

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

**Subsystem:** Master Schedule and Overview  
**WBS:** All  
**Date Submitted:** 12/23/99  
**Submitted By:** Harry Weerts, Bill Freeman

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Central Preshower Module Fabrication Complete	12/16/97	12/16/97	0 w
X	M2-Central Preshower Installed on Solenoid	5/21/98	5/21/98	0 w
	M3-Level Ø-South Installed	2/22/00	2/9/00	1.8 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	12/6/00	11/22/00	1.6 w
	M1-Detector Rolled-in and Hooked Up	2/6/01	2/2/01	0.4 w

Note: Some reportable milestones previously listed in this Master report have been moved to their respective subproject reports (i.e. Solenoid, ICD, Silicon), Also note that the full set of reportable milestones are collected and sorted by date at the end of this report.

## Areas of Concern

### Technical

Refer to WBS level 3 system reports

### Schedule

Central silicon detector remains on the critical path to roll-in

### Resources

We continued to develop and refine details of the installation and commissioning schedule to better understand the resource needs during the coming year. A major effort in this direction occurred in November during preparations for the installation and commissioning Director's Review on Dec 7-8. The need for additional personnel resources became apparent.

### Cost

Use of contingency remains a concern.

## Change Requests

None

## Progress Summary

The Upgrade Project had a DoE Lehman review on Nov 4, 1999 where the revised schedule, with an emphasis on "realism", was presented. This new schedule results in a "ready for beam" date of Feb 6, 2001. The committee characterized this newly developed schedule as "reasonable but optimistic" and recommended that fall back plans should be developed to make sure that the March 1, 2001 official start date of Run II is met. It is now clear that all parties involved have agreed on starting Run II on March 1, 2001 and that DØ will develop the necessary fall back plans to assure that it will have a detector to participate in the start of Run II.

During the month of November the collaboration also completed the election of new spokespersons, H. Weerts and J. Womersley, and strengthened the upper management of the project. M. Tuts and H. Weerts continue as project managers, but two associate project managers have been added -- H. Montgomery is associate project manager for the tracking system, with an emphasis on the silicon microstrip detector, and J. Kotcher is associate project manager for Installation and Commissioning. This greatly clarifies the management structure for these aspects of the project. We also added M. Demarteau to the silicon management to replace R. Reay, who will resume teaching at KSU in January, 2000. The full organization chart can be found at: [http://www-d0.fnal.gov/newd0/d0\\_org.html](http://www-d0.fnal.gov/newd0/d0_org.html)

## **DØ Upgrade Monthly Progress Report**

for the month of November, 1999

During November we also agreed with the Laboratory that at the beginning of December, 1999 there would be a Director's Review of our Installation and Commissioning plans. We requested an early date for this review, which forced us to look at this phase of the project in detail before the end of the calendar year.

We also appointed our two senior engineers, Rick Hance and Kurt Krempetz, to serve as project engineers. Hance will oversee the entire electrical infrastructure in the hall, and Krempetz oversees all mechanical engineering efforts for DØ as well as the mechanical infrastructure in the assembly hall.

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

**Subsystem:** Solenoid  
**WBS:** 3.1.1  
**Date Submitted:** 12/14/99  
**Submitted By:** Gene Fisk

<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	M1-Solenoid Installed and Tested	9/30/98	9/30/98	0 w

## Areas of Concern

The only milestone of the solenoid project that is incomplete is the delivery and inspection of the beryllium beam tube. The vendor delivered the beam tube to us in November but we have not been able to reliably make-up the vacuum connections at the ends of the pipe with metal seals as required. As soon as other inspection tasks are completed the beam-tube will be returned to the vendor where it will be thoroughly cleaned and inspected for further rework.

### Technical

The beam-tube is difficult to manufacture and it must obtain high vacuum. The difficulties encountered in making reliable vacuum seals with metal O-rings must be understood and rectified.

### Schedule

The schedule for completion of the Solenoid AIP is delayed by the Be beam-tube problems. The beam-tube is needed by July 2000. In tests made with polymer plastic O-rings the beam-tube seemed to be leak tight, but a final inspection and leak check is required after the beam-tube is pumped under high vacuum at temperatures exceeding 300 C.

### Resources

Brush-Wellman Electrofusion personnel are prepared to work on this problem.

### Cost

We do not expect any significant cost increase in rectifying these problems. The conditions the vendor must meet are clearly detailed in their contract with Fermilab.

## Change Requests

A modification request for extension of the Solenoid AIP has been made to the Fermilab administration and they are contacting the DOE Fermi Group office.

## Progress Summary

All other progress on the Solenoid project proceeds without problems.

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

**Subsystem:** 1.1.1  
**WBS:** Silicon Tracker  
**Date Submitted:** 12/20/99  
**Submitted By:** Marcel Demarteau, Ron 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	11/4/99	11/3/99	0.2 w
	6 Chip Ladder Fabrication 20% Complete	1/19/00	1/3/00	2.4 w
	F Wedge Assemblies 20% Complete	1/24/00	1/19/00	0.5 w
	M2-First Silicon Tracker Barrel/Disk Module Complete	2/2/00	1/24/00	1.4 w
	9 Chip Ladder Fabrication 80% Complete	3/10/00	3/27/00	-2.2 w
	6 Chip Ladder Fabrication 80% Complete	3/21/00	3/14/00	1 w
	H Half-Wedge Fabrication 80% Complete	3/29/00	2/23/00	5 w
	F Wedge Assemblies 80% Complete	5/3/00	4/26/00	1 w
	H-disks Ready	8/15/00	7/3/00	6 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
	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

## Areas of Concern

### Technical

- Areas of excess noise in the 90-degree ladders were found to be 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.
- Recently a problem with non-uniform depletion voltage across detectors was discovered. Approximately 23% of sensors for CDF are affected and a similar or smaller number of sensors for DØ. Tests are being implemented to uncover this defect. It is possible that sensors that exhibit this flaw will have to be accepted as detector-grade.
- There is a few-percent failure rate for n-side capacitors at final bias voltage. Work is still underway to understand the final testing and burn-in specifications based on our experience with the first 30-40 ladders.
- The low yield of HDI stuffing at Promex is still a concern. The company recently "lost" 14 F-disk HDIs. The first pass of HDIs received from Silitronics showed similar problems as Promex, but we are hopeful that the yield will be higher at this company.
- Initial tests with various final low-mass cables of varying lengths showed a narrowing of clock signals that are driven by the SVX chip. Changing the termination at the sending and receiving end brought the signals within a good operating margin.

