

DØ Run IIb Silicon Close-Out Plan

Draft V 2.0
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1. Introduction

The goal is to expeditiously close-out the DZero Run IIb silicon project while maximizing the benefits that can be gained from the significant investments that have already been made in this project to date. While some aspects of the project have reached the production phase, the remainder of the project was well along in the prototyping and pre-production phases, and we believe that it would be worthwhile to bring several aspects of this project development to fruition, so that studies can be properly completed and documented.

In particular, the pre-production versions of the hybrid substrates that are currently being fabricated should be inspected, stuffed, tested, and incorporated into modules to verify the grounding scheme, certify the potential hybrid substrate vendors, and prepare components for the fabrication of final versions of the pre-production stave.

A few more staves should be fabricated and tested to fully understand the characteristics of the stave and to verify that the pre-production design functions as anticipated.

The pre-production version of the layer 0 support structure should be produced, populated with a few modules, and tested to certify that the support structures will perform as modeled, and that the grounding scheme that has been developed is adequate to provide for successful operation of the detectors.

Our expectation is that this process will extend for at least half a year, because many of the steps are serial in nature, and of course, the urgency and priority of these tasks for the people involved has been drastically altered by circumstances well beyond their control. Some details associated with successfully implementing this plan are outlined below. A financial summary of the closeout for the silicon sub-project may be found in the table on the last page of this report.

2. Silicon Closeout Tasks

2.1 General SiDet Closeout Tasks

2.1.1 Outer Layer Sensors

Perform QA tests on a fraction of the ~830 production sensors that should be available, including database entry, key measurements to certify sensors and gain insight into Hamamatsu QC/QA; perform irradiation studies of test structures; identify sensors to be used in fabricating electrical grade staves.

	M&S Cost (k\$)	FTE (weeks)	Comment
Key Tests FNAL	---	16 MT	
Key Tests SB	---	5 MT	
Irradiation Tests KSU	---	6 MT	
Long Term Tests FNAL		20 Phys	

Target Close-out Date: February '04

Costs (\$FY04):

	Base Cost (FY04)	Burdened	Comment
FNAL Labor	\$24,320	\$31,281	\$38/hour base
Key Tests SB (M&S)	\$8,200	\$9,650	\$41/hour burdened + 17.72% M&S
Irradiation Tests KSU	\$9,850	\$11,595	\$41/hour burdened + 17.72% M&S

Total M&S : \$21,245

Total FNAL Labor: \$31,281

Total: \$52,526

2.1.2 Inner Layer Sensors---SiDet General

Complete studies of irradiated test structures to understand anticipated performance of detectors.

	M&S Cost (k\$)	FTE (weeks)	Comment
Key Tests FNAL		1.2 MT	

Target Close-out Date: Nov '03

Costs (\$FY04):

	Base Cost (FY04)	Burdened	Comment
Key Tests FNAL	\$1,824	\$2,350	\$38/hour base

Total M&S : Total FNAL Labor: \$2,350 Total: \$2,350

2.2 SVX4 Closeout Tasks

SVX4 wafers

Insure that pre-production run of SVX4 wafers are available for use in studies and for potential future applications. We anticipate that these costs may be shared with CDF and or PPD, since these readout chips may be of general interest.

	M&S (FY04 \$)	Burdened	Comment
Backgrinding, dicing	\$8,000		24 wafers
Testing	---	12 EE, 3 Phys	
Signoff, Documentation	---	2 Phys	

Target Close-out Date: December '03

Costs (FY04):

	Base Cost (FY04\$)	Burdened	Comment
Backgrinding, dicing	\$8,000	\$9,420	17.72% G&A
FNAL Labor	\$32,160	\$41,365	\$67/hour base EE

Total M&S: \$9,420 Total FNAL Labor: \$41,365 Total: \$50,785

Hybrid Testing

Continue running hybrids at the burn-in test stands to accumulate experience with reliability and long-term performance of the SVX4 readout chips and the hybrid substrates; verify grounding scheme, certify potential hybrid substrate vendors, and prepare components for fabrication of final pre-production electrical staves;

	M&S Cost (k\$)	FTE (weeks)	Comment
Key Tests FNAL	---	16 EE, 16 ET	
Key Tests Fresno	---	4 Phys	
Key Tests KU	---	5 ET	
Stuff hybrids	4	1 Phys	
Procure hybrid components	2	1 ET	

Target Close-out Date: May '04

Costs (FY04)

