

# *Memorandum of Understanding*

between the

University of Minnesota

and

Fermi National Accelerator Laboratory

for

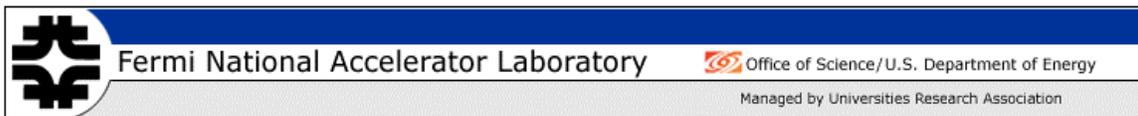
**Operation of the Soudan Laboratory**

as part of the

Fermilab Research Program

April 2004

This Memorandum of Understanding has been prepared to outline the basic principles of understanding among the interested parties in regards to the operation of the Soudan Laboratory for experiments carried out at the Soudan Laboratory. Such experiments are approved and funded through Fermi National Accelerator Laboratory.



Reviewed and Accepted by:

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Soudan Operations Manager  
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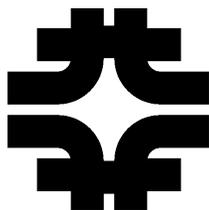
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Associate Vice President  
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## Introduction

The Soudan Underground Laboratory (SUL) is a unique research site operated by the School of Physics and Astronomy of the University of Minnesota. It is located in the Soudan Underground Mine State Park where the State of Minnesota, Department of Natural Resources (DNR) preserves the oldest iron mine in Minnesota. The Soudan Underground Laboratory site is leased by the University of Minnesota from the DNR. A surface facility building is also leased by the University from Breitung Township. In this document the underground facilities and the surface facility are collectively referred to as the Soudan Laboratory.

The first physics experiments at the Soudan Laboratory were carried out using the Soudan1 and Soudan2 detectors. These experiments focused on three major topics: the stability of matter (nucleon decay), the interactions of the cosmic (atmospheric) neutrinos, and the properties of cosmic rays. The cavern for the Soudan2 experiment was constructed between 1984 and 1986. At the Laboratory's inception in 1983, the research activities at the Laboratory were managed by a Principal Investigator on the dominant research contract funding the activities, namely the University of Minnesota's High Energy Physics grant from the Department of Energy's University Programs for the funding of the Soudan2 experiment. At the present time Fermilab is the primary conduit of funds for the Soudan Laboratory.

