This held us flat in the CPI in August and September.





SPI & CPI for Active Work

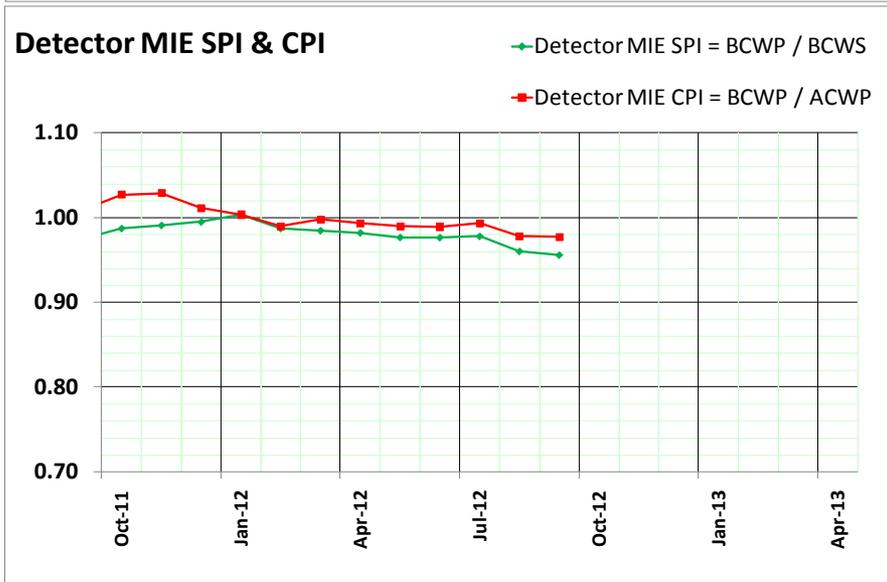
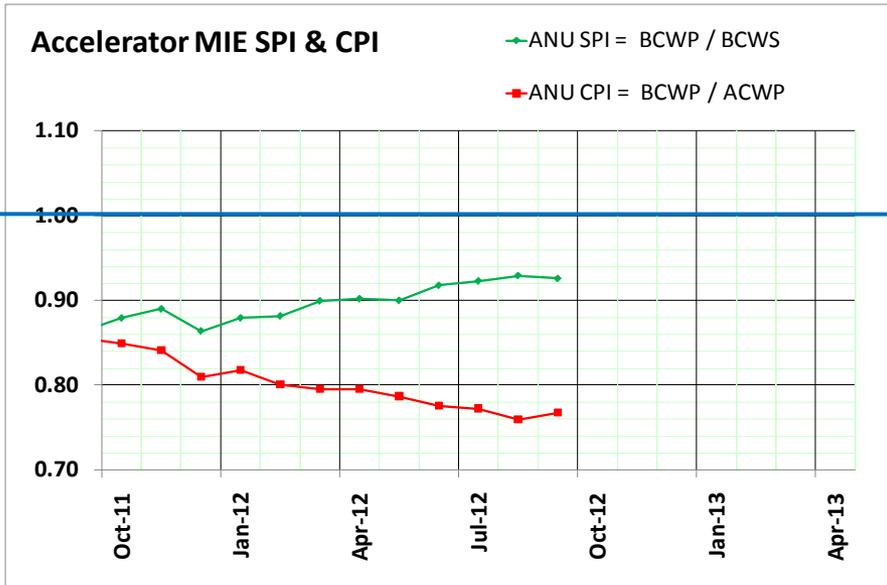


- ANU long slide down to 0.76 reversed to 0.77 in September
 - Installed Change Request doubling the labor estimate on unstarted tasks
- Meanwhile the SPI trends up, ~0.925.
- Detector still relatively constant near 1.0
 - SPI=0.955, CPI=0.977



SPI & CPI for Active Work

new slide suggested by W. Wisniewski



- Same data, plot only the last year
- Vertical scale expanded

- ANU long slide down to 0.76 reversed to 0.77 in September
 - Installed Change Request doubling the labor estimate on unstarted tasks
- Meanwhile the SPI trends up, ~0.925.

- Detector still relatively constant near 1.0
 - SPI=0.955, CPI=0.977

**COST PERFORMANCE REPORT
FORMAT 1 - WORK BREAKDOWN STRUCTURE**

CPR1 Sep 2012

CONTRACTOR						CONTRACT			PROGRAM			PERIOD		
NAME						NAME			NAME			FROM 01-Sep-2012		
Fermi National Accelerator Laboratory									NOvA project			TO 30-Sep-2012		
PERFORMANCE DATA														
CTC-FndSrc CTC[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	2,298	2,028	2,284	(270)	(256)	30,903	28,606	37,276	(2,297)	(8,671)	36,086	43,135	(7,048)	
CTC-FndSrcTotals:	2,298	2,028	2,284	(270)	(256)	30,903	28,606	37,276	(2,297)	(8,671)	36,086	43,135	(7,048)	
DC DOE-CA														
2.1 Site and Building														
Fully burdened AY\$k	0	0	0	0	0	35,060	35,060	34,872	0	188	35,060	34,872	188	
CTC-FndSrcTotals:	0	0	0	0	0	35,060	35,060	34,872	0	188	35,060	34,872	188	
DD DOE-ACEL R&D														
1.0 ANU R&D														
Fully burdened AY\$k	0	0	(0)	0	0	7,025	7,025	6,615	0	410	7,025	6,615	410	
CTC-FndSrcTotals:	0	0	(0)	0	0	7,025	7,025	6,615	0	410	7,025	6,615	410	
DE DOE-DET MIE														
2.1 Site and Building														
Fully burdened AY\$k	3	10	94	7	(84)	7,131	7,131	6,148	0	983	7,131	6,148	983	
2.10 NOvA Project Management														
Fully burdened AY\$k	182	182	142	0	40	8,849	8,849	7,690	0	1,159	11,699	10,540	1,159	
2.2 Liquid Scintillator														
Fully burdened AY\$k	115	110	144	(6)	(34)	10,053	9,948	10,127	(105)	(179)	22,187	22,375	(188)	
2.3 WLS Fiber														
Fully burdened AY\$k	400	38	93	(362)	(54)	11,648	12,045	12,389	397	(344)	12,838	13,184	(346)	
2.4 PVC Extrusions														
Fully burdened AY\$k	1,012	697	803	(316)	(106)	20,656	20,172	20,536	(484)	(364)	30,141	30,579	(438)	
2.5 PVC Modules														
Fully burdened AY\$k	430	519	498	90	22	12,850	12,891	12,098	41	793	21,715	20,942	773	
2.6 Electronics														
Fully burdened AY\$k	26	113	195	87	(82)	7,389	5,982	6,099	(1,406)	(117)	12,515	12,685	(170)	
2.7 DAQ														
Fully burdened AY\$k	51	71	90	20	(19)	4,117	3,116	4,009	(1,002)	(893)	4,488	5,371	(883)	
2.8 Near Detector Assembly														
Fully burdened AY\$k	694	851	545	158	306	5,807	5,363	5,703	(444)	(340)	12,344	12,724	(380)	
2.9 Far Detector Assembly														
Fully burdened AY\$k	1,016	733	845	(283)	(112)	12,189	10,696	13,628	(1,493)	(2,932)	22,348	25,528	(3,180)	
CTC-FndSrcTotals:	3,929	3,325	3,448	(604)	(123)	100,688	96,192	98,427	(4,496)	(2,235)	157,406	160,075	(2,669)	

Down dramatically from negative 1M\$ in Aug

J. Cooper Also down dramatically from negative 1.5 M\$ in Aug

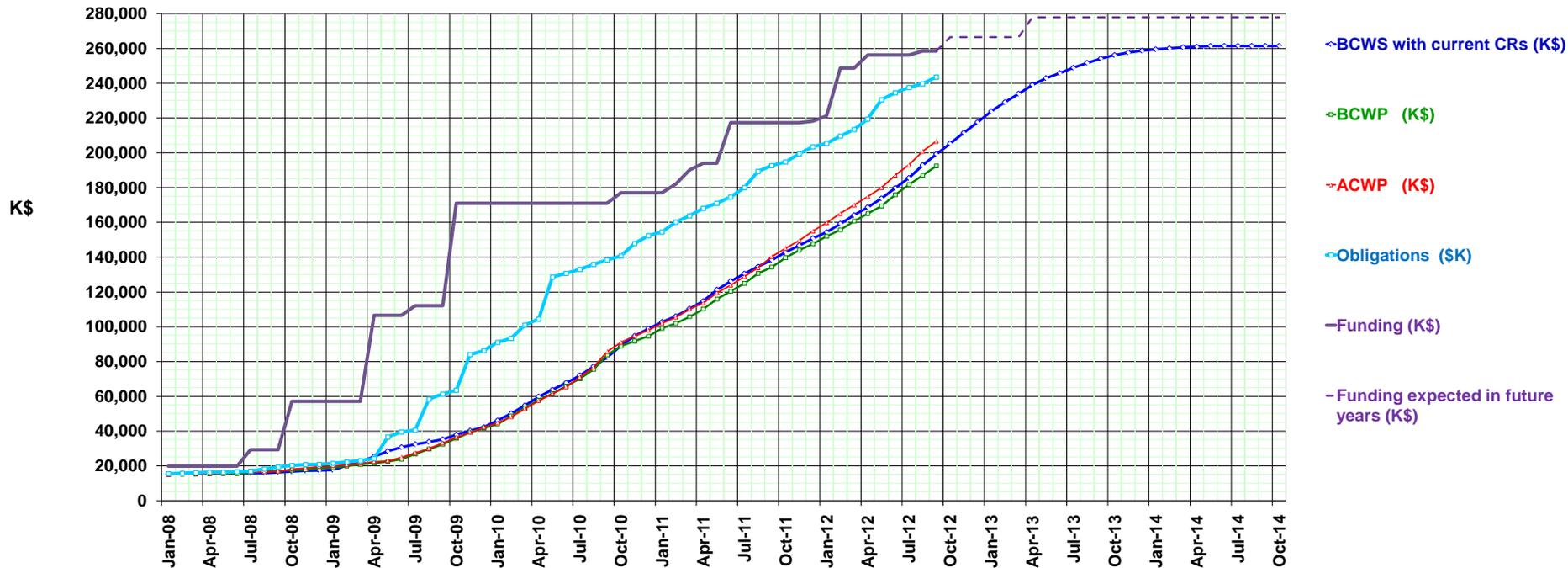
CONTRACTOR NAME	CONTRACT NAME
Fermi National Accelerator Laboratory	

CTC-FndSrc CTC[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)
DO DOE- OPS													
1.0 ANU R&D													
Fully burdened AY\$k	129	8	59	(121)	(51)	1,689	1,646	1,282	(43)	365	1,816	1,430	385
2.7 DAQ													
Fully burdened AY\$k	0	0	0	0	0	0	0	0	0	0	192	192	0
CTC-FndSrcTotals:	129	8	59	(121)	(51)	1,689	1,646	1,282	(43)	365	2,007	1,622	385
DR DOE-POST CD-1 DET R&D													
1.1 Site and Building R&D													
Fully burdened AY\$k	0	0	0	0	0	3,630	3,630	3,168	0	462	3,630	3,168	462
1.2 Liquid Scintillator R&D													
Fully burdened AY\$k	0	0	0	0	0	297	297	389	0	(92)	297	389	(92)
1.3 WLS Fiber R&D													
Fully burdened AY\$k	0	0	0	0	0	341	341	375	0	(34)	341	375	(34)
1.4 PVC Extrusion R&D													
Fully burdened AY\$k	0	0	0	0	0	1,369	1,369	2,083	0	(714)	1,369	2,083	(714)
1.5 PVC Module R&D													
Fully burdened AY\$k	0	0	0	0	0	2,260	2,260	2,421	0	(160)	2,260	2,421	(160)
1.6 Electronics R&D													
Fully burdened AY\$k	0	0	0	0	0	2,028	2,028	2,600	0	(572)	2,028	2,600	(572)
1.7 DAQ R&D													
Fully burdened AY\$k	0	0	0	0	0	1,635	1,635	2,822	0	(1,186)	1,635	2,822	(1,186)
1.8 Detector Assembly R&D													
Fully burdened AY\$k	0	0	0	0	0	3,123	3,123	4,931	0	(1,808)	3,123	4,931	(1,808)
1.9 Project Management R&D													
Fully burdened AY\$k	0	0	0	0	0	383	383	559	0	(176)	383	559	(176)
CTC-FndSrcTotals:	0	0	0	0	0	15,067	15,067	19,347	0	(4,281)	15,067	19,347	(4,281)
DI DOE CD-0 TO CD-1 R&D													
1.9 Project Management R&D													
Fully burdened AY\$k	0	0	0	0	0	8,801	8,801	8,801	0	0	8,801	8,801	0
CTC-FndSrcTotals:	0	0	0	0	0	8,801	8,801	8,801	0	0	8,801	8,801	0
Undist. Budget											0	0	0
Sub Total	6,356	5,360	5,790	(995)	(429)	199,232	192,396	206,620	(6,836)	(14,224)	261,451	274,466	(13,015)
Management Resrv.											16,549		
Total	6,356	5,360	5,790	(995)	(429)	199,232	192,396	206,620	(6,836)	(14,224)	278,000		

