Report to Congress on the Security Inspection Program for Operating Commercial Power Reactors and Category I Fuel Cycle Facilities: Results and Status Update

Annual Report for Calendar Year 2019

U.S. Nuclear Regulatory Commission
Office of Nuclear Security and Incident Response
Washington, DC 20555-0001

Enclosure 1

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ABSTRACT

This report fulfills the requirements of Section 170D.e of the Atomic Energy Act of 1954, as amended (AEA) (42 U.S.C. §2210d(e)), which states, "[n]ot less often than once each year, the Commission shall submit to the Committee on Environment and Public Works of the Senate and the Committee on Energy and Commerce of the House of Representatives a report, in classified form and unclassified form, that describes the results of each security response evaluation conducted and any relevant corrective action taken by a licensee during the previous year." Additionally, Section 170D.a of the AEA (42 U.S.C. §2210d(a)) grants the U.S. Nuclear Regulatory Commission (NRC) the authority to determine which licensed facilities must undergo these security evaluations. Due to the nature, form, and quantity of nuclear material, the NRC is reporting the security response evaluation results for the Nation's fleet of operating commercial nuclear power plants (NPPs) and Category I (CAT I) fuel cycle facilities. To aid in understanding how the NRC regulates, the NRC is also providing a description of relevant security programs, including: the Reactor Oversight Process (ROP), the Security Baseline Inspection Program for NPPs, a force-on-force evaluation description, and the CAT I Fuel Cycle Facilities Security Oversight Program. This report is a comprehensive overview of the combined results of these security programs for calendar year (CY) 2019.

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ABBREVIATIONS AND ACRONYMS

10 CFR	Title 10 of the *Code of Federal Regulations*
ADAMS	Agencywide Documents Access and Management System
AEA	Atomic Energy Act of 1954, as amended
ERA	Energy Reorganization Act of 1974, as amended
CAT I	Category I
CY	calendar year
DBT	design-basis threat
FOF	force-on-force
HEU	highly enriched uranium
NOV	notice of violation
NPP	nuclear power plant
NRC	U.S. Nuclear Regulatory Commission
PI	performance indicator
ROP	Reactor Oversight Process
SDP	significance determination process
SL	severity level
SRM	Staff Requirements Memorandum
SSNM	strategic special nuclear material
U.S.C.	*United States Code*

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1. INTRODUCTION

This report fulfills the requirements of Section 170D.e of the Atomic Energy Act of 1954 , as amended, (AEA) (42 U.S.C. §2210d(e)), which states, "[n]ot less often than once each year, the Commission shall submit to the Committee on Environment and Public Works of the Senate and the Committee on Energy and Commerce of the House of Representatives a report, in classified form and unclassified form, that describes the results of each security response evaluation conducted and any relevant corrective action taken by a licensee during the previous year." Additionally, Section 170D.a of the AEA (42 U.S.C. §2210d(a)) grants the U.S. Nuclear Regulatory Commission (NRC) the authority to determine which licensed facilities must undergo these security evaluations. Due to the nature, form, and quantity of nuclear material, the NRC is reporting the security response evaluation results for the Nation's fleet of operating commercial nuclear power plants (NPPs) and Category I (CAT I) fuel cycle facilities.[1]

Conducting force-on-force (FOF) inspections and implementing the security inspection program are two of the regulatory activities that the NRC performs to ensure the secure and safe use of radioactive and nuclear materials by the commercial nuclear power industry and CAT I fuel cycle facilities. In support of these activities, the NRC evaluates relevant intelligence information and conducts vulnerability analyses to determine realistic and practical security requirements and mitigating strategies for known or reasonable threats. The NRC takes a risk-informed, graded approach to establish appropriate regulatory controls, to enhance the agency's inspection efforts, to assess the significance of security issues, and to require timely and effective corrective action for identified deficiencies by licensees of commercial NPPs and at CAT I fuel cycle facilities. The NRC also relies on interagency cooperation to develop an integrated approach to the security of nuclear facilities and to contribute to the NRC's comprehensive evaluation of licensee security performance.

This report provides both an overview of the NRC's security inspection, FOF, and related programs, and summaries of the results of those inspections. The NRC staff's communications and outreach activities with the public are also described.

[1] CAT I fuel cycle facilities are those that use or possess at least a formula quantity of SSNM. The term "formula quantity" is defined in Title 10, "Energy," of the *Code of Federal Regulations* (10 CFR) 70.4, "Definitions," as strategic special nuclear material (SSNM) "in any combination in a quantity of 5000 grams or more computed by the formula grams = (grams contained [uranium]-235) + 2.5 (grams [uranium]-233 + grams plutonium). This class of material is sometimes referred to as a Category I quantity of material."

