



MINOS Detector

WBS 2.4 Far Detector Installation

Co-Level 2 Manager

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Outline

Far Detector Installation at Soudan

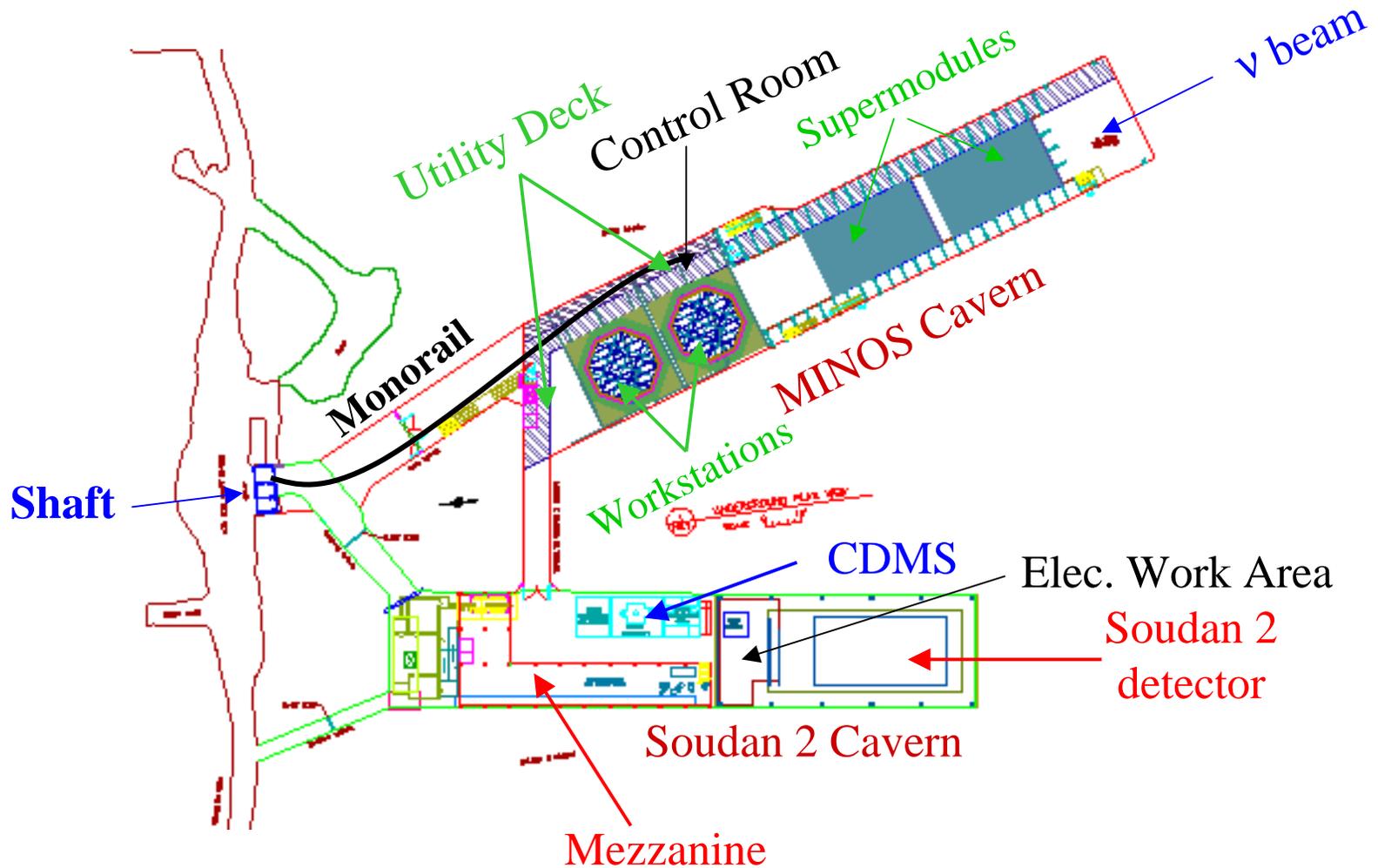
- Overview
- Technical Progress and Status
- Cost & Schedule update
- Activities for next 6 months
- Summary

Far Detector Installation Group

(Level 2 & Level 3 managers, workers)

*Argonne, Caltech, Fermilab, Indiana, Minnesota,
Rutherford, Sussex, Texas A&M, Western Washington*

