

# **Memorandum of Understanding**

**Between the  
University of Minnesota  
and  
Fermi National Accelerator Laboratory**

**for  
Implementation of a Cooperative Agreement between  
the U.S. Department of Energy, Office of Science and  
the  
University of Minnesota  
For Neutrino Research and NO<sub>v</sub>A Far Detector Site  
Preparation, Building Construction and Detector  
Operation**

**September 27, 2007 to October 31, 2011**

## **Preamble**

This Memorandum of Understanding (MOU) is made between the Regents of the University of Minnesota (UM) and Fermi National Accelerator Laboratory NOvA Project Management (Fermilab) concerning implementation of Cooperative Agreement No. DE-FC02-07ER41471 (CA) between the U.S. Department of Energy, Office of Science and the Regents of the University of Minnesota. The scope of the Cooperative Agreement includes neutrino research and NOvA Far Detector Laboratory Site Preparation, Building Construction and Detector Operation. The time interval for the initial Cooperative Agreement is September 27, 2007 through October 31, 2011. This MOU begins at the start of the CA and ends either upon termination of the CA or termination of the Fermilab NOvA Project Management function, whichever event occurs first.

The context for this MOU is that UM is a large and highly respected public research university with considerable expertise and experience in performing and managing scientific research, managing large and complex civil construction projects and maintaining and operating extensive holdings of buildings and lands. UM is also a constitutional corporation with legal authority to act as a Responsible Governmental Unit (RGU) and to issue building permits and administer building codes with respect to its property. In addition, UM has operated a physics laboratory at Soudan, Minnesota for more than 25 years in support of several major DOE-funded research projects. For these reasons and because of the location of the NOvA Far Detector at Ash River, Minnesota, near Soudan, the DOE has decided that construction and operation of the NOvA Far Detector Laboratory by UM will facilitate NOvA and provide optimal use of DOE resources allocated to NOvA.

The context for this MOU is also that Fermi National Accelerator Laboratory (Fermilab) is a DOE national laboratory with considerable expertise and experience in performing and managing scientific research, managing large and complex civil construction projects and operating buildings in support of Fermilab experiments. The DOE has decided that construction and operation of the NOvA Far Detector by Fermilab will facilitate the NOvA Project and provide optimal use of DOE Major Item of Equipment (MIE) resources allocated to the NOvA Project. The NOvA Project also includes an upgrade to the accelerator complex at Fermilab to provide beam to the NOvA experiment in Ash River. The DOE has decided that the NOvA Project including the CA portion, the detector construction portion, and an accelerator upgrade portion should be managed by the Fermilab NOvA Project team as a common whole with a common project contingency. In the context of this MOU, common project management recognizes that the Ash River building, the detector and the accelerator are all essential components of the NOvA Project.

This MOU is intended to address those UM activities funded by the CA that are related to the NOvA Far Detector Laboratory site preparation, building construction and detector operation. This MOU explicitly excludes UM activities under the CA with regard to neutrino research, including participation as a member institution in the NOvA Collaboration. This MOU is intended to more effectively implement the CA.

This MOU does not constitute a legal contractual obligation on the part of either of the parties. It reflects an arrangement that is currently satisfactory to the parties involved. Both parties may by written notice to the other terminate this MOU in whole or in part when the party terminating can no longer meet its responsibilities as described in this MOU. Any future changes to this MOU will be implemented in future Addenda signed by all parties.

## **I. Cooperative Principles**

The Fermilab NOvA Project and the Cooperative Agreement at UM are tied together and must succeed together for the DOE NOvA Project to meet its milestones on the Site and Building WBS 2.1 as well as the Operations requirements that will be applicable at later stages in the Project. The general principle of cooperation will involve consensus on the major decisions related to the Site and Building tasks. The intent is to follow UM procurement procedures but to involve the Fermilab NOvA Project team via consensus on the following list of tasks:

1. Choice of an Engineering Project Management firm<sup>1</sup>.
2. Choice of the Engineering lead person from the Engineering Project Management firm<sup>2</sup>.
3. Choice of the Architectural and Engineering firm to complete the Site Design.
4. Choice of the Architectural and Engineering firm to complete the Building Design initiated by Fermilab via the A&E firm Burns & McDonnell.
5. Choice of the contractor for the Site and road work
6. Choice of the contractor for the excavation work
7. Choice of the contractor for the building concrete work
8. Choice of the contractor for the building shell
9. Choice of contractors for the building outfitting
10. Choice of a Far Detector Building Manager during the construction phase of the detector in the Ash River Building.
11. Choice of a Far Detector Laboratory Manager during the operations phase of the CA.