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2. REACTOR SECURITY OVERSIGHT PROCESS

2.1 Reactor Oversight Process Framework

The NRC assesses nuclear power plant (NPP) licensees' performance under NRC regulations, license requirements, and other applicable standards for implementing its corrective action programs. The ROP is the NRC's program to inspect, measure, and assess the safety and security performance of a licensee, and to respond to a decline in performance. The ROP is a risk-informed process with three key strategic performance areas:

- reactor safety (including avoiding incidents and reducing consequences if they occur)
- radiation safety for both plant workers and the public during routine operations
- protection of the plant against radiological sabotage or other security threats

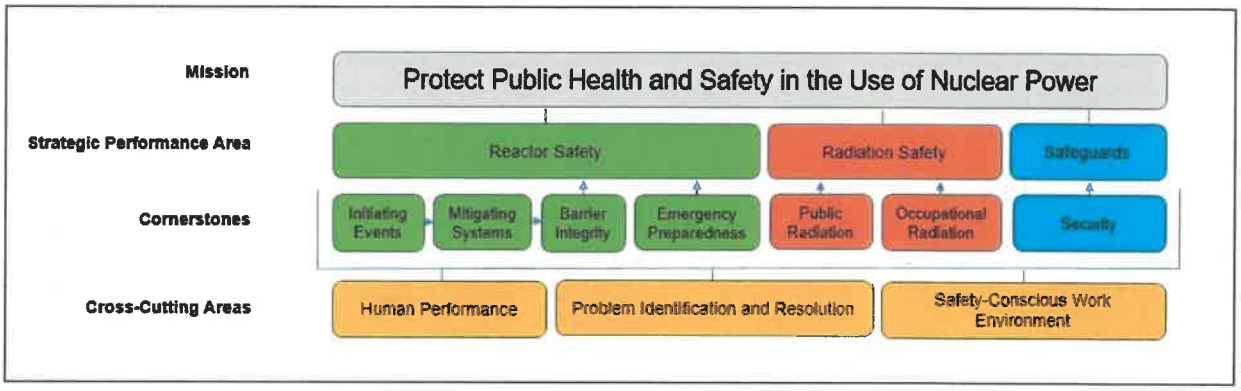

Figure 1: Reactor Oversight Framework[2]

The ROP collects information about licensee performance, assesses the information for its safety and security significance, and provides for appropriate licensee and NRC response. To measure NPP performance, the oversight program focuses on seven specific "cornerstones," which reflect and support the safety of NPP operations in three strategic performance areas. In addition to these cornerstones, the ROP features three "cross-cutting" elements, so named because they affect each of the cornerstones.

2.2 Measuring and Inspecting Nuclear Power Plant Performance

The NRC evaluates licensee performance by analyzing two distinct inputs: inspection findings resulting from the NRC's inspection programs and performance indicators (PIs) reported by the licensees. The results of these inspections and PIs contribute to an overall assessment of licensee performance. In addition, the NRC conducts periodic reviews and annual assessments of the effectiveness of each licensee's programs to identify and correct problems.

PIs use objective data tracked by each NPP licensee to monitor performance for each cornerstone. A licensee collects the data for each PI and submits this data to the NRC on a quarterly basis. Each PI's data is measured against established thresholds that are related to their effect on performance. The security inspection program is designed, in part, to verify the accuracy of PI information and to assess licensee performance that is not directly measured by

[2] The security cornerstone is further discussed in this report's third chapter, "Nuclear Reactor Security."

PI data. The PIs complement the inspection program by providing additional insights into licensee performance at a plant in selected areas.

2.3 Inspection Programs

The ROP includes baseline inspections that are common to all NPPs. The NRC may perform inspections beyond the baseline at plants with licensee performance that is below established thresholds, as assessed through information gained from PIs and NRC inspections. The NRC staff may also perform additional inspections in response to a specific event or problem. Inspections may be conducted by inspectors from NRC headquarters, any of the four regional offices, and/or NRC resident inspectors that work at each NPP.

The baseline inspection program has three parts:

- inspections of areas not covered by PIs, or where a PI does not fully cover the inspection area;
- inspections to verify the accuracy of a licensee's PI reports; and
- reviews of the licensees' effectiveness in finding and resolving problems.

