Security Vulnerability Assessment

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Security Vulnerability Assessment

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- Only required for nuclear facilities, but we learned this after writing the document. Thought it was useful, so we kept it.
- NOνA has some unique issues because most of our activity takes place at a remote, isolated facility.
- Work at Fermilab, Universities covered by existing plans.
- Computer security covered by Fermilab requirements and will evolve between now and 2012 as the technology changes

Project Phases

Five phases to the project which all have different issues and concerns:

1. Conventional road and building construction at Ash River
2. Far Detector construction at Ash River
3. Near Detector construction/ANU activities at Fermilab
4. Detector operations
5. Decommissioning

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The probability of an attack is considered quite small, but some common sense security precautions will be implemented. For example:

- Require visitors and deliveries to enter through one specific point.
- Require background checks of all prospective employees.
- Enclose the property with a fence and limited access gates.
- Display of employee identification cards while on-site.
- Implement a key card system to obtain access to the building.

Possible Threats

Most likely threats:

- Theft of construction materials/equipment
  - Construction fence with controlled access
- Serious accidents or health issues that require immediate evacuation to a hospital 30 miles away.
  - Helicopter can land in parking lot.
  - Satellite phone
- Transportation
  - University of Minnesota maintains access road.
  - Most important during the Winter.

Security Vulnerability Assessment Report for the NOνA Project

Fermilab
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1.0 Executive Summary

NOνA is a non-nuclear facility and no part of the project is sensitive or classified. The potential security threats to NOνA are conventional theft and vandalism. Security of computing networks will also be required. The one unique feature of NOνA is the Far Detector that will be located in a remote section of Northern Minnesota, outside of the typical security envelope provided by a National Laboratory. Providing adequate security at a remote location adds to the project cost and has been accounted for in the NOνA cost estimate.

2.0 Introduction

The NOνA security plan is an integrated system of activities, systems, programs and policies for the protection of personnel, facilities, property and equipment. In order to support overall project planning and design, applicable security requirements must be identified at the earliest possible project phase. The NOνA project does not involve special nuclear materials, classified or sensitive information. Security issues were identified early in the NOνA Project and discussed in the Conceptual Design Report[1] (CDR) along with procedures for mitigating any concerns. This document formalizes those procedures and updates any issues that have changed as the project has evolved.

The NOνA Project is somewhat unique in that the most valuable asset, the Far Detector, does not reside on the Fermilab site. The Far Detector will be located in Northern Minnesota. The Far Detector building and the land on which it is constructed will be owned by the recipient of a Cooperative Agreement grant. The detector that is constructed inside the Far Detector building will belong to Fermilab and will be constructed with MIE funds. Because of this unique project structure a significant effort will be required to facilitate effective communication between all parties.

There are five phases to the NOνA project that require somewhat different security strategies. Some of the phases overlap. The first two years of the project are dominated by construction of the Far Detector Building in Northern Minnesota. This is a large but relatively conventional construction project. Once the Far Detector Building construction is complete, construction of the NOνA Far Detector commences inside the building. In parallel with this activity, the NOνA near detector is being constructed on the Fermilab site and the accelerator and NuMI beamline at Fermilab are being upgraded. Once the detectors have been constructed and the beam upgrades have been completed we enter a prolonged operations phase. Once operations are complete, there will be a decommissioning phase where the Near and Far Detectors are dismantled.

3.0 Target Identification and Description

NOνA is not a nuclear facility and no part of the project is sensitive or classified. However, because of NOνA's association with the U.S. Government it could be considered a potential target. The probability of an attack is considered quite small, but some common sense security precautions will be implemented. The most likely security concern for NOνA involves theft or vandalism. This is particularly true during the building construction phase.

There are a number of locations where activities related to NOνA R&D, the NOνA Project and NOνA operations would take place. Appropriate security is required at every location. This includes protection against unauthorized access, theft, destruction of DOE assets, and other adverse impacts on the science, or on the ES&H for employees and the public via host institutions.

3.1 R&D at Collaborating Institutions

A significant fraction of the R&D and detector construction work for NOνA will be done at institutions other than Fermilab. Some of this work will be performed at Argonne National Laboratory, a multi-purpose National Laboratory with security requirements in excess of those in place at Fermilab. This work poses no special concerns and there are no related costs to the NOνA Project.