ANU OPS \$ also only slightly negative this month

EVMS Reporting Overview

- Basic data in BCWS, BCWP, ACWP, **Funding & Obligations** through **Sept 2012**
 - BCWS = Budgeted cost of work Scheduled
 - BCWP = Budgeted cost of work Performed
 - ACWP = Actual cost of work Performed
- Project is 73.6 % complete ($BCWP/BAC = 192.4 \text{ M\$} / 261.5 \text{ M\$}$)
 - BAC = Budget at Completion (using EAC, get 70%)
- Project is 93.1 % obligated ($Obligations/BAC = 243.5 / 261.5$)
 - EAC = Estimate at Completion (using EAC, get 88%)





AY\$ by Level 2 with MIE/OPC split

WBS	Items	NOvA Costs to Date (\$M) as of 30-Sep-2012	NOvA 's Cost Estimate AY \$M (for October 1, 2012 to project end)									
			Estimated Cost (with indirects)			Mgmt Reserve Estimate			Contingency %			Total
			M&S	Labor ¹	Total	M&S	Labor ¹	Total	M&S	Labor ¹	Total	Cost
2.0	Accelerator & NuMI Upgrades	\$ 37.3	\$ (0.6)	\$ 6.4	\$ 5.9	\$ 0.2	\$ 0.7	\$ 0.9	-37%	11%	16%	\$ 44.1
2.1	Far Detector Site and Building	\$ 6.1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 6.1
2.2	Liquid Scintillator	\$ 10.1	\$ 12.0	\$ 0.2	\$ 12.2	\$ 1.5	\$ 0.1	\$ 1.6	13%	42%	13%	\$ 24.0
2.3	Wave-Length-Shifting Fiber	\$ 12.4	\$ 0.7	\$ 0.1	\$ 0.8	\$ 0.0	\$ 0.0	\$ 0.0	0%	10%	1%	\$ 13.2
2.4	PVC Extrusions	\$ 20.5	\$ 9.5	\$ 0.6	\$ 10.0	\$ 0.4	\$ 0.1	\$ 0.5	4%	18%	5%	\$ 31.0
2.5	PVC Modules	\$ 12.1	\$ 3.4	\$ 5.4	\$ 8.8	\$ 0.0	\$ 0.2	\$ 0.3	1%	5%	3%	\$ 21.2
2.6	Electronics Production	\$ 6.1	\$ 5.8	\$ 0.8	\$ 6.6	\$ 0.4	\$ 0.2	\$ 0.6	6%	29%	9%	\$ 13.3
2.7	Data Acquisition System	\$ 4.0	\$ 0.7	\$ 0.7	\$ 1.4	\$ 0.2	\$ 0.2	\$ 0.4	25%	28%	27%	\$ 5.7
2.8	Near Detector Assembly	\$ 5.7	\$ 6.0	\$ 1.0	\$ 7.0	\$ 0.0	\$ 0.1	\$ 0.1	0%	5%	1%	\$ 12.8
2.9	Far Detector Assembly	\$ 13.6	\$ 5.3	\$ 6.6	\$ 11.9	\$ 1.1	\$ 2.3	\$ 3.4	21%	35%	29%	\$ 28.9
2.10	Project Management	\$ 7.7	\$ 0.1	\$ 2.7	\$ 2.9	\$ 0.0	\$ 0.0	\$ 0.0	10%	0%	1%	\$ 10.6
Subtotal Construction		\$ 135.7	\$ 42.9	\$ 24.6	\$ 67.5	\$ 3.8	\$ 4.0	\$ 7.8	9%	16%	12%	\$ 211.0
O P C	R&D - Accelerator	\$ 6.6	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 6.6
	R&D - Detector	\$ 28.1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 28.1
	Cooperative Agreement	\$ 34.9	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 34.9
	Operating	\$ 1.3	\$ 0.0	\$ 0.1	\$ 0.1	\$ 0.0	\$ 0.0	\$ 0.0	38%	8%	14%	\$ 1.5
	Total OPC:	\$ 70.9	\$ 0.0	\$ 0.1	\$ 0.1	\$ 0.0	\$ 0.0	\$ 0.0	\$ 0.0	38%	8%	14%
Available Contingency								\$ (4.078)				\$ (4.1)
TPC:		\$ 206.6	\$ 43.0	\$ 24.7	\$ 67.7	\$ 3.8	\$ 4.0	\$ 3.73	9%	16%	6%	\$ 278.000

- 3.73 M\$ Contingency
 - 5.5% of remaining work
 - 12.0 % of remaining Obligations

Details: AY\$ by Level 2 with MIE/OPC split

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			M&S	Labor ¹	Total	M&S	Labor ¹	Total	M&S	Labor ¹	Total	Cost
2.0	Accelerator & NuMI Upgrades	\$ 37.3	\$ (0.6)	\$ 6.4	\$ 5.9	\$ 0.2	\$ 0.7	\$ 0.9	-37%	11%	16%	\$ 44.1
2.1	Far Detector Site and Building	\$ 6.1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 6.1
2.2	Liquid Scintillator	\$ 10.1	\$ 12.0	\$ 0.2	\$ 12.2	\$ 1.5	\$ 0.1	\$ 1.6	13%	42%	13%	\$ 24.0
2.3	Wave-Length-Shifting Fiber	\$ 12.4	\$ 0.7	\$ 0.1	\$ 0.8	\$ 0.0	\$ 0.0	\$ 0.0	0%	10%	1%	\$ 13.2
2.4	PVC Extrusions	\$ 20.5	\$ 9.5	\$ 0.6	\$ 10.0	\$ 0.4	\$ 0.1	\$ 0.5	4%	18%	5%	\$ 31.0
2.5	PVC Modules	\$ 12.1	\$ 3.4	\$ 5.4	\$ 8.8	\$ 0.0	\$ 0.2	\$ 0.3	1%	5%	3%	\$ 21.2
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2.8	Near Detector Assembly	\$ 5.7	\$ 6.0	\$ 1.0	\$ 7.0	\$ 0.0	\$ 0.1	\$ 0.1	0%	5%	1%	\$ 12.8
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Subtotal Construction		\$ 135.7	\$ 42.9	\$ 24.6	\$ 67.5	\$ 3.8	\$ 4.0	\$ 7.8	9%	16%	12%	\$ 211.0
O P C	R&D - Accelerator	\$ 6.6	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 6.6
	R&D - Detector	\$ 28.1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 28.1
	Cooperative Agreement	\$ 34.9	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 34.9
	Operating	\$ 1.3	\$ 0.0	\$ 0.1	\$ 0.1	\$ 0.0	\$ 0.0	\$ 0.0	38%	8%	14%	\$ 1.5
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Available Contingency								\$ (4.078)				\$ (4.1)
TPC:		\$ 206.6	\$ 43.0	\$ 24.7	\$ 67.7	\$ 3.8	\$ 4.0	\$ 3.73	9%	16%	6%	\$ 278.000

Counting on 1.53 M\$ reimbursement to project via buy into Special Process Spares.
M&S to go is less than 1.53 M\$ now

Should be zero, action taken to eliminate labor overrun

All electronics (except APDs) in hand with no problems

Ash River labor estimates are close to reality.
Using 1 OT shift in assembly = 19% for that part.
No OT for Outfitting.



Project Manager View of Contingency

WBS	Items	NOvA Costs to Date (\$M) as of 30-Sep-2012	NOvA 's Cost Estimate AY \$M (for October 1, 2012 to project end)										
			Estimated Cost (with indirects)			Mgmt Reserve Estimate			Contingency %			Total Cost	
			M&S	Labor ¹	Total	M&S	Labor ¹	Total	M&S	Labor ¹	Total		
T E C	2.0	Accelerator & NuMI Upgrades	\$ 37.3	\$ (0.6)	\$ 6.4	\$ 5.9	\$ -	\$ -	\$ -	0%	0%	0%	\$ 43.1
	2.1	Far Detector Site and Building	\$ 6.1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 6.1
	2.2	Liquid Scintillator	\$ 10.1	\$ 12.0	\$ 0.2	\$ 12.2	\$ -	\$ -	\$ -	0%	0%	0%	\$ 22.4
	2.3	Wave-Length-Shifting Fiber	\$ 12.4	\$ 0.7	\$ 0.1	\$ 0.8	\$ -	\$ -	\$ -	0%	0%	0%	\$ 13.2
	2.4	PVC Extrusions	\$ 20.5	\$ 9.5	\$ 0.6	\$ 10.0	\$ -	\$ -	\$ -	0%	0%	0%	\$ 30.6
	2.5	PVC Modules	\$ 12.1	\$ 3.4	\$ 5.4	\$ 8.8	\$ -	\$ -	\$ -	0%	0%	0%	\$ 20.9
	2.6	Electronics Production	\$ 6.1	\$ 5.8	\$ 0.8	\$ 6.6	\$ -	\$ -	\$ -	0%	0%	0%	\$ 12.7
	2.7	Data Acquisition System	\$ 4.0	\$ 0.7	\$ 0.7	\$ 1.4	\$ -	\$ -	\$ -	0%	0%	0%	\$ 5.4
	2.8	Near Detector Assembly	\$ 5.7	\$ 6.0	\$ 1.0	\$ 7.0	\$ -	\$ -	\$ -	0%	0%	0%	\$ 12.7
	2.9	Far Detector Assembly	\$ 13.6	\$ 5.3	\$ 6.6	\$ 11.9	\$ -	\$ -	\$ -	0%	0%	0%	\$ 25.5
	2.10	Project Management	\$ 7.7	\$ 0.1	\$ 2.7	\$ 2.9	\$ -	\$ -	\$ -	0%	0%	0%	\$ 10.5
	Subtotal Construction	\$ 135.7	\$ 42.9	\$ 24.6	\$ 67.5	\$ -	\$ -	\$ -	0%	0%	0%	\$ 203.2	
O P C	R&D - Accelerator	\$ 6.6	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 6.6	
	R&D - Detector	\$ 28.1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 28.1	
	Cooperative Agreement	\$ 34.9	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 34.9	
	Operating	\$ 1.3	\$ 0.0	\$ 0.1	\$ 0.1	\$ -	\$ -	\$ -	0%	0%	0%	\$ 1.4	
	Total OPC:	\$ 70.9	\$ 0.0	\$ 0.1	\$ 0.1	\$ -	\$ -	\$ -	0%	0%	0%	\$ 71.1	
	Available Contingency							\$ 3.725				\$ 3.7	
	TPC:	\$ 206.6	\$ 43.0	\$ 24.7	\$ 67.7	\$ -	\$ -	\$ 3.73	0%	0%	6%	\$ 278.000	