A record of consensus on each decision shall be maintained by Marvin Marshak, the CA Principal Investigator, with email notification to all the parties in the Joint Management Structure discussed in the next section.

Additional cooperative principles are discussed in Sections III through X and cover the following subjects:

1. A Responsibility in Project Execution Matrix.
2. Formal sign-off by both parties on the Final Design of the Site.
3. Formal sign-off by both parties on the Final Design of the Building.
4. Formal narrative and financial reporting to the Fermilab NOvA Project Office. This includes formal change control for contingency use.
5. Environmental, Safety and Health (ES&H) considerations for building and detector construction

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<sup>1</sup> UM intends to retain the services of the Hines Company as the Engineering Project Management firm for NOvA. NOvA Project Management at Fermilab concurs in this choice.

<sup>2</sup> Hines has currently designated Chuck McNabney as its lead person. NOvA Project Management at Fermilab concurs in this choice.

6. Systems Configuration Management considerations for the building.
7. Security considerations for the building during construction and operations of the NOvA detector.
8. A method for resolution of conflicts between the parties.

## **II. Joint Management Structure**

The organization chart for management of the work covered by this MOU is shown in Figure 1.

The Fermilab NOvA Project Office reports to the DOE via Pier Oddone, Laboratory Director, and Hugh Montgomery, the Associate Director for Research. John Cooper is the NOvA Project Manager with Ron Ray as the Deputy Project Manager. Steve Dixon of the Fermilab Engineering Services Section (FESS) is the NOvA Project Level 2 Manager for the Site and Building (Project WBS 2.1) and reports to John Cooper. Merle Olsen of FESS is the Design Coordinator.

The University NOvA Project Office reports to the DOE via Marvin Marshak, the CA Principal Investigator for programmatic matters and via Tim Mulcahy, Vice-President for Research (or his designee), for administrative matters. Earl Peterson will act as Deputy for Marvin Marshak in administrative matters within the University of Minnesota but is not a member of the NOvA Integrated Management Team shown in Figure 1.

The NOvA Integrated Management Team for this MOU consists of personnel from both Fermilab and the University. During the construction phase of the project, Fermilab will be represented by Steve Dixon, the L2 Manager for Site and Buildings. During this phase, the University will be represented its *Management Group*, consisting of Marvin Marshak, CA Principal Investigator and Michael Perkins, Associate Vice-President for Capital Planning and Project Management.

The UM *Management Group* will coordinate the efforts and resources of the University for the NOvA Project. The University will support and manage NOvA facilities and activities with the same care and to the same standard that it manages its own activities.

The NOvA Integrated Management Team (or their designees) will participate in regular Management meetings, generally held weekly. Formal discussion of and decisions affecting topics listed in the Cooperative Principles (Section I of this MOU) will not occur without all parties present.

The operations phase of the CA begins following beneficial occupancy of the Ash River building. During the operations phase, Fermilab and UM will each reconfigure their participants in regular Management Team meetings after consultation with the other party, but the cooperative principles and the University's resource commitments described in this MOU will continue to apply.

