



Cost & Schedule Status Risks & Mitigations

John Cooper
Project Manager



As of June 1, 2012, we had

WBS	Items	NOVA Costs to Date (\$M) as of 31-May-2012	NOVA 's Cost Estimate AY \$M (for June 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	\$ 28.1	\$ 1.5	\$ 9.0	\$ 10.5	\$ 0.9	\$ 1.7	\$ 2.6	60%	19%	25%	\$ 41.2
2.1	Far Detector Site and Building	\$ 6.0	\$ 0.0	\$ 0.0	\$ 0.0	\$ -	\$ -	\$ -	0%	0%	0%	\$ 6.0
2.2	Liquid Scintillator	\$ 9.3	\$ 12.9	\$ 0.2	\$ 13.2	\$ 3.1	\$ 0.1	\$ 3.2	24%	42%	24%	\$ 25.7
2.3	Wave-Length-Shifting Fiber	\$ 11.2	\$ 1.6	\$ 0.1	\$ 1.8	\$ 0.1	\$ 0.0	\$ 0.1	5%	10%	6%	\$ 13.1
2.4	PVC Extrusions	\$ 17.1	\$ 13.1	\$ 0.5	\$ 13.7	\$ 0.8	\$ 0.1	\$ 0.9	6%	20%	6%	\$ 31.7
2.5	PVC Modules	\$ 9.0	\$ 3.4	\$ 6.1	\$ 9.6	\$ 0.3	\$ 0.9	\$ 1.2	8%	15%	12%	\$ 19.7
2.6	Electronics Production	\$ 5.1	\$ 5.8	\$ 1.0	\$ 6.8	\$ 0.4	\$ 0.3	\$ 0.7	7%	29%	10%	\$ 12.6
2.7	Data Acquisition System	\$ 3.5	\$ 0.9	\$ 0.9	\$ 1.8	\$ 0.2	\$ 0.3	\$ 0.4	22%	27%	25%	\$ 5.7
2.8	Near Detector Assembly	\$ 2.6	\$ 6.8	\$ 0.4	\$ 7.3	\$ 0.0	\$ 0.1	\$ 0.2	0%	34%	3%	\$ 10.1
2.9	Far Detector Assembly	\$ 10.7	\$ 6.4	\$ 7.9	\$ 14.3	\$ 1.2	\$ 3.8	\$ 5.0	19%	48%	35%	\$ 30.1
2.10	Project Management	\$ 6.9	\$ 0.1	\$ 3.5	\$ 3.6	\$ 0.0	\$ -	\$ 0.0	24%	0%	1%	\$ 10.6
	Subtotal Construction	\$ 109.6	\$ 52.7	\$ 29.8	\$ 82.5	\$ 7.0	\$ 7.3	\$ 14.3	13%	24%	17%	\$ 206.4
OPC	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	\$ 0.7	\$ 0.0	\$ 1.0	\$ 1.0	\$ 0.0	\$ 0.2	\$ 0.2	42%	16%	17%	\$ 1.9
	Total OPC:	\$ 70.3	\$ 0.0	\$ 1.0	\$ 1.0	\$ 0.0	\$ 0.2	\$ 0.2	\$ 0.2	42%	16%	17%
	Available Contingency							\$ 0.069				\$ 0.1
	TPC:	\$ 179.9	\$ 52.8	\$ 30.8	\$ 83.6	\$ 7.1	\$ 7.4	\$ 14.6	13%	24%	17%	\$ 278.000

- 14.6 M\$ of contingency



Two facts have spurred a harder look at the endgame with contingency

- The fact that we are finally in production for both PVC Modules at Minneapolis and for Blocks at Ash River
- A 670 K\$ charge in June for the laboratory's change in the overhead rates for M&S and SWF for FY12
- TWO lists of items are discussed next
 - The first list has known and possible calls on contingency
 - The second has known and possible mitigations on contingency
 - BOTH lists have items which are well understood with well understood costs in BLACK, and then items which are being considered or do not yet have well understood costs (or both) in BLUE



Known & Possible calls on Contingency

Identified Contingency Needs		CR in June		
		CR in July		
		\$M		\$M
		Well Understood		Additional Estimates (some unknown, some where cost is)
				WHEN
Whole Project	Increase of Fermilab fringe and G&A retroactive Oct-May FY12	0.37		
	Increase of Fermilab fringe and G&A for June - Sept FY12	0.30		
	An extension of these rates into FY13 would cost even more	-		0.28 2014
ANU	Anticipate using all remaining contingency (2.6 M\$) during shutdown	1.82		2012-2013
		0.34		
	Retroactive change in Cobra to T&M rates, correcting an error	0.44		
	Above 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.	-		1.53 2014
Scintillator	Bids just returned for transportation from Wolf Lake IN to Ash River MN. Some are within our estimate, some are not. We are still evaluating the bids and asking the bidders questions about their proposals.	-		evaluating bids Aug-13
Fiber	Increased cost (\$/Yen) for final part of Kuraray order	0.23		-
	See PVC Modules below. May need as much as 10% additional fiber to cover training, start-up and continuing waste at Module Factory. Still evaluating the need.	-		1.26 Aug-12



More Known & Possible calls on Contingency

Identified Contingency Needs		CR in June		
		CR in July		
PVC Extrusions	Need additional PVC resin to cover waste during final R&D in 1st 9 months of 2011.	2.00	-	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	-	2.00	Apr-13
	Need additional PVC extruding 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)	-	still calculating	Apr-13
	Need to pay storage costs in Manitowoc, WI since the Minnesota Module Factory is full (June CR covers through Apr 2013)	0.11	0.12	
	Need additional labor for QA at extruding vendor for work now occurring in FY13	0.16		Apr-13
PVC Modules	extension of rental on 24,000 sq ft Factory space in FY12 (FY13)	0.03	0.10	
	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.	0.76		Oct-12
	Operate Module Factory during April 2013 - March 2014	0.17		Oct-12
	Rental of Module Factory space April 2014 - Aug 2014?	-	0.32	Oct-13
	Operate Module Factory during April 2014 - Aug 2014?	-	0.06	Oct-13



More Known & Possible calls on Contingency

Identified Contingency Needs		CR in June			
		CR in July			
Electronics	APD success rate for installation and cooling to -15°C is currently 88%. 12% more APDs may be required	-		0.54	Jan-14
Far Detector	Standing army charge in FY12. Work on Pivoter, practice assembly	0.62			
	Additional effort from ANL during assembly startup	0.17			
Near Detector	Add concrete floor and drip ceiling to the Excavation task	0.32		-	
	Add the Outfitting and Demobilization tasks to the schedule	1.60		-	
	Need Engineering & Drafting to design Fermilab Factory and underground installation fixtures	0.50		-	Sep-12
	Need Fermilab technicians to build new 3x3 Near Detector	0.55		-	Nov-12
	Sum:	10.50		6.20	M\$
	Contingency Need Range	10.50	to	16.71	M\$
	June Sum:	4.07			
	July Sum:	0.47			