- Just to emphasize that the **L2 managers do not hold the contingency.**
 - As Project Manager I hold all the contingency & I have to convince Pepin/Steve before using it.
- I am of course fully aware of the line by line risk analyses, but also more able to judge how many of these independent assessments are likely to occur together.
 - And able to judge how many are currently overstated, see previous slide.
- And, I am the one who can adjust priorities to accommodate risks as they occur.
 - I implement any contingency savings plan action that spans across L2 WBSs
 - E.g., a reduction in the number of blocks, like we did with block #29 after the 14 August IPR.
 - E.g., buying additional fiber based on my estimate of the waste rate in module assembly



Current list of top ten risks

- All these risks have been reduced in score
- Added one **new** risk for Project Manager's judgment

NOVA Top Ten Risk List					
List is sorted by Tolerance - Top Priority to Lowest Priority and then by Score High to Low					
Activity	Risk #	Score	Tolerance	Event	Owner
2.0.3 - NuMI Upgrades	39	0.35	Top Priority	Insufficient manpower, takes longer	Derwent, Paul
2.0 - ANU Construction	92	0.28	Middle Priority	Work can not be accomplished as planned	Derwent, Paul
2.10 - Project Management - Construction	516	0.25	Middle Priority	Allocation of Contingency across WBS items	Cooper, John
2.9.4 - Block Assembly and Installation	185	0.21	Middle Priority	Adhesive failure causes structural failure	Lukens, Patrick (Pat)
2.0.1.1.1.14 - Installation	8	0.20	Middle Priority	Installation Takes longer than expected	Derwent, Paul
2.0 - ANU Construction	99	0.20	Middle Priority	Construction takes longer than expected	Derwent, Paul
2.6.1.2 - APD Arrays	193	0.20	Middle Priority	ADP Delivery lags schedule	Mualem, Leon
2.10 - Project Management - Construction	254	0.17	Middle Priority	CD-4 Float inadequate	Carolan, Pepin
2.0.1.2.3.3.9 - RKB Magnets - HV testing in transfer gallery	75	0.11	Middle Priority	electrocution	Derwent, Paul
2.0.1.2.3.3.10 - RKB Magnets - Life testing	76	0.11	Middle Priority	electrocution	Derwent, Paul



Recall where we were

at the time of the 14Aug2012 IPR

- **14.6 M\$** of contingency remained as of June 1 financial processing.
- **10.5 – 16.7 M\$** of items were identified which could use contingency.
- **2.9 – 6.0 M\$** of items were identified which would **increase** contingency.
- Since June 1 we have processed **12.7 M\$** of Change Requests that used contingency:
 - Only one major item was not on our 14Aug list:
 - An accrual from the Univ of Minn to true up their reporting of costs, used 1.5 M\$ of contingency
 - They will stay current from now on so that we do not get a surprise like this at the project end.
 - Three other items on our 14Aug list cost more than planned.
 - Our estimates of 3.11 M\$ turned into 6.0 M\$
 - Accelerator labor in the shutdown went from 1.80 M\$ estimate to 3.89 M\$ actual + a 1.30 M\$ CR to double this labor for the rest of the shutdown
 - Minneapolis factory space rental went from 0.76 to 1.12 M\$
 - Estimated effort to build the Near Detector went from 0.55 to 0.98 M\$, adding needed details.
- Since June 1 we have processed **2.5 M\$** of Change Requests that **increased** contingency:
 - Removed the 29th Far Detector block for a savings of 1.8 M\$
 - Removed Accelerator scope (2nd target, 2nd hadron monitor) for a savings of 0.54 M\$
 - The laboratory reversed overhead increases of 0.06 M\$ for FY12



Contingency overview **2 weeks ago:**

- **3.7 M\$** of contingency remains as of Oct 1 financial processing.
 - **The future contingency use identified by the Project is now much smaller, since most of the items presented at the 14 Aug IPR have been done.**
 - One major item has been removed since the 14 Aug IPR:
 - The Laboratory now assures the Project that the estimated 1.53 M\$ of spare accelerator components will be put into Special Process Spares in FY14, reimbursing the project for these items. The Project counts on this reimbursement.
- **0.5 – 3.5 M\$** of items are now identified which could use contingency.
 - The initial FY13 Fringe and Overhead rates **then** announced by the Laboratory will cost the Project an additional 0.426 M\$ beyond our assumption of FY12 initial rates.
 - About 2.240 M\$ remains for additional PVC resin needed for 28 blocks. (**error**)
 - About 0.300 M\$ remains for sanding, about 0.34 M\$ for Near modules.
 - About 0.130 M\$ remains for sufficient spare APDs.
- **0.1 – 3.0 M\$** of items are now identified which would **increase** contingency
 - Move Accelerator as-built drawings off project to offset accelerator labor overrun in the shutdown = 0.080 M\$
 - Move Accelerator Pump Vault Nine work off-project since this is a general infrastructure item for Accelerator cooling ponds and is not NOVA specific = 0.189 M\$
 - Use all PVC modules with “visual fiber damage” (NOT broken fibers) in ONE cell. Now estimate we could have 900 such modules along with (10,752 – 900) “perfect” ones. This would amount to a 2.6 M\$ increase in contingency by cost avoidance.
- **It is conceivable that 3.7 M\$ is enough contingency.**



New actions taken to increase contingency

- **“It is conceivable that 3.7 M\$ is enough contingency.”**
- **3.7M\$ covers known risks, but not with enough certainty to satisfy all parties.**
- **New actions taken during the week of November 12, 2012:**
 - The Laboratory expects to lower the TSCS rate for NOvA in FY12 and beyond = 0.731 M\$
 - TSCS is “Technical & Scientific Common Support”, a 2.7 % tax on NOvA in FY12.
 - CFO Cindy Conger estimates NOvA will realize 1.1 M\$ from this action, but we had not entered new rates for FY13
 - See previous slide 2nd bullet.
 - THIS IS IN PROGRESS, NEEDS DOCUMENTATION & FINAL APPROVAL FROM THE FERMI SITE OFFICE.
 - We have changed the base plan to include 50% water in the last 4 of the 28 blocks
 - This turns the back of the detector into a sampling calorimeter vs. a “totally” live calorimeter (“totally” = 64%)
 - This increases contingency by 1.078 M\$ by reducing the amount of scintillator required
 - We moved 0.852 M\$ of spare electronics off-project into Special Process Spares in FY14.
 - This did not include any APDs.
 - The Laboratory has agreed to move 5 NOvA scientists in project management roles off-project in FY14 (commissioning vs. managing), = 0.387 M\$ of additional contingency.
 - We reduced scope by moving two accelerator items off-project:
 - Accelerator cooling pond work (general infrastructure), 0.224 M\$
 - Accelerator “as-built” drawings (for future operations), 0.140 M\$
 - We now include using PVC modules built at Minneapolis even if one cell shows “visible fiber damage”, & we now include using slightly out of spec PVC extrusions.
 - As stated on Slides 2 and 4, these actions bring our Extrusion and Module waste rates down to match the assumptions in our schedule.
 - This saves in additional PVC resin we still need to buy. (This purchase is not yet in the schedule)



REVISED AY\$ by Level 2 with MIE/OPC split

WBS	Items	NOVA Costs to Date (\$M) as of 30-Sep-2012	NOVA 's Cost Estimate AY \$M (for October 1, 2012 to project end)									
			Estimated Cost (with indirects)			Mgmt Reserve Estimate			Contingency %			Total Cost
			M&S	Labor ¹	Total	M&S	Labor ¹	Total	M&S	Labor ¹	Total	
2.0	Accelerator & NuMI Upgrades	\$ 36.8	\$ (0.8)	\$ 6.4	\$ 5.6	\$ -	\$ -	\$ -	0%	0%	0%	\$ 42.4
2.1	Far Detector Site and Building	\$ 6.1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 6.1
2.2	Liquid Scintillator	\$ 10.1	\$ 11.0	\$ 0.2	\$ 11.2	\$ -	\$ -	\$ -	0%	0%	0%	\$ 21.3
2.3	Wave-Length-Shifting Fiber	\$ 12.4	\$ 0.7	\$ 0.1	\$ 0.8	\$ -	\$ -	\$ -	0%	0%	0%	\$ 13.2
2.4	PVC Extrusions	\$ 20.5	\$ 9.5	\$ 0.6	\$ 10.0	\$ -	\$ -	\$ -	0%	0%	0%	\$ 30.6
2.5	PVC Modules	\$ 12.1	\$ 3.4	\$ 5.4	\$ 8.8	\$ -	\$ -	\$ -	0%	0%	0%	\$ 20.9
2.6	Electronics Production	\$ 6.1	\$ 5.0	\$ 0.8	\$ 5.8	\$ -	\$ -	\$ -	0%	0%	0%	\$ 11.8
2.7	Data Acquisition System	\$ 4.0	\$ 0.7	\$ 0.7	\$ 1.4	\$ -	\$ -	\$ -	0%	0%	0%	\$ 5.3
2.8	Near Detector Assembly	\$ 5.7	\$ 6.0	\$ 1.1	\$ 7.0	\$ -	\$ -	\$ -	0%	0%	0%	\$ 12.7
2.9	Far Detector Assembly	\$ 13.5	\$ 5.3	\$ 6.6	\$ 11.9	\$ -	\$ -	\$ -	0%	0%	0%	\$ 25.4
2.10	Project Management	\$ 7.6	\$ 0.1	\$ 2.2	\$ 2.4	\$ -	\$ -	\$ -	0%	0%	0%	\$ 10.0
Subtotal Construction		\$ 135.0	\$ 40.9	\$ 24.0	\$ 64.9	\$ -	\$ -	\$ -	0%	0%	0%	\$ 199.8
O P C	R&D - Accelerator	\$ 6.6	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 6.6
	R&D - Detector	\$ 28.1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 28.1
	Cooperative Agreement	\$ 34.9	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 34.9
	Operating - Accelerator	\$ 1.3	\$ 0.0	\$ 0.1	\$ 0.2	\$ -	\$ -	\$ -	0%	0%	0%	\$ 1.4
	Operating - Detector	\$ -	\$ -	\$ 0.2	\$ 0.2	\$ -	\$ -	\$ -	0%	0%	0%	\$ 0.2
	Total OPC:	\$ 70.9	\$ 0.0	\$ 0.3	\$ 0.3	\$ -	\$ -	\$ -	0%	0%	0%	\$ 71.2
Contingency												\$ 6.913
TPC:		\$ 205.9	\$ 40.9	\$ 24.3	\$ 65.234	\$ -	\$ -	\$ 6.913	0%	0%	10.6%	\$ 278.000

- **6.913 M\$ Contingency**
 - 10.6 % of remaining work
 - 22.3 % of remaining Obligations
(using EAC from Slide 14)



Contingency overview **TODAY:**

- **6.9 M\$** of contingency remains as of Oct 1 financial processing.
 - **The future contingency use identified by the Project is now much smaller, since most of the items presented at the 14 Aug IPR have been done.**
 - One major item has been removed since the 14 Aug IPR:
 - The Laboratory now assures the Project that the estimated 1.53 M\$ of spare accelerator components will be put into Special Process Spares in FY14, reimbursing the project for these items. The Project counts on this reimbursement.
- **3.7 M\$** of items are now identified which could use contingency.
 - We need to buy more PVC resin to complete the extruding required for 28 blocks.
 - Need 0.300 M\$ for sanding operation in Minneapolis
 - Need 0.339 M\$ to cover the Near Detector modules built in Minneapolis
- **0.1 M\$** of items are now identified which would **increase** contingency
 - Expect to use Collaboration labor to Outfit the Near Detector.
 - This includes scintillator filling and installation of cables, power supplies and electronics.
- **3.2 M\$** of other items identified that could bail us out if needed.
 - Details of this more speculative list are at the end of the talk.
- **Without any additional actions,**
we now have $6.9 - 3.7 + 0.1 = 3.3 \text{ M\$}$
available for unknown problems.
 - Another 3.2 M\$ of possible future actions are identified.

Where did the contingency go?