### Schedule

Ladder production has slowed due to some of the fixtures being out of specification. Two fixtures were re-qualified and yielded mechanically acceptable ladders. Two additional fixtures are currently being qualified. All ladders that have been fabricated have been re-measured. A few of them will need to be retrofitted to fall within our specifications. F-wedge production has started and it is anticipated that 12 wedge detectors will be built by the end of December. We are in the process of reevaluating the schedule based on our current understanding of production rates and parts availability.

### Resources

Ladder production has been strengthened with the addition a production technician. Two other personnel were also added to support overall technical efforts. Training for some of these tasks, however, takes 2-3 months so this influx of people will not be felt for some time. We do not have the ability to work multiple shifts. Physicist manpower is still needed in all areas. Also, Marcel Demarteau was appointed co-leader of the silicon effort and will replace Bill Reay who will resume teaching at Kansas State University.

# **DØ Upgrade Monthly Progress Report**

for the month of November, 1999

## **Cost**

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

## **Change Requests**

None

## **Progress Summary**

All detector types are now in production. A set of 12 F-wedges should be built by the end of the year. Eighty percent of the 3-chip ladders and 20% of the 9-chip ladders have been built. Currently 8 90-degree 6-chip ladders have been produced and the detectors are being tested. H-wedge production is 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. The low yields of HDI stuffing remains a problem. The 12-ladder test team is in place and has installed and measured mechanical ladders in barrels. The read out system is being prepared to take cosmic-ray data.

# DØ Upgrade Monthly Progress Report

for the month of November, 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	-0.1 w
	M2-Fiber Tracker Assembly Begun	1/18/00	12/6/99	4.2 w
	M3-Fiber Tracker Cylinders 8, 7, 6, and 5 Complete	2/25/00	1/28/00	4.2 w
	Waveguide Production 50% Complete	3/1/00	1/29/00	4.5 w
	M3-Fiber Tracker Ribbon Fabrication Complete	3/6/00	3/6/00	0 w
	M3-Fiber Tracker Ribbon Mounting Complete	4/27/00	4/20/00	1.1 w
	M2-Fiber Tracker Assembly Complete	5/11/00	5/4/00	1.1 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
	M3-VLPC Cassette Assembly 50% Complete	5/24/00	4/12/00	6 w
	M3-VLPC Cryo System Operational	6/12/00	6/12/00	0 w
	M3-VLPC Cassette Assembly Complete	10/4/00	8/22/00	6 w

## Areas of Concern

### Technical

VLPC cassette flex circuit delivery is still not up to production delivery rates. However, we have received new shipments and the circuits look good.

### Schedule

Start of VLPC cassette assembly.

### Resources

We would like three additional technicians and a CMM operator for the months of January, February, and March. This would give us a better than 95% chance of meeting a 5/4/00 completion date for fiber tracker assembly complete. The 4.6-week delay in the waveguide completion date has been addressed by hiring an additional technician at Notre Dame.

### Cost

None

## Change Requests

A schedule change request will be prepared and submitted to the PMG for the 4.2-week slippage in the M2 milestone "Fiber Tracker Assembly Begun". This slippage is due to a hold in getting some requisitions out of the Fermilab procurement system and the need for some additional engineering/drafting time. The completion of the fiber tracker assembly has not slipped by a corresponding 4 weeks because there was some slack between the time the nesting machine was needed and when Cylinder 8 was to be ready. A subsequent delay in having the nesting cart ready has reduced this slack in the fiber tracker subproject to zero, with the net effect being only a one-week slippage in the "Fiber Tracker Assembly Complete" milestone.

## Progress Summary

- Ribbon production continued on schedule.
- Kuraray fiber deliveries are ahead of schedule.
- Carbon fiber work completed.
- Ribbon mounting on cylinder 8 – axial layer complete.

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

**Subsystem:** Forward Preshower  
**WBS:** 1.1.4  
**Date Submitted:** 12/20/99  
**Submitted By:** Abid Patwa

<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 and Testing 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 remaining technical area of concern is the assembly of the lead absorber elements with their respective supporting units. The spherical shape of the detector makes this a challenging section of the device. Although all the lead and stainless steel pieces have arrived from the BNL heavy shop and a method for bonding each element has been devised, final production awaits the inner and outer support ring structure that is expected to arrive in December. These supporting units will maintain proper registration of all the bonded lead pieces and provide precision alignment of the full unit.

### Schedule

Staging the installation vertically at BNL before shipping it to FNAL may take longer than expected, but all necessary steps are being taken to reduce the time needed for this to a minimum. Assembly of the detector on the vertically mounted spherical dome gradually continued but awaits parts from the shop in order to finish.

### Resources

None

### Cost

None

## Change Requests

None

## Progress Summary

Cabling of the remaining small modules for the south detector was completed and after receiving additional connector assemblies from Fermilab-Lab 3, cabling of the four special modules that are needed in the south detector started. Installation and testing of LED calibration systems continued with all the large modules for the south detector complete, and 50% of the large modules in the north FPS. Testing of similar but modified calibration systems for the small modules started and final adjustments in their required light distribution level are being made. The process of certifying completed, fully functional modules to a stage that they are ready for installation into the detector support structure started, with modules for the first layer in the south FPS complete. All the 239 lead absorber pieces were received from the manufacturer and inspected at the BNL Central Shop. Additional pieces were bonded and an assembly procedure has been developed. Full production awaits final parts (inner and outer lead support rings) from the Stony Brook and BNL shops. Mounting and initial alignment of the detector support ribs and rings began on the vertically positioned 300-pound wooden dome, spherically shaped to mock the end calorimeter cryostat head.