- As of June 1, have 14.6 M\$, may need 10.5 – 16.7 M\$



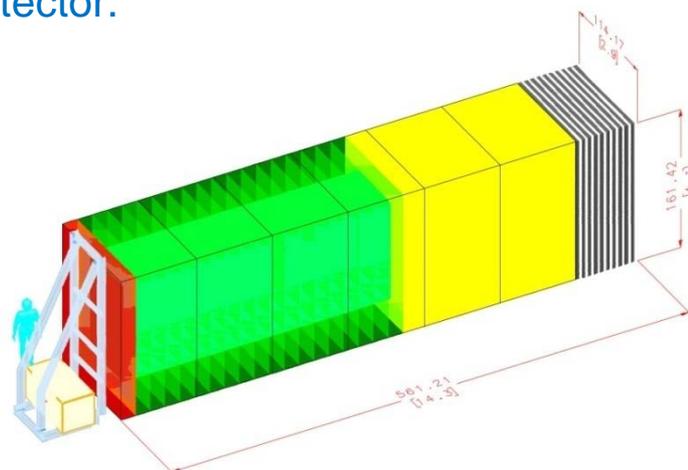
Two definite steps in mitigation

- We are no longer considering any increases in scope
 - There will not be a 2nd Near Cavern
 - There will not be a 2nd Near Detector
 - There will not be a SciNOvA funded by the Project
 - There will not be a Test Beam module funded by the Project
- We have determined that the Key Performance Parameter of a 14 kt Far Detector can be reached with 28 detector blocks instead of 29 blocks.
 - PVC modules have thicker walls than the specification and are heavier
 - We count manifolds, end closures, PVC side stiffeners, Flexane between bottoms of vertical modules and the pallets, and the pallets themselves.
 - Counting everything that makes the detector a complete standing object
 - This saves one block of PVC & scintillator, saves module assembly, block assembly, block outfitting, and preserves some float to CD-4.



And a possible third step in mitigation

- An event vertex in Block #28 is of no use for physics analysis since the event leaks out the back of the detector and the event information is lost.
- For the Near Detector, we determined that an event needs to have 2.5 blocks of detector downstream of the vertex (yellow area below).
 - Even then muons from ν_μ charged current events leak out the back and require a muon catcher (black area below) in the small Near Detector.
- For the Far Detector we can emulate this design and change the composition of the furthest downstream blocks
 - We would do this by making blocks of PVC as usual but then fill 2 planes with scintillator followed by 2 planes with water, ..., making a 32 plane block that is 50% water-filled with ~ 0.30 radiation length per sample instead of 0.15 rad lengths.
 - An alternate scheme is to fill 10 planes with water followed by 2 planes with scintillator and repeat this structure to model the muon catcher with the same cost savings
- Since these modules come last, we can decide late in the project to buy less scintillator and build fewer complete modules. We can \sim dial in to the TPC.





Known and Possible Mitigations

- With the last two slides in mind, we now have a companion spreadsheet with Known Mitigations (in black) and Possible Mitigations (in blue) of contingency need on the next few slides.

Identified possible Contingency savings		June CRs		
		July CRs		
		\$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.	-	(0.28)	?
ANU	Move 2nd target off-project (AD is buying one from RAL on Ops \$ for delivery late next Spring)	(0.18)	-	
	Move Hadron Monitors off-project (existing one still works, AD planning to buy one on operations)	(0.32)	-	
Scintillator	Less scintillator if drop Block #29	(0.53)	-	
	Less scintillator if Block #28 is 50% water	-	(0.27)	Mar-14
	Less scintillator if Block #27 is 50% water	-	(0.27)	Mar-14
	Less scintillator if Block #26 is 50% water	-	(0.27)	Mar-14



More: known and Possible Mitigations

Identified possible Contingency savings		June CRs		
		July CRs		
		\$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. The amount of fiber in hand at the endgame may determine the number of blocks that are 50% filled with water. There is no fiber in a cell filled with water.	-	(0.63)	Aug-12
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.	(0.46)		
	Need additional PVC extruding to complete 29 blocks: Now reduced to just 28	(0.41)		
	Still need 28 blocks of modules even if some are 50% water filled, but might use some of our 6% extrusion rejects for this purpose?	-	still calculating	
PVC Modules	Use ~ 150 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 ~1/100, or ~ 100 more will occur). 190 modules = 1/2 of a block. Put these at the back of the detector in the tail-end event containment area.		(0.83)	Mar-14
	Savings in module assembly from dropping the 29th block.	(0.23)		
	If build "1/2 blocks" with water, then only 1/2 the fiber is required, generating some "spare" fiber	-	still calculating	Mar-14
	If build modules for "50% water blocks", will save assembly costs, avoiding fiber stringing (restringing), fiber QA & flycutting. Some manifold parts spares result.	-	still calculating	Mar-14



More: known and Possible Mitigations

Identified possible Contingency savings		June CRs		
		July CRs		
		\$M	\$M	WHEN?
		Well Understood	Additional Possibilities & Estimates	
Electronics	Dropping Block 29 saves 384 APDs. Dropping readout in 1/2 blocks with water saves 192 APDs per such block. $384+3(192) = 960$ APDs = 9.4% of the remaining APDs. This avoids 75% of an additional purchase of APDs shown on the Contingency NEED spreadsheet	-	(0.40)	Mar-14
Far Detector	Save assembly costs if drop Block 29	(0.40)		
Near Detector	Re-use prototype Near Detector	-	(0.55)	Nov-12
	Still need design/drafting to install + installation labor	-	-	
	Sum:	(2.52)	(3.48)	M\$
	Contingency Savings Range	(2.52)	- (6.00)	M\$
	June Sum:	(0.32)		
	July Sum:	(2.20)		

- That is, we have identified 2.5 – 6.0 M\$ of possible contingency savings



Just to be crystal clear

- As of June 1, we had **14.6 M\$** of contingency
- We have identified **10 .5 – 16.7 M\$** of known/possible contingency need
- We have identified **2.9 – 6.0 M\$** of known/possible contingency savings

