
Regulatory Analysis for Final Rule on Cyber Security Event Notifications (10 CFR Part 73)

U.S. Nuclear Regulatory Commission
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1. Introduction

This document presents a regulatory analysis of the U.S. Nuclear Regulatory Commission's (NRC's) final rule on cyber security event notifications (Agencywide Document Management System (ADAMS) Accession No. ML14136A214) and the associated Regulatory Guide 5.83, Revision 0, "Cyber Security Event Notifications" (ADAMS Accession No. ML14175A657). A discussion of backfitting of the final rule is presented in Appendix A. The recommended regulatory action establishes regulations under Title 10 of the *Code of Federal Regulations* (10 CFR) section 73.77 related to the process, timeliness, and reporting of cyber security event notifications that licensees submit to the NRC following cyber security events.

2. Statement of the Problem and Objective

The cyber security event notifications (CSEN) final rulemaking amends the NRC regulations to add timely notification requirements for certain cyber security events. This rulemaking increases the NRC's ability to respond to security-related plant events, evaluate ongoing suspicious activities for threat implications, and accomplish the Agency's strategic communications mission.

2.1. Background

Following the terrorist attacks on September 11, 2001, the NRC conducted a thorough review of security to ensure that nuclear power plants continued to have effective security measures in place given the changing threat environment. Through a series of orders, the Commission specified a supplement to the Design Basis Threat (DBT), as well as requirements for specific training enhancements, access authorization enhancements, security officer work hours, and enhancements to defensive strategies, mitigative measures, and integrated response. Additionally, in generic communications, the Commission specified expectations for enhanced notifications to the NRC for certain security events or suspicious activities. As noted to recipients of the post-September 11, 2001 orders, the Commission's intent was to complete a thorough review of the existing physical protection program requirements and undertake a rulemaking that would codify generically-applicable security requirements.

In October 2006, the NRC issued a proposed power reactor security requirements rule to amend its security regulations and add new security requirements pertaining to nuclear power reactors (71 *Federal Register* (FR) 62664; October 26, 2006). The rule included: (1) security requirements imposed by Commission orders issued after the terrorist attacks of September 11, 2001; (2) requirements for access to enhanced weapons and firearms background checks; and (3) new requirements that resulted from insights from implementation of the security orders, review of site security plans, and implementation of the enhanced baseline inspection program and force-on-force exercises. One of the new security requirements in the proposed rule was the establishment of a cyber security program.

In March 2009, the NRC issued the power reactor security requirements final rule, which included adding section 73.54, "Protection of Digital Computer and Communication Systems and Networks," to the NRC's regulations (74 FR 13926; March 27, 2009). Section 73.54 requires power reactor licensees to establish and maintain a cyber security program at their facilities to provide high assurance that digital computer and communication systems and networks are adequately protected against cyber attacks, up to and including the DBT, as described in 10 CFR 73.1.

In February 2011, the NRC published a proposed enhanced weapons rule that would add new security requirements for enhanced weapons and firearms background checks, as well as revisions to existing regulations governing security event notifications (76 FR 6200; February 3, 2011). The proposed revisions to security event notification requirements included notification requirements related to imminent or actual hostile acts, physical intrusions, suspicious activities, unauthorized operation or tampering events, and cyber security events. The NRC included the CSEN requirements as part of the February 2011 proposed rule because CSEN requirements were not included in the March 2009 final power reactor security requirements rule.

Subsequently, the NRC bifurcated the February 2011 proposed enhanced weapons rule into two separate rulemakings. One rulemaking will address the CSEN requirements. The second rulemaking will address the remaining requirements, which include the enhanced weapons requirements, firearms background check requirements, and physical security event notification requirements. This regulatory analysis examines only the CSEN requirements.

2.2. Statement of the Problem

Notification of a cyber security event is necessary to assist the NRC in assessing and evaluating issues with potential cyber security-related implications in a timely manner, determining the significance and credibility of the identified issue(s), and providing recommendations and/or courses of action to NRC management. Currently, licensees are reporting certain cyber security events voluntarily to the NRC. However, since this is done voluntarily there could be certain cyber security events that may not be reported to the NRC in a timely manner or reported at all. It is important for the NRC to have information about certain cyber security events to fulfill its strategic communications mission within the framework of the National Infrastructure Protection Plan (NIPP) developed by the Department of Homeland Security (DHS). The NIPP is carried out by Federal, state and local agencies and private sector entities all operating together voluntarily. The CSEN final rule removes the voluntary aspects of reporting certain cyber security events and provides regulatory stability and ensures the NRC is notified in a timely manner, including suspicious cyber security events, which plays an important role in our strategic communications mission, as well as certain cyber security events within the scope of 10 CFR 73.54 (e.g., adverse impacts to safety, security, or emergency preparedness functions).

