Fermilab 2019 Security Design Based Threat (DBT) Plan

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Executive Summary

The 2018 risk and hazard assessment identified five recommendations to achieve DBT compliance and increase effectiveness of Fermilab protection operations. Overall, the risk to DOE assets at Fermilab continues to be low, with the exception of the potential for intelligence gathering activities, which were deemed to be MODERATE. This assessment informs all areas of security at the Fermi National Accelerator Laboratory (FNAL). This plan provides a roadmap detailing DBT compliance (see Appendix B) and directly supports and compliments the Fermilab Site Security Plan (SSP).

Fermilab is a Protection Level (PL) 7 site and as such, the security program is required to meet a compliance standard of performance. Fermilab has accounted for the Tier II chemicals that exist on site (See attachment 2) and is accountable for the Department of Energy's Government Property and its Facilities on the Fermilab site. These areas have all been identified in GIS and are a part of the Fermilab Asset Risk Evaluation (FARE) process. Fermilab has significant quantities of radioactively activated materials, however it does not have or is in use of any Classified or Controlled Unclassified Information (CUI) materials, biological agents, or Category III or IV SNM (Special Nuclear Material). See Attachment 1 in this document which outlines a DBT analysis of a malevolent act involving dispersal of radioactive nuclear material.

The Fermilab Physical Security Systems (PSS) Program continues to strive for a level of physical protection that is balanced, cost effective, and reasonable. The Laboratory has made efforts to identify S&S activities required by DOE Directives, develop an S&S Budget to address those functions, and provide funds for performance of other functions such as life safety and fire protection not directly related to security.

Current safeguard and security methods used in the United States are in a unique paradigm shift and is forced to consider additional security methods to be successful in this current climate. The Fermilab Security Program is moving into a new era of safety and security which prioritizes the use of technology and best practices to adequately protect the critical infrastructure on Fermilab. Fermilab analyzed the physical protection strategies outlined in the DOE Order, Design Basis Threat (DBT). In order to accomplish this, Fermilab implemented a proactive multi-step process by combining the use of Geographic Information Systems (GIS) and Fermilab Asset Risk Evaluation (FARE) assessments to visually record the PL 7 locations, and specifically, Property Protection Areas (PPA). Fermilab's chemical inventory consists only in non-reportable quantities therefore Fermilab is exclusively a PL 7 DOE site. This GIS map (Exhibit 5) will also illustrate the ShotSpotter expansion program, Axis technology expansion program, and Axis Camera current and future locations. These camera locations were determined by either incidents (property damage/theft) that drove a need to secure an area more effectively or by the assessments of our critical areas. With the changing environment and the need to secure our unfenced borders at Fermilab, the Security Department is analyzing new technology that would allow for AXIS Perimeter Defender detection technology using our current AXIS Camera system. This would allow for thermal and radar technology to alert the Security Department when an abnormal situation is taking place. AXIS Perimeter Defender automatically applies a metadata overlay in the form of bounding boxes

and trajectories that show the detection and tracking of moving people and vehicles. This allows for Fermilab to secure its borders without the use of a tractional perimeter fencing; preserving the open site that is central to maintaining our excellent relationship with the nearby community.

With the implementation of the FARE assessment coupled with the data of the Hazard Analysis, Fermilab will institute a five-year cycle to complete all building assessments at Fermilab in accordance with DOE Order 470.3C. The FARE assessment is a weighted average Risk Assessment that focuses on threats associated with the current environment Fermilab faces paralleled with a focus on critical infrastructure. This will allow for data driven decision making on the building security, pre-construction security planning, the locations of experiments, and the safeguarding of information that is contained at some locations. Analyzing enhanced data allows for an educated discussion on whether or not new security measures need to be provided or the location of experiments need to be adjusted in order to comply with the new Foreign Visits & Assignments or DOE International Science and Technology Engagement Policy directive that is currently being set in place for all Science Laboratory's under DOE. This policy will drive further considerations for badging, access, and internal access control at Fermilab. This policy will lead to the update of DOE Order 142.3A, Unclassified Foreign Visits and Assignments Program.

The Fermilab Security Program will be implementing additional changes to the organization and structure of its current processes. Keeping in mind the upcoming DOE Safeguard & Security (S&S) Audit in the Fall of 2019, the Fermilab Security Program will consult the Quality Assurance Section at Fermilab to analyze the processes for streamlining this Audit into Fermilab's DocDB (document database). This will allow for a structured approach for Security to not only comply with DOE Order 470.4B, (Safeguards and Security Program Planning and Management), but more efficiently meet the requirements in order to train and exercise to this requirement internally.

Introduction

Background

In 2013, SC and HSS conducted a physical security system RA at Fermilab using DOE S&S directives and the SC DBT as the basis for the assessment. The intent of the review was to determine the Departmental assets meeting the criteria defined for Security Protection Level SPL4 assets within the department's Graded Security Protection Policy requiring protection at Fermilab, determine threats to those assets, and determine the level of protection implemented for the assets at the site. This current Risk Assessment (2018) builds on the 2013 RA and is updated to reflect current DOE requirements (i.e. DOE O 470.3C Design Basis Threat). In addition, *Appendix A "2013 RA Recommendations"* summarizes the recommendations and corrective actions from the 2013 assessment.

The basis for establishing protection for Fermilab's concerns can be found in national standards and DOE directives. DOE ranks protection requirements based on the highest risk activities and materials with PL1 being the highest. These levels also communicate graded protection planning standards for security ranging from a performance standard to include rigorous force-on-force testing for sites with high risk special nuclear materials (SNM) and complete weapon assemblies to a compliance standard for the lowest risk assets. Fermilab is a PL7 site and as such, the security program is required to meet a compliance standard of performance. Fermilab has accounted for the Tier II (See attachment 2) chemicals that exist on site and is accountable for the Department of Energy's Government Property and its Facilities on the Fermilab site. These areas have all been identified in GIS and are a part of the Fermilab Asset Risk Evaluation (FARE) process. Fermilab does not have or is in use of any Classified or Controlled Unclassified Information (CUI) materials, biological agents, or Category III or IV SNM (Special Nuclear Material).

Fermilab has a small amount of other accountable nuclear material and Radiological Materials. These areas have all been identified in GIS and are a part of the Fermilab Asset Risk Evaluation (FARE) process.

As stated in Attachment 1, page 8 in this document, "Fermilab has no Special Nuclear Material." "The majority of radioactive materials at Fermilab are volume-activated solid metal materials that are not capable of dispersal. The dispersal and direct acute radiation exposure dose criteria in DOE O 470.3C are not applicable to volume-activated radioactive materials. (Attachment 1, page 7)."

The DOE Orders provide a framework for S&S program planning and risk management that requires a documented risk assessment prior to the establishment of PPA's not otherwise required by DOE directives. The RA also supports decisions to retain or eliminate physical security measures based on those measures' contribution either to risk mitigation or to other tangible mission support such as safety compliance or employee convenience. If the decision is justified

by security consideration, the element is funded through FS-10 direct. Otherwise, management may choose to retain or eliminate the element or activity and fund it through overhead.

It is unrealistic to envision unlimited resources to eliminate all risk. When programs cannot fully mitigate risk, the risk which remains after reasonable mitigation has been applied is the residual risk which must be clearly described and then accepted. So, the compliance standard of mitigation for PL7 sites is important. National and DOE standards represent federal acceptance of residual risk once compliance standards are met. The results of this analysis will be recommendations to: comply with directives (without which direct risk is not mitigated and residual risk cannot be accepted) and add, enhance or remove security elements.

Objectives of the Assessment

The specific objectives of the assessment were to:

- Compare the current physical protection as implemented at Fermilab to the requirements in DOE Directives;
- Determine the relative risk to the assets to aid in determining reasonable levels of protection;
- Identify opportunities to improve the effectiveness and efficiency of the S&S Program;
- Provide Fermilab, DOE Fermi Site Office (FSO) and SC Senior Management with information to make risk-informed decisions based on the intent of the DOE Directives.

Expected Benefits

The expected benefits of this assessment are to provide:

- A risk-based foundation for implementation of DOE directives, and development of the Site Security Plan (SSP);
- Consistent application of requirements.
- Foundation for requesting additional funding for security mitigation needs.

Scope

The scope of the assessment included protection of assets defined by DOE as security interests requiring physical protection from theft, diversion, terrorist attack, industrial sabotage, chemical, biological, or radiological (CBR) sabotage, espionage, unauthorized access, compromise, and other acts that may have an adverse impact on Fermilab mission, the environment, or pose significant danger to the health and safety of DOE Federal and contractor employees or the public.

The Fermilab facilities assessed included all the Property Protection Areas and Areas of Security Interest located on the Fermilab site. In addition, risk ratings for all other facilities were considered and recommendations identified for updated risk evaluations due to facility mission changes.

Team Members

- Chuck Morrison, Fermilab Environment, Safety, and Health (ES&H) Section, Security Supervisor
- Rick Oropez, Fermilab ES&H Section, Security Supervisor

Risk-based Physical Security Assessment Process

Overview

The risk-based security assessments of SC sites are based on established qualitative risk-based security assessment principles. Utilizing the *Security Risk Assessment Framework Figure 1*, as a model, this risk-based process is intended to provide information regarding the threats, consequences of loss or damage, and vulnerability of DOE PL7 and PL8 assets to specific malevolent acts and serves as a defensible method to help determine the baseline protection requirements as defined in the DBT and DOE directives.

A qualitative process that considers the important factors necessary to make risk-informed decisions such as: the consequence of loss of specific assets at a site, the potential threats to those assets; and vulnerabilities in existing or proposed Physical Protection System (PPS). This information is used to aid in decision-making regarding the adequacy of a PPS at the site.

The Fermilab Security Department Procedure, “Fermilab Asset Risk Evaluation”, defines the process for assessing and reassessing security measures for certain assets at Fermilab according to the DOE Safeguards and Security requirements (DOE 470.4B) and the Design Basis Threat order (DOE O 470.3C). The procedure establishes an evaluation of assets to identify current security countermeasures and potential security mitigation needs.

The potential sources of threats against Fermilab are considered to be intelligence collectors, criminals, mentally ill, disgruntled employees, insider threats, violent activists, and terrorists. Impacts include the loss of an assets’ function due to a threat.

Risk factors considered during an Asset Risk Evaluation include: criticality to the High Energy Physics (HEP) program; accessibility to pedestrian and vehicular traffic; cost and time to recover from acts of sabotage or theft; attractiveness of the asset; presence of portable equipment or data that, if stolen, would disrupt the HEP mission.

Mitigation factors credited during an Asset Risk Evaluation include: ability to recover from incidents of sabotage or theft; presence of Security protective measures such as locks, alarms, video surveillance, protective force patrols, occupancy, fences, lighting, card access control, or administrative procedures.

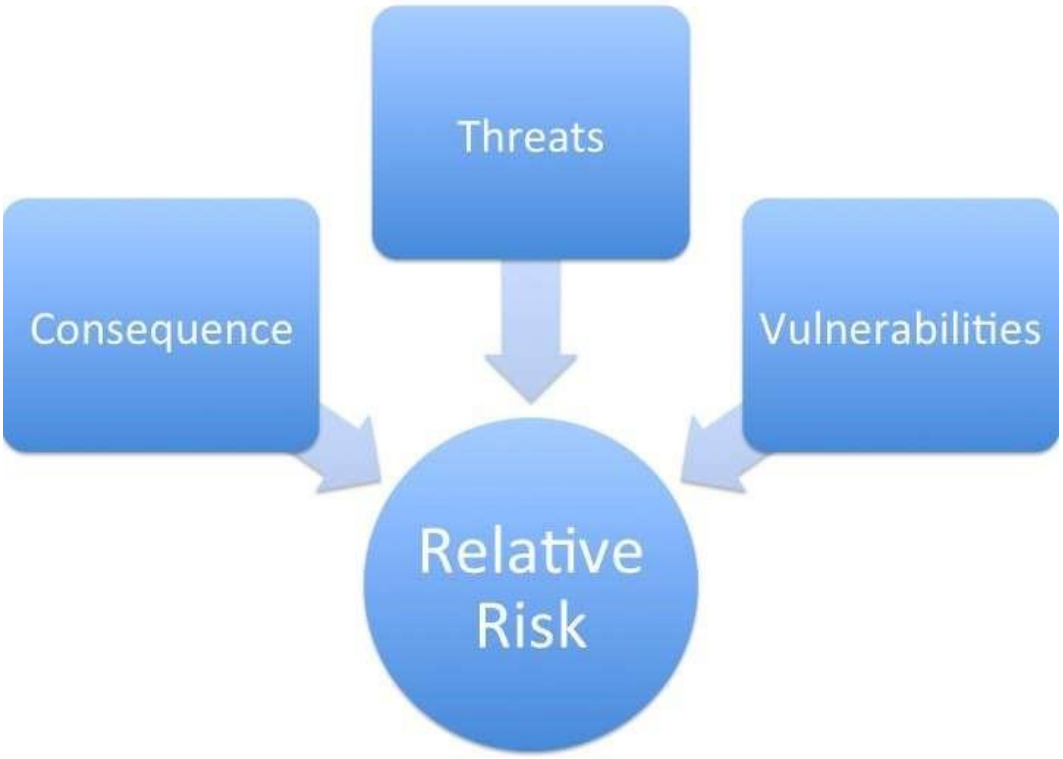


Figure 1 Security Risk Assessment Framework

Asset Risk Evaluation Process

The five major steps of the asset risk evaluation process include:

1. Identify asset to be evaluated.
2. Complete Asset Risk Evaluation.
    a. Consequence Assessment (Table 1)
    b. Access Vulnerability (Table 2)
    c. Recovery Potential (Table 3)
    d. Security protective measures (Table 4)
3. Evaluate Risk Factors Total
    a Assets rated as High Risk (≥88) are PPA.
    b Assets rated as Medium Risk (70-87) are an ASI.
    c Assets rated as Low Risk (<70) do not require categorization and are rated “Other Assets.”
4. Evaluate Adjusted Risk Rating

a Assets rated as High Risk (≥88) require additional security protective measures. Enter into iTrack and assign/develop corrective actions.

b Assets rated as Medium Risk (70-87) may require additional security protective measures. Enter into iTrack and assign/develop corrective actions.

c "Other Assets" rated as Low Risk (<70) have adequeate protective measures in place.

5. Repeat every five years or as activities/mission change.

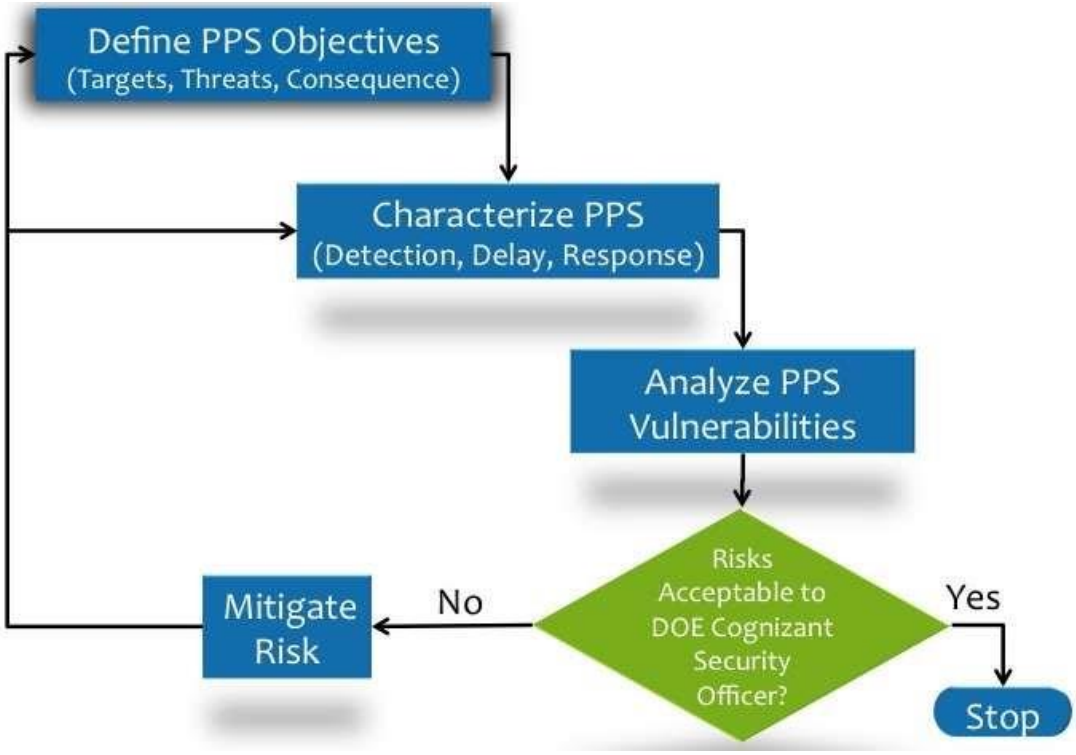


Figure 2 Fermilab Asset Risk Evaluation Process Flow Diagram

The procedure below describes Fermilab Security Department's implementation of this process.

ESH Section Procedure – Fermilab Asset Risk Evaluation

Purpose of this Procedure

The purpose of this procedure is to define the process for assessing and reassessing security measures for certain assets at Fermilab according to the DOE Safeguards and Security requirements (DOE 470.4B, etc.) and the Design Basis Threat order (DOE O 470.3C). The procedure establishes an evaluation of assets to identify current security countermeasures and potential security mitigation needs.

The potential sources of threats against Fermilab are considered to be intelligence collectors, criminals, mentally ill, disgruntled employees, insider threats, violent activists, and terrorists.

Impacts include the loss of an assets' function due to a threat. (See Table 7 for generic threat definitions.)

Risk factors considered during a Security Risk Assessment include: criticality to the HEP program; accessibility to pedestrian and vehicular traffic; cost and time to recover from acts of sabotage or theft; attractiveness to theft or sabotage; presence of portable equipment or data that, if stolen, would disrupt the HEP mission.

Mitigation factors credited during a Security Risk Assessment include: ability to recover from incidents of sabotage or theft; presence of Security protective measures such as locks, alarms, video surveillance, protective force patrols, staffing, fences, lighting, card access control, or administrative procedures.

Definitions

An **Asset** is a Fermilab and Fermilab leased space facilities, construction projects, experiments, scientific projects (e.g. DOE O 413.3b), and equipment.

An **Asset Risk Evaluation** is the process by which an asset is evaluated to determine if it is a security risk. The evaluation determines if an asset is a Property Protection Area (PPA), Area of Security Interest (ASI) or not categorized. It also determines if adequate security protection measures are in place to properly secure the asset, see Appendix A.

Credible Threats to Fermilab are mission disruption, theft, hostage, protest.

A **Security Risk Assessment (SRA)** is an evaluation of potential threats against a safeguards and security interest and the development of potential security countermeasures to address vulnerabilities. It also provides Fermilab with a firm foundation on which to make informed decisions regarding the effectiveness of a safeguards and security system.

A **Property Protection Area (PPA)** is an area where the consequences of some adverse, intentional act might destroy DOE property and result in significant and prolonged programmatic impacts to the HEP program. Asset risk evaluation/Risk Factor totals ≥ 88 points shall be defined as PPAs due to the security risk associated with the asset, see Table 5.