- Now we go on to the July 1 financial status



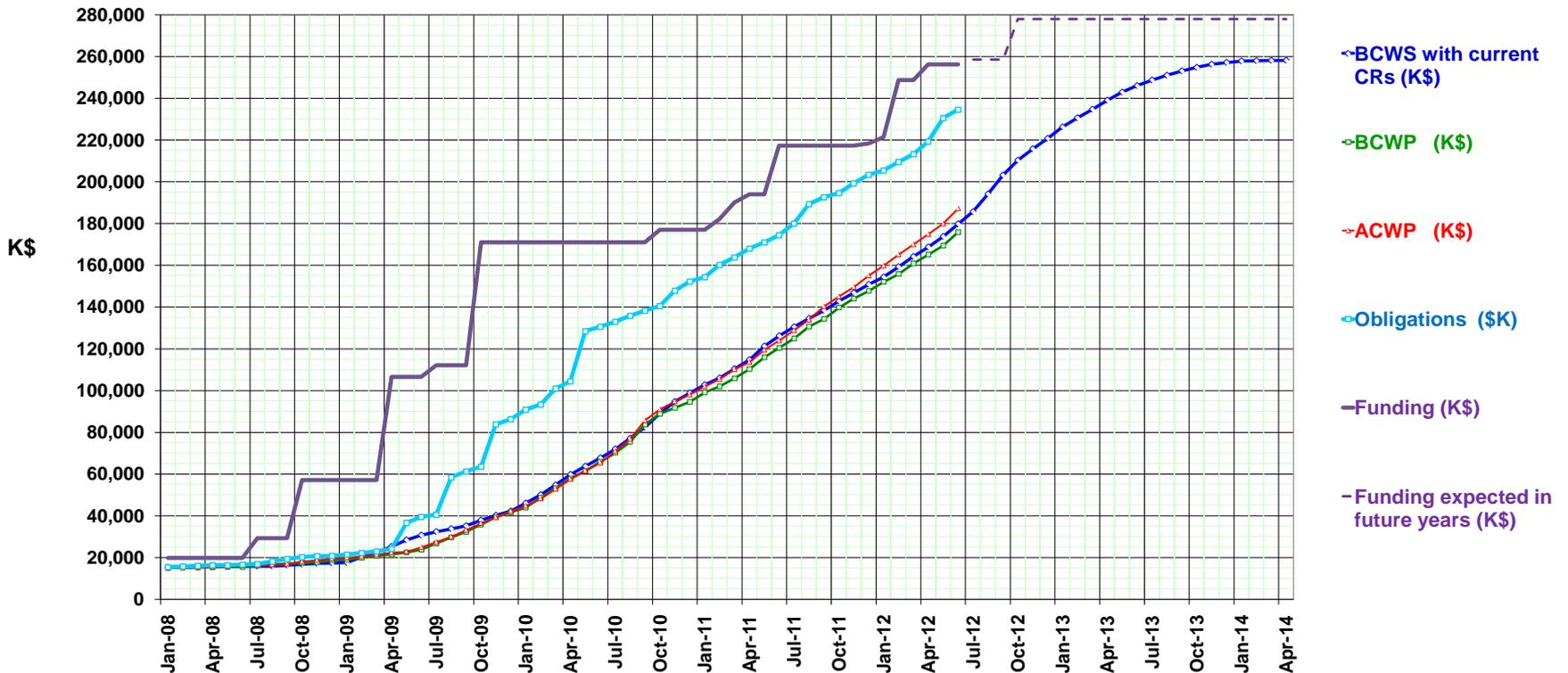
EVMS Reporting Overview

- Data now available through **June 2012**
 - SPI = **0.978**, compare to 0.975 in May, 0.978 in Apr, 0.979 in Mar
 - CPI = **0.940**, compare to 0.942 in May, 0.944 in Apr, 0.946 in Mar
 - **CPI still trending down slightly**



EVMS Reporting Overview

- Basic data in BCWS, BCWP, ACWP, **Funding & Obligations** through **Jun 2012**
 - BCWS = Budgeted cost of work Scheduled
 - BCWP = Budgeted cost of work Performed
 - ACWP = Actual cost of work Performed
- Project is 68.1 % complete ($BCWP/BAC = 175.8 \text{ M\$} / 258.1 \text{ M\$}$)
 - BAC = Budget at Completion (using EAC, get 65.6%)
- Project is 90.1 % obligated ($Obligations/BAC = 234.6 / 258.1$)
 - EAC = Estimate at Completion (using EAC, get 87.6%)





AY\$ by Level 2 with MIE/OPC split (July 1 now)

WBS	Items	NOVA Costs to Date (\$M) as of 30-June-2012	NOVA's Cost Estimate AY \$M (for July 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	
TE C	2.0	Accelerator & NuMI Upgrades	\$ 30.8	\$ 1.1	\$ 8.1	\$ 9.2	\$ 0.5	\$ 1.6	\$ 2.1	40%	20%	23%	\$ 42.1
	2.1	Far Detector Site and Building	\$ 6.1	\$ 0.0	\$ 0.0	\$ 0.0	\$ -	\$ 0.0	\$ 0.0	0%	25%	2%	\$ 6.1
	2.2	Liquid Scintillator	\$ 9.6	\$ 12.7	\$ 0.2	\$ 12.9	\$ 2.0	\$ 0.1	\$ 2.1	16%	42%	16%	\$ 24.6
	2.3	Wave-Length-Shifting Fiber	\$ 11.6	\$ 1.5	\$ 0.1	\$ 1.6	\$ 0.0	\$ 0.0	\$ 0.0	0%	10%	1%	\$ 13.2
	2.4	PVC Extrusions	\$ 18.1	\$ 12.4	\$ 0.5	\$ 12.9	\$ 0.7	\$ 0.1	\$ 0.8	6%	22%	6%	\$ 31.8
	2.5	PVC Modules	\$ 9.5	\$ 3.2	\$ 5.7	\$ 8.8	\$ 0.3	\$ 0.9	\$ 1.1	9%	15%	13%	\$ 19.4
	2.6	Electronics Production	\$ 5.3	\$ 5.8	\$ 1.0	\$ 6.8	\$ 0.4	\$ 0.3	\$ 0.7	7%	29%	10%	\$ 12.8
	2.7	Data Acquisition System	\$ 3.7	\$ 0.7	\$ 0.8	\$ 1.6	\$ 0.2	\$ 0.2	\$ 0.4	24%	28%	26%	\$ 5.6
	2.8	Near Detector Assembly	\$ 3.4	\$ 8.0	\$ 0.4	\$ 8.5	\$ 0.0	\$ 0.2	\$ 0.2	0%	36%	2%	\$ 12.1
	2.9	Far Detector Assembly	\$ 11.3	\$ 6.6	\$ 8.1	\$ 14.7	\$ 1.2	\$ 2.7	\$ 3.9	19%	33%	27%	\$ 29.9
	2.10	Project Management	\$ 7.1	\$ 0.1	\$ 3.3	\$ 3.5	\$ 0.0	\$ -	\$ 0.0	25%	0%	1%	\$ 10.6
	Subtotal Construction	\$ 116.6	\$ 52.1	\$ 28.2	\$ 80.3	\$ 5.3	\$ 6.0	\$ 11.4	10%	21%	14%	\$ 208.2	
OP C	R&D - Accelerator	\$ 6.6	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 6.6	
	R&D - Detector	\$ 28.2	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 28.2	
	Cooperative Agreement	\$ 34.9	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	0%	0%	0%	\$ 34.9	
	Operating	\$ 0.9	\$ 0.0	\$ 0.5	\$ 0.5	\$ 0.0	\$ 0.1	\$ 0.1	40%	16%	18%	\$ 1.6	
	Total OPC:	\$ 70.6	\$ 0.0	\$ 0.5	\$ 0.5	\$ 0.0	\$ 0.1	\$ 0.1	\$ 0.1	40%	16%	18%	\$ 71.2
	Available Contingency							\$ (1.414)				\$ (1.4)	
	TPC:	\$ 187.1	\$ 52.1	\$ 28.7	\$ 80.8	\$ 5.3	\$ 6.1	\$ 10.0	10%	21%	12%	\$ 278.000	