	Base Cost (FY04\$)	Burdened	Comment
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FNAL Labor: 16 EE	\$42,880	\$55,152	\$67/hour base
FNAL Labor: 17 ET	\$29,240	\$37,610	\$43/hour base
Key Tests KU 5ET	\$10,000	\$11,772	\$50/hour base (incl. fringe) 17.72% G&A
M&S (stuffing/procuring hybrids)	\$6,000	\$7,063	17.72% G&A

Total M&S : \$18,835 Total FNAL Labor: \$92,762 Total: \$111,597

Mechanical Grade Staves

Complete the investigation of the mechanical properties of the stave

	M&S Cost (k\$)	FTE (weeks)	Comment
M&S (Autoclave Installation)	10		
Stave Fabrication	---	4 ME, 4 MT	
Stave Tests		4 ME	

Target Close-out Date: Dec '03

Costs (FY04)

	Base Cost (FY04\$)	Burdened	Comment
Autoclave Installation	\$10,000	\$11,772	17.72%
FNAL Labor: 8ME	\$19,520	\$25,106	\$61/hour base
FNAL Labor: 4 MT	\$6,080	\$7,820	\$38/hour base

Total M&S : \$11,772 Total FNAL Labor: \$32,926 Total: \$44,698

Electrical Grade Staves

Build a total of 2 electrical staves and verify simultaneous readout of all hybrids on the pre-production stave using the full readout chain. Exercise all components of operating stave, including low voltage remote sense.

	M&S Cost (k\$)	FTE (weeks)	Comment
Module Production	1	2 MT, 1 ME	2 staves
Stave Production	1	1 MT, 1 ME	2 staves
Electrical Tests	---	2 EE, 2 ET	
Stave Tests		1 ME	
Test of Adapter Card at KSU		1 EE	
Pre-production Junction Card	1	1 EE	

Target Close-out Date: May '04

Costs (FY04)

	Base Cost (FY04)	Burdened	Comment
M&S	\$3,000	\$3,532	17.72%
FNAL Labor: 3MT	\$4,560	\$5,865	\$38/hour base
FNAL Labor: 3ME	\$7,320	\$9,415	\$61/hour base
FNAL Labor: 2EE	\$5,360	\$6,895	\$67/hour base
FNAL Labor: 2ET	\$3,440	\$4,425	\$43/hour base
University Labor: 2EE	\$6,880	\$8,100	\$86/hour base (incl fringe) +17.72%

Total M&S : \$11,632 Total FNAL Labor: \$26,600 Total: \$38,232

Inner Layer Support Structures and Electrical Tests

Complete pre-production of inner layer support structures to fully demonstrate proof of principle and verify mechanical and electrical characteristics and performance.

	M&S Cost (k\$)	FTE (weeks)	Comment
Module Production	5	8 MT, 2 ME	4 modules each
Electrical Tests	---	10 EE, 10 ET	
Cooling Setup	15	6 ME	
Mechanical Tests		2 ME	

Target Close-out Date: May '04

Costs (FY04):

	Base Cost (FY04\$)	Burdened	Comment
M&S	\$20,000	\$23,544	17.72%
FNAL Labor: 8MT	\$12,160	\$15,640	\$38/hour base
FNAL Labor: 10ME	\$24,400	\$31,384	\$61/hour base
FNAL Labor: 10EE	\$26,800	\$34,470	\$67/hour base
FNAL Labor: 10ET	\$17,200	\$22,123	\$43/hour base

Total M&S : \$23,544 Total FNAL Labor: \$26,600 Total: \$50,144

Totals

M&S (k\$)	47
ME (FTE Weeks)	21
MT (FTE Weeks)	43.2
EE (FTE Weeks)	42
ET (FTE Weeks)	34

Cost Totals (Fully Burdened FY04\$)

<i>Task</i>	<i>M&S</i>	<i>Labor</i>	<i>Total</i>
Outer Layer Sensors	\$21,245	\$31,281	\$52,526
Inner Layer Sensors		\$2,350	\$2,350
SVX4	\$9,420	\$41,365	\$50,785
Hybrid Testing	\$18,835	\$92,762	\$111,597
Mechanical Grade Staves	\$11,772	\$32,926	\$44,698
Electrical Grade Staves	\$11,632	\$26,600	\$38,232
Inner Layer Support Structure	\$23,544	\$26,600	\$50,144
Total	\$96,448	\$253,884	\$350,332