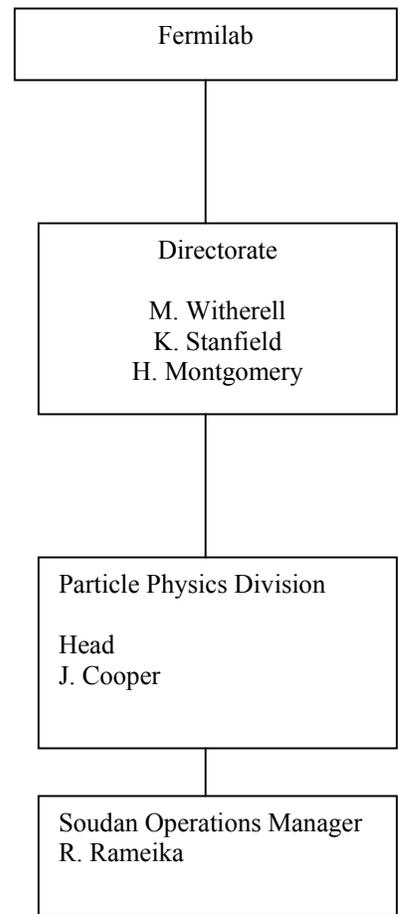
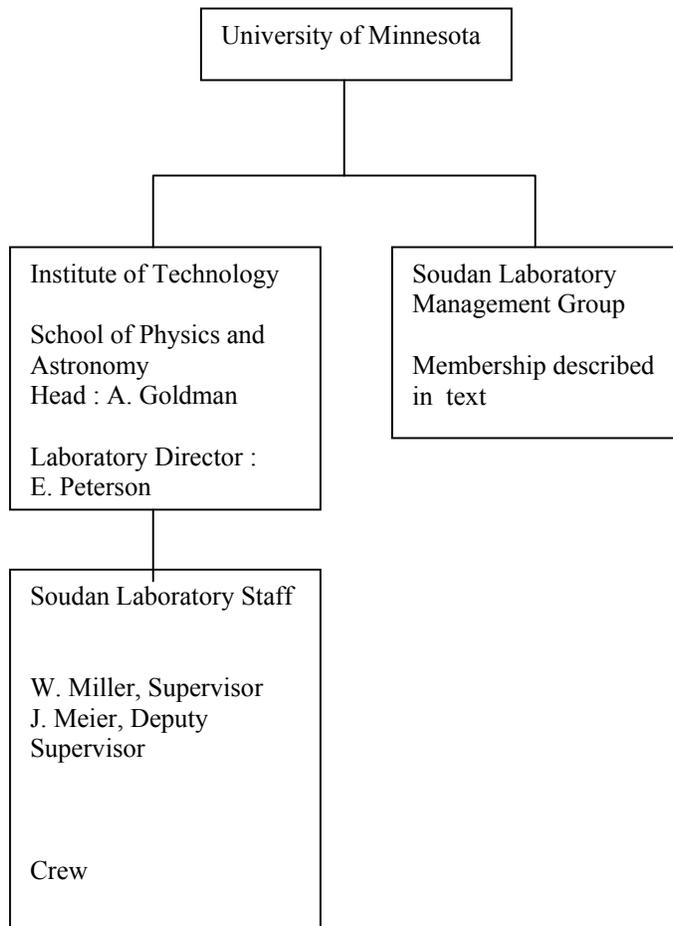
As described below, the expansion of activities at the Laboratory to include experiment construction funded by the U.S. Department of Energy, through the Fermi National Accelerator Laboratory, has dictated that the original management model is no longer adequate or appropriate. In the sections which follow, a plan is laid out for the management and basic operation of the research facilities at the Soudan Laboratory for currently approved and possible future experimental programs. Any expansion of the experimental program or completion of the currently approved experiments will initiate a review by Fermilab management and revision of the plan for continued funding and operation of the Laboratory.

In 1995 Fermi National Accelerator Laboratory (Fermilab) approved and began the process of funding the MINOS Experiment (E-875). MINOS proposed to use a new neutrino beam to be constructed at Fermilab and

directed through the earth's crust to the Soudan Laboratory where the MINOS far detector would be installed in a new cavern to be constructed specifically for the MINOS experiment. In 1998 Fermilab approved funding for the CDMSII experiment which would be installed and operated at the Soudan Laboratory in the existing Soudan2 cavern. Both MINOS and the CDMSII experiments have completed construction and are entering the operations phase. This document represents an understanding between Fermilab and the University of Minnesota concerning the responsibilities of each associated with the use of the Soudan Laboratory for the Maintenance and Operation (M&O) of experiments. Roles, responsibilities and funding arrangements that are specific to the construction and/or operation of the individual experiments are covered in separate MOU's and Statements of Work (SOW) for each program. The plans described herein are not contractual obligations but represent the current understanding of the parties. Commitments for funding are subject to the normal uncertainties of federal funding. This MOU can be amended by mutual agreement as projects proceed.

## Management of the Laboratory

The Soudan Laboratory is operated by the School of Physics and Astronomy at the University of Minnesota. Management oversight is provided by both the University of Minnesota Management Group and the Fermi National Accelerator Laboratory (Fermilab), as described below. If at some future time Fermilab is not the primary source of funding for the SUL operations the Fermilab oversight role will be appropriately reevaluated or terminated. An organization chart is shown in Figure 1.



## **University of Minnesota**

### **General Responsibilities**

The University of Minnesota shall be responsible for coordinating and negotiating with the Minnesota Department of Natural Resources concerning all matters pertaining to the lease of space in the Soudan Underground Mine. These leases define terms and conditions for the occupancy of the premises, and it is the responsibility of the University to recognize and enforce these. Funding for the leased spaces is provided in the SUL operations budget.

