Neutrinos at the Main Injector (NuMI) Project

Project No. 98-G-304
Progress Report No. 60
November 1-30, 2003
(G. Bock, A.L. Read - Editors)
(NuMI-997)

I. PROJECT DESCRIPTION

The NuMI Project provides for the construction of an intense, variable energy, beam of neutrinos using the Fermilab Main Injector, as well as large underground neutrino detectors located at Fermilab and Soudan, Minnesota. The purpose of the project is to enable a new generation of long baseline neutrino experiments that can decisively detect and accurately measure neutrino oscillations. Detection of such oscillations would firmly establish a non-zero value of neutrino mass. The neutrino beam will be of sufficient energy that experiments capable of identifying muon neutrino to tau neutrino oscillations are feasible. The scope of the NuMI Project includes the excavation of large underground laboratories to house the neutrino beam system and the MINOS detectors.

II. OVERVIEW OF PROJECT STATUS – G. Bock

Overall this month the project continued to make good progress towards completion in the coming year. It is now 94% complete. Installation work in the accelerator tunnels during the shutdown completed. Installation activity at MI-65 continued. A DOE Office of Science review of the NuMI Project occurred November 13-14.

Progress on the Service Buildings and Outfitting (SBO) contract continues to be quite good. The work is now 87% complete. Attention is now focused entirely on work at the MINOS area after last month's very successful delivery of the Target Area which was on NuMI's critical path. The contractor had redeployed effort from MINOS Area to Target Area to achieve that important date. Full effort has now returned to finish the job at the MINOS area, and there are also plans to increase the workforce there. Two injuries occurred this month on this job. A worker suffered contusions to a toe when pieces of a concrete paving block he was carrying fell. A second injury occurred near the construction site when a delivery truck that was backing up near the site struck a worker walking along the roadway. The worker suffered fractures and abrasions. Both these incidents and the project's corrective actions are explained in further detail elsewhere in this report and were also discussed during the DOE review.

The September–November accelerator shutdown ended with the installation and electrical termination of all 28 major NuMI magnets in the Main Injector Tunnel. All major work elements were accomplished including the installation of the NuMI Lambertson magnets. The Main Injector returned to operation with no ill effects attributable to the NuMI magnets. Five Level 3

milestones were completed in November. One injury occurred when a worker suffered a strain during the installation of magnets in the pre-target area.

In November the Far Detector took atmospheric neutrino data. Assembly of the Near Detector electronics racks continued at Fermilab.

More detailed information on the project's progress and status this month follows in the rest of this report.

III. MASTER SCHEDULE AND FUNDING SUMMARY

The NuMI DOE Project Master Schedule is shown in Figure 1.

The DOE baseline milestones are shown in the figure as solid squares. These fixed milestones are defined in the DOE Project Execution Plan and the Baseline Change Proposal approved in December 2001. Shown as diamonds on the same line are the project's baseline projected dates for achieving the milestones. Actual dates of achieving milestones are shown as inverted black triangles.

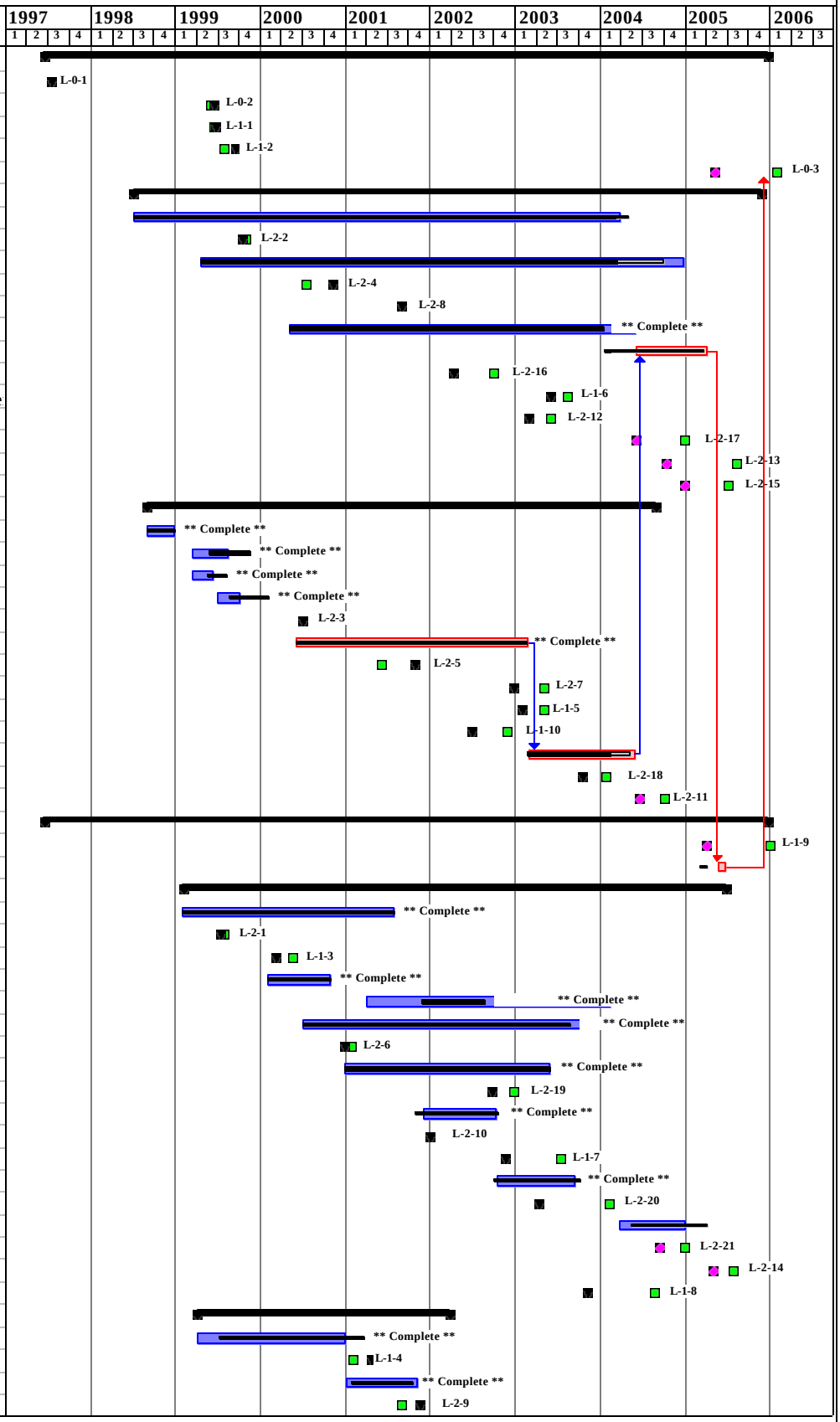
Our actual progress is indicated by black 'thermometer' lines within the horizontal (baseline schedule) bars.

A Table titled "DOE Milestones vs. Current Forecast" follows immediately after the Project Master Schedule. That table lists all the approved Level 0-1-2 DOE milestone dates along with the project's current (and previous month's) forecast for achieving them. The list is sorted by DOE Milestone date. Milestones with forecast dates that have changed significantly in the last month are discussed in Section VIII of this report.

As always the TEC and OPC profiles are presented in the Funding Summary.

12/18/03

NuMI Project
(Fiscal Years)



Project: NuMI_Master_Sched
Date: 12/18/03

Baseline Task
Critical Task
Summary Task
DOE Baseline Milestone
FNAL Current Projection
Milestone Complete
FNAL Forecast
Task Status

DOE Milestone vs Current Forecast
(Sorted by DOE Milestone Date)

12/18/2003

Milestone Description	PEP Milestone #	DOE Milestones (As of 12/2001)	Last Month's Forecast Milestone (10/2003)	Current Month's Forecast Milestone (11/2003)	DOE Milestone Variance (Cal Days)	Monthly Variance (Cal Days)	Notes
CD-1 Approve Mission Need	L-0-1	3/17/1997	3/17/1997	3/17/1997	0	0	Complete
CD-3a Start Limited Construction	L-1-1	2/15/1999	2/23/1999	2/23/1999	(8)	0	Complete
CD-2 Approve Baselines	L-0-2	2/17/1999	2/17/1999	2/17/1999	0	0	Complete
CD-3b Continue Construction	L-1-2	3/31/1999	5/21/1999	5/21/1999	(51)	0	Complete
MINOS Steel Purchase Subcontract Awarded	L-2-1	4/1/1999	3/15/1999	3/15/1999	17	0	Complete
Top of Soudan #8 Mineshaft Located with GPS	L-2-2	6/28/1999	6/16/1999	6/16/1999	12	0	Complete
Far Detector Prototype Erected	L-1-3	1/17/2000	11/10/1999	11/10/1999	68	0	Complete
NTP Issued for Fermilab Underground Subcontract	L-2-3	3/6/2000	3/6/2000	3/6/2000	0	0	Complete
High Current Pulse into Prototype Horn	L-2-4	3/14/2000	7/14/2000	7/14/2000	(122)	0	Complete
CalTech Factory Commissioned	L-2-6	9/29/2000	9/1/2000	9/1/2000	28	0	Complete
Far Detector Excavation Complete	L-1-4	10/2/2000	12/22/2000	12/22/2000	(81)	0	Complete
Fermilab Underground Construction 50% Complete	L-2-5	2/6/2001	6/29/2001	6/29/2001	(143)	0	Complete
Magnets for MI Stub Refurbished	L-2-8	4/30/2001	4/30/2001	4/30/2001	0	0	Complete
Outfitting of Far Detector Enclosure Complete	L-2-9	4/30/2001	7/19/2001	7/19/2001	(80)	0	Complete
Cosmic Rays Observed in Far Detector	L-2-10	3/22/2002	8/31/2001	8/31/2001	203	0	Complete
Technology Choice Made for Muon Monitors	L-2-16	5/30/2002	12/10/2001	12/10/2001	171	0	Complete
Service Building & Outfitting Bid Package Out	L-1-10	7/30/2002	2/25/2002	2/25/2002	155	0	Complete
75% Scintillator Produced	L-2-19	8/30/2002	5/24/2002	5/24/2002	98	0	Complete
Near Detector Hall Excavation Complete	L-2-7	12/30/2002	8/30/2002	8/30/2002	122	0	Complete
Target Hall Excavation Complete	L-1-5	12/30/2002	10/4/2002	10/4/2002	87	0	Complete
Lambertson & C-Magnets Assembled & Tested	L-2-12	2/1/2003	10/31/2002	10/31/2002	93	0	Complete
First Far Detector Super Mod Complete & Tested	L-1-7	3/15/2003	7/24/2002	7/24/2002	234	0	Complete
Inner & Outer Conductors for First Production Horn Assembled	L-1-6	4/14/2003	2/5/2003	2/5/2003	68	0	Complete
Target Service Building Shell Complete	L-2-18	9/30/2003	6/17/2003	6/17/2003	105	0	Complete
Near Plane Pre-assembly Complete	L-2-20	10/10/2003	12/17/2002	12/17/2002	297	0	Complete
Far Detector Complete & Tested	L-1-8	4/25/2004	7/9/2003	7/9/2003	291	0	Complete
Beneficial Occupancy of Service Buildings at Fermilab	L-2-11	5/31/2004	1/30/2004	2/16/2004	105	(17)	
Start Commissioning with Both Near and Far DAQ	L-2-21	8/30/2004	5/4/2004	5/19/2004	103	(15)	
Complete Installation of Horn Power Supply	L-2-17	9/1/2004	2/6/2004	2/3/2004	211	3	
MI Stub Installation Complete	L-2-15	3/11/2005	9/1/2004	9/1/2004	191	0	
Near Detector Complete & Tested	L-2-14	3/31/2005	12/27/2004	1/4/2005	86	(8)	
First Horn Installed	L-2-13	4/7/2005	6/14/2004	6/14/2004	297	0	
Start Commissioning	L-1-9	9/1/2005	12/28/2004	12/2/2004	273	26	
CD-4 Start Operations	L-0-3	9/30/2005	2/4/2005	1/11/2005	262	24	End of Commissioning

IV. FUNDING SUMMARY (K$)

Funding Summary (as of 11/30/2003), amounts in thousands

YEAR	TEC (NuMI Facility) Appropriations	OPC (MINOS, Soudan) Obligations
		Actual costs through FY03. Plan from Baseline Change Proposal
Prior FY's	0	1,417 actual
FY98	5,500	2,348 actual
FY99	14,300	4,114 actual
FY00	22,000	11,324 actual
FY01	22,949[1]	13,598 actual
FY02	11,400	17,227 actual
FY03	19,842[1,2,3]	7,067 actual
		Future Funding Plan
FY04	12,500[2]	4,605 balance
FY05	751[2,3]	500
TOTALS	**109,242**	**62,200**

Note [1]: FY01 Rescission removed $51K from plant line and $26K from OPC. We planned the restoration of these funds in FY03.

Note [2]: FY03, FY04, and FYY05 plant line funds as recommended for inclusion in the Baseline Change Proposal by the September DOE Review and approved in December 2001. This is the $33.042M in additional funding in the rebaseline proposal from Project Management.

Note [3]: FY03 Rescission removed $251K from plant line. We show the restoration of these funds in FY05.

TEC Funding Appropriated,
Not yet authorized
0 Reflects $251K removed from FY03. See Note 3 above.

Total TEC funding authorized
95,991

TEC Obligations to date, (Not including requisitions in progress)
93,996 57,403 **OPC Obligations to date**

TEC Funding authorized but not obligated
1,995

V. NARRATIVE HIGHLIGHTS

MANAGEMENT HIGHLIGHTS – G. Bock

A review of the NuMI Project by the DOE Office of Science occurred on November 13th and 14th. The review concentrated on installation and commissioning progress and on safety. The only action item was to hold the next semi-annual review in May 2004. Some recommendations on improving management safety walk-throughs and analyzing leading indicators were received. The project has already reconfigured some of its safety oversight activities and is additionally planning a visit to other DOE sites in an effort to identify further steps to improve safety. No other recommendations were received.

Three Change Requests (CRs) drawing a total of approximately $550K of TEC contingency have been processed and are included in this report. CR #255 increases the budget of WBS 1.1.7 by $349K for changes and additions to gas and water systems, including past overruns of about $150K. CR# 256 increases the budget of WBS 1.1.1, 1.1.2, and 1.1.3 by $400K to cover increases in installation activities. These changes include previously under-budgeted amounts for extraction area installation, crew training, startup activities at the new MI-65 area, and field changes during the busy October-November period. CR #255 returns $200K to contingency for over-budgeted project management costs in WBS1.3.

Three OPC CRs are included in this report as well. CR #247 draws $81K from contingency and closes out WBS 2.1 activities which are complete. CR #253 draws $112K from contingency to cover prior, current, and future project management costs for the OPC. CR #254 adds four new L3 milestones to the MINOS project.

The Project continues to report its progress against its own plan, which has a more aggressive schedule than that required by DOE milestones. The Project Support staff has developed a chart that provides the DOE NuMI Project Manager with a progress report against the DOE milestones.

Procurement Highlights – R. Huite

The closeout team is responsible for the timely and effective closeout of the S. A. Healy contract. This team is organized with several sub-groups bringing together a variety of as-needed expert help, i.e., a negotiating group, claims and legal strategy expertise, geotechnical experts, cost estimators, auditors, procurement, etc.

The NuMI Tunnels and Halls Closeout Team consist of W. D. Wightman & Company (T. Wightman – Lead Negotiator), R. Helmuth (Claims professional); and Montgomery Watson Harza (J. Kovacich – Technical Support). Fermilab support continues to be provided by C. Laughton – BD/NuMI, R. Huite – BSS/Procurement and G. Leonard, BSS/Legal. The NuMI Tunnels and Halls Closeout Team continued to evaluate DRB recommendations, S. A. Healy claims and other correspondence. Additional outside professionals are retained as the NuMI Closeout Team may require.

On September 29, 2003, the Fermilab Director authorized Mr. W. D. Wightman to negotiate on behalf of Universities Research Association, Inc. with S. A. Healy for the settlement of their claims engendered by their work under the NuMI Tunnels and Hall Contract. In addition, Mr. Wightman is authorized to represent URA in all matters relating to the settlement of these claims involving the Disputes Review Board, outside consultants and other interested parties.

BSS/Procurement support to the NuMI Tunnels and Halls Closeout Team continues to provide oversight of the subcontract terms and conditions, tracking of invoice/payment, and ensuring compliance with the Fermilab Procurement Policy and Procedures manual, and continues to be provided by the NuMI Procurement Administrator. The NuMI Senior Procurement Coordinator (R. Huite) attends the NuMI Project Manager's weekly staff meeting (each Monday); a weekly closeout status meeting (each Monday) with the NuMI Manager (G. Bock); a weekly status meeting with the BSS/Procurement Manager (J. Collins); a weekly meeting (each Tuesday) with the BSS/Procurement Manager, DOE-FAO Procurement Specialist (J. Chapman), and others as necessary. In addition, meetings with Head, BSS as may be necessary.

Six disputes have been presented to the Disputes Review Board. DRB recommendations have now been received on all six of the issues:

(1) DRB Recommendation No. 3, August 2, 2002 – Geocompostie Drainage Strips/Shotcrete (FNAL No. 40) (Hearing Date – May 9, 2002), for quantum.

(2) DRB Recommendation No. 1, August 21, 2002 – Enhanced Water Treatment Facilities (FNAL No. 14) (Hearing Date – April 4, 2002), for entitlement.

(3) DRB Recommendation No. 2, November 12, 2002 -- Carrier Tunnel Clay Seam DSC at Station 4+20 (SAH No. 17/FNAL No. 53 (Hearing Date – April 4 & 5, 2002), for quantum.

(4) DRB Recommendation No. 4, November 12, 2002 -- MINOS Shaft Excavation Vertical DSC (SAH No. 32/FNAL No. 20) (Hearing Date – May 9 & 10, 2002 and rebuttal July 9, 2002), for quantum.

(5) DRB Recommendation No. 5, April 29, 2003 -- Safety Stoppages & Constraints (SAH No. 68/FNAL No. 62) (Hearing Date -- November 12 and 13, 2002), for entitlement.

(6) DRB Recommendation No. 6, October 24, 2003 -- Decay Tunnel – Clay Seams and Groundwater/TBM (SAH NO. 69/FNAL No. 63) (Hearing Date -- September 17 and 18, 2002), for entitlement and quantum.

The Decay Tunnel Bad Ground Differing Site Conditions (SAH No. 62/FNAL No. 67) DRB hearing was held Monday and Tuesday, November 10th and 11th, 2003. Dates have been mutually agreed to for future hearings.

The S. A. Healy's subcontract No. 527522 totals $34,629,667 through Supplemental Agreement No. 16. Total amount invoiced from S. A. Healy to date is $34,480,116 through and including Invoice No. 68 Rev. 1. Payment has been made in the amount of $31,621,265.36 and $2,858,850.64 retained.

There are a total of 64 claims/change orders open or unresolved (this does not include twelve change orders denied). The parties have exchanged all outstanding claims except for about eight where Healy has "reserved their rights" for later presentation.

The following is a summary total of the numbered correspondence (i.e., letters and field communications/memorandums) that have been entered into the NCMO tracking database:

SAH to NuMI Numbered letters – 1307
NuMI to SAH Numbered Letters – 868

Fermilab entered into a purchase order with Holland & Knight LLP, Oakbrook Terrace, Illinois to provide professional legal services as may be required to provide advice and counsel on legal matters related to the NuMI Tunnels & Halls contract negotiation closeout team.

NuMI Surface Buildings and Outfitting

The subcontract was awarded to Ragnar Benson, Inc. (RBI), of Park Ridge, Illinois in the amount of $17,880,000 million. The NuMI SB&O Construction Manager for this subcontract is Elaine McCluskey. The Business Services Section/Senior Procurement Administrator is R. Cibic. The following Supplemental agreements have been issued:

Supplemental Agreement No. 1 – EC-001, Temporary Water Treatment at Minos -- $207,508.92
Supplemental Agreement No. 2 – EC-003, Power Clarifications and back-up Generator -- $19,057.50
Supplemental Agreement No. 3 – EC-002, EC-005, EC-006, & EC-007 -- $99,033.00
Supplemental Agreement No. 4 -- EC-009, EC-010, EC-011, EC-012, EC-013, EC-014, & EC-015 -- $28,813.39
Supplemental Agreement No. 5 – EC-004, EC-008, EC-021, EC-022, EC-025, EC-027, & EC-034 -- $159,477.99
Supplemental Agreement No. 6 – EC-017, EC-018, EC-023, EC-031, & EC-032 -- $122,390.74
Supplemental Agreement No. 7 – EC-019, EC-020, EC-028, EC-033, EC-037, EC-038, EC-040, EC-042, EC-043, EC-044, EC-046, EC-048, EC-049, EC-051, EC-053, EC-054, EC-056 -- $140,304.33
Supplemental Agreement No. 8 – EC-026, EC-020b, EC-065, EC-050, EC-061 -- $380,547.53
Supplemental Agreement No. 9 – EC-030, EC-035, EC-052A, EC-058, EC-059, EC-060, EC-62, EC-63, EC-064, EC-066 EC-067, EC-072, EC-076 -- $56,962.56
Supplemental Agreement No. 10 – EC-036, EC-069A, EC-075, EC-078, EC-079, EC-080, EC-081, EC084 -- $144,211.83
Supplemental Agreement No. 11 – EC-088, EC-090, EC-091, EC-094, EC-52B -- $546,129.48
Supplemental Agreement No. 12 -- Pending

The RBI's subcontract No. 546631 totals $19,784,437.27 through Supplemental Agreement No. 11. Total amount invoiced from RBI to date is $15,891,477.92 through and including Invoice No. 9315, dated 03-Nov-2003. Payment has been made in the amount of $14,619,884.68 and $1,271,593.24 retained. The amount retained was reduced from 10 percent to 8 percent based on the subcontract Incentive Program for fieldwork completed satisfactorily.

On June 19, 2003, RBI submitted their formal claim for the victaulic pipe run up the Decay Pipe Walkway pursuant to Exhibit D of the subcontract. Fermilab is in the process of reviewing and developing its strategy. This claim is still under evaluation.

NTP1 (October 1, 2002) provided for procurement and planning activities to include:

(1) Submission of technical and Subcontract submittals including but not limited to: required schedules, safety and quality control submittals, long-lead item shop drawings, and critical item shop drawing submittals.

(2) Procurement of initial critical and long lead items after coordinate submittals have been approved.

NTP2 (November 22, 2002) authorized commencement of work as required by the terms and conditions of the subcontract. Construction activities continue at both the Minos and Target sites.

The subcontract incorporates two incentive programs:

(1) Percentage of fieldwork completed satisfactorily: if Fermilab finds that satisfactory progress is being achieved in the field, Fermilab may reduce the percentage retained based on the schedule contain in the subcontract. This retention rate is adjusted by increments of 2 percent based on fieldwork percentage completed satisfactorily.

(2) Safety performance record: in rewarding the subcontractor for accomplishing the work described within the subcontract without injuries, lost workdays, and/or fatalities within the contractual requirements of the subcontract, Fermilab will reward the subcontractor for fieldwork accomplished over four periods established with the subcontract. The first safety performance period was not achieved due to a missed milestone date and one recordable lost-time accident. RBI and their workforce successfully completed the second safety performance incentive period.

The following is a summary total of the numbered correspondence (i.e., letters and field communications/memorandums) that have been entered into the SB&O tracking database:
SBO to RBI – 349
RBI to SBO – 121
Field Memos (FM) – 0
Field Communications (FC) – 2
NCMO General – 84

The Target Area, including the MI-65 Service building and the below grade Pre-Target area, the Support Rooms, Target Hall, and the Target Shaft, was accepted from Ragnar Benson, Inc., for Beneficial Occupancy by Fermilab at the close of business on Monday, October 20, 2003. This was on time with respect to the revised date of subcontract Milestone No. 7. A punch list of items was generated and a report on completion of the punch list items will be generated.

NuMI Technical Components

The Procurement Coordinator continues to be available to assist the NuMI Project regarding NuMI Technical Components issues.

NuMI FACILITY AT FERMILAB
TECHNICAL COMPONENTS (WBS 1.1) – B. Baller, N. Grossman

Overview

The September–November accelerator shutdown ended with the installation and electrical termination of all 28 major NuMI magnets in the Main Injector Tunnel. All major work elements were accomplished. In addition, the NuMI Lambertson magnets and C-magnet were installed (Milestone L-3-215), 8 months ahead of schedule. The Main Injector returned to operation with no ill effects attributable to the NuMI magnets.

Five Level 3 milestones were completed in November. In addition to the two mentioned above, the Horn 2 Module was assembled (L-3-216). The upstream decay pipe endcap was installed (L-3-210). The RAW systems engineering notes were sent out for review (L-3-153). The pre-target magnet stands are ready for installation (L-3-237).

Integration and Installation – R. Andrews

General Remarks

November saw the completion of the long shutdown in the Main Injector, the ramping up of the installation plan for the newly acquired MI-65, and the preparation for the DOE Review of NuMI.

NuMI's work in the Main Injector proper was completed during the 1st seven weeks of the shutdown. During the final two weeks of the shutdown, NuMI's work was confined to the "stub" area of the tunnel. We were able to take advantage of this time period to complete some cable pulling tasks, installation of gas lines, and some preparation work for the LCW system.

In MI-65, we further refined the administrative controls in the building, began the stockpiling of materials for the upcoming installation, and started the actual process of installation.

Main Injector

The long shutdown was completed during the month of November. All of the planned tasks (except two) were successfully completed. This was a very well executed work effort by all involved in the installation of the NuMI components. The two tasks which were not completed were: magnet alignment (due to prioritized resource allocation), and connection of the LCW lines from the header to the magnets (again, there was a lack of resources available to complete this task.)