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

**Subsystem:** Tracking Electronics  
**WBS:** 1.1.5  
**Date Submitted:** 12/20/99  
**Submitted By:** Marvin Johnson

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	First Readout Crate Installed & Working	11/16/99	12/2/99	-2 w
	Multichip Modules Received	3/8/00	2/23/00	2 w
	10 Analog Boards Available	5/3/00	4/19/00	2 w
	10 Digital Boards Available	5/10/00	3/22/00	7 w
	Mixer Boards Ready	7/27/00	6/22/00	4.8 w

## Areas of Concern

### Technical

None

### Schedule

We are more than 4 weeks behind on delivering the digital motherboard. The mother and daughter boards will arrive in December and will be tested in early January. We have successfully tested all the communications protocol on a special test board. Time has been allocated in the schedule for rework and retesting of the board. However, we feel that most of this time will not be needed. This will put us roughly back on schedule.

### Resources

None

### Cost

None

## Change Requests

None

## Progress Summary

Work continued on testing VRB crates for the silicon. We have a modification to the VIPA crates so that the insertion force for the VBD module is reduced. This modification worked well for one crate and we are in the process of trying it on a few other crates. All the rack preparation for all the silicon VRB crates is done (power supplies, wiring, cooling etc) except the crate installation itself. The later is waiting on the above tests. We expect to have most or all of the VRB's and sequencers installed and working by early February.

The Multichip module tests were nearly completed and changes to the substrate were sent to the vendor. Design of the digital daughter boards was completed. Progress continued on the re-layout of the analog front-end board. Work started on cable routing and other infrastructure tasks.

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

**Subsystem:** Calorimeter Electronics  
**WBS:** 1.2.1  
**Date Submitted:** 12/16/99  
**Submitted By:** Mike Tuts

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	SCA Testing Complete	11/23/99	12/15/99	-2.8 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	7/10/00	6/16/00	3 w
	Timing System Installed	8/18/00	8/18/00	0 w
	BLS Motherboard Assembly Complete	8/28/00	8/7/00	3 w
	M2-Calorimeter BLS Assembly Complete	10/17/00	9/26/00	3 w

## Areas of Concern

### Technical

Our technical efforts have focused on improving the cooling for the preamp box. Recent tests with a full set of production preamps and the present cooling system indicate that the temperature rise in certain sections of the box reached 50 °C. We are investigating options and have a Nevis Labs designer working on the problem. It is unknown how much rework of the existing preamp boxes this will entail.

### Schedule

The SCA testing milestone was completed ahead of schedule. Unfortunately, the problems with the final packaging of the remaining 4" wafer lots will probably require additional SCAs. It is not expected to have a schedule impact. The delays in the above milestones relative to the baseline have been caused by the need for an additional prototype cycle for the BLS motherboard and daughter cards because of necessary design changes. This will cause about a 2-3 week delay that presently will translate into delay in the start of the cosmic ray running, but it does not effect the overall project end date. It may be possible to recover that delay during production. Delays in obtaining power supplies for the calibration system have delayed the final testing for that system by 4-6 weeks. There is sufficient slack in this project that it has no significant schedule impact. Finally, we expect that we will have to exercise the option of replacing power transformers in the BLS power supplies because of larger-than-predicted current loads. The schedule impact is as yet unknown.

### Resources

We are presently interviewing electrical technicians to fill one open contract requisition. We have used overtime when appropriate to try and recover schedule delays in the preamp power supply fabrication.

### Cost

The cost risks focus on production issues and yields. We expect we will be short on the SCAs by about 5% because of difficulties in getting our vendor (ASAT) to bond the devices from the 4" lots. We have started negotiations with business services at Fermilab to see if we can obtain additional SCAs from the chip vendor at reduced prices or for free to make up for the extremely low yields we obtained earlier. There is some concern that the BLS boards are more complex than originally expected, and hence this may have some cost impact. We are working with potential vendors to try and mitigate this cost impact.

## Change Requests

None

# **DØ Upgrade Monthly Progress Report**

for the month of November, 1999

## **Progress Summary**

- All preamps (54,000) have been delivered from Taiyo-Yuden (55,000 total). The balance (1,000) will be produced by a U.S. vendor from whom we have received prototypes that are under test.
- About 20,000 of the required 25,000 SCAs have tested good.
- Preamp power supplies are 90% complete (24 total).
- We have received 1,000 preamp motherboards (1,250 total).
- Preamp motherboard assembly has started and 60 boards have been delivered (1,250 total).
- All pre-production BLS shaper hybrids have been delivered (5,000).
- The pulser system (except for power supplies) was installed, and the first tests were successfully completed. Further debugging is underway.
- Steady progress on the calorimeter software continued.

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

**Subsystem:** Intercryostat Detector  
**WBS:** 1.2.2  
**Date Submitted:** 12/20/99  
**Submitted By:** Andy White

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	Drawers Ready	2/25/00	12/14/99	8.6 w
	M3-ICD Tile Modules Ready	2/29/00	1/18/00	6 w
	M2-ICD Modules Arrive at Fermilab	3/7/00	1/25/00	6 w
	M3-InterCryostat Detectors Installed	3/14/00	2/1/00	6 w

## Areas of Concern

### Technical

Rerouted some of the short WLS fibers to avoid excessive bending.  
Still need to determine whether Fiber Systems International (FSI) can produce good fiber cables.

### Schedule

I-type preamps are not expected to arrive until early January, 2000. This implies that we will probably not be able to do relative calibrations on all supertiles prior to shipping to Fermilab. The six week slippage in the ICD installation date must be coordinated with the forward preshower installation, but it is still far from the critical path for roll-in of the detector.

### Resources

None

### Cost

Need to determine fiber cable costs from FSI.