The University is also responsible for a lease with the Township of Breitung that covers a 7-year rental (December 2000 through November 2007) of a surface facility used by the Laboratory staff and experimenters. Funding for the M&O of this building is provided in the SUL operations budget.

Any increases in the cost of occupying the underground or surface facilities, beyond annual inflation, as prescribed by the Department of Energy to Fermilab, must be agreed to by Fermilab before the University agrees to the new terms of any of the leases.

Any construction of facilities in the SUL is the responsibility of the University, which is the relevant code enforcement agency. Construction supervision will be done by the Soudan Laboratory staff, when appropriate, or by an outside consultant hired by the University.

The University of Minnesota will be responsible for requiring that all applicable Environment, Safety and Health (ESH) standards are followed during the installation and operation of experiments located in the laboratory. In addition, the University of Minnesota will be responsible for the mitigation of the requirements of the Environmental Assessment Worksheet (EAW), including mitigation of the high sulfur excavated rock to Minnesota Pollution Control Agency standards, control of water quality from excavation and operation, monitoring the resident bat population and obtaining all required permissions for modifications to historic structures from the Minnesota State Historical Preservation Office and the Advisory Council on Historic Preservation.

The operational ESH responsibility for the Soudan Laboratory lies with the University. The Laboratory safety officer is responsible for maintaining a safe working environment, training permanent staff in safety procedures and conducting training sessions for visiting personnel. The safety officer reports to the University Department of Environmental Health and Safety, and coordinates policies and equipment with the DNR. When requested the safety officer will provide ESH documentation and reports to the Soudan Operations Manager from Fermilab.

The University of Minnesota will accept funding from Fermilab for construction and operation of experiments at the Soudan Laboratory. The University will collect overhead charges on this funding at the following rates :

Purchase of Capital Equipment (including Civil Construction)	0%
Payments to DNR	26%
Materials and Services	26%

Approximately one half of these overhead charges are allocated towards recovery of the \$3 million internal loan granted from the University to the Institute of Technology (IT) to initiate construction of the MINOS Cavern. The status of the internal loan will be reported regularly by the Soudan Laboratory Director to the University Soudan Program Management Group.

### **University of Minnesota Management Group**

The University of Minnesota has established the Soudan Program Management Group. Members of the group include :

A representative of the Vice President for Research (head)

The Laboratory Director

An additional faculty member of the School of Physics and Astronomy

The Head of the School of Physics and Astronomy

A representative of the Dean of the Institute of Technology

## The Soudan Laboratory Manager from Fermilab

Meetings of the Management Group will be convened by the representative of the Vice President for Research.

The Management Group will meet regularly to hear presentations by the Laboratory Director on Laboratory operations and budgets. Any new initiatives proposed for the Laboratory must be presented to and ultimately approved by the Management Group. Note that approval by the Management Group does not indicate that the projects are guaranteed funding from non-University sources, and thus work on new initiatives should not proceed prior to final approvals for the funding.

The Management Group will advise the Laboratory Director on budget matters.

### **Soudan Laboratory Director**

The University of Minnesota will appoint a Soudan Laboratory Director who will be the primary point of contact for the University's responsibilities at the Laboratory. The Director will be responsible for the operation of the Soudan Laboratory, subject to the oversight of the Management Group. The Soudan Laboratory Director will be a member of the faculty of the School of Physics and Astronomy. The Laboratory Director will serve at the pleasure of the University of Minnesota Vice President for Research and, under the conditions set forth in this Memorandum of Understanding, the Director of Fermilab.

Responsibilities of the Soudan Laboratory Director include but are not limited to :

Safe and efficient operation of the facility. This includes the authority to stop work by any individual or organization that the Director determines may jeopardize the safety of individuals or equipment within the Laboratory. The Director may delegate this authority to Laboratory staff or users as appropriate.

Operation of the Laboratory within the allocated budgets. This includes notification of the Experiment Managers and/or Soudan Operations Manager from Fermilab of any unanticipated activities or expenses that are outside of approved and funded MOU's or Statements of Work prior to commitment of funds that would cause an overrun in any specific segment of the budget.