MI-65

Installation activities mobilized in the month of November, beginning with the installation of the Zero-Layer rails of the Target Pile in the MI-65 Target Pit and the placing and anchoring of magnet stands in the Carrier and Pre-Target Enclosures. Tests of the magnet mover system on the grade of the Carrier and Pre-Target enclosures continued. The tests resulted in physical improvements in the braking system and some adjustments to the magnet installation procedure.

The upstream decay pipe window was installed which allowed the placement of a portion of the downstream steel shield to the air break. A track system and transporter was installed from the base of the delivery shaft to the Target Pit mezzanine to facilitate steel block deliveries for construction of the Target Pile.

MINOS

The electrically operated fork truck that is needed to install Absorber components has arrived at Fermilab.

One of the first scheduled items after beneficial occupancy will be to have Alignment mark the beam line location on the Absorber floor.

Jim Kilmer is also discussing issues with Alignment regarding the centering of the collar that must be done as each detector plane is set in place. The idea is to do the alignment using the technicians that are installing the planes rather than having an alignment crew standing by all the time. Since the alignment takes only about 10 minutes or so out of each 2 – 3 hour period, we don't want to "waste" Alignment resources. However, timely survey of each collar is needed as the planes are installed. Jim is expecting that some type of laser unit can be mastered by the technicians.

The item discussed in the paragraph below this one, which was in last month's report, needs some clarification regarding the hauling of un-instrumented planes. Installation of the planes of course will start at the downstream end of the detector and work toward the upstream end. Of the first 140 planes to be installed, four out of each five have un-instrumented planes. Of the last 142, each of the planes will have instrumentation, and will therefore have to be hauled individually.

(Rather than haul every Detector plane individually attached to a strongback from new Muon to the MINOS Service Building (MSB), un-instrumented planes (one in five for some parts of the Detector) can be stacked and transported in groups of four on one truck trip. Then, at MSB, they will be individually attached to the strong back when lowered into the MINOS Hall.

CD/Datacom is expected to have a layout/design of a LAN in the MINOS Hall by about mid-December.

Maintenance of hard copies of HAs (hazard analyses) at the job site is under discussion. The leading idea is to have two binders. One binder will have active HAs and a second binder will have completed HAs. The completed HAs will remain at the site until it is determined that no further activity will be needed on the respective task.

Primary Beam (WBS 1.1.1) – S. Childress

Overview

All scheduled primary beam installation tasks were successfully accomplished during the Sept – Nov. accelerator shutdown period. Additionally, the NuMI extraction Lambertson magnet installation is complete, with efficient Main Injector beam startup at resumption of operations.

Very good progress has been made with magnet stand and magnet installation tasks in the new Pre-target enclosure, accessed thru the MI-65 target hall shaft.

Magnets and Stands

During the Sept. – Nov. shutdown period, the full set of 28 major magnets, (3 Lambertsons, 1 C-magnet, 12 Quadrupoles and 12 Dipole bending magnets), was successfully installed. The needed schedule date was also met to reinstall the Main Injector 614 area dipole, removed for NuMI extraction enclosure magnet installation. Main Injector staff was able to accomplish an efficient accelerator beam startup, including the use of new local orbit bumps around the septa of the NuMI extraction Lambertson magnets.

Post shutdown, installation efforts were switched to the Pre-target tunnel, available since beneficial occupancy during the last week of October. In this area, all major magnet stands have been installed and final testing accomplished for magnet installation carts for both 3Q120 and B2 magnets. Five 3Q quads and two B2 dipoles have also been installed, using these carts. Sharing of the shaft crane with the target hall installation efforts has been efficiently accomplished during these installation tasks.

Technical Division personnel have constructed a prototype EPB dipole shield, and are now doing magnetic field measurements to test design effectiveness at controlling external magnetic fields, which could impact Recycler ring operation. Extensive measurement checks were also made in the MI 60 area, to ensure the accuracy of drawings needed to design the dipole shields.

Kicker Magnet System – C. Jensen

High power testing for the prototype load assembly has continued with good results. This test effort is expected to conclude in mid-December, with construction of the production assemblies to follow.

Kicker magnet construction is now nearing completion, with this expected during December also.

Beam Instrumentation

The prototype profile monitor constructed by UT. Austin was installed in the Mini-BooNE primary beam line prior to beam startup. Good SEM signals are seen from the monitor, with a handful of bad channels out of the 88 total for both planes. A dedicated beam test has also been carried out, measuring the effectiveness of the clearing field planes for changing beam intensity.

Subsequent to the review of NuMI primary instrumentation held in late October, procurement of production components for the profile monitors has begun.

Procurement of BPM electronics components continues, and is now well advanced.

Beam Permit System – R. Ducar

New Beam Permit System hardware is again operational for Mini-BooNE operations. A version of the BPS application program that will facilitate easier initial set-up is being developed. With elements of the BPS now installed in Main Injector service buildings, work is underway to develop the primary application for NuMI. An overview of the NuMI BPS was presented to Main Injector Department personnel in late November. Preparations are being made for a final review of the BPS, now tentatively scheduled for February 2004.

Neutrino Beam Devices (WBS 1.1.2) – J. Hylen, D. Ayres, K. Anderson, A. Stefanik

I. Magnetic Focusing Horns

Production Horns.

Horn 1. Horn 1 was mounted to the Horn 1 module using the remote motion table; the central support shafts and drawbar work as designed. Remaining work is to test fit the instrumentation line connections and water connections, to mount and test fit the stripline connection, and to develop and test the procedures and calibrations that will facilitate doing the operation remotely from behind shielding.

Some pitting was discovered on the horn 1 stripline connection to the horn. It is believed that this may have been caused during pulsing on the test stand by a less-than-perfect fit. The stripline had been moved as one piece from the prototype horn to production horn 1, while we believe now we should loosen the strips, individually tighten them to the horn, and then re-tighten the bolts between strips. A light machining pass was done to remove the pitting, and the strips are now out to be re-silver-plated; the stripline should be back sometime in December.

The beam-alignment cross-hair was mounted on horn 1.

Horn 2. Horn 2 is on the pulsing test stand. It is being used to test the revised bdot coils and to test the power supply controls, which are being set up to run remotely via ACNET from the control room. The water tank will be mounted to the horn when it is removed from the test stand in December or January.

II. Target

Further target vibration testing is still on hold. We are just about ready to mount the target on the target carrier, which will allow testing with its actual support structure.

III. Modules

Horn 1 Module. The horn 1 module was moved from the module assembly stand to the module/component stand, and the horn was test-fitted to the module. It fit.

Horn 2 Module. On November 4, assembly of the Horn 2 module was completed. This is well before the milestone date for L-3-216 "Assembly of Horn 2 Module Complete" of 2/26/04.

Target/Baffle Module. Now that Horn 1 module is off the assembly stand, we can put the target/baffle module on the assembly stand and begin assembly in earnest. We are on track to meet the milestone date for L-3-235 "Assembly of Target/Baffle Module Complete" of 2/25/04.

Remote Clamp/Stripline block. Work is proceeding for acquisition of two stripline block units, which consist of horn stripline penetrating through shielding blocks with a clamp to remotely attach to a horn. The fabrication of stripline segments should be done early in December. The parts for the shielding block structure are on site but assembly is waiting on completion and approval of the engineering safety note for the assembly stand. The engineering note is now complete, but the 4 required levels of review of the engineering note will take some time. The remote clamp is assembled as far as possible without the block structure to mount it to. The first test of plugging the horn into a module with the remote stripline clamp will probably happen early in January. This provides three months before scheduled installation to correct any problem found.

IV. Target Carrier and Baffle

Assembly of the target/baffle carrier is proceeding, mostly as fill-in work so far. It will become higher priority in December.

The baffles are complete and were shipped from IHEP to FNAL.

V. Target Hall Shielding/Cooling

Air Cooling System. The sheet metal contractor prototyped a section of the target pile air block shield at Meson detector building. The work went well and allowed optimization of some details.

Steel Shielding. Shielding blocks continue to be pre-staged from the railhead to a hard stand next to MI-65.

Concrete Covers. Delivery of "R" concrete cover shielding blocks will start early December and be completed by March.

Other Remaining Work. We need to generate the bid-packages for the air-recirculation system. The engineer in charge did not make much progress here, as most of his time was spent in support of the target hall installation effort. As installation of shielding blocks becomes routine, time should be available to finish this task.

VI. Radioactive component handling

Component-module test stand / positioning system. This test stand is used for assembling horn and target components onto their respective modules and testing hot horn and target handling procedures in MI-8. The stand received final safety approval and has now been used to mount a horn on a module. The milestone date for L-3-212 "Assembly of Horn 1 on Module Complete" is 2/13/04. To reach this milestone, we need to finish the stripline block assembly, and mount it along with the horn and module. The milestone date for L-3-308 "Assembly of Horn 2 on Module Complete" is 5/5/04, and the milestone date for L-3-309 "Assembly of Target Baffle on Module Complete" is 5/27/04, both of which we should have no trouble meeting.

Hot cell. All hot cell components are now in hand except for the access platform and stairs on the east wall. This platform provides a place for operators to control and view (through lead-glass windows) the attachment or disengagement of a radioactive horn or target-baffle carrier from its support module. This final stage of the access platform design is being deliberately delayed until the layout of the air recirculation system is finalized, as the platform also provides access to that system. The pre-assembly of the hot cell structure in the New Muon Lab progressed well during the month. The 12-inch thick steel end plate was mounted on the downstream end of the hot cell and the lifting fixture for the upstream 12-inch plate passed its load test. The only remaining work needed to complete the hot cell pre-assembly is to construct the shield-block wall diagonal braces and to mount and test the upstream movable shield door.

Cameras. No work on the camera system for remote handling has been done since the physicist involved retired. Work on this system will resume after the remaining vibration test of the target and horn test of the bdot coil with drain installed.

VII. Instrumentation/Electronics

Readout testing of Target Hall instrumentation in MI-8 has started, with the readout into ACNET of thermocouple channels.

The MINOS Brazilian collaborators have generated drawings of the support rods that are used to lower the BLMs through holes in the Target Hall shielding and which also carry the signal and high voltage wiring for the BLMs. In November the materials and connection methods for BLM electrical connections and grounding were specified. It was also decided to construct the support rods out of aluminum instead of steel.

Pulse tests appear to confirm that a drainpipe added to the horn field monitor bdot coil feedthrough fixes the bdot readout problems with the two lower coils, where water previously collected around the feed-through fixtures.

VIII. Installation

The target pile zero layer installation was finished on schedule, including a survey to check proper height before the final grouting. To reduce the chance of excessive humidity in the target pile air recirculation system, a couple layers of concrete blocks were laid in the water-drain-pit next to the decay pipe, presenting a dry surface to the recirculating air. The rails and cart to

move shielding from the drop shaft to the target hall have been installed. The installation of the steel shielding at the downstream end of the target hall has begun. This work is the project critical path, and is proceeding on schedule. The milestone date for L-3-310 "Install Bottom Shielding Complete" is 5/12/04, which we are well on track to completing. Note the master schedule had us installing the upstream shield wall, then the main run of bulk shielding, and finally the downstream shielding; we are reversing this order as it is making some aspects of installation easier, and should allow the start of hot cell installation earlier.

IX. Administrative/Project Management

Milestones for the next six months are called out in the above text. Critical tasks are proceeding on schedule. We are on track, but free slack between completing the technical components and their installation-early dates is small, so that we must remain very focused and active in our attempts to prevent slippage.

Physicist, engineering, drafting, technician and installation team resources are at reasonable levels. We are on a learning curve with the T&M installation resources, and some improvement of reporting tools is being undertaken.

Power Supply Systems (WBS 1.1.3) – G. Krafczyk

Overview

All work for the September shutdown was completed as scheduled. This work was mainly cabling work for the power supplies. Final horn controls check out took place at the end of the month. Temperature measurements on 3Q120 magnets continued throughout the month.

Horn Power Supply - K. Bourkland

Three of the five new control electronics modules, plus the spares for the three modules, were installed, calibrated and validated by operating the horn power supply system. Specifically, these were the cell voltage monitor, cell current monitor, and stripline current monitor modules. Work is in progress on the two remaining modules and is expected to be completed within two weeks.

The CAMAC PEI controllers have been programmed with the requisite functions and a Main Injector clock synchronous trigger has been installed. A validation check of remote operation and monitoring was also completed.

Transmission Lines - D. Tinsley

The remote clamp assembly process is complete.

All of the stripline shielding blocks have arrived at MI-8. We are waiting for the engineering committee to approve the Shield Block Support Engineering Note.

Rafael Silva is working on transporting the bus bars down the shaft. Wedge clamps have been coated with tungsten disulfide. The Shielding Block Stripline is being silver-plated. The last of the transmission line drawings are being sent out for bid.

Vladimir Sidorov made an engineering note on the stripline lifting fixture (for silver plating and other use).

Joel Misek has started to do an engineering note on the power supply support structure.

Extraction Kicker Power Supply - C. Jensen

Progress in November was still small due to accelerator start-up issues. During the last week we have lined up mechanical technicians from PPD to do assembly work on the pulse-forming network (PFN). The machine shop will start on the coil winding very soon. The taps for the PFN coil had the terminals brazed on and filed smooth. Time was spent on sorting the PFN capacitors in several different ways and then simulating these. Results will be known soon and then the capacitors can be put into the tank.

Conventional Power Supplies - S. Hays

Very little work was accomplished on the power supply installation and testing front due to the large operational workload coming out of the shutdown.

Decay Region & Hadron Absorber (WBS 1.1.4) – C. James

The upstream endcap was installed, with no problems encountered.

A detailed schedule of day-to-day installation activities continues to be discussed and fine-tuned. In this way, the necessary contract work, such as piping, is integrated with other tasks; once integrated these contracts can begin to be specified with dates. Procurement of filler steel plate and other miscellaneous parts continues; drafting on the detailed core piping layout continues. Discussion of fall-protection, and which methods function best with the assembly process, continues.

Neutrino Beam Monitoring (WBS 1.1.5) – D. Harris, S. Kopp

Progress continues on construction of the downstream hadron monitor, and a calibration program for the downstream hadron monitor is being put into place in the lab at UT-Austin. The muon monitors have all been calibrated and a few have been isolated that will need minor repairs before being shipped to Fermilab. The muon monitor support structures were completed this month and will be shipped to Fermilab by the time the project has beneficial occupancy of the downstream (MINOS) region.

Survey, Alignment & Geodesy (WBS 1.1.6) – W. Smart

The long accelerator shutdown ended mid-month with very good alignment progress made on the installation of the NuMI proton beam magnets, especially considering the heavy accelerator workload on the surveyors.

Survey support for the NuMI target pile installation this month included additional survey marks, alignment of the "zero layer" forms before the grout was poured, and alignment of and education on the spinning laser reference instrument being used to mark the pile centerline.

The survey engineer effort for NuMI in November was 3.6 mw, with 2.2 mw used for analyzing MI tunnel network measurements in the NuMI proton beam areas; and 1.4 mw for target pile installation support.

Beamline Utilities (WBS 1.1.7) –D. Pushka

General

Activities presently underway for WBS 1.1.7 include: Beginning to install instrumentation wiring on the skid assemblies and starting electrical hook up on the skids.

Engineering notes for the RAW systems were sent in October for peer review. No responses have been received.

Ross Doyle (BD/Mechanical) has prepared the purchase requisition for the instrumentation for all systems. Level, temperature, pressure and conductivity sensors have all been received and installed on the skids at New Muon Laboratory. Instrumentation has not yet been installed in MI-62 because the technicians have still not been made available to Ross.

Paul Kasley and members of his group within Beams Division Controls Department did charge effort against 1.1.7 in November for programming the programmable logic controllers (PLC) used on the NuMI Water systems and the connection to the ACNET front end. This effort appears to be progressing well.

A requisition for the time and materials electrician sub-contractor to wire the pump motors to the motor starters has been initiated. Work, however, has not yet occurred because the T&M electricians are still busy. Work is scheduled to start on December 9th.

Upstream LCW System

The project originally planned on using traditional rubber hose and hose barbs for the magnet LCW connections because these have worked well in the fixed target area. Approximately a decade ago, the LCW group experienced problems using hose barbs. As a result, they have begun to use very expensive crimped hose assemblies in lieu of hose and barbs and have mandated that NuMI due the same. In the larger sizes, the cost increases from $5 per hose end to more than $80 per hose end.

Final Horn Raw System

Work to weld the piping for the Horn 1 and Horn 2 skids is completed, as is the installation of the instrumentation and motor starters. Wiring remains to be started. Piping for this system installed as part of the SB&O contract is complete.

The engineering note for this system was peer reviewed nearly a year ago. However, recent sizing checks for the ejector pumps indicate that the motive water needed to meet the design conditions will be larger than what is available from the installed circulation pumps. This is due to the restrictions now apparent in the module design. More careful analysis was performed in October to quantify the magnitude of the problem. The solution was to order replacement impellers for these pumps to get the required flow and head. Impellors have been ordered and are scheduled for a December delivery. Once here, they will be installed in the pumps before the skids are installed in the target hall mechanical support room.

Upstream RAW System

Work to weld the piping for the upstream RAW skid is completed, as is the installation of the instrumentation and motor starters. Wiring remains to be started. Piping for this system installed as part of the SB&O contract is complete.

Downstream RAW System

Piping routing drawings for the piping between the absorber and the absorber RAW skid have been finished. This drawing, together with a specification, will be used for the installation of this piping post beneficial occupancy of MINOS.

A need to generate a cost neutral CR to revise the number of RAW pipes between the absorber shielding and the absorber RAW skid has been identified. This CR has been initiated with the project office staff.

The pumps skids for the absorber RAW and absorber Intermediate systems have been assembled, and all pipe welding completed. Instrumentation has been installed. Wiring remains to be started.

In summary, on the Downstream (Absorber and Decay Pipe) RAW Systems, the mechanical design is complete and has been submitted for peer review.

Vacuum Decay Pipe Cooling

Piping routing drawings for the piping between the downstream end of the decay pipe and the downstream and the upstream decay pipe RAW systems were prepared, checked and signed off. This piping is included in the SB&O civil outfitting contract and installation of all decay pipe cooling piping in SB&O has been completed.

Meanwhile, the Decay Pipe cooling system skids are assembled and piping has been brazed. Instrumentation and motor starters have been installed but await wiring.

Status of the engineering note and equipment for the Vacuum Decay Pipe Cooling system is identical to that of the absorber RAW system. The engineering note had been completed for the pre-revision 6 design, and revised for the new design. The peer review has been initiated.

Extraction and Primary Beam Vacuum System

Jim Klen (BD/MSD) has been assigned to re-evaluate the vacuum design for the primary beam transport beam pipe and has written an engineering note. The note has yet to be subject to a peer review.

Meanwhile a layout of the vacuum system for the pre-target area (complete with the material take-off lists) has been completed with guidance from Mayling Wong (PPD/MD) and Jim Klen. Gary Trotter (PPD/MD) started a similar drawing for the portion of the beamline in the NuMI stub (also with guidance from Jim and Mayling). In September, it was reported that a similar drawing for the extraction channel remains awaiting attention from Tim Hamerla (BD/MSD). Because of the difficultly experienced with the extraction channel stands, Tim is not able to attend to this work. Therefore, Gary Trotter has been asked to increase his scope of work and extend his responsibility to the extraction area. Gary's work remains to be finished.

The long lead-time ion vacuum pumps have been ordered and all 56 have been received. However, much of the vacuum beam pipe spools, flanges, and clamps have not yet been ordered. Spool assemblies for the ends of the decay pipe are being fabricated in the central shop and are nearly complete. Spool assemblies are due to be sent for cleaning and leak checking in December.

The need for a CR to add the $20,000 cost for using metal vacuum seals has been identified.

Decay Pipe Vacuum System

Piping and Instrumentation Diagram is complete, the instrument list generated, and the vacuum pump has been received. An oil containment skid has been designed, material ordered, and fabrication of the oil containment pan has started.

Layout of the vacuum pump out line in the absorber cavern and labyrinth has been completed. This drawing, together with a specification, will be used for the installation of this piping post-beneficial occupancy.

Gas Systems The system manager has been instructed to generate a CR to add the upstream (beamline) system back into the scope of the project. Information for the CR has gone to the project office and awaits action by the project office staff. Meanwhile, $30,000 worth of T&M work to run gas lines in the Main Injector tunnel has been completed.

Controls, Interlocks and Cable Installation (WBS 1.1.8) – R. Ducar

The ten week accelerator shutdown ended in November with all WBS 1.1.8 scheduled work completed. All 500 MCM cables to and between enclosure magnets were installed and terminated. Additionally, the total loss monitor (TLM) cable was installed from the NuMI Stub to the downstream end of Pre-Target. This single cable will be divided later into four sections for individualized TLMs covering distinct areas of the NuMI beamline. All newly installed cables were identified and dressed at their future points of termination, in both the Main Injector enclosure and upstairs service building equipment racks.

The Motor Control Center for the NuMI LCW System was positioned and connected to building power at the MI-62 service building. This necessitated a complete shutdown of building power that was fortunately accommodated late in the shutdown. Doing so after accelerator start-up would have been much more difficult a task to schedule.

At MI-65, most of the equipment racks are in their final positions with most technical cables routed, trimmed and identified. All of the technical cables in the Lower Hobbit and Pre-Target enclosure have also been identified and dressed to their final points of termination. A new fan was installed just downstream of the firewall dividing Upper and Lower Hobbit so as to mitigate interference with the Q113 quadrupole magnet. At the upstream face of the firewall dividing Lower Hobbit and Pre-Target, a junction box and associated conduit were relocated to mitigate interferences with a beamline magnet.

Milestones for 1.1.8 continue to be reviewed with a resulting assessment that completion dates are reasonable.

CIVIL CONSTRUCTION AT FERMILAB (WBS 1.2) – D. Bogert

Overview

During November Ragnar Benson continued construction work for the Service Buildings and Outfitting contract in the MINOS area and cleared many of the punch list items from the completed MI-65 (target) area. There were approximately 172 punch list items at beneficial occupancy of the target area, and 123 were cleared by the end of November. At the end of November the contract was approximately 87% complete, including work added to the contract by supplemental agreement. There were two recordable safety incidents during the month of November. On November 5th, a laborer carrying a concrete paver block suffered contusions to a toe when the paver broke into several pieces. The laborer was not wearing steel-toed shoes as required by the job hazard analysis. On November 7th a subcontractor project superintendent walking on an access road was injured when a delivery truck backing off the site (without a spotter) backed into the pedestrian. A traffic citation was issued to the truck driver for operating a vehicle without a backup alarm. After NuMI Project Management received a report on November 12th concerning a non-injury electrical incident that occurred on November 8th, a stop work order for the RBI electrical subcontractor was issued. This order was lifted after demonstration that adequate control procedures and the appropriate staff were in place to prevent any recurrence of similar situations. (A job foreman had authorized the energizing of a system prior to completion of all the planned work.) The safety incidents occurred near the end of the third period (of four contractually defined periods) of the safety incentive program. Fermilab and RBI project staff met with the work force after the pedestrian incident to reemphasize the mutual commitment to the entire safety program and to commit to a mutual attempt to achieve the safety incentive for the fourth and final period.

During November Ragnar Benson re-concentrated the entire workforce on tasks associated with the completion of the MINOS Area. Significant effort had been diverted in pervious months to achieve the Target Area beneficial occupancy on October 20th. Up until beneficial occupancy of the Target Area, a steady deterioration of the schedule variance for the MINOS Area work had occurred. With the re-concentration of effort at MINOS, the MINOS Area negative schedule variance situation began to improve, but in view of the large amount of work for November

already scheduled, only modest improvement (recovery) of the negative schedule variance was achieved during November. Ragnar Benson and the electrical subcontractor added a second shift at MINOS and also Saturday shifts. At the end of November it was obvious that staffing additions were also required, and this was also authorized. As previously reported the MINOS occupancy was extended 43 calendar days to January 31, 2004. The extension reflected the time impact of scope additions to the contract. NuMI Project Management now believes that even if Ragnar Benson and subcontractors maintain the increased effort, work multiple shifts, and Saturdays, to the scheduled end of the contract on January 31, that it is no longer to possible to complete the work by that date. NuMI Project Management now expects the MINOS Area beneficial occupancy by approximately mid-February.

On the surface of the MINOS Area excavation for the pond began and the removal of shot rock hardstand areas continued. In the MINOS building high bay electrical rough in continued, fire suppression piping was installed, and painting was done on the masonry walls. Piping, HVAC duct installation and HVAC controls conduit installation at the MINOS building continued. The MINOS Hall crane installation on the rails was completed. Below grade piping and electrical installation effort was increased in the MINOS Area, reflecting the redirection of effort back to the MINOS Area. Piping and electrical installation in the MINOS Shaft was accomplished on a two-shift basis.

Laboratory staff continued to monitor weekly progress using the Ragnar Benson schedule for performance of the contract work. During November the negative schedule variance improved slightly at MINOS as measured against the approved "original" project schedule that contains 340 work elements. At the end of November, 312 work elements had been started, and 280 of those were completed. Seven work elements were not started after their respective "late start" dates and an additional twenty-seven elements underway were late with respect to "late finish." This reflects the situation after the rescheduling of the work at MINOS to include the additional 43 calendar days to be added by agreement. The DOE milestones are not threatened. For the purposes of forecast this month Project Management estimates that the recently increased effort (overtime and staffing) will continue be provided to the end of the project but that contract completion (MINOS area) by January 31, the recently extended date, is not possible. February 15 is projected as a more likely completion date.

The claims and contract closeout issues for the S. A. Healy contract again are discussed at length in the procurement portion of this monthly report. Additional discussions between Fermilab and S. A. Healy did not lead to a global resolution of the outstanding issues. A seventh DRB hearing (on the Decay Tunnel) was held during November.

Surface Buildings and Outfitting – E. McCluskey

At the Target Site, RBI worked on punchlist items. As of the end of November, 123/180 had been completed.