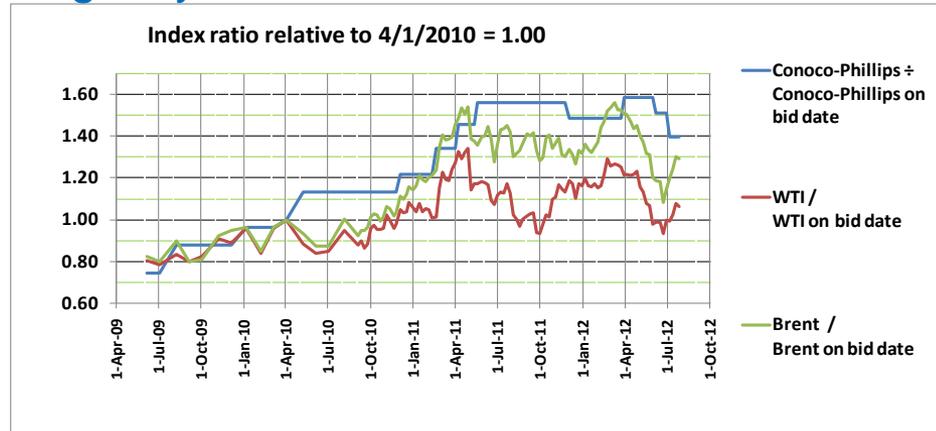
Notes: ¹ Labor costs presented here include all project labor from Fermilab, other DOE facilities and Universities.

- Now at 10 M\$ in contingency



Risk & Contingency re-evaluated for July 1

- Mineral Oil cost is down as predicted, have 586,000 gallons in storage to ride out any price increase.
 - reduced contingency from 30% to 15%.



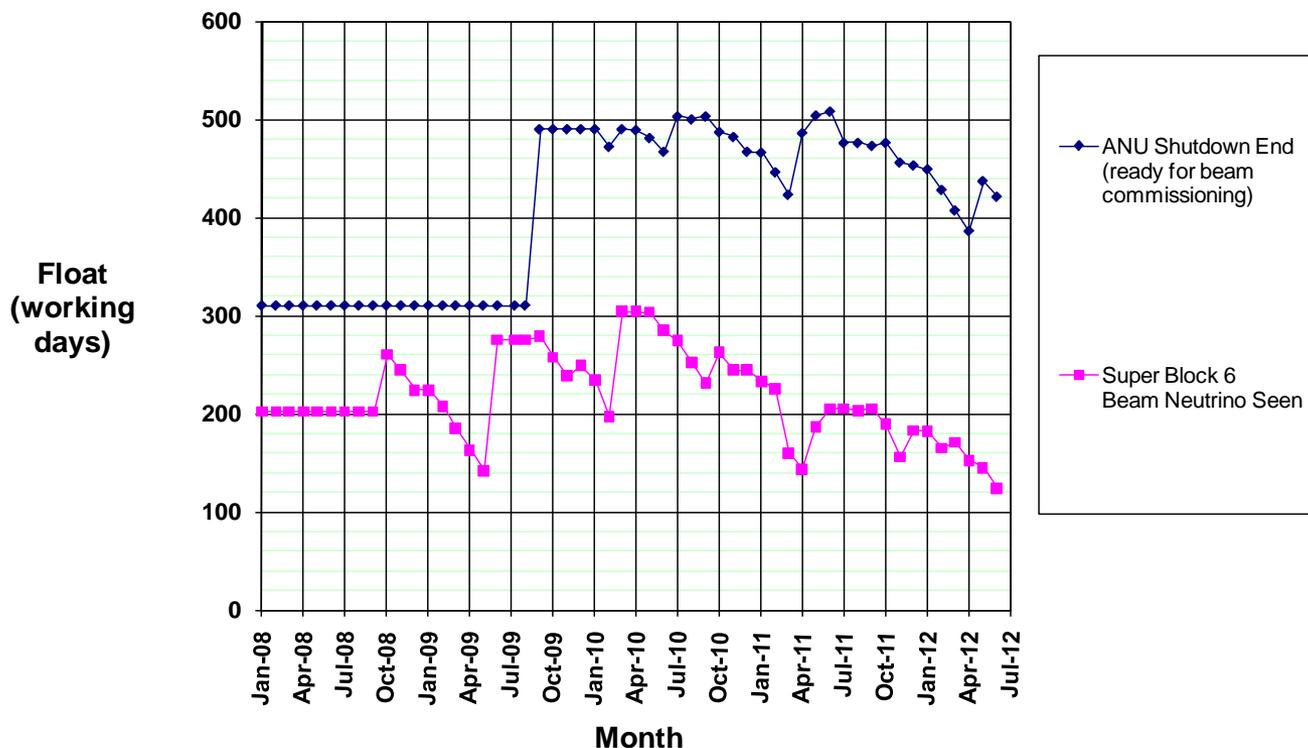
- Assembly labor had 50-67% assigned, sized for a 3rd shift.
 - Our Ash River crew assembly training indicates 2 shifts will work
 - May have to add 1-2 people to help surface prep, but overall can reduce contingency to 1 OT day per week.
 - Same argument used for scintillator filling and block outfitting
 - **In addition, it is not likely that all three of these activities will each require the assigned contingency (global risk analysis).**
 - Reduced Ash River labor contingency to 35%



Milestones: What about CD-4 ?