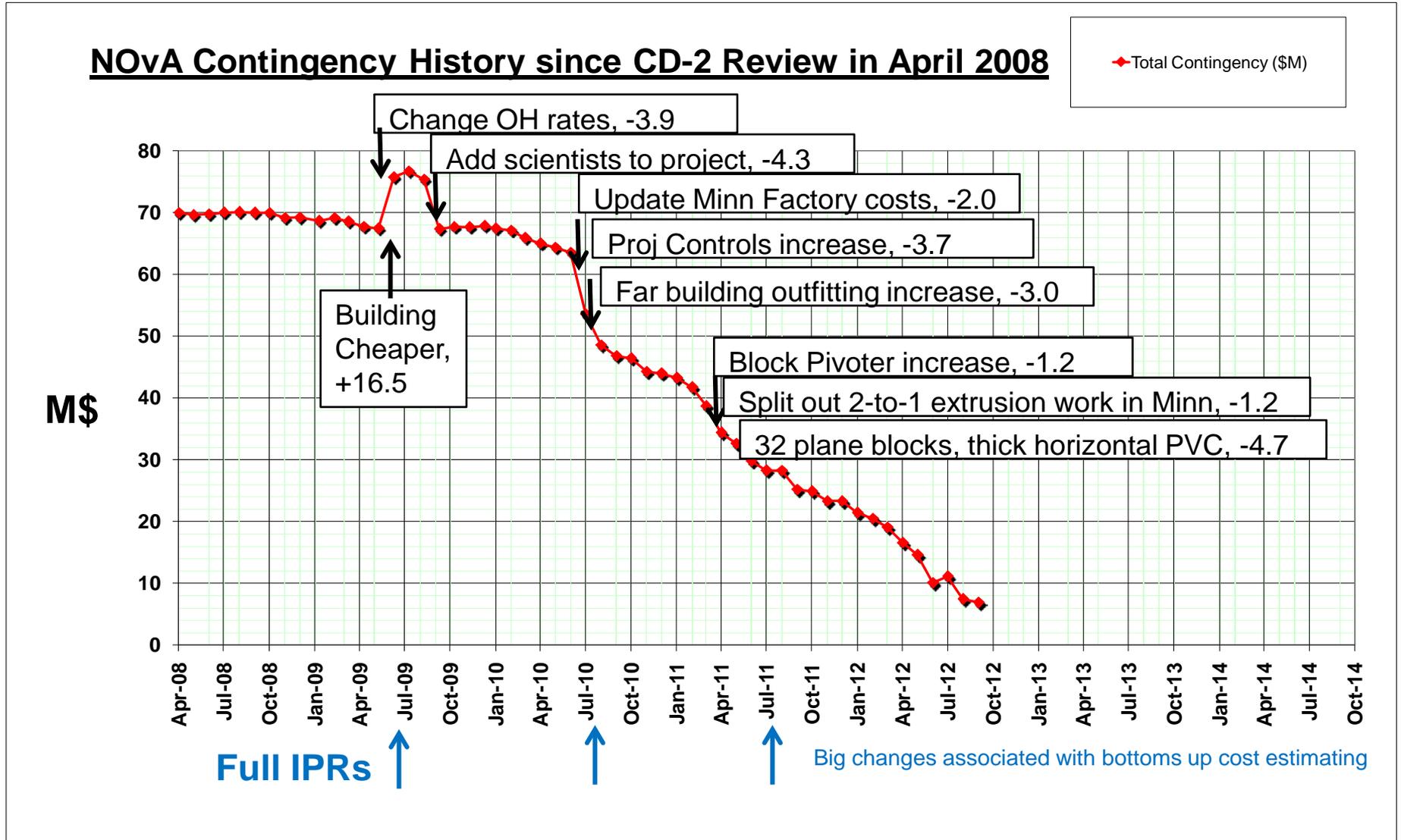
- Difference from CD-2 review in April 2008 to now.

WBS	Items	NOVA 's Cost Estimate AY\$M at CD-2 in April, 2008	NOVA 's Cost Estimate AY\$M on November 20, 2012	Delta costs AYM\$ (CD-2)-Now		Comments
		Total Cost	Total Cost	Delta Cost	% change	
2.0	Accelerator & NuMI Upgrades	\$ 30.1	\$ 42.4	(12.34)	41%	More labor, Technical problems (RF, kickers)
2.1	Far Detector Site and Building	\$ 2.3	\$ 6.1	(3.83)	167%	Building outfitting
2.2	Liquid Scintillator	\$ 18.6	\$ 21.3	(2.69)	14%	Price of lube oil, Cost of mixing facility
2.3	Wave-Length-Shifting Fiber	\$ 9.9	\$ 13.2	(3.30)	33%	\$/Yen, Additional 387 km of fiber
2.4	PVC Extrusions	\$ 25.4	\$ 30.6	(5.17)	20%	Extended production tune-up [(3.0) more coming], Thicker horizontal extrusions, Increasing TiO2 cost
2.5	PVC Modules	\$ 10.3	\$ 20.9	(10.64)	103%	Rework design for cracks, More labor
2.6	Electronics Production	\$ 11.9	\$ 11.8	0.01	0%	
2.7	Data Acquisition System	\$ 3.5	\$ 5.3	(1.79)	51%	
2.8	Near Detector Assembly	\$ 4.2	\$ 12.7	(8.47)	200%	Cavern Price, 3x3 detector scope increase
2.9	Far Detector Assembly	\$ 11.4	\$ 25.4	(13.99)	122%	Pivoter, More labor
2.10	Project Management	\$ 5.6	\$ 10.0	(4.43)	80%	Cost of scientist managers, Additions to Project Controls for EVMS
Subtotal Construction		\$ 133.2	\$ 199.8	(66.64)		
	R&D - Accelerator	\$ 9.1	\$ 6.6	2.50	-27%	Add this + to - WBS2.0 above for net
	R&D - Detector	\$ 17.0	\$ 28.1	(11.17)	66%	Prototype Near Detector & building
	Cooperative Agreement	\$ 47.0	\$ 34.9	12.15	-26%	Great Recession = cheaper building
	Operating - Accelerator	\$ 1.2	\$ 1.4	(0.22)	18%	
	Operating - Detector	\$ -	\$ 0.2	(0.19)	na	
	Total OPC:	\$ 74.3	\$ 71.2	\$ 3.1		
	Contingency	\$ 70.5	\$ 6.9	63.6		
	TPC:	\$ 278.000	\$ 278.000	-		



Contingency History

- Change Request data in backup slides





Another view of Contingency History

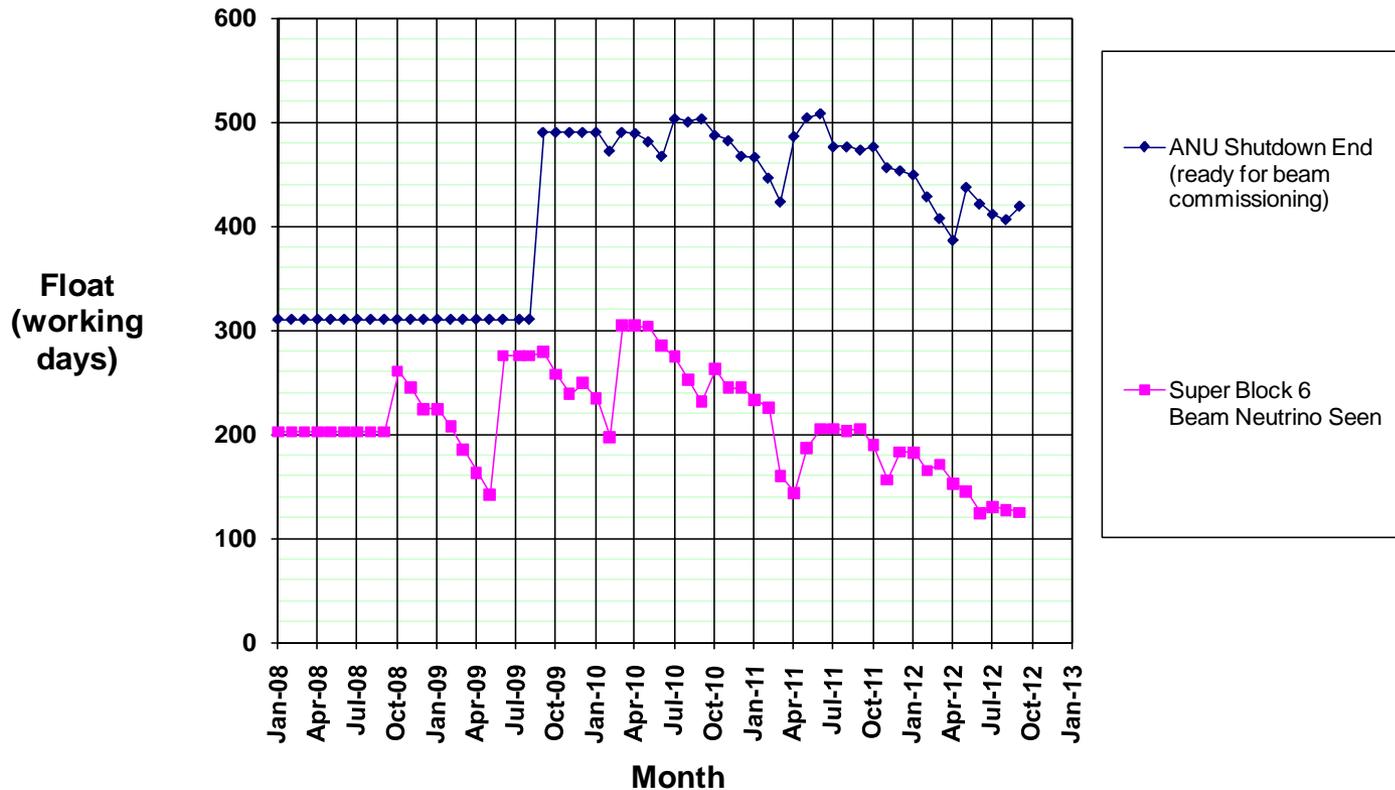
- Total use of contingency to date is 63.6 M\$
- Sum of CRs > 1M\$
 - 20 used 40.4 M\$ of contingency
 - 8 added 25.4 M\$ to contingency
 - Net use of 15.0 M\$ of contingency
- Sum of CRs > 0.5 M\$ (includes the 1 M\$ actions above)
 - 44 used 57.0 M\$ of contingency
 - 12 added 27.2 M\$ of contingency
 - Net use of 29.8 M\$ of contingency
- Sum of CRs associated with OH or rate changes
 - 6 used 4.1 M\$ of Contingency
 - 1 added Fermilab L1 & L2 scientific managers, used 4.3 M\$ of contingency
 - 1 doubled the size of Project Controls staff, used 3.7 M\$ of contingency
 - Net use of 12.1 M\$ of contingency
- Change Request data attached in backup slides



Schedule Contingency: Float to CD-4

- ANU gained 13 days of float in **September** -- Now at 419 days
 - Kicker and RF schedules are still the real drivers.
- The Detector lost 2 days of float in **September** -- Now at 125 days
 - This is driven by APD installation lagging Ash River block assembly of the 28th block by a week.

