

DØ Upgrade Monthly Progress Report

for the month of October, 1999

Subsystem: Master Schedule
WBS: All
Date Submitted: 11/23/99
Submitted By: Bill Freeman

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M1-Solenoid Delivered to Fermilab	5/12/97	5/12/97	0 w
X	M2-Central Preshower Installed on Solenoid	5/21/98	5/21/98	0 w
	M3-InterCryostat Detectors Installed	1/25/00	2/1/00	-1 w
	M3-Level Ø-South Installed	2/22/00	2/9/00	1.8 w
	M1-Central Silicon Complete	9/18/00	9/18/00	0.2 w
	M2-Silicon Tracker Installed in Solenoid/Fiber Tracker	9/25/00	9/25/00	0.2 w
	M2-Muon End Toroids Installed on Platform	11/15/00	11/15/00	0.2 w
	M1-Begin Shield Wall Removal/Ready to Roll-in	11/22/00	11/22/00	0 w
	M1-Detector Rolled-in and Hooked Up	2/2/01	2/2/01	-0.1 w

Variances of the order of 0.2 w or less are an artifact of a minor calendar change in Microsoft Project, and should be ignored.

Areas of Concern

Technical

(refer to WBS level 3 system reports)

Schedule

Central silicon detector completion is on the critical path to roll-in.
Fiber tracker has about 5 weeks of slack relative to the central silicon.

Resources

The need to construct a more detailed installation and commissioning schedule to better understand the necessary resource allocations among various tasks during the next year.

Cost

To stay on schedule and achieve faster delivery times we have spent a substantial fraction of our remaining contingency.

Change Requests

None

Progress Summary

A bottoms-up look at the entire schedule during September and October, prompted by the June 99 DoE review and the Fermilab Directorate, resulted in a revised baseline schedule with a "Detector Rolled in and Hooked Up" milestone date of 2/2/01. While this revised date represents a slippage of several months relative to the baseline established following the DoE review of Jan 98, we believe that it is based on a more realistic and achievable schedule, and supported by measured production rates.

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for the month of October, 1999

Subsystem: 1.1.1
WBS: Silicon Tracker
Date Submitted: 11/22/99
Submitted By: Ronald Lipton

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	H Half-Wedge Fabrication 20% Complete	10/15/99	10/15/99	0 w
X	3 Chip Ladder Fabrication 80% Complete	10/26/99	10/20/99	0.6 w
X	9 Chip Ladder Fabrication 20% Complete	11/3/99	11/3/99	0 w
	6 Chip Ladder Fabrication 20% Complete	1/10/00	1/3/00	1 w
	F Wedge Assemblies 20% Complete	1/19/00	1/19/00	0 w
	M2-First Silicon Tracker Barrel/Disk Module Complete	2/2/00	1/24/00	1.4 w
	H Half-Wedge Fabrication 80% Complete	2/23/00	2/23/00	0 w
	6 Chip Ladder Fabrication 80% Complete	3/21/00	3/14/00	1 w
	9 Chip Ladder Fabrication 80% Complete	3/27/00	3/27/00	0 w
	F Wedge Assemblies 80% Complete	4/26/00	4/26/00	0 w
	H-disks Ready	7/3/00	7/3/00	0 w
	M3-All Silicon Tracker Barrels/Disks Complete	8/25/00	8/25/00	0.2 w
	Central Silicon Complete & Ready To Move To DAB	9/18/00	9/18/00	0.2 w

Areas of Concern

Technical

Areas of excess noise in the 90-degree ladders were related to faults in the detector lithography causing shorts between the n-implant and the p-stop. All detectors in hand are being inspected for this flaw. Micron Semiconductor has promised not to ship detectors with this problem in the future.

There is a few-percent failure rate for n-side capacitors at final bias voltage. We are working to understand the final testing and burn-in specifications based on our experience with the first 30-40 ladders. Initial tests with the full readout system including the low-mass cable showed a narrow operating voltage range. This was cured by changes in termination and signal timing.

Schedule

Ladder production has slowed due to some of the fixtures being out of specification. These fixtures are being re-qualified and all ladders that have been fabricated are being re-measured. This will slow down ladder production for 2-3 weeks. The start of F-wedge production depends on delivery of jumpers and subsequent HDI assembly and test. Jumpers are now available but HDI production is dependent on the vendor schedule. We are re-evaluating the schedule based on our current understanding of production rates and parts availability.

Resources

Ladder production is limited by technician support for assembly and HDI lamination tasks. Training for some of these tasks takes 2-3 months so this lack of manpower will continue to be felt for some time. We do not have the ability to work multiple shifts. Physicist manpower is still needed in all areas.

Cost

We have begun reviewing costs and available spares based on production and testing yield. We expect that the original 20% spares will not be sufficient, especially for parts used in the early phase of production, and that additional spares will need to be ordered. Costs have also increased for low-mass cables from Allied Signal and for the interface card system.