In March 2009, the NRC published 10 CFR 73.54, "Protection of Digital Computer and Communication Systems and Networks," as part of the power reactor security requirements final rule. This rule established a cyber security program under section 73.54, in which licensees provide high assurance that digital computer and communication systems, and networks are adequately protected against cyber attacks. However, the power reactor security rulemaking did not include CSEN requirements. Currently, there is no mandatory CSEN regulation or process that requires nuclear power reactor licensees to notify the NRC of any cyber attacks (successful, suspicious, or unsuccessful) in a timely manner for NRC response.

2.3. Objective

The objective of this final rulemaking is to amend Title 10 of the *Code of Federal Regulations* to add section 73.77, "Cyber Security Event Notifications," to require licensees under 10 CFR parts 50 and 52 subject to the provisions of section 73.54, "Protection of Digital Computer and Communication Systems and Networks," to report certain cyber security events to the NRC Headquarters Operations Center via the Emergency Notification System (ENS) within the timeliness requirements specified. Section 73.77 also requires these licensees to record cyber

security events in their site corrective action program. Finally, licensees are required to submit written security follow-up reports to the NRC for certain notifications made under section 73.77.

The February 2011 proposed enhanced weapons rule applied to operating power reactor sites, decommissioning power reactor sites, operating and decommissioning research and test reactor sites, hot cell sites, other reactor sites, Category I strategic special nuclear material sites, Category II and Category III special nuclear material sites, and independent spent fuel storage installations (ISFSIs). However the CSEN final rule applies only to power reactor licensees under 10 CFR Parts 50 and 52 subject to the provisions of 10 CFR 73.54. In conducting the quantitative analysis presented in this document, the NRC staff assumed that the following sites will be affected by the final rule: 58 sites with only reactors that are currently in commercial operation, two sites with both operating reactors and projected new power reactors for which a combined license (COL) already has been issued under 10 CFR Part 52, one site with both an operating reactor and a reactor under active construction under a 10 CFR Part 50 construction permit, and four sites with reactors that currently are in decommissioning. This results in 65 affected power reactor sites.

3. Identification and Analysis of Alternative Approaches

This section presents an analysis of the alternatives that the NRC staff considered in meeting the regulatory goals identified in Section 2. The NRC staff considered two alternatives for revising the Part 73 provisions, as discussed below.

3.1. Option 1: No Action

Under this option, the “no-action” alternative, the NRC would not amend the current regulations in Part 73 to add notification and reporting requirements related to certain cyber security events. Under this option, licensees would not be required to submit cyber security event notifications and reports to the NRC. Rather, the NRC would rely on the current voluntary reporting process for cyber security events by licensees. Voluntary reports can be submitted by the licensee at any time, such that the NRC may not be able to assess and evaluate issues with potential cyber security-related implications in a timely manner. This option would avoid any new costs to licensees in communicating, documenting, and reporting cyber security events. It also would avoid new costs to the NRC to review and respond to cyber security event notifications not voluntarily reported to the NRC. However, this option would not increase the NRC’s ability to respond to cyber security-related plant events, evaluate ongoing suspicious activities for threat implications, or accomplish the Agency’s strategic communications mission. The strategic communications mission is part of the NIPP framework and is designed to share information in an effort to protect critical infrastructure and key resources (CIKR). Under the CIKR reporting guidelines from DHS, licensees are encouraged but not required to report information concerning suspicious or criminal activity related to terrorism (e.g., physical security, cyber security, emergency preparedness).

There is specific guidance contained in the NRC’s *Regulatory Analysis Technical Evaluation Handbook*¹ on how to handle voluntary initiatives, including credit to be given to voluntary actions by licensees. However, in this case, the voluntary actions (i.e., reporting suspicious

¹ NRC; *Regulatory Analysis Technical Evaluation Handbook* (NUREG/BR-0184); Section 5.7, “Quantification of Attributes;” January 1997. Available at: <http://pbadupws.nrc.gov/docs/ML0501/ML050190193.pdf>, last accessed on July 29, 2014.

activity associated with cyber incidents) occur as part of the “no action” alternative. Thus, by definition, voluntary actions will occur provided that the NRC takes no action. While the final rule adds cyber security event notification requirements, under this option a regulatory baseline already exists. The NRC provides oversight of the licensee’s corrective action program which includes cyber security events under the Physical Protection Program per section 73.55.