Far Detector Cavern Layout





Far Detector Installation WBS

(after Change Request #54, Sept. 2000)

- WBS 2.4.1 Completed design tasks (FY98-00) \$ 0k
 - WBS 2.4.2 Management \$404k
 - « Salary for Soudan Coordinator & Administrative Ass't
 - WBS 2.4.3 Construction oversight by minecrew \$ 40k
 - WBS 2.4.4 Installation infrastructure setup \$424k
 - WBS 2.4.5 Detector installation \$3,857k
 - « Move material underground, assemble & mount planes
 - « Based on 4PP and materials handling studies at Fermilab
 - WBS 2.4.6 DNR hoisting and effort \$790k
 - WBS 2.4.7 Detector alignment & survey \$ 58k
 - « Level 3 Manager D. Boehnlein
- Total** **\$5,573k**



Far Detector Installation Status

- **WBS 2.4 spending started in FY 2001**
- **All work to date has been liaison and planning**
 - « Underground outfitting, surface receiving building
 - « Steel materials handling and coil studies at FNAL
 - « Scintillator shipping, rigging, testing, mounting
 - « Electronics: racks, cabling, power requirements
 - « Planning for work force at Soudan
 - * Minecrew work plan and hiring plan
 - * Physicist work plan (shift leaders, workers, experts)
 - « Full-size model studies of cable routing, cable trays



Far Detector Cable-routing Studies using Full-size Model

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- Detector model in the New Muon Lab used to optimize/integrate
 - « Clear fiber cable runs
 - « Light injection cabling
 - « Cable tray locations
 - « Cable strain relief
 - « Relay rack locations
- Model contains 32 planes of one quadrant (used for top & bottom)





Far Detector Installation Progress since May DOE Review

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- **MINOS Project reviews**
 - « Scintillator-electronics integration #2 (June 11)
 - « Far detector installation planning #2 (September 21)
- **Far installation/integration working group activities**
 - « Coordinate installation Planning Manager work
 - « Develop integrated effort schedule for minecrew, physicists
- **September: Change Request #54 signed**
 - « Update schedule and cost estimates
 - * New schedule meets DOE Milestone dates, but no float left
 - * Cost estimate increased by \$781k to \$5,573k
 - « Revise task structure for easier maintenance
 - « Add trackable milestones during detector assembly
- **November: notified of 2-month delay in outfitting**



Far Detector Installation Planning Manager Tasks

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- Materials handling and plane assembly - Dave Ayres
- Initial infrastructure and space assignments - Louie Barrett
- Inventory control- Dave Boehnlein
- Alignment and survey - Dave Boehnlein
- LANs - Jonathan Thron
- PC coordination - Saeed Madani
- Electronics testing plans - Jonathan Thron
- DAQ installation - Geoff Pearce
- Control room - Louie Barrett, Bill Miller
- Online logbook - Pete Border
- Electronics test equipment - Bob Webb
- Scintillator testing plans - Bob Webb
- Training - Dave Boehnlein
- Shift Coordination - Dave Ayres
- UMN/DNR/FNAL approval of procedures - Earl Peterson
- Documentation of procedures - Dave Ayres



Far Detector Installation Status

- **We obtained final outfitting schedule in November**
 - « 5-week delay in Soudan Hall Mezzanine occupancy
 - « 9-week delay in MINOS cavern occupancy
 - « Cost and schedule implications for detector installation work are being worked out now
 - « Expect 3-6 week delay in detector completion and cost increase of \$40-80k in WBS 2.4
- **A WBS 2.4 Change Request will be submitted soon to incorporate the new outfitting schedule**



Far Detector Installation Status

- **Documentation**
 - « Far Detector Materials Handling Facilities, Procedures
 - « Far Detector Minecrew Hiring Plan
 - « Installation Planning Manager status reports
 - « Basis of Estimate for Change Request #54
- **Planning issues/concerns currently under study**
 - « Minecrew & physicist tasks, minecrew/physicist tradeoffs
 - « Specification of Electronics Work Area, Control Room
 - « LAN/WAN design/cost (FNAL Computing Div. role)
 - « Plans for electronics/DAQ/LAN cabling and cable trays
 - « Details of scintillator testing equipment and procedures



Response to recommendation from May Review

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Recommendation:

“Further refine the cost estimates for detector installation and guard against cost escalation”

Response:

Change Request 54 (September 2000) incorporates new cost estimates and schedules based on a detailed integrated work plan. It revises the structure of WBS 2.4 to make cost and schedule tracking easier.