2.4 Performance Evaluation

After compiling and reviewing PI data, the NRC posts PIs on the NRC Web site. NRC staff evaluate PI data and integrate the data with inspection findings to develop an assessment of licensee performance. Each PI is measured against the ROP criteria using a color-coded system for safety performance:

- green — performance within an expected range where cornerstone objectives are met
- white — performance outside of an expected range, but cornerstone objectives are still being met
- yellow — cornerstone objectives are being met, but with a minimal reduction in the safety margin
- red — a significant reduction in safety margin that requires the NRC staff to evaluate and integrate the PI with findings of the security inspection program to provide a comprehensive assessment of the NPP's security performance

The staff uses the NRC's baseline security significance determination process (SDP) to evaluate security inspection-related findings and determine the significance of security program deficiencies.[3] The NRC assigns the following colors to inspection findings evaluated within the SDP:

- green — a finding of very low safety or security significance
- white — a finding of low to moderate safety or security significance
- yellow — a finding of substantial safety or security significance
- red — a finding of high safety or security significance

[3] The SDP for NPPs uses risk insights, where appropriate, to help the NRC to determine the significance of inspection findings. These findings include both programmatic and process deficiencies.

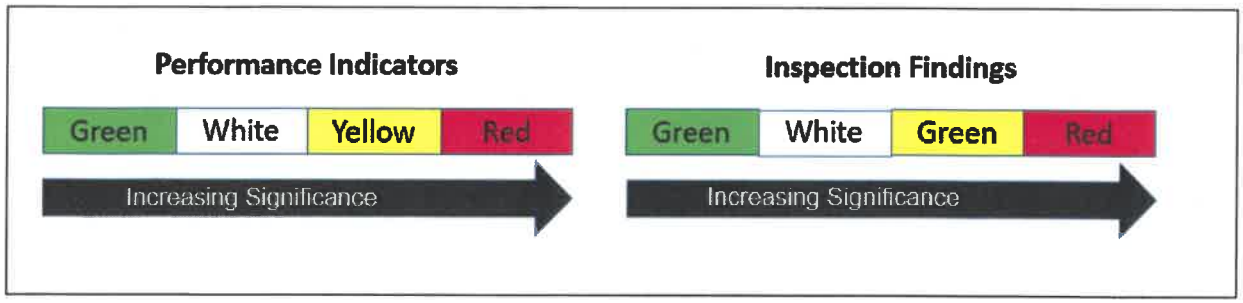

Figure 2: Reactor Oversight Action Matrix PIs

Information on all seven ROP cornerstones is available on the NRC's public Web site. Security information is included in the quarterly updates to action matrix inputs.[4] The Action Matrix Summary, posted on the NRC's public web page, only provides security inputs that are determined to be of very low significance (i.e., green); security inputs of greater significance (i.e., white, yellow, or red) are presented to simply reflect greater-than-green significance. Not specifying the actual "color" of greater-than-green security inputs is consistent with the Commission's information protection policy. Similarly, specific information about all security performance deficiencies will continue to be withheld from public disclosure to be consistent with the Commission's information protection policy.[5]

2.5 Assessing Reactor Performance

The SDP helps inspectors determine the safety significance of inspection findings. The staff uses the process for an initial screening review to identify those inspection findings that would not significantly increase risk and thus, do not need to be further analyzed. Remaining inspection findings are then subject to a stringent risk assessment, using the next phase of the SDP to determine whether the finding is green, white, yellow, or red and whether further regulatory action is warranted.

Each quarter, the NRC staff reviews the performance of all NPPs as measured by the PIs and inspection findings. Every 6 months, the NRC staff expands the review to include planning of inspections for the following 12-month period. Each year, the final quarterly review entails a more detailed assessment of plant performance over the previous 12 months and preparation of a performance report.

The NRC's quarterly reviews of plant performance, which consider both PIs and inspection findings, determine what additional actions, if any, the staff will take if there are signs of declining performance. The process uses five levels of regulatory response that increase NRC regulatory review as plant performance declines. The NRC regional office where the plant is located manages the first three levels of heightened regulatory review. The highest two levels call for an agency-level response by senior management from both headquarters and regional offices.

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[4] The action matrix identifies the range of NRC and licensee actions and the appropriate level of communication for different levels of licensee performance. Information on the action matrix is provided in section 2.6, "NRC Response to Plant Performance."

[5] Staff Requirements Memorandum (SRM) for SECY-04-0191, "Withholding Sensitive Unclassified Information Concerning Nuclear Power Reactors from Public Disclosure," dated November 9, 2004, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML043140175) directed the NRC staff to withhold specific information relating to findings and PIs to ensure that security-related information is not provided to a potential adversary.