3.2. Option 2: Amend Regulations to Add Cyber Security Event Notification Requirements

Under this option, the NRC would conduct a rulemaking to add notification and reporting requirements related to certain cyber security events. These changes would entail adding 10 CFR 73.77, “Cyber Security Event Notifications.” Specifically, the NRC would require through rulemaking that licensees conduct notifications and submit reports to the NRC in the event of certain cyber security attacks. The cyber security events fall into three categories: one-hour notifications, four-hour notifications, and eight-hour notifications. For some of these cyber security events, licensees would be required to provide a written security follow-up report to the NRC within 60 days using NRC Form 366. These cyber security events include one-hour notifications (cyber attacks that adversely impacted safety, security, or emergency preparedness (SSEP) functions (section 73.77(a)(1))) and two of the four-hour notifications (cyber attacks that could have caused an adverse impact to SSEP functions (section 73.77(a)(2)(i)) and cyber attacks initiated by personnel with physical or electronic access (section 73.77(a)(2)(ii))). Licensees also would be required to record, in their site corrective action program, vulnerabilities, weaknesses, failures and deficiencies in their cyber security program and notifications made under section 73.77(a).

The NRC staff will review the information provided by licensees to determine appropriate response actions. These actions may include one or more of the following actions: (1) notifying the NRC Cyber Assessment Team, (2) determining necessary follow-up actions based on the event characteristics, (3) documenting reported events, (4) making additional notifications to other government agencies, and (5) issuing threat advisories to other licensees. The NRC also will use the information provided by licensees to effectively monitor ongoing licensee actions and inform other licensees in a timely manner of cyber security-significant events.

4. Evaluation of Benefits and Costs

This section examines the benefits and costs expected to result from this rulemaking, and are presented in two subsections. Section 4.1 identifies attributes that are expected to be affected by the rulemaking. Section 4.2 describes how benefits and costs have been analyzed.

4.1. Identification of Affected Attributes

The following attributes are expected to be affected by this rulemaking. Their impacts are quantified where possible. Impacts to accident-related attributes are qualified because estimates of occurrences of possible attacks and their successful repulsions are unknown. Further, even if reliable estimates were available, they would be considered Safeguards Information and not to be released for public dissemination.

- **Safeguards and Security Considerations** — The actions regarding cyber security event notifications will increase the NRC’s ability to respond to cyber security events and to effectively monitor ongoing licensee actions and inform other licensees in a timely

manner of cyber security-significant events and thus, protect public health and safety, and the common defense and security.

- Industry Implementation — In implementing the regulatory action, licensees are expected to read the final rule and regulatory guide, and develop or upgrade their existing notification procedures. Licensees also are expected to develop and deliver initial and recurring notification training to designated personnel. For purposes of this analysis, the NRC staff estimates that 65 sites will be affected by the final rule. Estimated hours of burden for each of these activities can be found in:
 - Section 4.2.4.2: Development of Procedures
 - Section 4.2.4.3: Initial Notification Training
 - Section 4.2.4.10: Recurring Notification Training
- Industry Operation — The CSEN requirements of the final rule would result in operating expenses for industry. Specifically, the final rule will require licensees to make telephonic notifications and submit written security follow-up reports to the NRC. Written security follow-up reports must be prepared on NRC Form 366, which is currently used for physical security event notifications. Licensees also will need to record, in their existing site corrective action program, notifications made under section 73.77(a) and vulnerabilities, weaknesses, failures or deficiencies in their cyber security program. In addition, licensees will need to periodically supply NRC inspectors with cyber security event information to support security inspections, as needed. Finally, licensees will need to update and deliver recurring notification training.

The analysis includes three categories of cyber security events that will impact industry operations. The estimated rates of events per year for each notification requirement are based on the following:

- Voluntary Reporting Initiatives: The NRC has been collecting data from licensees under the voluntary reporting initiative. However, reporting is on a voluntary basis and it is not known if all of the cyber security events (within the voluntary initiative) are being reported to the NRC.
- 10 CFR 73.54 Requirements: As the implementation of the cyber security rule progresses, voluntary reporting has been decreasing.

Using information from the above two actions, the NRC staff generated the best estimate annual rates for the one-, four-, and eight-hour notifications as shown below:

- One-hour notifications: A cyber attack that adversely impacted SSEP functions (i.e., cyber security events covered under section 73.77(a)(1)). The NRC staff assumes that, on average, cyber attacks with adverse impacts occur once every two years (i.e., at a rate of 0.50 event per year) at each site that has reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license; cyber attacks with adverse impacts occur once every 20 years (i.e., at a rate of 0.05 event per year) at each site that has only reactors that currently are in decommissioning. In addition, the NRC staff assumes that each event would require one hour of licensee staff time to make a telephonic notification to the NRC Headquarters Operations Center.