## Change Requests

None

## Progress Summary

- 8 supertiles were tested with good uniformity results.
- 15 box assemblies were completed (mechanically) and are ready for supertiles.
- Design/review/updates of electronics motherboards.
- Assembly of calibration LMB/HP fibers began.

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

**Subsystem:** Muon Central  
**WBS:** 1.3.2  
**Date Submitted:** 11/30/99  
**Submitted By:** Tom Diehl

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	PDT Commissioning Complete	7/17/00	6/9/00	5 w
	CFA Commissioning Complete	8/16/00	7/10/00	5.5 w

## Areas of Concern

### Technical

None

### Schedule

The two central muon reportable milestones slipped during the month of November. The PDT commissioning milestone slipped because of the change in the arrival date of the front-end boards and control boards in the muon electronics schedule. The CFA commissioning milestone slipped for a similar reason, the change in the arrival date of the SFE and SRC cards in the muon electronics schedule. Despite the change in the schedule, there are still several months of contingency remaining for commissioning.

### Resources

Concerns about the technical manpower available for muon central installation tasks were expressed in last month's report. While it is clear that there is still a general shortage of technical manpower at DAB, the two installation items that caused concern, the PDT gas system and cabling installation, are now being addressed and technicians are working on them. The next most serious personnel issue is the small number of physicists available for commissioning the central muon detectors. At this time, there are 2.8 FTE physicists and no post-docs working on what amounts to three major detectors.

### Cost

None

## Change Requests

None

## Progress Summary

The central muon upgrade continues to do relatively well. Despite the shortage in personnel resources, our schedule is driven by arrival of the electronics as opposed to infrastructure.

- PDT HV testing was completed on 11/22/99.
- CFA installation should be completed by 12/15/99. It has taken more effort to install the A-Layer floor than was anticipated, however the problems have been straightforward. Commissioning 10% of the CFA system, scheduled for the end of January, awaits prototype electronics and may slip. There is no slack on this task within the muon central subproject, but it remains far from the critical path for roll-in of the detector.
- Completion of the calibration system will not occur in mid-December as originally scheduled, since priority has been given (correctly) to installation of the forward muon trigger counter calibration system. Therefore, the muon central system may be delayed by about a month. This is not a critical path item.

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

**Subsystem:** Muon Forward Trigger Detectors  
**WBS:** 1.3.3  
**Date Submitted:** 12/14/99  
**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	9/15/00	8/25/00	2.8 w

## Areas of Concern

### Technical

None

### Schedule

None

### Resources

Although this project is on schedule, possible slack could have been created this month if more of the technical manpower allocated to this subproject would have been available for it. This shortage is in part due to difficulties in filling existing openings for technicians.

### Cost

Within cost estimate

## Change Requests

None

## Progress Summary

Assembly of octants is moving at the desired production rate. We are starting to re-orient manpower efforts toward installation.

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

**Subsystem:** Muon Forward Tracker  
**WBS:** 1.3.4  
**Date Submitted:** 12/14/99  
**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	1.7 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

The noise levels of the amplifier discriminator boards (ADBs) are above specifications. Detailed studies are needed to improve the noise level.

### Schedule

Full-scale assembly of MDT octants for A-layer was not started on schedule. This could delay the sub-project end date by about a month depending on the actual assembly rate that is achieved. Details to be determined after full assembly is going smoothly.

### Resources

The number of Fermilab technicians involved in the project is 30% below the request. This and the large amount of engineering needed for the forward muon system have affected the overall MDT octant assembly schedule.

### Cost

None

## Change Requests

None

## Progress Summary

The major effort this month concentrated on getting a full-scale octant, based on the final design, built and tested. Preliminary results demonstrated that the gas and HV systems were well within specifications.

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

**Subsystem:** Muon Electronics  
**WBS:** 1.3.5  
**Date Submitted:** 12/17/99  
**Submitted By:** Boris Baldin

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	MDT ADB Fabrication Complete	12/2/99	12/2/99	0 w
	MDC Fabrication Complete	1/3/00	12/13/99	1 w
	M2-Muon Electronics Preproduction Installation Complete	1/17/00	12/13/99	3 w
	FEB, CB Production Complete	1/31/00	1/3/00	4 w
	SFE, SRC Fabrication Complete	3/13/00	2/3/00	5.5 w
	MRC, MFC Production Complete	4/12/00	3/27/00	2.4 w

## Areas of Concern

### Technical

SFE, SRC projects are delayed due to technical difficulties and low manpower.

### Schedule

SFE, SRC, and MFC projects are the source of the 3w delay in the "Muon Electronics Preproduction Installation Complete" M2 milestone.

### Resources

None

### Cost

Change request has been submitted for SFE production to cover additional costs.

## Change Requests

SFE production (WBS 1.3.5.3.2.4) requires additional funding of \$10,000. This money could be transferred from the MDC production budget (WBS 1.3.5.2.3.5) that has some savings in production costs.

## Progress Summary

Up-to-date on all the projects that are in production except for Scintillator electronics and the muon fanout card (MFC).

- MDT amplifier-discriminator board (ADB) production is complete.
- Muon readout card (MRC) production is complete.
- Front-end board (FEB) production is 52% complete; a delay in completion is expected due to PCB vendor delivery.
- Control board (CB) production is 5% complete.
- Muon digitizing card (MDC) production began on schedule; a 3-week delay in completion is expected due to parts delivery.
- MDT readout controller (MDRC) is awaiting arrival of the PNPI design engineer (no estimates of the delay; depends on resolution of visa problems).

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

**Subsystem:** Trigger  
**WBS:** 1.4.1-1.4.5  
**Date Submitted:** 12/15/99  
**Submitted By:** Gerald C. Blazey

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	SLICs Received	12/10/99	11/10/99	4 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- Cal Readout Available to L2	3/8/00	2/11/00	3.6 w
	MBTs Received	3/16/00	3/16/00	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
	M3-Muon Level 1 Trigger Preproduction Testing Complete	7/6/00	4/18/00	11 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

Problems with the SIFT and MCM components have been resolved.