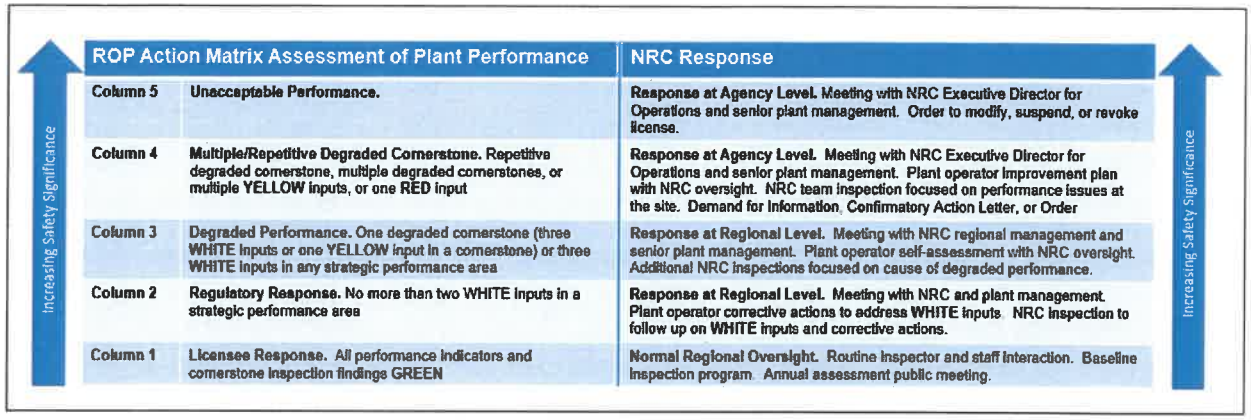

Figure 3: NRC Response Plan to ROP Assessment of Nuclear Power Reactor Performance

2.6 Violations of NRC Requirements

The NRC's enforcement jurisdiction is derived from the AEA and the Energy Reorganization Act of 1974, as amended (ERA). The enforcement program has two goals: (1) compliance with regulatory requirements, and (2) prompt and comprehensive identification as well as correction of violations.

Violations may be identified through inspections and investigations. All violations are subject to civil enforcement action and may also be subject to criminal prosecution. Unlike the "beyond a reasonable doubt" burden of proof standard for criminal actions, the NRC uses the preponderance of evidence standard in enforcement proceedings. After an apparent violation is identified, it is assessed consistent with the Commission's Enforcement Policy.

NRC uses three primary enforcement sanctions:

- Notice of Violation (NOV): identifies a requirement and how it was violated, formalizes a violation pursuant to 10 CFR 2.201, and typically requires a written response
- Civil Penalties: a monetary fine issued under authority of Section 234 of the AEA or Section 206 of the ERA
- Orders: modify, suspend, or revoke licenses or require specific actions to be taken by licensees or other persons

The agency's authority to issue orders is broad and extends to any area of licensed activity that affects the public health and safety. NOVs and civil penalties are issued based on violations. Orders may be issued for violations, or in the absence of a violation, to address a public health or safety issue.

The NRC uses the traditional enforcement process at NPPs to evaluate violations resulting in actual safety or security consequences, violations that may affect the ability of the NRC to perform its regulatory oversight function, and deliberate violations. The NRC staff categorizes these violations into four severity levels (SLs):

- SL I: violations that resulted in, or could have resulted in, serious safety or security consequences

- SL II: violations that resulted in, or could have resulted in, significant safety or security consequences
- SL III: violations that resulted in, or could have resulted in, moderate safety or security consequences
- SL IV: violations that are less serious but are of more-than-minor concern.

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3. NUCLEAR REACTOR SECURITY

3.1 NRC Security Cornerstone

The security cornerstone of the NRC's ROP utilizes inspection activities discussed in the first and second chapters and focuses on the following seven key licensee performance attributes:

- access authorization
- access control
- physical protection systems
- material control and accounting
- response to contingency events
- protection of Safeguards Information
- cyber security

3.2 Security Baseline Inspection Program at Nuclear Power Reactors

The security baseline inspection program is the primary way that the agency verifies that each NRC licensee operates its facility pursuant to NRC regulations. The objectives of the security baseline inspection program are to:

- gather sufficient factual inspection information to determine whether an NPP's security strategy can protect against the radiological sabotage pursuant to 10 CFR 73.55(b);
- determine an NPP licensee's ability to identify, assess the significance of, and effectively correct security issues commensurate with the significance of the issues;
- verify the accuracy and completeness of PI data used in conjunction with inspection findings to assess the security performance of NPP licensees;
- provide a mechanism for the NRC to remain cognizant of an NPP's security status and conditions; and,
- identify those significant issues that may have generic applicability or cross-cutting applicability to the safe and secure operation of NPPs subject to the requirements of 10 CFR Part 73.