- Four-hour notifications: A cyber attack that could have caused an adverse impact to SSEP functions (i.e., cyber security events covered under section 73.77(a)(2)(i)), cyber attacks initiated by personnel with physical or electronic access (section 73.77(a)(2)(ii)), or notification of a local, State, or other Federal agency (section 73.77(a)(2)(iii)). The NRC staff assumes that, on average, these types of events occur once a year at each site that has reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license; cyber attacks without adverse impacts to SSEP functions occur once every 10 years (i.e., at a rate of 0.10 event per year) at each site that has only reactors that currently are in decommissioning. The NRC staff also assumes that each event would require 0.5 hour of licensee staff time to make a telephonic notification to the NRC Headquarters Operations Center.
- Eight-hour notifications: Activities that may indicate intelligence gathering or preoperational planning related to a cyber attack (i.e., cyber security events covered under section 73.77(a)(3)). The NRC staff assumes that, on average, activities that may indicate intelligence gathering or preoperational planning related to a cyber attack occur 2.5 times a year at each site that has reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license; activities that may indicate intelligence gathering or preoperational planning related to a cyber attack occur once every two years (i.e., at a rate of 0.50 event per year) at each site that has only reactors that currently are in decommissioning. In addition, the NRC staff assumes that each event would require 0.50 hour of licensee staff time to make a telephonic notification to the NRC Headquarters Operations Center.

For events requiring entry in the site corrective action program, the NRC staff assumes that, on average, each site that has reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license will record 10 entries per year in its corrective action program; each site that has only reactors that currently are in decommissioning will record 2.5 entries per year in its corrective action program. The NRC staff also assumes that each site will require 0.50 hour of licensee staff time to record one entry in the site corrective action program. This final rule specifies certain cyber security events for entry into the site corrective action program and those hours are included in the regulatory baseline as required under the Physical Protection Program per section 73.55.

The NRC staff estimates that 65 sites will be affected by the final rule and will be required to conduct all of the above activities.

- NRC Implementation — The NRC implementation costs include the labor cost for the development of the final rule and the associated regulatory guidance.
- NRC Operation — The NRC activities under the final rule include the review of information received during a cyber security event notification for follow-up, activation of the NRC's Headquarters Operations Center, or immediate communication to DHS and other licensees, as needed. The NRC staff also will review written security follow-up reports received after initial telephonic notifications. In addition, the NRC staff may review information on cyber security events recorded in the site corrective action program during an inspection.

- Regulatory Efficiency — The regulatory action is expected to result in enhanced regulatory efficiency involving the NRC's ability to monitor ongoing cyber security events at a range of licensed facilities, and the ability to rapidly communicate information on cyber security events at such facilities to other NRC-regulated facilities and other government agencies, as necessary.
- Public Health (Accident) — The regulatory action is expected to reduce the risk that public health will be affected by radiological releases because of the increased likelihood of a successful repulsion of an attack.
- Occupational Health (Accident) — The regulatory action is expected to reduce the risk that occupational health will be affected by radiological releases because of the increased likelihood of a successful repulsion of an attack.
- Off-Site Property — The regulatory action is expected to reduce the risk that off-site property will be affected by radiological releases because of the increased likelihood of a successful repulsion of an attack.
- On-Site Property — The regulatory action is expected to reduce the risk that on-site property will be affected by radiological releases because of the increased likelihood of a successful repulsion of an attack.
- Other Government Agencies — The CSEN final rule will not have an effect on other Government agencies because the reporting of suspicious or criminal activity related to terrorism (e.g., physical security, cyber security) is captured under the NIPP and part of the NRC's strategic communications mission. In addition, certain cyber security events reported to the NRC that fall within the scope of 10 CFR 73.54 will not need to be reported to other Government agencies.

Attributes that are not expected to be affected by this rulemaking include the following: occupational health (routine); public health (routine); environmental considerations; general public; improvements in knowledge; and antitrust considerations.

4.2. Analytical Methodology

This section describes the process used to evaluate benefits and costs associated with the final rule. The benefits of the final rule include any desirable changes in affected attributes (e.g., monetary savings, improved safety, improved security) while the costs include any undesirable changes in affected attributes (e.g., monetary costs, increased exposures).

Of the 11 affected attributes, the analysis evaluates four—industry implementation, industry operation, NRC implementation, and NRC operation—on a quantitative basis. Quantitative analysis requires a baseline characterization of the affected universe, including characterization of factors such as the number of affected entities and the types of procedures that licensees would implement as a result of the final rule. Sections 4.2.1 through 4.2.4 describe the most significant analytical data and assumptions used in the quantitative analysis of these attributes.

The analysis primarily relies on a qualitative (rather than quantitative) evaluation of the remaining seven affected attributes (safeguards and security considerations, regulatory efficiency, public health (accident), occupational health (accident), off-site property, on-site

property, and other government agencies) because of the uncertainties associated with monetizing the impact that the cyber security event notifications under the final rule would have on these affected attributes. Monetizing the impact on any of these attributes would require estimation of factors such as the frequency with which radiological sabotage attempts are (i.e., pre-rule) and will be (i.e., post-rule) successful, and the impacts associated with successful radiological sabotage attempts. Because these factors preclude monetization of these seven affected attributes, this analysis discusses them qualitatively in Section 4.1.