Change Requests

None

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Progress Summary

Four of five detector types are in production. Production of the final type, F-wedges, should begin in November. Eighty percent of the 3-chip ladders and 20% of the 9-chip ladders have been built. F-wedge and 6-chip ladder production will start in earnest in November. H-wedge production is now well understood and is proceeding at the rate of 10 per week. A team is now in place to test and repair ladders and wedges. The repair process is better understood, although problems remain. HDI and ladder burn-in systems are working well and are being used routinely by shift personnel. New software has been installed in the LASER test stand that substantially improves the test. The 12-ladder test team is in place and has installed and measured mechanical ladders in barrels and is ready to begin installing working ladders.

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for the month of October, 1999

Subsystem: Fiber Tracker and VLPCs
WBS: 1.1.2
Date Submitted: 11/15/1999
Submitted By: Alan D. Bross

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	<i>Detector</i>			
X	M2 - Assembly Design Complete	3/5/99	3/5/99	0 w
X	M2-First Cylinder Complete	9/2/99	9/2/99	0 w
X	M3-Fiber Tracker Ribbon Fabrication 50% Complete	11/5/99	11/12/99	-1 w
	M2-Fiber Tracker Assembly Begun	1/4/00	12/6/99	2.2 w
	M3-Fiber Tracker Cylinders 8, 7, 6, and 5 Complete	2/11/00	1/28/00	2.2 w
	Waveguide Production 50% Complete	2/28/00	1/29/00	4.16 w
	M3-Fiber Tracker Ribbon Fabrication Complete	3/6/00	3/6/00	0 w
	M3-Fiber Tracker Ribbon Mounting Complete	4/20/00	4/20/00	0 w
	M2-Fiber Tracker Assembly Complete	5/4/00	5/4/00	0 w
	M3-Waveguide Production Complete	7/6/00	6/5/00	4.6 w
	<i>VLPCs</i>			
X	M2-VLPC Production 50% Complete	8/31/97	8/31/97	0 w
X	M3-VLPC Production Complete	6/26/98	6/26/98	0 w
	M3-VLPC Cassette Assembly begun	11/18/99	11/18/99	0 w
	M3-VLPC Cassette Assembly 50% Complete	4/12/00	4/12/00	0 w
	M3-VLPC Cryo System Operational	6/12/00	6/12/00	0 w
	M3-VLPC Cassette Assembly Complete	8/22/00	8/22/00	0 w

Areas of Concern

Technical

VLPC cassette flex circuit delivery is still not up to production delivery rates. Flex circuit delivery will likely delay the start of cassette production.

Schedule

Start of VLPC cassette assembly, as mentioned above.

Completion of waveguide production. We have identified possible ways to remedy the four weeks of slippage in the waveguide production completion date. These include: additional manpower at Notre Dame, rearranging production schedules at Notre Dame and Indiana University, and/or using manpower which will become available when the ribbon fabrication is complete.

Resources

None

Cost

None

Change Requests

None

Progress Summary

- Ribbon production continued on schedule.
- Kuraray fiber deliveries are ahead of schedule.
- Carbon fiber work neared completion
- Final decision on connector material and purchase of a new milling machine to manufacture connectors at Fermilab

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for the month of October, 1999

Subsystem: Forward Preshower
WBS: 1.1.4
Date Submitted: 11/22/99
Submitted By: Jonathan Kotcher

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Forward Preshower Module Fabrication Begun	11/4/98	11/4/98	0 w
	Module Fabrication Complete	1/21/00	12/10/99	4 w
	M3-1st Forward Preshower Detector Complete	1/25/00	1/12/00	1.8 w
	M3-2nd Forward Preshower Detector Complete	2/22/00	3/8/00	-2.2 w

Areas of Concern

Technical

The primary technical area of concern remaining is the final bonding of the lead absorber. The spherical shape of this detector makes this a challenging section of the device. The lead and stainless steel elements have been machined by the BNL heavy shop, along with the tooling necessary to maintain the registration. Initial bonding has given excellent results, but a few details remain to be ironed out before final bonding of the 98 pieces needed for the final detector. This final bonding should take about 2 weeks.

Schedule

Staging the installation vertically at BNL before shipping it to FNAL may take longer than expected, but all steps are being taken to reduce the time needed for this to a minimum. Vertical mounting of the dome is complete, and we are awaiting parts from the shop in order to begin final mocking of the vertical installation procedure. No technical issues are of concern here.

Resources

Module cabling is limited by receiving potted and polished connectors from Fermilab - a process that is personnel driven - and by completion of the last two elements (inner and outer lead rings) from the BNL and Stony Brook shops. These elements should be finished and delivered the first week in December.