### Schedule

- Final commissioning of the Level 2 Framework has slipped from December to January. This delay affects delivery of Level 1 calorimeter components since the same group is responsible for Framework and Level 1 CAL. The schedule adjustments are under study; however several months slack available prior to roll-in indicate that no project delays will occur.
- Testing of muon Level 1 MCEN, MCPB, and MCCM prototypes has been delayed approximately 2-3 months. Manpower has been added to the task to recover some of the delay.
- The Level 2 Alpha vendor quote failed to include approximately \$1100 worth of parts per board. These are socketed parts so the construction and assembly of the alphas will not be delayed, and costs are still within budget. However, procurement of the neglected parts may result in a delay of the final working boards. This extent of this delay is not yet known but should be less than one month.

### Resources

- The Level 3 trigger project requires an Windows NT professional to assist with code management.
- The trigger project will also require an additional ~1FTE technician to help with cable and crate installation, one electrical engineer to help with VHDL coding, and one electrical engineer to assist with design of the Level 1 CTT/CPS, Level 1 FPS system. We are trying to locate the additional technical help within the collaboration.

### Cost

None

## Change Requests

Added WBS 1.4.3.1.10 and \$12.2k for Level 1 Calorimeter power supplies and crates.

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

## Progress Summary

In general, nearly all parts of the Level 1, Level 2, and Level 3 components are in preproduction or production stages. Algorithm development is also proceeding. Only a few schedule delays have been encountered and we are trying to minimize impact.

- Design work to address timing requirements for the Level 1 framework pseudo-terms continued, and Level 2 framework installation is underway. Testing of Level 1 Muon preproduction MTCXX cards began and testing of MCCM and MCEN cards continued. Cross talk problems in the Level 1 central track trigger multichip modules were resolved by modifying the substrate design. The 8-MCM and analog front-end board layouts continued. Tests of the mixer prototype were successful. A digital front-end daughter board was designed and built. Design of trigger algorithms for the CTT/CPS and FPS progressed.
- Level 2 alpha production is proceeding but may be delayed about one month because of a vendor oversight. A prototype magic-bus transceiver was stuffed and tested. Second-level input computer (SLIC) cards were received and production tests are in preparation. Cable input converter and serial command link fanout prototypes were produced and some populated. Cabling and installation discussions of Level 2 also began. All preprocessor algorithm studies are in advanced states, in particular Level 2 timing tests meet specifications. Level 2 silicon track trigger design continued.
- Level 3/DAQ support of the Silicon 10% test and the CFT test continues. A VRC emulator has been installed in the movable counting house. A hardware version design is done with arrival at Brown expected in December. Level 1/Level 2 trigger simulation is 50% complete. Ntuple production is now a regular process. A design group has been formed to establish specifications for full trigger verification.

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

**Subsystem:** Online  
**WBS:** 1.5.1  
**Date Submitted:** 12/21/99  
**Submitted By:** Stuart Fuess

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	Steady DAQ Running	4/7/00	3/31/00	0.9 w

## Areas of Concern

### Technical

None

### Schedule

None

### Personnel

None

### Cost

None

## Change Requests

None

## Progress Summary

Activity centered on integration efforts associated with an 11/1/99 internal milestone. The goal for this milestone was to achieve unified control of the entire DAQ path by means of the COOR process. We satisfied the requirements of the milestone on 11/19/99, demonstrated by using the TAKER run interface to define a run using a single muon crate, read out via the secondary DAQ path to the Online host applications, logged, and simultaneously analyzed in real time. We were able to start and stop successive runs. The similar procedure via the primary, Level 3, data path still lacks some communication links, but is expected to be available with minimal additional effort. This milestone is a step towards providing an integrated system easily configured and operated in a detector commissioning role (the 4/7/00 reportable milestone listed above).

In addition to the DAQ integration activity, the Online group in conjunction with detector groups and offline analysis groups is attempting to further refine the ORACLE database structure for the configuration, monitoring, and calibration of the detector. Several existing database designs are being merged or otherwise interlinked. The current focus is upon the relations needed for the operation of the SMT detector; personnel from other detectors are participating in the discussion as a prelude to the production of their specific designs.

# **DØ Upgrade Monthly Progress Report**

for the month of November, 1999

## **November '99 Financial Summary**

The second month of fiscal year 2000 closed with obligations for the DØ Upgrade Project totaling \$1,200K on equipment M&S funds and \$36K on Solenoid AIP Plant funds. A spending plan, which shows that spending is thus far on target for FY00, has been derived from the current Project schedule. Because the latest version of the Upgrade Project Cost Estimate still needs to be loaded into the Project's schedule, the probability for changes to this spending plan is high. The Project was allocated an M&S budget of \$3,104K during November. DØ expects to spend the full FY00 budget. The remaining DoE funding of \$400K will be allocated during fiscal year 2001.

The M&S Upgrade Project balance is currently \$4,894K, excluding contingency. Non-DoE contributions to the Upgrade currently total \$1,800K. These contributions help to reduce the M&S balance. DØ Upgrade Spokespersons are in the process of negotiating additional contributions, but at this time these funds are still unspecified. The balance in AIP funds is \$284K. Once the Solenoid Project is complete, the unobligated AIP balance will be transferred to Upgrade M&S Equipment as budget dollars to be spent in either FY00 or FY01. Although some claims have been made on the contingency total presented at the November DoE review, management will continue to watch spending closely in an effort to reduce further decreases in the total contingency. All sub-project managers are continuously asked to review spending and if necessary, reevaluate cost estimates. See the following chart and table for further details concerning budget and spending.

The Project currently has commitments with universities and other institutions in the DØ Collaboration, via active Memoranda of Understanding (MoU), totaling \$9,635K. 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. A list of the universities and institutions involved as well as a more detailed breakdown of the commitments and costs follows.