At the Minos Site on the surface: Front plaza concrete was placed. Site work began on the north side of the site, including excavation for the pond and removal of surface mine tailings to the KRS Stockpile. Piping and controls for the holding tank were installed. Mechanical equipment, ductwork, and piping continued inside the building. Installation of site electrical lighting continued. Electrical cables pulling continued at the utility pad, and the permanent power tie-in

was completed. Electrical conduit and fixture rough-in inside the building began. The two elevators were brought back into service. Permanent and temporary exterior doors and windows were installed to secure and temperature-protect the building. Painting of doors and walls occurred at every opportunity.

Below-grade at MINOS: Masonry installation began at the elevator side of the bottom of the shaft. Electricians continued installation of conduit at the west side of the MINOS Tunnel, in the MINOS Hall, and up the Absorber Passageway. Sump discharge piping fabrication continued at the base of the shaft. Work on the non-elevator side of the shaft began, with pipefitters installing pipe supports on day shift. Electricians started a second shift to begin conduit and conduit support installation. The second shift and Saturday shift is expected to continue for the foreseeable future.

MS8, scheduled for completion November 8th, was not achieved during November. RBI had acknowledged this in a schedule update narrative, stating that this completion was an arbitrary milestone, since NuMI Project wouldn't use the space until the building and tunnel were both completed.

Two recordable incidents occurred on November 5th and 7th. First, a landscaping laborer dropped a piece of concrete paver on his foot for a toe injury when the paver broke while being carried. Secondly, a motor vehicle accident involving a delivery truck injured a pedestrian walking in the street outside the gate to the MINOS site. See the ES&H report for more information. On November 12th, after learning of an electrical non-injury incident on November 8th, the electrical work on site was halted by the CMO until RBI/Divane could demonstrate adequate management oversight for the electrical work. The work was restarted on November 19th. RBI chose at this time also to replace their superintendent in order to improve communications and relationships between RBI and the sub-tier contractors. Initial results are that this change has been very effective for the workers and project progress.

It should have been reported in October's report that RBI and CMO reached consensus on revision 9 pricing and schedule extension, not revision 11. Revision 11 pricing and request for time extension was received in November, and additional backup information and clarification was requested from RBI. The CMO and its consultant engineers worked on RFI responses.

Change orders to the SBO subcontract were processed, and SA11 was issued in November. The value of the contract was increased to $19,782,970.91, with MS7 & MS8 extended 7 calendar days and MS9 & MS10 extended 43 calendar days.

The CMO requested proposals from RBI for the following:
Removal of temporary poles and power line at the MINOS site.
Addition of 120V power for the outlets and lights inside the desiccants units at the Target site.
Addition of access panels for future maintenance on MINOS exterior light columns.
Change of AHU-MSB-3 from regular to emergency power.

Site tours for NuMI project installation and FESS services and operations personnel, as well as various special visitors, continued as required.

MINOS DETECTORS (WBS 2.0) – R. Rameika

Overview

In steady progress continued on the Near Detector electronics and rack preparation. The Far Detector continued to operate with up times averaging 85%.

Some examples of statistics for the production status at the end of the month are given below. (Production items that have been listed as 100% complete in prior months are not shown here.)

WBS	Near Detector Production Items	%Complete
2.2	Near MUX boxes complete and delivered to FNAL	98%
2.3	Near Electronics production MENU boards checked out	100%
2.5	Near Detector Electronics Rack assembly	72%
2.5	Near Detector Planes installed	0%

Electronics and Data Acquisition (WBS 2.3) – G. Pearce, P. Shanahan

Overview

The assembly of front-end mother boards (MINDERs) was completed in November. This finishes assembly of all modules that are both complex and required in significant quantities. Remaining boards include MINDER auxiliary cards, which have few parts, and the VME Timing Module (VTM), of which only 8 are required to operate the detector. Checkout of readout boards (MASTERs) and fabrication of the final VTM design were suspended in November, while significant improvements were made in the performance of the system. These improvements greatly reduce the rate of rare readout errors that had occurred in the data taken at the Calibration Detector (CALDET) at CERN.

All PCs needed for the Data Acquisition (DAQ) system for the Near Detector at Fermilab have been ordered, and are expected to arrive in December.

Parts for the Near Detector RPS system continue to arrive at Fermilab, with all parts expected in time to begin the Near Detector installation.

Near Detector Front End Electronics (WBS 2.3.1) - G. Drake

The checkout of MASTERs at Argonne was suspended during the month of November while we debugged a noise issue in the MASTER crates. This was related to the occasional data errors observed at CALDET. After a fashion, we were able to reproduce the errors at Argonne, and have found a remedy. The problem is very subtle, and is due to noise pick-up on the clock line used by the MASTERs on the VME backplane during certain VME operations. The fix includes: implementing a minor modification to the MASTERs to add filtering on the clock line; a new clock driver that will reside on the VTMs; and a new termination to the clock line on the backplane. We have implemented these changes in our test stand at ANL. Long-term testing over the course of several days with a full crate of MASTERs now shows no errors. The

checkout of MASTERs will resume in early December. At present, it is approximately 70% complete.

The assembly of MINDERs is now complete. The last boards were received in early November. Checkout continues at Argonne, and is almost complete. Only boards with stubborn problems remain, approximately 30 in total of the ~650 needed for the experiment.

We have been working on the final firmware for both the MASTERs and the MINDERs. The design work is now complete, and testing is in progress. We expect to begin burning and installing the final firmware in December. The cards will then be tested in the Vertical Slice test stand at Argonne. This is the last step before releasing the cards for the experiment.

The fabrication of the Type 2/3 PMT cable sets and the Type 1 PMT cable sets are complete. The assembly of the Type 4/5 cables is now in progress. The fabrication should be complete in December.

We have received bids for the assembly of the MINDER AUX boards. We have selected a vendor, and assembly will begin in early December. It is scheduled to be completed in early January.

The artwork changes to the VTM to incorporate the new clock driver and also other features have been completed. Review of the artwork is in progress. The boards will be fabricated in December. Since the number of boards is small and the number of parts on each board is not large, assembly will be done at IIT. It is scheduled to be completed in January.

The prototype PIN Diode AUX Card has been tested at CALDET. It appears to have worked satisfactorily. We are waiting for further analysis of CALDET data before proceeding with the fabrication and assembly of the cards needed for the near detector.

We have sent 35 of the 44 needed MINDER Crates back to Pentair-Schroff to have new horizontal rails and side plates installed. This was needed in order to address a mechanical problem with cards not seating well in the card guides. The problem was due to a last-minute error in the fabrication drawings by Schroff designers. We are waiting for the first 10 crates to be delivered. They are due in early December. If they are satisfactory, we will then swap out the crates currently in test stands and racks at FNAL, and return them to Schroff to complete the modifications. If all goes well, the modifications should be complete on all crates except the 10 at CALDET by early January.

We plan to decommission the electronics at CALDET in mid January, and return the electronics to Argonne. The electronics will be rechecked, and have the firmware updated. The crates will be sent back to Schroff for repairs and modifications. When the checkout is completed, the cards, crates, and power supplies will be sent to FNAL for the spare pool.

Data Acquisition (WBW 2.3.4) – G. F. Pearce

Members of the DAQ group visited the Soudan site this month to install modifications to the DAQ system. The operating system on all the DAQ PCs was updated to Fermi Redhat Linux 9 from RedHat Linux 6.2 (plus patches); this was necessary after over two years of operation and

will ease future maintenance. A number of modifications were made to the DAQ itself, the primary ones being to fully daemonize the DAQ processes across the system and eliminating the startup script used during commissioning, installing PVIC and processor resets at the run control interface, loading console software for better managed access to the VME processor consoles, and installing a console server for the DAQ PCs. A dual Xeon processor, server level PC was purchased and installed for the Online Monitoring server. This had previously been run on one of the DAQ spare PCs during the installation phase so that a cost effective machine of the appropriate power could be purchased when the detector installation was complete.

The DAQ at Soudan has run for a year with six PVIC branches as described in previous reports. The decision was made to continue with this configuration since it is stable and successful. The additional spares required to cover the move to six branches are being ordered, notably two optical PVIC fibers and PIBs.

The DAQ PCs for the Near Detector have been delivered and are in shipment to Fermilab. They should arrive on schedule in the second week of December.

Detector Control and Monitoring (WBS 2.3.8) – A. Habig

Software. The "map of MINOS" style iFix operator screen was brought back to make quick isolation of far detector problems easier. This time it reads its information from the DCS DB rather than directly from the instruments.

Environmental Monitoring. More progress was made on understanding how the temperature and radon measurements from this system relate to reality. While the jury is still out, lots of data on the situation were collected, pointing to the physical location of the sensors as a large component of the fluctuations.

The first drip sensor for the water-cooled near detector front end racks was tested with the low conductivity water to be used in the cooling system. The conductivity is high enough to provide warning of a drip, and the production run of the sensor boards is now well under way. The near detector rack protection hardware continues to arrive on a pace that will see its completion on schedule.

Near Detector Installation (WBS 2.5) - C. James, J. Thron

The detector racks in the New Muon Lab are continuing to have new components installed. This month all the plumbing for the water cooling of the Minder racks was installed and pressure tested. Rack protection system controller boxes, AC relay boxes and their associated cables continue to arrive and be installed. The first drip sensor was delivered and tested. All the components for the Minder fan packs were sent to Pittsburgh for assembly.

A new activity at the New Muon Lab was started -- a readout test using the actual racks and cables will be connected to the first 9 planes of the detector as they wait on their storage rack. This will be used to test and gain experience with the hookup procedures and to start up the learning curve for the Near Detector installation. If time permits the DAQ system will be used to read out real PMT signals. This month the platform, Minder, Master, and HV racks were moved in place and a test was done connecting the final fiber optic cables. A plan for installing network

connections on the floor at New Muon has started.

The planning for the installation proceeded on many fronts. The staging of planes in the MINOS surface building, the transportation of several blank steel sheets at once, and careful coordination with the absorber work, may allow speeding up the plane installation. The order of tasks to be performed right after beneficial occupancy was examined. Methods for aligning of the planes as they are installed were worked on. There was a meeting with the CD people, who will be supervising the underground LAN installation, to make them aware of the other tasks with which they will have to coordinate.

VI. ES&H HIGHLIGHTS – M. Andrews

Management Overview – M. Andrews

Mike Andrews continued to provide ES&H support to the Service Building & Outfitting Construction Management Offices (NCMO) to augment the civil construction oversight effort. His efforts include reviewing the implementation of the subcontractor's safety program, concurring with the subcontractor on where improvements are needed and the priority for those improvements, attending pre-shift subcontractor safety meetings to verify continuing improvement, and participating in weekly ES&H Inspections with the sub-contractor and representatives from the DOE Fermi Area Office.

The NuMI Project and Ragner Benson project management teams meet on a weekly basis to discuss work planning issues, hazard analysis review, training issues, general ES&H program issues, and day-to-day scheduling issues through a series of regularly scheduled meetings.

Mike Andrews is also providing ES&H support for the Installation phase of the project. At present, he chairs a weekly ES&H meeting with NuMI/MINOS Project Management to discuss issues relating to the upcoming installation and operational phases. John Cassidy, the Field Safety Coordinator, continues to supplement the ESH support effort.

NuMI Beam Safety Issues – M. Andrews

The NuMI Project ESH Coordinator (Mike Andrews) and the NuMI ES&H/QA Committee Chair (Keith Schuh) meet on a weekly basis to discuss and coordinate the process for completing upcoming equipment reviews by the committee. They also discuss the status of reviews, which are in progress.

The committee is presently reviewing Engineering Notes for the NuMI Horn Raw System, the NuMI Decay Pipe, the NuMI Decay Pipe Downstream End, and the NuMI Target Hall Work Cell. The committee has completed and signed off on reviews for the NuMI Horn 2 Module, NuMI Decay Pipe Upstream End, and the Strip Line Shield Assembly Fixture.

Regular weekly meetings continue to occur between the NuMI Project ES&H personnel and the MI-65 and MINOS Floor Managers to coordinate upcoming ES&H requirements including daily work planning meetings and Hazard Analysis for installation tasks.

Weekly Installation Meetings continue to occur between NuMI Project ES&H personnel, Floor Managers and L2/L3 Managers. The topics discussed include installation procedures, hazard analyses, equipment ESH/QA reviews and upcoming schedule issues.

Installation Safety – M. Andrews

A daily meeting is held between the MI-65 Floor Managers, the NuMI Project ES&H Coordinator, and the Field Safety Coordinator to discuss installation activities for the day, upcoming activities, hazards analyses, installation procedures and ES&H/QA review status.

NuMI Project Management, FNAL ES&H Section, and DOE Area Office performed multiple ES&H reviews and audits during the month of November 2003. NuMI Project Management conducted ES&H Inspections on November 6th, 13th and 20th, 2003. Results of an inspection were communicated to the MI-65 Floor Managers at the close out meeting held immediately following the inspection.

MI-65 Floor Managers are holding daily work planning meetings with all site workers, which includes a review of task hazards. T&M subcontractor personnel are holding weekly toolbox meetings. NuMI Project Management is monitoring these meetings on a regular basis.

Task Managers are developing task related HAs and submitting Hazard Analysis documentation for review and acceptance to the NuMI Field Safety Coordinator for all new tasks.

There was one OSHA-recordable injury during the month of November 2003. A rigging subcontractor employee, at MI-65 site, was using a pry bar to adjust the magnet cart while installing a quad magnet with other members of his crew in the upstream carrier pipe region when the pry bar slipped and he felt some pain on the side of his groin. The employee was sent to the doctor where he was diagnosed with a right inguinal hernia and placed on restricted duty and given instructions to follow up with a surgeon. The incident is an OSHA Recordable Lost Workday Case (LWDC) due to the 15-pound lifting restriction prescribed by the doctor.

Construction Safety – M. Andrews

NuMI Project Management, FNAL ES&H Section, and DOE performed multiple ES&H reviews and audits during the month of October. NuMI Project Management developed and distributed a report for ES&H Inspections conducted on November 6th, 13th, and 20th, 2003. Safety Findings/Deficiencies were transmitted to the Subcontractor through the NuMI Construction Management Office. A follow-up on each finding was conducted during the Weekly ES&H Inspections and in the Weekly Construction Management Meetings with Ragnar Benson Management in order to track and/or close each item.

RBI continues to hold their daily huddles, which include a review of task hazards, and their weekly toolbox meetings. RBI also held their monthly safety meeting for all site personnel. NuMI Project personnel continue to monitor these meetings on a regular basis.

RBI continues to submit Hazard Analyses for review and acceptance to the SBO-CMO for all new tasks. RBI has generated in excess on one hundred and twenty-five hazard analysis for tasks being completed by subcontractor personnel.

There were two OSHA-recordable injuries during the month of November 2003.

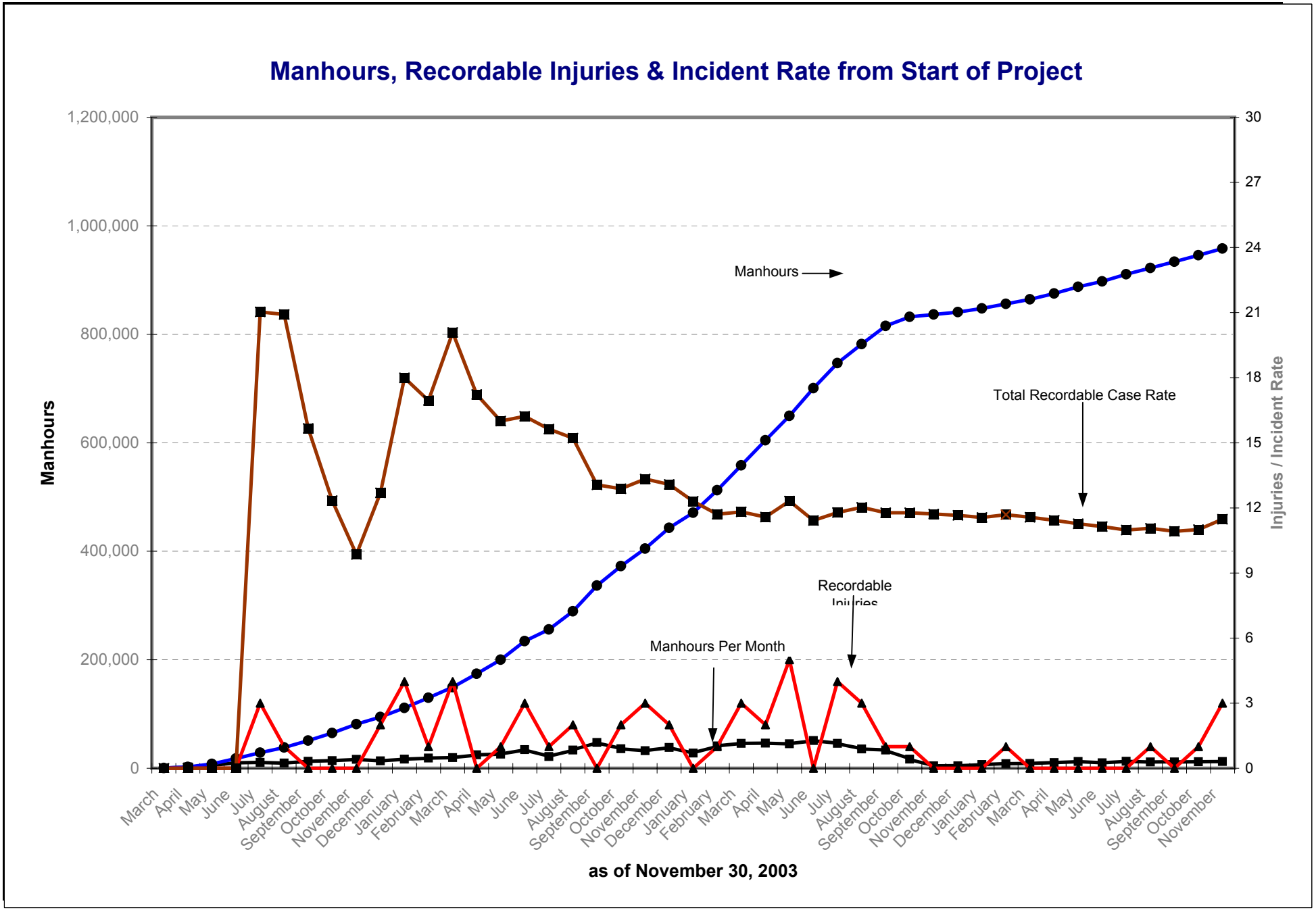
A sub-tier landscaper, at the MINOS site, was carrying a 40-pound paver block when it broke into two pieces one of which fell and landed on his left great toe. The employee was sent to the doctor where he was diagnosed with a contusion to the left great toe and issued a prescription for infection prevention. The incident is OSHA Recordable due to prescription medication being issued.

A sub-tier electrical delivery truck driver was driving in reverse gear on the MINOS access road outside of the construction site when he struck a sub-tier mechanical employee, from behind, with his vehicle. The employee was sent to the doctor where he was diagnosed with a fractured right shoulder, two fractured ribs, abrasions and contusions on his legs, right hand and head. The employee was treated and placed on off work status for two weeks. The incident is an OSHA Recordable Lost Workday Case due to the Lost Work Day Status. The incident is also meets the ORPS criteria due to the employee sustaining both a fractured shoulder and ribs.

Also during the month of November RBI and their subcontractors surpassed 23 consecutive days without an OSHA-recordable injury.

Safety Performance for the NuMI Construction/Installation Project for 2003 Calendar Year to Date includes a Recordable Incident Rate of 10.2**,** a Lost Time Incident Rate of 3.4, and a Lost Workday Incident Rate of 6.8. The Project to Date Safety Performance includes a Recordable Incident Rate of 11.5, a Lost Time Incident Rate of 2.7, and a Lost Workday Incident Rate of 7.5. Figure 2 shows man-hours worked, and recordable injury and incident rates from the start of the NuMI construction subcontracts through November 2003.

NuMI TUNNEL and HALLS PROJECT
CONTRACTOR'S INJURY DATA



Environmental Issues – M. Andrews

Discharge results to be reported to the IEPA for November 2003 are as follows:

MINOS Outfall 004
TSS Ave. 27 mg/l
pH 7.62

Target Outfall 006
TSS Ave. NA
pH NA

Vegetation over all seeded areas at MI-65 and MINOS sites is progressing well. RBI removed silt fence along the MINOS along south and east site boundaries.

FESS Operations continued 24 hr. operation of MINOS sump water pumping into FNAL ICW. Temporary pumping system operated throughout month without incident.

Ongoing erosion control findings:
RBI continues to make a good effort in resolving environmental findings throughout the month.

MINOS Safety – D. Boehnlein

A job hazard analysis has been prepared for the near detector test stand at New Muon Lab and those who will be working there have reviewed it and received training in safe operation of the man-lift. A set of "template" hazard analysis forms is now on hand at New Muon Lab so that a job hazard analysis can be prepared on the spot for any task that falls outside the scope of the test stand JHA.

Radiation Safety – N. Grossman

All shielding Assessment Methodology documents are complete and approved. They are all posted on the safety documents web page. The two documents "NuMI Hot Cell Shielding" and "The Groundwater Monitoring Strategy for NuMI" have been drafted, reviewed and are nearly complete. Radiation Safety drawings are well underway.

VII. LEVEL 3 MILESTONES

The current NuMI/MINOS Level 3 Milestones are shown in Figure 3. Milestones for the period 9/03 to 9/05 are shown. The triangles are the fixed Fermilab milestones. Note that we show L3 milestones along with the new “L-3-n” identifiers. Actual dates of achieving milestones are shown as black diamonds. Currently projected dates for achieving milestones are shown as hollow diamonds. Projected milestone dates which differ from the fixed Fermilab milestone dates by more than two weeks are flagged as **<Late>** or **<Early>**.

VIII. VARIANCE ANALYSIS – G. Bock

Variances are reported in the cost and schedule reports against the NuMI Project's plan, which is considerably more aggressive than that required by the DOE milestones. In all cases the project remains comfortably ahead of schedule with respect to the DOE milestones and within baseline cost.

We include the Variance Summary Table. Cost and schedule variances against the project's plan are extracted from the Cost Tables in Section IX and shown here at Level 2.

DOE MILESTONES

Planning for installation and commissioning continues to be a focus for the final stages of the NuMI project. Forecast dates for five DOE milestones have changed. Three involve some delay associated with the current change in the estimate of beneficial occupancy of the MINOS area: Milestones L-2-11, L-2-21, and L-2-14. These are not on the project critical path, however, as is evidenced by the changes in forecast for L-1-9 and L-0-3 which are forecast earlier this month than last. The forecast dates for all remaining DOE milestones continue to include comfortable amounts of float.

NuMI (WBS 1.1)

The Technical Components report a negative variance of ($271K). This is a significant improvement over the last month as a result of a combination of both a more complete reporting of progress and the processing of Change Requests included in this Monthly Report. The favorable schedule variance continues and is reported at $862K.

NuMI (WBS 1.2)

Schedule variance: Overall, project management remains pleased with the performance of the Service Buildings and Outfitting contract, especially with the effort on and delivery of the MI-65 Target area which was on the NuMI project's critical path. The subcontractor is adding effort, especially electrical, in an effort to complete the work at the MINOS area. Project management now expects beneficial occupancy in mid-February. We continue to monitor the progress closely.

Cost variance: There is no significant cost variance in WBS 1.2. A negative variance arising principally from an accrual against potential future claim settlements from work on the Tunnels and Halls project is counterbalanced now by a positive variance on Title III. Costs for the Service Buildings and Outfitting contract remain comfortably on the plan.

NuMI (WBS 1.3)

Cost variance: There is a favorable cost variance reported at $625K.

MINOS (WBS 2)

Cost and Schedule variances: A few hundred thousand dollars of the large favorable cost variance shown for the MINOS Detector is real. Work continues on closing out the contracts relating to far detector construction. Careful attention continues to be paid each month to the situation. There continue to be no real, significant schedule variances in WBS 2.0.

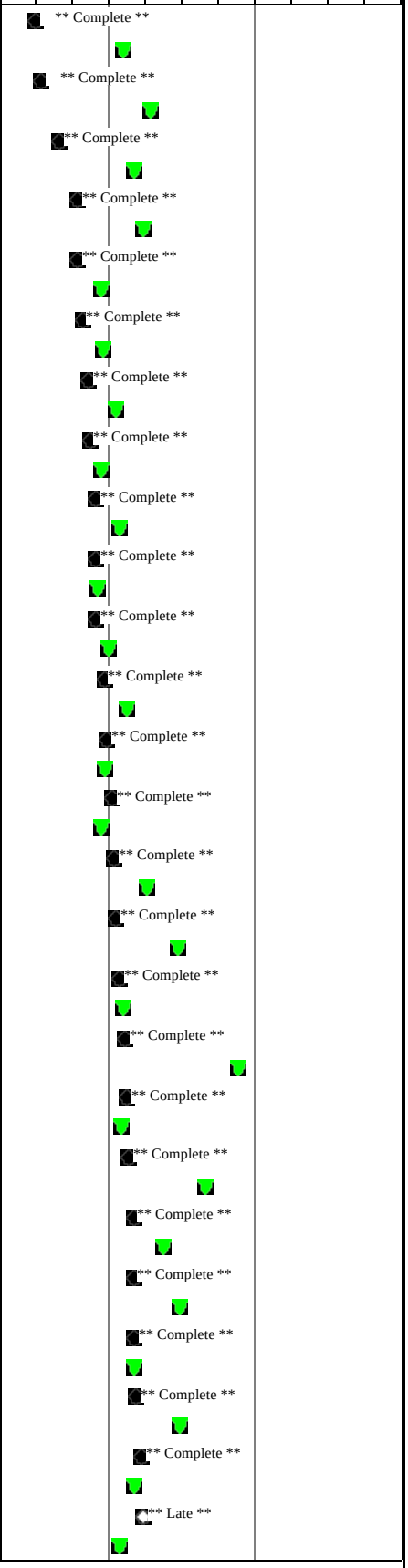
MINOS Cavern and Project Support (WBS 3)

The MINOS Cavern outfitting is complete. There is a small positive cost variance in WBS 3 which remains after the completion of MINOS project work in Soudan. There are no significant variances in WBS 3.