Cost

None

Change Requests

None

Progress Summary

All of the small modules were fabricated and then cut in the Brookhaven Central Shop during October. This includes all modules for the detector plus a subset of the needed spares. Half of the large modules for the south detector had calibration systems installed and tested. We received all necessary connector assemblies for cabling the remaining small modules for the south detector, and 50% of those necessary for the north FPS. These modules also were cabled during this month. Half of the 220 lead absorber pieces were received from the manufacturer and inspected at the BNL Central Shop. The 112 stainless steel pieces, stamped to shape and machined, were also delivered, as was the tooling for bonding the lead/stainless steel parts. First test pieces were bonded, and final adjustments to the procedure were developed. The 300 pound wooden dome-shaped mock-up of the end calorimeter cryostat head was fully dressed and re-mounted in the vertical position. It awaits final parts (inner and outer lead ring) from the Stony Brook and BNL shops. Final alignment of all support ribs and rings also was completed.

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Subsystem: Tracking Electronics
WBS: 1.1.5
Date Submitted: 11/19/99
Submitted By: Marvin Johnson

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	First Readout Crate Installed & Working	12/2/99	12/2/99	0 w
	Multichip Modules Received	3/8/00	2/23/00	2 w
	10 Digital Boards Available	4/19/00	3/22/00	4 w
	10 Analog Boards Available	5/3/00	4/19/00	2 w
	Mixer Boards Ready	6/21/00	6/22/00	-0.2 w

Areas of Concern

Technical

We still have not made a system with the SIFT chip operating at a 5 fC discriminator setting. This appears to be caused by clock noise on the board. Also, at the moment, the SIFT does not operate at 132 ns cycle time with a 70 ns charge acquisition window. However the chip operates at 396 nsec, which will be the operating time at the start of Run II.

Schedule

The schedule slippage is partly due to longer layout times and partly due to vendor delivery times (about half each). The longer layout times are hopefully a benefit to the schedule. We took extra time to review and correct layout errors with the hope that the time in schedule devoted to another prototype (about 4 weeks) can be shortened or eliminated. Currently, I do not know if the vendor time can be made up.

Resources

There is a concern that our task list is not complete so that additional electrical technicians may be required. Adding one or two now will be better than trying to add many more in the summer.

Cost

None

Change Requests

None

Progress Summary

The silicon system is being installed now and most of the work should be done by Christmas. The limitation for final check out will be the delivery of the interface boards from Kansas State. The digital designs for the fiber tracker are proceeding well. The noise issue was mentioned above.

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Subsystem: Calorimeter Electronics
WBS: 1.2.1
Date Submitted: 11/05/99
Submitted By: Mike Tuts

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	SCA Testing Complete	12/15/99	12/15/99	0 w
	M2-Calorimeter Preamp System Test Complete	4/4/00	3/31/00	0.4 w
	M3-Calorimeter CC, ECN Preamp Installation Complete	4/4/00	3/31/00	0.4 w
	Shaper Hybrid 50% Complete	5/9/00	5/9/00	0 w
	Daughterboard Vendor Production Complete	6/16/00	6/16/00	0 w
	BLS Motherboard Assembly Complete	8/7/00	8/7/00	0 w
	Timing System Installed	8/18/00	8/18/00	0 w
	M2-Calorimeter BLS Assembly Complete	9/26/00	9/26/00	0 w

Areas of Concern

Technical

We have more than 95% of all SCA's in hand. We have more than 70 wafers of 4" devices in hand that were expected to be packaged to provide spares and make up the balance. These devices have been under investigation because of initial low yields. We have been informed by the packaging vendor that they refuse to package these devices because the bond pads do not meet acceptable specifications. The situation is under investigation.

Schedule

We have incurred some delays in preamp power supplies (about 3 weeks), in part because of vendor delays and manpower shortages. This delay will not have an impact on the end date for this project. We have also incurred some delays (about 1-2 weeks) in BLS daughtercards prototype production due to faulty vendor test stations – this has been corrected. The prototype BLS motherboards are in hand, but the placement of the bid will be delayed for 1-2 weeks until the prototype daughtercards can be mounted on the motherboard and the full system tested. This is a concern as it may have an impact on the final schedule unless these delays can be recovered during production.

Resources

We have a requisition in the system for a contract electrical tech. That additional help could be used immediately.

Cost

The calorimeter electronics project has overrun by \$69k (out of \$4M). We do not expect any further overruns.

Change Requests

None

Progress Summary

- More than 20,000 calorimeter preamps were received (out of 55,000 total).
- Preamp power supplies are about 80% complete (80% of all 24 supplies).
- More than 400 preamp motherboards were received this month (out of 1,250 total).
- The BLS preproduction daughtercard was completed (5,000 pcs), but delivery was held up because of problems with the daughterboard tester.
- The SCL was successfully tested with calorimeter electronics.
- Further progress was made on the FPGA designs in the timing and control system.
- The software required to monitor the electronics performance was successfully tested and produced sigma and pedestal data.
- Testing of 4,000 SCAs was completed during this period.