Tracking Float to CD-4





Schedule Contingency Summary

- As of **Oct revised**, we have **125** working days float to CD-4
- As of Oct 1, we have 26 months to CD-4 = 542 working days
 - CD-4 is end of November, 2014
- Schedule Contingency is **125 / (542 – 125) days = 30%**.
 - Will have to revise Ethan's slide



Summary

- Risks are reduced
 - All parts are now flowing north to Ash River
 - Waste rates = our assumptions in the schedule. This is a BIG deal.
 - 4 detector blocks are up at Ash River. Also a BIG deal.
 - The above three items would not have been believable if predicted at the August Review
 - Scintillator filling and some Outfitting tasks remain to hit production stride
 - APDs are better understood, but 1,000's at Ash River will be the test.
- Contingency is 6.9 M\$
 - 10.6% of Remaining Work
 - 22.3% remaining Obligations
 - Contingency \$ NEEDS of 3.7 M\$ identified (details next slides)
 - There is room for unknown calls on contingency
 - I believe we can complete the project within the TPC. Pinching all pennies.
- Contingency float is reasonable
 - 125 out of 542 days remaining to CD-4 or 30%
 - I believe we can finish the project on schedule



Contingency Overview Spreadsheets

3 SETS



Contingency history since 14 Aug IPR and known future needs (continued on next slide)

Identified Contingency Needs		CR in June			
		CR in July			
		CR/Accrual in August			
		CR in September			
		CR in October			
		\$M	\$M	WHEN	
		Well Understood	Additional Estimates (some unknown, some where cost is unknown)		
Whole Project	Increase of Fermilab fringe and G&A retroactive Oct-May FY12	0.369		done	
	Increase of Fermilab fringe and G&A for June - Sept FY12	0.304		done	
	An extension of these rates into FY13 would cost even more	-	-	2013	
	This is the other part of the TSCS support agreed to by the Laboratory	-		FY14	zero entered here because the Project had not yet included this rate increase.
ANU	Anticipate using all remaining contingency (2.6 M\$) during shutdown. Actual now is 3.9 M\$	-			
	CR for MLAW and Pump Vault 9 upgrades	0.339		done	
	Retroactive change in Cobra to T&M rates, correcting an error	0.439		done	
	Cost overrun in June	0.941		done	
	Cost overrun in July	0.321		done	
	Cost overrun in August	0.999		done	
	Cost overrun in September	0.307		done	
	Change request to double unstarted labor tasks (except 30-Straight and RF)	1.320		done	
	Above ANU contingency need assumes Project recovers cost from spares built on-project. Accel Div now says they cannot do this in FY13, suggest FY14. Some risk that the Project may never get reimbursed for these items. Actual # of spares will depend on performance of non-spares. The amount of reimbursement planned is 1.53 M\$. The Laboratory now assures us that the Project will be reimbursed. Still some risk that the Project may not deliver working spares.	-		FY14	
Scintillator	For transportation from Wolf Lake IN to Ash River MN. Bidder chosen, cost was 0.20 M\$ more than in Open Plan. Some are within our estimate, some are not. We are still evaluating the bids and asking the bidders questions about their proposals.	0.201		done	
Fiber	Increased cost (\$/Yen) for final part of Kuraray order	0.232	-	done	
	See PVC Modules below. May need as much as 10% additional fiber to cover training, start-up and continuing waste at Module Factory. The estimate at the 14Aug2012 IPR was 2.0 M\$.	0.201		done	



Contingency history since 14 Aug IPR and known future needs (continued from previous slide & on next slide)

Identified Contingency Needs		CR in June			
		CR in July			
		CR/Accrual in August			
		CR in September			
		CR in October			
		\$M	\$M	WHEN	
		Well Understood	Additional Estimates (some unknown, some where cost is unknown)		
PVC Extrusions	Need additional PVC resin to cover waste during final R&D in 1st 9 months of 2011.	-	1.942	Apr-13	
	Original P.O. was on Recovery Act funds and did not cover the full detector. Need additional PVC resin to complete detector, depends on detector size. This estimate is for 28 blocks	-	1.066	Aug-13	
	Need additional PVC extruding of the resin to complete detector, depends on detector size and on the waste rate in extruding and waste in Minneapolis. (the original P.O. was also on Recovery Act funds and did not cover the full detector) THIS IS ALREADY IN THE SCHEDULE, SO NOT A CONTINGENCY CALL.	-	-	done	
	Need to pay storage costs in Manitowoc, WI since the Minnesota Module Factory is full (June CR covers through Apr 2013)	0.112	0.030		now likely through July 2013
	Need additional labor for QA at extruding vendor for work now occurring in FY13	0.122		done	
PVC Modules	extension of rental on 24,000 sq ft extra Factory space in 2012 (2013)	0.033	-		2013 now very unlikely
	Rental of main 125,000 sq ft Module Factory space in April 2013- March 2014. Current final task would be in mid-March 2014, so this extension has no float. Original estimate was 0.760 M\$.	0.815		done	
	Operate Module Factory during April 2013 - March 2014. Original estimate was 0.170	0.183		done	
	Rental of Module Factory space April 2014 - Aug 2014?	-	-	Oct-13	Now very unlikely, U Minn trying to modify the lease to allow month to month after April 2014.
	Operate Module Factory during April 2014 - Aug 2014?	-	-	Oct-13	now very unlikely
	New item, ACCRUAL of Module Assembly Labor in August. One time catch-up, U Minn to keep up in the future.	1.476		done	
	New item, addition required to fund sanding operation in Minneapolis		0.300	soon	
	New item, addition required to fund building 600 Near Detector modules		0.339	Jan-13	
Electronics	Nov 2012: Success rate in final production of 25 is 96%, assume no additional APDs needed. October 2012: APD success rate for installation and cooling to -15C is currently 85%. 15% more APDs may be required, but $0.15 * 10752 = 1600$ additional APDs now that we downsized to 28 blocks. Our existing P.O. with Hamamatsu is for 12,000 APDs, so we would only need $10,752 + 1,600 - 12,000 = 352$ more @ \$372 each = 130 K\$ August 2012: APD success rate for installation and cooling to -15C is currently 88%. 12% more APDs may be required, cost would be 536 K\$.	-	-	Jan-14	depends on initial installation test and Ash River experience



Contingency history since 14 Aug IPR and known future needs (continued from previous slides)

Identified Contingency Needs		CR in June			
		CR in July			
		CR/Accrual in August			
		CR in September			
		CR in October			
		\$M	\$M	WHEN	
		Well Understood	Additional Estimates (some unknown, some where cost is unknown)		
Far Detector	Standing army charge in FY12. Work on Pivoter, practice assembly	0.623		done	
	Additional effort from ANL during assembly startup	0.169		done	
Near Detector	Add concrete floor and drip ceiling to the Excavation task	0.322	-	done	
	Add the Outfitting and Demobilization tasks to the schedule	1.602	-	done	
	Need Eng & Drafting to design Fermilab Factory & underground install. fixtures (estimate 0.50)		-	done	original estimate was 0.500, actual CRs total 0.300
	Initial engineering and design	0.066		done	
	Complete designs of assembly tooling and muon catcher	0.232		done	
	Need Fermilab technicians to build new 3x3 Near Detector (estimate 0.55)		-	done	original estimate was 0.550, actual CRs total 0.980
	Initial setup of Block Assembly facility & muon catcher steel purchase	0.290		done	
	Block Assembly	0.512		done	
	Underground Installation	0.180		done	
		Sum:	12.710	3.677	M\$
Contingency Need Range		12.710	to 16.387	M\$	RANGE at 14Aug2012 IPR 10.5 - 16.71
		June Sum:	5.013		
		July Sum:	0.793		
		August Sum:	3.185		
		September Sum:	3.518		
		October Sum:	0.201		
TOTAL SUM to date:		12.710			
UPDATED Contingency Need Range as of November 19		-	to 3.677	M\$	
As of November 19, have 6.91 M\$					



Possible Contingency Actions to limit need

(continued on next slide)

Identified possible Contingency savings		June CRs			
		July CRs			
		Aug CRs			
		Sept CRs			
		CR in October			
		\$M	\$M	WHEN?	
	Well Understood	Additional Possibilities & Estimates			
Whole Project	Ask Laboratory to freeze NOVA fringe and overhead rates in FY13 and FY14: Basis would be that no Project in the final stages can contend with varying rates, particularly if the rates are applied retroactively. Lab did lower FY12 rates in final FY12 accounting, saved NOVA 58 K\$.	(0.058)	-	done	
	Laboratory PPD buys Project's spare electronics into Special Process Spares to ensure smooth operations for 6 - 10 years. 2,500 FEBs @ \$125 each = 312.5 K\$ 1672 TECCs @ \$12 each = 20.0 K\$ 18 PDBs @ \$1,500 each = 27.0 K\$ 70 DCMs @ \$2,200 each = 154.0 K\$ 6 master TDUs @ \$2,500 each = 15 K\$ 14 slave TDUs @ \$1,000 each = 14 K\$ 10 LV Power Supplies @ 8 K\$ each = 80K\$ 4 HV mainframes @ 7K\$ each = 28 K\$ 6 HV cards at 7.3 k\$ each = 44 K\$ MINOS crane long lead time parts (300 ft rope, hoist brake, inverter)	(0.852)		done	
	Laboratory does not charge Scientists to Project in FY14	(0.387)		done	
ANU	Move 2nd target off-project (AD is buying one from RAL on Ops \$ for delivery late next Spring)	(0.222)	-	done	
	Move Hadron Monitors off-project (existing one still works, AD planning to buy one on operations)	(0.318)	-	done	
	NEW ITEM: move As-Built drawings off-project	(0.140)	-	done	
	Move Pump Vault 9 work off project	(0.224)	-	done	
Scintillator	Less scintillator if drop Block #29	(0.389)	-	done	
	We have now put in as our base assumption that FOUR blocks will have 50% water. The calculated savings is \$5.94 per gallon and this saves 200,000 gallons or \$1.18M. We hope to reverse this move if possible in the future. The reversal can come almost as late as the day we put up Block #25.	(1.078)		done	



Possible Contingency Actions to limit need (continued from previous slide)

Identified possible Contingency savings		June CRs			
		July CRs			
		Aug CRs			
		Sept CRs			
		CR in October			
		\$M	\$M	WHEN?	
		Well Understood	Additional Possibilities & Estimates		
Fiber	Buy only 5% additional fiber instead of 10%. This assumes the rate of waste will not grow from recent performance. Original estimated savings was (0.63). In fact on this line all the savings came in NOT buying more fiber in the "Contingency Needs" spreadsheet. We only paid 200K\$ more and now will watch the waste rate to see if this commodity is the driver to put water into some blocks simply because we can't put fiber in and so water will be fine.	-	-	done	
PVC Extrusions	Need additional PVC resin to complete 29 blocks, BUT 28 blocks may satisfy the 14 kt KPP. Serendipitously, a block 1/2 filled with water ADDs 24,400 kg of mass and would help us reach 14 kt with 28 blocks. 28 blocks does satisfy the KPP.	(0.462)		done	
	Need additional PVC extruding to complete 29 blocks: Now reduced to just 28	(0.404)		done	
PVC Modules	Use ~ 300 existing modules with "visual fiber damage" on a single fiber in the detector. Use any more with this defect that we build in the future (estimate ~500 more will occur). Total is 900 modules. 384 modules = one block. Put these at the back of the detector.		-	done	zero. All covered in 1st spreadsheet as an additional PVC resin cost
	Savings in module assembly from dropping the 29th block.	(0.226)		done	
Electronics	Dropped Block #29, but not technically a savings because we let the order for 12,000 stand until we know the APD installation rate. Even then, we likely will need enough of these custom devices to keep the detector going for ten years. The question: Is 12,000 enough? It does include 12% spares for 28 blocks.	-	-	?	
Far Detector	Save assembly costs if drop Block 29	(0.400)		done	
Near Detector	Re-use prototype Near Detector NO, pursuing full new Near Detector as most important to science in era of large theta13	-	-	done	
	Would still have needed design/drafting to install + installation labor Collaboration labor will be used to Outfit the Near Detector (scintillator, cables, electronics)	-	(0.102)	May-13	
	Sum:	(5.160)	(0.102)	M\$	
	Contingency Savings Range	(5.160)	(5.262)	M\$	RANGE at 14Aug2012 IPR (2.52) - (6.00)
	June Sum:	(0.318)			
	July Sum:	(1.881)			
	August Sum:	(0.222)			
	September Sum:	(2.739)			
	October Sum:				
	TOTAL SUM to date:	(5.160)			
	UPDATED future Contingency Savings Range as of Nov 6			(0.10)	M\$



Other more speculative contingency savings discussed

(most require that the laboratory have additional cash)
 (some require that collaborating Univ get additional DOE help)