An **Area of Security Interest (ASI)** is an area that would not have as severe impact programmatically as a PPA, but could cause significant interruption of services, supplies and equipment and/or cause adverse publicity for the lab. Asset risk evaluation/Risk Factor totals between 70 - 87 points shall be defined as ASIs due to the security risk associated with the asset, see Table 5.

The **Consequence Assessment** is an evaluation of the credible threats to a specific asset and assessing five potential impacts (listed below) also see Table 1. Each consequence is weighted and noted in parentheses. The weight, rated on a scale from 1-5 (low to high) is meant to represent the relative impact of a given factor to high energy physics program. The impacts include:

- Accelerator or physics shutdown (5)
- Major project or activity delay (4)
- Recovery costs (4)
- Injury or illness (3)
- Environment or public image impact (2)

Access Vulnerability is an evaluation of the credible threats applied to a specific asset and assessing four potential vulnerabilities (listed below) and see Table 2. Each vulnerability is weighted and noted in parentheses. The weight rated on a scale from 1-5 (low to high) is meant to represent the relative impact of a given factor to high energy physics program. The vulnerabilities include:

- Target attractiveness (2)
- Target visibility (2)
- Target susceptibility (2)
- Target accessibility (2)

Recovery Potential is an evaluation of the length of time an asset would need to recover from a worst-case scenario, credible threat security incident.

Protective Measures are security countermeasures in place at the time of completing the Asset Risk Evaluation spreadsheet or recommended based upon the Adjusted Risk Rating. Each protective measure is weighted and noted in parentheses:

- Perimeter (3)
- Occupancy (3)
- Patrols (4)
- Intrusion detection system (4)
- Proximity Card Access (3)

The **Adjusted Risk Rating** is the result of completing the Security Risk Assessment Spreadsheet; it is a post-mitigation risk ranking. Adjusted Risk Rating scores are organized into High, Medium, or Low risks to determine when additional protective measures may be warranted.

- High: Adjusted Risk Rating ≥ 88 points → additional protective measures are required as soon as possible.
- Medium: Adjusted Risk Rating 70 – 87 points → additional protective measures may be needed.
- Low: Adjusted Risk Rating < 70 → current protective measures are adequate.

RESPONSIBILITIES

The **ES&H Security Department** is responsible for completing the Security Risk Assessment Spreadsheet for all Fermilab facilities and other areas.

The **Security Chief** is responsible for ensuring each facility, outdoor construction site, and critical infrastructure are evaluated at least every five years, or as activities or mission needs change to assure adequate security countermeasures are in place.

Division and Section Heads are responsible for providing data regarding facility, program and operations information in order to complete the evaluation.

DETAILED PROCEDURE:

Using the Fermilab Asset Risk Evaluation spreadsheet, see sample below, and subsequent following tables, determine the risk factor total and adjusted risk rating for each asset. Assets whose risk factor total 88 points or more are at high risk and should be considered a PPA. Risk factor totals between 70 and 87 points should be considered an ASI. Total points of less than 70 are low risk and do not require security countermeasures, these are classified as "Other assets." PPAs and ASIs must be noted in the Site Security Plan.

1. Identify asset to be evaluated.
2. Complete Asset Risk Evaluation.
    A. D/S Subject Matter Experts (SMEs) complete:
        i. Consequence Assessment according to Table 1.
        ii. Access Vulnerabilities according to Table 2.
        iii. Recovery Potential according to Table 3.
    B. Security Department complete:
        i. Security protective measures according to Table 4.
    C. Evaluate Risk Factors Total Table 5.
        i. Assets rated as High Risk (≥88) are PPA.
        ii. Assets rated as Medium Risk (70-87) are an ASI.
        iii. Assets rated as Low Risk (<70) do not require categorization and are rated "Other Assets."

D. Evaluate Adjusted Risk Rating (Table 6).
   i. Assets rated as High Risk (≥88) require additional security protective measures. Enter into iTrack and assign/develop corrective actions.
   ii. Assets rated as Medium Risk (70-87) may require additional security protective measures. Enter into iTrack and assign/develop corrective actions.
   iii. "Other Assets" rated as Low Risk (<70) have adequeate protective measures in place.

E. Update the Site Security Plan with the results of the Asset Risk Evaluations.

3. Repeat every five years or as activities/mission change.

Sample -Asset Risk Evaluation Spreadsheet

AREA: 0 *Asset Risk Evaluation- high, medium or low*

Risk Factors Total = ***0***

SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY-AV2	TARGET SUSCEPTIBILITY-AV3	TARGET ACCESSIBILITY-AV4
Disruption of Mission (TL5) Theft, Hostage, Protest (TL5)										
		0	0	0	0	0	0	0	0	0

PI - TOTAL: **0** **AV - TOTAL** **0**

Notes: **High =** **3** **Medium =** **2** **Low =** **1**

Mitigation Factors Total = ***0***

	RECOVERY POTENTIAL	PROTECTIVE MEASURES				
Weight	4	3	3	4	4	3
	Recovery Time-RP1	Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5

PR Total: **0** **PM Total:** **0**

Notes: **Low =** **1** **medium =** **2** **High =** **3**

Adjusted Risk Rating = ***0***

Table 1 Consequence Assessment

	Low	Medium	High
Accelerator/Physics Shutdown	<3 days	3-30 days	>30 days
Major Project/Activity Delay	<10 days	10-100 days	>100 days
Additional Cost	< $-30k	$30-$300k	>$300k
Injury or Illness	No disability or overexposure	Some disablity or slight overexposure	Death, substantial disability, or serious overexposure
Environmental Impact or Damage	Localized and short-term	Localized and long-term or widespread and short-term	Widespread and long-term

Table 2 Access Vulnerabilities

	Low	Medium	High
Attractiveness	Target and/or its contents are not very critical/desirable	Target and/or its contents are fairly critical/desirable	Target and/or its contents are very crticical /desirable
Accessibility	Poor access – multiple barriers, people diverted away from targets	Some access – few or partial barriers, people can get to targets	Ready access – no barriers, people directed next to targets
Susceptibility	Great effort required to affect target, powered equipment or energetic reaction	Some effort required to affect target, hand tools effectie	Minimal effort required to affect target, tools unneccessary
Visibility	Target areas readily observable, observers normally present	Target areas partially obscured, observers occassionally present	Target areas difficult to observe, observers normally absent

Table 3 Recovery Potential

	High	Medium	Low
Recovery Potential	< 3 days	3-30 days	>30 days

Table 4 Security Protective Measures

	High	Medium	Low
Barriers	Concrete walls, inaccessible windows, few doors, good repair	Sheet metal, wood frame, good repair. 6' or higher in good repair	Light construction, standard construction in poor repair
Occupancy	Always staffed	Normal work hour staffing	Seldon/intermittently staffed
Patrols	3 or more rounds/shift	2 rounds/shift	<2 rounds/shift
Intrusion Detection System	Multi-layer system (perimeter, space and target protection)	Multi-layers (perimeter and space protection)	Single layer system (perimeter protection)
Card Access	Low and Medium features coupled with Security camera presence.	Alarm linked to FIRUS	Access and Reporting

Table 5 Risk Factor Classification

	Property Protection Area (PPA)	Area of Security Interest (ASI)	Other Assets
Risk Factor Totals	≥ 88 points; Asset loss would have a high impact on mission AND is also moderately vulnerable.	70-87 points; Asset loss could have a high impact on mission BUT is not very vulnerable. OR Asset loss could have a moderate impact on mission AND is moderately vulnerable.	< 70 points; Asset loss could have a moderate impact on mission AND is not very vulnerable.

Table 6 Adjusted Risk Rating

	Need additional protective measures	**May need additional protective measures**	**Protective Measures are adequate**
Adjusted Risk Ratings	≥ 88 points The physical protection system is generally believed not to be effective against the defined threat.	70-87 points The physical protection system is generally believed to be *somewhat* effective against the defined threat	< 70 points The physical protection system is generally believed to be effective against the defined threat.

Table 7 Generic Threat Definitions

Title	Description	Type
Terrorist	The objective of the threat may vary widely and may include infliction of damage to infrastructure, property, or equipment and seizure, destruction, or use of a nuclear weapon, and/or chemical or biological agent. Capable of committing acts such as theft, bombing (including use of large vehicle bombs or aircraft), extortion, facility seizure, hostage taking, kidnapping, and sabotage (including CBR).	Outsiders
Criminal, Individual	An individual who seeks classified and/or sensitive unclassified information or material, nuclear material, or government property for the purpose of gaining economic advantage or attempts to alter data maintained by DOE or attempts to steal or embezzle government funds or commit contract fraud for the purpose of economic advantage to the individual or the individual's employer. May have access to classified matter, SNM, and/or security areas.	Outsiders/ Insiders
Criminals, Organized	Persons who conspire, and/or perpetrate criminal acts against DOE or DOE contractors for profit or economic gain. Prone to commit acts such as theft, fraud, extortion, and coercion.	Outsiders
Mentally Ill	Capable of committing acts such as arson, bombing, extortion, facility seizure, sabotage (including CBR sabotage), and attacks against individual employees or threats to do such to accomplish personal goals. May have access to a facility's most sensitive activities.	Outsiders/ Insiders

Disgruntled Employee	Normally willing to commit crimes posing low-risk of detection such as vandalism, work interruption, property destruction, arson, bombing (including the use of pre-positioned vehicle bombs), theft of Government property, theft, or destruction of classified and/or sensitive information or material, and industrial sabotage, but may commit crimes with unacceptable adverse consequences, such as espionage/foreign intelligence collection, radiological, and/or chemical sabotage.	Insiders
Violent Activists	Using tactics such as demonstrations, facility seizure, theft, sabotage (includes CBR sabotage), individual targeting, and civil disobedience.	Outsiders
Intelligence Collector	Attempts to collect classified, sensitive unclassified, proprietary, economic, scientific information, and/or other targets of opportunity. May have legitimate access to Departmental facilities, possibly including security areas, due to his employment status and access authorization or membership in a foreign inspection team.	Insiders

Adversary Scenarios

As part of the Fermilab Asset Risk Evaluation (FARE), Fermilab assessed all the PL 7 locations which include Property Protection Areas (PPA), Areas of Security Interest (ASI), TIER II chemical locations, and Accountable Nuclear Materials (ANM) using a weighted system. These assessments provide a summary of the current security measures which include key access, card access, interior camera locations, exterior cameras locations, whether this area is patrolled by the protective force, outside lighting for the parking lot, lighting around the points of entry, access / door type, and if any type of chemical, radiological, and / or nuclear materials of any type that exist in each facility.

This FARE assessment and the Hazard Analysis are then overlaid with the mission essential functions that each building provides for the laboratory and its occupancy. This will provide a clear picture on the level of risk that is associated with these locations. This type of data driven decision making may drive the possibility of moving an experiment to account for the likelihood of the misappropriation of information sharing, materials, or other safety concerns.

The Fermilab Sitewide Security Team (FV&A, Export Controls, Cyber Security) and the Security Department will then asses the likelihood of an adversary scenario on these locations and how much risk Fermilab is willing to except given the weighted decision. Page 47 is an example for

our primary business building, Wilson Hall, and the likelihood for an adversary event taking place. Using DOE Order 470.3C, appendix H, the analytical process that determines the effectiveness against these threats thus taking into consideration the adversary types and capabilities: Terrorism (international/ domestic), Activists, Criminals, Psychotics, Disgruntled Employee, Insider Threats, Cyber Threats, and Airborne Threats, for example:

- The FARE takes into consideration of how close vehicles are parked to the building in the event of a VBIED. Vehicles parked next to the building require a parking sticker in the window and is for employees only.
- The 15th floor is where WDRS (Human Resources) is located. This area has an extra level of security to include special card access, panic buttons on desks, and special drills for WDRS staff in the event of a disgruntled employee.
- The recent implementation of the Security Department into our Fermilab Facility Engineering Services Section (FESS) design approval provides the Security Department of a deeper understanding on how to mitigate against a Facility Seizure or a Mechanical Attack.
- The Security Department has identified the need to improve the security presence in Wilson Hall to deter against the possibility of a ballistic attack. Training is being established with the local SWAT team to provide not only the presence of law enforcement on site, but to familiarize the SWAT team with the nuances of Wilson Hall.
- Wilson Hall has recently undertaken an extensive security camera upgrade. This helps to identify abnormalities around the building should Fermilab encounter a potential IED placement, as well as helping to identify individuals of suspected theft.

By adequately assessing these locations, Fermilab is able to effectively implement the protection strategies to protect, mitigate, and recover from an incident on site.

Physical Protection System Objectives

Fermilab Overview

Fermilab's mission is to drive discovery by:

- Building and operating world-leading accelerator and detector facilities
- Performing pioneering research with national and global partners
- Developing new technologies for science that support U.S. industrial competitiveness

Fermilab is located 42 miles west of Chicago in Batavia, Illinois on a 6,800-acre site located in DuPage and Kane counties. There are approximately 36 miles of roads on the site which are not a part of the dedicated State highway system. Fermilab is government owned and contractor operated for the DOE by the Fermi Research Alliance (FRA), a joint venture with the University of Chicago and the Universities Research Association (URA). Fermilab does not process or store any classified matter.

Fermilab has the following Graded Access Area's (GAA), PPAs, Areas of Security Interest (local terminology) and General Access Areas (public). The Site is not fenced, and buildings and other areas of security interest are protected by security officer patrols, locked doors, fences and/or security entry, video surveillance, key pads, and/or duress alarms.

Fermilab employs approximately 1,750 personnel and approximately 2,300 scientific users who carry out a world-leading program of discovery at the three interrelated frontiers of particle physics: Energy Frontier, Intensity Frontier, and the Cosmic Frontier.

Departmental Assets as Fermilab

DOE Order 470.3C Design Basis Threat prescribes the performance metrics for protection of DOE assets as well as adversary capabilities for planning purposes used in risk analysis. According to 470.3C Fermilab concludes it is a Protection Level (PL) 7 and PL8 site. This is because Fermilab's mission does not require high risk assets such as nuclear weapons or components, nor special nuclear material (SNM) Category II or higher quantities. Fermilab's asset risks include:

- Accountable Nuclear Material
- Radiological Materials
- Chemicals
- Government Property and Facilities
- Controlled Unclassified Matter

Specific information regarding these assets is included in the following sections. In addition, the summary table in Table 11, lists the highest relative consequence of loss for each asset type as depicted in Table 11, Target Criticality Matrix.

Accountable Nuclear Material

Fermilab maintains small quantities of nuclear materials that include depleted uranium, sealed sources of americium and CF-252, and deuterium gas, see Table 8. There is no SNM maintained at Fermilab. Fermilab's previous inventory of Lithium-6 was dispositioned to Y12 in 2018.

Table 8 Accountable Nuclear Material Inventory

Isotope	Mass	Room or Building
Uranium, Depleted	476 Kg	D-Zero Facility
Uranium, Depleted	42 Kg	Outdoor storage next to D Zero
Uranium, Depleted	4 Kg	NM4 Enclosure
Uranium, Depleted	0.2 Kg	ME North Worm
Americium 241	11 G	Site 38 RPCF/AOSC

Deuterium Gas	BELOW REPORTING THRESHOLD	NM4
Deuterium	78.8 KG	Railhead
CF-252 Sealed Neutron Sources	Below reporting threshold	RPCF
Uranium, Depleted	2 KG	Site 40

Classified and Sensitive Information and Material

Fermilab has no classified matter or information. It does have limited amounts of controlled unclassified information (CUI) in the form of Personally Identifiable Information (PII).

General Property and Government Facilities

Fermilab has government general property and facilities with a total Replacement Plant Value (RPV) of approximately $2.1 Billion.

The real property assets include 367 buildings with 2.4 million total gross square feet. In addition to general property, which includes specialized scientific and research equipment, Fermilab has precious metals used for research activities valued at over $52k.

Radioactive Sources

Fermilab maintains a small radiological quantity of cesium 137 (sealed source), which does not meet minimum criteria for Category III sources as defined in DOE Order 231.1B.

Summary of Assets and Consequence of Loss

A summary of the Departmental assets located at Fermilab, along with their defined relative consequence of loss is displayed in the following table. Consequence of loss is listed for the highest type of asset within an asset category as defined in Table 9.

Table 9 Summary of the Fermilab Assets and Consequence of Loss

Security Interest	On Site	Relative Consequence Value
Accountable Nuclear Material	Category IV	Low
Sensitive Information or Matter	Sensitive Unclassified Information	Low
General Government Property and Facilities	Specialized scientific and research equipment, precious metals, general property	Medium

Radioactive Sources	Less than Category III sources	Low

Threat Assessment

The local threat assessment for Fermilab is based on these four factors:

- Local Crime rates.
- Historical Events at the Facility.
- Known Adversary Organizations in the Vicinity.
- Target Attractiveness.

The potential sources of threats against Fermilab are considered to be intelligence collectors, criminals, mentally ill, disgruntled employees, insiders, violent activists, and terrorists. Impacts include the loss of an assets' function due to a threat.

Local Crime Rates

A review of local criminal statistics determined criminal activity in DuPage and Kane Counties and areas surrounding Fermilab are low compared to the national average.

Historical Events at the Facility

Historically, there have been no protests at Fermilab beyond typical labor disputes. There have been a few thefts of copper that resulted arrests. In addition, there was property damage to Pioneer Cemetery that was able to be restored, however, the vandals were not apprehended. Response by the laboratory to these incidents was to install additional video surveillance.

Fermilab is conducting far reaching experiments in high energy physics research. As such, there is considerable interest in this research by many foreign governments. There are foreign national visitors from sensitive countries that frequent Fermilab each year which provides opportunistic scenarios for economic data gathering of intellectual property associated with cooperative research and development agreements (CRADA) and Work for Other activities.

Target Attractiveness

Fermilab is the largest U.S. laboratory for high energy physics research and the series of accelerators represent the largest energy particle accelerator in the U.S. The entire accelerator system, including large data storage and analyses support systems, make Fermilab an attractive target for foreign economic and intellectual property data mining, however, the nature of "open" science conducted at Fermilab is by definition, accessible.

Fermilab has some very high value, one-of-a-kind equipment that is not easily transported. Because of these extenuating circumstances and the relatively low crime rate in the area compared to the national average, the threat to physical assets at Fermilab is considered LOW. However, the cyber threat and information intelligence gathering threat are occurring frequently and are considered MODERATE.

Table 10 reflects the estimated likelihood of adversary types defined in DOE's DBT and applied to the assets identified at Fermilab (Table 8). These estimates are based on an understanding of national level threats and local threat estimates. N/A ratings are applied when a target does not exist, or no threat motive is indicated. For example, criminals and intelligence collectors would not attempt to commit sabotage acts.