NuMI WBS Level 3 Milestones
(8/2003 - 9/2005)

12/18/03

Mlstn#	WBS Lev	Name	FNAL Cur Forecast	FNAL Base Date	Float
L-3-155	118	L3 Managers Review of Controls Syst Design Compl	3/3/03	10/10/03	0 d
L-3-196	112	Production Target Fabrication Complete	3/17/03	12/19/03	0 d
L-3-192	117	U.S. LCW Syst Piping & Equip Installed in MI-62	4/30/03	11/7/03	0 d
L-3-178	114	Core Backshielding Steel Fabricated	6/16/03	11/28/03	0 d
L-3-191	120	Target Service Bldg Shell Complete	6/17/03	8/15/03	0 d
L-3-176	118	Cable System Specifications Complete	6/30/03	8/18/03	0 d
L-3-193	120	MSB Shell Complete	7/14/03	9/19/03	0 d
L-3-332	111	Pre-Target Magnet Stands Design & Drafting Complete	7/15/03	8/16/03	0 d
L-3-171	112	Upper Chase Shielding Fab & Installation Dwg Set Compl	7/31/03	9/29/03	0 d
L-3-174	112	Production Horn 1 Assembly Complete	7/31/03	8/7/03	0 d
L-3-328	111	Major Magnet Stands Ready for MI and Stub Installation	8/1/03	9/2/03	0 d
L-3-333	111	BPM Electronics Procurement Started	8/22/03	10/18/03	0 d
L-3-190	112	Complete Horn 2 Operational Testing in Test Stand	8/29/03	8/22/03	0 d
L-3-170	113	Transmission Line Design & Dwgs Compl	9/15/03	8/15/03	0 d
L-3-197	112	Complete Horn 1 Operational Testing in Test Stand	9/15/03	12/5/03	0 d
L-3-335	111	Complete Beam Permit System Input Parameters	9/22/03	2/21/04	0 d
L-3-194	112	Assembly of Horn 1 Module Complete	9/30/03	10/7/03	0 d
L-3-215	111	Lambertson Magnet Installation Complete	10/10/03	7/23/04	0 d
L-3-198	120	Beneficial Occupancy of UG Target Area	10/20/03	10/6/03	0 d
L-3-219	111	Extraction Devices Ready for Installation	10/23/03	4/30/04	0 d
L-3-329	111	MI & Stub Magnets Installed & Ready for Low Power Testing	11/3/03	1/15/04	0 d
L-3-216	112	Assembly of Horn 2 Module Complete	11/4/03	2/26/04	0 d
L-3-334	111	Start Construction of Multi-Wires	11/7/03	11/2/03	0 d
L-3-210	114	Start of U.S. VacuumEndcap Installation	11/10/03	2/27/04	0 d
L-3-237	111	Pre-Target Equip Stands Ready for Installation	11/26/03	11/3/03	0 d
L-3-153	117	RAW Systems Engineering Notes Sent for Review	12/1/03	9/30/03	197 d

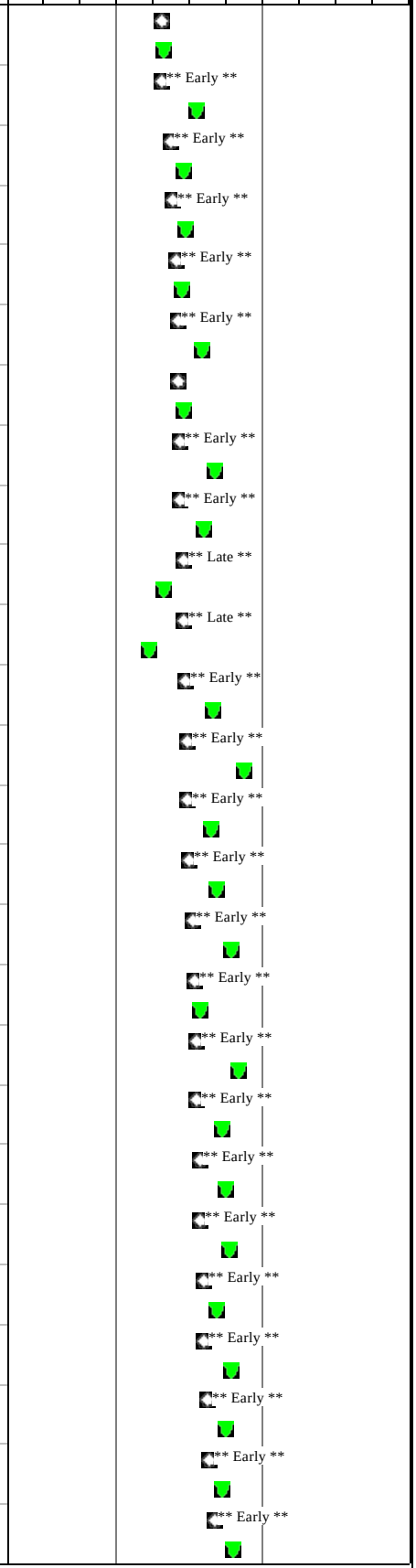


FNAL Current Forecast ◆ FNAL Baseline Date ■ Milestone Complete ●

NuMI WBS Level 3 Milestones
(8/2003 - 9/2005)

12/18/03

Mlstn#	WBS Lev	Name	FNAL Cur Forecast	FNAL Base Date	Float
L-3-331	111	Kicker Magnet Construction Complete	12/23/03	12/27/03	138 d
L-3-213	115	Muon Monitors Ready for Installation	12/23/03	3/19/04	228 d
L-3-195	113	Kicker Power Supply Construction Complete	1/15/04	2/16/04	130 d
L-3-235	112	Assy of Target/Baffle Module Complete	1/21/04	2/25/04	115 d
L-3-212	112	Assy of Horn 1 & Module Complete	1/30/04	2/13/04	139 d
L-3-330	111	Low Power Test of MI Magnets Started	2/3/04	4/6/04	134 d
L-3-199	113	Compl Install of Horn Power Supply in PS Room	2/3/04	2/16/04	210 d
L-3-308	112	Assy of Horn 2 & Module Complete	2/10/04	5/5/04	150 d
L-3-217	115	Downstream Hadron Monitors Ready for Installation	2/10/04	4/7/04	221 d
L-3-218	120	B.O. of MINOS Shaft, Absorber, MINOS Tunnel & MINOS Hall	2/16/04	12/26/03	56 d
L-3-211	120	MINOS Service Bldg Complete	2/16/04	11/26/03	29 d
L-3-230	111	Kicker Ready to Install	2/25/04	4/30/04	97 d
L-3-231	117	All Water System Skids Installed in Enclosures	2/27/04	7/16/04	182 d
L-3-234	118	Fiber Optic Cable Installation Complete	2/27/04	4/26/04	88 d
L-3-310	112	Install Bottom Shielding Complete	3/2/04	5/12/04	62 d
L-3-238	114	All Hadron Absorber Core Material Delivered	3/11/04	6/18/04	169 d
L-3-320	113	Receipt of Major Transmission Line Materials & Parts	3/16/04	3/30/04	180 d
L-3-321	117	All Water System Skid Instrumentation Connected	3/19/04	7/4/04	233 d
L-3-326	118	Personnel Safety Interlock Syst Enginering & Des Compl	3/22/04	5/27/04	208 d
L-3-214	118	FIRUS Cable System Installation Complete	3/29/04	5/31/04	222 d
L-3-315	112	Targ Pile Carriage Pads on Concrete Install Compl	4/1/04	6/13/04	62 d
L-3-250	113	Power Supply Refurbishing Complete	4/7/04	5/11/04	41 d
L-3-236	116	Network in Target Hall	4/9/04	6/17/04	219 d
L-3-239	114	Test of Vacuum Integrity Complete	4/20/04	6/1/04	122 d
L-3-309	112	Assy of Target Baffle on Module Complete	4/21/04	5/27/04	113 d
L-3-258	115	Downstream Hadron Monitor Installed	5/4/04	6/21/04	192 d

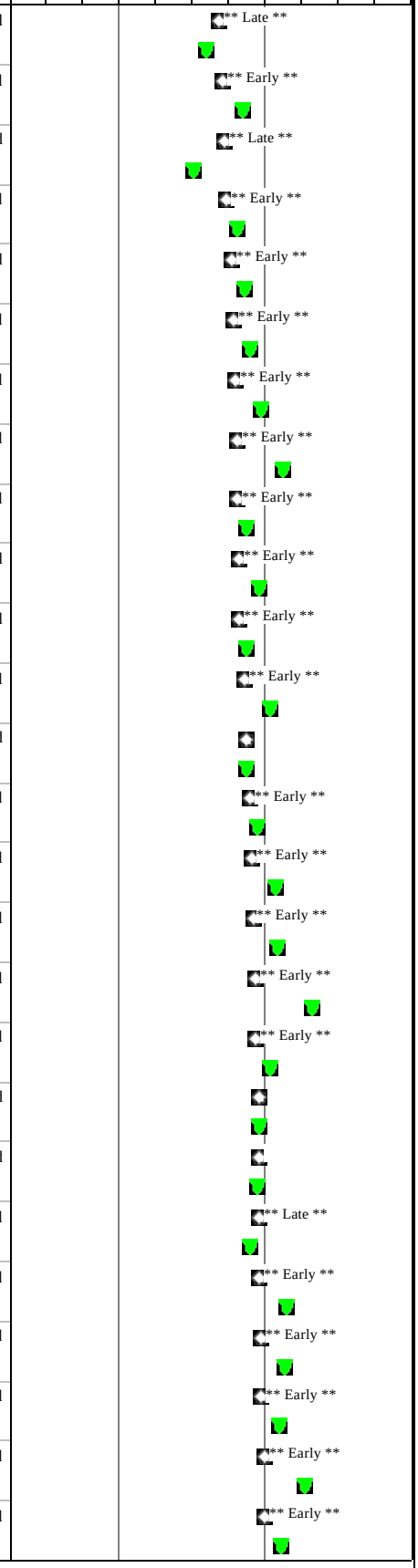


FNAL Current Forecast ◘ FNAL Baseline Date ■ Milestone Complete ●

NuMI WBS Level 3 Milestones
(8/2003 - 9/2005)

12/18/03

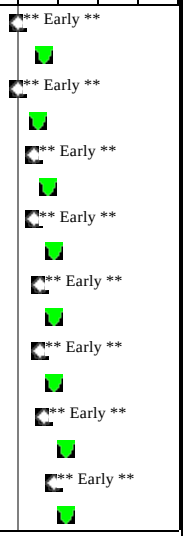
Mlstn#	WBS Lev	Name	FNAL Cur Forecast	FNAL Base Date	Float
L-3-271	111	Target Interface Baffle/Window Ready for Install	5/12/04	4/9/04	10 d
L-3-232	114	Start Absorber Outer Shielding Installation	5/19/04	7/9/04	144 d
L-3-252	111	Instrumentation Ready for Installation	5/24/04	3/5/04	4 d
L-3-251	111	Primary Beam Instrumentation Construction Compl	5/31/04	6/25/04	143 d
L-3-254	112	Compl Placement of Horn 1 into Target Station	6/14/04	7/12/04	69 d
L-3-256	114	Assy of Core on Carrier Complete	6/16/04	7/27/04	122 d
L-3-257	118	MI60 Cable Syst Install Compl (Excl Trim Elements)	6/21/04	8/20/04	158 d
L-3-259	118	Personnel Safety Interlock System Installation Complete	6/22/04	10/20/04	143 d
L-3-276	113	Complete Assy/Installation of Stripline	6/23/04	7/21/04	136 d
L-3-314	112	Compl Placement of Horn 2 Assy into Target Station	7/2/04	8/18/04	69 d
L-3-274	113	Power Test of TH Conventional Power Supplies Compl	7/2/04	7/21/04	18 d
L-3-311	111	Install Pre-target Instrumentation Complete	7/13/04	9/15/04	134 d
L-3-324	118	NuMI Stub Cables Installed	7/19/04	7/19/04	9 d
L-3-255	115	Muon Monitors Installed	7/28/04	8/13/04	133 d
L-3-322	118	Complete Installation of Devices in MI	7/30/04	9/29/04	131 d
L-3-270	112	Target & Horn Installation Complete	8/4/04	10/5/04	128 d
L-3-297	115	Downstream Hadron Monitor Operational	8/11/04	12/28/04	133 d
L-3-293	118	MI-62 Cable System Installation Complete	8/11/04	9/17/04	122 d
L-3-277	113	Compl Install & Testing of Kicker PS	8/17/04	8/16/04	2 d
L-3-318	113	Power Test of MI60 & MI-62 Power Supplies Complete	8/17/04	8/13/04	2 d
L-3-253	118	Pre-Targ Hall & Targ Hall Cable Syst Installation Compl	8/17/04	7/26/04	129 d
L-3-272	117	All Water Systems Checked Out	8/18/04	10/25/04	127 d
L-3-278	111	Pre-Target Installation Complete	8/24/04	10/22/04	124 d
L-3-294	114	Checkout Absorber Complete	8/26/04	10/8/04	122 d
L-3-298	117	VacuumSystems Checked Out	8/31/04	12/10/04	118 d
L-3-291	111	MI Stub Installation Complete	9/1/04	10/13/04	107 d



FNAL Current Forecast ◘ FNAL Baseline Date ■ Milestone Complete ●

NuMI WBS Level 3 Milestones
(8/2003 - 9/2005)

Mlstn#	WBS Lev	Name	FNAL Cur Forecast	FNAL Base Date	Float
L-3-299	111	Extraction & Primary Beam Checked Out	9/1/04	10/29/04	145 d
L-3-312	111	MI Installation Complete	9/1/04	10/18/04	118 d
L-3-290	112	Shielding Installation Complete (Pre-Hot Handling)	10/7/04	11/11/04	73 d
L-3-319	113	Start to Pulse & Checkout Horn System	10/8/04	11/25/04	74 d
L-3-295	112	Pulse & Checkout Horn System Complete	10/22/04	11/26/04	74 d
L-3-279	118	Controls Installation Complete	10/22/04	11/19/04	62 d
L-3-325	118	Controls Checkout Complete	10/29/04	12/20/04	77 d
L-3-296	115	Muon Monitors Operational	11/19/04	12/20/04	62 d

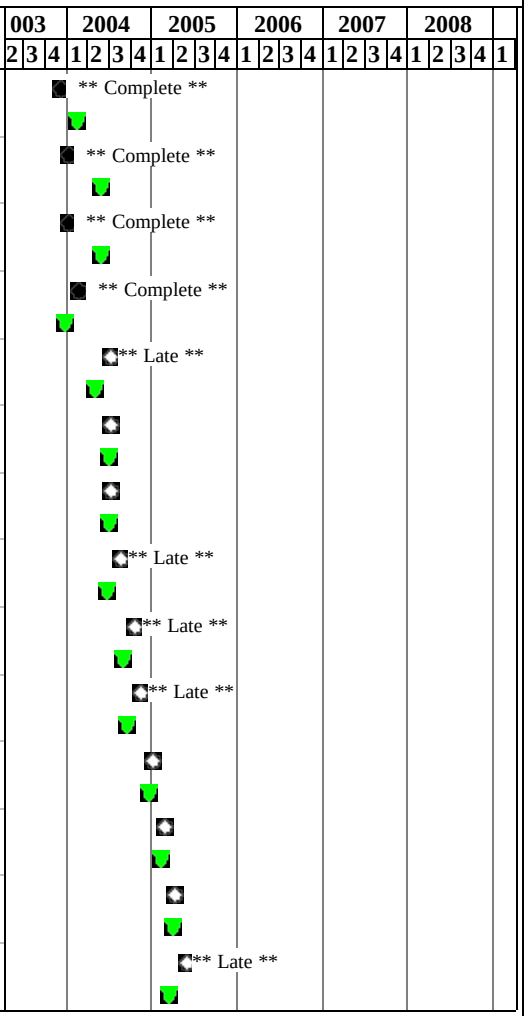


FNAL Current Forecast FNAL Baseline Date Milestone Complete

MINOS WBS Level 3 Milestones
(8/2003 - 9/2005)

12/18/03

Mlstn #	WBS Lev 3	Name	FNAL Cur Forecast	FNAL Base Date	Float
L-3-300	245	Approve SM2 Coil Turnon - UMN/DNR/FNAL	7/9/03	9/15/03	0d
L-3-288	222	100% of ND Clear Cables Complete	8/15/03	12/31/03	0d
L-3-285	225	100% of Near MUX Boxes Complete	8/15/03	12/30/03	0d
L-3-289	251	50% of ND Rack Assy Complete	9/30/03	7/31/03	0d
L-3-302	250	Near Detector Infrastructure Installation Started	2/16/04	12/10/03	33d
L-3-303	251	80% of ND Rack Assy Complete	2/16/04	1/30/04	33d
L-3-336	251	Checkout of Readout Equipment	2/16/04	1/30/04	37d
L-3-304	253	Begin Spectrometer Plane Installation	3/30/04	1/27/04	44d
L-3-301	231	Begin Near FE Electronics Installation	5/25/04	4/5/04	178d
L-3-305	253	25% Detector Installed	6/24/04	4/20/04	102d
L-3-337	253	Spectrometer Installation Complete	8/11/04	7/27/04	69d
L-3-338	253	50% of Calorimeter Planes Installed	9/30/04	9/15/04	34d
L-3-339	253	100% Detector Planes Installed	11/18/04	11/3/04	63d
L-3-306	250	Near Detector Installation Complete	1/4/05	10/22/04	34d



FNAL Current Forecast FNAL Baseline Date Milestone Complete

Variance Summary Table

(Cumulative to Date as of 11/30/03)

WBS / Description	Budgeted Cost		Actual Cost	Variance	
	Work Scheduled	Work Performed	Work Performed	Schedule	Cost
1.1 Technical Components	20,241	21,104	21,375	862	(271)
1.2 Facility Construction	67,793	66,938	66,635	(855)	304
1.3 Project Management	3,416	3,378	2,753	(39)	625
1.0 TEC Total	**91,451**	**91,420**	**90,763**	**(31)**	**657**
2.1 Magnets: Steel & Coils	7,621	7,621	7,622	0	(1)
2.2 Scintillator Detector Fabrication	19,540	19,540	19,525	0	15
2.3 Electronics, DAQ & Database	9,079	9,095	8,734	16	361
2.4 Far Detector Installation	5,077	5,077	4,576	0	500
2.5 Near Detector Installation	3,497	3,262	3,146	(236)	116
2.6 MINOS Project Management	1,606	1,606	1,612	(0)	(6)
UK In-Kind Contribution	(4,808)	(4,802)	(4,802)	6	0
2.0 MINOS Detector	**41,613**	**41,399**	**40,415**	**(213)**	**985**
3.1. NuMI Conceptual Design	1,934	1,934	1,928	0	6
3.2 MINOS Detector R&D	1,780	1,780	1,768	(0)	12
3.3 MINOS Cavern	14,527	14,527	14,527	0	0
3.4 Soudan/MINOS Operating	1,896	1,896	1,677	0	219
Minnesota Preconstruction Funds	(758)	(758)	(758)	0	0
Minnesota Contruction Funds FY99	(3,000)	(3,000)	(3,000)	0	0
3.0 NuMI Project Support	**16,378**	**16,378**	**16,142**	**0**	**237**
OPC Total	**57,991**	**57,778**	**56,556**	**(213)**	**1,222**
TPC Total	**149,443**	**149,198**	**147,320**	**(245)**	**1,878**

IX. COST REPORTS

Cost and earned value reports for the NuMI Project are presented in two sets, one for WBS 1.0 Total Estimated Cost (TEC), and a second for Other Project Costs (OPC) that includes both the MINOS Detector (WBS 2.0) and Project Support (WBS 3.0). Information for all segments of the project is summarized at WBS Level 3 except in the case of the OPC CURVE Reports that are at WBS Level 2 instead. The actual cost of work performed (ACWP) is comprised of the following: 1) costs collected and reported by the Fermilab financial system, 2) costs collected and reported to NuMI Project Management by the University of Minnesota in their monthly progress report for WBS 3.3 MINOS Cavern, and 3) an estimate of the value of work performed by the United Kingdom (UK) collaborating institutions towards their in-kind contribution. Since the UK collaborating institutions are not required to report their actual costs to NuMI Project Management, we are assuming that actual current period costs and cumulative costs are equal to current period earned value and cumulative earned value, respectively. Each set of cost and earned value reports includes the following:

CPR Format 1A
This is a modified version of the traditional CPR Format 1 report that shows indirect cost for each WBS Level 3 rather than as a single line item for the entire project. As a result it is possible to review the status of both burdened and unburdened costs for each major system or cost component. In addition, the report for the OPC includes a summary section at the end, with WBS Level 2 totals for the MINOS Detector and Project Support segments of the project.

CPR Format 3
This is the traditional format for reporting changes to the project baseline that were approved and implemented in the current reporting period, as well as their impact on the time phased project baseline.

CURVE Reports
These graphically depict cumulative Budgeted Cost of Work Scheduled (BCWS), Budgeted Cost of Work Performed (BCWP), and Actual Cost of Work Performed (ACWP), at WBS Level 3 and WBS Level 2 for the TEC and OPC, respectively. The OPC reports reflect all project costs, including the UK In-Kind Contribution, and also funding contributed ($3.758M) by the University of Minnesota. All amounts shown are fully burdened.

Plan v Act Reports
These reports compare burdened planned costs (BCWS) with burdened actual costs (ACWP) on a cumulative basis through the end of the prior fiscal year, and by month for the current fiscal year. There are two versions of this report, one for total cost, and a second for labor costs only. Both OPC versions exclude the value of UK In-Kind Contributions and thus represent US Funds only.

NuMI Project Obligations
This report reflects burdened obligations to date, including requisitions in progress, for the entire project, as recorded in the Fermilab financial system. Consequently, it does not include any assumed obligations with respect to work performed by the UK collaborating institutions. Nor

does it reflect actual amounts obligated by the University of Minnesota under the grant for WBS 3.3 MINOS Cavern; instead, obligations shown for WBS 3.3 represent the cumulative amount of the Financial Plan transfers to the University of Minnesota from the Fermilab budget.