Preparation of annual funding request to cover expenses required to maintain the safe and efficient operation of the Laboratory and prepare any additional funding requests for those items that are not specifically authorized and funded in otherwise approved and funded SOW's.

Management of University accounts which are funded by outside agencies, i.e Fermilab, via direct grants or purchase orders and used to reimburse the University for the expenses which are incurred at the Laboratory and paid for by the University. This management includes but is not limited to transfers between accounts required so that all charges are paid from the appropriate source of funding. Reconciliation of accounts should be made no less frequently than semi-annually. Fermilab requires that all reimbursable expenses for the fiscal year be invoiced before the end of the corresponding calendar year.

Appointment or termination of permanent Laboratory staff, consistent with approved and funded budgets and Laboratory activities. The Laboratory director will notify the Operations Manager of any University mandated increases in salary or fringe benefit rates for the Laboratory staff. Non-mandated increases will be allocated only after consultation with and approval of the Project or Operations Manager whose budget is responsible covering for the salary increase. The Operations Manager will be responsible for notifying the Fermilab Directorate of such increases in order that the implication on the overall Laboratory budget may be assessed.

Coordination and negotiation with the Minnesota Department of Natural Resources concerning all matters pertaining to activities at the Laboratory. These matters include but are not necessarily limited to:

- the lease of cavern space

- monetary charges for use of space, electricity, the hoist and DNR labor associated with the presence of the laboratory and related research activities

The Laboratory Director will review the monthly invoices and payments made to the DNR and initiate measures to correct any errors in charges or accounting.

The Laboratory Director will notify the Operations Manager of any DNR mandated increases in the charge for any of the services provided. The Laboratory Director will then work with the Experiment Operations managers to make adjustments to the budget plan to accommodate the increase without allowing a budget overrun.

### **Soudan Laboratory Supervisor**

The Laboratory Director will appoint the Soudan Laboratory Supervisor.

The responsibilities of the Supervisor include, but are not necessarily limited to :

Direct supervision of the Laboratory Staff

Coordination of daily activities at the Laboratory, including arranging experimenters and contractors access to the Laboratory in a safe and efficient manner.

Assignment of appropriate Laboratory Staff to tasks required for basic facility operation as well as specific tasks outlined in Memoranda of Understanding and/or Statements of Work

Authorization of time sheets for Laboratory staff, including review and approval of effort reporting to appropriate project codes

Participation (with Laboratory Director) in staff hiring and termination actions consistent with approved and funded staffing plans as outlined in Memoranda of Understanding and/or Statements of Work

Assisting the Laboratory Director with oversight and management of the General Operations budget which covers materials and services required to maintain the safe and efficient operation of the base facility that are not specifically authorized and funded in approved and otherwise funded SOW's.

Reviewing monthly invoices from the DNR and informing the Laboratory Director of charges in excess of 10% of the budgeted allocation for that month.

Submitting monthly effort reports for hours worked and operating expenditures at the Laboratory to the Laboratory Director and the Soudan Operations Manager from Fermilab.

Submitting copies of the monthly invoices from the DNR to the Soudan Operations Manager if requested.

## **Fermilab**

### **General Responsibilities**

As outlined in this Memorandum of Understanding Fermilab is the organization primarily responsible for funding the research program of approved experiments at the Soudan Laboratory. Specific methods of funding are described in each Memorandum and include but are not necessarily limited to:

Assistance Grants, whereby funds are directly transferred from the granting agency to the University of Minnesota;

Purchase Orders, whereby Fermilab Project Managers or the Operations Manager issue a Purchase Order to the University, which will subsequently invoice Fermilab for payment upon completion of the work.

In both cases the work to be carried out will be specifically itemized in Statements of Work issued at appropriate intervals and at least annually.

Funds transferred from Fermilab via Purchase Order will be subject to the Fermilab G&A rate applicable to the magnitude of the Purchase Order.

Purchase Orders for long-term operation which will surpass \$500K are currently eligible for the G&A pass-through rate of 1.5% on the first \$500K and 0% thereafter.

Fermilab will advise the Soudan Laboratory Director on matters of ES&H when requested by the Soudan Laboratory Director.

Fermilab may request periodic reviews of ES&H records and activities at the Laboratory.