4.2.1. Baseline for Analysis

This regulatory analysis measures the incremental costs of the final rule relative to a “baseline” that reflects anticipated behavior in the event the NRC undertakes no regulatory action (Option 1, the “no-action” alternative). As part of the baseline used in this analysis, the NRC staff assumes full licensee compliance with existing NRC regulations, which includes the NRC’s oversight of the licensee’s corrective action program to include cyber security events as part of the physical protection program per section 73.55. Section 5 presents the estimated incremental costs of the final rule relative to this baseline.

4.2.2. Affected Universe

The NRC staff estimates that 65 U.S. commercial nuclear power reactor sites will be affected by the final rule.² This estimate includes sites with:

- Operating power reactors (one, two, or three units);
- Projected new power reactors for which a combined license (COL) already has been issued under Part 52;
- Power reactors under active construction under a Part 50 license (i.e., Watts Bar Nuclear Plant Unit 2);³ and
- Decommissioning reactors.

The analysis evaluates the incremental costs of the final rule on a site (65) basis rather than on a per unit (116) basis. For each type of site included in the analysis, Table 4-1 presents the number of sites and the average number of years that sites are expected to be subject to the final rule requirements (i.e., final rule applicability period).

The final rule applicability period was derived as follows:

- Sites with only reactors that are currently in commercial operation - The final rule applicability period for this type of site is estimated to be 34 years. This estimate is based on the sum of the average remaining operating life across all sites and then adding a 15-year decommissioning period. For each site, the staff identified the operating reactor unit with the latest license expiration date.⁴ The staff then used that

² The Bellefonte Nuclear Power Station is not included in this analysis because the site will not be affected by the final rule. The site does not have any operating units, has no fuel on site, and new construction is indefinitely delayed. Bellefonte Units 1 and 2 are under the Commission Policy Statement on Deferred Plants (52 FR 38077; October 14, 1987).

³ Watts Bar Nuclear Plant Unit 2 is currently under active construction.

⁴ Based on information obtained from NRC, 2013-2014 Information Digest (NUREG-1350, Volume 25), "Appendix H: U.S. Commercial Nuclear Power Reactor Operating Licenses - Expiration by Year, 2013–2049," August 2013. Available at: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>, last accessed on July 7, 2014.

license expiration date to calculate the remaining operating life for the site. For example, for a site where the last unit license expiration date will occur in 2017, the staff calculated the remaining operating life to be 2 years (i.e., 2017 – 2015). The staff assumed that all operating licenses go to term with the exception of: (1) early terminations already announced (i.e., Vermont Yankee plans to terminate commercial operation in December 2014 and Oyster Creek plans to terminate commercial operation in 2019) and (2) license renewal applications already under consideration (i.e., Indian Point Nuclear Generating) for which the staff assume that the license renewal is granted. After the staff calculated the remaining operating life for each site, the staff then calculated the average remaining operating life across all sites. Finally, the staff added a 15-year decommissioning period. (Refer to “sites with only reactors that currently are in decommissioning” for information on the derivation of the 15-year decommissioning period).

- Sites with both operating reactors and projected new reactors under a Part 52 license - The final rule applicability period for this type of site is estimated to be 59 years. This estimate is based on the sum of the average estimated remaining operating life across all sites and then adding a 15-decommissioning period. For each site, the staff identified the reactor unit with the latest license expiration date.^{5,6,7} The staff then used that license expiration date to calculate the remaining operating life for the site. The staff assumed that all licenses go to term. After the staff calculated the remaining operating life for each site, the staff then calculated the average remaining operating life across all sites. Finally, the staff added a 15-year decommissioning period. (Refer to “sites with only reactors that currently are in decommissioning” for information on the derivation of the 15-year decommissioning period).
- Sites with both operating reactors and reactors under active construction under a Part 50 license – The final rule applicability period for this type of site is estimated to be 55 years. This estimate is based on the remaining operating life of the only site with reactors under active construction under a Part 50 license (i.e., the Watts Bar Nuclear Plant) and then adding a 15-year decommissioning period. (Refer to “sites with only reactors that currently are in decommissioning” for information on the derivation of the 15-year decommissioning period).

⁵ Based on information obtained from NRC, 2013-2014 Information Digest (NUREG-1350, Volume 25), "Appendix H: U.S. Commercial Nuclear Power Reactor Operating Licenses - Expiration by Year, 2013–2049," August 2013. Available at: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>, last accessed on July 7, 2014.

⁶ Based on information obtained from NRC, 2013-2014 Information Digest (NUREG-1350, Volume 25), "Appendix A: U.S. Commercial Nuclear Power Reactors - Operating Reactors under Active Construction or Deferred Policy," August 2013. Available at: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>, last accessed on July 7, 2014

⁷ For a Part 52 license, the 40-year term of the license does not begin until after the 10 CFR 52.103(g) finding, which occurs after construction is completed. Summer Units 2 and 3 are expected to begin commercial operation in 2016 and 2019, respectively. Vogtle Units 3 and 4 are expected to begin commercial operation in 2017 and 2018, respectively.