There are many University groups engaged in R&D for NOνA at their home institutions. Safety and security for these activities is primarily the responsibility of each University. Since the total cost of materials and equipment provided by the NOνA Project for these R&D activities is small and only small amounts of materials are involved, no additional attention is required.

3.2 Module Factories

NOνA is planning on two module factories where 53-foot long extrusions are threaded with wavelength shifting fiber, sealed at both ends and tested. The location of these module factories has yet to be decided but they could be setup at any of the NOνA collaborating institutions or in rented space near a NOνA Institution.

3.3 Near Detector and Beam Upgrades

The NOνA Near Detector and the NuMI beamline both reside on the Fermilab site in a low-occupancy location that is difficult to access. Security issues for the Near Detector and the beam all fall under the umbrella of the normal security procedures at Fermilab.

3.4 Far Detector

The NOνA project is most vulnerable at the Far Detector site since that site does not fall within a highly protected area like a national laboratory or a university campus. The fact that the Far Detector building is mostly underground and protected by a thick overburden of rock will make most of the facility relatively secure. However, a loading dock will be located at one end of the building and its exposed building walls will be more vulnerable. During the construction phase of the project there will be 30-40 people on site during normal working hours. In addition, there will be several truck deliveries per day. Once construction has been completed and NOνA is in the operations phase a small crew of 3-5 people will be present during normal working hours.

3.4 Transportation

A large fraction of the project's raw materials will be transported in dedicated transport loops. This includes ~ 15 kilotons of scintillator components being transported from vendors to a blending location and then transported in ~ 700 truckloads to the Far Detector site. Another ~ 800 truckloads of PVC extrusions move from the extruder vendors to the module factories and then ~ 600 truckloads of assembled modules move from the module factories to the Far Detector site. This large number of deliveries will need appropriate security measures against theft and against contamination of the materials. Selection of quality transportation vendor(s) with solid security plans is a key element of the NOνA security plan.

A related vulnerability is the road conditions for the last several miles from the St. Louis County maintained road to the Far Detector site. The project will have to maintain this road properly to mitigate accidents. This is particularly true during the winter when the roads are icy or covered with snow.

3.5 Computer Security

Data collected from the Far Detector will be stored locally for a short time before being transferred via the Internet to Fermilab for permanent storage. In addition, because of the remote location, Internet access to the DAQ is necessary to monitor the performance of the detector.

Because of the high value of the stored data and the need to be connected to the Internet, the NOνA DAQ system will have to be an environment that is secure against unauthorized access and malicious acts.

4.0 Threat Definition

4.1 R&D at Collaborating Institutions

There are potential security threats at the various NOνA collaborating institutions mentioned in Section 3.1. These threats involve primarily theft and vandalism. The probability of these threats is considered small because of the existing adequate security already in place at these institutions and the relatively small monetary value of the equipment and materials.

4.2 Module Factories

The primary security threats at the NOνA module factories are theft and vandalism. The threat potential depends on where the module factories are located. If the module factories are located at a University or National Laboratory then the probability of occurrence of these threats is considered small because of the existing adequate security already in place. If a module factory is located in rented space near a University, there is an increased threat probability because of the absence of the typical security envelope provided by a University or National Laboratory.

Regardless of the location of the module factories, fire poses a potentially serious threat because of the abundance of PVC that will be present. PVC is not particularly flammable but when involved in a fire it releases toxic gas that can be lethal to personnel and can cause significant property damage.

4.3 Near Detector and Beam Upgrades

Fire poses the most significant security threat for the Near Detector. This has already been identified as a concern by the Fermilab management and will be mitigated according to the existing ES&H requirements in place at Fermilab. There are no noteworthy security threats associated with the accelerator and beamline upgrades.

4.4 Far Detector

The most likely threat to the NOνA Project is the theft of popular tools and building materials during the construction of the Far Detector Building. There is a moderate probability of theft and a small probability of vandalism.

Construction of the Far Detector takes place inside the Far Detector building. In addition, the materials used for constructing the detector are specific to their application and are of less interest to potential adversaries than the tools and materials used during the

construction of the Far Detector Building. The threat of theft and vandalism during this phase of the project is small.

When all construction activities have been completed the operations phase of NOνA commences. The operations crew will be much smaller than the construction crews needed to construct the building and detector and the building will likely be unoccupied for longer periods. This may prove to be a more inviting environment to potential adversaries intent on committing vandalism. We still consider the overall threat of theft and vandalism to be small during the operations phase.