The security baseline inspection program covers the eleven inspectable areas provided in Figure 4.

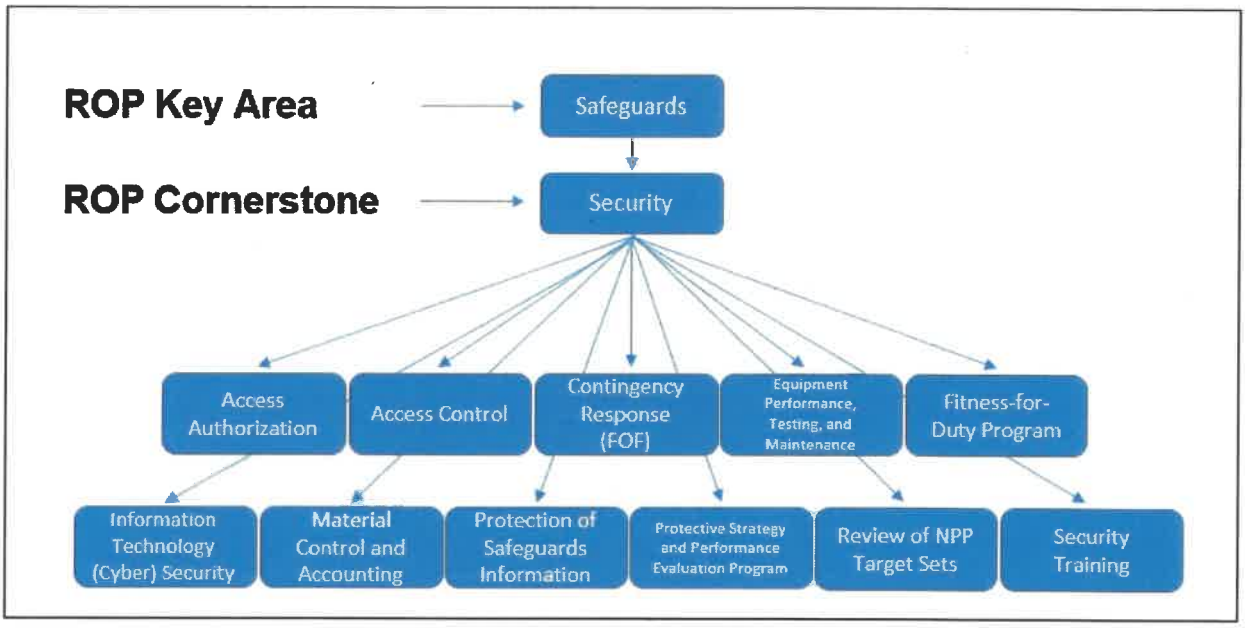


Figure 4: Inspectable Areas of the Security Cornerstone

3.2.1 Inspection Results

Table 1 summarizes the results of the security baseline inspection program for operating commercial NPPs in CY 2019 and shows that 96 out of 97 security findings at NPPs issued in CY 2019 were of very low security significance (i.e., green or SL IV violations). Further, at the end of CY 2019, all licensees reported that their security PI was "green" and therefore did not warrant additional NRC inspection.

Table 1: CY 2019 Security Baseline Inspection Program Summary for Commercial Nuclear Power Reactors

Total number of security inspections conducted	170
Total number of inspection findings	97
Total number of green findings	93
Total number of greater-than-green findings	1
Total number of SL IV violations	3
Total number of greater-than-SL IV violations	0

4. Category I Fuel Cycle Facility Security Oversight Program

4.1 Overview

The NRC maintains regulatory oversight of safeguards and security programs at two CAT I fuel cycle facilities: BWX Technologies, Inc., located in Lynchburg, Virginia, and Nuclear Fuel Services, Inc., located in Erwin, Tennessee. These facilities manufacture fuel for government reactors and also down-blend highly enriched uranium (HEU) into low-enriched uranium for use in commercial nuclear power reactors. Each CAT I fuel cycle facility is licensed to use and process a formula quantity of strategic special nuclear material (SSNM). The SSNM must be protected against acts of radiological sabotage as well as theft and diversion.