Table 10 Threat Likelihood Estimate

	Terrorists	Criminals: Individual	Criminals: Organized	Mentally Ill	Disgruntled Employee	Violent Activists	Intelligence Collectors
Accountable Nuclear Material	L	L	L	L	L	L	N/A
Sensitive Information or Matter	L	L	L	L	L	L	M
General Government Property and Facilities	L	L	L	L	M	L	N/A
Radioactive Sources	L	L	L	L	L	L	N/A

Target Criticality

Table 11 reflects a qualitative rating of target criticality for the identified assets at the Fermilab. It is based on a combination of the highest estimated threat to a specific asset and the relative consequence of loss of the asset. The matrix displayed below was used to determine the target criticality ratings in the following table. Table 11 Target Criticality Matrix

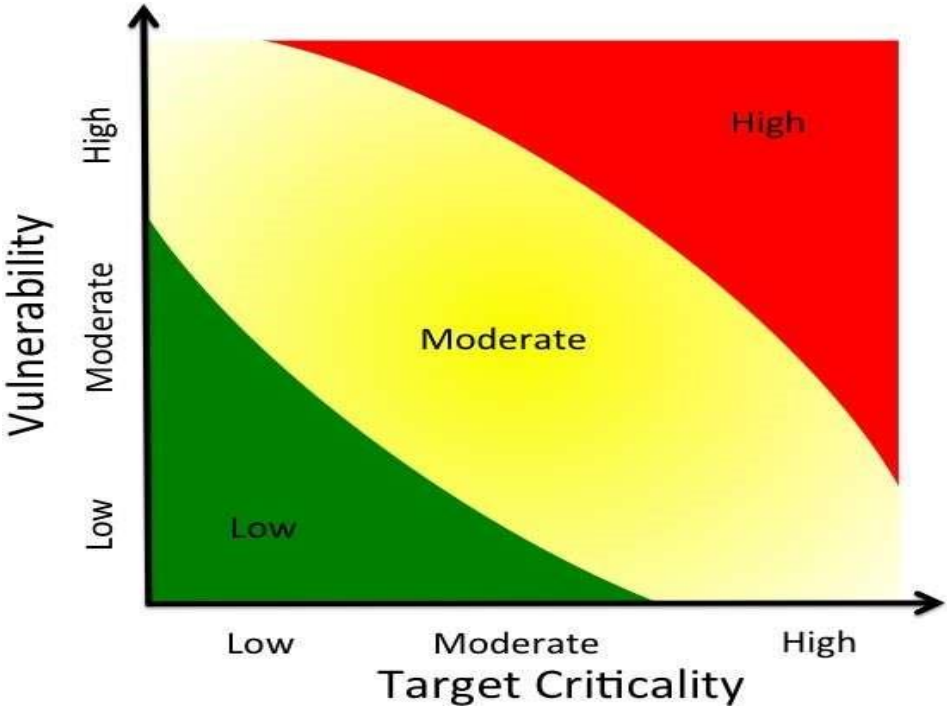


Table 11 Target Criticality Matrix

	Consequence of Loss	Highest Threat Likelihood	Target Criticality
Sensitive Information or Matter	Low	Low	Low
General Government Property and Facilities	Moderate	Moderate	Moderate
Accountable Nuclear Material	Low	Low	Low
Radioactive Sources	Low	Low	Low

The purpose of Table 11 is to identify and prioritize PL7 assets requiring protection at the site and can be used to aid decision makers in prioritizing activities regarding protection of departmental assets. At the Fermilab, given the departmental defined assets on site, the most important or critical target is government property and facilities.

Attachment 1 – Dispersal of Radioactive Material Memorandum

Fermi National Accelerator Laboratory

Fermilab

Memorandum

Kathy Graden

ES&H&Q Section
P.O. Box 500, MS 371
Kirk Road and Pine Street
Batavia, Illinois 60510-5011
USA
Office: 630.840.4939
Fax: 630.840.3390
graden@fnal.gov

Date: November 8, 2018

To: Martha Michels, Amber Kenney, and David Esterquest

From: Kathy Graden Kathy Graden

Re: DOE Order 470.3C, Design Basis Threat Analysis of Malevolent Act Involving Dispersal of Radioactive Material

Message:

Fermilab reviewed the dispersal of an acute radiation dose delivered in a 24-hour period after intake dose criteria and direct acute radiation exposure dose delivered over one-hour period criteria per DOE O 470.3C, *Design Basis Threat* dated August 8, 2008.

The majority of radioactive materials at Fermilab are volume-activated solid metal materials that are not capable of dispersal. The dispersal and direct acute radiation exposure dose criteria in DOE O 470.3C are not applicable to volume-activated radioactive materials.

The beta-gamma emitting radionuclide Cesium-137 (Cs-137) contained in sealed radioactive sources comprise the highest activity levels in the Fermilab inventory. Cs-137 sources are contained in source projectors at Site 38 Radiation Physics Calibration Facility (RPCF) and in the Site 40 Source Room. Americium-241 Beryllium (Am-241Be) in the form of sealed neutron sources contain the highest alpha-emitting activity levels at Fermilab. Am-241Be neutron sources are stored in the neutron storage vault at the RPCF.

External dose calculations were performed for Cs-137 and Am-241 for a direct acute radiation exposure based on DOE O 470.3C criteria. For both Cs-137 and Am-241, radiation dose calculations were less than 100 rads at one meter delivered in a one-hour period. Fermilab is in compliance with this direct radiation exposure dose threshold.

Internal dose calculations were performed for Cs-137 and Am-241 based on the criteria prescribed in DOE O 470.3C. Internal dose criteria thresholds for Cs-137 and Am-241Be for 20 rads to the red bone marrow, 50 rads to the gastrointestinal tract, or 100 rads to the lung would be exceeded. To vastly mitigate the threat of radioactive material dispersal by a malevolent act, Fermilab has a system of controls in place including special form certification, source container configuration control, nuclear materials category and attractiveness level grading, security measures, and access controls for these radioactive sources.

Sealed radioactive sources defined by DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports* have strict radiological and security controls. Sealed radioactive sources and accountable nuclear materials within this categorization are located in Property Protection Areas and are never removed from these locations. All high activity Cs-137 and Am-241Be sources have International Atomic Energy Agency (IAEA) Certificate of Competent Authority Special Form Radioactive Materials Certificates in place. Special Form sources

meet IAEA and Department of Transportation regulatory requirements for source integrity. Special Form Cs-137 source capsules housed in shielded source projectors are not accessible.

Fermilab has no Special Nuclear Materials (Plutonium, Enriched Uranium). Per DOE O 474.2, *Nuclear Material Control and Accountability* dated May 15, 2015, Fermilab is graded as Attractiveness Level E, Category IV. This classification is the lowest risk and lowest threat level for nuclear materials.

Fermilab has an intrusion alarm system installed at Site 38 RPCF which, upon unauthorized entry, sets off an alarm at the Communications Center. The alarm system is made up of door contacts, passive infrared/microwave sensors, and a keypad. A common Personal Identification Number (PIN) which is intended to deactivate the alarm system to permit authorized entry is issued to designated ESH&Q personnel. An emergency backup power system with a lifetime of approximately 12 hours is used in the event of power outages. During system failures, Fermilab Security Department provides guard inspections of RPCF integrity at two-hour intervals. Door locks at RPCF are controlled through the Laboratory's key system. During routine conditions, the Security Department provides exterior site inspection at least twice per 8-hour shift.

All sealed neutron sources are stored in a concrete neutron storage vault. The neutron storage vault is part of the poured concrete walls of RPCF Cave One. Access to the neutron storage vault is controlled by use of a combination lock. A limited number of people are officially authorized to have access to Cave One neutron storage vault. Upon removal of any neutron source, the authorized personnel are required to sign a log sheet noting what source is being signed out. Upon return of the Am-241Be neutron source, the same person is required to verify the presence of all neutron sources.

Only authorized ESH&Q Section personnel have access to high activity Cs-137 and Am-241Be sealed sources. Padlock and other combination locks for Cs-137 sources not contained in source projectors are changed in the event of termination or transfer of any person authorized to have access to these combinations.

In conclusion, sealed radioactive sources that could cause internal doses above DOE O 470.3C thresholds have a variety of systems in place to mitigate the possibility of such an exposure from occurring.

Please contact me at x4939 or graden@fnal.gov if you have questions.

cc: D. Cossairt
A. Olson
M. Quinn
M. Schoell

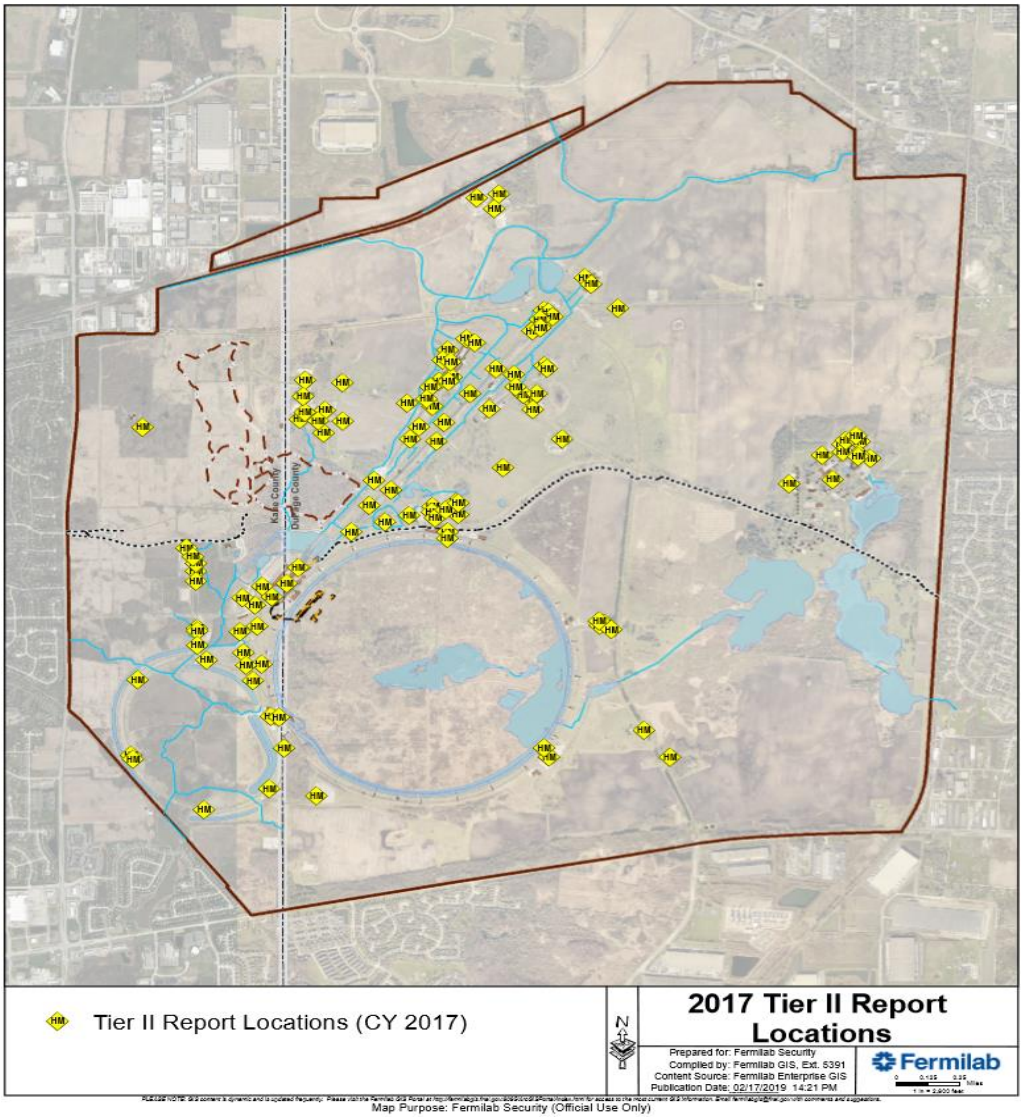
DocDB#: https://esh-docdbcert.fnal.gov/cgi-bin/cert/ShowDocument?docid=4742

Relative Risk Summary

The risks to the DOE PL7 assets at Fermilab, summarized in Table 12, are based on the consequence of loss of specific assets at the facility, the type and likelihood of threats to those assets, and the vulnerability of the PPS in preventing threat attempts.

The **Fermilab Emergency Planning Hazard Survey (EPHS)** provides of summary of all the Tier II data locations (PL-7) and encompasses a comprehensive overview of the chemical hazards that exist on Fermilab. In this plan, page 12-23 lists the location of buildings and quantities of each chemical hazard type. Page 24-37 list the quantity of these chemical hazard types and its effects on local population.

Exhibit 1



Attachment 2 – Tier II Report CY 2018

Fermilab CY 2018 Tier II Data

D/S	Location	FIMS #	Chemical	OPTIONAL	CY2018 TOTAL
PD	MS-4 gas shed	414	1, 1, 1, 2 Tetrafluoroethane (R134a)	L=Cylinder	100
			1, 1, 1, 2 Tetrafluoroethane TOTAL		**100**
PD	Lab 6	184	1,2,4 Trimethylbenzene	D=Steel Drum	7
ND	Meson Detector Building west parking lot	408	1,2,4-Trimethylbenzene (pseudocumene)		3,960
ND	MiniBooNE	780	1,2,4-Trimethylbenzene (pseudocumene)		145
ND	MINOS	785	1,2,4-Trimethylbenzene (pseudocumene)		13,365
			1,2,4 Trimethylbenzene TOTAL		**17,477**
ND	PAB	502	Acteylene-G		21
PD	D0	325	Acteylene-G	L=Cylinder	83
PD	MAB	412	Acteylene-G	L=Cylinder	62
PD	LAB F	630	Acteylene-G	L=Cylinder	41
TD	IB2	801	Acteylene-G		16
TD	IB2	801	Acteylene-G	L=Cylinder	83
			Acteylene-G TOTAL		**306**
TD	IB4 CPL	805	Ammonia		23
			Ammonia TOTAL		**23**
PD	LAB 7	185	Anyhydrous Ammonia	L=Cylinder	6
			Anyhydrous Ammonia TOTAL		**6**
ND	LArTF	787	Argon-G		77
ND	PAB	502	Argon-G		997
ND	PC-4		Argon-G		697
ND	SBN-Far	788	Argon-G		123
ND	LArTF	787	Argon/Hydrogen (97.5/2.5)		11,254
ESHQ	Site 39 RAF	926	Argon-G	L	80
PD	LAB 3	181	Argon-G	L=Cylinder	57
PD	LAB 6	184	Argon-G	L=Cylinder	115
PD	Lab 7	185	Argon-G		217
PD	MC-1	209	Argon-G	L=Cylinder	553
PD	D0	325	Argon-G	Tank inside building	454
PD	D0	325	Argon-G	L=Cylinder	307
PD	MDB	408	Argon-G	L=Cylinder	47
PD	MAB	412	Argon-G	L=Cylinder	126
PD	MS-4 gas shed	414	Argon-G	L=Cylinder	499
PD	LAB A	600	Argon-G	L=Cylinder	102
PD	LAB F	630	Argon-G	L=Cylinder	142
PD	Lab G	612	Argon-G	L=Cylinder	26
PD	PB-7	626	Argon-G	L=Cylinder	123
PD	KTEV (SeaQuest)	630	Argon-G	L=Cylinder	1,046
TD	MACHINE REPAIR TD FIMS 109	109	Argon-G	L=Cylinder	25
TD	LAB 1 TD FIMS 179	179	Argon-G	L=Cylinder	204
TD	IB-1 TD FIMS 800	800	Argon-G	L	26
TD	IB2	801	Argon-G	L=Cylinder	128
TD	IB2	801	Argon-G	L=Cylinder	26
TD	IB-3 TD FIM 804	804	Argon-G	L	26
TD	ICB TD FIMS 806	806	Argon-G	L	52
TD	IB-1A TD FIMS 807	807	Argon-G	L	231
			Argon-G TOTAL		**17,758**
TD	IB-1 TD FIMS 800	800	Argon-L	R	556
TD	IB-3 TD FIMS 804	804	Argon-L	R	192
TD	ICB TD FIMS 806	806	Argon-L	R	2,780
TD	IB3a	808	Argon-L		50
ND	LArTF	787	Argon-L		1,536
ND	LArTF	787	Argon-L		75,595
ND	PAB	502	Argon-L		2,763
ND	PAB	502	Argon-L		1,536
ND	PC-4		Argon-L		23,260
ND	SBN-Far	788	Argon-L		492
ND	LArTF	787	Argon-L (uB cryostat)		372,160
			Argon-L TOTAL		**480,920**
PD	LAB A	600	Asbestos-Friable		3,000
			Asbestos-Friable TOTAL		**3,000**
PD	LAB A	600	Beryllium		2
PD	LAB C	604	Beryllium		2
PD	LAB D	606	Beryllium		2
PD	D0	325	Beryllium (beam pipe, silicon disks, silicon barrels)		12
			Beryllium TOTAL		**18**
PD	LAB 3	181	Carbon Dioxide-G	L=Cylinder	80
PD	LAB 6	184	Carbon Dioxide-G	L=Cylinder	13
PD	MC-1	209	Carbon Dioxide-G	L=Cylinder	58
PD	MDB	408	Carbon Dioxide-G		19. 2
PD	MAB	412	Carbon Dioxide-G	L=Cylinder	147
PD	MS-4 GAS SHED	414	Carbon Dioxide-G	L=Cylinder	145
PD	LAB C	604	Carbon Dioxide-G	L=Cylinder	684
PD	LAB F	630	Carbon Dioxide-G	L=Cylinder	14
PD	PB-7 PD FIMS 626	626	Carbon Dioxide-G	L=Cylinder	6
PD	KTEV (SeaQuest)	630	Carbon Dioxide-G	L=Cylinder	3,326
ND	PAB	502	Carbon Dioxide-G		64
			Carbon Dioxide-G TOTAL		**4,537**
FESS	Master Substation	854	Diesel Fuel	Generator	1,440
FESS	Kautz Road Substation	860	Diesel Fuel	Generator	1,440
ND	MINOS	785	Diesel Fuel		8,238
ND	SBND	789	Diesel Fuel		1,613
ND	SBN-Far	788	Diesel Fuel		1,613
FESS	Site 38	921	Diesel Fuel		36
FESS	Site 37	921	Diesel Fuel		7,313
FESS	High Use Storage	928	Diesel Fuel		300
FESS	Site 38 Fuel Center	929	Diesel Fuel		20,829
CD	FCC	3	Diesel Fuel	A	40,614
PD	MC-1 Generator	209	Diesel Fuel	A=Above Ground Tank	4,500
PD	Muze Generator	270	Diesel Fuel	A=Above Ground Tank	4,418
PD	D0	325	Diesel Fuel	A=Above Ground Tank	2,708
			Diesel Fuel TOTAL		**95,061**
PD	Lab 3	181	Ethane-G	L=Cylinder	6
PD	MC-1 PD FIMS 209	209	Ethane-G	L=Cylinder	285
PD	MS-4 Gas Shed	414	Ethane-G		3
			Ethane-G TOTAL		**293**