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

## FY00 Financial Report as of 11/30/99

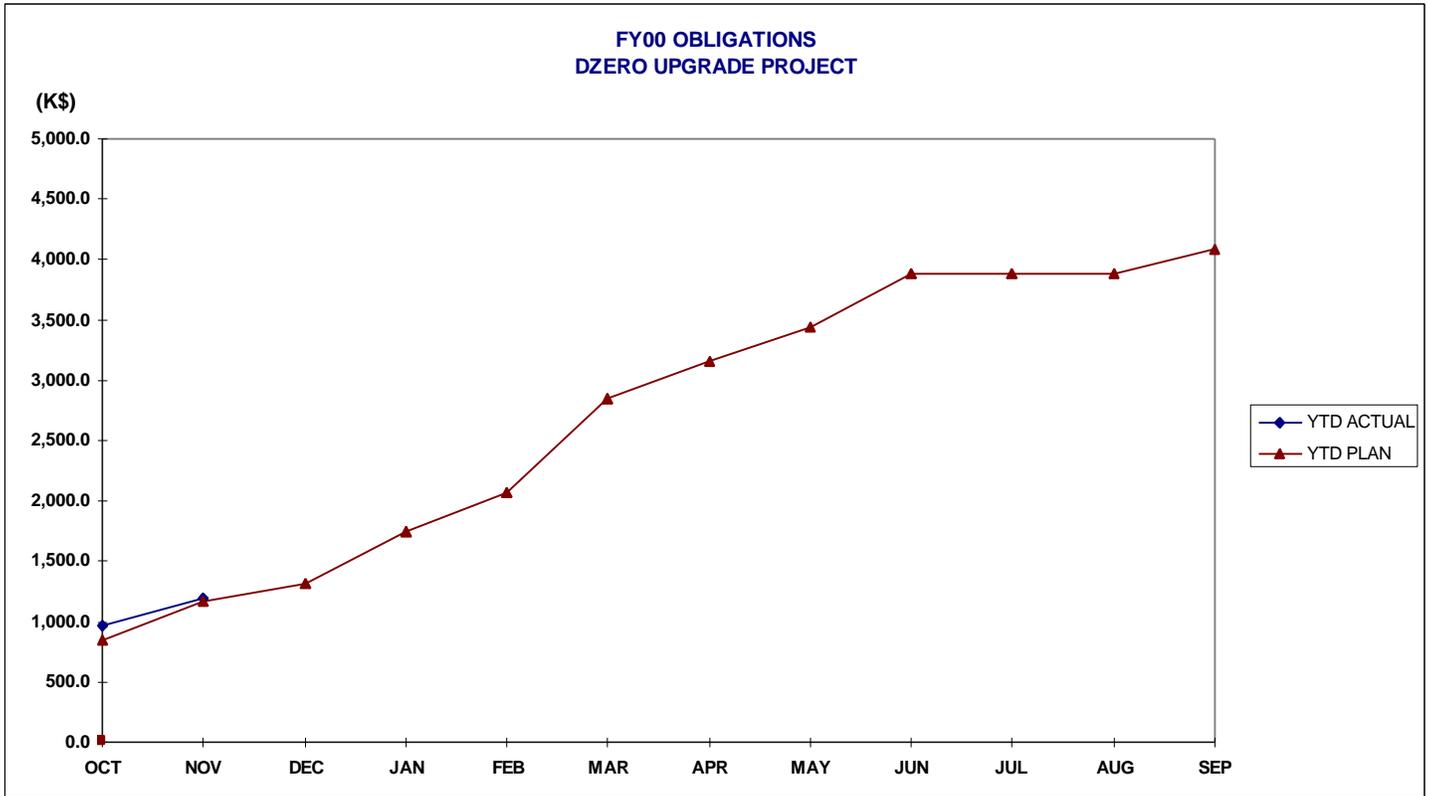
	<u>COST</u> <u>ESTIMATE</u>	<u>PRIOR YR</u> <u>OBLIG</u>	<u>FY 00</u> <u>YTD OBLIG</u>	<u>PROJECT</u> <u>BALANCE</u>
1 TOTAL DZERO UPGRADE PROJECT	40,351.2	34,257.9	1,199.7	4,893.6
1.1 TRACKING DETECTORS	19,137.5	16,818.0	946.9	1,372.6
1.1.1 SILICON TRACKER	7,578.6	6,192.0	678.7	707.9
1.1.2 FIBER TRACKER	7,281.1	6,976.3	201.3	103.5
1.1.3 CENTRAL PRESHOWER DETECTOR	238.1	238.2	0.0	-0.1
1.1.4 FORWARD PRESHOWER DETECTOR	510.9	500.3	0.0	10.6
1.1.5 TRACKING ELECTRONICS	3,528.7	2,911.1	66.8	550.7
1.2 CALORIMETER	4,618.1	4,161.6	18.0	438.4
1.2.1 FRONT-END ELECTRONICS	4,315.8	3,913.8	17.4	384.7
1.2.2 INTERCRYOSTAT DETECTOR	302.2	247.9	0.6	53.8
1.3 MUON DETECTORS	9,284.7	7,791.9	178.3	1,314.6
1.3.1 COSMIC RAY SCINTILLATOR	1,223.2	963.2	0.0	260.0
1.3.2 CENTRAL TRIGGER DETECTORS	910.3	720.6	11.4	178.2
1.3.3 FORWARD TRIGGER DETECTOR	2,033.6	1,635.3	20.0	378.3
1.3.4 FORWARD TRACKING DETECTOR	1,213.4	936.5	105.6	171.3
1.3.5 FRONT-END ELECTRONICS	3,904.3	3,536.2	41.3	326.7
1.4 TRIGGER	6,588.9	5,193.1	0.0	1,395.9
1.4.1 FRAMEWORK	1,859.4	1,859.4	0.0	0.0
1.4.2 LEVEL 0	136.4	124.2	0.0	12.2
1.4.3 LEVEL 1	1,427.9	1,120.0	0.0	308.0
1.4.4 LEVEL 2	2,079.8	1,275.9	0.0	803.9
1.4.5 LEVEL 3	1,085.5	813.7	0.0	271.8
1.5 ONLINE EQUIPMENT	722.0	293.4	56.6	372.1
1.5.1 ON-LINE EQUIPMENT	722.0	293.4	56.6	372.1
<hr style="border-top: 1px dashed black;"/>				
3.1 TOTAL SOLENOID PROJECT	5,168.0	4,848.0	36.0	284.0
3.1.1 SOLENOID	5,168.0	4,848.0	36.0	284.0