Cost & Schedule Update as of September 2000

- **Sept. schedule delay resulted from excavation work**
 - « Original July 2000 completion date delayed to Nov. 2000
 - « Sept. schedule (barely) met DOE Milestone dates
 - * November schedule will miss them by 1-2 months
- **WBS 2.4 cost increase = \$781k (to \$5.57M)**

<u>Task</u>	<u>Cost change</u>
Minecrew effort cost	+\$480k
Installation infrastructure M&S	+\$176k
DNR hoisting & labor	+\$276k
Base facility M&S costs	-\$171k
Overhead cost changes	-\$ 8k
Other costs	<u>+\$ 28k</u>
Total	+\$781k



WBS 2.4, Change Request #54

- **Rework installation plan in light of schedule changes**
(dates in parentheses are based on November outfitting schedule update)
 - « Start of underground outfitting work delayed to Nov 15, 00 (Nov 6, 00)
 - « Add Surface Building beneficial occupancy date: Jan 2, 01 (Dec 1, 00)
 - « Add Mezzanine beneficial occupancy date: Jan 15, 2001 (Mar 23, 01)
 - « MINOS cavern beneficial occupancy delayed to May 1, 01 (Jun 29, 01)
- **Task structure simplification**
 - « NuMI Master Project file has only rolled-up WBS 2.4 tasks after CR#54
 - « Detailed Minecrew task assignments now tracked elsewhere
 - * Separate, integrated-schedule Project file used to determine effort profile
 - « Coordinate WBS 2.4 Minecrew effort with Lab & Expt operations effort



Far Installation Labor Estimate

Labor Estimate (FTE)									
Labor type	FY01				FY02	FY03			
	Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4
Facility crew	3	3	3	3	3	3	3	3	3
WBS 2.4 crew	3.5	6	16	33	36.5	36.5	36.5	36.5	0
Subsys. Exprt	0.3	3.4	9.2	11	0	0	0	0	0
Shift physicist	0.2	1.8	5.6	6.9	10	10	10	10	10

- Detailed effort profiles are based on Integrated Effort Schedule.
- U. of Minn. Human Resources Dept. is helping us prepare for minecrew hiring ramp-up.
- Subsystem expert and shift physicist effort profiles are based on WBS 2.1, 2.2, 2.3 and institutional manpower plans.



Far Detector Installation Milestones as of September 2000

- Total of 20 trackable milestones, Jan. 01 - July 03
- First cosmic ray tracks in August 2001
 - « Was July 2001
 - « DOE Milestone = September 2001
- Supermodule 1 complete June 2002
 - « Was March 2002
 - « DOE Milestone = July 2002
- Supermodule 2 complete June 2003
 - « Was February 2003
 - « DOE Milestone = June 2003



Far Detector Installation Scorecard for Past 6 months

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- ✓ Complete planning for minecrew, physicist effort
- ✓ Complete planning for cable trays and cable routing
- ✓ Complete planning for computer systems & LANs
- ✓ Complete cost and schedule update
- ✗ Begin ramp-up of mine crew staff (Elect. Tech only)
- ✗ Install materials handling cage (mid-December)



Activities for next 6 months

- **Revise installation plan to agree with November outfitting schedule**
- **Install materials handling cage**
 - « Move first scintillator crates underground
- **Complete setup of surface building**
 - « Begin receiving detector components
- **Begin ramp-up of mine crew staff**
- **Complete setup of Soudan 2 Hall Mezzanine**
 - « Begin module mapping
- **Complete setup of Electronics Work Area**
 - « Begin receiving tests of detector components
- **Begin fabrication of Workstation equipment**



Far Detector Installation Summary

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- Much detailed planning work done since May review
- Current cost estimate more reliable than in May 00
 - « Outfitting contract now well defined
 - « Materials handling procedures, equipment well understood
 - « 4-plane prototype validates detector installation procedures
 - « Full-size model studies of cabling and rack plans
- September schedule was (barely) consistent with DOE milestone dates
 - « New “November” schedule may be 1-2 months late
- Detector installation can be completed before beam arrives (with adequate OPC funding profile)