- **ANU lost 16 days of float in June** -- **Now at 421 days**
 - Kicker and RF schedules still drive this float.
- **The Detector lost 21 days of float in June** -- **Now at 124 days**
 - This is due to delay in start of Ash River assembly.
 - Expect to lose 21 more in July, but regain ~20 due to dropping Block #29
 - Then ultimate Ash River assembly rate will set final float, known in ~ Nov 2012

Tracking Float to CD-4





Summary

- May 8 IPR Problems are being resolved
 - Fiber Damage Problem is solved
 - APD Problem is still being worked
 - Increased statistics with installations of APDs with both coatings
 - Substantial progress with 90% of Silicone and 100% of Parylene coated APDs working for many weeks now at -15C with dry air
 - Coating + dry air = belt & suspenders
- A Block Assembly / adhesive issue arose after May 8 and has been solved.
- The Accelerator shutdown work is on schedule but a little over cost.
- All parts of the Project are now in production
 - PVC Module factory has reached full rate since the May 8 IPR
 - Ash River Assembly has started since the May 8 IPR
- Contingency is still adequate
 - Re-evaluating contingency needs
 - Developing fall-back plans for possible contingency savings
- Float to CD-4 is still adequate
 - 6 months of float, 26 months to CD-4



COST PERFORMANCE REPORT FORMAT 1 - WORK BREAKDOWN STRUCTURE													
CONTRACTOR					CONTRACT			PROGRAM			REPORT PERIOD		
NAME Fermi National Accelerator Laboratory					NAME			NAME NOVA project			FROM 01-June-2012 TO 30-June-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	1,483	1,799	2,740	316	(941)	26,045	23,898	30,825	(2,147)	(6,927)	34,674	40,010	(5,337)
CTC-FndSrcTotals:	1,483	1,799	2,740	316	(941)	26,045	23,898	30,825	(2,147)	(6,927)	34,674	40,010	(5,337)
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	3	0	(3)	7,025	7,025	6,615	0	410	7,025	6,615	410
CTC-FndSrcTotals:	0	0	3	0	(3)	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	11	12	54	1	(42)	7,054	7,052	6,051	(2)	1,001	7,072	6,071	1,001
2.10 Project Management - Nova Project - Construction													
Fully burdened AY\$K	232	232	230	0	3	8,245	8,245	7,132	0	1,113	11,699	10,586	1,113
2.2 Liquid Scintillator													
Fully burdened AY\$K	75	323	304	248	19	9,196	9,492	9,631	297	(139)	22,375	22,520	(146)
2.3 WLS Fiber													
Fully burdened AY\$K	403	387	353	(16)	35	10,494	11,220	11,551	726	(331)	12,838	13,153	(315)
2.4 PVC Extrusions													
Fully burdened AY\$K	1,169	944	994	(224)	(49)	17,361	17,814	18,132	453	(318)	30,841	31,015	(174)
2.5 PVC Modules													
Fully burdened AY\$K	417	710	499	293	211	11,299	11,170	9,459	(129)	1,712	19,997	18,282	1,714
2.6 Electronics													
Fully burdened AY\$K	66	55	208	(10)	(153)	7,290	5,630	5,338	(1,660)	292	12,313	12,089	224
2.7 DAQ													
Fully burdened AY\$K	211	240	208	29	32	3,633	2,891	3,665	(742)	(773)	4,488	5,225	(737)
2.8 Near Detector Assembly													
Fully burdened AY\$K	836	753	797	(83)	(43)	2,780	2,666	3,433	(114)	(767)	11,138	11,896	(759)
2.9 Far Detector Assembly													
Fully burdened AY\$K	832	504	601	(329)	(98)	9,497	8,604	11,335	(893)	(2,732)	23,073	25,998	(2,925)
CTC-FndSrcTotals:	4,253	4,161	4,247	(92)	(86)	86,849	84,784	85,727	(2,065)	(942)	155,834	156,836	(1,002)

Another negative cost month, but add to + on next page

Another negative month 25% of last month

CPR1 June 2012 continued

COST PERFORMANCE REPORT FORMAT 1 - WORK BREAKDOWN STRUCTURE													
CONTRACTOR					CONTRACT			PROGRAM			REPORT PERIOD		
NAME Fermi National Accelerator Laboratory					NAME			NAME NOvA project			FROM 01-June-2012 TO 30-June-2012		
PERFORMANCE DATA													
CTC-FndSrc CTC(z) Results... ITEM (1)	CURRENT PERIOD					CUMULATIVE TO DATE					AT COMPLETION		
	BUDGETED COST		ACTUAL COST WORK (4)	VARIANCE		BUDGETED COST		ACTUAL COST WORK (9)	VARIANCE		BUDGETED (12)	LATEST REVISED ESTIMATE (13)	VARIANCE (14)
	WORK SCHEDULED (2)	WORK PERFORMED (3)		SCHEDULE (5)	COST (6)	WORK SCHEDULED (7)	WORK PERFORMED (8)		SCHEDULE (10)	COST (11)			
DO DOE-ACEL OPS													
1.0 ANU R&D													
Fully burdened AY\$K	302	528	284	226	244	961	1,194	946	233	248	1,687	1,476	210
CTC-FndSrcTotals:	302	528	284	226	244	961	1,194	946	233	248	1,687	1,476	210
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	2,084	0	(716)	1,369	2,084	(716)
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	2	0	(2)	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	2	0	(2)	15,067	15,067	19,349	0	(4,283)	15,067	19,349	(4,283)
DY 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	6,038	6,489	7,278	451	(789)	179,807	175,828	187,135	(3,979)	(11,307)	258,146	267,960	(9,814)
Management Resrv.											19,854		
Total	6,038	6,489	7,278	451	(789)	179,807	175,828	187,135	(3,979)	(11,307)	278,000		