NuMI Project TEC

($000's Omitted)

Cost Performance Report - Work Breakdown Structure													
Contractor:	Fermi National Accelerator Laboratory			Contract Type/No:			Project Name/No:		Report Period:				
Location:	Batavia						NuMI TEC		10/31/03	11/30/03			
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work	Tgt. Profit/ Fee %		Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling			
1	109,242		0	0	0	109,242	0		0	0			
WBS[2]	Current Period					Cumulative to Date					At Completion		
WBS[3] Results...	Budgeted Cost		Actual Cost	Variance		Budgeted Cost		Actual Cost	Variance				
Item	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Budgeted	Latest Revised Estimate	Variance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1.1 Technical Components													
1.1.1 Extraction & Primary Beam													
Direct Cost + Escalation	337	396	115	59	281	3,615	3,552	3,590	(63)	(39)	4,134	4,134	0
Indirect Cost	67	81	30	14	51	839	818	882	(21)	(64)	952	952	0
WBS[3]Totals:	404	477	145	73	332	4,454	4,370	4,473	(84)	(102)	5,087	5,087	0
1.1.2 Neutrino Beam Devices													
Direct Cost + Escalation	406	295	243	(111)	52	6,440	6,706	6,815	265	(109)	8,202	8,202	0
Indirect Cost	81	63	57	(18)	6	1,509	1,585	1,567	75	18	1,911	1,911	0
WBS[3]Totals:	487	358	300	(129)	58	7,950	8,290	8,382	341	(92)	10,112	10,112	0
1.1.3 Power Supply System													
Direct Cost + Escalation	89	118	56	29	62	3,390	3,267	3,439	(123)	(171)	3,827	3,827	0
Indirect Cost	16	21	11	6	10	812	787	808	(24)	(20)	910	910	0
WBS[3]Totals:	105	140	67	35	73	4,202	4,055	4,247	(147)	(192)	4,738	4,738	0
1.1.4 Hadron Decay and Absorber													
Direct Cost + Escalation	17	102	14	85	88	534	622	588	88	34	1,161	1,161	0
Indirect Cost	5	19	3	14	16	144	159	149	14	9	267	267	0
WBS[3]Totals:	22	121	17	99	103	679	781	738	103	44	1,428	1,428	0
1.1.5 Neutrino Beam Monitoring													
Direct Cost + Escalation	13	0	22	(13)	(22)	292	368	300	76	68	455	455	0
Indirect Cost	0	0	0	(0)	(0)	23	24	36	1	(11)	26	26	0
WBS[3]Totals:	13	0	22	(13)	(22)	315	392	336	77	57	481	481	0
1.1.6 Alignment Systems													
Direct Cost + Escalation	1	1	0	0	1	204	201	151	(2)	50	240	240	0
Indirect Cost	0	0	0	0	0	58	58	39	(0)	19	68	68	0
WBS[3]Totals:	1	2	0	1	2	262	259	190	(3)	69	308	308	0
1.1.7 Water, Vacuum & Gas Systems													
Direct Cost + Escalation	259	176	74	(83)	101	1,069	1,154	1,250	85	(96)	2,059	2,059	0
Indirect Cost	65	48	16	(18)	32	250	273	273	23	(1)	475	475	0
WBS[3]Totals:	324	223	90	(101)	133	1,318	1,426	1,523	108	(97)	2,534	2,534	0
1.1.8 Installation and Integration													
Direct Cost + Escalation	147	191	127	44	64	800	1,186	1,192	386	(6)	2,348	2,348	0
Indirect Cost	28	36	22	8	13	199	281	233	83	49	516	516	0
WBS[3]Totals:	174	227	149	52	77	999	1,467	1,425	468	43	2,864	2,864	0
1.1.9 Hadronic Hose (Close-out)													
Direct Cost + Escalation	0	0	0	0	0	53	53	54	0	(0)	53	53	0
Indirect Cost	0	0	0	0	0	9	9	9	0	(0)	9	9	0
WBS[3]Totals:	0	0	0	0	0	62	62	63	0	(1)	62	62	0
WBS[2]Totals:	1,530	1,547	790	17	756	20,241	21,104	21,375	862	(271)	27,614	27,614	0

NuMI Project TEC

($000's Omitted)

Cost Performance Report - Work Breakdown Structure													
Contractor: Fermi National Accelerator Laboratory				Contract Type/No:			Project Name/No:		Report Period:				
Location: Batavia							NuMI TEC		10/31/03	11/30/03			
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work	Tgt. Profit/ Fee %		Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling			
1	109,242		0	0	0	109,242	0		0	0			
WBS[2] WBS[3] Results...	Current Period					Cumulative to Date					At Completion		
	Budgeted Cost		Actual Cost	Variance		Budgeted Cost		Actual Cost	Variance				
Item	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Budgeted	Latest Revised Estimate	Variance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1.2 Facility Construction													
1.2.1 Facility Physics Design Phase													
Direct Cost + Escalation	0	0	0	0	0	49	49	52	0	(3)	49	49	0
Indirect Cost	0	0	0	0	0	21	21	19	0	2	21	21	0
WBS[3]Totals:	0	0	0	0	0	70	70	70	0	(0)	70	70	0
1.2.2 Facility Construction Title I Design Phase													
Direct Cost + Escalation	0	0	0	0	0	1,254	1,254	1,288	0	(34)	1,254	1,254	0
Indirect Cost	0	0	0	0	0	184	184	149	0	35	184	184	0
WBS[3]Totals:	0	0	0	0	0	1,438	1,438	1,437	0	1	1,438	1,438	0
1.2.3 Facility Construction Title II Design Phase													
Direct Cost + Escalation	0	0	0	0	0	2,620	2,620	2,807	0	(187)	2,620	2,620	0
Indirect Cost	0	0	0	0	0	355	355	167	0	188	355	355	0
WBS[3]Totals:	0	0	0	0	0	2,975	2,975	2,974	0	1	2,975	2,975	0
1.2.4 Facility Construction Phase													
Direct Cost + Escalation	83	514	784	431	(270)	61,755	60,914	60,763	(840)	151	61,967	61,967	0
Indirect Cost	13	0	25	(13)	(25)	1,555	1,541	1,390	(14)	150	1,596	1,596	0
WBS[3]Totals:	96	514	809	418	(296)	63,310	62,455	62,153	(855)	301	63,563	63,563	0
WBS[2]Totals:	96	514	809	418	(296)	67,793	66,938	66,635	(855)	304	68,047	68,047	0
1.3 Project Management													
1.3.1 FY 98 Project Management													
Direct Cost + Escalation	0	0	0	0	0	208	208	104	0	104	208	208	0
Indirect Cost	0	0	0	0	0	66	66	37	0	29	66	66	0
WBS[3]Totals:	0	0	0	0	0	275	275	141	0	133	275	275	0
1.3.2 FY 99 Project Management													
Direct Cost + Escalation	0	0	0	0	0	425	425	512	0	(88)	425	425	0
Indirect Cost	0	0	0	0	0	135	135	149	0	(14)	135	135	0
WBS[3]Totals:	0	0	0	0	0	560	560	661	0	(102)	560	560	0
1.3.3 FY 00 Project Management													
Direct Cost + Escalation	0	0	0	0	0	436	436	521	0	(85)	436	436	0
Indirect Cost	0	0	0	0	0	139	139	142	0	(3)	139	139	0
WBS[3]Totals:	0	0	0	0	0	575	575	663	0	(88)	575	575	0
1.3.4 FY 01 Project Management													
Direct Cost + Escalation	0	0	0	0	0	522	522	331	0	191	522	522	0
Indirect Cost	0	0	0	0	0	166	166	92	0	74	166	166	0
WBS[3]Totals:	0	0	0	0	0	688	688	423	0	265	688	688	0

NuMI Project TEC

($000's Omitted)

Cost Performance Report - Work Breakdown Structure													
Contractor:	Fermi National Accelerator Laboratory				Contract Type/No:			Project Name/No:		Report Period:			
Location:	Batavia							NuMI TEC		10/31/03	11/30/03		
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work		Tgt. Profit/ Fee %		Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling		
1	109,242		0		0	0	109,242	0		0	0		
WBS[2]	Current Period					Cumulative to Date					At Completion		
WBS[3] Results...	Budgeted Cost		Actual Cost	Variance		Budgeted Cost		Actual Cost	Variance			Latest Revised	
Item	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Budgeted	Estimate	Variance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1.3.5 FY 02 Project Management													
Direct Cost + Escalation	0	0	0	0	0	533	533	253	0	281	533	533	0
Indirect Cost	0	0	0	0	0	170	170	72	0	98	170	170	0
WBS[3]Totals:	0	0	0	0	0	703	703	324	0	378	703	703	0
1.3.6 FY 03 Project Management													
Direct Cost + Escalation	0	0	0	0	0	411	411	324	0	87	411	411	0
Indirect Cost	0	0	0	0	0	131	131	98	0	33	131	131	0
WBS[3]Totals:	0	0	0	0	0	541	541	421	0	120	541	541	0
1.3.7 FY 04 Project Management													
Direct Cost + Escalation	27	(12)	51	(39)	(64)	57	28	92	(29)	(64)	348	348	0
Indirect Cost	8	(4)	16	(12)	(19)	18	9	28	(9)	(19)	111	111	0
WBS[3]Totals:	35	(16)	67	(51)	(83)	75	37	120	(39)	(83)	458	458	0
1.3.8 FY 05 Project Management													
Direct Cost + Escalation	0	0	0	0	0	0	0	0	0	0	251	251	0
Indirect Cost	0	0	0	0	0	0	0	0	0	0	80	80	0
WBS[3]Totals:	0	0	0	0	0	0	0	0	0	0	330	330	0
WBS[2]Totals:	35	(16)	67	(51)	(83)	3,416	3,378	2,753	(39)	625	4,130	4,130	0
General and Administrative	0	0	0	0	0	0	0	0	0	0	0	0	0
Undistributed Budget											0	0	0
Sub Total	1,661	2,045	1,667	384	378	91,451	91,420	90,763	(31)	657	99,791	99,791	0
Contingency											9,451	9,451	0
Total	1,661	2,045	1,667	384	378	91,451	91,420	90,763	(31)	657	109,242	109,242	0

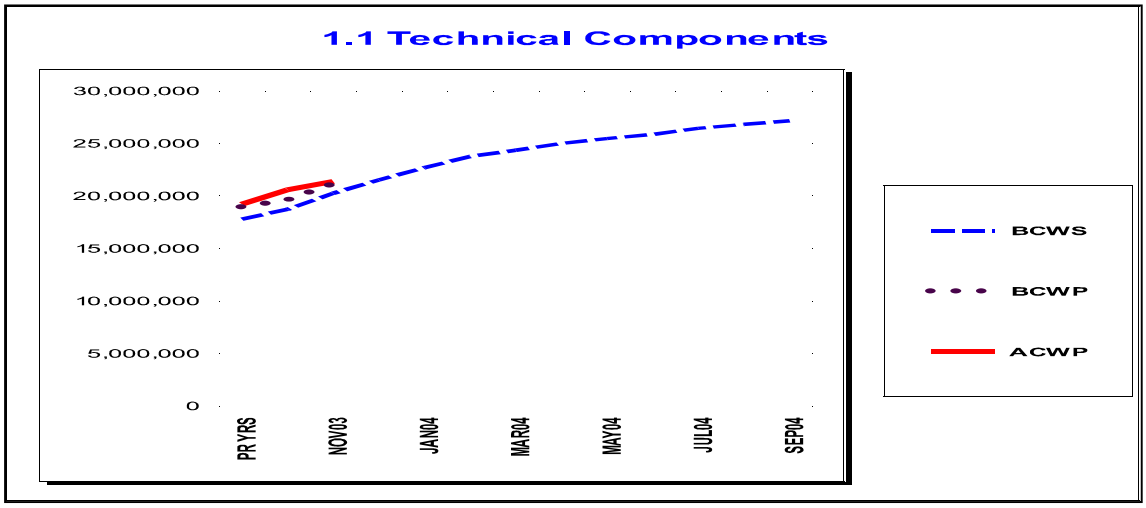
NuMI Project TEC

($000's Omitted)

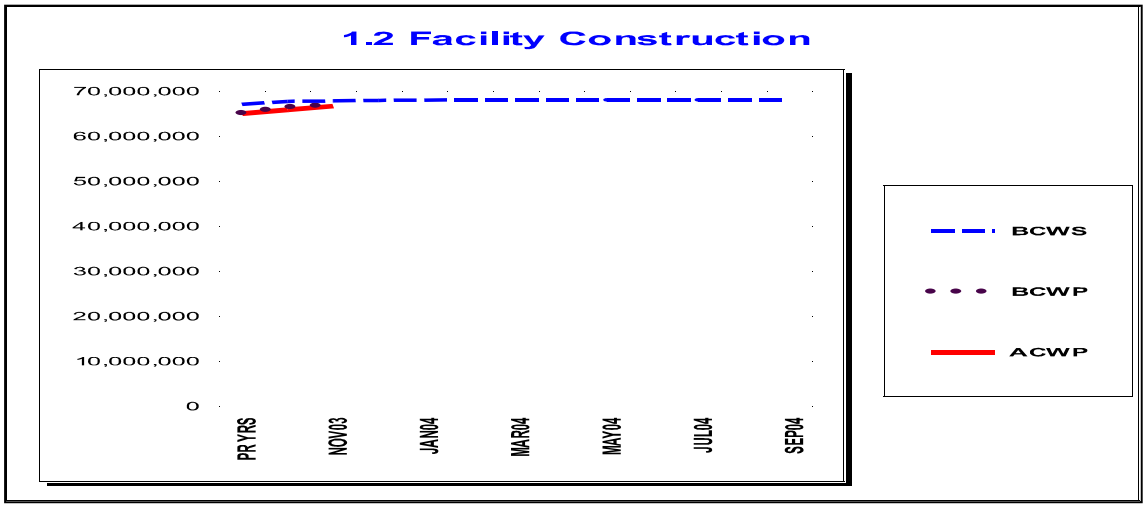
Cost Performance Report - Baseline																
Contractor:	Fermi National Accelerator Laboratory			Contract Type/No:		Project Name/No:			Report Period:							
Location:	Batavia					NuMI TEC			10/31/03	11/30/03						
(1) Original Contract Target Cost		(2) Negotiated Contract Changes		(3) Current Target Cost		(4) Est. Cost Authorized Authorized Unpriced Work			(5) Contract Budget Base (3) + (4)					(6) Total Allocated Budget		(7) Difference (5) - (6)
76,200		33,042		109,242		0			109,242					109,242		(0)
(8) Contract Start Date	10/1/97	(9) Contract Definitization Date	10/1/97			(10) Last Item Delivery Date	9/30/03		(11) Contract Completion Date	9/30/03				(12) Estimated Completion Date	9/30/03	
Item	BCWS Cum to Date	BCWS for Report Period	Budgeted Cost for Work Scheduled (Non-Cumulative) Six Month Forecast +1 DEC03	+2 JAN04	+3 FEB04	+4 MAR04	+5 APR04	+6 MAY04	(Enter Specific Periods) BAL FY04	FY05				Undist Budget	Total Budget	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	
PM Baseline (Beginning of Period)	89,808	1,039	1,397	1,261	1,183	626	707	518	1,909	795	0	0	0	0	99,242	
255 Scope Changes to WBS 1.1.7															349	
256 Installation Re-estimate															400	
257 Return Budget to Contingency															(200)	
PM Baseline (End of Period)	91,451		1,429	1,280	1,167	627	691	502	1,849	795	0	0	0	0	99,791	
Contingency															9,451	
Total															109,242	

NuMI Project TEC

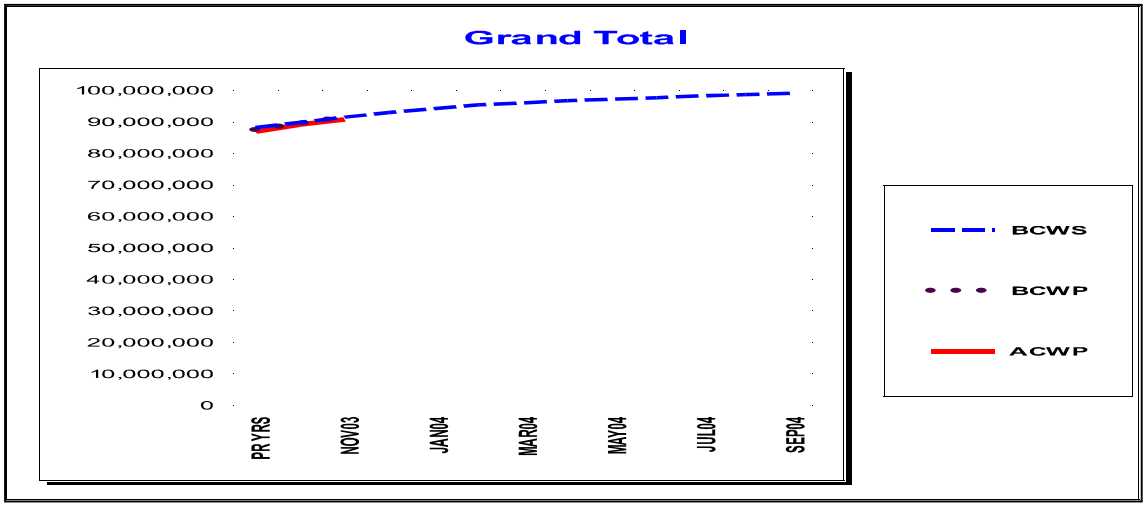
($000's Omitted)



	PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04
BCWS	17,780	18,712	20,241	21,513	22,678	23,753	24,337	24,989	25,455	25,845	26,430	26,795	27,150
BCWP	18,928	19,557	21,104										
ACWP	19,209	20,585	21,375										



	PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04
BCWS	67,035	67,697	67,793	67,911	67,988	68,045	68,047	68,047	68,047	68,047	68,047	68,047	68,047
BCWP	65,113	66,425	66,938										
ACWP	64,975	65,826	66,635										



	PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04
BCWS	88,156	89,791	91,451	92,881	94,161	95,328	95,955	96,645	97,147	97,577	98,200	98,603	98,996
BCWP	87,383	89,375	91,420										
ACWP	86,818	89,096	90,763										

NuMI Project TEC

($000's Omitted)

Program:	Description:	Approval:
NUMITEC	NuMI TEC	Program Manager
Run Date: 12/16/03	Status Date: 11/30/2003	Functional Manager
		Cost Account Manager

DESCRIPTION		PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04	FY05	TOTAL
1.1 Technical Components																
1.1.1 Extraction & Primary Beam	BCWS	3,900	150	404	221	121	92	35	47	8	7	71	4	14	12	5,087
	ACWP	3,769	558	145	0	0	0	0	0	0	0	0	0	0	0	4,473
1.1.2 Neutrino Beam Devices	BCWS	7,190	273	487	227	475	359	212	158	77	91	129	192	77	166	10,112
	ACWP	7,790	292	300	0	0	0	0	0	0	0	0	0	0	0	8,382
1.1.3 Power Supply System	BCWS	3,958	139	105	119	109	71	66	39	13	28	71	8	10	2	4,738
	ACWP	3,991	189	67	0	0	0	0	0	0	0	0	0	0	0	4,247
1.1.4 Hadron Decay and Absorber	BCWS	561	95	22	16	115	153	63	108	55	104	127	8	0	0	1,428
	ACWP	689	31	17	0	0	0	0	0	0	0	0	0	0	0	738
1.1.5 Neutrino Beam Monitoring	BCWS	286	15	13	96	6	3	3	1	5	6	10	9	0	28	481
	ACWP	283	31	22	0	0	0	0	0	0	0	0	0	0	0	336
1.1.6 Alignment Systems	BCWS	257	4	1	3	3	2	3	6	3	3	3	3	5	13	308
	ACWP	190	0	0	0	0	0	0	0	0	0	0	0	0	0	190
1.1.7 Water, Vacuum & Gas Systems	BCWS	806	189	324	320	253	72	83	86	102	36	126	77	36	26	2,534
	ACWP	1,371	63	90	0	0	0	0	0	0	0	0	0	0	0	1,523
1.1.8 Installation and Integration	BCWS	759	65	174	270	85	323	120	207	204	116	47	64	211	219	2,864
	ACWP	1,063	212	149	0	0	0	0	0	0	0	0	0	0	0	1,425
1.1.9 Hadronic Hose (Close-out)	BCWS	62	0	0	0	0	0	0	0	0	0	0	0	0	0	62
	ACWP	63	0	0	0	0	0	0	0	0	0	0	0	0	0	63
WBS[2] Totals:	BCWS	17,780	932	1,530	1,272	1,165	1,075	584	652	465	391	585	364	355	465	27,614
	ACWP	19,209	1,375	790	0	0	0	0	0	0	0	0	0	0	0	21,375
1.2 Facility Construction																
1.2.1 Facility Physics Design Phase	BCWS	70	0	0	0	0	0	0	0	0	0	0	0	0	0	70
	ACWP	70	0	0	0	0	0	0	0	0	0	0	0	0	0	70
1.2.2 Facility Construction Title I Design Phase	BCWS	1,438	0	0	0	0	0	0	0	0	0	0	0	0	0	1,438
	ACWP	1,437	0	0	0	0	0	0	0	0	0	0	0	0	0	1,437
1.2.3 Facility Construction Title II Design Phase	BCWS	2,975	0	0	0	0	0	0	0	0	0	0	0	0	0	2,975
	ACWP	2,974	0	0	0	0	0	0	0	0	0	0	0	0	0	2,974
1.2.4 Facility Construction Phase	BCWS	62,551	663	96	117	77	57	2	0	0	0	0	0	0	0	63,563
	ACWP	60,493	851	809	0	0	0	0	0	0	0	0	0	0	0	62,153
WBS[2] Totals:	BCWS	67,035	663	96	117	77	57	2	0	0	0	0	0	0	0	68,047
	ACWP	64,975	851	809	0	0	0	0	0	0	0	0	0	0	0	66,635
1.3 Project Management																
1.3.1 FY 98 Project Management	BCWS	275	0	0	0	0	0	0	0	0	0	0	0	0	0	275
	ACWP	141	0	0	0	0	0	0	0	0	0	0	0	0	0	141
1.3.2 FY 99 Project Management	BCWS	560	0	0	0	0	0	0	0	0	0	0	0	0	0	560
	ACWP	661	0	0	0	0	0	0	0	0	0	0	0	0	0	661
1.3.3 FY 00 Project Management	BCWS	575	0	0	0	0	0	0	0	0	0	0	0	0	0	575
	ACWP	663	0	0	0	0	0	0	0	0	0	0	0	0	0	663

NuMI Project TEC

($000's Omitted)

Program:	Description:	Approval:
NUMITEC	NuMI TEC	Program Manager
Run Date: 12/16/03	Status Date: 11/30/2003	Functional Manager
		Cost Account Manager

DESCRIPTION		PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04	FY05	TOTAL
1.3.4 FY 01 Project Management	BCWS	688	0	0	0	0	0	0	0	0	0	0	0	0	0	688
	ACWP	423	0	0	0	0	0	0	0	0	0	0	0	0	0	423
1.3.5 FY 02 Project Management	BCWS	703	0	0	0	0	0	0	0	0	0	0	0	0	0	703
	ACWP	324	0	0	0	0	0	0	0	0	0	0	0	0	0	324
1.3.6 FY 03 Project Management	BCWS	541	0	0	0	0	0	0	0	0	0	0	0	0	0	541
	ACWP	421	0	0	0	0	0	0	0	0	0	0	0	0	0	421
1.3.7 FY 04 Project Management	BCWS	0	40	35	40	38	35	40	38	37	38	38	38	38	0	458
	ACWP	0	52	67	0	0	0	0	0	0	0	0	0	0	0	120
1.3.8 FY 05 Project Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	330	330
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WBS[2] Totals:	BCWS	3,341	40	35	40	38	35	40	38	37	38	38	38	38	330	4,130
	ACWP	2,634	52	67	0	0	0	0	0	0	0	0	0	0	0	2,753
Grand Totals:	BCWS	88,156	1,635	1,661	1,429	1,280	1,167	627	691	502	429	623	403	393	795	99,791
	ACWP	86,818	2,278	1,667	0	0	0	0	0	0	0	0	0	0	0	90,763

NuMI Project TEC - Labor Only

($000's Omitted)

Program:	Description:	Approval:
NUMITEC	NuMI TEC	Program Manager
Run Date: 12/16/03	Status Date: 11/30/2003	Functional Manager
		Cost Account Manager

DESCRIPTION		PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04	FY05	TOTAL
1.1 Technical Components																
1.1.1 Extraction & Primary Beam	BCWS	1,936	35	93	32	32	28	22	32	8	7	41	4	14	12	2,296
	ACWP	2,388	135	106	0	0	0	0	0	0	0	0	0	0	0	2,629
1.1.2 Neutrino Beam Devices	BCWS	3,815	72	120	132	154	120	102	63	51	73	50	45	43	121	4,960
	ACWP	4,630	118	174	0	0	0	0	0	0	0	0	0	0	0	4,922
1.1.3 Power Supply System	BCWS	2,122	21	8	3	27	38	16	32	12	21	53	8	10	2	2,374
	ACWP	2,622	21	19	0	0	0	0	0	0	0	0	0	0	0	2,662
1.1.4 Hadron Decay and Absorber	BCWS	448	11	22	16	12	31	11	21	18	26	22	8	0	0	645
	ACWP	555	11	7	0	0	0	0	0	0	0	0	0	0	0	574
1.1.5 Neutrino Beam Monitoring	BCWS	78	0	0	0	0	0	0	0	0	0	0	0	0	0	78
	ACWP	74	0	0	0	0	0	0	0	0	0	0	0	0	0	74
1.1.6 Alignment Systems	BCWS	207	4	1	3	3	2	3	3	3	3	3	3	3	5	244
	ACWP	140	0	0	0	0	0	0	0	0	0	0	0	0	0	140
1.1.7 Water, Vacuum & Gas Systems	BCWS	413	17	192	41	40	30	46	61	69	34	103	57	21	26	1,150
	ACWP	634	20	34	0	0	0	0	0	0	0	0	0	0	0	689
1.1.8 Installation and Integration	BCWS	508	33	29	31	30	27	45	46	40	42	32	32	73	120	1,088
	ACWP	383	12	17	0	0	0	0	0	0	0	0	0	0	0	413
1.1.9 Hadronic Hose (Close-out)	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WBS[2] Totals:	BCWS	9,527	193	465	257	298	276	244	257	201	206	304	157	164	286	12,835
	ACWP	11,426	319	358	0	0	0	0	0	0	0	0	0	0	0	12,103
1.2 Facility Construction																
1.2.1 Facility Physics Design Phase	BCWS	70	0	0	0	0	0	0	0	0	0	0	0	0	0	70
	ACWP	70	0	0	0	0	0	0	0	0	0	0	0	0	0	70
1.2.2 Facility Construction Title I Design Phase	BCWS	300	0	0	0	0	0	0	0	0	0	0	0	0	0	300
	ACWP	299	0	0	0	0	0	0	0	0	0	0	0	0	0	299
1.2.3 Facility Construction Title II Design Phase	BCWS	556	0	0	0	0	0	0	0	0	0	0	0	0	0	556
	ACWP	556	0	0	0	0	0	0	0	0	0	0	0	0	0	556
1.2.4 Facility Construction Phase	BCWS	2,827	52	45	52	49	45	2	0	0	0	0	0	0	0	3,071
	ACWP	2,853	76	91	0	0	0	0	0	0	0	0	0	0	0	3,020
WBS[2] Totals:	BCWS	3,754	52	45	52	49	45	2	0	0	0	0	0	0	0	3,998
	ACWP	3,778	76	91	0	0	0	0	0	0	0	0	0	0	0	3,945
1.3 Project Management																
1.3.1 FY 98 Project Management	BCWS	275	0	0	0	0	0	0	0	0	0	0	0	0	0	275
	ACWP	125	0	0	0	0	0	0	0	0	0	0	0	0	0	125
1.3.2 FY 99 Project Management	BCWS	560	0	0	0	0	0	0	0	0	0	0	0	0	0	560
	ACWP	595	0	0	0	0	0	0	0	0	0	0	0	0	0	595
1.3.3 FY 00 Project Management	BCWS	575	0	0	0	0	0	0	0	0	0	0	0	0	0	575
	ACWP	616	0	0	0	0	0	0	0	0	0	0	0	0	0	616

NuMI Project TEC - Labor Only

($000's Omitted)

Program:	Description:	Approval:
NUMITEC	NuMI TEC	Program Manager
Run Date: 12/16/03	Status Date: 11/30/2003	Functional Manager
		Cost Account Manager

DESCRIPTION		PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04	FY05	TOTAL
1.3.4 FY 01 Project Management	BCWS	688	0	0	0	0	0	0	0	0	0	0	0	0	0	688
	ACWP	416	0	0	0	0	0	0	0	0	0	0	0	0	0	416
1.3.5 FY 02 Project Management	BCWS	703	0	0	0	0	0	0	0	0	0	0	0	0	0	703
	ACWP	324	0	0	0	0	0	0	0	0	0	0	0	0	0	324
1.3.6 FY 03 Project Management	BCWS	541	0	0	0	0	0	0	0	0	0	0	0	0	0	541
	ACWP	416	0	0	0	0	0	0	0	0	0	0	0	0	0	416
1.3.7 FY 04 Project Management	BCWS	0	40	35	40	38	35	40	38	37	38	38	38	38	0	458
	ACWP	0	52	67	0	0	0	0	0	0	0	0	0	0	0	120
1.3.8 FY 05 Project Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	330	330
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WBS[2] Totals:	BCWS	3,341	40	35	40	38	35	40	38	37	38	38	38	38	330	4,130
	ACWP	2,493	52	67	0	0	0	0	0	0	0	0	0	0	0	2,612
Grand Totals:	BCWS	16,622	285	545	349	386	356	286	295	238	245	343	196	203	616	20,963
	ACWP	17,697	447	516	0	0	0	0	0	0	0	0	0	0	0	18,660