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Subsystem: Intercryostat Detector
WBS: 1.2.2
Date Submitted: 11/18/99
Submitted By: Andy White

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	Drawers Ready	1/4/00	12/14/99	1 w
	M3-ICD Tile Modules Ready	1/11/00	1/18/00	-1 w
	M2-ICD Modules Arrive at Fermilab	1/18/00	1/25/00	-1 w

Areas of Concern

Technical

Need to show that Fiber Systems International (FSI) can produce acceptable 5m fiber cables with polished connectors. I-type preamps are reported to have tested outside specifications on rise time – we are determining if they are still acceptable.

Schedule

Future schedule will be affected by any further delay in I-type preamp delivery – this could delay the relative calibration of the ICD tile in the Cosmic Ray test stand at UTA prior to delivery to Fermilab.

Resources

None

Cost

Cost of fiber cables (to be determined by FSI) vs. Cost estimate.

Change Requests

None

Progress Summary

- 38 (32 + 6 spares) tile/fiber assemblies have been made and 3 tested with uniformity approximately 10% between corresponding sub-tiles.
- Improvements have been made to the motherboard and a six-channel prototype has been made.
- The HP calibration fibers have been cut to length and sent to Lab 7 for polishing.
- A new mounting fixture for the ICD/FPS has been agreed to with the FPS group.

DØ Upgrade Monthly Progress Report

for the month of October, 1999

Subsystem: Muon Central
WBS: 1.3.2
Date Submitted: 10/30/1999
Submitted By: Tom Diehl

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	PDT Commissioning Complete	6/16/00	6/9/00	1 w
	CFA Commissioning Complete	7/10/00	7/10/00	0 w

Areas of Concern

Technical

None

Schedule

None

Resources

Most of the work on the central muon system occurs at the DØ assembly building and is done by a small group of technicians and physicists, some of whom also work on other subprojects. There are concerns about a possible overallocation of those resources once the testing and installation of the forward muon system shielding begins.

Cost

None

Change Requests

None

Progress Summary

The central muon upgrade subproject is doing well. Infrastructure is being installed and commissioning is underway.

- 2% of the PDTs have been commissioned. A delay in reaching the goal of having 10% of PDTs commissioned has occurred because we await additional electronics. This delay will not impact the roll-in date. PDT HV testing also continued.
- Work is well under way on the remaining CFA installation tasks. These include: installation of the floor, the bottom A- ϕ counters, and their cables.
- Work on the calibration system is about 50% complete. It has been delayed by the late delivery of some light-mixing blocks that are being manufactured at Lab 3. However, about 3 weeks of slack still remains before they are needed to start commissioning of the B/C layer counters on schedule. This delay does not impact the roll-in date.

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Subsystem: Muon Forward Trigger Detectors
WBS: 1.3.3
Date Submitted: 11/06/99
Submitted By: Dmitri Denisov

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Muon Forward Trigger Counter Assembly 10% Complete	10/12/98	10/12/98	0 w
	All Pixel Octants Assembled	4/4/00	4/4/00	0 w
	All Muon Forward Trigger Detector Planes Installed	8/25/00	8/25/00	0 w

Areas of Concern

Technical:

None

Schedule:

Octant production is running about 2 weeks behind the baseline.

Resources:

Need another 3 Fermilab technicians to help with assembly (Note: these have been planned for, and requisitions have been approved);
Continued support of visitors from IHEP.

Cost:

None

Change Requests:

None

Progress Summary:

- Octant assembly is continuing with about a two-week delay relative to the baseline schedule. 22 octants out of a total of 48 have been completed. Plan to catch up by the end of November.

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Subsystem: Muon Forward Tracker
WBS: 1.3.4
Date Submitted: 11/06/99
Submitted By: Dmitri Denisov

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Muon Forward Tracker MDT Assembly 10% Complete	1/29/99	1/29/99	0 w
X	Arrival Of C-Layer MDT Modules At FNAL	11/3/99	10/22/99	2 w
	M2-All Muon Forward Tracker MDT Modules At Fermilab	3/10/00	3/10/00	0 w
	B-Layer Octants Assembled	4/18/00	4/18/00	0 w
	Muon Forward Tracker B-Layer Planes Installed	6/9/00	6/15/00	-0.8 w
	All MDT Octants Assembled	7/14/00	7/14/00	0 w
	All MDT Planes Installed	8/4/00	8/4/00	0 w

Areas of Concern

Technical:

Flatness of industrially-produced honeycomb panels for B and C layers.
Delivery of MDT mounting parts from vendor.

Schedule:

Running about 3 weeks later than the baseline schedule for assembly of MDT octants.

Resources:

Three more Fermilab technicians are needed (Note: requisitions have been approved). Engineering/designer resources will remain a critical item over the next few months because of the need to complete many drawings for this system. Support for JINR visitors.

Cost:

None.

Change Requests:

None.

Progress Summary

There has been considerable progress since last month. All A-layer drawings were finished, all parts were ordered and many were received. However, mass-production of octants has not started yet.