It is possible that NOνA could be the target of an attack because of its association with the Department of Energy and the Federal Government. The most likely adversaries would be domestic anti-government activists. MINOS has enjoyed a very good relationship with the surrounding community in Northern Minnesota and has had no incidents, so the probability of such an attack against NOνA is considered to be very small.

4.4.1 Computer Security

Unauthorized access and malicious attacks against computer systems is an unfortunate fact of life for every organization. Fermilab's computing system is routinely attacked. NOνA can expect a similarly hostile environment. The probability of attempted unauthorized accesses and malicious attacks against the NOνA computing facilities is moderate.

5.0 Security Elements

5.1 R&D at collaborating Institutions

The existing security infrastructure at NOνA's collaborating Institutions is sufficient to meet the anticipated threat level. No additional effort is required.

5.2 Module Factories

The value of the assets in process and storage at any given time in the module factories is non-negligible but small compared to the overall cost of the project. The NOνA Project will have to ensure that adequate security is in place to protect these assets. Access restrictions, appropriate ES&H procedures and sufficient fire protection will be required at the module factories. Explicit requirements will be spelled out in the Statement of Work issued to the institutions that take responsibility for the module factories. The NOνA Project Office will be responsible for reviewing the security plan and for verifying that the security plan has been properly implemented at each module factory. The NOνA Project incurs the cost of factory setup and outfitting, so the cost of any security measures

beyond that which is normally provided by the host institution will borne by the Project. The specific costs will not be known until the factory locations are selected.

5.3 Near Detector and Beam Upgrades

The existing security infrastructure at Fermilab is sufficient to meet the anticipated threat level. No additional effort is required

5.4 Far detector Site

The Cooperative Agreement Recipient (CAR) shall have the primary responsibility for implementation of security at the Far Detector site. The required security measures will be spelled out in detail in the Cooperative Agreement. The following security measures are under consideration for the Far Detector site to address the potential threats listed in Section 4.4.

1) Develop a written job site security policy.

2) Designate one person to be responsible for security issues.

3) Set up a key control policy.

4) Reduce the number of unlocked entrances to the minimum required for efficient operation and to be in compliance with applicable building codes and access laws.

5) Require visitors and deliveries to enter through one specific point.

6) Limit the number of unlocked or unattended entries/exits that can be used by employees. Discourage employees from propping doors open while unattended.

7) Determine if some exits can be converted to emergency exits in which an alarm sounds if opened.

8) Require employees, visitors and vendors to park in designated areas and control access to onsite parking. Keep vehicles a minimum of 30 feet from the building through the use of a berm or other physical barriers.

9) Require background checks of all prospective employees.

10) Enclose the property with a fence and limited access gates.

11) Display of employee identification cards while on-site.

12) Require visitors and vendors to be escorted by an employee while in the facility.

13) Implement a key card system to obtain access to the building.

14) Consider the use of security cameras at all entrance points.

15) Utilize good exterior lighting consistent with the surroundings of nearby Voyager National Park.

16) Take steps to prevent any unauthorized access to air intakes, exhausts and power sources.

Detailed costing for these security measures is in progress.

5.5 Health and Safety at the Far Detector Site

The nearest city to the Far Detector site is International Falls, MN, approximately 30 miles away. Because of the remote location it will be important to have a sufficient number of supervisors and employees with appropriate first aid training. The National Safety Council is one of the leading authorities on safety/injury training and education and they offer a number of relevant first-aide courses including a course on Wilderness / Remote Location First Aid (http://www.emtinc.net/nsc.htm).

Communication is also an issue in a remote location, particularly one with occasionally severe weather like Northern Minnesota. The project will invest in a satellite phone to insure communication in the event of service disruptions to traditional landlines. The parking lot will also be large enough to land an emergency helicopter.

5.2 Transportation

The road conditions for the last several miles from the St. Louis County maintained road to the Far Detector site pose vulnerability for the large number of material shipments to the Far detector Building. NOνA will have to maintain this road properly to mitigate accidents. This is particularly true during the winter when the roads are icy or covered with snow.

5.3 Computer Security

Appropriate security will be built into the DAQ system as a requirement. As this is currently a rapidly changing and timely field with the onset of grid computing, we will wait as long as possible before committing to a particular protocol. We will follow the Fermilab Computing Division's lead on this issue and will be included within Fermilab's online security envelope.

References

[1] "NOνA Conceptual Design Report," NOνA Collaboration, March 31, 2006.