NuMI Other Project Costs

($000's Omitted)

Cost Performance Report - Work Breakdown Structure														
Contractor:	Fermi National Accelerator Laboratory				Contract Type/No:			Project Name/No:		Report Period:				
Location:	Batavia							NuMI Other Proj Costs		10/31/03	11/30/03			
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work		Tgt. Profit/ Fee %		Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling			
1	62,200		0		0	0	62,200	0		0	0			
WBS[2] WBS[3] Results...	Current Period					Cumulative to Date					At Completion			
	Budgeted Cost		Actual Cost	Variance		Budgeted Cost		Actual Cost	Variance			Latest		
Item	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Budgeted	Revised Estimate	Variance	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
2.1 Magnets: Steel & Coils														
2.1.1 Steel Plane Fabrication														
Direct Cost + Escalation	(24)	(25)	0	(0)	(25)	4,372	4,372	4,375	0	(3)	4,372	4,372	0	
Indirect Cost	(3)	(3)	0	(0)	(3)	229	229	226	0	3	229	229	0	
WBS[3]Totals:	(27)	(27)	0	(0)	(27)	4,601	4,601	4,601	0	(0)	4,601	4,601	0	
2.1.2 Steel handling fixtures														
Direct Cost + Escalation	17	17	0	0	17	637	637	637	(0)	0	637	637	0	
Indirect Cost	3	3	0	0	3	156	156	157	0	(0)	156	156	0	
WBS[3]Totals:	20	20	0	0	20	793	793	793	0	(0)	793	793	0	
2.1.3 Near Detector Support Structures														
Direct Cost + Escalation	(3)	(3)	0	0	(3)	(2)	(2)	1	0	(4)	(2)	(2)	0	
Indirect Cost	(0)	(0)	0	0	(0)	4	4	0	0	4	4	4	0	
WBS[3]Totals:	(3)	(3)	0	0	(3)	1	1	1	0	0	1	1	0	
2.1.4 Magnet Coil														
Direct Cost + Escalation	96	96	0	0	96	1,386	1,386	1,373	(0)	14	1,386	1,386	0	
Indirect Cost	15	15	0	0	15	286	286	300	0	(14)	286	286	0	
WBS[3]Totals:	111	111	0	0	111	1,673	1,673	1,673	0	(0)	1,673	1,673	0	
2.1.5 Detector Plane Prototypes														
Direct Cost + Escalation	(4)	(4)	0	0	(4)	390	390	394	0	(4)	390	390	0	
Indirect Cost	(1)	(1)	0	0	(1)	106	106	102	(0)	4	106	106	0	
WBS[3]Totals:	(5)	(5)	0	0	(5)	495	495	496	(0)	(0)	495	495	0	
2.1.6 Steel Management														
Direct Cost + Escalation	(13)	(13)	0	0	(13)	53	53	53	0	(0)	53	53	0	
Indirect Cost	(1)	(1)	0	0	(1)	4	4	5	(0)	(0)	4	4	0	
WBS[3]Totals:	(14)	(14)	0	0	(14)	57	57	58	(0)	(0)	57	57	0	
WBS[2]Totals:	81	81	0	(0)	81	7,621	7,621	7,622	0	(1)	7,621	7,621	0	
2.2 Scintillator Detector Fabrication														
2.2.1 Scintillator Strips														
Direct Cost + Escalation	0	0	0	0	0	2,912	2,912	2,867	0	45	2,912	2,912	0	
Indirect Cost	0	0	0	0	0	270	270	289	0	(19)	270	270	0	
WBS[3]Totals:	0	0	0	0	0	3,182	3,182	3,156	0	26	3,182	3,182	0	
2.2.2 Fiber														
Direct Cost + Escalation	0	0	0	0	0	4,313	4,313	4,270	0	43	4,313	4,313	0	
Indirect Cost	0	0	0	0	0	61	61	26	0	35	61	61	0	
WBS[3]Totals:	0	0	0	0	0	4,374	4,374	4,296	0	78	4,374	4,374	0	

NuMI Other Project Costs

($000's Omitted)

Cost Performance Report - Work Breakdown Structure													
Contractor:	Fermi National Accelerator Laboratory				Contract Type/No:			Project Name/No:		Report Period:			
Location:	Batavia							NuMI Other Proj Costs		10/31/03	11/30/03		
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work		Tgt. Profit/ Fee %		Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling		
1	62,200		0		0	0	62,200	0		0	0		
WBS[2] WBS[3] Results...	Current Period					Cumulative to Date					At Completion		
	Budgeted Cost		Actual Cost	Variance		Budgeted Cost		Actual Cost	Variance			Latest	
Item	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Budgeted	Revised Estimate	Variance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
2.2.3 Scintillator Modules													
Direct Cost + Escalation	0	0	0	0	0	1,925	1,925	1,893	0	32	1,925	1,925	0
Indirect Cost	0	0	0	0	0	84	84	89	0	(6)	84	84	0
WBS[3]Totals:	0	0	0	0	0	2,008	2,008	1,982	0	26	2,008	2,008	0
2.2.4 Photodetector Systems													
Direct Cost + Escalation	2	0	0	(2)	0	2,174	2,175	2,170	0	4	2,175	2,175	0
Indirect Cost	0	0	0	0	0	23	23	9	(0)	14	23	23	0
WBS[3]Totals:	2	0	0	(2)	0	2,197	2,198	2,179	0	19	2,198	2,198	0
2.2.5 Mux Boxes & Connectors													
Direct Cost + Escalation	0	0	0	0	0	1,368	1,368	1,397	(0)	(30)	1,368	1,368	0
Indirect Cost	0	0	0	0	0	23	23	23	(0)	(1)	23	23	0
WBS[3]Totals:	0	0	0	0	0	1,390	1,390	1,421	(0)	(30)	1,390	1,390	0
2.2.6 Calibration Systems													
Direct Cost + Escalation	0	0	0	0	0	1,105	1,105	1,103	0	3	1,105	1,105	0
Indirect Cost	0	0	0	0	0	1	1	0	0	1	1	1	0
WBS[3]Totals:	0	0	0	0	0	1,106	1,106	1,103	0	3	1,106	1,106	0
2.2.7 Ass'y & Test Equipment													
Direct Cost + Escalation	0	0	0	0	0	1,685	1,685	1,677	(0)	8	1,685	1,685	0
Indirect Cost	0	0	0	0	0	54	54	53	(0)	0	54	54	0
WBS[3]Totals:	0	0	0	0	0	1,739	1,739	1,731	(0)	8	1,739	1,739	0
2.2.8 Factories													
Direct Cost + Escalation	0	0	0	0	0	3,142	3,142	3,275	0	(133)	3,142	3,142	0
Indirect Cost	0	0	0	0	0	46	46	4	0	42	46	46	0
WBS[3]Totals:	0	0	0	0	0	3,188	3,188	3,279	0	(91)	3,188	3,188	0
2.2.9 Scintillator Management													
Direct Cost + Escalation	0	0	0	0	0	348	348	375	(0)	(27)	348	348	0
Indirect Cost	0	0	0	0	0	8	8	5	0	3	8	8	0
WBS[3]Totals:	0	0	0	0	0	355	355	379	(0)	(24)	355	355	0
WBS[2]Totals:	2	0	0	(2)	0	19,540	19,540	19,525	0	15	19,540	19,540	0
2.3 Electronics, DAQ & Database													
2.3.1 Near Detector Front End													
Direct Cost + Escalation	20	9	27	(11)	(18)	4,166	4,185	3,774	19	411	4,262	4,262	0
Indirect Cost	5	0	4	(5)	(3)	433	446	472	13	(26)	450	450	0
WBS[3]Totals:	24	9	31	(15)	(21)	4,599	4,631	4,246	32	385	4,712	4,712	0

NuMI Other Project Costs

($000's Omitted)

Cost Performance Report - Work Breakdown Structure													
Contractor:	Fermi National Accelerator Laboratory				Contract Type/No:			Project Name/No:		Report Period:			
Location:	Batavia							NuMI Other Proj Costs		10/31/03	11/30/03		
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work		Tgt. Profit/ Fee %		Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling		
1	62,200		0		0	0	62,200	0		0	0		
WBS[2]	Current Period					Cumulative to Date					At Completion		
WBS[3]			Actual					Actual					
Results...	Budgeted Cost		Cost	Variance		Budgeted Cost		Cost	Variance			Latest	
Item	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Budgeted	Revised Estimate	Variance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
2.3.2 Far Detector Front-end													
Direct Cost + Escalation	0	0	0	0	0	1,579	1,579	1,593	0	(15)	1,579	1,579	0
Indirect Cost	0	0	0	0	0	81	81	79	0	2	81	81	0
WBS[3]Totals:	0	0	0	0	0	1,660	1,660	1,672	0	(12)	1,660	1,660	0
2.3.3 Data Routing & Trigger Farm													
Direct Cost + Escalation	2	0	0	(2)	0	1,215	1,210	1,210	(6)	0	1,241	1,241	0
WBS[3]Totals:	2	0	0	(2)	0	1,215	1,210	1,210	(6)	0	1,241	1,241	0
2.3.4 Data Acquisition & Triggering													
Direct Cost + Escalation	0	0	0	(0)	0	390	389	389	(1)	0	391	391	0
WBS[3]Totals:	0	0	0	(0)	0	390	389	389	(1)	0	391	391	0
2.3.5 Database													
Direct Cost + Escalation	0	0	0	0	0	48	48	10	0	38	48	48	0
Indirect Cost	0	0	0	0	0	1	1	0	0	1	1	1	0
WBS[3]Totals:	0	0	0	0	0	48	48	10	0	38	48	48	0
2.3.6 Auxilliary Systems													
Direct Cost + Escalation	0	0	0	(0)	(0)	457	451	491	(6)	(40)	460	460	0
Indirect Cost	0	0	0	(0)	(0)	36	35	49	(1)	(14)	37	37	0
WBS[3]Totals:	0	0	0	(0)	(0)	493	486	539	(8)	(54)	497	497	0
2.3.7 Electronics Management													
Direct Cost + Escalation	0	0	34	0	(34)	143	142	217	(1)	(75)	143	143	0
Indirect Cost	0	0	0	0	0	2	2	1	(0)	1	2	2	0
WBS[3]Totals:	0	0	34	0	(34)	146	144	218	(1)	(74)	146	146	0
2.3.8 Slow Control & Monitoring													
Direct Cost + Escalation	0	0	0	0	0	433	432	361	(0)	72	433	433	0
Indirect Cost	0	0	0	0	0	12	12	12	(0)	(0)	12	12	0
WBS[3]Totals:	0	0	0	0	0	445	444	373	(0)	71	445	445	0
2.3.9 HV System													
Direct Cost + Escalation	0	0	0	0	0	74	74	66	0	7	74	74	0
Indirect Cost	0	0	0	0	0	9	9	11	0	(2)	9	9	0
WBS[3]Totals:	0	0	0	0	0	83	83	77	0	6	83	83	0
WBS[2]Totals:	27	9	65	(18)	(56)	9,079	9,095	8,734	16	361	9,222	9,222	0
2.4 Far Detector Installation													
2.4.1 FDI Completed Design Tasks													
Direct Cost + Escalation	0	0	0	0	0	0	0	0	0	0	0	0	0
Indirect Cost	0	0	0	0	0	0	0	0	0	0	0	0	0
WBS[3]Totals:	0	0	0	0	0	0	0	0	0	0	0	0	0

NuMI Other Project Costs

($000's Omitted)

Cost Performance Report - Work Breakdown Structure													
Contractor:	Fermi National Accelerator Laboratory				Contract Type/No:			Project Name/No:		Report Period:			
Location:	Batavia							NuMI Other Proj Costs		10/31/03	11/30/03		
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work		Tgt. Profit/ Fee %		Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling		
1	62,200		0		0	0	62,200	0		0	0		
WBS[2]	Current Period					Cumulative to Date					At Completion		
WBS[3] Results...	Budgeted Cost		Actual Cost	Variance		Budgeted Cost		Actual Cost	Variance			Latest	
Item	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Budgeted	Revised Estimate	Variance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
2.4.2 FDI Management													
Direct Cost + Escalation	0	0	2	0	(2)	631	631	550	0	81	631	631	0
Indirect Cost	0	0	0	0	(0)	30	30	34	(0)	(4)	30	30	0
WBS[3]Totals:	0	0	2	0	(2)	661	661	584	(0)	77	661	661	0
2.4.3 SDN-FDI Construction Oversight													
Direct Cost + Escalation	0	0	0	0	0	58	58	115	0	(57)	58	58	0
WBS[3]Totals:	0	0	0	0	0	58	58	115	0	(57)	58	58	0
2.4.4 FDI Soudan Lab Infrastructure Setup													
Direct Cost + Escalation	0	0	0	0	0	507	507	469	0	38	507	507	0
Indirect Cost	0	0	0	0	0	2	2	4	0	(2)	2	2	0
WBS[3]Totals:	0	0	0	0	0	509	509	473	0	36	509	509	0
2.4.5 SDN-FDI Detector Installation													
Direct Cost + Escalation	0	0	200	0	(200)	3,084	3,084	2,953	0	131	3,084	3,084	0
Indirect Cost	0	0	0	0	0	0	0	6	0	(6)	0	0	0
WBS[3]Totals:	0	0	200	0	(200)	3,084	3,084	2,959	0	124	3,084	3,084	0
2.4.6 SDN-FDI DNR Costs													
Direct Cost + Escalation	0	0	0	0	0	708	708	378	0	330	708	708	0
Indirect Cost	0	0	0	0	0	0	0	1	0	(1)	0	0	0
WBS[3]Totals:	0	0	0	0	0	708	708	378	0	329	708	708	0
2.4.7 FDI Alignment & Survey													
Direct Cost + Escalation	0	0	0	0	0	51	51	58	0	(7)	51	51	0
Indirect Cost	0	0	0	0	0	6	6	9	(0)	(3)	6	6	0
WBS[3]Totals:	0	0	0	0	0	57	57	67	(0)	(10)	57	57	0
WBS[2]Totals:	0	0	202	0	(202)	5,077	5,077	4,576	0	500	5,077	5,077	0
2.5 Near Detector Installation													
2.5.1 NDI Infrastructure													
Direct Cost + Escalation	18	22	11	5	12	232	215	164	(17)	51	384	384	0
Indirect Cost	5	5	3	0	2	57	55	40	(3)	15	104	104	0
WBS[3]Totals:	22	27	14	5	14	290	270	204	(20)	66	488	488	0
2.5.2 NDI Plane Assembly													
Direct Cost + Escalation	0	0	0	0	0	393	393	403	0	(10)	393	393	0
Indirect Cost	0	0	0	0	0	123	123	111	(0)	12	123	123	0
WBS[3]Totals:	0	0	0	0	0	516	516	514	0	2	516	516	0
2.5.3 NDI Detector Installation													
Direct Cost + Escalation	16	150	96	134	54	28	164	130	136	34	818	818	0
Indirect Cost	4	25	17	21	8	7	28	23	21	5	213	213	0
WBS[3]Totals:	20	175	113	155	62	34	191	153	157	39	1,031	1,031	0

NuMI Other Project Costs

($000's Omitted)

Cost Performance Report - Work Breakdown Structure													
Contractor:	Fermi National Accelerator Laboratory				Contract Type/No:			Project Name/No:		Report Period:			
Location:	Batavia							NuMI Other Proj Costs		10/31/03	11/30/03		
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work		Tgt. Profit/ Fee %		Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling		
1	62,200		0		0	0	62,200	0		0	0		
WBS[2]	Current Period					Cumulative to Date					At Completion		
WBS[3]	Budgeted Cost		Actual Cost	Variance		Budgeted Cost		Actual Cost	Variance				
Results...	Work	Work	Work			Work	Work	Work				Latest	
Item	Scheduled	Performed	Performed	Schedule	Cost	Scheduled	Performed	Performed	Schedule	Cost	Budgeted	Revised Estimate	Variance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
2.5.4 NDI Facility Experimental Infrastructure													
Direct Cost + Escalation	15	2	16	(13)	(14)	133	117	129	(16)	(12)	133	133	0
Indirect Cost	3	0	1	(3)	(0)	26	21	21	(5)	0	26	26	0
WBS[3]Totals:	18	2	16	(15)	(14)	160	138	150	(21)	(12)	160	160	0
2.5.5 RBI SB&O Experimental Systems Outfitting													
Direct Cost + Escalation	51	74	135	23	(61)	2,498	2,146	2,126	(351)	21	2,559	2,559	0
WBS[3]Totals:	51	74	135	23	(61)	2,498	2,146	2,126	(351)	21	2,559	2,559	0
WBS[2]Totals:	111	279	278	168	1	3,497	3,262	3,146	(236)	116	4,753	4,753	0
2.6 MINOS Project Management													
2.6.1 FNL-Project Management													
Direct Cost + Escalation	46	46	3	(0)	43	1,149	1,149	1,186	(0)	(37)	1,188	1,188	0
Indirect Cost	15	15	1	(0)	14	359	359	328	(0)	32	372	372	0
WBS[3]Totals:	61	61	4	(0)	56	1,508	1,508	1,514	(0)	(6)	1,560	1,560	0
2.6.2 ANL-Project Management													
Direct Cost + Escalation	0	0	0	0	0	96	96	96	0	(0)	96	96	0
Indirect Cost	0	0	0	0	0	1	1	1	0	0	1	1	0
WBS[3]Totals:	0	0	0	0	0	98	98	98	0	(0)	98	98	0
WBS[2]Totals:	61	61	4	(0)	56	1,606	1,606	1,612	(0)	(6)	1,658	1,658	0
3.1 NuMI Conceptual Design													
3.1.1 FNL-BD-NuMI CDR													
Direct Cost + Escalation	0	0	0	0	0	407	407	407	0	0	407	407	0
Indirect Cost	0	0	0	0	0	82	82	80	0	2	82	82	0
WBS[3]Totals:	0	0	0	0	0	489	489	487	0	2	489	489	0
3.1.2 FNL-BD-NuMI FESS CDR													
Direct Cost + Escalation	0	0	0	0	0	282	282	282	0	0	282	282	0
Indirect Cost	0	0	0	0	0	64	64	64	0	0	64	64	0
WBS[3]Totals:	0	0	0	0	0	346	346	346	0	0	346	346	0
3.1.3 FNL-NuMI Beam Design													
Direct Cost + Escalation	0	0	0	0	0	612	612	612	0	(0)	612	612	0
Indirect Cost	0	0	0	0	0	186	186	184	0	3	186	186	0
WBS[3]Totals:	0	0	0	0	0	798	798	796	0	3	798	798	0
3.1.4 FNL-BD-NuMI Project Management													
Direct Cost + Escalation	0	0	0	0	0	184	184	184	0	(0)	184	184	0
Indirect Cost	0	0	0	0	0	51	51	50	0	1	51	51	0
WBS[3]Totals:	0	0	0	0	0	235	235	234	0	1	235	235	0

NuMI Other Project Costs

($000's Omitted)

Cost Performance Report - Work Breakdown Structure													
Contractor:	Fermi National Accelerator Laboratory				Contract Type/No:			Project Name/No:		Report Period:			
Location:	Batavia							NuMI Other Proj Costs		10/31/03	11/30/03		
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work		Tgt. Profit/ Fee %		Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling		
1	62,200		0		0	0	62,200	0		0	0		
WBS[2]	Current Period					Cumulative to Date					At Completion		
WBS[3]			Actual					Actual					
Results...	Budgeted Cost		Cost	Variance		Budgeted Cost		Cost	Variance			Latest	
Item	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Budgeted	Revised Estimate	Variance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
3.1.5 FNL-Soudan Lab Design													
Direct Cost + Escalation	0	0	0	0	0	55	55	56	0	(1)	55	55	0
Indirect Cost	0	0	0	0	0	10	10	9	0	1	10	10	0
WBS[3]Totals:	0	0	0	0	0	65	65	65	0	0	65	65	0
WBS[2]Totals:	0	0	0	0	0	1,934	1,934	1,928	0	6	1,934	1,934	0
3.2 MINOS Detector R&D													
3.2.1 FNL-MINOS Scintillator R&D													
Direct Cost + Escalation	0	0	0	0	0	879	879	870	0	9	879	879	0
Indirect Cost	0	0	0	0	0	116	116	118	0	(1)	116	116	0
WBS[3]Totals:	0	0	0	0	0	995	995	988	0	8	995	995	0
3.2.2 FNL-MINOS Steel R&D													
Direct Cost + Escalation	0	0	0	0	0	553	553	550	0	2	553	553	0
Indirect Cost	0	0	0	0	0	96	96	94	0	2	96	96	0
WBS[3]Totals:	0	0	0	0	0	649	649	644	0	4	649	649	0
3.2.3 FNL-RD-Neutrino Oscillation R&D													
Direct Cost + Escalation	0	0	0	0	0	116	116	116	0	0	116	116	0
Indirect Cost	0	0	0	0	0	20	20	20	(0)	0	20	20	0
WBS[3]Totals:	0	0	0	0	0	136	136	136	(0)	0	136	136	0
WBS[2]Totals:	0	0	0	0	0	1,780	1,780	1,768	(0)	12	1,780	1,780	0
3.3 MINOS Cavern													
3.3.0 Preconstruction Work													
Direct Cost + Escalation	0	0	0	0	0	758	758	758	0	0	758	758	0
WBS[3]Totals:	0	0	0	0	0	758	758	758	0	0	758	758	0
3.3.1 Cavern Construction													
Direct Cost + Escalation	0	0	0	0	0	6,597	6,597	6,597	0	0	6,597	6,597	0
WBS[3]Totals:	0	0	0	0	0	6,597	6,597	6,597	0	0	6,597	6,597	0
3.3.2 Cavern Outfitting													
Direct Cost + Escalation	0	0	0	0	0	7,171	7,171	7,171	0	0	7,171	7,171	0
WBS[3]Totals:	0	0	0	0	0	7,171	7,171	7,171	0	0	7,171	7,171	0
WBS[2]Totals:	0	0	0	0	0	14,527	14,527	14,527	0	0	14,527	14,527	0
3.4 Soudan/MINOS Operating													
3.4.1 UMN-Mine Crew Support/Soudan Gen'l Operations													
Direct Cost + Escalation	0	0	0	0	0	1,702	1,702	1,503	0	198	1,702	1,702	0
Indirect Cost	0	0	0	0	0	8	8	27	0	(20)	8	8	0
WBS[3]Totals:	0	0	0	0	0	1,709	1,709	1,531	0	178	1,709	1,709	0

NuMI Other Project Costs

($000's Omitted)

Cost Performance Report - Work Breakdown Structure													
Contractor:	Fermi National Accelerator Laboratory				Contract Type/No:			Project Name/No:		Report Period:			
Location:	Batavia							NuMI Other Proj Costs		10/31/03	11/30/03		
Quantity	Negotiated Cost		Est. Cost Authorized Unpriced Work		Tgt. Profit/ Fee %		Tgt. Price	Est Price	Share Ratio	Contract Ceiling	Estimated Contract Ceiling		
1	62,200		0		0	0	62,200	0		0	0		
WBS[2]	Current Period					Cumulative to Date					At Completion		
WBS[3] Results...	Budgeted Cost		Actual Cost	Variance		Budgeted Cost		Actual Cost	Variance			Latest	
Item	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Work Scheduled	Work Performed	Work Performed	Schedule	Cost	Budgeted	Revised Estimate	Variance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
3.4.2 UMN-Breitung Township Building Rental													
Direct Cost + Escalation	0	0	0	0	0	114	114	75	0	39	114	114	0
WBS[3]Totals:	0	0	0	0	0	114	114	75	0	39	114	114	0
3.4.3 UMN-E Peterson Salary													
Direct Cost + Escalation	0	0	0	0	0	73	73	71	0	2	73	73	0
WBS[3]Totals:	0	0	0	0	0	73	73	71	0	2	73	73	0
WBS[2]Totals:	0	0	0	0	0	1,896	1,896	1,677	0	219	1,896	1,896	0
General and Administrative	0	0	0	0	0	0	0	0	0	0	0	0	0
Undistributed Budget											0	0	0
Sub Total	283	430	550	147	(120)	66,557	66,338	65,116	(220)	1,222	68,009	68,009	0
Contingency + MINOS Scope Reserve											3,221	3,221	0
Total NuMI Other Proj Costs	283	430	550	147	(120)	66,557	66,338	65,116	(220)	1,222	71,230	71,230	0
UK In-Kind Contribution	(4)	0	0	4	0	(4,808)	(4,802)	(4,802)	6	0	(5,272)	(5,272)	0
Minnesota Preconstruction Funds	0	0	0	0	0	(758)	(758)	(758)	0	0	(758)	(758)	0
Minnesota Construction Funds FY99	0	0	0	0	0	(3,000)	(3,000)	(3,000)	0	0	(3,000)	(3,000)	0
Total US Funds	278	430	550	152	(120)	57,991	57,778	56,556	(213)	1,222	62,200	62,200	0
WBS[2}Totals:													
Direct Cost + Escalation	239	372	525	133	(153)	43,880	43,636	42,727	(244)	908	45,049	45,049	0
Indirect Cost	44	58	25	14	33	2,541	2,565	2,489	24	76	2,823	2,823	0
Subtotal	283	430	550	147	(120)	46,421	46,201	45,216	(220)	985	47,872	47,872	0
UK In-Kind Contribution	(4)	0	0	4	0	(4,808)	(4,802)	(4,802)	6	0	(5,272)	(5,272)	0
Total MINOS Detector	278	430	550	152	(120)	41,613	41,399	40,415	(213)	985	42,601	42,601	0
Direct Cost + Escalation	0	0	0	0	0	19,502	19,502	19,253	0	249	19,502	19,502	0
Indirect Cost	0	0	0	0	0	634	634	646	0	(12)	634	634	0
Subtotal	0	0	0	0	0	20,136	20,136	19,900	0	237	20,136	20,136	0
Minnesota Preconstruction Funds	0	0	0	0	0	(758)	(758)	(758)	0	0	(758)	(758)	0
Minnesota Construction Funds FY99	0	0	0	0	0	(3,000)	(3,000)	(3,000)	0	0	(3,000)	(3,000)	0
Total Project Support	0	0	0	0	0	16,378	16,378	16,142	0	237	16,378	16,378	0
Contingency + MINOS Scope Reserve											3,221	3,221	0
Total US Funds	278	430	550	152	(120)	57,991	57,778	56,556	(213)	1,222	62,200	62,200	0