Fermilab CY 2018 Tier II Data

D/S	Location	FIMS #	Chemical	OPTIONAL	CY2018 TOTAL
FESS	Site 37 Main Bldg	921	Ethyl Alcohol		6
FESS	Site 38 Fuel Center	929	Ethyl Alcohol		2,634
FESS	Site 38 Fuel Center	929	Ethyl Alcohol		17,124
FESS	Site 38 WH 1	938	Ethyl Alcohol		79
FESS	Site 38 WH 1	938	Ethyl Alcohol		158
FESS	Site 38 WH 1	938	Ethyl Alcohol		329
ESHQ	Site 39 RAF	926	Ethyl Alcohol	R=Other	66
				Ethyl Alcohol TOTAL	**20,396**
FESS	Site 37 Main Building	921	Ethylene Glycol		108
FESS	Site 38 VM	930	Ethylene Glycol		495
FESS	Site 38 WH 1	938	Ethylene Glycol		396
FESS	Site 38 WH 1	938	Ethylene Glycol		1,188
PD	D0	325	Ethylene Glycol	E=Plastic/Non-metal Drum	232
PD	Lab A	600	Ethylene Glycol	E=Plastic/Non-metal Drum	1,021
				Ethylene Glycol TOTAL	**3,440**
FESS	CUB	214	FREON 123		10,650
				FREON 123 TOTAL	**10,650**
FESS	30A Sauk Blvd	55	Gasoline		26
FESS	15A Pottawatomi	161	Gasoline		27
FESS	Site 37 Cabinet	921	Gasoline		710
FESS	High Use Storage	928	Gasoline		80
FESS	Site 38 Fuel Center	929	Gasoline		2,130
FESS	Site 38 Fuel Center	929	Gasoline		19,170
				Gasoline TOTAL	**22,142**
PD	D0	325	Halon 1211 (1st floor, movable counting room)		9
PD	D0	325	Halon 1211 (2nd floor, movable counting room)		9
PD	D0	325	Halon 1211 (Pit area)		300
PD	D0	325	Halon 1211 (rm 107, 109, 209, 210)		36
				Halon 1211 TOTAL	**354**
FESS	Wilson Hall - FP001D1B1G	1	Halon 1301		334
FESS	Wilson Hall - FP001D1A1G	1	Halon 1301		480
FESS	FCC - FP003D1B1G	3	Halon 1301		920
FESS	FCC - FP003 Spare	3	Halon 1301		950
FESS	APSB-SO - FP20B01G	203	Halon 1301		334
FESS	Cross Gallery - FP212BF1	212	Halon 1301		5
FESS	Cross Gallery - FP212BF2	212	Halon 1301		5
FESS	Cross Gallery - FP212BF3	212	Halon 1301		5
FESS	Cross Gallery - FP212BF4	212	Halon 1301		5
FESS	Cross Gallery - FP212BF5	212	Halon 1301		5
FESS	Cross Gallery - FP212BF6	212	Halon 1301		5
FESS	Cross Gallery - FP212BF7	212	Halon 1301		5
FESS	Cross Gallery - FP212AB1GB	212	Halon 1301		130
FESS	Cross Gallery - FP212AB1GA	212	Halon 1301		297
FESS	Cross Gallery - FP212A1A1G	212	Halon 1301		473
FESS	CDF @ B0 - F323 (Elev. Machine Space)	323	Halon 1301		1
FESS	CDF @ B0 - FP323A1GA	323	Halon 1301		2,950
FESS	D0 - FP325D1GA	325	Halon 1301		18
FESS	D0 - FP325 Spare	325	Halon 1301		30
FESS	D0 - FP323D1GC	325	Halon 1301		33
FESS	D0 - FP325D1GB	325	Halon 1301		33
FESS	D0 - FP325D1GD	325	Halon 1301		114
FESS	D0 - FP325D1GE	325	Halon 1301		186
FESS	D0 - FP325E1GL	325	Halon 1301		4,419
FESS	Meson Cryo Bldg. - FP410D1G	410	Halon 1301		133
FESS	Training Center - FP522D1G	522	Halon 1301		80
FESS	LCC - FP700D1GB	700	Halon 1301		30
FESS	LCC - FP700D1GE	700	Halon 1301		35
FESS	Site 55 Garage - Stock	968	Halon 1301		10,429
PD	D0	325	Halon 1301	L=Cylinder	4,919
PD	D0	325	Halon 1301 (D1GA)		18
PD	D0	325	Halon 1301 (D1GB)		33
PD	D0	325	Halon 1301 (D1GC)		33
PD	D0	325	Halon 1301 (D1GD)		114
PD	D0	325	Halon 1301 (D1GE) (rm 109 & 209)		272
PD	D0	325	Halon 1301 (E1GL)		4,419
PD	D0	325	Halon 1301 (Spare)		30
				Halon 1301 TOTAL	**32,282**
ND	LArTF	787	Helium-G		2
ND	MINOS	785	Helium-G		60
ND	PAB	502	Helium-G		26
ND	PC-4		Helium-G		7
ND	SIRN-Far	788	Helium-G		15
TD	IB2	801	Helium-G	L=Cylinder	7
TD	IB3a	808	Helium-G		4
PD	Lab 3	181	Helium-G	L=Cylinder	2
PD	Lab 6	184	Helium-G	L=Cylinder	19
PD	Lab 7	185	Helium-G	L=Cylinder	7
PD	MC-1 PD FIMS 209	209	Helium-G	L=Cylinder	9
PD	MC-1	209	Helium-G		400
PD	D0	325	Helium-G	L=Cylinder	13
PD	MDB	408	Helium-G		2
PD	MAB	412	Helium-G	L=Cylinder	13
PD	MS-4 GAS SHED	414	Helium-G	L=Cylinder	9
PD	Lab A	600	Helium-G	L=Cylinder	6
PD	Lab B PD FIMS 602	602	Helium-G	L=Cylinder	13
PD	Lab C	604	Helium-G		2
PD	LAB F	610	Helium-G	L=Cylinder	2
PD	Lab G	612	Helium-G	L=Cylinder	2
PD	ICTEV (SeaQuest)	630	Helium-G	L=Cylinder	6
TD	LAB 1 TD FIMS 179	179	Helium-G	L=Cylinder	13
TD	LAB 4 TD FIMS 180	180	Helium-G	L=Cylinder	3
TD	MP-9 TD FIMS 418	416	Helium-G	L=Cylinder	4
TD	IB-1 TD FIMS 800	800	Helium-G	L	9
TD	IB-1 TD FIMS 800	800	Helium-G	A	241
TD	IB4	805	Helium-G	L=Cylinder	2
TD	IB4	805	Helium-G	L=Cylinder	2
TD	ICB TD FIMS 806	806	Helium-G	L	11
TD	IB-1A TD FIMS 807	807	Helium-G	C	6
TD	IB-1A TD FIMS 807	807	Helium-G	A	14
TD	IB-1A TD FIMS 807	807	Helium-G	L	58
TD	IB-1A TD FIMS 807	807	Helium-G	R	10,000
TD	CHL High-pressure tube trailers	851	Helium-G	p	400
TD	CHL Tank Farm (between A3 & A4)	851	Helium-G	A	200
TD	MuCool Test	210	Helium-G	A=Above Ground Tank	80
TD	B0	224	Helium-G	A	250

Fermilab CY 2018 Tier II Data

D/S	Location	FIMS #	Chemical	OPTIONAL	CY2018 TOTAL
				Helium-G TOTAL	11,880
TD	ICB-QCL	806	Helium 3-L	R=Other	11
TD	ICB-QCL	806	Helium 4-L	R=Other	50
TD	IB3a	808	Helium-L		138
TD	HAB	323	Helium-L	R=Other	16
TD	IB-1 TD FIMS 800	800	Helium-L	R	414
TD	IB-1 TD FIMS 800	800	Helium-L	R	414
TD	IB-1 TD FIMS 800	800	Helium-L	C	2,873
TD	IB-1 TD FIMS 800	800	Helium-L	C	2,873
TD	ICB-MSL FIMS 806	806	Helium-L	R=Other	17
TD	ICB-MSL FIMS 806	806	Helium-L	R=Other	69
TD	HAB	323	Helium-L	R=Other	44
PD	MC-1 PD FIMS 209	209	Helium-L	C=Tank Inside Building	303
ND	MINOS	785	Helium-L		515
				Helium-L TOTAL	7,735
ND	PC-4		Hydraulic oil - elevator		865
PD	D0	325	Hydraulic oil - elevator, pumper		1,665
				Hydraulic oil TOTAL	2,530
TD	IB4-CPL	805	Hydrochloric acid	R=Other	4
				Hydrochloric acid TOTAL	4
TD	Lab 5 TD FIMS 93	93	Hydrofluoric Acid	N	22
TD	IB4-CPL	805	Hydrofluoric Acid	R=Other	3
				Hydrofluoric Acid TOTAL	25
ND	LArTF	787	Hydrogen-G		15
				Hydrogen-G TOTAL	15
ND	MINOS	785	Hydrogen Peroxide, 34%		520
				Hydrogen Peroxide TOTAL	520
PD	MS-4 gas shed	414	Isobutane-G	L=Cylinder	30
PD	KTEV (SeaQuest)	630	Isobutane-G	L=Cylinder	5
PD	MD8	408	Isobutane-G	L=Cylinder	3
				Isobutane-G TOTAL	37
TD	IB4	805	Isopropyl Alcohol	G=Carboy	7
				Isopropyl Alcohol TOTAL	7
ND	LArTF	787	Lead	lead-acid batteries	111
ND	MiniBooNE	780	Lead	lead-acid batteries	17
ND	MINOS	785	Lead	lead-acid batteries	2,434
ND	MINOS	785	Lead	lead bricks	7,800
ND	PC-4		Lead	lead-acid batteries	182
ND	SBND	789	Lead	lead-acid batteries	237
ND	SBN-Far	788	Lead	lead-acid batteries	237
FESS	Master Substation	854	Lead		4,320
FESS	Kautz Road Substation	860	Lead		2,160
ESHQ	ME7 WORM	400	Lead	R	100
ESHQ	Site 40	840	Lead	R	16,087
ESHQ	Supershed	850	Lead	R	17
ESHQ	Site 39 RAF	926	Lead	R	30,610
ESHQ	Site 38 RPCF	931	Lead	R	5,700
ESHQ	Site 55 WS-3	970	Lead	R	4
ESHQ	Site 55 WS-2	972	Lead	R	2
ESHQ	Site 55 WS-1	974	Lead	R	3
ESHQ	Site 55 WS-1	974	Lead	R	3
CD	Wilson Hall 8 West	1	Lead	R	2,640
CD	Wilson Hall 16	1	Lead	R=Other	621
CD	FCC	3	Lead	R	33,258
CD	GCC	628	Lead	R	46,131
PD	LAB 3 (batteries)	181	Lead	R=Other	1,500
PD	LAB 6	184	Lead	R	250
PD	MC-1 (batteries)	209	Lead	R=Other	769
PD	Muze (batteries)	270	Lead	R=Other	806
PD	D0 (batteries)	325	Lead	R=Other	1,001
PD	D0 Shielding	325	Lead	R=Other	100,000
PD	MAB (batteries)	412	Lead	R=Other	38
PD	HIL	506	Lead	L=Cylinder	3,105
PD	Lab B (batteries)	602	Lead	Q=Rail Car	82
PD	Lab C (batteries)	604	Lead	R=Other	51
PD	Lab D (batteries)	606	Lead	R=Other	56
PD	BEG (batteries)	609	Lead	R=Other	31
PD	Lab F (batteries)	610	Lead	R=Other	553
PD	Lab G	612	Lead	R=Other	20
PD	PB7 (batteries)	626	Lead	R=Other	215
PD	PW-5	626	Lead	R=Other	390,650
PD	KTeV (batteries)	630	Lead	R=Other	275
TD	TPL TD FIMS 504	504	Lead	R	905
TD	IB-1 TD FIMS 800	800	Lead	R	175
TD	IB3a	808	Lead		21
TD	IB1		Lead		900
FESS	Site Wide	SITE	Lead	Fire Alarm Batteries	4,317
				Lead TOTAL	658,354
PD	Lab 6	184	Linear Alkylbenzene	D=Steel Drum	790
				Linear Alkylbenzene TOTAL	790
PD	LAB 3	181	Methane-G	L=Cylinder	1
PD	LAB 6	184	Methane-G	L=Cylinder	1
PD	D0	325	Methane-G	L=Cylinder	8
PD	MS-4 GAS SHED	414	Methane-G	L=Cylinder	10
PD	KTEV (SeaQuest)	630	Methane-G	L=Cylinder	25
				Methane-G TOTAL	43
ND	Meson Detector Building west parking lot	408	Mineral Oil		80,370
ND	MiniBooNE	780	Mineral Oil		1,772,497
ND	MINOS	785	Mineral Oil		271,249
PD	LAB 6	184	Mineral Oil		388
				Mineral Oil TOTAL	2,124,503.8

Fermilab CY 2018 Tier II Data

D/S	Location	FIMS #	Chemical	OPTIONAL	CY2018 TOTAL
ND	LArTF	787	Nitrogen-G		16
ND	MINOS	785	Nitrogen-G		230
ND	NOvA Surface	786	Nitrogen-G		66
ND	PAB	502	Nitrogen-G		218
ND	SBN-Far	788	Nitrogen-G		16
ND	SciBooNE	714	Nitrogen-G		131
ND	LArTF	787	Nitrogen/Oxygen (80/20)		12
ND	LArTF	787	Nitrogen/Oxygen (95/5)		15
FESS	Master Substation	854	Nitrogen-G		2,100
FESS	Kautz Road Substation	860	Nitrogen-G		1,024
PD	LAB 3	181	Nitrogen-G	L=Cylinder	82
PD	LAB 5	183	Nitrogen-G	L=Cylinder	16
PD	LAB 6	184	Nitrogen-G	L=Cylinder	82
PD	LAB 7	185	Nitrogen-G	L=Cylinder	706
PD	MC-1 PD FIMS 209	209	Nitrogen-G	L=Cylinder	115
PD	DO	325	Nitrogen-G	L=Cylinder	66
PD	MDB	408	Nitrogen-G		16
PD	MAB	412	Nitrogen-G	L=Cylinder	16
PD	MS-4 GAS SHED	414	Nitrogen-G	L=Cylinder	83
PD	MC7	426	Nitrogen-G		16
PD	LAB A	600	Nitrogen-G	L=Cylinder	49
PD	LAB B	602	Nitrogen-G	L=Cylinder	82
PD	LAB C	604	Nitrogen-G	L=Cylinder	16
PD	KTEV (SeaQuest)	630	Nitrogen-G	L=Cylinder	99
TD	Lab 5 TD FIMS 093	93	Nitrogen-G	L	33
TD	LAB 1 TD FIMS 179	179	Nitrogen-G	L=Cylinder	32
TD	B0	224	Nitrogen-G	L	32
TD	MESON CRYO	410	Nitrogen-G	L	50
TD	MP-9 TD FIMS 419	416	Nitrogen-G	L=Cylinder	16
TD	IB-1 TD FIMS 800	800	Nitrogen-G	L	33
TD	IB2	801	Nitrogen-G	L=Cylinder	66
TD	IB-3 TD FIMS 804	804	Nitrogen-G	L	50
TD	IB4-CPL	805	Nitrogen-G	L=Cylinder	33
TD	ICB TD FIMS 806	806	Nitrogen-G	L	66
TD	IB-1A TD FIMS 807	807	Nitrogen-G	L=Cylinder	165
				Nitrogen-G TOTAL	**5,849**
TD	IB3a	808	Nitrogen-L		285
ND	LArTF	787	Nitrogen-L		74,074
ND	MiniBooNE	780	Nitrogen-L		415
ND	PAB	502	Nitrogen-L		12,626
ND	SBN-Far	787	Nitrogen-L		569
ND	PC-4		Nitrogen-L (opposite side of proton berm)		26,936
TD	HAB	323	Nitrogen-L	R=Other	216
ESHQ	Site 39 RAF	926	Nitrogen-L	A	3,026
PD	Lab 6	184	Nitrogen-L	A=Above Ground Tank	4,040
PD	Lab 7	185	Nitrogen-L	L=Cylinder	285
PD	MC-1 PD FIMS 209	209	Nitrogen-L	L=Cylinder	570
PD	MC-1 PD FIMS 209	209	Nitrogen-L	A=Above Ground Tank	101,010
PD	MS-4 SHED	414	Nitrogen-L	L=Cylinder	320
PD	Lab B PD FIMS 602	602	Nitrogen-L	P=Tank Wagon	20,202
PD	LAB D	606	Nitrogen-L	A=Above Ground Tank	33,670
TD	Meson Cryo Bldg	410	Nitrogen-L	A	45,528
TD	MP-9 TD FIMS 416	416	Nitrogen-L	R=Other	1,919
TD	IB-1 TD FIMS 800	800	Nitrogen-L	R	446
TD	IB-1 TD FIMS 800	800	Nitrogen-L	C=Tank Inside Building	635
TD	IB4	805	Nitrogen-L	R=Other	1,139
TD	ICB TD FIMS 806	806	Nitrogen-L	R	1,605
TD	IB-1 TD FIMS 800	809	Nitrogen-L	A	67,443
TD	Lab 2	179	Nitrogen-L		6,061
TD	B0	224	Nitrogen-L	A	87,542
				Nitrogen-L TOTAL	**400,561**
PD	MS-4 gas shed	414	Octafluorotetrahydrofuran	L=Cylinder	54
				Octafluorotetrahydrofuran TOTAL	**54**
PD	DO	325	Oxygen-G		41
PD	MAB	412	Oxygen-G	L=Cylinder	911
PD	LAB F	610	Oxygen-G	L=Cylinder	41
TD	IB2	801	Oxygen-G		162
TD	IB2	801	Oxygen-G		20
				Oxygen-G TOTAL	**1,174**
ND	PAB	502	Propane		134
FESS	Site 29 House & Garage	914	Propane		4,110
FESS	Site 37 Main Bldg	921	Propane		290
FESS	Site 38 HUS	928	Propane		132
FESS	Site 38 WH 1	938	Propane		231
FESS	Site 38 WH 1	938	Propane		132
FESS	Site 50 House	946	Propane		2,055
FESS	Site 56 House	976	Propane		4,110
FESS	Site 58 House	986	Propane		2,055
FESS	Site 67 Barn	994	Propane		2,055
FESS	Railhead	848	Propane		4,110
FESS	Railhead	848	Propane		165
ESHQ	Site 40	840	Propane	L	100
ESHQ	Site 39 RAF	926	Propane	L	1
ESHQ	Site 38 RFOF	931	Propane	L	1
ESHQ	Site 38 Fire Dept.	932	Propane	L	20
ESHQ	Site 52 Security	948	Propane	A	3,500
ESHQ	Site 55 WS-3	970	Propane	L	66
PD	Lab 5	183	Propane	L=Cylinder	134
PD	DO	325	Propane	L=Cylinder	201
PD	MAB	412	Propane	L=Cylinder	201
PD	Site 50 Proton Pole Building	520	Propane		4,000
PD	Lab B PD FIMS 602	602	Propane	L=Cylinder	67
PD	LAB E/F	608	Propane	L=Cylinder	134
TD	MACHINE REPAIR STORAGE TD FIMS 105	105	Propane	L=Cylinder	134
TD	MP-9 TD FIMS 416	416	Propane	L	40
TD	PTPL	504	Propane		80
TD	IB-4 TD FIMS 804	804	Propane		80
TD	IB-1A TD FIMS 807	807	Propane	L	60
TD	Magnet Storage Building	809	Propane		60
ND	PC-4		Propane (emergency generator)		510
TD	IB2	801	Propane	L=Cylinder	268
				Propane TOTAL	**28,936**
PD	MAB	412	Propylene	L=Cylinder	150
PD	MS-4 gas shed	414	Propylene	L=Cylinder	63
				Propylene TOTAL	**213**