Should add this to (941) on previous page

~ 55% ANU, 45% Det MIE ~60% ANU, 40% Det R&D

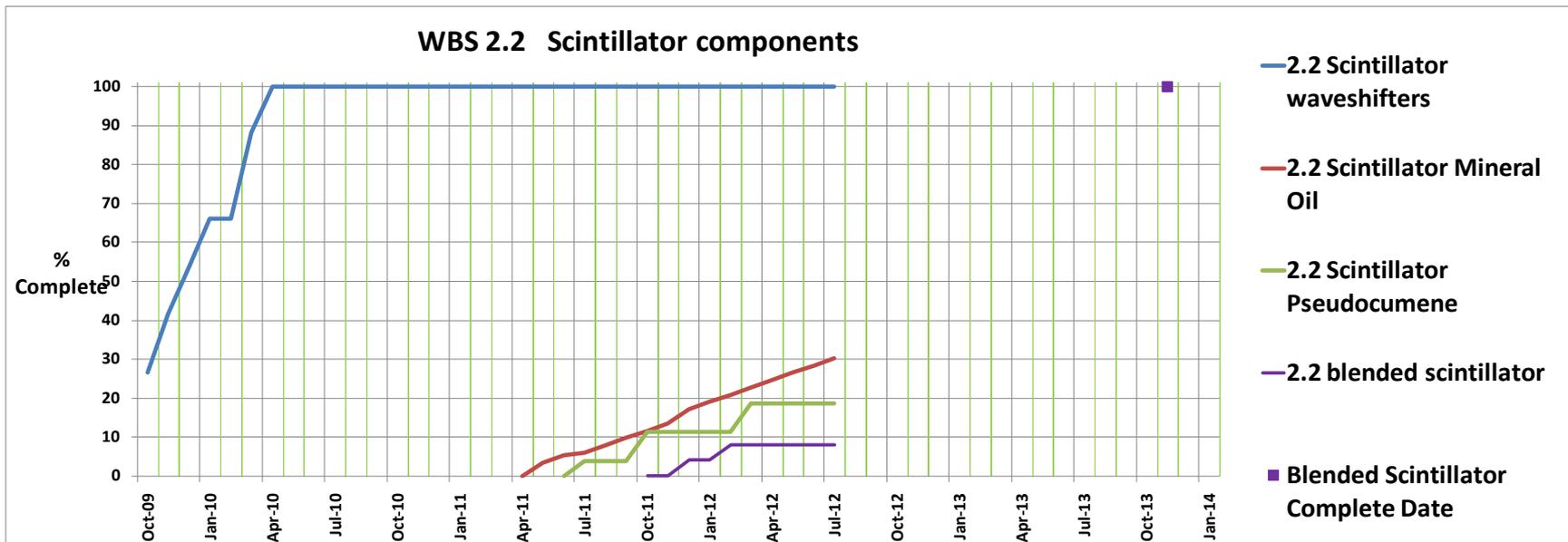


SOME DETECTOR STATUS SLIDES FROM AUGUST 2



Scintillator

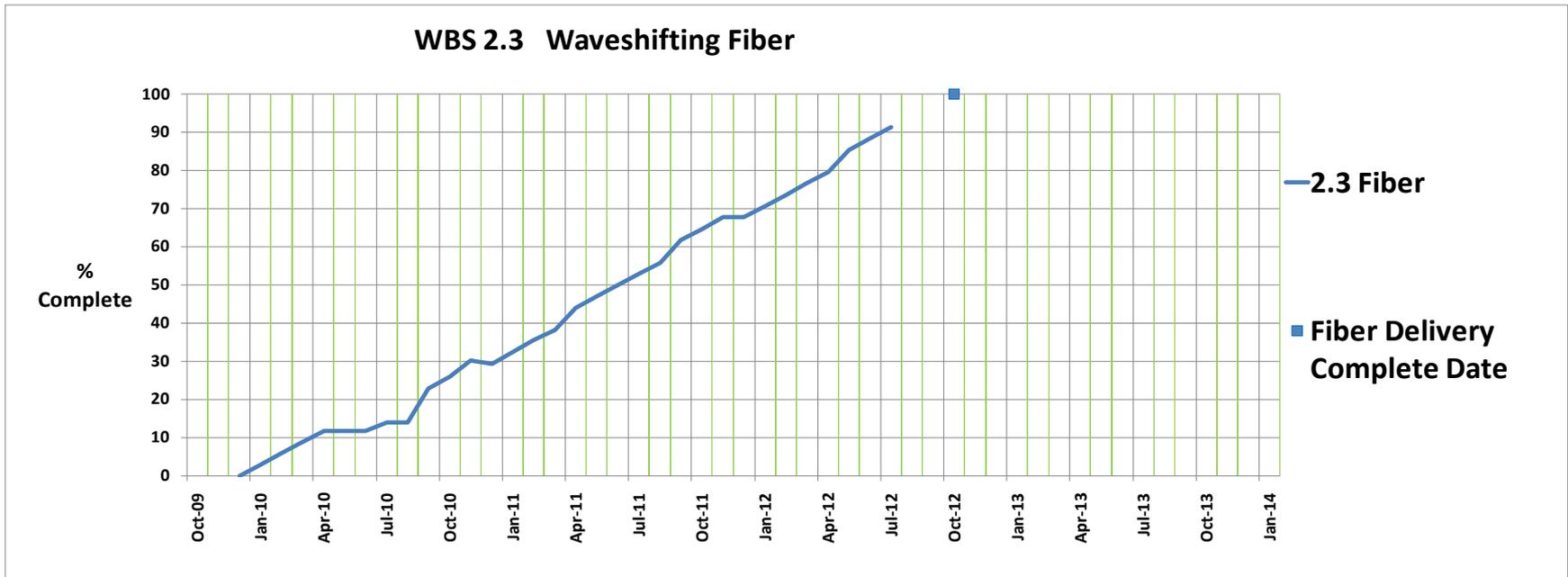
- We need 2.8 M gallons of scintillator
 - **2.65 M gallons of mineral oil:** Price is still high, but fell \$0.57/gallon (15%) during June/July, should fall another 20 – 30% to be in line with historical data relative to Crude Oil
 - **155,000 gallons of pseudocumene:** Price fell ~ 25% during the last 4 months
 - **Waveshifters** (we own enough for the experiment)
- Our two scintillator storage tanks are now full: 227,000 gallons = 2.4 blocks
 - **We have a 600,000 gallon buffer tank for mineral oil, nearly full @ 586,000 gal**
 - This is 30% of the total required, so the risk due to oil prices is reduced
 - we can ride out approximately 8 month of high prices with the buffer volume if needed.
 - **We have 2 tankers as a buffer for pseudocumene, 1 more on order**





Fiber

- We have 11,130 km of fiber or 91% of the total needed.
 - Still on schedule to complete as planned.
- An assessment of the waste rate in the Minneapolis factory is in progress.
 - Initial start-up waste was ~ 5%.
 - Ongoing production waste is fluctuating in the range of 2 - 8%.
 - The plan was 4%.
 - May need 5 – 10% more fiber