NuMI Other Project Costs

($000's Omitted)

Cost Performance Report - Baseline							
Contractor: Fermi National Accelerator Laboratory		Contract Type/No:		Project Name/No: NuMI Other Proj Costs		Report Period: 10/31/03	11/30/03
Location: Batavia							

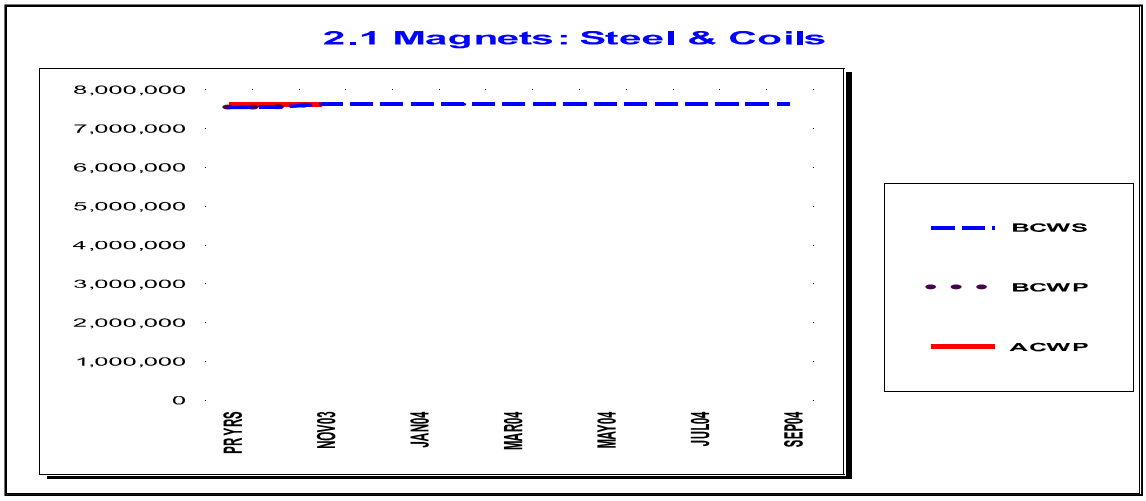
(1) Original Contract Target Cost	(2) Negotiated Contract Changes	(3) Current Target Cost	(4) Est. Cost Authorized Authorized Unpriced Work	(5) Contract Budget Base (3) + (4)	(6) Total Allocated Budget	(7) Difference (5) - (6)
62,200	0	62,200	0	62,200	62,200	0

(8)Contract Start Date	(9) Contract Definitization Date	(10) Last Item Delivery Date	(11) Contract Completion Date	(12) Estimated Completion Date
10/1/97	10/1/97	4/30/04	4/30/04	4/30/04

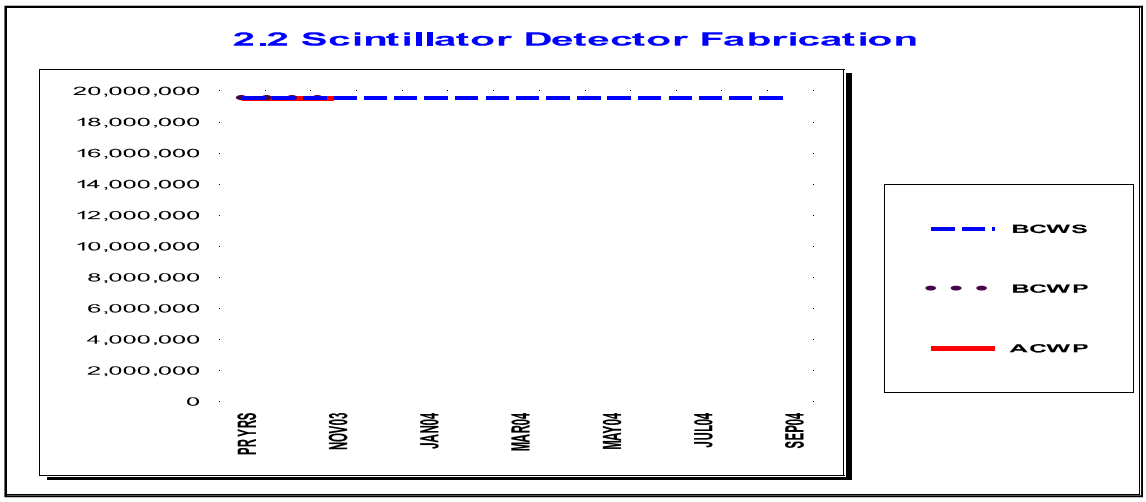
Item	BCWS Cum to Date	BCWS for Report Period	Budgeted Cost for Work Scheduled (Non-Cumulative) Six Month Forecast +1 DEC03	+2 JAN04	+3 FEB04	+4 MAR04	+5 APR04	+6 MAY04	(Enter Specific Periods) BAL FY04	FY05				Undist Budget	Total Budget
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
PM Baseline (Beginning of Period)	66,274	141	338	167	123	109	102	98	427	37	0	0	0	0	67,815
247 Adjust WBS 2.1 Estimates to Final Cost															81
253 Project Mgmt Budget Adjustment															112
PM Baseline (End of Period)	66,557		342	170	126	112	106	101	441	52	0	0	0	0	68,009
Contingency + MINOS Scope Reserve															3,221
Total NuMI Other Project Costs															71,230
UK In-Kind Contribution															(5,272)
Minnesota Preconstruction Funds															(758)
Minnesota Preconstruction Funds FY99															(3,000)
Total US Funds															62,200

NuMI Other Project Costs

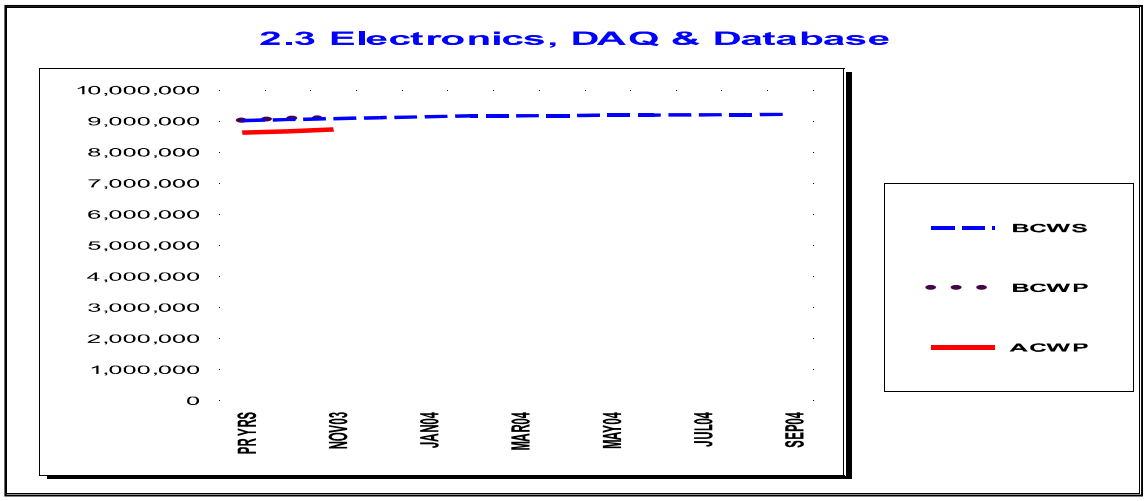
($000's Omitted)



	PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04
BCWS	7,539	7,540	7,621	7,621	7,621	7,621	7,621	7,621	7,621	7,621	7,621	7,621	7,621
BCWP	7,540	7,540	7,621										
ACWP	7,622	7,622	7,622										



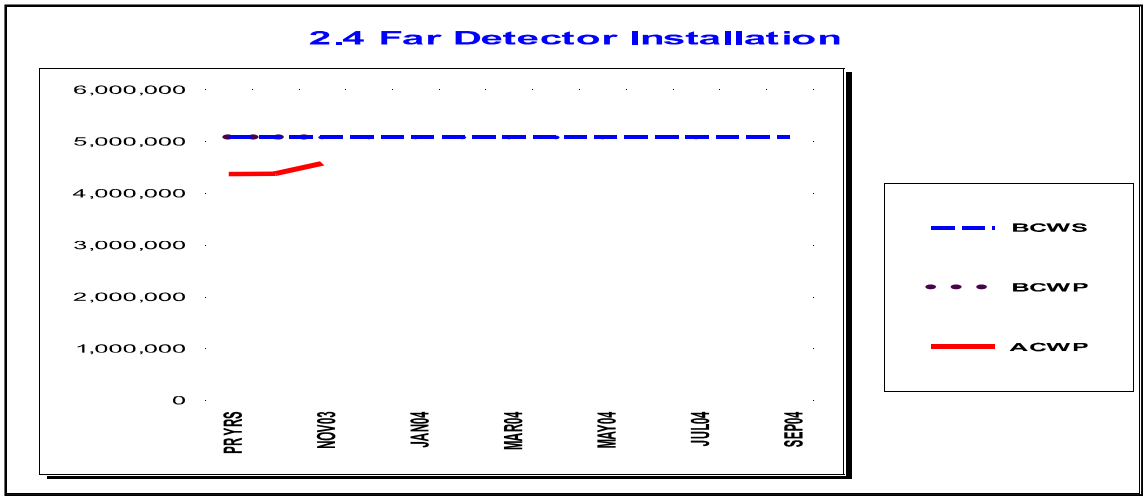
	PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04
BCWS	19,535	19,538	19,540	19,540	19,540	19,540	19,540	19,540	19,540	19,540	19,540	19,540	19,540
BCWP	19,540	19,540	19,540										
ACWP	19,525	19,525	19,525										



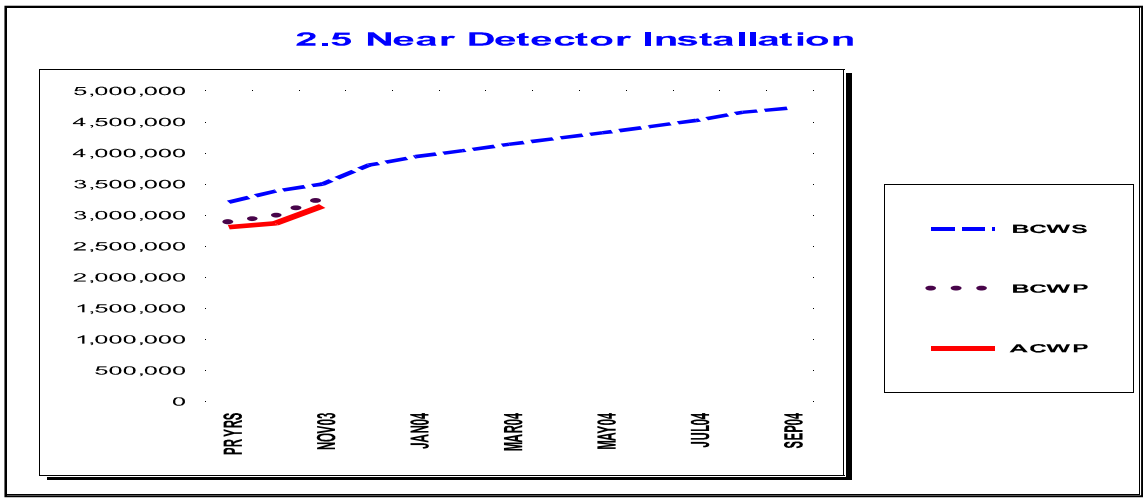
	PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04
BCWS	9,017	9,052	9,079	9,111	9,141	9,168	9,173	9,180	9,188	9,195	9,203	9,210	9,217
BCWP	9,018	9,086	9,095										
ACWP	8,628	8,669	8,734										

NuMI Other Project Costs

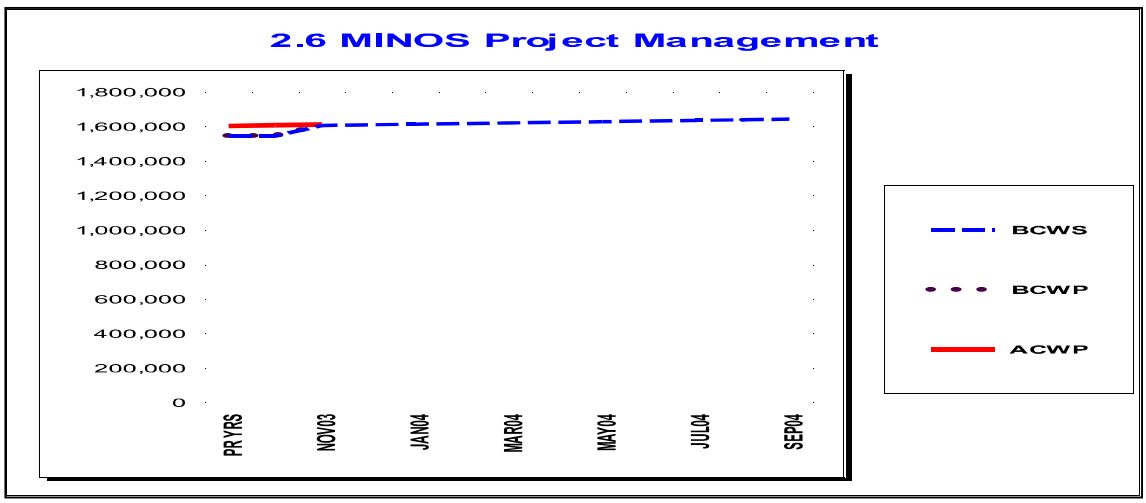
($000's Omitted)



	PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04
BCWS	5,077	5,077	5,077	5,077	5,077	5,077	5,077	5,077	5,077	5,077	5,077	5,077	5,077
BCWP	5,077	5,077	5,077										
ACWP	4,369	4,374	4,576										



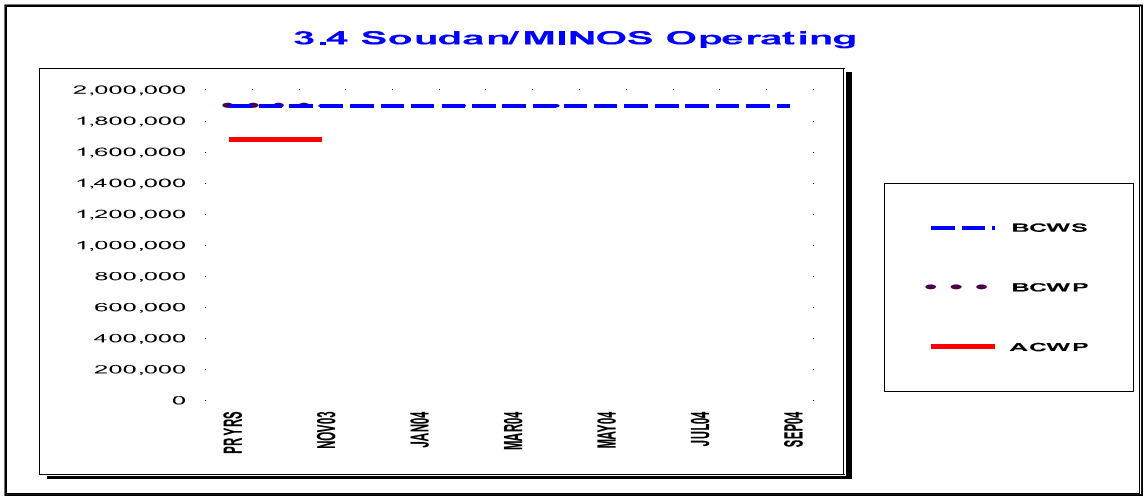
	PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04
BCWS	3,206	3,386	3,497	3,804	3,940	4,035	4,139	4,234	4,324	4,423	4,523	4,655	4,721
BCWP	2,886	2,983	3,262										
ACWP	2,805	2,868	3,146										



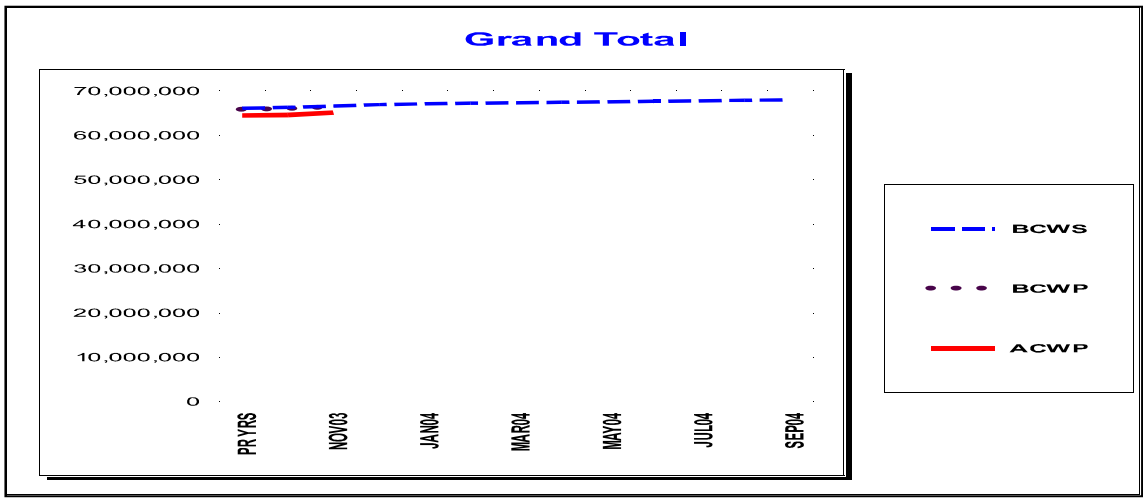
	PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04
BCWS	1,546	1,546	1,606	1,610	1,614	1,617	1,621	1,625	1,628	1,632	1,636	1,639	1,643
BCWP	1,546	1,546	1,606										
ACWP	1,603	1,608	1,612										

NuMI Other Project Costs

($000's Omitted)



	PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04
BCWS	1,896	1,896	1,896	1,896	1,896	1,896	1,896	1,896	1,896	1,896	1,896	1,896	1,896
BCWP	1,896	1,896	1,896										
ACWP	1,677	1,677	1,677										



	PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04
BCWS	66,056	66,274	66,557	66,899	67,070	67,195	67,308	67,414	67,515	67,624	67,736	67,879	67,956
BCWP	65,744	65,908	66,338										
ACWP	64,452	64,566	65,116										

NuMI Other Project Costs - US Funds

($000's Omitted)

Program:	Description:	Approval:
NUMIOPC	NuMI Other Proj Costs	Program Manager
Run Date: 12/18/03	Status Date: 11/30/2003	Functional Manager
		Cost Account Manager

DESCRIPTION		PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04	FY05	TOTAL
2.1 Magnets: Steel & Coils																
2.1.1 Steel Plane Fabrication	BCWS	4,628	1	-27	0	0	0	0	0	0	0	0	0	0	0	4,601
	ACWP	4,601	0	0	0	0	0	0	0	0	0	0	0	0	0	4,601
2.1.2 Steel handling fixtures	BCWS	773	0	20	0	0	0	0	0	0	0	0	0	0	0	793
	ACWP	793	0	0	0	0	0	0	0	0	0	0	0	0	0	793
2.1.3 Near Detector Support Structures	BCWS	5	0	-3	0	0	0	0	0	0	0	0	0	0	0	1
	ACWP	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2.1.4 Magnet Coil	BCWS	1,562	0	111	0	0	0	0	0	0	0	0	0	0	0	1,673
	ACWP	1,673	0	0	0	0	0	0	0	0	0	0	0	0	0	1,673
2.1.5 Detector Plane Prototypes	BCWS	501	0	-5	0	0	0	0	0	0	0	0	0	0	0	495
	ACWP	496	0	0	0	0	0	0	0	0	0	0	0	0	0	496
2.1.6 Steel Management	BCWS	71	0	-14	0	0	0	0	0	0	0	0	0	0	0	57
	ACWP	57	0	0	0	0	0	0	0	0	0	0	0	0	0	58
WBS[2] Totals:	BCWS	7,539	1	81	0	0	0	0	0	0	0	0	0	0	0	7,621
	ACWP	7,622	0	0	0	0	0	0	0	0	0	0	0	0	0	7,622
2.2 Scintillator Detector Fabrication																
2.2.1 Scintillator Strips	BCWS	2,998	0	0	0	0	0	0	0	0	0	0	0	0	0	2,998
	ACWP	2,972	0	0	0	0	0	0	0	0	0	0	0	0	0	2,972
2.2.2 Fiber	BCWS	4,039	0	0	0	0	0	0	0	0	0	0	0	0	0	4,039
	ACWP	3,961	0	0	0	0	0	0	0	0	0	0	0	0	0	3,961
2.2.3 Scintillator Modules	BCWS	2,008	0	0	0	0	0	0	0	0	0	0	0	0	0	2,008
	ACWP	1,982	0	0	0	0	0	0	0	0	0	0	0	0	0	1,982
2.2.4 Photodetector Systems	BCWS	1,720	0	0	0	0	0	0	0	0	0	0	0	0	0	1,720
	ACWP	1,702	0	0	0	0	0	0	0	0	0	0	0	0	0	1,702
2.2.5 Mux Boxes & Connectors	BCWS	1,063	0	0	0	0	0	0	0	0	0	0	0	0	0	1,063
	ACWP	1,093	0	0	0	0	0	0	0	0	0	0	0	0	0	1,093
2.2.6 Calibration Systems	BCWS	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2.7 Ass'y & Test Equipment	BCWS	1,729	0	0	0	0	0	0	0	0	0	0	0	0	0	1,729
	ACWP	1,721	0	0	0	0	0	0	0	0	0	0	0	0	0	1,721
2.2.8 Factories	BCWS	3,188	0	0	0	0	0	0	0	0	0	0	0	0	0	3,188
	ACWP	3,279	0	0	0	0	0	0	0	0	0	0	0	0	0	3,279
2.2.9 Scintillator Management	BCWS	355	0	0	0	0	0	0	0	0	0	0	0	0	0	355
	ACWP	379	0	0	0	0	0	0	0	0	0	0	0	0	0	379
WBS[2] Totals:	BCWS	17,104	0	0	0	0	0	0	0	0	0	0	0	0	0	17,104
	ACWP	17,089	0	0	0	0	0	0	0	0	0	0	0	0	0	17,089
2.3 Electronics, DAQ & Database																
2.3.1 Near Detector Front End	BCWS	4,545	30	24	28	27	24	1	4	4	5	5	5	5	5	4,712
	ACWP	4,175	40	31	0	0	0	0	0	0	0	0	0	0	0	4,246
2.3.2 Far Detector Front-end	BCWS	1,184	0	0	0	0	0	0	0	0	0	0	0	0	0	1,184
	ACWP	1,197	0	0	0	0	0	0	0	0	0	0	0	0	0	1,197
2.3.5 Database	BCWS	48	0	0	0	0	0	0	0	0	0	0	0	0	0	48
	ACWP	10	0	0	0	0	0	0	0	0	0	0	0	0	0	10

NuMI Other Project Costs - US Funds

($000's Omitted)

Program:	Description:	Approval:
NUMIOPC	NuMI Other Proj Costs	Program Manager
Run Date: 12/18/03	Status Date: 11/30/2003	Functional Manager
		Cost Account Manager