- Sites with only reactors that currently are in decommissioning – The final rule applicability period for this type of site is estimated to be 15 years. This estimate is based on information on time periods contained in Irradiated Fuel Transfer Plans submitted, pursuant to 10 CFR 50.54(bb), by licensees that have prematurely shutdown their reactor units.⁸

In estimating the costs to sites, the NRC staff classified sites with more than one type of reactor under the site category with the longest final rule applicability period. For example, a site with one operating reactor and one decommissioning reactor is categorized as a “site with only reactors that are currently in commercial operation” because the final rule applicability period for an operating reactor exceeds the period for a reactor that already is decommissioning.

Appendix B to this analysis presents additional information on the sites affected by the final rule, including information on the categorization of the individual sites.

⁸ Kewaunee permanently ceased commercial operation on May 7, 2013. The licensee expects to have all of Kewaunee’s spent fuel transferred from the spent fuel pool to the ISFSI by the end of year 2016 (e.g., transfer within 4 years of ceasing commercial operation). Crystal River Unit 3 permanently ceased commercial operation on February 20, 2013, which is when the licensee transferred fuel from the reactor vessel to the spent fuel pool. The licensee expects to have all of Crystal River Unit 3’s spent fuel transferred from the spent fuel pool to the ISFSI by the end of year 2019 (e.g., transfer within 6 years of ceasing commercial operation). Based on these representative plans, it is reasonable to estimate that licensees will transfer all spent fuel to ISFSI (e.g., dry cask storage) within 15 years of ceasing commercial operation.

Table 4-1. U.S. Commercial Nuclear Power Reactor Sites Affected by the Final Rule ^a

Type of Site	Number of Sites	Final Rule Applicability Period (years)
Sites with only reactors that are currently in commercial operation	58	34
Sites with both operating reactors and projected new reactors under a Part 52 license	2	59
Sites with both operating reactors and reactors under active construction under a Part 50 license	1	55
Sites with only reactors that currently are in decommissioning	4	15
Total	65	Not applicable

^a Sites with more than one type of reactor were included under the site category with the longest final rule applicability period. Refer to Appendix B for information on the categorization of the individual sites.

Sources:

- (1) NRC, "Operating Nuclear Power Reactors (by Location or Name)" Web page, www.nrc.gov. Data current as of March 19, 2014. Available at: <http://www.nrc.gov/info-finder/reactor/>, last accessed on July 7, 2014.
- (2) NRC, 2013-2014 Information Digest (NUREG-1350, Volume 25), "Appendix H: U.S. Commercial Nuclear Power Reactor Operating Licenses - Expiration by Year, 2013–2049," August 2013. Available at: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>, last accessed on July 7, 2014.
- (3) NRC, "Combined License Applications for New Reactors" Web page, www.nrc.gov. Data current as of July 1, 2014. Available at: <http://www.nrc.gov/reactors/new-reactors/col.html>, last accessed on July 7, 2014.
- (4) NRC, 2013-2014 Information Digest (NUREG-1350, Volume 25), "Appendix A: U.S. Commercial Nuclear Power Reactors - Operating Reactors under Active Construction or Deferred Policy," August 2013. Available at: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/>, last accessed on July 7, 2014.
- (5) NRC, "Locations of Power Reactor Sites Undergoing Decommissioning" Web page, www.nrc.gov. Data current as of April 24, 2014. Available at: <http://www.nrc.gov/info-finder/decommissioning/power-reactor/>, last accessed on July 7, 2014.

4.2.3. Labor Rates

In estimating the incremental costs of the final rule, the analysis uses two hourly labor rates that include salary, fringe benefits (e.g., paid leave and health benefits), and indirect costs:

- The average labor rate for licensee staff is estimated to be \$125 per hour.⁹
- The average labor rate for NRC staff is estimated to be \$121 per hour.¹⁰

Both average labor rates are in 2014 dollars.

4.2.4. Assumptions

This subsection discusses the analysis of the costs associated with the implementation of the final rule. The analysis employs the following assumptions and considerations:

- All licensees are assumed to be in full compliance with the existing baseline requirements. The costs to comply with the baseline requirements are not expected to change with the final rule. Therefore, this analysis only presents the incremental costs associated with the final rule changes.
- All costs presented in this subsection are in 2014 dollars.
- Implementation costs are assumed to be incurred in 2015.
- Licensees will incur costs over the final rule applicability period, as presented in Table 4-1. The actual time period that each site will be operated will depend on the term of the operating license, and on whether the licensee chooses to operate the site for the duration of the licensed period.
- The costs incurred in each year of the analysis are discounted to the present using a 7 percent and 3 percent discount rate, in accordance with NUREG/BR-0058, Rev. 4, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission." (See Section 5 for these results).
- For purposes of this analysis, the costs under the final rule were categorized as follows:
 - One-time costs:
 - Rulemaking activities;
 - Development of procedures; and
 - Initial notification training.