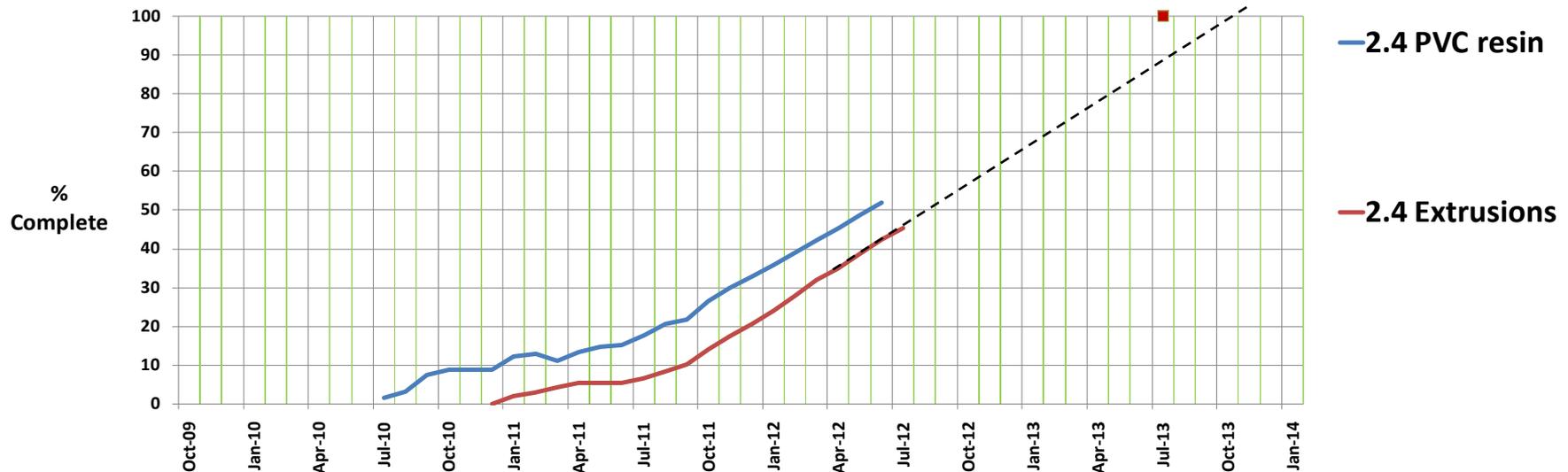




PVC Extrusions

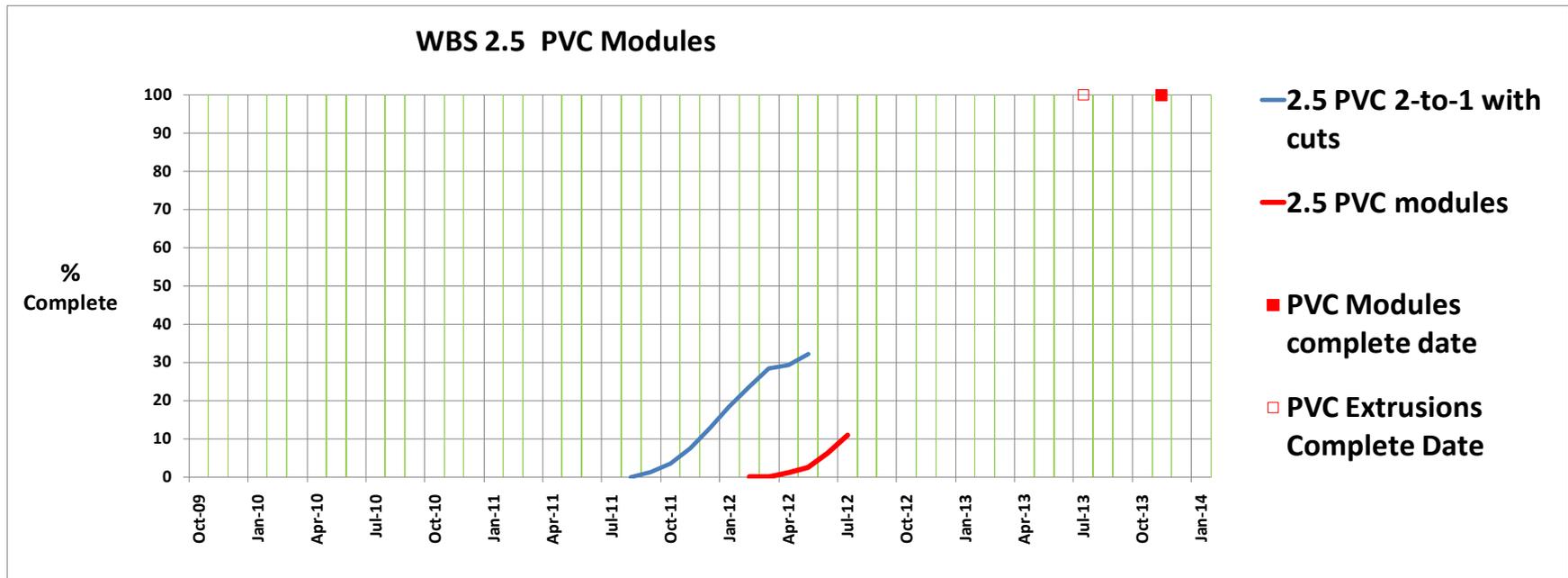
- We have ~10,000 good extrusions in hand of the 22,272 required
- Vendor's 6x24 operations reduced to 5x24 since we are out of storage space in Minnesota. Rented additional space in Manitowoc in June.
- Extrusion Cost Problems:
 - Resin used in the final 9 months of special R&D on NOVA-27 was 2 million pounds. Must buy more to make this up.
 - Current Resin and Extruding orders were on Recovery Act funds and were NOT for the full amount needed in the detector. Must buy even more to get to the total.

WBS 2.4 PVC Resin and Extrusions



PVC Modules

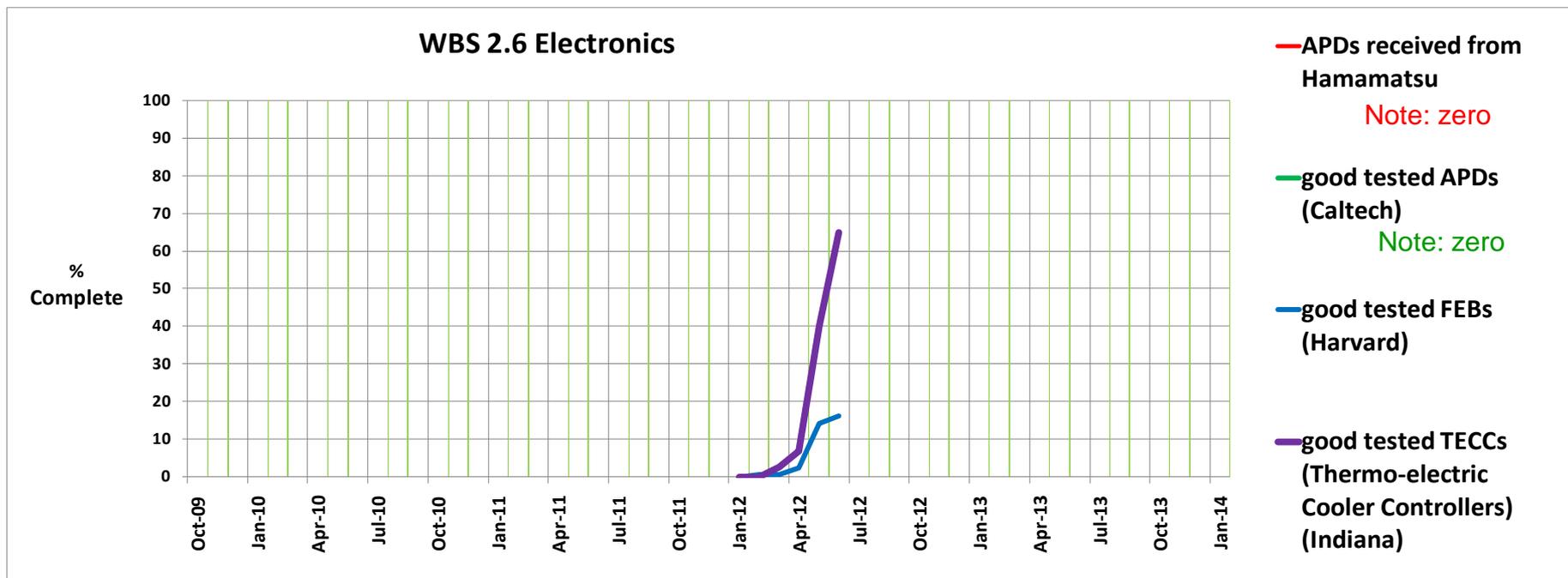
- Module assembly at Minnesota has been divided into two parts:
 - 2-to-1 assembly of 2 extrusions into one module + cut to length
 - Final assembly with fiber, endcap, manifold, & all seals + pressure test
- 3581 2-to-1s are done (as of June 1), only update since then is that they are “out” of single extrusions at Minnesota as of July 24.
- 1226 good completed modules are done ! 11% of total needed.
 - Rate is now at the planned rate !
 - The waste rate is crucial and you should hear more about that from Ken Heller.