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Subsystem: Muon Electronics
WBS: 1.3.5
Date Submitted: 11/19/99
Submitted By: Boris Baldin

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	MDT ADB Fabrication Complete	12/2/99	12/2/99	0 w
	MDC Fabrication Complete	12/13/99	12/13/99	0 w
	M2-Muon Electronics Preproduction Installation Complete	12/13/99	12/13/99	0 w
	FEB, CB Production Complete	1/3/00	1/3/00	0 w
	SFE, SRC Fabrication Complete	2/3/00	2/3/00	0 w
	MRC, MFC Production Complete	3/27/00	3/27/00	0 w

Areas of Concern

Technical

Some design errors were found during SRC system tests.

Schedule

Possible delay in start of SRC production due to design errors.
Possible delay in estimated completion date for CB production.

Resources

None

Cost

Scintillator Electronics project (SFE) will require about an additional \$10k to complete. This will come from savings in other areas of the subproject.

Change Requests

None.

Progress Summary

- Currently, all muon electronics projects are in production except Scintillator Electronics and MFC.
- FEB production is 34% complete.
- CB production started later than scheduled, therefore the expected completion has been delayed.
- MDT ADB production is 91% complete.
- MDC production started on schedule.
- MDRC is awaiting arrival of the PNPI design engineer (no estimates here, visa problems).
- MRC production is 68% complete

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for the month of October, 1999

Subsystem: Trigger/Online
WBS: 1.4.1-1.4.5, 1.5.1
Date Submitted: 11/19/99
Submitted By: Jerry Blazey

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	SLICs Received	12/10/99	11/10/99	4.0 w
	M3-Establish Single Crate Internal Data Movement	1/6/00	1/6/00	0 w
	Preproduction MTCxx, MTFB, and MTCM Complete	1/24/00	1/24/00	0 w
	M3-Complete Cal Readout to L2	2/9/00	2/11/00	-0.4 w
	MBTs Received	3/16/00	3/16/00	0 w
	Steady DAQ Running	4/7/00	3/31/00	0.9 w
	M3-Muon Level 1 Trigger Preproduction Testing Complete	4/18/00	4/18/00	0 w
	Alpha Cards Received	5/15/00	5/15/00	0 w
	M3-L3 Operational	6/1/00	6/1/00	0 w
	Production MTCxx, MTFB, and MTCM Complete	6/27/00	6/27/00	0 w
	Global Installation Complete	7/12/00	7/12/00	0 w
	L2 Muon Installation Complete	7/26/00	7/26/00	0 w
	L2 CTT Installation Complete	8/9/00	8/9/00	0 w
	L2 Cal Installation Complete	8/21/00	8/21/00	0 w
	M3-Trigger Level 2 Commissioned	9/21/00	9/21/00	0 w

Areas of Concern

Technical

Initial timing settings for the Level 1 central fiber tracker multi-chip-module (MCM) permitted cross talk between the discriminator output and the SVX chip analog input. Timing adjustments eliminated this for 396ns crossings. Work is continuing on understanding operation for 132ns crossings. (See also Tracking Electronics report.)

Schedule

The technical problems with the MCM may have introduced a 1-month delay in the schedule. We are attempting to mitigate this with manpower adjustments. The "SLIC received" reportable milestone has been permitted to slip 4w to 12/10/99. This was by choice and will permit more thorough testing of preproduction FPGA code during a 4w slack period. There is no associated schedule risk.

Resources

The Level 1 central tracking trigger requires the addition of an electrical engineer, technician, and VHDL programmer. We are also trying to recruit non-DOE resources for this effort. These needs are somewhat exacerbated by the MCM studies.

Cost

The overall Level 2 budget is undergoing a review as production quantities of the major components have now been placed.

Change Requests

None

Progress Summary

- A Trigger Commissioning Workshop was held October 22, 1999 at Northern Illinois U. Each project reported on status and plans for commissioning. A rough commissioning outline is now available.
- Work proceeded on the Serial Command Link (SCL) and framework installation and commissioning. SCL-calorimeter controller, SCL-SVX controller, and SCL-framework communication has been established. The

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Level 1 framework has been extended to include FPGA capable of "AND/OR" or-ing. Cards have been installed for the Level 2 framework. There has been continued progress on the luminosity monitor detector assembly and electronics design.