Fermilab CY 2018 Tier II Data

D/S	Location	FIMS #	Chemical	OPTIONAL	CY2018 TOTAL
FESS	WH Ramsey Preheat FE FIMS 001	1	Propylene Glycol		410
FESS	WH ACLE Preheat FIMS 001	1	Propylene Glycol		650
FESS	WH Snow Melt FIMS 001	1	Propylene Glycol		1,030
PD	Lab 5	183	Propylene Glycol		217
PD	Lab 6	184	Propylene Glycol		87
TD	MP-9 TD FIMS 416	416	Propylene Glycol	R	649
TD	IB-4 Chiller TD FIMS 526	526	Propylene Glycol		1,900
TD	IB-1 TD FIMS 800	800	Propylene Glycol	R	31
TD	IB2	801	Propylene Glycol	D=Steel Drum	477
TD	ICB TD FIMS 806	806	Propylene Glycol	R	2,283
TD	CHL Worthington Compressors	851	Propylene Glycol	A	43,350
PD	Mu2e	270	Propylene Glycol (chiller: 90 gal @ 30% PG)		233
TD	IB4 CPL	805	propylene glycol		52
				propylene glycol TOTAL	51,368
TD	IB2	801	Propylene-G	L=Cylinder	378
				Propylene-G TOTAL	378
PD	Lab 6	184	Scintillator Oil		134
				Scintillator Oil TOTAL	134
FESS	Muster Substation	854	Shell Diala Oil	T84	124,560
FESS	Muster Substation	854	Shell Diala Oil	T83	122,112
FESS	Muster Substation	854	Shell Diala Oil	T81	85,032
FESS	Muster Substation	854	Shell Diala Oil	T82	76,176
FESS	Muster Substation	854	Shell Diala Oil	Y-M6S	2,160
FESS	Kautz Road Substation	860	Shell Diala Oil	T85	100,800
FESS	Kautz Road Substation	860	Shell Diala Oil	T86	115,776
FESS	Kautz Road Substation	860	Shell Diala Oil	T87	63,000
FESS	Kautz Road Substation	860	Shell Diala Oil	T88	85,032
				Shell Diala Oil TOTAL	774,648
TD	IB4 CPL	805	Sodium Bicarbonate		25
				Sodium Bicarbonate TOTAL	25
TD	IB-3 TD FIM 804	804	Sodium Chloride	C	51
				Sodium Chloride TOTAL	51
TD	Lab 5 TD FIMS 93	93	Sodium Hydroxide	E=Plastic/Non-metal Drum	77
TD	IB4-CPL	805	Sodium Hydroxide	R=Other	44
				Sodium Hydroxide TOTAL	121
TD	IB4 CPL	805	Spill X-A		300
TD	IB4 CPL	805	Spill X-C		252
ND	LArTF	787	Sulfuric Acid	lead-acid batteries	33
ND	MiniBooNE	780	Sulfuric Acid	lead-acid batteries	5
ND	MINOS	785	Sulfuric Acid	lead-acid batteries	730
ND	PC-4		Sulfuric Acid	lead-acid batteries	55
ND	SBND	789	Sulfuric Acid	lead-acid batteries	71
ND	SBN-Far	788	Sulfuric Acid	lead-acid batteries	71
FESS	CUB	214	Sulfuric Acid		5,796
FESS	Muster Substation	854	Sulfuric Acid		2,880
FESS	Kautz Road Substation	860	Sulfuric Acid		1,440
FESS	Site Wide	SITE	Sulfuric Acid	Fire Alarm Batteries	1,727
ESHQ	Site 40	840	Sulfuric Acid	R	25
ESHQ	Supershed	850	Sulfuric Acid	R	1
ESHQ	Site 39 RAF	926	Sulfuric Acid	R	8
ESHQ	Site 55 WS-3	970	Sulfuric Acid	R	4
ESHQ	Site 55 WS-2	972	Sulfuric Acid	R	2
CD	Wilson Hall 8 West	1	Sulfuric Acid	R	402
CD	Wilson Hall 16	1	Sulfuric Acid	R=Other	279
CD	FCC	3	Sulfuric Acid	R	13,024
CD	GCC	628	Sulfuric Acid	R	18,215
PD	Lab 3 (batteries)	181	Sulfuric Acid	R=Other	450
PD	MC-1 (batteries)	209	Sulfuric Acid	R=Other	222
PD	Mu2e (batteries)	270	Sulfuric Acid	R=Other	269
PD	D0 (batteries)	325	Sulfuric Acid	R=Other	300
PD	MAB (batteries)	412	Sulfuric Acid	R=Other	13
PD	LAB B (batteries)	602	Sulfuric Acid	R=Other	25
PD	LAB C (batteries)	604	Sulfuric Acid	R=Other	1
PD	Lab D (batteries)	606	Sulfuric Acid	R=Other	17
PD	BEG (batteries)	609	Sulfuric Acid	R=Other	9
PD	Lab F (batteries)	610	Sulfuric Acid	R=Other	166
PD	Lab G	612	Sulfuric Acid	R=Other	6
PD	PB7 (batteries)	626	Sulfuric Acid	R=Other	64
PD	ICTeV (batteries)	630	Sulfuric Acid	R=Other	82
TD	Lab 5 TD FIMS 93	93	Sulfuric Acid	M	16
TD	IB-1 TD FIMS 800	800	Sulfuric Acid	R	50
TD	IB4-CPL	805	Sulfuric Acid	R=Other	447
TD	IB3a	808	Sulfuric Acid		6
TD	IB4-CPL	805	Sulfuric Acid		403
TD	IB1	800	Sulfuric Acid		240
				Sulfuric Acid TOTAL	47,556
PD	Lab 7	185	Tetrafluoromethane-G	L=Cylinder	52
PD	D0	325	Tetrafluoromethane-G	L=Cylinder	389
PD	MDB	408	Tetrafluoromethane-G	L=Cylinder	70
PD	ICTeV (SeaQuest)	630	Tetrafluoromethane-G	L=Cylinder	218
				Tetrafluoromethane-G TOTAL	729
PD	MC-1	209	Transformer Oil		141
				Transformer Oil TOTAL	141
PD	MC-1 PD FIMS 209	209	Vegetable Oil (Castor)	D=Steel Drum	440
				Vegetable Oil (Castor) TOTAL	440

Tables 13 and 14 list the relative risk results in detail for both threats from outsiders and insiders. In the Tables, the column headings are:

- CON – The relative consequence (CON) of loss of the specific target from Table 9.
- THR – The likelihood of threat (THR) for each threat and target combination from Table 10.
- VLN – The vulnerability (VLN) of the PPS against the defined threat from Table 7.
- RSK – The relative risk (RSK) value used for summary purposes. The relative risk is simply an un-weighted average of the threat, consequence, and vulnerability estimates.

Table 12 Relative Vulnerability of Targets to Specific Threat Summary

	Outsider Threats					**Insider Threats**			
	Terrorists	Criminals: Individual	Criminals: Organized	Mentally Ill	Violent Activists	Criminals: Individual	Mentally Ill	Disgruntled Employee	Intelligence Collectors
Accountable Nuclear Material	L	L	L	L	L	L	M	M	L
Sensitive Information and Material	L	L	L	L	L	M	M	M	M
General Property	L	L	L	L	L	M	L	H	L
Radioactive Sources	L	L	L	L	L	L	L	L	L
SNM	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 13 Relative Risk Results for Threats from Outsiders

	Terrorists				Criminals: Individual				Criminals: Organized				Mentally Ill				Violent Activists			
	CON	THR	VLN	**RSK**	CON	THR	VLN	**RSK**	CON	THR	VLN	**RSK**	CON	THR	VLN	**RSK**	CON	THR	VLN	**RSK**
Accountable Nuclear Material	L	L	L	**L**	L	L	L	**L**	L	L	L	**L**	L	L	L	**L**	L	L	L	**L**
Sensitive Information and Material	L	L	L	**L**	L	L	L	**L**	L	L	L	**L**	L	L	L	**L**	L	L	L	**L**
General Property	L	L	L	**L**	L	L	M	**L**	L	L	M	**L**	L	L	M	**L**	L	L	M	**L**
Radioactive Sources	L	L	L	**L**	L	L	L	**L**	L	L	L	**L**	L	L	L	**L**	L	L	L	**L**
SNM	N/A	N/A	N/A	**N/A**	N/A	N/A	N/A	**N/A**	N/A	N/A	N/A	**N/A**	N/A	N/A	N/A	**N/A**	N/A	N/A	N/A	**N/A**

Table 14 Relative Risk Results for Threats from Insiders

	Criminals: Individual				Mentally Ill				**Disgruntled Employee**				**Intelligence Collectors**			
	CON	THR	VLN	**RSK**	CON	THR	VLN	**RSK**	CON	THR	VLN	**RSK**	CON	THR	VLN	**RSK**
Accountable Nuclear Material	L	L	L	**L**	L	L	L	**L**	L	L	M	**L**	L	N/A		
Sensitive Information and Material	L	L	M	**L**	L	L	M	**L**	M	L	M	**M**	M	M	M	**M**
General Property	L	L	M	**L**	L	L	M	**L**	L	L	M	**L**	L	N/A		
Radioactive Sources	L	L	L	**L**	L	L	L	**L**	L	L	M	**L**	L	N/A		
SNM	N/A	N/A	N/A	**N/A**	N/A	N/A	N/A	**N/A**	N/A	N/A	N/A	**N/A**	N/A	N/A		

Fermilab Physical Protection Systems

Overview

Fermilab applied the Protection Program Operations Order (473.3A) in designating areas as PPAs based on mission criticality and the work being performed. Areas are added and dropped as missions begin or are completed. See Exhibit 3 for the locations of PPA's/ASI's.

Fermilab currently has designated seven facilities/areas as PPA;

- Feynman Computing Center
- Accelerator Computer Room
- Accelerator Main Control Room
- Central Utility Building
- Master Substation
- Kautz Road Substation
- Grid Computing Center

Areas that do not qualify as a PPA but have some security interest, for example, key experimental areas and Wilson Hall, have been designated as Areas of Security Interest. The site is not fenced but does have road gates and security control points for access control. Buildings and other areas of security interest are protected by security officer patrols, video surveillance, key pads, locked doors, fences and/or security entry and duress alarms. Signs prohibiting trespassing, listing prohibited and controlled articles, and designating areas restricted to authorized personnel only are posted.

The following facilities are designated as Areas of Security Interest:

- Site 40
- Radiation Physics Calibration Facility
- Wilson Hall
- Site 55
- NuMI-MINOS
- Telecommunication Quarter Room
- Casey's Pond Pump House
- Tevatron and Main Injector Radio Frequency (RF) Buildings (F-0 and MI-60)
- MiniBooNE
- NuMI-MI-65
- Heavy Assembly Building (formerly known as Collider Detector Facility (CDF) Assembly Building)
- D-0 Assembly Building
- Communication Center (Security)

Barriers and Locks

Public Areas include a recreational corridor through the site from the Batavia Road entrance to the Pine Street entrance, as well as the Wilson Hall Ground Floor and Atrium, Ramsey Auditorium and Foyer. Fishing, bird watching, dog exercising, buffalo viewing, walking/jogging, bicycling, and cross-country skiing is permitted within designated areas of this corridor. Security Officers at the East and West gates check driver's licenses and issue informational flyers defining recreational areas and restricted areas. Restricted area access is controlled by signage, employee awareness, and concentrated physical protective measures for PPA's and Areas of Security Interest(ASI).
The Fermilab FS-10 budget prioritization of cyber threats is consistent with national threat estimates however; the site access approval process obliges the entry controller to permit entry for an expansive range of plausible reasons.

Access to Fermilab and its various facilities, services and resources are controlled through an Integrated Access System. This system consists of access control policies, documents, procedures, and devices. Included are Fermilab Identification Cards, vehicle logos, keys, key cards, and locks.

A key control and lock system administered by the Security Department. All building keys are issued, and locks installed under a controlled process. Designated Division, Section personnel approve each issuance or installation. The Security Department records and maintains records of all keys issued and returned. The location of lock installations is recorded. Details of the system can be found in Security Department procedures.

The Security Department is responsible for the fabrication of all security-related keys and the installation of locks and locking devices. The laboratory locksmith reports to the Deputy Security Chief and makes recommendations on key and lock systems and related matters. The Security Department has the responsibility to review plans for new buildings or modifications to existing ones and to make appropriate recommendations concerning access control and security.
The facility lock and key control program meets the DOE Directive requirements.

Security Systems

Access Control Systems Description

Fermilab access control functions are managed through a centralized system using Johnson Controls, Inc. technologies. The system is owned by Johnson Controls, Inc. and the site has a blanket ordering agreement primarily for repair purposes. Johnson Controls, Inc. (JCI) proprietary components consist of the server software and

controllers whereas other components including card readers, door contact switches, and interior request to exit sensors are off-the-shelf commercial items.

The determination of whether or not a room, facility, or area (including PPAs) is equipped with access controls (proximity card readers) resides with the Security Department in consultation with the program division or section using the facility. If desired, a request from the Division or Section head to the security office is made to add access controls and if approved, the installation of the controls is paid for out of laboratory overhead.

The rationale for installing access controls includes protection of property, protection of mission, safety regulations, and efficiencies related to the elimination of thousands of keys that were previously issued to employees.

Operationally the access control system consists of a contact switch on the door frame, a proximity card reader, a request to exit sensor (prevents door alarms when exiting a facility when readers are not installed for egress), all of which are connected to a JCI controller. Workstations are in use to monitor and interface with the access control points providing a capability to add or terminate access privileges. The JCI system is deployed as a distributed system in that several facilities, such as the gym and computers centers, have levels of control over access privileges for their facilities. Four of the workstations (three in Wilson Hall and one in Building 52) provide the status of all access points, including attempts to open with an invalid card and forced open alarms; however, the alarms generated by the JCI system do not report or interface with the Fire Information Reporting and Utility System (FIRUS).

Controlled access at the site boundary is accomplished using staffed vehicle entry control points and physical barriers. Two of the entry points have limited hours of operation (Wilson and Batavia) while the Pine Street gate is staffed 24/7. Fermilab automated the Wilson gate, in 2015, in order to alleviate the need to staff the entry point. The other two gates, Wilson and Batavia, provide limited utility during non-duty hours and would be prime candidates for automation augmented by PF as necessary. Other vehicle entry points are routinely barricaded and only opened under special circumstances such as access for construction vehicles.

Assessment of Access Control Systems

The implementation of access controls on individual facilities remains similar as it was in 2013 and supports the “security islands” concept restricting facility entry to authorized personnel only. This is especially relevant as Fermilab does not have a perimeter barricade or an exterior intrusion detection system to prevent site access from walkers or bikers. Additionally, Fermilab routinely grants access to numerous visitors entering through the vehicle-controlled entry points but has no means of

tracking the whereabouts of visitors once access has been granted. Given these circumstances, any visitor or unauthorized intruder has free access up to the skin of any facility so denying access at the facility entry points is the primary means of preventing theft, sabotage, or other malevolent acts.

Access control systems on a given facility can be initiated by the primary facility user and approved by the security elements on site. The Asset Risk Evaluation procedure is used as a qualitative way to establish PPAs and ASIs as well as to judge the adequacy of mitigations. The PPA's are the most critical facilities on site enabling and sustaining the laboratory's research mission. It is important to note that although access controls have been placed on most of the designated PPA's, alarms from the controllers do not report through the FIRUS system and therefore are not likely to be noticed by personnel in the communications room. Alarms are depicted on a JCI workstation in the communications center, but these are not typically a primary area of focus for security personnel manning the center. The JCI's proprietary system is not compatible with the in house FIRUS system, preventing interface.

Protective Force

The Fermilab PF mission is to protect government property, and personnel located at the Fermilab. The protection strategy is based on compliance with national policy and DOE directives. Protection strategies and other applicable response strategies to security incidents, suspected adversary intrusion of a facility, etc., are addressed in S&S Administrative Procedures.

PF support services are provided by Steiner Security Services, LLC at Fermilab. Steiner Security Services, LLC, provides unarmed, uniformed, union PF personnel to Fermilab. Steiner Security Services, LLC, security officers' PERC training is outlined by Illinois Department of Financial & Professional Regulation, Division of Professional Regulation. Illinois required training is provided by Steiner Security Services, LLC, at their cost but site-specific training is conducted on site and provided by Fermilab personnel. All the training is conducted on shift and does not create an overtime cost for training, which meets DBT requirements.

Protective force routine and emergency services include:

- Lock and Unlock facility exterior doors when requested for special events only.
- Investigation of vehicle accidents or loss of property (Non-Emergency).
- First responder to incidents (security, fire, medical)/Incident documentation.
- Traffic control and enforcement.
- Special event support.
- Access control for Fermilab perimeter.
- Security checks for select buildings/rooms.
- Limited Scope Performance Testing for Security Officers.

Fermilab PF management and administration positions include:

- Security Chief
- Deputy Chief
- Two Security Captains

Fermilab has authorized 21 Full Time Employee (FTE) positions under the current contract. Fermilab PF shift rotation is three 8-hour shifts within a 24-hour period. Each security officer arrives 30 minutes prior to their shift for guard mount. Table 15 shows the minimum required security personnel needed per shift defined in the SSP. Table 16 identifies the Fermilab Protective Force Post, Patrols, and Schedules. A Steiner Security Services, LLC, service account manager is also assigned to Fermilab during dayshift.

Table 15 Fermilab Protective Forces Duty Staffing

	Security Officer Supervisor	**Security Officers**
Day Shift 0700-1500hrs	1	6
Evening Shift 1500-2300hrs	1	6
Midnight Shift 2300-0700hrs	1	3

Table 16 Fermilab Protective Force Post, Patrols, and Schedule

Security Posts and Patrols	**Hours of Operation**	**Days of Operation**
Post 201 – Batavia Road Gate	0600-0030	7 days a week
Post 202 – Wilson Road Gate	0600-1630	M-F
Post 203 – Pine Street Gate	24 hours	7 days a week
Post 205 – Lieutenant/Mobile Patrol	24 hours	7 days a week
Post 211- Beat 11/Mobile Patrol	24 hours	7 days a week
Post 212 – Beat 12/Mobile Patrol	0700-2300 24 hours	M-F Sat-Sun

See Exhibit 2 for patrol beats

Security Officer Equipment

Security Officer duty and emergency equipment includes Steiner Security Services, LLC, uniforms, reflective safety vests, flashlights, pepper spray, portable radio, and mobile radio mounted in vehicles marked with Fermilab Security. Vehicles are owned by Steiner Security Services, LLC. The lieutenant's patrol is equipped with a cell phone for secondary communication.