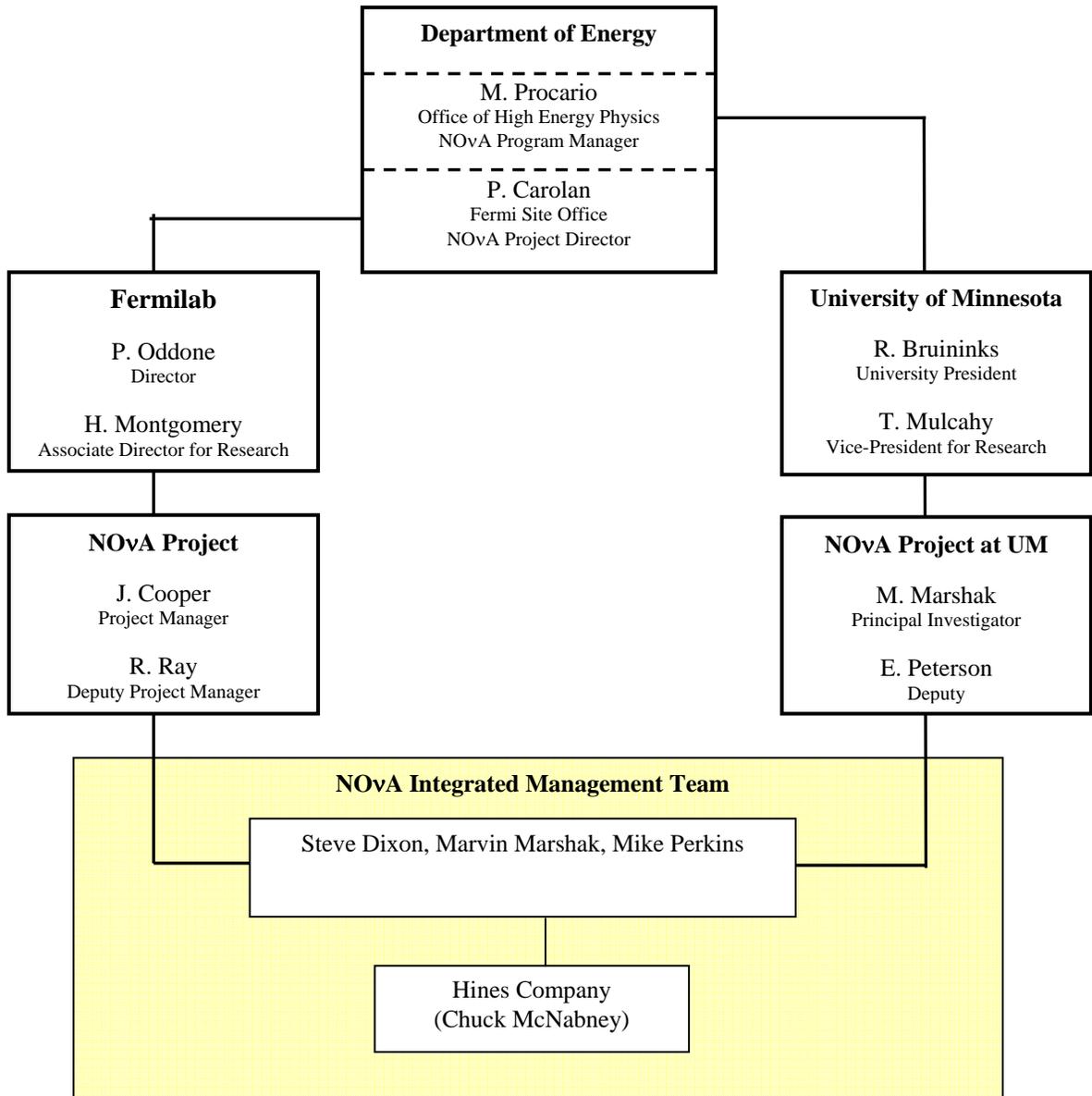


Figure 1. Organization chart.

### **III. Responsibilities / Project Execution Matrix**

UM will use its best efforts to prepare a site and construct a laboratory building for the NOvA Far Detector and operate the Detector on behalf of the NOvA Collaboration. Expected activities include:

- procuring ownership, lease and/or easement rights to access and build on the selected site in St. Louis County, MN;
- acquiring required environmental and building permits for the project;
- retaining the services of a Development Manager to represent the University in the administration of the civil construction;
- retaining the services of a design consultant or a design/build firm to complete the project design and construction bid package, based on work done by Burns & McDonnell working for Fermilab;
- retaining the services of contractors and sub-contractors to complete the construction of the access, building, systems and utilities;
- employing University staff to operate the Detector.