### **Fermilab Director**

The Fermilab Director concurs on the appointment of the Soudan Laboratory Director, under the terms of this Memorandum of Understanding.

The Fermilab Director appoints the Soudan Operations Manager from Fermilab.

### **Soudan Operations Manager from Fermilab**

The Operations Manager is a Fermilab staff member who is appointed by the Fermilab Director and reports to the Head of the Particle Physics Division.

The role of the Operations Manager is to provide coordination and support to the Soudan Laboratory Director and the Experiment Specific Project Managers specifically in regard to the preparation of budgets required for the non-experiment specific facility operation. Responsibilities of the Operations Manager include but are not limited to:

Preparation and maintenance of this Memorandum of Understanding.

Assistance in preparation and maintenance of the Memorandum of Understanding for the operation of the MINOS Experiment.

Review and approval of the Memorandum of Understanding for the CDMSII experiment.

Preparation of an annual Facility Operations budget which will provide the funds required to ensure safe and efficient operation of the facility that are not otherwise provided by the budgets of the projects or experiments that are being constructed or operated in the Laboratory.

Preparation of Statements of Work to cover the Facility operation budget.

Preparation and tracking of the of the requisitions which provide the Facility Operation funding.

Regular advice to the Head of the Particle Physics Division of the status of activities and budgets at the Soudan Laboratory.

Attendance at the periodic meetings of the University of Minnesota Management Group

# Laboratory Operations

Operation of the Laboratory is defined as the labor, materials and services required to provide the infrastructure and maintenance thereof, that is not specifically and uniquely assigned to the requirements of one of the experiments using the facility. In this Memorandum of Understanding these needs are addressed as they apply to the Fermilab approved experimental programs being operated and installed at the Laboratory.

## Facility Operations

These basic services include, but are not necessarily limited to:

- Providing the leased space that comprises the facility
- Access to the laboratory for experimenters and contractors (i.e. cage riding supervision)
- Basic communications and computer services including telephone, E-mail, FAX, WEB serving and printing
- Services for drinking and washing water, lunch rooms, waste services and janitorial functions
- Experimenter access to basic laboratory tools, machine shop services and electronics repair assistance
- Maintenance of laboratory facilities, basic lighting and electrical service, air-handling equipment, cranes, forklifts and pallet jacks.
- Safety services, including i.e. authorization for operation of equipment, MDS's (Material Data Safety sheets) and supervision of construction/repair activities
- Coordination and scheduling of laboratory access and services.

This base operation of the Laboratory is provided – in addition to experiment-related services – during experiment mobilization, operation and decommissioning phases.

## **Laboratory Staff**

The above services are provided by the staff of the Soudan Laboratory, who are employees of the University of Minnesota. The salaries, wages and fringe benefits (SWF) of the staff are paid by the University which is or will be reimbursed for these salaries by Purchase Order and Statement of Work from Fermilab.

Specific staffing and on-call arrangements are developed on an annual basis and dependent on the experiments needs and overall level of funding available.

## **Laboratory Infrastructure**

It is recognized by all parties that maintenance, repairs and improvements to the infrastructure at the Laboratory may become necessary or desirable to maintain the safe and efficient operation of the experimental program. Funding to accommodate these needs will be negotiated annually.

## **Laboratory Expansion**

Proposals of plans for expansion of the current experimental program must be presented for consideration and review by the Fermilab Directorate and the University of Minnesota Management Group. Proposals which would anticipate receiving funding from Fermilab will be expected to follow the normal Fermilab procedure for experiment approvals. Until such a proposal would be accepted for consideration by the Fermilab Director and additional funding allocated, Fermilab funding for the current programs may not be used to further the development of new proposals.

It is understood that experiment proposals having no relationship to Fermilab may request the use of Laboratory facilities from time to time. The University of Minnesota Management Group must consult with Fermilab to insure that the installation and operation of these other experiments/programs do not interfere with or use funds intended for the operation of Fermilab-supported experiments.