- The Level 1 muon project is proceeding without problems. Preproduction testing of the muon trigger crate manager and serial link transmitters continues at Arizona. A preproduction muon trigger card was also received but testing has not yet begun. Testing continues at Boston on the prototype muon centroid crate manager and the muon centroid cards. Conversion of a FORTRAN simulator to C++ continues.
- Work continues on design of the Level 1 CTT digital and analog front-ends and the collector/broadcaster system for interfacing with the Level 1 framework and Level 2. Technical issues regarding the operation of the multi-chip-modules (MCM) at 132 ns are under study. The 8-MCM analog front end and backplane designs have been modified to accommodate the MCM requirements. Preliminary tests on a prototype mixer board, which reorganizes the axial fibers from a cylindrical geometry into trigger sectors, have been good. A prototype tracking daughter board is in construction. Work has commenced on the various algorithms required to operate the FPGA's in the Level 1 tracking system. A first version of the forward preshower Level 1 algorithm is complete. There has been an active effort to recruit assistance for the Level 1 CTT effort.
- Nearly all the Level 2 components have reached the preproduction or production stage: the purchase orders for the alpha processors were issued, five preproduction MBT modules were produced, twelve Level 2 muon DSPs were received, and studies of the DSP's and motherboards were extended an additional 4 weeks. CIC and SFO design work is on schedule. Great progress was made on software development and simulation for the entire Level 2 system. Level 2 CTT and Level 2 FPS TDR's were submitted. Design work on the Level 2 STT proceeded.
- Much of the Level 3/DAQ effort went into supporting the 10% silicon test and the DAQ system at DØ. Design work on the final hardware (in particular, the VRC) is proceeding well. The filtering group also prepared for the 10% test and continued tool development. The online group continued integration work. All elements of the primary (Level 3) and secondary (slow control) readout have been demonstrated to operate for the muon and calorimeter systems.

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October '00 Financial Summary

The first month of fiscal year 2000 closed with obligations for the DØ Upgrade Project totaling \$963K on equipment M&S funds and \$24K on Solenoid AIP Plant funds. An updated spending plan for equipment M&S has not yet been developed, thus spending performance as compared to the plan can not be analyzed at this time. The latest version of the Upgrade Project Cost Estimate needs to be loaded into the revised Project schedule before a spending plan can be extracted. In addition, the actual allocation of budget dollars was not distributed to the Project in October.

The M&S Upgrade Project balance is currently \$5,494K, excluding contingency. Recent additions by various foreign collaborators have increased the non-DoE funding by roughly \$300K bringing the total contributions to \$1,800K. These contributions help to reduce the M&S balance. The balance in AIP funds is \$296K. The remaining contingency was reevaluated in October and was presented at the November DoE review. Project management continues to watch spending closely in an effort to keep any available contingency. All sub-project managers will be asked to review spending and cost estimates on a monthly basis.

The Project currently has commitments with universities and other institutions in the DØ Collaboration, via active Memoranda of Understanding (MoU), totaling \$9,429K. These funds represent an obligation on the part of the DØ Upgrade Project and are regularly costed each month via invoices received from these institutions as work is completed. In addition, several institutions have made significant contributions to the DØ Upgrade. Below is a list of the universities and institutions involved as well as a more detailed breakdown of the commitments and costs.

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DZero Active MoUs as of 10/31/99

<u>Institution</u>	<u>Equipment</u>	<u>R&D</u>	<u>Total Costed</u>
Boston University	298,200	161,500	165,076
Brookhaven National Laboratory	236,439		123,000
Brown University	856,867	106,000	152,644
California State University, Fresno	26,160		0
Columbia University, Nevis Labs	140,000		45,879
DAPNIA / Saclay	0	0	0
IN2P3	0	0	0
Indiana University	65,000		13,618
Institute for High Energy Physics (IHEP)	404,512	15,000	156,911
Institute of Theoretical and Experimental Physics (ITEP)	42,537	5,000	47,437
Joint Institute for Nuclear Research (JINR)	1,391,286	22,000	1,132,590
Kansas State University	210,520	32,500	170,471
Louisiana Tech University	107,692		67,417
Michigan State University	1,445,027		1,011,951
Moscow State University	238,400		187,300
NIKHEF / Amsterdam	0	0	0
Northern Illinois University	143,000	8,000	103,600
Rice University		35,656	35,656
SUNY at Stony Brook	1,105,750	20,000	104,406
University of Arizona	747,648	256,500	365,504
University of Calif, Davis		9,720	0
University of Calif, Irvine	48,800		28,449
University of Calif, Riverside	89,116		84,310
University of IL, Chicago	129,103	22,000	66,001
University of Kansas, Center for Research, Inc.	16,000		0
University of Maryland	221,000		148,329
University of Michigan	206,500		167,897
University of Nebraska, Lincoln	95,913		0
University of Notre Dame	167,000	77,000	181,728
University of Oklahoma	43,000		27,994
University of Texas, Arlington	126,764		76,917
University of Washington	50,640	5,250	0
Total Fermilab Funds:	<u>\$8,652,874</u>	<u>\$776,126</u>	
Total Costed:	4,017,401	647,683	<u><u>\$4,665,084</u></u>
Total Open Commitments:	<u>\$4,635,472</u>	<u>\$128,443</u>	

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Reportable Milestone Summary