⁹ Based on data developed by the Bureau of Labor Statistics for "Power Plant Operators, Distributors, and Dispatchers" (Standard Occupational Code 51-8010) and for "Nuclear Power Reactor Operators" (Standard Occupational Code 51-8011), hourly labor rates for industry range from about \$89 to \$98. As a conservative assumption, this analysis uses an hourly labor rate of \$125.

¹⁰ NRC, Rulemaker@nrc.gov, "NRC Labor Rates for Use in Regulatory Analyses (as of October 2013)," January 2, 2014.

- Annual costs:
 - One-hour notifications;
 - Four-hour notifications;
 - Eight-hour notifications;
 - Twenty-four-hour recordable events;
 - Written security follow-up reports;
 - Inspections; and
 - Recurring notification training.

The remainder of this subsection describes the derivation of the estimated per site costs for each of the cost categories.

4.2.4.1. Rulemaking Activities

In implementing the regulatory action, the NRC will perform rulemaking activities that include development and publication of the final rule and regulatory guidance. To estimate the costs associated with NRC's rulemaking activities, the analysis employs the following assumptions:

- 1 person-year of NRC staff time (i.e., 1,375 hours) will be required for performing the final rulemaking activities.¹¹
- The NRC published a proposed enhanced weapons rule in 2011 that contained new security requirements for enhanced weapons and firearms background checks along with proposed cyber security event notification requirements. The proposed cyber security event notification requirements were a part of the much larger proposed enhanced weapons and firearms background checks proposed rule. The NRC is unable to determine the costs of the proposed cyber security event notification requirements separate from the enhanced weapons activities. As such, only the hours for the final cyber security event notification rulemaking activities are being reported in this analysis.

Based on the above, the NRC's one-time cost for rulemaking activities is estimated to be \$166,375 (i.e., 1,375 hours x \$121/hour).

4.2.4.2. Development of Procedures

In implementing the regulatory action, licensees are expected to read the final rule and develop/revise procedures (e.g., site security plan). To estimate the costs associated with the development of procedures, the analysis employs the following assumptions:

- On average, each site will require 88 hours of licensee staff time to read the final rule and regulatory guide (RG), and develop 2 procedures for plant staff and security staff. The following are the estimated hours to perform each task:
 - 1 person – review final rule/RG = 8 hours
 - 1 person – modify/create procedures = 40 hours
 - 1 person – review procedures = 24 hours

¹¹ Number of productive hours in one person-year obtained from NRC, Rulemaker@nrc.gov, "NRC Labor Rates for Use in Regulatory Analyses (as of October 2013)," January 2, 2014.

- Approval process (Site Management and Plant Operating Review Committee (PORC)):
 - Procedures Review – 2 hours * 6 people = 12 hours
 - PORC Meeting – ¼ hour * 6 people = 1.5 hours
- 1 person – Enter procedures into plant document control system = 2 hours
- *Total is 87.5 hours, rounded up to 88 hours*

Table 4-2 shows the estimated one-time cost per site for development of procedures, by type of site.

Table 4-2. Estimated One-Time Cost per Site for Development of Procedures (2014 Dollars)

Type of Site	One-Time Cost to Industry ^{a, b}	One-Time Cost to the NRC
Sites with only reactors that are currently in commercial operation	\$11,000	Not applicable
Sites with both operating reactors and projected new reactors under a Part 52 license	\$11,000	Not applicable
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$11,000	Not applicable
Sites with only reactors that currently are in decommissioning	\$11,000	Not applicable

^a One-Time Cost to Industry = [88 hours] x [\$125/hour].

^b Costs in the table are rounded to the nearest whole number.

4.2.4.3. Initial Notification Training

In implementing the regulatory action, licensees are expected to revise their notification training and deliver the revised training to designated personnel. To estimate the costs associated with the initial notification training, the analysis employs the following assumptions:

Operating Reactors

- On average, each operating reactor site will require 286 hours of licensee staff time to develop, approve, and deliver the initial notification training to 800 licensee staff members. This time includes 36 hours to develop the training and 250 hours to deliver the training. The following are the estimated hours to perform each task:
 - Read Final Rule/Regulatory Guide
 - 1 person from Licensing department = 8 hours
 - 1 person from Cyber Security Assessment Team (CSAT) = 8 hours
 - 1 person from Training department = 8 hours
 - *Sub-total 24 hours*
 - Training Material Development
 - 1 person to develop training materials/lesson plans = 8 hours
 - 1 person to review training materials/lesson plans = 4 hours
 - *Sub-total 12 hours*