Local Law Enforcement
Fermilab does not have a Memorandum of Understanding/Agreement (MOU/MOA) with any local law enforcement agencies, although outreach efforts to LLEA are underway. Fermilab is divided by county lines. The majority of the laboratory is in DuPage County and a small portion on the west side is in Kane County. There have not been any jurisdictional issues that have compromised the security of the laboratory when local law enforcement agencies have been requested to respond and Fermilab security continues to respond and assess all security incidents before requesting support. This meets the DBT requirements for response to site security incidents.

Analysis of Physical Protection System Vulnerabilities

The following section displays the results of the quantitative assessment of the relative vulnerability of the PPS at Fermilab PPAs and ASIs. The rating scale is defined as:

- High - The physical protection system is generally believed *not* to be effective against the defined threat.
- Moderate - The physical protection system is generally believed to be *somewhat* effective against the defined threat.
- Low - The physical protection system is generally believed to be effective against the defined threat.

The vulnerability ratings in the following table are based on the team's estimation of the effectiveness of protection measures against each of the defined threats to each asset type. Moderate or high vulnerability ratings may be due to areas at a site where failure to comply with established requirements may lead to increased vulnerabilities or may be due to inherent challenges protecting certain assets against certain threats. For example, an employee (considered an insider in policy) could steal a laptop computer without much difficulty or potential of being caught.

Meeting protection requirements does not necessarily result in elimination of all vulnerabilities. However, national and DOE standards represent federal acceptance of residual risk if compliance standards are met. In the DOE model of compliance-based security for PL7 assets, DOE assumes the responsibility for establishing physical protection policy and requirements, and the contractor assumes responsibility for due diligence in complying with the established requirements.

Asset Risk Evaluation Worksheets for PPA's

AREA:	FCC	Asset Risk Evaluation - high, medium or low								
							Risk Factors Total =			100
SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY-AV2	TARGET SUSCEPTIBILITY-AV3	TARGET ACCESSIBILITY-AV4
Disruption of Mission (TL5)	Y	3	2	3	3	1	2	3	2	2
Theft, Hostage, Protest (TL5)	Y	1	1	2	1	1	1	2	2	2
Radiological Sabotage (STL4)	N									
		PI - TOTAL: 68					AV - TOTAL 32			
Notes:	High = 3	Medium = 2	Low = 1							
2nd floor computer room										
3rd floor server room										
1st floor utility corridor										
							Mitigation Factors Total =			30
		RECOVERY POTENTIAL				PROTECTIVE MEASURES				
Weight			4			3	3	4	4	3
			Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			1			3	2	2	0	1
		PR Total: 4				PM Total: 26				
Notes:	Low = 1	medium = 2	High = 3							
Facillity has a card access system										
Facility has a video surveillence system - local										
							Adjusted Risk Rating =			70

AREA: **AD CompRm**	*Asset Risk Evaluation - high, medium or low*

Risk Factors Total = **96**

SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY-AV2	TARGET SUSCEPTIBILITY-AV3	TARGET ACCESSIBILITY-AV4
Disruption of Mission (TL5)	Y	3	3	3	1	1	3	2	2	2
Theft, Hostage, Protest (TL5)	Y	1	1	1	1	1	2	2	2	2
Radiological Sabotage (STL4)	N									
		PI - TOTAL: **62**					AV - TOTAL **34**			

Notes: High = 3 Medium = 2 Low = 1

Equipment supports MCR(PI1).

Loss of equipment would be serious impact on programPI2)

Area is on tour route(AV1&2)

Mitigation Factors Total = **31**

RECOVERY POTENTIAL					PROTECTIVE MEASURES				
Weight		4			3	3	4	4	3
		Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
		2			2	2	2	0	1
		PR Total: **8**			PM Total: **23**				

Notes: Low = 1 medium = 2 High = 3

Recovery from major damage/theft would exceed three days (RP1)

Facilty has a card access system

Adjusted Risk Rating = **65**

AREA: MCR	Asset Risk Evaluation - high, medium or low								
						Risk Factors Total =			95
SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY-AV2	TARGET SUSCEPTIBILITY-AV3	TARGET ACCESSIBILITY-AV4
Disruption of Mission (TL5)	Y	3	1	3	1	1	3	2	2	2
Theft, Hostage, Protest (TL5)	Y	2	2	1	1	1	1	2	2	2
Radiological Sabotage (STL4)	N									
		PI - TOTAL: 63					AV - TOTAL 32			

Notes: High = 3 Medium = 2 Low = 1

MCR supplies controls for the accelerator complex(PI1).
Room contains large quantity of electronics and related cabling(PI3).
The MCR is on the tour route(AV1).

						Mitigation Factors Total =				34
RECOVERY POTENTIAL						PROTECTIVE MEASURES				
Weight			4			3	3	4	4	3
			Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			2			2	3	2	0	1
		PR Total: 8					PM Total: 26			

Notes: Low = 1 medium = 2 High = 3

The MCR is occupied by trained crew members 24x7 regardless of accelerator status(PM2)
Facililty has a card access system

						Adjusted Risk Rating =				61

AREA: CUB	Asset Risk Evaluation - high, medium or low									
								Risk Factors Total =		93
SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY- AV2	TARGET SUSCEPTIBILITY- AV3	TARGET ACCESSIBILITY- AV4
Disruption of Mission (TL5)	Y	3	2	3	2	1	3	2	2	2
Theft, Hostage, Protest (TL5)	Y	1	1	1	1	1	1	2	2	2
Radiological Sabotage (STL4)	N									
		PI - TOTAL: 61					AV - TOTAL 32			

Notes: High = 3 Medium = 2 Low = 1

								Mitigation Factors Total =		31
		RECOVERY POTENTIAL				PROTECTIVE MEASURES				
Weight			4			3	3	4	4	3
			Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			1			2	2	2	1	1
			PR Total: 4				PM Total: 27			

Notes: Low = 1 medium = 2 High = 3

Facility has card access system

								Adjusted Risk Rating =		62

AREA: Master Substation	*Asset Risk Evaluation - high, medium or low*								
							Risk Factors Total =		***90***
SPECIFIC THREATS		**PROGRAM IMPACT**					**ACCESS VULNERABILITY**		
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY-AV2	TARGET SUSCEPTIBILITY-AV3	TARGET ACCESSIBILITY-AV4
Disruption of Mission (TL5)	Y	3	3	3	1	1	3	3	2	2
Theft, Hostage, Protest (TL5)	Y	1	1	1	1	1	1	1	1	1
Radiological Sabotage (STL4)	N									
		PI - TOTAL: 62					AV - TOTAL 28			

Notes: High = 3 Medium = 2 Low = 1

This electrical substation is essential to the full completion of the Laboratory's mission(PI1&2)
The four main transformers are valued in excess of one million dollars each(PI3)
The substation is an obvious major electrical installation(AV1)
The substation is located at the intersection of two major roads (AV2)

							Mitigation Factors Total =			***29***
		RECOVERY POTENTIAL				**PROTECTIVE MEASURES**				
Weight			4			3	3	4	4	3
			Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			3			2	1	2	0	0
		PR Total: 12				PM Total: 17				

Notes: Low = 1 medium = 2 High = 3

Recovery from major damage to the substation would be slow and expensive. The transformers typical take ~one year to acquire(RP1)

							Adjusted Risk Rating =			***61***

AREA: Kautz Road Substation	*Facilities/Areas Ranked - high, medium or low*

Risk Factors Total = **88**

SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY-AV2	TARGET SUSCEPTIBILITY-AV3	TARGET ACCESSIBILITY-AV4
Disruption of Mission (TL5)	Y	3	3	3	1	1	3	2	2	2
Theft, Hostage, Protest (TL5)	Y	1	1	1	1	1	1	1	1	1
Radiological Sabotage (STL4)	N									
		PI - TOTAL: 62					AV - TOTAL 26			

Notes: High = 3 Medium = 2 Low = 1

This electrical substation is essential to the full completion of the Laboratory's mission(PI1&2)
The four main transformers are valued in excess of one million dollars each(PI3)
The substation is an obvious major electrical installation(AV1)
The substation is located in an outlaying area and not readily observable by the public (AV2)

Mitigation Factors Total = **21**

RECOVERY POTENTIAL					PROTECTIVE MEASURES				
Weight			4		3	3	4	4	3
			Recovery Time-RP1		Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			1		2	1	2	0	0
		PR Total: 4			PM Total: 17				

Notes: Low = 1 medium = 2 High = 3

Recovery from major damage to the substation would be slow and expensive. The transformers typical take ~one year to acquire(RP1)

Adjusted Risk Rating = **67**

AREA: CD/GCC	Asset Risk Evaluation - high, medium or low									
									Risk Factors Total =	93
SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY-AV2	TARGET SUSCEPTIBILITY-AV3	TARGET ACCESSIBILITY-AV4
Disruption of Mission (TL5)	Y	1	3	3	1	1	2	2	2	1
Theft, Hostage, Protest (TL5)	Y	2	1	3	1	1	2	2	2	1
Radiological Sabotage (STL4)	N									
		PI - TOTAL: 65					AV - TOTAL 28			

Notes: High = 3 Medium = 2 Low = 1

Housed in Wideband counting house

Data is routed from the experiments, via fiber, through FCC.

Operation consists of thusands of computers and related electrical and electronic equipment(PI2&3).

										Mitigation Factors Total =	38
		RECOVERY POTENTIAL				PROTECTIVE MEASURES					
Weight			4			3	3	4	4	3	
			Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5	
			1			2	1	2	2	3	
		PR Total: 4				PM Total: 34					

Notes: Low = 1 medium = 2 High = 3

Facility has surveillance camera system

Facility has card access system

Adjusted Risk Rating =	55

Asset Risk Evaluation Worksheets for ASI's

AREA: S40 Rad	Asset Risk Evaluation - high, medium or low									
							Risk Factors Total =			82
SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY-AV2	TARGET SUSCEPTIBILITY-AV3	TARGET ACCESSIBILITY-AV4
Disruption of Mission (TL5)	Y	1	1	2	2	2	2	2	2	2
Theft, Hostage, Protest (TL5)	Y	1	1	1	2	2	2	2	2	2
Radiological Sabotage (STL4)	Y	Risk deemed to be theft of material					Rating incorporated under Theft			
		PI - TOTAL: 50					AV - TOTAL 32			

Notes: High = 3 Medium = 2 Low = 1

							Mitigation Factors Total =			28
		RECOVERY POTENTIAL				PROTECTIVE MEASURES				
Weight			4			3	3	4	4	3
			Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			2			2	2	2	0	0
		PR Total: 8				PM Total: 20				

Notes: Low = 1 medium = 2 High = 3

							Adjusted Risk Rating =			54

AREA: RPCF	Asset Risk Evaluation - high, medium or low									
								Risk Factors Total =		75
SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY- AV2	TARGET SUSCEPTIBILITY- AV3	TARGET ACCESSIBILITY- AV4
Disruption of Mission (TL5)	Y	1	1	2	1	1	2	2	1	1
Theft, Hostage, Protest (TL5)	Y	1	1	2	2	3	2	2	1	1
Radiological Sabotage (STL4)	Y	Risk deemed to be theft of material					Rating incorporated under Theft			
		PI - TOTAL: 51					AV - TOTAL 24			

Notes: High = 3 Medium = 2 Low = 1

Stores spare chipmunks. Takes 1 year to acquire replacements. If no spares Lab can make admin decision on monitoring required.

Cobalt 60/Cesium137 sources are sealed and or in large projectors.

HEP shutdown risk due mainly to potential media impact(PI-5).

Project delay possibility due to calibration delay(PI2). Injury or illness more likely to occur to person who steals sources(PI4).

								Mitigation Factors Total =		36
		RECOVERY POTENTIAL				PROTECTIVE MEASURES				
Weight			4			3	3	4	4	3
			Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			1			2	2	2	3	
		PR Total: 4				PM Total: 32				

Notes: Low = 1 medium = 2 High = 3

Facility has a security alarm system

Adjusted Risk Rating =	39

AREA: **Wilson Hall**	*Asset Risk Evaluation - high, medium or low*

Risk Factors Total = **81**

SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY-AV2	TARGET SUSCEPTIBILITY-AV3	TARGET ACCESSIBILITY-AV4
Disruption of Mission (TL5)	Y	1	1	3	3	3	1	3	2	2
Theft, Hostage, Protest (TL5)	Y	0	1	1	1	1	1	3	2	2
Radiological Sabotage (STL4)	N									
		PI - TOTAL: 49					AV - TOTAL 32			

Notes: High = 3 Medium = 2 Low = 1

HEP would not be directly impacted if major damage occurred to Wilson hall (PI1)

Costs to repair or move functions could be high (PI3)

Wilson is normally occupied by ~800 people during normal working hours(PI3)

Mitigation Factors Total = **35**

RECOVERY POTENTIAL					PROTECTIVE MEASURES				
Weight			4		3	3	4	4	3
			Recovery Time-RP1		Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			2		2	2	3	0	1
		PR Total: 8				PM Total: 27			

Notes: Low = 1 medium = 2 High = 3

Administrative functions can be shifted to other locations(RP1)

Has some CCTV coverage to aid patrols(PM3)

Facility has a card access system.

Adjusted Risk Rating = **46**

AREA: S55-Haz	Asset Risk Evaluation - high, medium or low								
							Risk Factors Total =		80
SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY		
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY- AV2	TARGET SUSCEPTIBILITY- AV3	TARGET ACCESSIBILITY- AV4
Disruption of Mission (TL5)	Y	1	1	3	2	1	2	2	2	2
Theft, Hostage, Protest (TL5)	Y	1	1	1	2	1	1	2	2	2
Radiological Sabotage (STL4)	N									
		PI - TOTAL: 50					AV - TOTAL 30			

Notes: High = 3 Medium = 2 Low = 1

							Mitigation Factors Total =			32
RECOVERY POTENTIAL						PROTECTIVE MEASURES				
Weight			4			3	3	4	4	3
			Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			3			2	2	2	0	0
		PR Total: 12				PM Total: 20				

Notes: Low = 1 medium = 2 High = 3

							Adjusted Risk Rating =			48

AREA:	MINOS	Asset Risk Evaluation - high, medium or low								
							Risk Factors Total =			80
SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY-AV2	TARGET SUSCEPTIBILITY-AV3	TARGET ACCESSIBILITY-AV4
Disruption of Mission (TL5)	Y	1	2	3	1	2	2	3	2	2
Theft, Hostage, Protest (TL5)	Y	1	1	1	1	1	1	1	2	2
Radiological Sabotage (STL4)	N									
		PI - TOTAL: 50					AV - TOTAL 30			

Notes: High = 3 Medium = 2 Low = 1

Building located very close to Pine St. (AV2)

High profile experiment (PI5)

							Mitigation Factors Total =			28
		RECOVERY POTENTIAL				PROTECTIVE MEASURES				
Weight			4			3	3	4	4	3
			Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			1			2	1	3	0	1
		PR Total: 4				PM Total: 24				

Notes: Low = 1 medium = 2 High = 3

Facility has a card access system

Facility has exterior cameras

Adjusted Risk Rating =	52

AREA: TeleCOMQTER	Asset Risk Evaluation - high, medium or low								
							Risk Factors Total =		**79**
SPECIFIC THREATS		**PROGRAM IMPACT**					**ACCESS VULNERABILITY**		
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY- AV2	TARGET SUSCEPTIBILITY- AV3	TARGET ACCESSIBILITY- AV4
Disruption of Mission (TL5)	Y	1	2	3	2	2	2	1	2	2
Theft, Hostage, Protest (TL5)	Y	1	1	1	1	1	1	1	2	2
Radiological Sabotage (STL4)	N									
		PI - TOTAL:	**53**				**AV - TOTAL**	**26**		

Notes: High = 3 Medium = 2 Low = 1

Equipment in this room gives the dial tone to the phone system, including "879" and "406" exchanges (PI2)

Fermi is responsible for equipment (PI3)

Supplies voice mail and paging capability (PI2)

Potential loss of "3131" system (PI4)

Communication internal and external to the Laboratory compromised (PI5)

						Mitigation Factors Total =			**20**
RECOVERY POTENTIAL					**PROTECTIVE MEASURES**				
Weight			4			3	3	4	4	3
			Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			1			2	2	1	0	0
		PR Total:	**4**			**PM Total:**	**16**			

Notes: Low = 1 medium = 2 High = 3

Located in remote area of Wilson Hall

Adjusted Risk Rating = 59

AREA: Casey's Pond	Asset Risk Evaluation - high, medium or low

Risk Factors Total = 26

SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY-AV2	TARGET SUSCEPTIBILITY-AV3	TARGET ACCESSIBILITY-AV4
Disruption of Mission (TL5)	Y	2	2	3	1	1	3	2	2	2
Theft, Hostage, Protest (TL5)	Y	1	1	1	1	1	1	1	1	1
Radiological Sabotage (STL4)	N									
		PI - TOTAL: 0					AV - TOTAL 26			

Notes: High = 3 Medium = 2 Low = 1

If Casey's Pond pump house were disabled HEP would be down. It supplies water for both fire protection and HEP
A fire engine could supply pumping capacity for fire protection but not HEP. Casey's can pump 12,000 gallons per minute.
Replacing the pumps at Casey's would take an extended period

Mitigation Factors Total = 17

RECOVERY POTENTIAL						PROTECTIVE MEASURES				
Weight			4			3	3	4	4	3
			Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			1			2	1	1	0	0
			PR Total: 4				PM Total: 13			

Notes: Low = 1 medium = 2 High = 3

Adjusted Risk Rating = 9

AREA: RF Bldgs_Tev/MI	Asset Risk Evaluation - high, medium or low									
								Risk Factors Total =		73
SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY- AV2	TARGET SUSCEPTIBILITY- AV3	TARGET ACCESSIBILITY- AV4
Disruption of Mission (TL5)	Y	2	2	2	1	1	1	1	2	2
Theft, Hostage, Protest (TL5)	Y	1	1	1	1	1	1	1	2	2
Radiological Sabotage (STL4)	N									
		PI - TOTAL: 49					AV - TOTAL 24			

Notes: High = 3 Medium = 2 Low = 1

The RF Building and the MI60 building tie the Main Injector to the Tevatron.