<u>Done</u>	<u>Reportable Milestone</u>	<u>Project</u>	<u>Date</u>	<u>Baseline</u>	<u>Var.</u>
X	M1-Solenoid Delivered to Fermilab	Master	5/12/97	5/12/97	0 w
X	M2-VLPC Production 50% Complete	VLPC Cassettes	8/31/97	8/31/97	0 w
X	M2-Central Preshower Module Fabrication Complete	Central Preshower	12/16/97	12/16/97	0 w
X	M2-Central Preshower Installed on Solenoid	Master	5/21/98	5/21/98	0 w
X	M1-Solenoid Installed and Tested	Solenoid Installation	9/30/98	9/30/98	0 w
X	M2-Muon Forward Trigger Counter Assembly 10% Complete	Muon Fwd Trigger	10/12/98	10/12/98	0 w
X	M2-Forward Preshower Module Fabrication Begun	Forward Preshower	11/4/98	11/4/98	0 w
X	M2-Muon Forward Tracker MDT Assembly 10% Complete	Muon Fwd Tracker	1/29/99	1/29/99	0 w
X	M2 - Assembly Design Complete	Fiber Tracker 98	3/5/99	3/5/99	0 w
X	M2-First Cylinder Complete	Fiber Tracker 98	9/2/99	9/2/99	0 w
X	H Half-Wedge Fabrication 20% Complete	Silicon Vertex 98	10/15/99	10/15/99	0 w
X	3 Chip Ladder Fabrication 80% Complete	Silicon Vertex 98	10/26/99	10/20/99	0.6 w
	Arrival Of C-Layer MDT Modules At FNAL	Muon Fwd Tracker	11/12/99	10/22/99	3.08 w
	9 Chip Ladder Fabrication 20% Complete	Silicon Vertex	11/3/99	11/3/99	0 w
	SLICs Received	Trigger	11/10/99	11/10/99	0 w
	M3-Fiber Tracker Ribbon Fabrication 50% Complete	Fiber Tracker	11/12/99	11/12/99	0 w
	First Readout Crate Installed & Working	Tracking Electronics	12/2/99	12/2/99	0 w
	MDT ADB Fabrication Complete	Muon Electronics	12/2/99	12/2/99	0 w
	M2-Fiber Tracker Assembly Begun	Fiber Tracker	1/4/00	12/6/99	2.2 w
	Module Fabrication Complete	Forward Preshower	1/21/00	12/10/99	4 w
	MDC Fabrication Complete	Muon Electronics	12/13/99	12/13/99	0 w
	M2-Muon Electronics Preproduction Installation Complete	Muon Electronics	12/13/99	12/13/99	0 w
	Drawers Ready	ICD	1/4/00	12/14/99	1 w
	SCA Testing Complete	Calor Electronics	12/15/99	12/15/99	0 w
	6 Chip Ladder Fabrication 20% Complete	Silicon Vertex	1/10/00	1/3/00	1 w
	FEB, CB Production Complete	Muon Electronics	1/3/00	1/3/00	0 w
	M3-Establish Single Crate Internal Data Movement	Trigger	1/6/00	1/6/00	0 w
	M3-1st Forward Preshower Detector Complete	Forward Preshower	1/25/00	1/12/00	1.8 w
	M3-ICD Tile Modules Ready	ICD	1/11/00	1/18/00	-1 w
	F Wedge Assemblies 20% Complete	Silicon Vertex	1/19/00	1/19/00	0 w
	Preproduction MTCxx, MTFB, and MTCM Complete	Muon Level 1	1/24/00	1/24/00	0 w
	M2-First Silicon Tracker Barrel/Disk Module Complete	Silicon Vertex	2/2/00	1/24/00	1.4 w
	M2-ICD Modules Arrive at Fermilab	ICD	1/18/00	1/25/00	-1 w
	M3-Fiber Tracker Cylinders 8, 7, 6, and 5 Complete	Fiber Tracker	2/11/00	1/28/00	2.2 w
	Waveguide Production 50% Complete	Fiber Tracker	2/28/00	1/29/00	4.16 w
	M3-InterCryostat Detectors Installed	Master	1/25/00	2/1/00	-1 w
	SFE, SRC Fabrication Complete	Muon Electronics	2/3/00	2/3/00	0 w
	M3-Level Ø-South Installed	Master	2/22/00	2/9/00	1.8 w
	M3-Complete Cal Readout to L2	Trigger	2/9/00	2/11/00	-0.4 w
	H Half-Wedge Fabrication 80% Complete	Silicon Vertex	2/23/00	2/23/00	0 w
	Multichip Modules Received	Fiber Electronics	3/8/00	2/23/00	2 w
	M3-Fiber Tracker Ribbon Fabrication Complete	Fiber Tracker	3/6/00	3/6/00	0 w
	M3-2nd Forward Preshower Detector Complete	Forward Preshower	2/22/00	3/8/00	-2.2 w
	M2-All Muon Forward Tracker MDT Modules At Fermilab	Muon Fwd Tracker	3/10/00	3/10/00	0 w
	6 Chip Ladder Fabrication 80% Complete	Silicon Vertex	3/21/00	3/14/00	1 w
	MBTs Received	Trigger	3/16/00	3/16/00	0 w
	10 Digital Boards Available	Fiber Electronics	4/19/00	3/22/00	4 w
	9 Chip Ladder Fabrication 80% Complete	Silicon Vertex	3/27/00	3/27/00	0 w
	MRC, MFC Production Complete	Muon Electronics	3/27/00	3/27/00	0 w
	M2-Calorimeter Preamp System Test Complete	Calor Electronics	4/4/00	3/31/00	0.4 w
	M3-Calorimeter CC, ECN Preamp Installation Complete	Calor Electronics	4/4/00	3/31/00	0.4 w
	Steady DAQ Running	Online	4/7/00	3/31/00	0.9 w