Possible additional (more speculative) Contingency savings				
		\$M	\$M	WHEN?
		Well Understood \$, but not agreed to	Additional Possibilities & Estimates	
	Collaboration provides the labor to build the Near Detector modules at Minneapolis. This would offset 190K\$ by providing approximately 9,500 hours of labor. This labor would take about 10 people over a period of 5.6 months, Feb-July 2013.		(0.190)	by Feb 2013
	Collaboration provides the labor to build Ash River modules at Minneapolis Factory so we can vacate warehouse rental by April 1. 2014. Not well defined, but the idea is that collaborators could replace students in the Fall of 2013 to provide a solid core to finish Ash River modules on time. For the moment assume this is another offset of 200K\$ by providing approximately 10,000 hours of labor. This labor would take about 10 people over a period of 6 months, September 2013-March 2014.		(0.190)	by Sep 2013
	Laboratory does not charge Scientists to Project in FY13		(0.992)	?
	Laboratory buys the prototype Near Detector building from the Project. Shell cost was 841 K\$ Outfitting cost was 343 K\$ 223 K\$ of the building shell were NOVA specific. 120 K\$ of Outfitting was NOVA specific. Net is 841 K\$		(0.841)	?
	MiniBooNE / Columbia / NSF agree to give or "loan" MiniBooNE mineral oil to NOVA. We have not tested a sample but expect it would pass our specs. This is 800 tons = 1.6 M pounds = 232,000 gallons of mineral oil. NOVA pays \$4.12 per gallon today, making this worth 956 K\$ if free to NOVA.		(0.956)	?
	SUM:	0.000	(3.169)	
		Contingency Savings Range	-	(3.169) M\$



Change Requests

3 SETS

> 1 M\$ (POSITIVE & NEGATIVE)

**>0.5 M\$ (POSITIVE & NEGATIVE), WITH MORE TEXT DETAIL
CRS ABOUT OVERHEAD AND RATES**



CRs > +1 M\$, ordered by \$

CR By Dollar Amount Largest to Smallest				
CR Number	CR Title	Final Cost Impact	Final Schedule Impact	EVMS Month for this CR
320	PVC Extrusion Schedule and Budget Adjustments for 32-Plane Blocks	\$4,746,914	L2 milestone moves later by 7 months	April-11
87	Add L1 & L2 Scientists to Project Budgets	\$4,289,677	none	July-09
75	Update to FNAL OH Rates, FESS Chargeback Rates, UMN Rates	\$3,942,023	none	June-09
185	Nova Project Management Effort and Budget Adjustments for FY11-FY14	\$3,667,408	none	July-10
186	Far Detector Building Outfitting	\$3,039,976	none	July-10
416	Update Budget and Schedule for Liquid Scintillator Blending	\$2,193,570	none	October-11
219	Budget Adjustments to Near Detector Underground Outfitting and Enclosure Work	\$1,589,216	none	August-10
122	Module Factory Setup and Operation	\$1,571,856	none	November-09
221	Budget Updates to Certain Tasks Related to Far Detector Block Assembly	\$1,542,971	none	August-10
184	Budget and Schedule Adjustments for Assembly and Testing of Far Detector Modules	\$1,529,191	baseline dates moved earlier	June-10
348	Budget and Schedule Adjustments for the Pallets and Adhesive Used in Far Detector Assembly	\$1,490,189	none	June-11
145	Budget and Schedule Adjustments for WLS Fiber Production and QA Testing	\$1,456,988	none	March-10
573	ANU Labor and Schedule Adjustments	\$1,325,247	none	September-12
299	Budget Increases and Schedule Adjustments for Block Pivoter Engineering and Construction	\$1,263,688	L2 milestone for block pivoter completed	March-11
303	Split-Out Work Scope for Combining Two 16-Cell Extrusions for Far Detector Modules	\$1,241,915	none	March-11
88	Near Detector Surface Building	\$1,174,219	none	July-09
147	WBS 2.1.1.4.10.8 - Tension Rock Anchors	\$1,146,469	none	February-10
430	Detector Assembly Budget and Labor Adjustments - Various	\$1,118,244	None	November-11
175	Update to Mineral Oil Procurement, Delivery, and QC Tasks	\$1,066,347	none	May-10
518	Near Detector Cavern Excavation Task Budget and Schedule Update	\$1,046,838	none	April-12
		SUM \$40,442,947		



CRs > +1 M\$, ordered by date

CR By Process Date				
CR Number	CR Title	Final Cost Impact	Final Schedule Impact	EVMS Month for this CR
75	Update to FNAL OH Rates, FESS Chargeback Rates, UMN Rates	\$3,942,023	none	June-09
87	Add L1 & L2 Scientists to Project Budgets	\$4,289,677	none	July-09
88	Near Detector Surface Building	\$1,174,219	none	July-09
122	Module Factory Setup and Operation	\$1,571,856	none	November-09
147	WBS 2.1.1.4.10.8 - Tension Rock Anchors	\$1,146,469	none	February-10
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416	Update Budget and Schedule for Liquid Scintillator Blending	\$2,193,570	none	October-11
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518	Near Detector Cavern Excavation Task Budget and Schedule Update	\$1,046,838	none	April-12
573	ANU Labor and Schedule Adjustments	\$1,325,247	none	September-12
		\$40,442,947		



CRs > -1 M\$, ordered by date

CR By Process Date				
CR Number	CR Title	Final Cost Impact	Final Schedule Impact	EVMS Month for this CR
26	Removing Gap Clearing Kicker R&D from NOVA Project	-\$1,633,197	none	February-08
73	Far Detector Building Schedule Correlation to Contractor Plan	-\$16,488,510	MS impacts in docdb	May-09
109	Update Cobra Rates to FY10 Fermilab OH and FESS Chargeback Rates	-\$1,027,184	none	October-09
120	ANU Management Task Adjustments	-\$972,157	none	November-09
360	Labor Budget Adjustments for FY12-FY14 Project Management Activities	-\$1,702,115	none	June-11
415	Eliminate Block 30 Items in WBS 2.2 - Liquid Sciintillator	-\$1,450,642	none	October-11
441	Revise Labor Budgets for Module Assembly Tasks	-\$1,095,900	none	November-11
451	UMNTC FD Assembly Crew rate update	-\$981,177	none	December-11
		-\$25,350,882		



CRs > +0.5 M\$, ordered by date

CR By Process Date					
CR Number	CR Title	CR Description	Final Cost Impact	Final Schedule Impact	EVMS Month for this CR
62	HU Engineering Labor Subsidy Change	Due to change in how DOE OHEP is structured the Laboratory of Particle Physics and Cosmology (LPPC) at Harvard is no longer able to subsidize engineering and technician labor. Therefore the labor rates for all future tasks need to be doubled. The subsidy was previously accounted for by reporting a labor rate of 1/2 the actual rate. The total change over all control accounts and life of the project is roughly estimated at \$563,228. This change does not affect the schedule, only the cost for these resources. It affects control accounts 1.6,1.8, 2.6,2.9,and 2.10. The details of all the future tasks with HU labor are in the supporting docdb document.	\$597,634	none	February-09
75	Update to FNAL OH Rates, FESS Chargeback Rates, UMN Rates	The NOvA project overhead rates at the time of the baseline were the rates for FY07. We have not done annual change requests to incorporate changes to the SWF burdens (VAC, OPTO & fringe), the overhead rates (CSS, program support & G&A) or the FESS chargebacks rate. The rates for FY09 are significantly different from the FY07 rates (adjusting to FY09\$). In order to more effectively manage the project, we want to update the baseline to incorporate the published FY09 rates provided by the CFO.	\$3,942,023	none	June-09
84	Minnesota Sales Tax	The original procurement documents required the construction cost to be tax-exempt. The subcontractor proposal assumed tax-exempt status. The University of Minnesota position, verified by DOE, is that construction work is not tax-exempt. This change includes the estimated additional costs for the Minnesota tax.	\$895,116	none	July-09
87	Add L1 & L2 Scientists to Project Budgets	At the direction of the Fermilab Directorate, Fermilab scientists at L1 and L2 must be costed to the project starting in FY10 until project completion. This affects the project manager, deputy project manager, associate project manager, and L2 for 1.0, 2.0, 1.8, 2.8, 2.9, 2.10. This is actually 4 real people in the NOvA project.	\$4,289,677	none	July-09
88	Near Detector Surface Building	This change removes the construction of the IPND Enclosure in the MINOS Service Building from WBS 1.8.5.6 and instead designs/procures/constructs a Near Detector Surface Building south of the MINOS Service Building to house the entire NOvA Near Detector under WBS 1.1.5.	\$1,174,219	none	July-09
105	Increase Scintillator Brightness	This changes uses available contingency to reduce newly acquired risks of 1) wider range of PVC reflectivity than expected in latest batch 2) loss of scintillator brightness in the 4500 gallon mix in Fall 2008 for unknown reasons 3) experience from MINOS that fresh fiber is better than older fiber. This change is expected to result in 12% more light. Purchase by December 15, 2009, should allow the purchase of the expensive waveshifter portion at the same cost quoted by the vendor for the rest of the waveshifters.	\$717,930	none	September-09
118	Match WLS Fiber Delivery Plan and Budget to Vendor Contract-initial production (deliveries 1 thru 3)	This change aligns the baseline schedule and budget for the WLS fiber "initial production" task to the vendor's contract (WBS 2.3.2.1.1, deliveries 1 through 3). It also adjusts and aligns the schedule and budget for the associated fiber quality assurance task (2.3.2.12.1) at MSU to match that expected delivery schedule. This change incorporates into the baseline a previous EAC change [EAC003] made in Jun09. M&S contingency also was adjusted from 28% to 20% at that time.	\$532,195	None	October-09



CRs > +0.5 M\$, ordered by date

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CR By Process Date					
CR Number	CR Title	CR Description	Final Cost Impact	Final Schedule Impact	EVMS Month for this CR
122	Module Factory Setup and Operation	This change essentially doubles the module warehouse space to include storage for both extrusions and finished modules. This decouples the module production from the detailed delivery schedule of the extrusions and the installation at Ash River, and removes the potential need for storage at the extrusion producer and at the far detector site.	\$1,571,856	none	November-09
133	Decouple Module Production from Far Detector Installation	This change implements parts of EAC006 for advancing the module production plan, in order to compress the schedule and decouple it from far detector installation. This has the effect of reducing risk, but will increase the baseline cost.	\$999,244	none	January-10
147	WBS 2.1.1.4.10.8 - Tension Rock Anchors	This change order will provide for tensioned rock anchors for the Far Detector Building site in Ash River, Minnesota.	\$1,146,469	none	February-10
145	Budget and Schedule Adjustments for WLS Fiber Production and QA Testing	The budget for the remaining WLS fiber production tasks (beginning with the exercising of Option A under the contract with the vendor) requires an adjustment due to changes in the base cost per meter of the fiber that has arisen from yen-to-dollar exchange rate fluctuations. In addition, the existing FY-year-long fiber production tasks will be replaced with individual monthly delivery tasks sequenced to match the expected delivery schedule and quantities from the vendor. This should simplify the EV accounting as the project moves forward. The associated FY-based fiber quality assurance tasks to be done at MSU will also be replaced with separate month-long QA tasks associated with each monthly delivery of fiber from the vendor.	\$1,456,988	none	March-10
161	WBS 2.1.1.4.10.9 - Change Order #004	This change order from University of Minnesota to Adolphson and Peterson includes sanitary line elevation changes (COR-004), communication manhole and duct bank (COR-005), Foundation changes (COR-006), Road signs (COR-007), Phase 2 Issued for Construction (COR-008), Bulletin 1 (COR-009), Rock dowel retest (COR-010), steel stair changes (COR-013) and Bulletin #2 (COR-016)	\$672,800	none	April-10
175	Update to Mineral Oil Procurement, Delivery, and QC Tasks	Future mineral oil production and delivery (to a toll blender and/or an oil storage facility) for subsequent blending of the far detector scintillator in FY11-FY13 has now been contracted for a fixed-price (plus some potential indexed price adjustments). This allows for a better-defined baseline mineral oil budget (cost per gallon of \$3.92 (AYS) now assumed, including base cost of oil plus delivery from refinery), and a substantially reduced M&S contingency on the mineral oil production tasks (157% --> 30%). A residual delivery budget of \$0.15 per gallon (AYS) + 30% contingency is retained to account for the possibility of additional mineral oil transport costs in the greater Chicagoland area, should that prove necessary.	\$1,066,347	none	May-10