DESCRIPTION		PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04	FY05	TOTAL
2.3.6 Auxilliary Systems	BCWS	202	0	0	0	0	0	0	0	0	0	0	0	0	0	206
	ACWP	247	1	0	0	0	0	0	0	0	0	0	0	0	0	248
2.3.7 Electronics Management	BCWS	146	0	0	0	0	0	0	0	0	0	0	0	0	0	146
	ACWP	184	0	34	0	0	0	0	0	0	0	0	0	0	0	218
2.3.8 Slow Control & Monitoring	BCWS	445	0	0	0	0	0	0	0	0	0	0	0	0	0	445
	ACWP	373	0	0	0	0	0	0	0	0	0	0	0	0	0	373
2.3.9 HV System	BCWS	82	1	0	0	0	0	0	0	0	0	0	0	0	0	83
	ACWP	77	0	0	0	0	0	0	0	0	0	0	0	0	0	77
WBS[2] Totals:	BCWS	6,652	31	25	29	27	25	2	5	5	5	5	5	5	5	6,824
	ACWP	6,263	41	65	0	0	0	0	0	0	0	0	0	0	0	6,369
2.4 Far Detector Installation																
2.4.1 FDI Completed Design Tasks	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.4.2 FDI Management	BCWS	661	0	0	0	0	0	0	0	0	0	0	0	0	0	661
	ACWP	577	5	2	0	0	0	0	0	0	0	0	0	0	0	584
2.4.3 SDN-FDI Construction Oversight	BCWS	58	0	0	0	0	0	0	0	0	0	0	0	0	0	58
	ACWP	115	0	0	0	0	0	0	0	0	0	0	0	0	0	115
2.4.4 FDI Soudan Lab Infrastructure Setup	BCWS	509	0	0	0	0	0	0	0	0	0	0	0	0	0	509
	ACWP	473	0	0	0	0	0	0	0	0	0	0	0	0	0	473
2.4.5 SDN-FDI Detector Installation	BCWS	3,084	0	0	0	0	0	0	0	0	0	0	0	0	0	3,084
	ACWP	2,759	0	200	0	0	0	0	0	0	0	0	0	0	0	2,959
2.4.6 SDN-FDI DNR Costs	BCWS	708	0	0	0	0	0	0	0	0	0	0	0	0	0	708
	ACWP	378	0	0	0	0	0	0	0	0	0	0	0	0	0	378
2.4.7 FDI Alignment & Survey	BCWS	57	0	0	0	0	0	0	0	0	0	0	0	0	0	57
	ACWP	67	0	0	0	0	0	0	0	0	0	0	0	0	0	67
WBS[2] Totals:	BCWS	5,077	0	0	0	0	0	0	0	0	0	0	0	0	0	5,077
	ACWP	4,369	5	202	0	0	0	0	0	0	0	0	0	0	0	4,576
2.5 Near Detector Installation																
2.5.1 NDI Infrastructure	BCWS	261	6	22	57	97	5	0	0	0	0	0	38	1	0	488
	ACWP	170	20	14	0	0	0	0	0	0	0	0	0	0	0	204
2.5.2 NDI Plane Assembly	BCWS	516	0	0	0	0	0	0	0	0	0	0	0	0	0	516
	ACWP	514	0	0	0	0	0	0	0	0	0	0	0	0	0	514
2.5.3 NDI Detector Installation	BCWS	9	5	20	197	30	90	104	95	90	98	100	94	65	32	1,031
	ACWP	39	0	113	0	0	0	0	0	0	0	0	0	0	0	153
2.5.4 NDI Facility Experimental Infrastructure	BCWS	78	64	18	0	0	0	0	0	0	0	0	0	0	0	160
	ACWP	124	9	16	0	0	0	0	0	0	0	0	0	0	0	150
2.5.5 RBI SB&O Experimental Systems Outfitting	BCWS	2,341	106	51	52	9	0	0	0	0	0	0	0	0	0	2,559
	ACWP	1,957	33	135	0	0	0	0	0	0	0	0	0	0	0	2,126
WBS[2] Totals:	BCWS	3,206	180	111	306	136	95	104	95	90	98	100	132	66	32	4,753
	ACWP	2,805	63	278	0	0	0	0	0	0	0	0	0	0	0	3,146

NuMI Other Project Costs - US Funds

($000's Omitted)

Program:	Description:	Approval:
NUMIOPC	NuMI Other Proj Costs	Program Manager
Run Date: 12/18/03	Status Date: 11/30/2003	Functional Manager
		Cost Account Manager

DESCRIPTION		PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04	FY05	TOTAL
2.6 MINOS Project Management																
2.6.1 FNL-Project Management	BCWS	1,448	0	61	4	4	3	4	4	4	4	4	4	4	15	1,560
	ACWP	1,505	5	4	0	0	0	0	0	0	0	0	0	0	0	1,514
2.6.2 ANL-Project Management	BCWS	98	0	0	0	0	0	0	0	0	0	0	0	0	0	98
	ACWP	98	0	0	0	0	0	0	0	0	0	0	0	0	0	98
WBS[2] Totals:	BCWS	1,546	0	61	4	4	3	4	4	4	4	4	4	4	15	1,658
	ACWP	1,603	5	4	0	0	0	0	0	0	0	0	0	0	0	1,612
3.1 NuMI Conceptual Design																
3.1.1 FNL-BD-NuMI CDR	BCWS	489	0	0	0	0	0	0	0	0	0	0	0	0	0	489
	ACWP	487	0	0	0	0	0	0	0	0	0	0	0	0	0	487
3.1.2 FNL-BD-NuMI FESS CDR	BCWS	346	0	0	0	0	0	0	0	0	0	0	0	0	0	346
	ACWP	346	0	0	0	0	0	0	0	0	0	0	0	0	0	346
3.1.3 FNL-NuMI Beam Design	BCWS	798	0	0	0	0	0	0	0	0	0	0	0	0	0	798
	ACWP	796	0	0	0	0	0	0	0	0	0	0	0	0	0	796
3.1.4 FNL-BD-NuMI Project Management	BCWS	235	0	0	0	0	0	0	0	0	0	0	0	0	0	235
	ACWP	234	0	0	0	0	0	0	0	0	0	0	0	0	0	234
3.1.5 FNL-Soudan Lab Design	BCWS	65	0	0	0	0	0	0	0	0	0	0	0	0	0	65
	ACWP	65	0	0	0	0	0	0	0	0	0	0	0	0	0	65
WBS[2] Totals:	BCWS	1,934	0	0	0	0	0	0	0	0	0	0	0	0	0	1,934
	ACWP	1,928	0	0	0	0	0	0	0	0	0	0	0	0	0	1,928
3.2 MINOS Detector R&D																
3.2.1 FNL-MINOS Scintillator R&D	BCWS	995	0	0	0	0	0	0	0	0	0	0	0	0	0	995
	ACWP	988	0	0	0	0	0	0	0	0	0	0	0	0	0	988
3.2.2 FNL-MINOS Steel R&D	BCWS	649	0	0	0	0	0	0	0	0	0	0	0	0	0	649
	ACWP	644	0	0	0	0	0	0	0	0	0	0	0	0	0	644
3.2.3 FNL-RD-Neutrino Oscillation R&D	BCWS	136	0	0	0	0	0	0	0	0	0	0	0	0	0	136
	ACWP	136	0	0	0	0	0	0	0	0	0	0	0	0	0	136
WBS[2] Totals:	BCWS	1,780	0	0	0	0	0	0	0	0	0	0	0	0	0	1,780
	ACWP	1,768	0	0	0	0	0	0	0	0	0	0	0	0	0	1,768
3.3 MINOS Cavern																
3.3.0 Preconstruction Work	BCWS	758	0	0	0	0	0	0	0	0	0	0	0	0	0	758
	ACWP	758	0	0	0	0	0	0	0	0	0	0	0	0	0	758
3.3.1 Cavern Construction	BCWS	6,597	0	0	0	0	0	0	0	0	0	0	0	0	0	6,597
	ACWP	6,597	0	0	0	0	0	0	0	0	0	0	0	0	0	6,597
3.3.2 Cavern Outfitting	BCWS	7,171	0	0	0	0	0	0	0	0	0	0	0	0	0	7,171
	ACWP	7,171	0	0	0	0	0	0	0	0	0	0	0	0	0	7,171
WBS[2] Totals:	BCWS	14,527	0	0	0	0	0	0	0	0	0	0	0	0	0	14,527
	ACWP	14,527	0	0	0	0	0	0	0	0	0	0	0	0	0	14,527
3.4 Soudan/MINOS Operating																
3.4.1 UMN-Mine Crew Support/Soudan Gen'l Operations	BCWS	1,709	0	0	0	0	0	0	0	0	0	0	0	0	0	1,709
	ACWP	1,531	0	0	0	0	0	0	0	0	0	0	0	0	0	1,531
3.4.2 UMN-Breitung Township Building Rental	BCWS	114	0	0	0	0	0	0	0	0	0	0	0	0	0	114
	ACWP	75	0	0	0	0	0	0	0	0	0	0	0	0	0	75

NuMI Other Project Costs - US Funds

($000's Omitted)

Program:	Description:	Approval:
NUMIOPC	NuMI Other Proj Costs	Program Manager
Run Date: 12/18/03	Status Date: 11/30/2003	Functional Manager
		Cost Account Manager

DESCRIPTION		PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04	FY05	TOTAL
3.4.3 UMN-E Peterson Salary	BCWS	73	0	0	0	0	0	0	0	0	0	0	0	0	0	73
	ACWP	71	0	0	0	0	0	0	0	0	0	0	0	0	0	71
WBS[2] Totals:	BCWS	1,896	0	0	0	0	0	0	0	0	0	0	0	0	0	1,896
	ACWP	1,677	0	0	0	0	0	0	0	0	0	0	0	0	0	1,677
Grand Totals:	BCWS	61,259	212	278	339	167	123	109	103	99	107	109	141	75	52	63,174
	ACWP	59,651	114	550	0	0	0	0	0	0	0	0	0	0	0	60,314

NuMI Other Project Costs - US Funds - Labor Only

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Program:	Description:	Approval:
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Run Date: 12/18/03	Status Date: 11/30/2003	Functional Manager
		Cost Account Manager

DESCRIPTION		PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04	FY05	TOTAL
2.1 Magnets: Steel & Coils																
2.1.1 Steel Plane Fabrication	BCWS	130	0	0	0	0	0	0	0	0	0	0	0	0	0	130
	ACWP	171	0	0	0	0	0	0	0	0	0	0	0	0	0	171
2.1.2 Steel handling fixtures	BCWS	437	0	0	0	0	0	0	0	0	0	0	0	0	0	437
	ACWP	560	0	0	0	0	0	0	0	0	0	0	0	0	0	560
2.1.3 Near Detector Support Structures	BCWS	36	0	0	0	0	0	0	0	0	0	0	0	0	0	36
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.1.4 Magnet Coil	BCWS	564	0	0	0	0	0	0	0	0	0	0	0	0	0	564
	ACWP	839	0	0	0	0	0	0	0	0	0	0	0	0	0	839
2.1.5 Detector Plane Prototypes	BCWS	355	0	0	0	0	0	0	0	0	0	0	0	0	0	355
	ACWP	375	0	0	0	0	0	0	0	0	0	0	0	0	0	375
2.1.6 Steel Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
WBS[2] Totals:	BCWS	1,521	0	0	0	0	0	0	0	0	0	0	0	0	0	1,522
	ACWP	1,946	0	0	0	0	0	0	0	0	0	0	0	0	0	1,946
2.2 Scintillator Detector Fabrication																
2.2.1 Scintillator Strips	BCWS	111	0	0	0	0	0	0	0	0	0	0	0	0	0	111
	ACWP	344	0	0	0	0	0	0	0	0	0	0	0	0	0	344
2.2.2 Fiber	BCWS	8	0	0	0	0	0	0	0	0	0	0	0	0	0	8
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2.3 Scintillator Modules	BCWS	11	0	0	0	0	0	0	0	0	0	0	0	0	0	11
	ACWP	284	0	0	0	0	0	0	0	0	0	0	0	0	0	284
2.2.5 Mux Boxes & Connectors	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	37	0	0	0	0	0	0	0	0	0	0	0	0	0	37
2.2.6 Calibration Systems	BCWS	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2.7 Ass'y & Test Equipment	BCWS	9	0	0	0	0	0	0	0	0	0	0	0	0	0	9
	ACWP	139	0	0	0	0	0	0	0	0	0	0	0	0	0	139
2.2.8 Factories	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.2.9 Scintillator Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WBS[2] Totals:	BCWS	144	0	0	0	0	0	0	0	0	0	0	0	0	0	144
	ACWP	805	0	0	0	0	0	0	0	0	0	0	0	0	0	805
2.3 Electronics, DAQ & Database																
2.3.1 Near Detector Front End	BCWS	356	15	13	15	15	13	1	0	0	0	0	0	0	0	428
	ACWP	652	15	13	0	0	0	0	0	0	0	0	0	0	0	680
2.3.2 Far Detector Front-end	BCWS	112	0	0	0	0	0	0	0	0	0	0	0	0	0	112
	ACWP	176	0	0	0	0	0	0	0	0	0	0	0	0	0	176

NuMI Other Project Costs - US Funds - Labor Only

($000's Omitted)

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Run Date: 12/18/03	Status Date: 11/30/2003	Functional Manager
		Cost Account Manager

DESCRIPTION		PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04	FY05	TOTAL
2.3.6 Auxilliary Systems	BCWS	97	0	0	0	0	0	0	0	0	0	0	0	0	0	102
	ACWP	166	1	0	0	0	0	0	0	0	0	0	0	0	0	167
2.3.7 Electronics Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.3.8 Slow Control & Monitoring	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.3.9 HV System	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WBS[2] Totals:	BCWS	566	16	14	16	15	14	1	0	0	0	0	0	0	0	643
	ACWP	993	16	14	0	0	0	0	0	0	0	0	0	0	0	1,023
2.4 Far Detector Installation																
2.4.1 FDI Completed Design Tasks	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.4.2 FDI Management	BCWS	89	0	0	0	0	0	0	0	0	0	0	0	0	0	89
	ACWP	47	0	0	0	0	0	0	0	0	0	0	0	0	0	47
2.4.4 FDI Soudan Lab Infrastructure Setup	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	7	0	0	0	0	0	0	0	0	0	0	0	0	0	7
2.4.7 FDI Alignment & Survey	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WBS[2] Totals:	BCWS	89	0	0	0	0	0	0	0	0	0	0	0	0	0	89
	ACWP	54	0	0	0	0	0	0	0	0	0	0	0	0	0	54
2.5 Near Detector Installation																
2.5.1 NDI Infrastructure	BCWS	161	2	16	48	94	5	0	0	0	0	0	38	1	0	365
	ACWP	101	17	12	0	0	0	0	0	0	0	0	0	0	0	130
2.5.2 NDI Plane Assembly	BCWS	501	0	0	0	0	0	0	0	0	0	0	0	0	0	501
	ACWP	468	0	0	0	0	0	0	0	0	0	0	0	0	0	468
2.5.3 NDI Detector Installation	BCWS	3	0	13	16	21	82	94	89	84	92	94	88	59	20	756
	ACWP	11	0	10	0	0	0	0	0	0	0	0	0	0	0	20
2.5.4 NDI Facility Experimental Infrastructure	BCWS	27	5	4	0	0	0	0	0	0	0	0	0	0	0	37
	ACWP	17	0	1	0	0	0	0	0	0	0	0	0	0	0	18
2.5.5 RBI SB&O Experimental Systems Outfitting	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WBS[2] Totals:	BCWS	692	7	33	64	116	87	94	89	84	92	94	126	60	20	1,659
	ACWP	596	17	22	0	0	0	0	0	0	0	0	0	0	0	636
2.6 MINOS Project Management																
2.6.1 FNL-Project Management	BCWS	1,398	0	61	4	4	3	4	4	4	4	4	4	4	15	1,511
	ACWP	1,356	5	4	0	0	0	0	0	0	0	0	0	0	0	1,365
2.6.2 ANL-Project Management	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NuMI Other Project Costs - US Funds - Labor Only

($000's Omitted)

Program:	Description:	Approval:
NUMIOPC	NuMI Other Proj Costs	Program Manager
Run Date: 12/18/03	Status Date: 11/30/2003	Functional Manager
		Cost Account Manager

DESCRIPTION		PR YRS	OCT03	NOV03	DEC03	JAN04	FEB04	MAR04	APR04	MAY04	JUN04	JUL04	AUG04	SEP04	FY05	TOTAL
WBS[2] Totals:	BCWS	1,398	0	61	4	4	3	4	4	4	4	4	4	4	15	1,511
	ACWP	1,356	5	4	0	0	0	0	0	0	0	0	0	0	0	1,365
3.1 NuMI Conceptual Design																
3.1.1 FNL-BD-NuMI CDR	BCWS	99	0	0	0	0	0	0	0	0	0	0	0	0	0	99
	ACWP	99	0	0	0	0	0	0	0	0	0	0	0	0	0	99
3.1.2 FNL-BD-NuMI FESS CDR	BCWS	112	0	0	0	0	0	0	0	0	0	0	0	0	0	112
	ACWP	112	0	0	0	0	0	0	0	0	0	0	0	0	0	112
3.1.3 FNL-NuMI Beam Design	BCWS	530	0	0	0	0	0	0	0	0	0	0	0	0	0	530
	ACWP	529	0	0	0	0	0	0	0	0	0	0	0	0	0	529
3.1.4 FNL-BD-NuMI Project Management	BCWS	132	0	0	0	0	0	0	0	0	0	0	0	0	0	132
	ACWP	132	0	0	0	0	0	0	0	0	0	0	0	0	0	132
3.1.5 FNL-Soudan Lab Design	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WBS[2] Totals:	BCWS	872	0	0	0	0	0	0	0	0	0	0	0	0	0	872
	ACWP	872	0	0	0	0	0	0	0	0	0	0	0	0	0	872
3.2 MINOS Detector R&D																
3.2.1 FNL-MINOS Scintillator R&D	BCWS	7	0	0	0	0	0	0	0	0	0	0	0	0	0	7
	ACWP	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6
3.2.2 FNL-MINOS Steel R&D	BCWS	46	0	0	0	0	0	0	0	0	0	0	0	0	0	46
	ACWP	46	0	0	0	0	0	0	0	0	0	0	0	0	0	46
3.2.3 FNL-RD-Neutrino Oscillation R&D	BCWS	9	0	0	0	0	0	0	0	0	0	0	0	0	0	9
	ACWP	9	0	0	0	0	0	0	0	0	0	0	0	0	0	9
WBS[2] Totals:	BCWS	62	0	0	0	0	0	0	0	0	0	0	0	0	0	62
	ACWP	62	0	0	0	0	0	0	0	0	0	0	0	0	0	62
3.4 Soudan/MINOS Operating																
3.4.1 UMN-Mine Crew Support/Soudan Gen'l Operations	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
3.4.2 UMN-Breitung Township Building Rental	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WBS[2] Totals:	BCWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ACWP	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Grand Totals:	BCWS	5,345	23	107	84	134	104	99	93	88	96	98	130	64	35	6,501
	ACWP	6,686	38	40	0	0	0	0	0	0	0	0	0	0	0	6,764

NuMI Project Obligations

$000's Omitted

WBS #	DESCRIPTION	Amounts as of November 30, 2003					
		Total Budget	PTD Cost	PO Encumbrances	Requisition Encumbrances	PTD Obligations	Remaining Obligation Authority
1.1.1	Extraction & Primary Beam	4,437	4,473	356	24	4,852	(415)
1.1.2	Neutrino Beam Devices	8,209	8,382	462	203	9,047	(838)
1.1.3	Power Supply System	4,068	4,247	44	57	4,348	(280)
1.1.4	Hadron Decay & Absorber	1,124	738	11	0	749	375
1.1.5	Neutrino Beam Monitoring	484	336	138	0	474	11
1.1.6	Alignment Systems	185	190	1	0	190	(6)
1.1.7	Water, Vacuum & Gas Systems	1,552	1,523	19	0	1,543	10
1.1.8	Installation & Integration	1,141	1,425	72	10	1,506	(365)
1.1.9	Hadronic Hose	63	63	0	0	63	0
1.1	**Technical Component**	**21,262**	**21,375**	**1,102**	**294**	**22,771**	**(1,509)**
1.2.1	Facility Physics Design Phase	70	70	0	0	70	0
1.2.2	Facility Construction Title I Design Phase	1,437	1,437	0	0	1,437	0
1.2.3	Facility Construction Title II Design Phase	2,974	2,974	0	0	2,974	0
1.2.4	Facility Construction Phase	64,011	62,153	2,131	124	64,408	(397)
1.2	**Facility Constructior**	**68,493**	**66,635**	**2,131**	**124**	**68,890**	**(397)**
1.3.1	FY98 Project Management	141	141	0	0	141	0
1.3.2	FY99 Project Management	661	661	0	0	661	0
1.3.3	FY00 Project Management	663	663	0	0	663	0
1.3.4	FY01 Project Management	423	423	0	0	423	0
1.3.5	FY02 Project Management	324	324	0	0	324	(0)
1.3.6	FY03 Project Management	428	421	0	0	421	7
1.3.7	FY04 Project Management	0	120	0	0	120	(120)
1.3.9	Unallocated Budget	3,596	0	0	0	0	3,596
1.3	**Project Managemen**	**6,236**	**2,753**	**0**	**0**	**2,753**	**3,483**
1	**NuMI TEC (Total Estimated Cost**	**95,991**	**90,763**	**3,233**	**418**	**94,414**	**1,577**
2.1.1	MINOS-Steel Plane Fabrication	4,674	4,601	73	0	4,674	0
2.1.2	MINOS-Steel Handling Fixtures	793	793	0	0	793	0
2.1.3	MINOS Near Detector Support Structures	1	1	0	0	1	0
2.1.4	MINOS Magnet Coil	1,673	1,673	0	0	1,673	0
2.1.5	MINOS Detector Plane Prototypes	496	496	0	0	496	0

NuMI Project Obligations

$000's Omitted

WBS #	DESCRIPTION	Amounts as of November 30, 2003					
		Total Budget	PTD Cost	PO Encumbrances	Requisition Encumbrances	PTD Obligations	Remaining Obligation Authority
2.1.6	MINOS Steel Management	58	58	0	0	58	0
2.1	**MINOS-Magnets: Steel & Coil**	**7,695**	**7,622**	**73**	**0**	**7,695**	**0**
2.2.1	MINOS Scintillator Strips	2,990	2,972	18	0	2,990	0
2.2.2	MINOS Fiber	3,962	3,961	1	0	3,962	0
2.2.3	MINOS Scintillator Modules	2,008	1,982	26	0	2,008	0
2.2.4	MINOS Photodetector Systems	1,702	1,702	0	0	1,702	0
2.2.5	MINOS Mux Boxes & Connectors	1,094	1,093	0	0	1,094	0
2.2.6	MINOS Calibration Systems	0	0	0	0	0	0
2.2.7	MINOS Ass'y & Test Equipment	1,721	1,721	0	0	1,721	0
2.2.8	MINOS Factories	3,279	3,279	0	0	3,279	0
2.2.9	MINOS Scintillator Management	379	379	0	0	379	0
2.2	**MINOS-Scintillator Detector Fabricatio**	**17,135**	**17,089**	**46**	**0**	**17,135**	**0**
2.3.1	MINOS Near Detector Front-end	4,397	4,246	152	0	4,397	0
2.3.2	MINOS Far Detector Front-end	1,197	1,197	0	0	1,197	0
2.3.3	MINOS Data Routing & Trigger Farm	0	0	0	0	0	0
2.3.4	MINOS Data Acquisition & Triggering	0	0	0	0	0	0
2.3.5	MINOS Database	10	10	0	0	10	0
2.3.6	MINOS Auxiliary Systems	249	248	0	0	249	0
2.3.7	MINOS Electronics Management	218	218	0	0	218	0
2.3.8	MINOS Slow Control & Monitoring	396	373	23	0	396	0
2.3.9	MINOS HV System	77	77	0	0	77	0
2.3	**MINOS-Electronics: DAQ & Databas**	**6,544**	**6,369**	**175**	**0**	**6,544**	**0**
2.4.1	MINOS FDI Completed Design Tasks	0	0	0	0	0	0
2.4.2	MINOS FDI Minecrew Management	584	584	1	0	584	0
2.4.3	MINOS FDI MINOS Construction Oversight	115	115	0	0	115	0
2.4.4	MINOS FDI Soudan Lab Infrastructure Setup	475	473	2	0	475	0
2.4.5	MINOS FDI Detector Installation	2,959	2,959	0	0	2,959	0
2.4.6	MINOS FDI DNR Costs	378	378	0	0	378	0
2.4.7	MINOS FDI Alignment & Survey	69	67	1	0	69	0
2.4	**MINOS Far Detector Installation (FDI**	**4,580**	**4,576**	**4**	**0**	**4,580**	**0**
2.5.1	MINOS NDI Infrastructure	217	204	2	11	217	0

NuMI Project Obligations

$000's Omitted

WBS #	DESCRIPTION	Amounts as of November 30, 2003					
		Total Budget	PTD Cost	PO Encumbrances	Requisition Encumbrances	PTD Obligations	Remaining Obligation Authority
2.5.2	MINOS NDI Plane Assembly	514	514	0	0	514	0
2.5.3	MINOS NDI Detector Installation	163	153	0	10	163	0
2.5.4	MINOS NDI Facility Experimental Infrastructure	221	150	71	0	221	0
2.5.5	MINOS NDI SB&O Experimental Systems Outfitting	2,602	2,126	476	0	2,602	0
2.5	**MINOS Near Detector Installation (NDI**	**3,716**	**3,146**	**548**	**22**	**3,716**	**0**
2.6.1	MINOS FNL Project Management	1,514	1,514	0	0	1,514	0
2.6.2	MINOS ANL Project Management	98	98	0	0	98	0
2.6	**MINOS Project Managemen**	**1,612**	**1,612**	**0**	**0**	**1,612**	**0**
2	**MINOS Detector**	**41,283**	**40,415**	**846**	**22**	**41,283**	**0**
3.1.1	NuMI CDR	487	487	0	0	487	0
3.1.2	NuMI FESS CDR	346	346	0	0	346	0
3.1.3	Beam Design	796	796	0	0	796	0
3.1.4	Project Management	234	234	0	0	234	0
3.1.5	Soudan Lab Design	65	65	0	0	65	0
3.1	**NuMI Conceptual Desig**	**1,928**	**1,928**	**0**	**0**	**1,928**	**0**
3.2.1	MINOS Scintillator R&D	988	988	0	0	988	0
3.2.2	MINOS Steel R&D	644	644	0	0	644	0
3.2.3	Neutrino Oscillation R&D	136	136	0	0	136	0
3.2	**MINOS Detector R&D**	**1,768**	**1,768**	**0**	**0**	**1,768**	**0**
3.3	**MINOS Cavern**	**10,769**	**0**	**10,769**	**0**	**10,769**	**0**
3.4.1	Mine Crew Support/Soudan Gen'l Operations	1,531	1,531	0	0	1,531	0
3.4.2	Breitung Township Building Rental	76	75	0	0	76	0
3.4.3	E Peterson Salary	72	71	1	0	72	0
3.4	**Soudan/MINOS Operating**	**1,678**	**1,677**	**1**	**0**	**1,678**	**0**
3	**Project Support**	**16,143**	**5,373**	**10,770**	**0**	**16,143**	**0**
	Total Other Project Costs (OPC's	**57,425**	**45,788**	**11,616**	**22**	**57,425**	**0**

NuMI Project Obligations

$000's Omitted

WBS #	DESCRIPTION	Amounts as of November 30, 2003					
		Total Budget	PTD Cost	PO Encumbrances	Requisition Encumbrances	PTD Obligations	Remaining Obligation Authority
	NuMI TPC (Total Project Cost)	**153,416**	**136,551**	**14,849**	**440**	**151,839**	**1,577**