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<u>Done</u>	<u>Reportable Milestone</u>	<u>Project</u>	<u>Date</u>	<u>Baseline</u>	<u>Var.</u>
	All Pixel Octants Assembled	Muon Fwd Trig	4/4/00	4/4/00	0 w
	M3-VLPC Cassette Assembly 50% Complete	VLPC Cassettes	4/12/00	4/12/00	0 w
	B-Layer Octants Assembled	Muon Fwd Tracker	4/18/00	4/18/00	0 w
	M3-Muon Level 1 Trigger Preproduction Testing Complete	Muon Level 1	4/18/00	4/18/00	0 w
	10 Analog Boards Available	Fiber Electronics	5/3/00	4/19/00	2 w
	M3-Fiber Tracker Ribbon Mounting Complete	Fiber Tracker	4/20/00	4/20/00	0 w
	F Wedge Assemblies 80% Complete	Silicon Vertex	4/26/00	4/26/00	0 w
	M2-Fiber Tracker Assembly Complete	Fiber Tracker	5/4/00	5/4/00	0 w
	Shaper Hybrid 50% Complete	Calor Electronics	5/9/00	5/9/00	0 w
	Alpha Cards Received	Trigger	5/15/00	5/15/00	0 w
	M3-L3 Operational	Trigger	6/1/00	6/1/00	0 w
	M3-Waveguide Production Complete	Fiber Tracker	7/6/00	6/5/00	4.6 w
	PDT Commissioning Complete	Muon Cent Detector	6/16/00	6/9/00	1 w
	M3-VLPC Cryo System Operational	VLPC Cassettes	6/12/00	6/12/00	0 w
	Muon Forward Tracker B-Layer Planes Installed	Muon Fwd Tracker	6/9/00	6/15/00	-0.8 w
	Daughterboard Vendor Production Complete	Calor Electronics	6/16/00	6/16/00	0 w
	Mixer Boards Ready	Fiber Electronics	6/21/00	6/22/00	-0.2 w
	Production MTCxx, MTFB, and MTCM Complete	Muon Level 1	6/27/00	6/27/00	0 w
	H-disks Ready	Silicon Vertex	7/3/00	7/3/00	0 w
	CFA Commissioning Complete	Muon Cent Detector	7/10/00	7/10/00	0 w
	Global Installation Complete	Trigger	7/12/00	7/12/00	0 w
	All MDT Octants Assembled	Muon Fwd Tracker	7/14/00	7/14/00	0 w
	L2 Muon Installation Complete	Trigger	7/26/00	7/26/00	0 w
	All MDT Planes Installed	Muon Fwd Tracker	8/4/00	8/4/00	0 w
	BLS Motherboard Assembly Complete	Calor Electronics	8/7/00	8/7/00	0 w
	L2 CTT Installation Complete	Trigger	8/9/00	8/9/00	0 w
	Timing System Installed	Calor Electronics	8/18/00	8/18/00	0 w
	L2 Cal Installation Complete	Trigger	8/21/00	8/21/00	0 w
	M3-VLPC Cassette Assembly Complete	VLPC Cassettes	8/22/00	8/22/00	0 w
	M3-All Silicon Tracker Barrels/Disks Complete	Silicon Vertex	8/25/00	8/25/00	0.2 w
	All Muon Forward Trigger Detector Planes Installed	Muon Fwd Trig	8/25/00	8/25/00	0 w
	M1-Central Silicon Complete	Master	9/18/00	9/18/00	0.2 w
	Central Silicon Complete & Ready To Move To DAB	Silicon Vertex	9/18/00	9/18/00	0.2 w
	M3-Trigger Level 2 Commissioned	Trigger	9/21/00	9/21/00	0 w
	M2-Silicon Tracker Installed in Solenoid/Fiber Tracker	Master	9/25/00	9/25/00	0.2 w
	M2-Calorimeter BLS Assembly Complete	Calor Electronics	9/26/00	9/26/00	0 w
	M2-Muon End Toroids Installed on Platform	Master	11/15/00	11/15/00	0.2 w
	M1-Begin Shield Wall Removal/Ready to Roll-in	Master	11/22/00	11/22/00	0 w
	M1-Detector Rolled-in and Hooked Up	Master	2/2/01	2/2/01	-0.1 w