CRs > +0.5 M\$, ordered by date

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CR By Process Date					
CR Number	CR Title	CR Description	Final Cost Impact	Final Schedule Impact	EVMS Month for this CR
184	Budget and Schedule Adjustments for Assembly and Testing of Far Detector Modules	Schedule and budgets updated to reflect the experience in building the near detector modules. Approximately 1 hr/module labor increase is a result of the module painting, which was not part of the 2007 BOE because it was included in the block assembly costs at the far detector laboratory. Other additional labor is primarily due to an increased number of QA/QC operations. The costs and quantities of the adhesives have been updated to reflect the experience with the production of the near detector, resulting in an M&S cost increase.	\$1,529,191	baseline dates moved earlier	June-10
192	Schedule and Budget adjustments for far detector module shipping tasks	Budget and baseline schedule adjustments are requested for the tasks that involve the shipping of detector modules from the module factory in Minnesota to the Far Detector site at Ash River.	\$512,949	baseline module shipping dates move earlier	June-10
185	Nova Project Management Effort and Budget Adjustments for FY11-FY14	he current Project Office scheduling staff has been increased from the original BOE estimate of 1.35 in FY11 to 2.0 FTE until the end of the project. This reflects actual history in FY10 with all the bells and whistles required for FRA EVMS.	\$3,667,408	none	July-10
186	Far Detector Building Outfitting	This change request removes portions of the Far Detector Building outfitting work from the existing WBS 2.9 and creates a new series of tasks to design, procure and construct work associated with outfitting the Far Detector Building in preparation for the detector assembly.	\$3,039,976	none	July-10
219	Budget Adjustments to Near Detector Underground Outfitting and Enclosure Work	New estimates of the cost for design work associated with the tunnel outfitting for the Near Detector and for excavation of the Near Detector cavern indicate the need for increased budgets for this work.	\$1,589,216	none	August-10
221	Budget Updates to Certain Tasks Related to Far Detector Block Assembly	Revisions to the labor and M&S budget are proposed for selected tasks under control account 2.9.4 -- Block Assembly and Installation - Far Detector Assembly.	\$1,542,971	none	August-10
249	Replan and Add Scope/Budget for Several Detector Assembly-Related	Additional scope and budget are required for several tasks related to detector assembly. In addition, some budget must be shifted from R&D	\$637,827	none	November-10
260	Budget Increases and Schedule Adjustments for Work Shifted from the Cooperative Agreement To Nova Construction	This change request is made because of a management decision to move a portion of the scope of work and budget from the University of Minnesota/DOE Cooperative Agreement onto the Nova Construction Project and thereby allocate NOVA MIE funds to pay for the work. This work includes tasks covering Far Detector Site electricity payments, forklift rental costs, safety equipment procurements, miscellaneous support facilities and equipment, safety officer salary, and additional personnel training, housing, and travel costs.	\$537,078	none	December-10
299	Budget Increases and Schedule Adjustments for Block Pivoter Engineering and Construction	This change request proposes: 1) increases to the future labor budget for block pivoter engineering, sub-assembly preparation, and testing and commissioning, based on actual efforts required to date. Three new tasks will be added to cover this additional effort. (A 50% labor contingency will be assigned to these new tasks as well.)2) increases to the M&S budget for procurement of the table top sub-assembly for the block pivoter. 3) baseline date adjustments to certain related pivoter tasks to align them with the current forecast.	\$1,263,688	L2 milestone for block pivoter completed	March-11



CRs > +0.5 M\$, ordered by date

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CR By Process Date					
CR Number	CR Title	CR Description	Final Cost Impact	Final Schedule Impact	EVMS Month for this CR
303	Split-Out Work Scope for Combining Two 16-Cell Extrusions for Far Detector Modules	The operation of joining two 16-cell extrusions to form a single 32-cell object will be split out into a new set of tasks (with associated budget) because this work will be done asynchronously with the rest of the module assembly. Since the joining process is synchronous with the receipt of extrusions from Extrutech, the extrusion receiving labor at the module factory will also be included in the "2-to-1" scope of work. This change has no impact on schedule except to add flexibility.	\$1,241,915	none	March-11
302	Assemble and Test Far Detector Modules - Budget and Schedule Adjustments	This request addresses changes of budget and schedule to conform with a revised module assembly plan. The revised plan implements lessons-learned from assembling the NDOS and accommodates the latest schedule for extrusion and parts deliveries. It also corrects a mistake in the previous labor budget for the module assembly which inadvertently left out the 75% efficiency factor to account for movements not in the time and motion studies. The other major change is to remove the budget for the operation of gluing and QA-ing two 16-cell extrusions together (2-to-1 operations) and transfer it to its own asynchronous new set of tasks. That will be processed separately as CR303.	\$730,219	L2 and L3 milestones move later	March-11
319	Rearrange RKB/RKD Kicker Magnet Work Breakdown Structure and Adjust Budget and Schedule	1) Adjust task ID/WBS arrangement and task descriptions to match magnet assembly type (RKB, RKD) rather than location. This will simplify effort reporting and tracking of work associated with these magnets. Rename associated Chargeable Task Codes 2.0.1.2.3 and 2.0.1.2.5, 2) Revise selected task durations and relationships to better reflect the current plan for the work. 3) Adjust Labor and M&S budget to reflect the greater number of magnets and who will do which tasks. 4) Reduce M&S and labor contingencies for several tasks, reflecting improved knowledge of the base costs involved.	\$532,302	one L3 milestone is slightly affected	April-11
320	PVC Extrusion Schedule and Budget Adjustments for 32-Plane Blocks	Schedule and budget adjustments to the PVC extrusion plan are necessary to accommodate 32-plane detector blocks made entirely of thick-walled extrusions, rather than 31-plane blocks composed of alternating layers of thick- and thin-walled extrusions.	\$4,746,914	L2 milestone moves later by 7 months	April-11
3201	Addendum to CR320 - Further Adjustments of Resin Budget (CR320A)	After further discussion with the Project Manager and a look at the BOE assumptions document, it was decided that the PVC resin budget for Far Detector extrusions should be decreased somewhat relative to that recently proposed by the CAM and processed in CR320. The reduction is from \$226,000 (FY10S) to \$216,000 (FY10S) per half-block's worth of resin, applied to the resin activities which are not yet in progress and whose baseline dates are still in the future. (Basically half of blocks 5 and 6 and all blocks beyond.)	\$515,205	none	April-11
348	Budget and Schedule Adjustments for the Pallets and Adhesive Used in Far Detector Assembly	Budget and schedule adjustments are required following completion of the bidding process for fabrication and receipt of block pallets and for procurement of the adhesive to be used in assembly of the Far Detector.	\$1,490,189	none	June-11
357	Budget and Schedule Adjustments to Ash River Detector Outfitting Activities	Update for the labor, M&S for the Ash River Detector outfitting based on the near detector experience.	\$704,417	none	June-11



CRs > +0.5 M\$, ordered by date

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CR By Process Date					
CR Number	CR Title	CR Description	Final Cost Impact	Final Schedule Impact	EVMS Month for this CR
358	Budget and Schedule Adjustments for Far Detector Checkout and Commissioning	Change request taking into account experience learned from installation and operation of the near detector on the surface. Changes include: Addition of explicit APD installation tasks with additional labor budget, based on experience with NDOS, Modify links to other assembly, filling and outfitting tasks to take account of the new, explicit APD installation tasks.	\$537,738	none	June-11
407	Add Budget for Supplemental Maintenance at Extrusion Vendor - Sep-Dec 2011	Additional budget will be added on two new tasks to cover payments to the extruding vendor for costs due to one or more of the following causes: (1) Making extrusions that do not meet NOVA specifications due to poor N-27 resin, which is not the fault of the extrusion vendor (2) Stopping production at the request of the L2 PVC manager for short periods of time (3) Replacement of or additions to the NOVA die and tooling hardware to maintain or improve performance (4) Occasional maintenance tuning of the production line.	\$531,574	none	September-11
416	Update Budget and Schedule for Liquid Scintillator Blending	1) The budget and schedule for the Scintillator Blending tasks under WBS 2.2.4 require updating to match the vendor's contracted pricing (\$0.67 per gal.) and plan. Since fixed unit prices are now available from the vendor, the assigned contingency associated with the blending tasks can be reduced (from 25% to 10%), where 10% is retained to cover the risk associated with the possible production of up to ~3 bad batches/blocks worth of blended Scintillator that would then require replacement. 2) Date updates to blending tasks for blocks 3-29 will be required since they are ultimately driven by the schedule for block assembly and installation. That's because Scintillator must be removed from the blend and storage tanks and sent to the far site before additional blends can be made, once the Scintillator storage tanks are initially filled. 3) Dates for the associated QC tasks for blended fluor concentrate and Scintillator will be updated. No changes to QC task resources will be made at this time, pending further evaluation. 4) A new task and budget will be added to cover infrastructure improvements by the blending vendor that is needed before production blending can	\$2,193,570	none	October-11
422	FY12 updates to OH rates, including the addition of the new TSCS indirect burden	CR422 - update the FNAL burden rates to the published FY12 provisional rates, including the addition of the new TSCS indirect burden. The estimated impact to BAC is an INCREASE in the amount of \$523,723	\$523,723	none	October-11
430	Detector Assembly Budget and Labor Adjustments - Various	Additional items and budget are needed to outfit the Ash River building. Additional assembly equipment, spare parts, and assembly support activities are required.	\$1,118,244	None	November-11
480	Revise Budget for Near Detector Underground Hall Site Prep and Infrastructure	1) Budget and schedule for infrastructure/site preparation work associated with the near detector underground hall and tunnel will be adjusted to match that part of the bid info from the tunnel contractor's proposal. One new task for site preparation and utilities will be added under CTC 2.8.1-Near Detector Site Preparation to contain this budget. (approx BAC increase \$1,200k A YS) 2) Seven previously existing tasks related to part of this scope of work will be rendered obsolete and their budgets will be zeroed out. (approx BAC reduction from those tasks, \$364k A YS) 3) Three associated level 5 milestones will also be made obsolete. One L5 milestone (2.8.1.3.17- Near detector infrastructure contract completed) will be retained, with its date updated from 19Jun13 -> 26Jun12.	\$834,204	none	February-12