UM will manage these activities using the same methods and personnel as it uses for all of its other civil construction and facility operation activities.

- The NOvA Project at Fermilab will participate in the preparation of the site and in the construction of the laboratory building for the NOvA Far Detector.
- The NOvA Project at Fermilab will provide to UM the work product of all previous and ongoing design activity and all required specifications for the construction activities.

Both parties agree to establish further details of their working relationship via a “Responsibility in Project Execution Matrix” to be developed and agreed to by the NOvA Integrated Management Team by December 31, 2007. This document is expected to be a living document with updates as required to meet any changing circumstances.

### **IV. Formal Sign-off on Final Designs**

The UM CA and the Fermilab NOvA Project will agree to the Final Design of the Ash River Site and to the Final Design of the Ash River Building through formal signed documents. Approvals will include Steve Dixon, Mike Perkins, Marvin Marshak, and John Cooper.

### **V. Narrative and Financial Reporting to the NOvA Project Office**

The Fermilab NOvA Project is responsible for monthly reporting to the DOE of the project status and will include UM information on the CA in these narrative and financial status reports. NOvA Project change control procedures will be exercised by the Fermilab NOvA Project Office using the allocation of contingency information provided by UM. NOvA Change Control procedures require reporting to DOE when the sum of contingency usage passes certain thresholds, so a running total of all contingency usage is required.

UM will provide monthly reports, as well as episodic updates on NOvA construction activities. Reports will include both narrative and quantitative construction and financial data.

Monthly reports will include detailed descriptions of contingency accounts, including allocations of CA contingency and remaining CA contingency. UM will report individually and, as soon as possible, on all allocations of contingency less than \$10,000. Whenever possible, UM will seek consultation with Fermilab NOvA Project Management on contingency allocations in excess of \$10,000, in advance of such allocation.

## **VI. ES&H Responsibilities**

During NOvA construction, UM will require all Contractors to comply with University environmental safety and health (ES&H) policies as implemented by the University's Department of Environmental Health and Safety (DEHS), as well as all applicable Federal and State regulations. UM will also require the Development Manager (Hines) to provide on-site oversight with respect to Contractor ES&H performance. During Detector installation and operation, UM will provide on-site ES&H expertise with CA funds, as well as ES&H oversight by UM professional DEHS staff. UM will authorize its Site Manager to issue an immediate "stop work" order with respect to any and all on-site activities not in compliance with the ES&H policies determined under this agreement for the NOvA Laboratory. UM will consult with Fermilab regarding definition and implementation of ES&H policies and facilitate site visits and inspections by Fermilab personnel at Fermilab's discretion. UM will respond promptly to all Fermilab recommendations with regard to environmental safety and health.

For ES&H purposes, the Fermilab NOvA Project office will treat all MIE detector construction activities at Ash River as if the activities were being done at Fermilab. This means that detector activities will include formal Hazard Analyses and Work Plans. All such ES&H documentation will be furnished to the UM CA Principal Investigator and the Fermilab Project Office recognizes that additional UM policies may require additional effort from the Fermilab Project Office. The Fermilab NOvA Project office will facilitate and support implementation of any "stop work" orders issued by the UM NOvA Building Manager.

Both parties recognize that a critical time for ES&H oversight is just after beneficial occupancy of the building, when "punchlist" activities by the contractor, building activities by UM and detector activities by the Fermilab Project may require simultaneous shared use of the Detector site and building. Before beginning work in this critical transition phase, the parties will examine and discuss the proposed method of work. The role of the UM Building Manager will be crucial for ES&H oversight and this person must be in place before any of the transition work begins. Both UM and Fermilab agree that the UM Building Manager has clear ES&H authority with respect to the Fermilab NOvA Project MIE detector construction team and that UM will provide professional support to the UM Building Manager through its DEHS professional staff.