Electronics

- As of July 1:
 - 1813 Front End Boards (FEBs) tested and good. (Harvard)
 - 16% done
 - 7243 Thermo-electric Cooler Controllers tested and good (Indiana).
 - 65% done

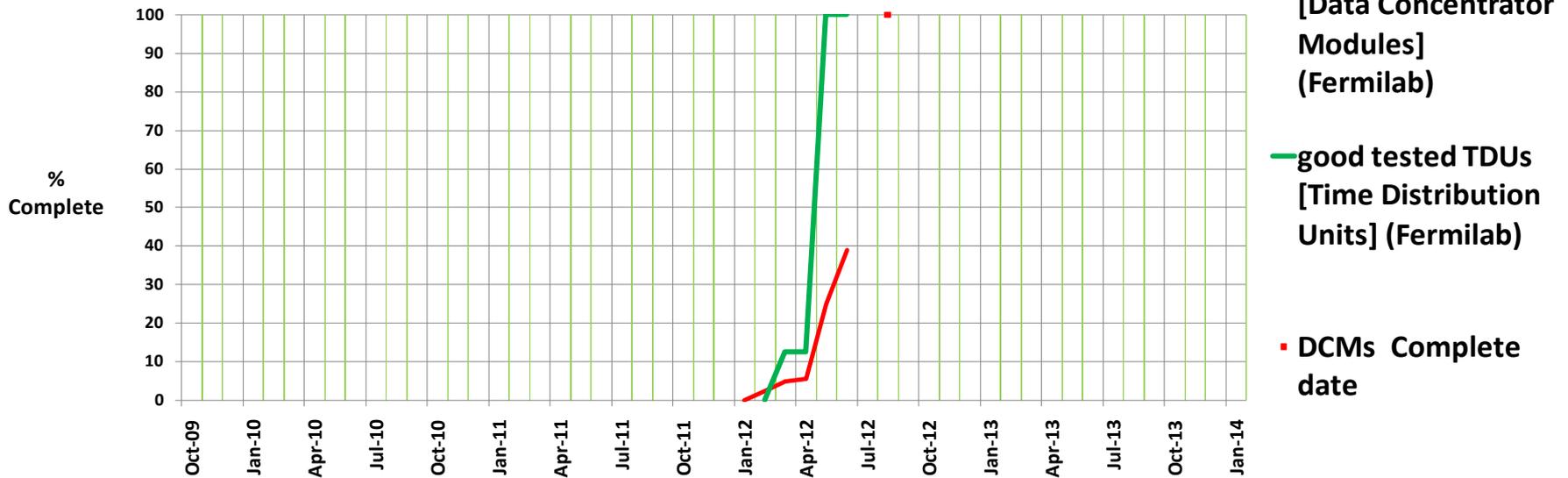




DAQ Hardware

- As of July 1:
- Data Concentrator Modules (DCMs)
 - Now have 78 final boards completely tested
- Timing Distribution Units (TDUs)
 - 2 Types, Master (2 required at Ash River) & Slave (30 required at Ash River)
 - Have them all, all tested

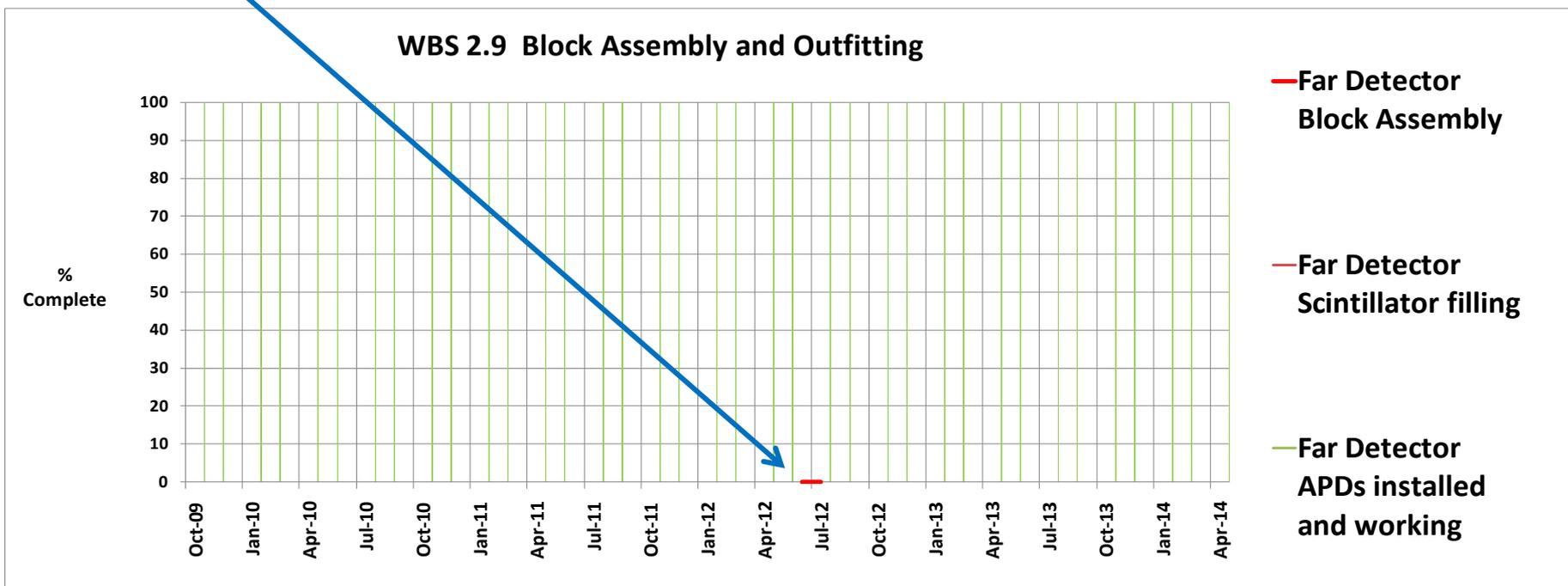
WBS 2.6 Data Acquisition Hardware





Block Assembly

- The first modules on the 1st Block are in place !
- Lots of Outfitting progress to prepare for scintillator filling and electronics installation
- Added a new graph
 - a long way to go yet, but a great victory to finally get a visible line !





Near Detector Cavern

- Excavation should start on August 15.