								Mitigation Factors Total =		21
		RECOVERY POTENTIAL				PROTECTIVE MEASURES				
			4			3	3	4	4	3
			Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			2			2	1	1	0	0
			PR Total: 8			PM Total: 13				

Notes: Low = 1 medium = 2 High = 3

Facility has exterior cameras

Adjusted Risk Rating =	52

AREA: MiniBooNE	Asset Risk Evaluation - high, medium or low									
								Risk Factors Total =		76
SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY-AV2	TARGET SUSCEPTIBILITY-AV3	TARGET ACCESSIBILITY-AV4
Disruption of Mission (TL5)	Y	1	2	3	1	2	2	1	2	2
Theft, Hostage, Protest (TL5)	Y	1	1	1	1	1	1	1	2	2
Radiological Sabotage (STL4)	N									
		PI - TOTAL: 50					AV - TOTAL 26			

Notes: High = 3 Medium = 2 Low = 1

								Mitigation Factors Total =		17
		RECOVERY POTENTIAL				PROTECTIVE MEASURES				
			4			3	3	4	4	3
			Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			1			2	1	1	0	0
		PR Total: 4				PM Total: 13				

Notes: Low = 1 medium = 2 High = 3

									Adjusted Risk Rating =	59

AREA: MI 65	Asset Risk Evaluation - high, medium or low

Risk Factors Total = 76

SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY- AV2	TARGET SUSCEPTIBILITY- AV3	TARGET ACCESSIBILITY- AV4
Disruption of Mission (TL5)	Y	1	2	3	1	2	2	1	2	2
Theft, Hostage, Protest (TL5)	Y	1	1	1	1	1	1	1	2	2
Radiological Sabotage (STL4)	N									
		PI - TOTAL: 50					AV - TOTAL 26			

Notes: High = 3 Medium = 2 Low = 1

Mitigation Factors Total = 25

RECOVERY POTENTIAL						PROTECTIVE MEASURES				
Weight			4			3	3	4	4	3
			Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			1			2	1	3	0	0
			PR Total: 4			PM Total: 21				

Notes: Low = 1 medium = 2 High = 3

Adjusted Risk Rating = 51

AREA: HAB	Asset Risk Evaluation - high, medium or low

Risk Factors Total = 73

SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY-AV2	TARGET SUSCEPTIBILITY-AV3	TARGET ACCESSIBILITY-AV4
Disruption of Mission (TL5)	Y	1	1	1	1	1	2	2	1	2
Theft, Hostage, Protest (TL5)	Y	1	1	2	2	2	1	2	2	2
Radiological Sabotage (STL4)	N									
		PI - TOTAL: 45					AV - TOTAL 28			

Notes: High = 3 Medium = 2 Low = 1

Mitigation Factors Total = 27

RECOVERY POTENTIAL					PROTECTIVE MEASURES				
Weight			4		3	3	4	4	3
			Recovery Time-RP1		Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			1		2	2	2	0	1
		PR Total: 4			PM Total: 23				

Notes: Low = 1 medium = 2 High = 3

Facility has a card access system

Adjusted Risk Rating = 46

AREA:	D0	Asset Risk Evaluation - high, medium or low								
							Risk Factors Total =			77
SPECIFIC THREATS		PROGRAM IMPACT					ACCESS VULNERABILITY			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY-AV2	TARGET SUSCEPTIBILITY-AV3	TARGET ACCESSIBILITY-AV4
Disruption of Mission (TL5)	Y	1	2	2	1	1	2	1	1	2
Theft, Hostage, Protest (TL5)	Y	1	1	2	2	2	1	2	1	2
Radiological Sabotage (STL4)	N									
		PI - TOTAL: 53					AV - TOTAL 24			

Notes: High = 3 Medium = 2 Low = 1

							Mitigation Factors Total =			35
RECOVERY POTENTIAL						PROTECTIVE MEASURES				
Weight			4			3	3	4	4	3
			Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			3			2	2	2	0	1
		PR Total: 12				PM Total: 23				

Notes: Low = 1 medium = 2 High = 3

Facility has a card access system

							Adjusted Risk Rating =			42

AREA:	*ComCenter*	*Asset Risk Evaluation - high, medium or low*								
						Risk Factors Total =				***70***
SPECIFIC THREATS		**PROGRAM IMPACT**					**ACCESS VULNERABILITY**			
Weight		5	4	4	3	2	2	2	2	2
	(YES OR NO)	ACCELERATOR / PHYSICS SHUTDOWN-PI1	MAJOR PROJ/ ACTIVITY DELAY-PI2	ADDITIONAL COSTS-PI3	INJURY / ILLNESS-PI4	ENVIRONMENTAL IMPACT OR PUBLIC IMAGE-PI5	TARGET ATTRACTIVE-NESS- AV1	TARGET VISIBILITY-AV2	TARGET SUSCEPTIBILITY-AV3	TARGET ACCESSIBILITY-AV4
Disruption of Mission (TL5)	Y	1	1	2	1	1	2	2	2	2
Theft, Hostage, Protest (TL5)	Y	1	1	1	1	1	1	2	2	2
Radiological Sabotage (STL4)	N									
		PI - TOTAL:	**40**				**AV - TOTAL**	**30**		

Notes: **High = 3** **Medium = 2** **Low = 1**

Supplies switchboard service and emergency dispatching

Emergency dispatcher and minimal switchboard capability available at Site 52.

						Mitigation Factors Total =				***38***
RECOVERY POTENTIAL						**PROTECTIVE MEASURES**				
Weight			4			3	3	4	4	3
			Recovery Time-RP1			Perimeter-PM1	Occupation-PM2	Patrols-PM3	IDS-PM4	ProxCard Access-PM5
			2			2	3	2	1	1
		PR Total:	**8**			**PM Total:**	**30**			

Notes: **Low = 1** **medium = 2** **High = 3**

This facility has a card access system

						Adjusted Risk Rating =				***32***

Appendix A 2013 RA Security Department Improvement Plan

Security Improvement 1:

Fermilab should institute procedures at the Site Entry Points that enable the PF to validate visit purposes/sponsors prior to allowing access to the site.

Control post orders direct the PF to validate the purpose and area being visited or accessed by each vehicle. The PF contacts the Security Communication Center to validate any visitors accessing non-public areas.

Security Improvement 2:

Fermilab should automate all vehicle access points to the Site and augment them during peak hours with PF, as needed.

In 2014 the Wilson Street gate was automated. The laboratory determined Batavia Road gate automation was not feasible due to multiple factors (cost, geography, infrastructure concerns).

Security Improvement *3*:

Fermilab should transfer alarms generated at PPA's (to include the industrial complex video and access control system signal data) through the JCI system into FIRUS.

The JCI's proprietary system is not compatible with the in house FIRUS system, preventing interface.

Security Improvement *4*:

Fermilab should continue to promote mutual aid and cooperation with local first responder agencies by including them in the Site Emergency Drills and select limited scope performance tests conducted by the PF.

During three consecutive Saturdays in October 2016, the Fermilab Fire Department (FFD) collaborated with local fire departments and conducted a high-rise drill in Wilson Hall. In 2017, in preparation and response to its 50th Anniversary, Fermilab liaison and collaborated with law enforcement from city, county, state and federal agencies. In addition, planning efforts included Kane and DuPage County Offices of Emergency Management and local surrounding Fire/EMS Departments.

Security Improvement *5:*

Fermilab senior management should begin immediate training and emergency drills on workplace violence and particularly "active shooter" scenarios.

In 2014, Fermilab Senior management (Directorate) and members of the Emergency Operation Center, Security, Fire/EMS participated in a tabletop exercise (TTX) simulating an active shooter scenario on Wilson Hall. This TTX also involved members from the FBI and county coroner's office.

Security Improvement *6:*

Fermilab should continue to respond to emergency incidents.

Fermilab FFD/EMS and Security does respond to all emergency incidents.

Security Improvement *7:*

The practice of checking select buildings when time allows, provides a deterrent to property theft, is a good business practice, and should be continued.

The PF continues to conduct security patrols of buildings.

Security Improvement *8:*

Fermilab should discontinue funding traffic enforcement with the FS-10 budget. If Fermilab management elects to continue this practice, then funding should be secured from a different source.

As a PL8 facility, limited traffic enforcement is performed to protect life and safety.

Security Improvement *9:*

Fermilab should continue the current function at the CAA Gates and evaluate the need for the number of PF after an assessment of the installed technology.

Fermilab shall evaluate the need for the number of PF after any technology installation.

Appendix B 2018 RA Security Department Improvement Plan

Security Improvement 1

Fermilab Security Department should re-evaluate some critical assets to determine if additional protective measures are needed, including Wilson Hall and the Communications Center.

Security Improvement 2

Fermilab Security Department should consider eliminating the weighting incorporated into the Asset Risk Evaluation spreadsheet to simplify the risk evaluation. If eliminated, Fermilab must establish new scoring for identifying PPAs, ASIs and adequate protective measures.

Security Improvement 3

Fermilab Security Chief is included in the new facility design review. Fermilab should fold in the Security Supervisors into this review as well to ensure a security perspective is always provided to new facility design.

Security Improvement 4

Fermilab Security should re-evaluate the following assets due to new activities, mission changes or other change that affects the security standing, including:

- Proton Assembly Building
- PC4
- Industrial Center Building
- Lab 2

Security Improvement 5

Fermilab Security should re-evaluate the new assets constructed since the previous RA, including:

- Short Baseline Neutrino (SBN) Near Detector Building
- SBN Far Detector Building
- MC1
- Mu2e

Fermilab Security Department Improvement & Five-Year Strategic Plan

Security Improvement 1, 2019-2020

- Secure a new sitewide unarmed, uniformed security guard and patrol services contract.
- S&S Plan to be incorporated into DocDB or other medium.
- Place all PL7 locations and PPA's into GIS.
- Use Axis security camera technology to enhance Fermilab's surveillance capabilities.
- Expand ShotSpotter program to include new experimental buildings/locations/complex.
- Identify a plan moving forward to resolve the Badging/ Access Issues at Fermilab with Foreign Visits & Assignments DOE Order(s).

Security Improvement 2, 2020-2021

- Complete a FARE (risk assessment) for every building on Fermilab.
- Create a sub-committee to Consolidate Risk Assessments on Fermilab into comprehensive program which includes Highly Protective Risk (HPR) assessments.
- Conduct a complete Critical Infrastructure Assessment on Fermilab.

Security Improvement 3, 2021-2022

- Complete a FARE (risk assessment) for every building on Fermilab.
- Assess the data from the FARE and incorporate into GIS.
- Assess the current security beats/patrols and adjust the beats into zones. Data that will drive security decisions.
- GEO fence the open areas for use of drone technology.
- Request to secure funding for Fermilab Emergency Services building.
- Based on the data derived from the FARE, prepare a plan with Directorate to move non-essential projects into different areas on Fermilab to lower risk.

Security Improvement 4, 2022-2023

- Complete a FARE (risk assessment) for every building on Fermilab.
- Based on the data derived from the FARE, implement a five-year plan with Directorate to start moving non-essential projects into different areas on Fermilab to lower risk.

Security Improvement 5, 2023-2024

- Complete a FARE (risk assessment) for every building on Fermilab.
- Reevaluate Security Zones on Fermilab based on current risks
- Reevaluate Physical Security Contract, prepare for new RFI
- Transition current Comms Center into back-up Comms Center.
- Transition Emergency Operations Center (EOC) into back-up EOC.

Hazard Analysis Report 1, 2019-2020

Fermilab is developing an Acquisition plan in part, to secure a new contract for the sitewide unarmed, uniformed security guard and patrol services in accordance with DOE Order 473.3A by the end of September 2019. In addition, Fermilab has completed a Supplemental Sole Source Agreement with Procurement to engage Allied Universal Security to provide an "as needed" security personnel to staff Fermilab's Security gates. This will allow Fermilab to meet the requirements of the DOE Orders before a new RFP can be finalized, or in the event a contractor cannot meet requirements.

The current safeguard and security methods used in the United States finds itself in a unique paradigm shift and is forced to consider additional security methods to be successful in this current climate. The Fermilab Security Program is moving into a new era of safety and security which prioritizes the use of technology and best practices to adequately protect the critical infrastructure on Fermilab. Fermilab is analyzing the physical protection strategies which are outlined in the DOE Order, Design Basis Threat (DBT). In order to accomplish this, Fermilab is taking a proactive multi-step process by combining the use of Geographic Information Systems (GIS) and Fermilab Asset Risk Evaluation (FARE) assessments to visually record the Protection Level (PL) 7 locations, and specifically, Property Protection Areas (PPA). Fermilab's chemical inventory consists only in non-reportable quantities therefore Fermilab is exclusively a PL 7 DOE site. This GIS map (Exhibit 5) will also illustrate the ShotSpotter expansion program, Axis technology expansion program, and Axis Camera current and future locations. These camera locations were determined by either incidents (property damage/theft) that drove a need to secure an area more effectively or by the assessments of our critical areas. With the changing environment and the need to secure our unsecure borders at Fermilab, the Security Department is analyzing new technology that would allow for AXIS Perimeter Defender detection technology using our current AXIS Camera system. This would allow for thermal and radar technology to alert the Security Department when an abnormal situation is taking place. AXIS Perimeter Defender automatically applies a metadata overlay in the form of bounding boxes and trajectories that show the detection and tracking of moving people and vehicles. This allows for Fermilab to secure its borders without the use of a tractional perimeter fencing; preserving the open site.

With the implementation of the FARE assessment, Fermilab will institute a five-year cycle to complete all building assessments at Fermilab in accordance with this new DOE Order for the DBT. The FARE assessment is a weighted average Risk Assessment that focuses on threats associated with the current environment Fermilab faces paralleled with a focus on critical infrastructure. This will allow for data driven decision making on the building security, pre-construction security planning, the locations of experiments, and the safeguarding of information that is contained at some locations. Analyzing the data will allow for an educated discussion on whether or not new security measures need to be provided or the location of experiments need to be adjusted in order to comply with the new Foreign Visits & Assignments DOE International Science and Technology Engagement Policy directive that is currently being set in place for all Science Laboratory's under DOE. This policy will drive further considerations for badging and access on Fermilab. This policy will lead to the update of DOE Order 142.3A, Unclassified Foreign Visits and Assignments Program.

The Fermilab Security Program will be implementing additional methods to the organization and structure of its current processes. Keeping in mind the upcoming DOE Safeguard & Security (S&S) Audit in the Fall of 2019, the Fermilab Security Program will consult the Quality Assurance Section at Fermilab to analyze the processes for streamlining this Audit into Fermilab's DocDB (document database). This will allow for a structured approach for Security to not only comply with DOE Order 470.4B, (Safeguards and Security Program Planning and Management), but more efficiently meet the requirements in order to train and exercise to this requirement internally.

Hazard Analysis Report 2, 2020-2021

The Fermilab Security Program will continue to complete FARE risk assessments on site. Initially the security assessment team will integrate into Fermilab's FESS Engineering compliance review process in order to provide security pre-planning considerations. As part of this initiative, the security assessment team will make themselves available for the appropriate FESS Engineering meetings. Secondly the security assessment team will follow the scheduled FESHM 6015; Highly Protective Risk (HPR) inspections schedule and complete their FARE assessments in tandem. The security Assessment team will look for ways to incorporate the nuances of the FARE assessment into the established HPR inspections. The collaboration of the both assessment teams will be invaluable.

The Fermilab Security Program will take a closer look at all Property Protection Areas (PPA) and identify ways to take a more comprehensive look at identifying all 16 area of the Department of Homeland Security (DHS) Critical Infrastructure Sectors and how they will be incorporated into the HPR and FARE assessments.

Hazard Analysis Report 3, 2021-2022

The Fermilab Security Program will continue to complete FARE risk assessments on site while following the FESHM 6015; Highly Protective Risk (HPR) inspections team's schedule; completing their FARE assessments in tandem.

The Fermilab Security Program will incorporate the data from the FARE assessments into Geographic Information System (GIS); seeking the guidance from GIS professionals on ways to streamline antiquated spreadsheets. Once this information is uploaded into GIS the information will be analyzed; allowing for decisions to be formulated based on new ways of looking at the information. It is very possible that the combination of FARE assessments, PL7 locations, and Critical Infrastructure (PPA) locations (Exhibit 1) will lead to the formulation of Security Zones instead of Security Beats. Beats follow a geographical area determined by size whereas zones are created to justify the importance of assets within a given area. Zones where no or minimum critical assets exist lead to the justification of alternative options for securing these zones. For an example, the use of drones and other motion detection camera technology would be an effective and efficient way to cover a low risk zone. These automatically recharging drones can easily be geofenced to follow a predesignated flight path with the use of GIS. Based on the data derived from these assessments, a well thought out plan with the Office of the Directorate should be considered to move non-essential projects into different zones to lower Fermilab's risk.

Due to the aging infrastructure on Fermilab and based on the data from the identification of the PL7 and Critical Infrastructure (PPA) locations it is reasonable to assume and financially begin planning for the perfect location for an Emergency Services building which would incorporate Emergency Management, GIS, Fire Services, and the entire Security Program to include the Communications Center.

Hazard Analysis Report 4, 2022-2023

The Fermilab Security Program will continue to complete FARE risk assessments on site while following the FESHM 6015; Highly Protective Risk (HPR) inspections team's schedule; completing their FARE assessments in tandem.

Continue to plan for the implementation of a five-year plan with the Directorate to start moving non-essential projects into different zones to lower Fermilab's risk.

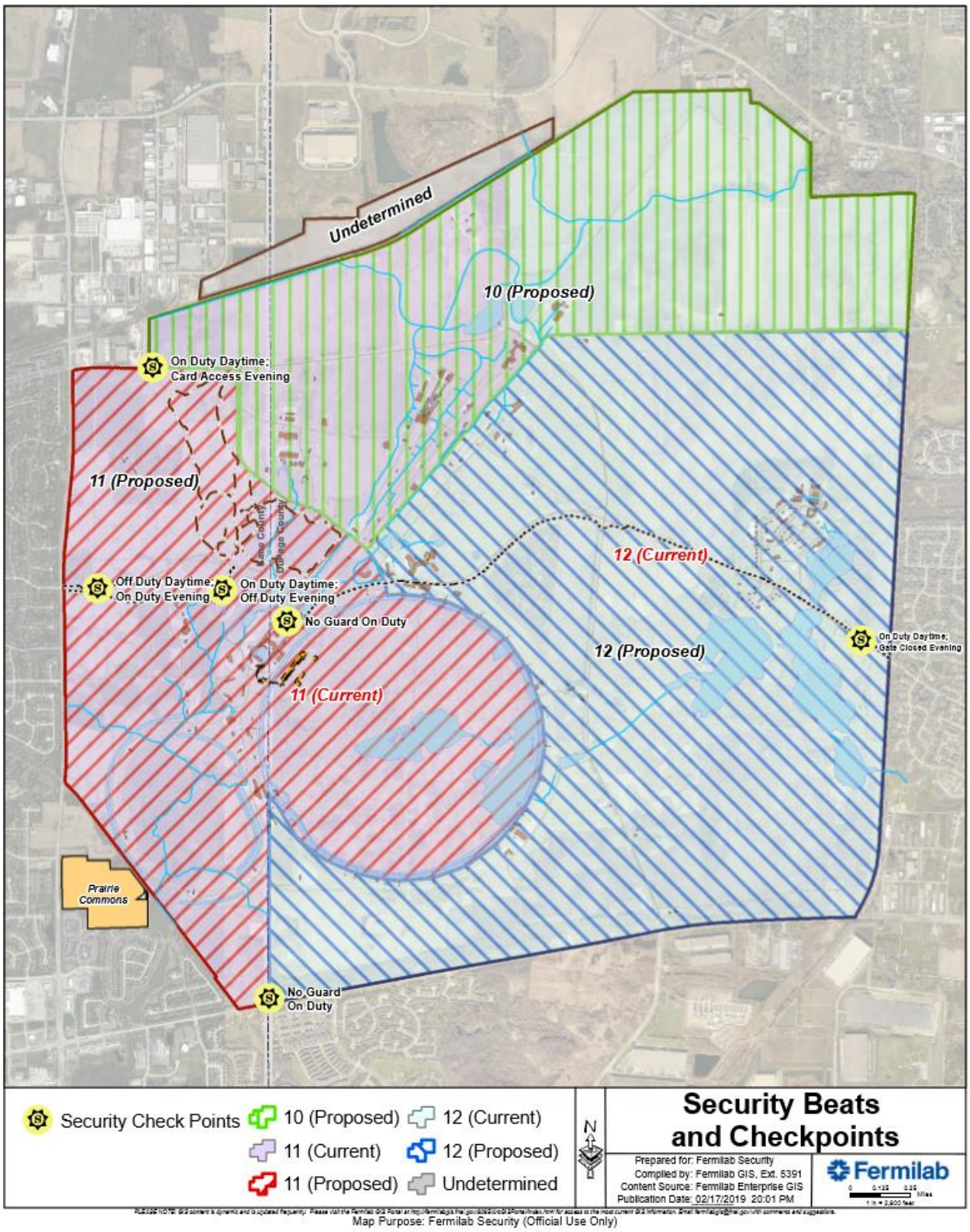
Hazard Analysis Report 5, 2023-2024

The Fermilab Security Program will complete all on site FARE risk assessments. Continue to Reevaluate Security Zones on Fermilab based on current risks. Reevaluate the Physical Security Contract and prepare for new RFI and RFP. Consider the plan to transition the current Comms Center into a back-up Comms Center and consider the transition of the Emergency Operations Center (EOC) into a back-up EOC. We may need to project out for this funding into 2023, but if funding is available sooner the Security Department will start as soon as possible.