CRs > +0.5 M\$, ordered by date

- continued

CR By Process Date					
CR Number	CR Title	CR Description	Final Cost Impact	Final Schedule Impact	EVMS Month for this CR
487	ANU Labor and Schedule Adjustments	1) After discussion with project manager, will adjust labor in selected future ANU tasks upward by ~10 to 15%. As labor estimates have been running low by ~10%, this adjustment is to better match future anticipated costs. 2) In conjunction with increase, we are decreasing the assigned contingency for the same tasks. 3) Some tasks whose forecast early dates have moved later due to the progress of predecessors will also have their baseline dates updated to their current early dates. Note that a replan of the schedule for various shutdown tasks is expected to follow in the near future which may further adjust some of these dates. 4) The following L5 milestones are affected: 2.0.1.2.8.2 - RR Extraction MI Injection Line Kicker Checkout/Test Complete, 10-Dec-12 --> 28-Jan-13 2.0.1.2.8.3 - RR Beam Abort Kicker Checkout/Test Complete, 28-Aug-12 --> 28-Sep-12 2.0.1.2.8.4 - RR Injection & Gap Clearing Magnets & Fluorinert Piping in Tunnel Checkout/Test Complete, 29-Oct-12 --> 19-Nov-12 2.0.2.2.5.5 - MI LCW System Mods Complete, 3-Jul-12 --> 17-Jul-12 2.0.3.1.5.1 - NuMI Charging PS Upgrades Testing Complete, 18-Oct-12 --> 28-Nov-12 2.0.3.2.4.8 - Replacement Hadron Monitor Delivered, 17-	\$784,835	Forecast end of shutdown from 01Feb13 to 18Mar13	February-12
507	Add Budget and Task for Near Detector Hall Construction Mobilization	Add new task and M&S budget under WBS 2.8.1.3 for Near Detector Hall construction mobilization by the contractor. Contractor proposed amount for this item is \$764,000 FY12S. First \$500k of M&S on this task is assumed to have the FNAL indirects for the ND Hall construction contract applied to it.	\$854,158	none	April-12
518	Near Detector Cavem Excavation Task Budget and Schedule Update	1) Update to the budget and schedule for task 2.8.1.4.5 - Perform cavern excavation to align it with the contractor's bid price and plan for this segment of the work. Scope of this task to include instrumentation (\$106k), initial rock support (\$55.3k), tie rods (\$73.8k), rock excavation (\$3264k), rock bolt installation (\$239.8k), and shotcrete (\$200k). FFP contract so M&S cont 25% --> 0%, pending experience with the contractor during the mobilization and site prep segments of the work. 2) Update to dates and duration for task 2.8.1.4.6 - Oversite of excavation work 3) add two new excavation endgame activities as placeholders to eventually contain budgets as shown 2.8.1.4.8 - Concrete floor (\$86k) 2.8.1.4.9 - Drip ceiling (\$236.3k) Adding budget to these two tasks will be deferred pending progress and actual costs realized on the excavation..	\$1,046,838	none	April-12
526	Budget and Schedule Adjustments for Selected Far Detector Assembly Tasks under WBS 2.9	Budget and schedule adjustments are required for several existing tasks under WBS 2.9 - Far Detector Assembly, along with the addition of several new tasks to cover the required work.	\$743,167	none	May-12
533	FY12 FNAL Burden rate change published June-2012	FY12 FNAL Burden rate change published June-2012. This CR incorporates the FNAL mid-year burden rate adjustments (OPTO, Fringe and Overheads) for FY12 into the NOVA project PMB baseline.	\$671,442	none	June-12
558	Budget and Schedule Updates for Selected Module Fabrication and Shipping Tasks	Changes to the budget for tasks related to the fabrication and shipment of modules. This re-planning will result in a remaining schedule and budget that better conforms to past factory experience in meeting new constraints of QA and shipping delays. These changes reflect the effort to produce modules that includes receiving and QA for modules and parts, gluing and QC for attaching two extrusions together, final assembly and testing of modules at the factory, and shipping modules to Ash River.	\$804,602	none	July-12



CRs > +0.5 M\$, ordered by date

- end

CR By Process Date					
CR Number	CR Title	CR Description	Final Cost Impact	Final Schedule Impact	EVMS Month for this CR
570	Add Budget and Tasks to Lease and Operate Module Factory Space for One Additional Year (Apr13-Mar14)	Budget is required to cover the leasing and operating costs (i.e. building utilities, phone, security, waste disposal etc.) of the University of Minnesota module factory space for one additional year, referred to as "Year 4" and spanning the 12-month period from April 2013 through March 2014. Costs are well established from prior years so the M&S contingency percentage assigned to the new tasks will be 0%.	\$999,088	none	August-12
572	Add Tasks and Budget for Underground Near Detector Assembly and Installation	This change request includes: 1) Three new WBS L4 sections under CA/CTC 2.8.7/2.8.7-Underground Near Detector Assembly. They are: 2.8.7.2 - Block Assembly Tooling (5 new tasks/WPs) 2.8.7.3 - Block Assembly Preparation (10 new tasks/WPs) 2.8.7.4 - Block Assembly Production (52 new tasks/WPs)	\$692,094	Completion date of near detector underground	August-12
573	ANU Labor and Schedule Adjustments	1) After discussion with project manager, we propose to adjust budgeted labor in selected future ANU tasks upward by a factor of two. This adjustment is to better match future anticipated costs. 2) In conjunction with the increase, we will decrease the assigned labor contingency for the same tasks to 0% 3) Some future tasks whose forecast early dates have moved later due to the progress of predecessors will also have their baseline dates re-planned to their current early dates	\$1,325,247	none	September-12
total			\$57,004,488		



CRs > -0.5 M\$, ordered by size

CR By Dollar Amount Largest to Smallest					
CR Number	CR Title	CR Description	Final Cost Impact	Final Schedule Impact	EVMS Month for this CR
187	Update to PVC Resin Budget and Schedule for Far Detector Extrusion Production	A contract is now in place for the PVC resin to be used in the fabrication of the far detector extrusions at a unit cost of \$1.00 per pound (FY10\$). The budget will be adjusted to reflect the contracted amount, which is slightly less (in FY07\$) than the currently budgeted unit cost. Baseline dates and some durations for the resin tasks will also be adjusted to match the current forecast. Reduce M&S contingency from 30% to 15% as well.	(\$553,957.22)	resin tasks move earlier	July-10
123	Revisions to Extrusion Production Tasks to Match Extrusion Contract	This change revises the budget on each extrusion production task to match the contract unit price. At baseline, the price was estimated at \$0.92/lb in FY07\$. The contract has been written at ~\$0.97/lb in A Y\$. The unneeded budget will be returned to available contingency.	(\$585,786.00)	advances schedule relative to baseline	December-09
417	Cooling Manifold Obsolescence	Lower than planned cooling power enables a serial cooling scheme that eliminates the need for these cooling manifold procurement and shipping tasks. The heat sink hoses will be used directly instead. Therefore the budgets on tasks 2.6.3.5.1.1.1 through 2.6.3.5.1.1.30 (Procure manifolds) and 2.6.3.5.1.2.1 through 2.6.3.5.1.2.30 (Ship manifolds) can be set to zero and the tasks rendered obsolete. Their durations will be set to 1d and their M&S contingencies reduced from 33% to 0%. Their relationships to block assembly tasks will be removed.	(\$735,732.62)	none	October-11
331	APD Quote Update 2011	Received a quote for Hamamatsu APDs of \$372(A Y\$) per item in US dollars, firm-fixed-price for coated APDs. This will allow the reduction of the APD unit cost assumed in the budget (was at \$425(FY07)/pc) and also a reduction in the contingency. This is because we now have a quote rather than just a target price, and the price is now in dollars, not Yen, so possible currency fluctuations are not an issue.	(\$779,082.33)	L2 Milestone date shifted by ~3weeks	May-11
556	Eliminate Block 29 Items Under WBS 2.4 - PVC Extrusions	For budgetary reasons, the Nova Project Manager has decided to eliminate Block 29 from the Far Detector scope. This CR zeroes the budget for tasks related to Block 29 extrusion production and shipping under WBS 2.4. Eight tasks under CA/CTC 2.4.3 - "Extrusion Production" are affected and will be rendered obsolete.	(\$866,372.43)	none	July-12
120	ANU Management Task Adjustments	This change reduces the labor for ANU management and administration, based on FY09 actual costs for FY11, FY12, and FY13. Because the actual FY09 effort was only 63% of that budgeted, the ANU management was overly-conservative in its original estimate, and it is reasonable to reduce costs in the future to 75% of that currently budgeted. This reduction includes a correction to bring the ANU "annual FTE" definition into line with NOVA detector management (ANU FTE= 2080 hrs, detector FTE=1768).	(\$972,157.46)	none	November-09
451	UMNTCFD Assembly Crew rate update	A rate analysis revealed that LUMNTCFD rates in Cobra are out of sync with the actual rates at UM, which is most likely due to Cobra rates not reflecting periodic wage freezes, etc at UM over the last several years. This change request will update the Cobra rates to agree with the UMNTC rates for the LUMNTCFD resources that are used primarily for the FD Assembly activities. The net affect of this change in Cobra is a DECREASE in BAC of approximately \$981,177.43. There is no effect or processing required on the Open Plan side.	(\$981,177.43)	none	December-11



CRs > -0.5 M\$, ordered by size

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CR By Dollar Amount Largest to Smallest

CR Number	CR Title	CR Description	Final Cost Impact	Final Schedule Impact	EVMS Month for this CR
109	Update Cobra Rates to FY10 Fermilab OH and FESS Chargeback Rates	Update Fermilab burden rates and FESS chargeback rates for FY10. updating these rates results in a cost savings estimated at \$1.027M.	(\$1,027,183.62)	none	October-09
441	Revise Labor Budgets for Module Assembly Tasks	Revision of factory module production plan incorporating time and motion studies for factory procedures using revised machinery, production rate, and additional QA steps.	(\$1,095,899.91)	none	November-11
415	Eliminate Block 30 Items in WBS 2.2 - Liquid Sciintillator	Per the direction of John Cooper, budget and quantity reductions will be processed for mineral oil, pseudocumene, scintillator blending, QC, and shipping tasks to reflect the elimination of Block 30 from the resource-loaded schedule.	(\$1,450,641.78)	None	October-11
360	Labor Budget Adjustments for FY12-FY14 Project Management Activities	Labor budgets associated with project management activities in FY12-FY14 will be adjusted to better reflect past experience and expected future requirements. Adjustments will be made to the budgeted hours for the following labor resources under WBS 2.10:	(\$1,702,114.69)	none	June-11
73	Far Detector Building Schedule Correlation to Contractor Plan	This CR addresses changes to the schedule and PMB BAC in response to the far detector building contractor's proposed construction plan and budget. The new building schedule is substantially earlier relative to the original baseline. Substantial completion is now expected in Sep 2010 and subproject complete in Nov 2010. The budget is significantly lower and the bottoms-up contingency percentages are lower, typically now 5%, due to the fact that a contracted price is known.	(\$16,488,510.23)	MS impacts in docdb	May-09
	total		-\$27,238,616		



CRs about OH and Rates, by date

CR's associated with FNAL OH Rate Change by CR Process Date					
CR Number	CR Title	CR Description	Final Cost Impact	Final Schedule Impact	EVMS Month for this CR
75	Update to FNAL OH Rates, FESS Chargeback Rates, UMN Rates	The NOvA project overhead rates at the time of the baseline were the rates for FY07. We have not done annual change requests to incorporate changes to the SWF burdens (VAC, OPTO & fringe), the overhead rates (CSS, program support & G&A) or the FESS chargebacks rate. The rates for FY09 are significantly different from the FY07 rates (adjusting to FY09\$). In order to more effectively manage the project, we want to update the baseline to incorporate the published FY09 rates provided by the CFO.	\$3,942,023	none	June-09
109	Update Cobra Rates to FY10 Fermilab OH and FESS Chargeback Rates	Update Fermilab burden rates and FESS chargeback rates for FY10. updating these rates results in a cost savings estimated at \$1.027M.	-\$1,027,184	none	Oct-09
234	NOvA FY11 rate update	Update to the FNAL chargebacks rates, direct burden rates and indirect rates based on the FY11 provisional rates published by the Fermilab accounting Department	\$95,648	none	October-10
266	Two Year Wage Freeze for Fermilab and Argonne National Lab and Revised FY11 FNAL Burden Rates	DOE has mandated a two year wage freeze. Since Oct 1, 2010 raises were already approved and implemented, we have defined the freeze for the project purposes as FY12 & FY13. All FNAL and ANL labor resources (except FNAL T&M labor) will receive no incremental escalation on 10/1/2011 (FY12) and 10/1/2012 (FY13). FNAL and ANL Labor escalation will resume on 10/1/2013.	-\$449,874	none	January-11
422	FY12 updates to OH rates, including the addition of the new TSCS indirect burden	CR422 - update the FNAL burden rates to the published FY12 provisional rates, including the addition of the new TSCS indirect burden. The estimated impact to BAC is an INCREASE in the amount of \$523,723	\$523,723	none	October-11
533	FY12 FNAL Burden rate change published June-2012	FY12 FNAL Burden rate change published June-2012. This CR incorporates the FNAL mid-year burden rate adjustments (OPTO, Fringe and Overheads) for FY12 into the NOvA project PMB baseline.	\$671,442	none	June-12
No CR Yet for FY13/14	NOvA FY13/14 rate update		\$426,000	Unknown	Unknown
Sum:			\$4,181,779		