## **Department of Natural Resources (DNR)**

The Department of Natural Resources provides services to the University of Minnesota for the operation of the Soudan Underground Laboratory. Charges are made on the basis of full cost recovery. The DNR attempts to allocate the charges to the appropriate aspect of the Laboratory Operations. The DNR directly invoices the University on a monthly basis. The University pays the invoice. Subsequently the Laboratory Director is notified that payment has been made.

## **Experiment Specific Operations**

Each experiment which is approved and funded by Fermilab will negotiate a Memorandum of Understanding (MOU) with Fermilab. The MOU will clearly outline the scope of support that will be provided by Fermilab for the operation of that experiment. The source of operating funds will be through the Fermilab Particle Physics Division. The amount of funding to be allocated annually will be negotiated between the Head of the Particle Physics Division and the Operations Manager in consultation with the experiment spokesperson(s) and the Soudan Laboratory Director.

## **Change Control**

Level 3 elements of the WBS structure used for budget preparation will be assigned an individual line in the Purchase Order and accompanying Statement of Work (SOW). Expenses which will result in the L3 category exceeding the amount authorized in the current SOW must have prior authorization by the Soudan Operations Manager from Fermilab. If the expenditure is authorized, the Soudan Operations Manager will furnish the University of Minnesota with an amended Purchase Order and SOW to cover the expenses.

## **Management Reserve for Emergencies**

While the annual budget plan will cover anticipated expenses, it is realized that unanticipated expenditures might be necessary from time to time. These expenditures would cover repairs or replacements to major Laboratory infrastructure elements that are required for safe and efficient operation of the Laboratory. The Laboratory Director will annually review any aspects of

the Laboratory where such situations may be arising. Funds for such situations must be requested by the Soudan Laboratory Director and approved by both the Soudan Operations Manager from Fermilab and the Head of the Particle Physics Division. The Head of the Particle Physics Division may choose to seek approval from the Associate Director for Research.

## **Soudan 2 Operations**

The Soudan 2 experiment received its final experiment-specific funding from the Department of Energy (via the University of Minnesota HEP contract) in 1999. The experiment continued to operate until July of 2001 with the minimal expenditures for supplies supported by the NuMI/MINOS project. The operation of the detector ceased when the maintenance efforts that were required were no longer available due to the beginning of MINOS installation and the increased utilization of the laboratory staff for that purpose. The Soudan 2 collaboration formally tendered the experiment to the MINOS collaboration in 1999. Any future operation of the detector, which is currently in a “mothballed” state, must be at the initiative of the MINOS collaboration and approved by Fermilab.

## **Decommissioning**

The lease with the Minnesota Department of Natural Resources requires that the Soudan 2, CDMS II and MINOS detectors be removed in an expedient manner at the termination of the lease agreement(s). Under the present leases, the removal of the Soudan 2 and CDMS II detectors (only) is required. In the MINOS cavern the removal of the detector and additionally all equipment and infrastructure in the MINOS laboratory is specified, with the exception of any elements that are agreed to, in writing, that may remain. The decommissioning costs for MINOS and CDMS II were foreseen in the project planning phases. The MINOS decommissioning is noted in the NuMI Project Execution Plan. However, the agreement for removal of the Soudan 2 detector pre-dates Fermilab’s participation in activities at the Laboratory. The source of funds required for the removal has not yet been identified by the University of Minnesota. It is acknowledged by the parties to this MOU that the removal is stipulated in the lease agreements. A funding plan for the detector removal will be negotiated by the relevant parties when there is a programmatic need for the detector to be removed or

in the fiscal year prior to the year of the lease termination when the scientific operation of the Laboratory ceases.

## REFERENCES

[1] MOU between the University of Minnesota and Fermi National Accelerator Laboratory for the. Construction of an Experimental Area for and Installation of the MINOS Detector at The Soudan Underground Laboratory, November 1998

[2] MOU between the University of Minnesota and Fermi National Accelerator Laboratory for the. Construction of an Experimental Area for and Installation of the MINOS Detector at The Soudan Underground Laboratory, October 2000

[3] Interim Memorandum of Understanding between the University of Minnesota and Fermi National Accelerator Laboratory for Installation and and Operation of the Cryogenic Dark Matter Search Experiment in the Soudan Underground Laboratory, September 2000.