### DEFINITION OF TERMS:

Funds: DØ Upgrade = M&S Equipment Funds; Solenoid = AIP Plant Funds.  
 Cost Estimate: Total Project and Sub-Project Budgets without contingency.  
 Prior Year Obligations: Obligations for fiscal years '92 through '99 as applicable.  
 FY 99 Year-to-Date Obligations: Obligations for fiscal year '00.  
 Project Balance: Cost Estimate - (Prior Year Obligations + Fiscal 00 YTD Obligations)  
 DØ FY 99 Plan: The M&S funds allocated to the Project/Sub-Projects as extracted from the current schedule.  
 DØ FY 99 Balance: DØ FY 00 Plan - FY 00 Year-to-Date Obligations

# DØ Upgrade Monthly Progress Report

for the month of November, 1999



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
<b>YTD ACTUAL</b>	962.6	1,199.8										
<b>YTD PLAN</b>	843.0	1,164.0	1,316.0	1,754.0	2,076.0	2,845.0	3,158.0	3,439.0	3,884.0	3,884.0	3,884.0	4,086.0

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

## Active MOUs as of 11/30/99

	<u>EQUIPMENT</u>	<u>R&amp;D</u>	<u>COSTED</u>
Boston University	298,200	161,500	165,076
Brookhaven National Laboratory	236,439		137,902
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	190,031
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	323,820	125,012	197,555
Louisiana Tech University	107,692		67,417
Michigan State University	1,445,027		1,011,951
Moscow State University	238,400		219,200
NIKHEF / Amsterdam	0	0	0
Northern Illinois University	143,000	8,000	113,600
Rice University		35,656	35,656
SUNY at Stony Brook	1,105,750	20,000	181,913
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	196,194
University of Oklahoma	43,000		28,755
University of Texas, Arlington	126,764		87,371
<u>University of Washington</u>	<u>50,640</u>	<u>5,250</u>	<u>38,538</u>
Total Fermilab Funds:	<u>\$8,766,174</u>	<u>\$868,638</u>	
Total Costed:	4,270,884	652,933	<u>\$4,923,817</u>
Total Open Commitments:	<u>\$4,495,289</u>	<u>\$215,705</u>	

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

## Reportable Milestones Summary

<u>Done</u>	<u>Reportable Milestones</u>	<u>Project</u>	<u>Date</u>	<u>Baseline</u>	<u>Var.</u>
X	M1-Solenoid Delivered to Fermilab	Solenoid	5/12/97	5/12/97	0 w
X	M2-VLPC Production 50% Complete	VLPCs	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	Central Preshower	5/21/98	5/21/98	0 w
X	M1-Solenoid Installed and Tested	Solenoid	9/30/98	9/30/98	0 w
X	M2-Muon Forward Trigger Counter Assembly 10% Complete	Muon Forward 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 Forward Tracker	1/29/99	1/29/99	0 w
X	M2 - Assembly Design Complete	Fiber Tracker	3/5/99	3/5/99	0 w
X	M2-First Cylinder Complete	Fiber Tracker	9/2/99	9/2/99	0 w
X	H Half-Wedge Fabrication 20% Complete	Silicon Tracker	10/15/99	10/15/99	0 w
X	3 Chip Ladder Fabrication 80% Complete	Silicon Tracker	10/26/99	10/20/99	0.6 w
X	Arrival Of C-Layer MDT Modules At FNAL	Muon Forward Tracker	11/3/99	10/22/99	1.7 w
X	9 Chip Ladder Fabrication 20% Complete	Silicon Tracker	11/4/99	11/3/99	0.2 w
X	M3-Fiber Tracker Ribbon Fabrication 50% Complete	Fiber Tracker	11/5/99	11/12/99	-0.9 w
X	First Readout Crate Installed & Working	Silicon Electronics	11/16/99	12/2/99	-2 w
X	SCA Testing Complete	Calorimeter Electronics	11/23/99	12/15/99	-2.8 w
X	MDT ADB Fabrication Complete	Muon Electronics	12/2/99	12/2/99	0 w
X	SLICs Received	Trigger	12/10/99	11/10/99	4 w
	MDC Fabrication Complete	Muon Electronics	1/3/00	12/13/99	1 w
	M3-Establish Single Crate Internal Data Movement	Trigger	1/6/00	1/6/00	0 w
	M2-Muon Electronics Preproduction Installation Complete	Muon Electronics	1/17/00	12/13/99	3 w
	M2-Fiber Tracker Assembly Begun	Fiber Tracker	1/18/00	12/6/99	4.2 w
	6 Chip Ladder Fabrication 20% Complete	Silicon Tracker	1/19/00	1/3/00	2.4 w
	Module Fabrication and Testing Complete	Forward Preshower	1/21/00	12/10/99	4 w
	F Wedge Assemblies 20% Complete	Silicon Tracker	1/24/00	1/19/00	0.5 w
	Preproduction MTCxx, MTFB, and MTCM Complete	Trigger	1/24/00	1/24/00	0 w
	M3-1st Forward Preshower Detector Complete	Forward Preshower	1/25/00	1/12/00	1.8 w
	FEB, CB Production Complete	Muon Electronics	1/31/00	1/3/00	4 w
	M2-First Silicon Tracker Barrel/Disk Module Complete	Silicon Tracker	2/2/00	1/24/00	1.4 w
	M3-2nd Forward Preshower Detector Complete	Forward Preshower	2/22/00	3/8/00	-2.2 w
	M3-Level Ø-South Installed	Luminosity Monitor	2/22/00	2/9/00	1.8 w
	M3-Fiber Tracker Cylinders 8, 7, 6, and 5 Complete	Fiber Tracker	2/25/00	1/28/00	4.2 w
	Drawers Ready	Intercryostat Detector	2/25/00	12/14/99	8.6 w
	M3-ICD Tile Modules Ready	Intercryostat Detector	2/29/00	1/18/00	6 w
	Waveguide Production 50% Complete	Fiber Tracker	3/1/00	1/29/00	4.5 w
	M3-Fiber Tracker Ribbon Fabrication Complete	Fiber Tracker	3/6/00	3/6/00	0 w
	M2-ICD Modules Arrive at Fermilab	Intercryostat Detector	3/7/00	1/25/00	6 w
	Multichip Modules Received	Fiber Electronics	3/8/00	2/23/00	2 w
	M3- Cal Readout Available to L2	Trigger	3/8/00	2/11/00	3.6 w
	9 Chip Ladder Fabrication 80% Complete	Silicon Tracker	3/10/00	3/27/00	-2.2 w
	M2-All Muon Forward Tracker MDT Modules At Fermilab	Muon Forward Tracker	3/10/00	3/10/00	0 w
	SFE,SRC Fabrication Complete	Muon Electronics	3/13/00	2/3/00	5.5 w
	M3-InterCryostat Detectors Installed	Intercryostat Detector	3/14/00	2/1/00	6 w
	MBTs Received	Trigger	3/16/00	3/16/00	0 w
	6 Chip Ladder Fabrication 80% Complete	Silicon Tracker	3/21/00	3/14/00	1 w
	H Half-Wedge Fabrication 80% Complete	Silicon Tracker	3/29/00	2/23/00	5 w
	M2-Calorimeter Preamp System Test Complete	Calorimeter Electronics	4/4/00	3/31/00	0.4 w
	M3-Calorimeter CC,ECN Preamp Installation Complete	Calorimeter Electronics	4/4/00	3/31/00	0.4 w
	All Pixel Octants Assembled	Muon Forward Trigger	4/4/00	4/4/00	0 w
	Steady DAQ Running	Online	4/7/00	3/31/00	0.9 w
	MRC, MFC Production Complete	Muon Electronics	4/12/00	3/27/00	2.4 w