Cost Analysist

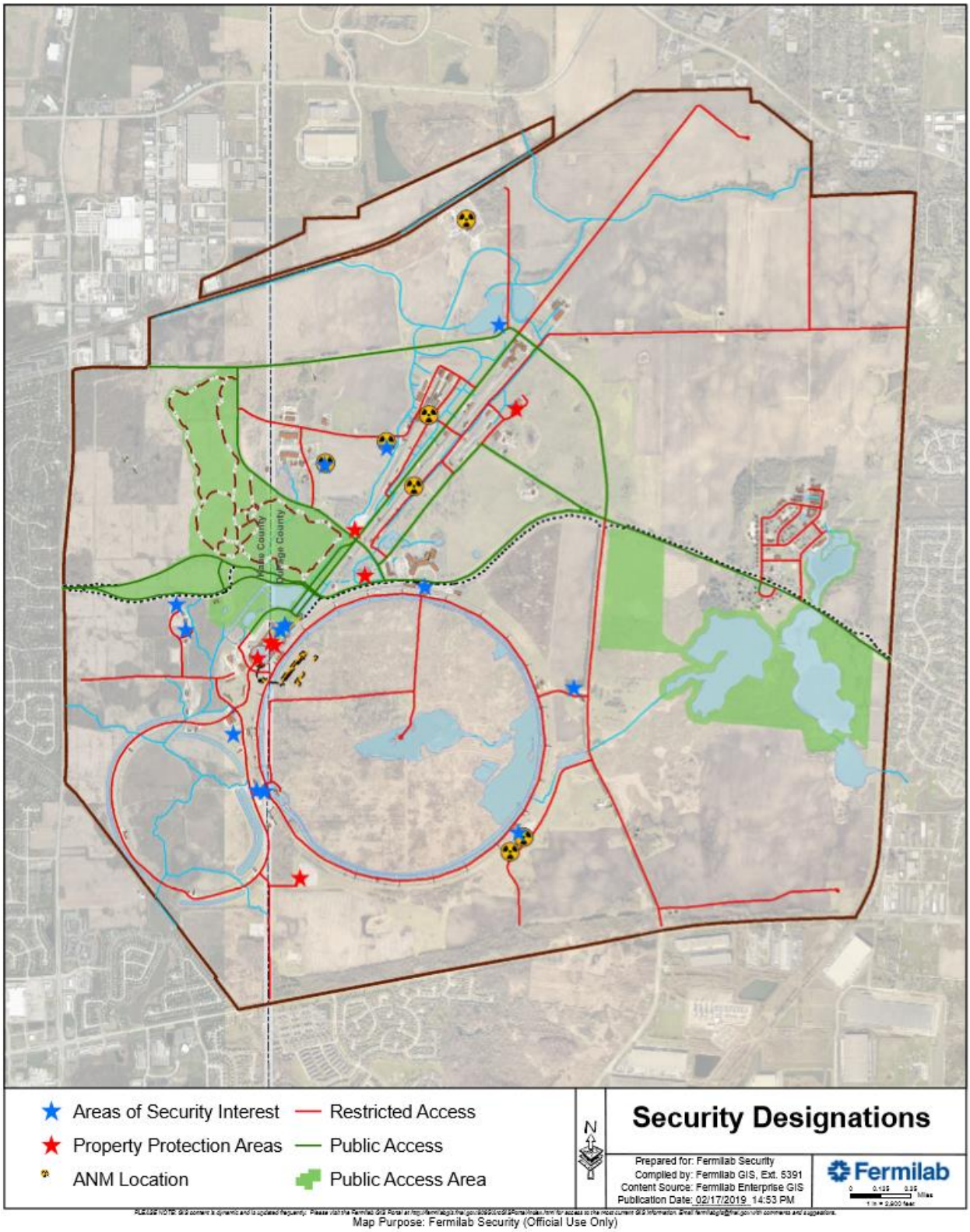
As Fermilab continues to drive the use of Security infrastructure and technology to isolate problematic threat issues, the realistic breakdown of costs becomes a visible factor in preparedness. The five-year high priorities listed in Exhibit 7 will help Fermilab focus on priorities for the future.

Exhibit 2



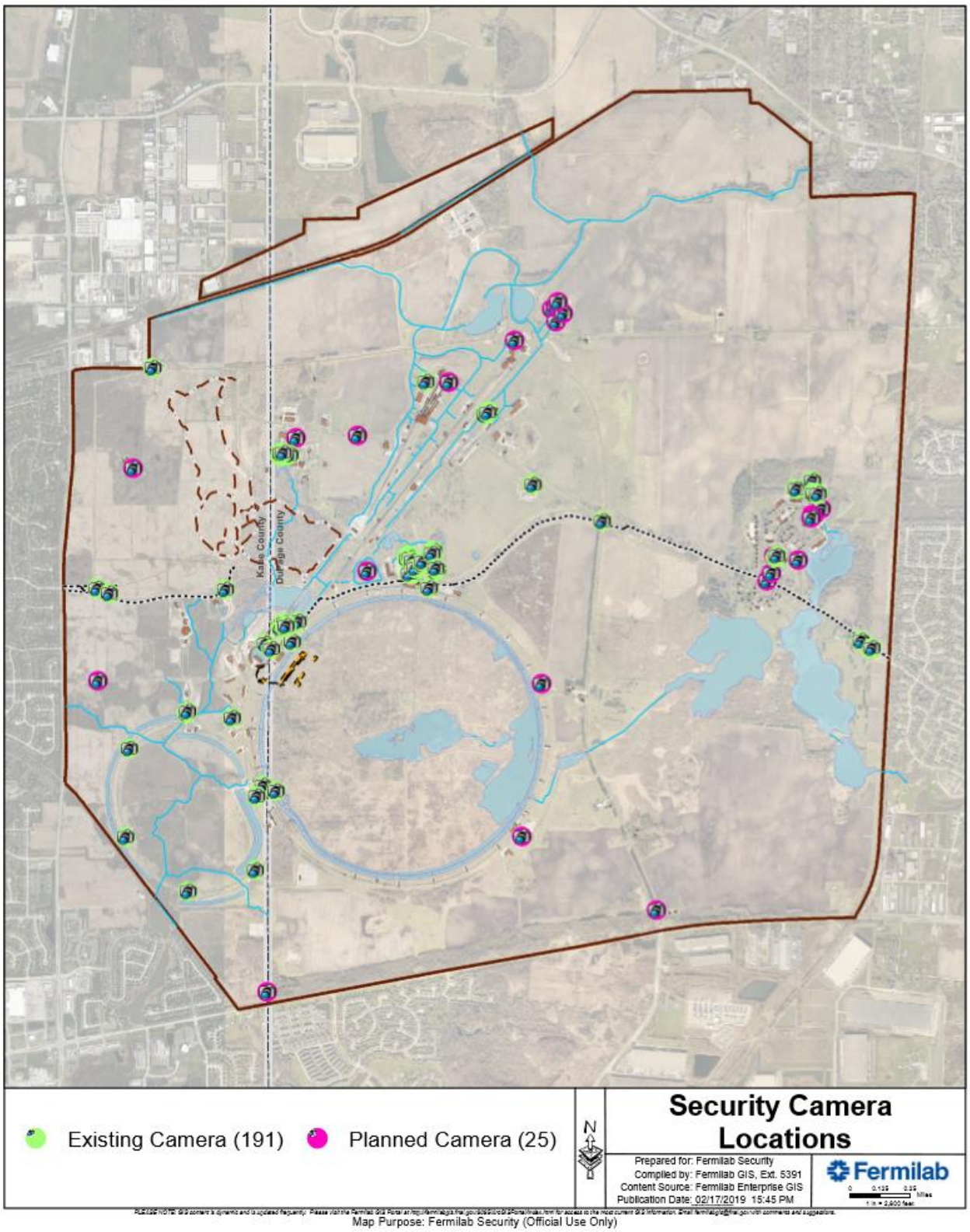
Map Purpose: Fermilab Security (Official Use Only)

Exhibit 3



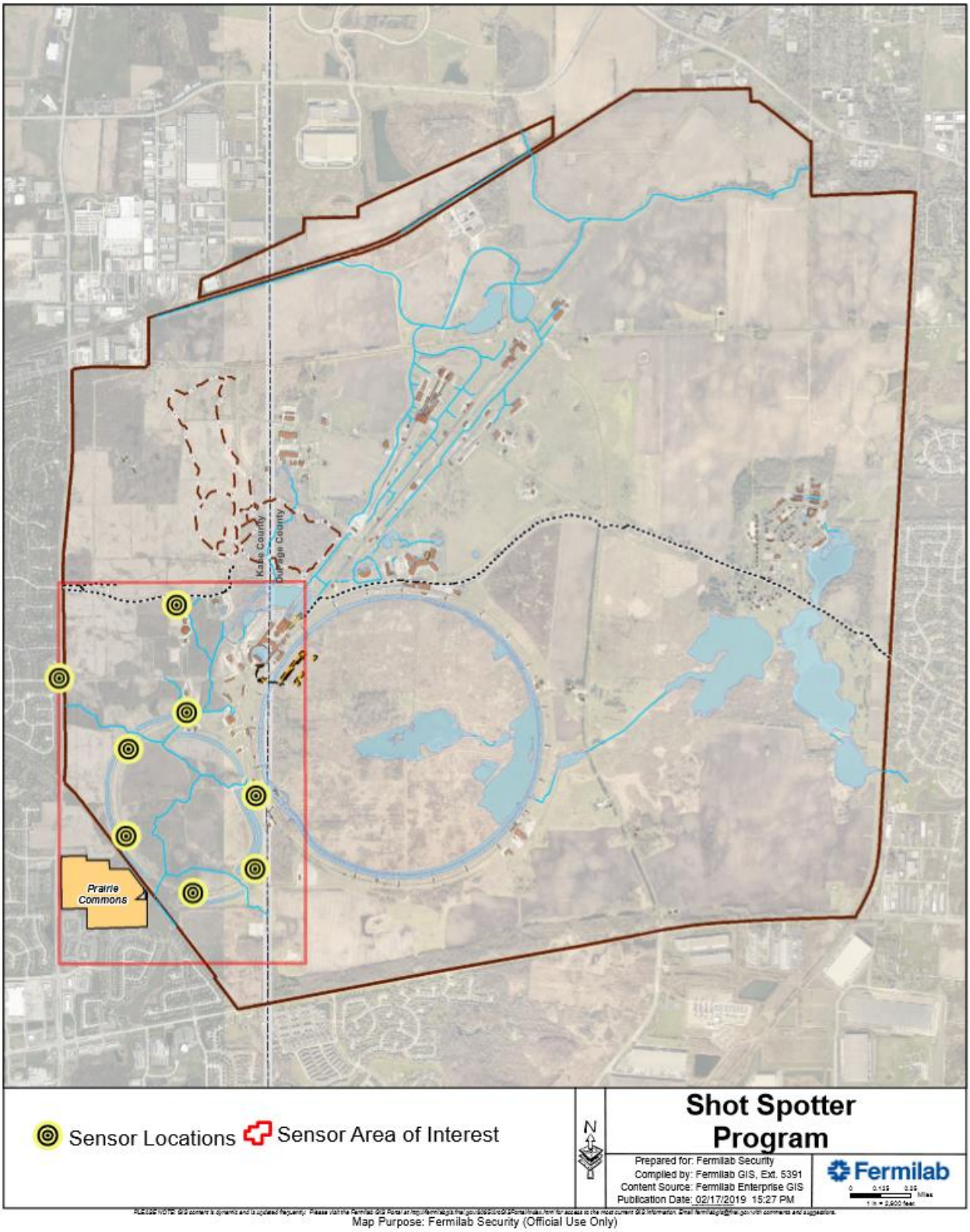
Map Purpose: Fermilab Security (Official Use Only)

Exhibit 4



Map Purpose: Fermilab Security (Official Use Only)

Exhibit 5



Map Purpose: Fermilab Security (Official Use Only)

Exhibit 6

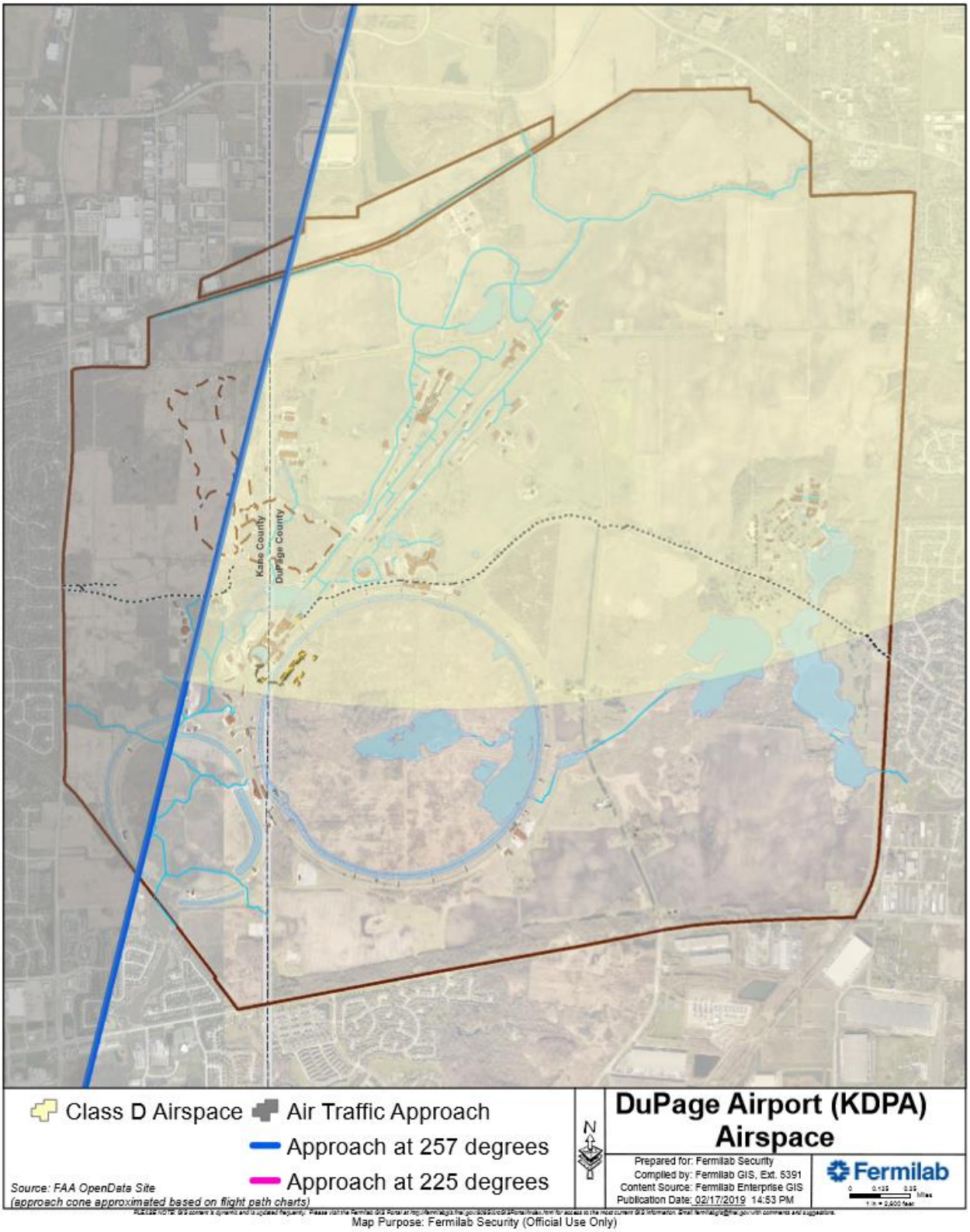

Kane County
DuPage County
Class D Airspace
Air Traffic Approach
Approach at 257 degrees
Approach at 225 degrees
Source: FAA OpenData Site
(approach cone approximated based on flight path charts)
N
DuPage Airport (KDPA) Airspace
Prepared for: Fermilab Security
Compiled by: Fermilab GIS, Ext. 5391
Content Source: Fermilab Enterprise GIS
Publication Date: 02/17/2019 14:53 PM
Fermilab
Map Purpose: Fermilab Security (Official Use Only)

Exhibit 7

Fermilab Security Department 5yr Cost Analysis			
Security Units	**Quantity**	**Cost / Item**	**Projected Cost**
Physical Security			
Fermilab Security FTE	1	$ 75,000.00	$ 75,000.00
Fermilab Lock Shop (Succession)	1	$ 75,000.00	$ 75,000.00
Security Vehicles Replacement	2	$ 50,000.00	$ 100,000.00
Back Up EOC			$ 1,000,000.00
Security Technology			
Server (additional)	1	$ 15,000.00	$ 15,000.00
AXIS Cameras	50	$ 500.00	$ 25,000.00
AXIS Thermal / Perimeter Software	20	$ 300.00	$ 6,000.00
Cemetery Light & Security Camera	1	$ 65,000.00	$ 65,000.00
Johnson Control Inc - Audio / Video Phone	1	$ 9,200.00	$ 9,200.00
PTZ -Cameras	12	$ 2,800.00	$ 33,600.00
TV + mounts EOC	3	$ 600.00	$ 18,000.00
iPads for Security Department	3	$ 500.00	$ 1,500.00
Sitewide unarmed, uniformed Security Guard & Patrol Services Contract			
Guard Force Services			$ 17,000,000.00
		TOTAL	**$ 18,423,300.00**

- END -