The primary objectives of the CAT I fuel cycle facility security oversight program are to:

- determine if the fuel cycle facilities are operating safely, securely, and pursuant to the NRC's regulatory requirements and orders issued to fuel cycle facilities to implement compensatory security measures;
- detect indications of declining safeguards performance;
- investigate specific safeguards events and weaknesses; and
- identify generic security issues.

The NRC uses the CAT I fuel cycle inspection program to identify findings, determine their significance, document the results, and assess licensees' corrective actions. The CAT I fuel cycle facility security inspection program uses traditional enforcement to assign the appropriate SL based on the significance of the finding; these SLs are described above. The core inspection program requires HEU-related physical security areas to be inspected either annually, biennially, or triennially using established inspection procedures. The results of these inspections contribute to an overall assessment of licensee performance.

The HEU physical security areas include:

- access authorization
- access control
- contingency response
- equipment performance
- fitness-for-duty
- material control and accounting
- protection of sensitive and classified information
- target area review
- security training
- transportation security

The core inspection program also includes FOF inspections. In addition, NRC resident inspectors assigned to each CAT I fuel cycle facility provide an onsite NRC presence for direct observation and verification of a licensee's ongoing activities. Through the results obtained from all oversight efforts, the NRC determines whether licensees comply with regulatory requirements and can provide adequate protection against the DBTs for radiological sabotage and theft or diversion.

The NRC may conduct facility-specific supplemental or reactive inspections to further investigate a particular deficiency or weakness. Such inspections are not part of the core inspection program and would be conducted to support a review and assessment of a particular security or safeguards event or condition.

4.2 Inspection Results

Table 3 summarizes the overall results of the security inspection program for CAT I fuel cycle facilities during CY 2019, excluding the FOF inspection results discussed in Section 5.3. Table 3 indicates that the one baseline security finding issued in CY 2019 at CAT I fuel cycle facilities during 2019, was of very low security significance (i.e., an SL IV violation).

Table 2: CY 2019 Security Inspection Summary for Category I Fuel Cycle Facilities

Total number of security inspections conducted	10
Total number of inspection findings	1
Total number of SL IV findings	1
Total number of greater-than-SL IV findings	0

5. Force-on-Force Evaluations

5.1 Overview

FOF inspections include both tabletop drills and performance-based FOF inspection exercises. These FOF inspection exercises simulate combat between a mock adversary force and a licensee's security force. At an NPP, the mock adversary force attempts to reach and simulate damage to significant components of safety-related systems (referred to as "target sets") that protect the reactor's core or the spent fuel. Compromise of target sets could potentially cause a radioactive release to the environment. The licensee's security force, in turn, attempts to interdict and neutralize the mock adversary force to prevent the adversary from reaching target sets, thus preventing such a release. At a CAT I fuel cycle facility, a similar process is used to assess the effectiveness of a licensee's protective strategy capabilities relative to the DBT of radiological sabotage and theft or diversion of SSNM.

In conducting FOF inspections, the NRC notifies the licensees in advance, for operational and personnel safety reasons, as well as logistical purposes. This notification offers adequate planning time for licensee coordination of the FOF exercises. The licensee must ensure that on-duty security staff are aware of the exercise, maintain actual plant security, and provide additional security staff for participation in the exercises. In addition, the licensee must arrange for a group of individuals to control and monitor each exercise. A key NRC goal is to balance actual personnel and plant safety and security while conducting a security exercise.

FOF inspections have been conducted in two 1-week segments. This includes a planning week, in which site tours are conducted and tabletop exercises are performed in order to understand how the licensee will implement its protective strategy when an event occurs. This information provides the NRC staff with insights into any potential deficiencies in a licensee's protective strategy and is factored into adversary force attack scenarios. The FOF inspections also consider security baseline inspection results and security plan reviews in the planning process. Approximately 2 weeks following the planning week, NRC inspection teams return to the site to conduct the FOF exercises. A FOF exercise consists of a simulated terrorist attack where the licensee uses security response personnel and laser engagement systems to implement its response to the adversary actions. The NRC assesses the licensee's performance and makes a determination regarding the effectiveness of the licensee's response in preventing the adversary from completing its intended mission.

Any significant deficiencies in the protective strategy identified during FOF inspections are reviewed and corrected by the licensee. When a complete target set is simulated to be destroyed, and it is determined that the licensee's protective strategy does not meet the general performance objective, compensatory measures outlined in the licensee security plans are implemented. Compensatory measures will remain in place until a permanent solution resolving the deficiencies in the protective strategy is implemented.

