
Management Issues

The Personal Perspective of One (of Four) NuMI Project Managers

**Dixon Bogert
December 8, 2008**

Management Issues: The Players

-
- Extent of Management (NuMI):
Participating Parties (Most significant)**
- 1) Department of Energy**
 - 2) Other Federal and State Agencies**
 - 3) PPARC (an agency of the UK govt.)**
 - 4) URA**
 - 5) Fermilab Directorate**
 - 6) Fermilab Divisions & Sections**
 - 7) NuMI/MINOS Project**
 - 8) MINOS Experiment**
 - 9) University of Minnesota**
 - 10) Minnesota State Parks/Soudan Mine**

Responsible for Determining the Program.

Sets Safety standards (conventional and radiological) – enforces safety performance.

For Projects: CD-0 (need),

CD-1 (baseline range – cost, schedule, performance)

CD-2 (baseline – cost & schedule)

CD-3 (start of construction)

CD-4 (start operations)

Sends Requests to Congress – Authorization, Appropriations

Appoints Federal Project Manager

Prepares Project Execution Plan (PEP)

Approves Project Management Plan

Organizes Project Reviews

Reviews and approves obligations and costing profiles

Approves contracts over stated levels

Management Issues:

Other Federal and State Agencies

OSHA – (DOE follows as applicable)

Army Corps of Engineers – Wetlands

Illinois – Mining Permit – water discharge

Illinois – State radiological standards

Illinois – State environmental standards

Minnesota – University of Minnesota – Lease holder at

Soudan Mine State Park – Soudan Lab employees

Minnesota – Department of Natural Resources – State Park

Operator – Underground access and standards

Management Issues:

PPARC (an agency of the UK govt.)

By agreement with the DOE, the UK govt. through PPARC provided a certain fixed contribution of “in-kind” equipment for MINOS at a fixed cost (in £ sterling) with unstated labor costs included. For the purposes of reporting to the DOE the total provided equipment and services were estimated in dollars (at replacement) and progress reported against a total project cost so established.

The UK contribution was estimated at \$10M.

The UK was entitled to test beam time at CERN. The UK MINOS team requested and was given beam time to run a test calorimeter using both the “Near” and “Far” Detector electronics.

Management Issues: URA

Note: URA held the Fermilab operating contract from DOE at the time of the NuMI Project. FRA holds that contract today.

Contractually responsible for the execution of the work under the contract. Hired Lab Director. Included all safety and environmental standards. URA set the contractual standards for its sub-contracts.

URA reviewed the NuMI Project performance as part of its overall supervision for work on site.

Management Issues: Fermilab Directorate

- **Consulted with DOE to define the project prior to CD-0.**
- **Defined the Project Management structure – matrix support from Fermi Divisions and Sections.**
- **Appointed Project Manager(s).**
- **Set up Project Management Group for periodic discussions of progress/problems.**
- **Allocated laboratory resources. Determined with DOE the split between “plant” and “operating” funding for the project. Prioritized funding and resources.**
- **Organized internal Reviews.**

Management Issues: Fermilab Directorate (2)

- **Organized internal safety investigations.**
- **Participated in/delegated contractual management and negotiations as necessary.**

Fermilab Divisions & Sections

Providing staffing for the NuMI/MINOS Project by the Matrix method. The project was formally located in the Accelerator (Beams) Division Office.

Resources (personnel and facilities) were provided by:

Accelerator (Beams) Division

PPD

Technical Support

FESS

Business Services

ES&H

Management Issues: NuMI/MINOS Project

A Project Office was created. The structure varied as work progressed, but during construction usually included:

- **Project Manager**
- **Deputy Project Manager**
- **Technical Components Manager**
- **MINOS Manager**
- **Civil Construction Manager**
- **Costs accounts manager**
- **Scheduling Manager**
- **Project Mechanical Engineer, Electrical Engineer, and Conventional Facilities Engineer**

Management Issues: NuMI/MINOS Project (2)

Under the overall direction of the Project Manager:

- **A Preliminary Conceptual Design was prepared with a preliminary cost estimate.**
- **A Conceptual Design Report and Baseline Cost Estimate and Schedule was developed.**
- **A Technical Design Handbook was prepared.**
- **A monthly narrative report with a monthly cost and schedule report conforming to DOE requirements was prepared and published.**
- **Technical Design Reviews were conducted.**
- **Alternatives were considered and proposed as appropriate and/or necessary.**

Management Issues: NuMI/MINOS Project (3)

(More)

Under the overall direction of the Project Manager:

- An A&E was selected (Fluor/Harza joint effort) for the work at Fermilab.**
- An understanding was developed with the Univ. of Minnesota for Design and Construction of the MINOS Lab at Soudan.**
- A Title I Report was Prepared and submitted to DOE.**
- Title II designs were prepared for Conventional Facilities (at Fermilab and Soudan).**
- Detailed technical designs were prepared.**

Management Issues: NuMI/MINOS Project (4)

(More)

Under the overall direction of the Project Manager:

- Bids were solicited for conventional construction and for purchases for conventional equipment for the beamlines and MINOS experiment.**
- Refurbishment of existing components was scheduled and performed and tested in Technical Support.**
- Contracts were awarded.**
- Contractual performance was supervised.**
- Contractual and safety issues were managed.**

Management Issues: NuMI/MINOS Project (5)

(More)

Under the overall direction of the Project Manager:

- Work assignments for MINOS collaboration institutions were negotiated. (Beam and Detector)**
- Foreign contributions were managed.**
- Cost and schedule performance was analyzed.**
- Change control was established and maintained.**
- Cost and Schedule overruns were estimated, reported, and when contingency was exhausted, a rebaseline proposal was prepared for DOE.**
- An installation plan was developed.**
- A commissioning plan was developed.**

Management Issues: MINOS Experiment

The Fermilab Directorate urged the consolidation of several experimental proposals into a single MINOS Experiment. Not all (but most) experimenters joined the consolidated effort.

The experiment organized and provided ex-officio positions on the MINOS executive committee for NuMI/MINOS project managers.

The MINOS collaborators participated in significant design and construction efforts of the detector, and also in beam instrumentation. This work had to be integrated across institutions and with Fermilab. Cost and schedule progress had to be reported in common.

The University of Minnesota and its Physics Department had an existing facility at the Soudan Mine. The NuMI/MINOS Project was able to build upon the existing personnel and physical infrastructure to organize the design and excavation of a new underground hall, and the installation of the mechanical and electronic components of the MINOS Far Detector under the auspices of UMinn.

The existing operations staff at the Soudan Lab was able to take over the Far Detector (and other unrelated to MINOS) operations responsibilities.

Management Issues: Minn. State Parks/Soudan Mine

The State Park is the landlord of the Soudan Underground Laboratory facility. The State Park controls access rules, provides hoist services (for a fee), and supervises underground safety. The MINOS construction had to be scheduled around the State Park tour schedules, but tours of the underground laboratory are now also offered to the public.

Personal Commentary: Department of Energy

The Department of Energy, especially the civil service, does not have the same view of the urgency of some experimentation that we as scientists may have. Pretty much one project is as good as another to “administrate.” Completion “sooner” is not necessarily seen as desirable.

The attitude that the “entire” NuMI/MINOS project was seen as a “unit” made planning for possible “general future use” beyond the “particular single project” difficult. We pay for that later (e.g. no drip ceilings in MINOS, limited radiological upgrades).

Personal Commentary: Department of Energy (2)

Pretty much ANY problem is seen as the result of “bad management” at the operating contractor because the DOE procedures “guarantee success.”

When planning projects the DOE encourages “optimal” scheduling – but the costs of all sorts resulting from “stretch-out” are seldom added – they are take from contingency, where they are seldom permitted in estimating.

Personal Commentary: Fermilab Directorate

The Directorate has been known to “over-promise” technical performance. For NuMI/MINOS beam power and protons on target are notorious examples.

The Directorate can “over-promise” funding and staffing resources. Delayed engineering support was a severe problem, but not the only one.

The Directorate has been known to “under-estimate” the bottom line for projects in preliminary budget discussions with DOE BEFORE serious cost estimates are available. Not all wished-for economies materialize.

Personal Commentary: Fermilab Directorate

The Directorate uses “matrix management” for almost all Fermilab plant line projects. This is viewed as suspect by DOE management investigators in the event of any problem given that “bad management” is the usual suspect in just about all DOE findings after any difficulty. (Safety, cost overruns, schedule overruns, etc.) For example, as originally “matrixed” by Fermilab, the organizational chart for oversight of the Healy contract was Byzantine.

Personal Commentary: NuMI/MINOS Project

The unexpected happens with great frequency, despite attempts to consider all possibilities. Not everything is thought through to completion.

Examples:

- **Water treatment was a contentious contractual issue.**
- **The early assumption that “slow spill” was possible from the Main Injector had numerous ramifications when single turn extract was realized to be essential. Extracted beam emittance is one example, detector readout another.**
- **Radiological issues – tritium, decay pipe cooling, Target Hall needs a crane garage, etc.**

Personal Commentary: NuMI/MINOS Project (2)

In spite of all my complaints, a generally well working project was delivered that has met all my reasonable expectations, if not all my most optimistic wishes.

We all ended up doing mostly pretty well.