During all phases of the CA and NOvA Project, both parties agree to prompt reporting of all ES&H incidents (including "near miss" incidents) to both UM and Fermilab via the management structure shown in Figure 1. The UM Building Manager has primary responsibility for this reporting function.

## **VII. Configuration Management Responsibilities**

UM will require the Architect/Engineer, the Development Manager and all Contractors to build and install mechanical, electrical and other site and building systems in accordance with UM policies and standards, in order to enhance long-term performance of these systems and operations of these systems by UM personnel.

## **VIII. Site Security Considerations**

UM will provide site security at an appropriate level consistent with security it provides for University-supported sites of a similar nature through its Central Security Office (CSO) (Robert Janoski, Director). The CSO will provide expertise and consultation on installation of security devices. CSO will also provide 24/7 remote monitoring of security systems and dispatch through the St. Louis County (Minnesota) Sheriff's office of first responders to any security incidents. UM will also provide best efforts to protect DOE property (such as the Far Detector) in accordance with DOE/Fermilab policies.

The Fermilab NOvA Project Office will work with the UM to achieve site security equivalent to a Fermilab Property Protection Area.

## **IX. Resolution of Conflicts**

Conflicts are not expected since both parties are expected to provide their best efforts to achieve a final operating experiment at Ash River using a neutrino beam from Fermilab. The principals at both UM and Fermilab are collaborators in the NOvA Experiment and expect to operate the experiment for collection of neutrino data for scientific goals.

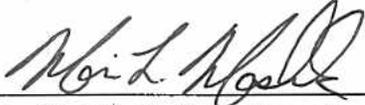
UM will respond promptly to all requests for consultations. The Fermilab NOvA Project will respond promptly to all requests for consultations.

In the event of a conflict, either the Fermilab NOvA Project Manager or the UM Principal Investigator can initiate a conflict resolution process. The first step of such a process will be a meeting co-chaired by the Fermilab Associate Director for Research and the UM Vice-President for Research involving personnel from both Fermilab and UM knowledgeable about the context of the conflict. Both co-Chairs will attempt to facilitate a resolution of the conflict. If this step is not successful, the parties will present their positions to the DOE Program Manager for resolution.

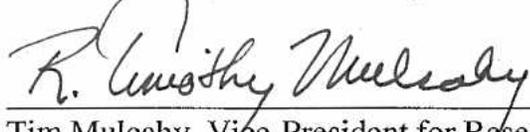
## **X. Financial Considerations**

This MOU includes no financial considerations. UM and Fermilab will each pay the salaries and expenses of their own personnel using funds available under the CA or other sources. Obligations by both parties under this agreement are funded by the Department of Energy or other sources, and obligations by both parties are contingent upon availability of those funds. No liability arises in any year for which the funds are not appropriated or made available for the projects described in this MOU.

**XI. Approvals**

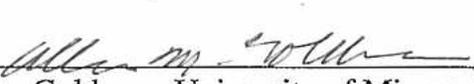


Marvin L. Marshak, University of Minnesota, School of Physics and Astronomy



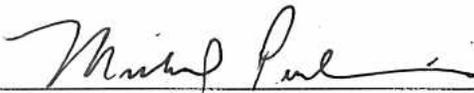
12/18/07

Tim Mulcahy, Vice-President for Research



12/12/2007

Allen Goldman, University of Minnesota, Head, School of Physics and Astronomy



12.14.07

Michael Perkins, University of Minnesota, Associate Vice President,  
Capital Planning and Construction Management



12/13/07

Steven Crouch, Dean, Institute of Technology



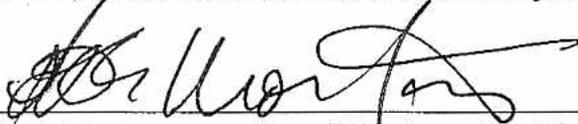
12/7/07

John Cooper, Fermilab, NOVA Project Manager



10 Dec 07

James Strait, Fermilab, Head, Particle Physics Division



Hugh Montgomery, Fermilab, Associate Director for Research