5.2 Program Activities for 2019

On October 9, 2018, the Commission approved a proposal from the NRC staff to modify the FOF inspection program to include one NRC-conducted FOF exercise and an enhanced NRC inspection of a licensee-conducted annual FOF exercise at NPPs, in lieu of two NRC-conducted exercises per inspection. The proposed framework to implement this change was submitted for

the Commission's review in COMSECY-19-0006, "Revised Security Inspection Program Framework (Option 3) in Response to SRM-SECY-17-0100."

5.3 Force-on-Force Evaluation Results

Pursuant to the FOF SDP, an effective exercise is one in which the licensee demonstrates effective implementation of its protective strategy in accordance with plans approved by the NRC and related implementation procedures, regulatory requirements, other Commission requirements such as orders, or confirmatory action letters. An "indeterminate" exercise indicates that the results were significantly skewed by an anomaly or anomalies, resulting in the inability to determine the outcome of the exercise (e.g., site responders neutralize the adversaries using procedures or practices unanticipated by the design of the site protective strategy or in conflict with the training of security personnel to implement the site protective strategy, or significant exercise control failures were experienced, including controller performance failures). A "marginal" exercise results when the licensee's performance prevented the loss of a complete target set; however, the site's response force did not neutralize the adversary before the simulated loss of target set elements. An "ineffective" exercise occurs when the licensee does not demonstrate effective implementation of its protective strategy in accordance with plans approved by the NRC and related implementation procedures, regulatory requirements, other Commission requirements such as orders, or confirmatory action letters.

In CY 2019, the NRC conducted 20 FOF inspections, including two exercises per inspection, at 19 commercial power reactors and one CAT I fuel cycle facility and identified 3 findings related to areas of the security baseline inspection program (See Figure 6 for total FOF findings issued by level of significance during CY 2013 to CY 2019). Table 3 summarizes the 20 FOF inspections conducted in CY 2019.

Table 3: CY 2019 Force-on-Force Evaluations Summary

Total number of inspections conducted (two exercises per inspection)	20
Total number of effective exercises	36
Total number of indeterminate exercises	1
Total number of marginal exercises	1
Total number of ineffective exercises	1
Total number of canceled exercises	1
Total number of inspection findings	3
Total number of green findings	3
Total number of greater-than-green findings	0
Total number of SL IV violations	0
Total number of greater-than-SL IV violations	0

In CY 2019, one exercise was deemed "ineffective" due to the licensee's inability to demonstrate an effective implementation of its protective strategy to defend the designated target set components. Another exercise was evaluated as "marginal" due to the licensee's failure to ensure that all drill and exercise controllers were trained and qualified. An exercise was evaluated as "indeterminate" due to drill artificialities, insufficient exercise control, responder actions, and/or safety concerns for the exercise participants. One exercise was cancelled because of safety concerns due to adverse weather.

6. TOTAL SECURITY INSPECTION RESULTS FOR 2019

6.1 Overview

In CY 2019, the NRC conducted 180 security inspections at operating commercial NPPs and CAT I fuel cycle facilities (including FOF inspections). There were 98 findings from those inspections.

6.2 Inspection Results

Table 4 summarizes the overall results of the NRC's security inspection program during CY 2019, including FOF inspections. Table 4 indicates that 97 out of 98 security inspection findings in CY 2019 were of very low security significance (i.e., green or SL IV violations). Figure 5 provides an overview of licensee performance within the security cornerstone. The Official Use Only – Security Related Information version of this report (Enclosure 2) contains additional details on each finding.

Table 4: Security Inspection Results for 2019

180	Total number of security inspections conducted
98	Total number of inspection findings
93	Total number of Green findings
1	Total number of greater-than-Green findings
4	Total number of SL IV violations
0	Total number of greater-than-SL IV violations