# DØ Upgrade Monthly Progress Report

for the month of November, 1999

B-Layer Octants Assembled	Muon Forward Tracker	4/18/00	4/18/00	0 w
M3-Fiber Tracker Ribbon Mounting Complete	Fiber Tracker	4/27/00	4/20/00	1.1 w
F Wedge Assemblies 80% Complete	Silicon Tracker	5/3/00	4/26/00	1 w
10 Analog Boards Available	Fiber Electronics	5/3/00	4/19/00	2 w
Shaper Hybrid 50% Complete	Calorimeter Electronics	5/9/00	5/9/00	0 w
10 Digital Boards Available	Fiber Electronics	5/10/00	3/22/00	7 w
M2-Fiber Tracker Assembly Complete	Fiber Tracker	5/11/00	5/4/00	1.1 w
Alpha Cards Received	Trigger	5/15/00	5/15/00	0 w
M3-VLPC Cassette Assembly 50% Complete	VLPCs	5/24/00	4/12/00	6 w
M3-L3 Operational	Trigger	6/1/00	6/1/00	0 w
Muon Forward Tracker B-Layer Planes Installed	Muon Forward Tracker	6/9/00	6/15/00	-0.8 w
M3-VLPC Cryo System Operational	VLPCs	6/12/00	6/12/00	0 w
Production MTCxx, MTFB, and MTCM Complete	Trigger	6/27/00	6/27/00	0 w
M3-Waveguide Production Complete	Fiber Tracker	7/6/00	6/5/00	4.6 w
M3-Muon Level 1 Trigger Preproduction Testing Complete	Trigger	7/6/00	4/18/00	11 w
Daughterboard Vendor Production Complete	Calorimeter Electronics	7/10/00	6/16/00	3 w
Global Installation Complete	Trigger	7/12/00	7/12/00	0 w
All MDT Octants Assembled	Muon Forward Tracker	7/14/00	7/14/00	0 w
PDT Commissioning Complete	Muon Central	7/17/00	6/9/00	5 w
L2 Muon Installation Complete	Trigger	7/26/00	7/26/00	0 w
Mixer Boards Ready	Fiber Electronics	7/27/00	6/22/00	4.8 w
All MDT Planes Installed	Muon Forward Tracker	8/4/00	8/4/00	0 w
L2 CTT Installation Complete	Trigger	8/9/00	8/9/00	0 w
H-disks Ready	Silicon Tracker	8/15/00	7/3/00	6 w
CFA Commissioning Complete	Muon Central	8/16/00	7/10/00	5.5 w
Timing System Installed	Calorimeter Electronics	8/18/00	8/18/00	0 w
L2 Cal Installation Complete	Trigger	8/21/00	8/21/00	0 w
M3-All Silicon Tracker Barrels/Disks Complete	Silicon Tracker	8/25/00	8/25/00	0.2 w
BLS Motherboard Assembly Complete	Calorimeter Electronics	8/28/00	8/7/00	3 w
All Muon Forward Trigger Detector Planes Installed	Muon Forward Trigger	9/15/00	8/25/00	2.8 w
Central Silicon Complete & Ready To Move To DAB	Silicon Tracker	9/18/00	9/18/00	0.2 w
M1-Central Silicon Complete	Silicon Tracker	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	Silicon Tracker	9/25/00	9/25/00	0.2 w
M3-VLPC Cassette Assembly Complete	VLPCs	10/4/00	8/22/00	6 w
M2-Calorimeter BLS Assembly Complete	Calorimeter Electronics	10/17/00	9/26/00	3 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	12/6/00	11/22/00	1.6 w
M1-Detector Rolled-in and Hooked Up	Master	2/6/01	2/2/01	0.4 w