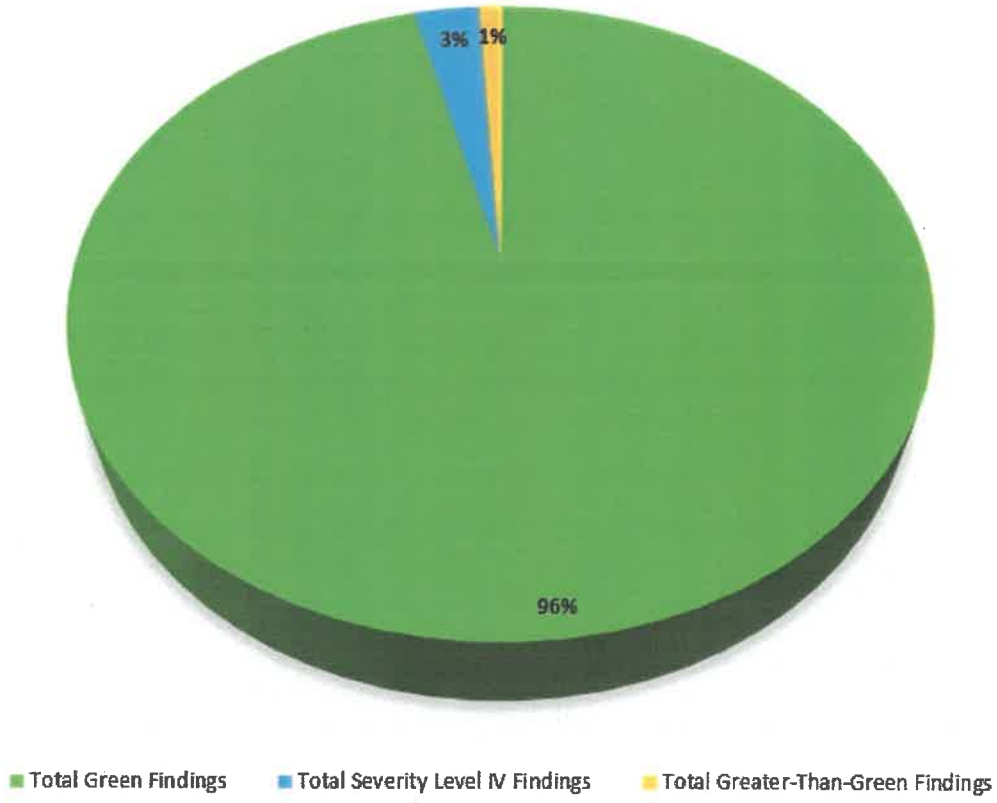
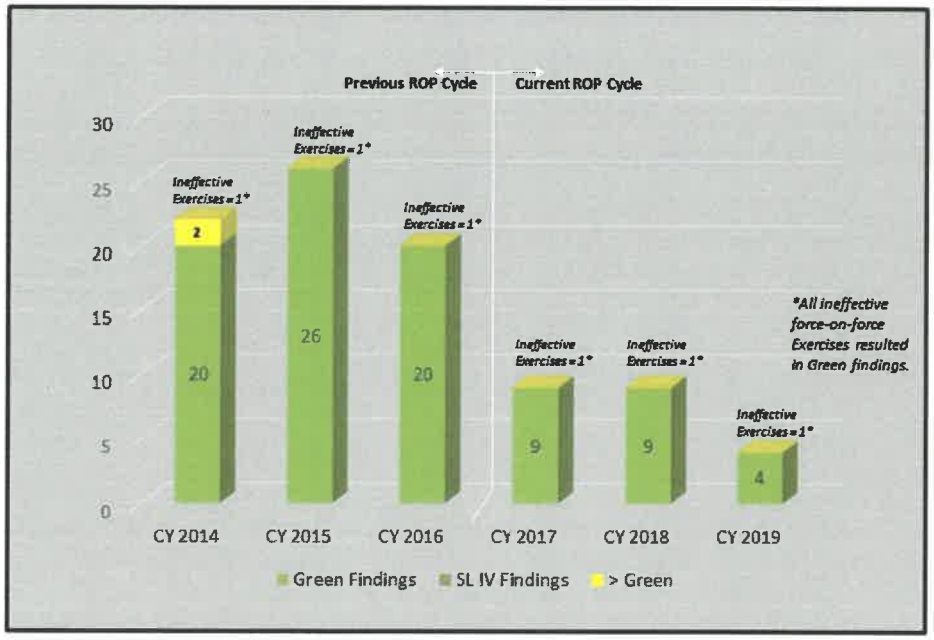


Figure 5: Summary of Security Inspection Program Results for CY 2019



Ineffective Exercise – an exercise where the licensee did not demonstrate effective implementation of its protective strategy in accordance with plans approved by the NRC and related implementation procedures, regulatory requirements, or other Commission requirements, such as orders or confirmatory action letters affecting protective strategy for the conduct of the FOF exercise.

Figure 6: Total Force-on-Force Findings Issued by Level of Significance.