- *Total Training Development Time = 36 hours*
- Initial Training of Plant Staff on CSEN Rule
 - Operations/Engineering/Administrative staff: 600 people * 0.25 hour = 150 hours
 - Security and CSAT staff: 200 people * 0.50 hours = 100 hours
- *Total Initial Training Time = 250 hours*

Grand Total: 36 hours + 250 hours = 286 hours

Decommissioning Reactors

- On average, each decommissioning site will require 136 hours of licensee staff time to develop, approve, and deliver the initial notification training to 300 licensee staff members. This time includes 36 hours to develop the training and 100 hours to deliver the training. The following are the estimated hours to perform each task:
 - Read Final Rule/Regulatory Guide
 - 1 person from Licensing department = 8 hours
 - 1 person from Cyber Security Assessment Team (CSAT) = 8 hours
 - 1 person from Training department = 8 hours
 - *Sub-total 24 hours*
 - Training Material Development
 - 1 person to develop training materials/lesson plans = 8 hours
 - 1 person to review training materials/lesson plans = 4 hours
 - *Sub-total 12 hours*
 - *Total Training Development Time = 36 hours*
 - Initial Training of Plant Staff on CSEN Rule
 - Operations/Engineering/Administrative staff: 200 people * 0.25 hours = 50 hours
 - Security and CSAT staff: 100 people * 0.50 hours = 50 hours
 - *Total Training Development Time = 100 hours*

Grand Total: 36 hours + 100 hours = 136 hours

Table 4-3 shows the estimated one-time cost per site for initial notification training, by type of site.

Table 4-3. Estimated One-Time Cost per Site for Initial Notification Training (2014 Dollars)

Type of Site	One-Time Cost to Industry ^{a, b}	One-Time Cost to the NRC
Sites with only reactors that are currently in commercial operation	\$35,750	Not applicable
Sites with both operating reactors and projected new reactors under a Part 52 license	\$35,750	Not applicable
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$35,750	Not applicable
Sites with only reactors that currently are in decommissioning	\$17,000 ^c	Not applicable

^a One-Time Cost to Industry = [286 hours] x [\$125/hour].

^b Costs in the table are rounded to the nearest whole number.

^c One-Time Cost to Industry = [136 hours] x [\$125/hour].

4.2.4.4. One-Hour Notifications

Licensees subject to the provisions of 10 CFR 73.54 must make a telephonic notification of the cyber security events identified at 10 CFR 73.77(a)(1) to the NRC within one hour after discovery. Notifications must be made according to 10 CFR 73.77(c).

To estimate the costs associated with one-hour notifications, the analysis employs the following assumptions:

- On average, cyber security events occur once every two years (i.e., at a rate of 0.50 event per year) at each site that has reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license; cyber security events occur once every 20 years (i.e., at a rate of 0.05 event per year) at each site that has only reactors that currently are in decommissioning. This rate of occurrence is based on data collected by the NRC since inception of the voluntary reporting initiatives and 10 CFR 73.54.
- On average, each site will require 1 hour of licensee staff time to make a telephonic notification.

On average, the NRC will require 5 hours of NRC staff time to review the information provided by licensees and respond to a cyber security event telephonic notification. The estimated hours are based on the NRC staff actions when a notification is received from the voluntary reporting initiatives. Response actions may include one or more of the following actions: (1) notifying the Cyber Assessment Team; (2) activation of the NRC's Headquarters Operations Center; (3) determining necessary follow-up actions based on the event characteristics; (4) documenting reported events; (5) making additional notifications to other government agencies (e.g., DHS); and (6) issuing threat advisories to other licensees.

Table 4-4 shows the estimated annual cost per site for one-hour notifications, by type of site.

Table 4-4. Estimated Annual Cost per Site for One-Hour Notifications (2014 Dollars)

Type of Site	Annual Cost to Industry ^{a, c}	Annual Cost to the NRC ^{b, c}
Sites with only reactors that are currently in commercial operation	\$63	\$303
Sites with both operating reactors and projected new reactors under a Part 52 license	\$63	\$303
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$63	\$303
Sites with only reactors that currently are in decommissioning	\$6	\$30

^a Annual Cost to Industry = [Annual number of cyber security events per site] x [1 hour/event] x [\$125/hour]. The “annual number of cyber security events per site” is 0.50 for sites that have reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license and 0.05 for sites that have only reactors that currently are in decommissioning.

^b Annual Cost to the NRC = [Annual number of cyber security events per site] x [5 hours/event] x [\$121/hour]. The “annual number of cyber security events per site” is 0.50 for sites that have reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license and 0.05 for sites that have only reactors that currently are in decommissioning.

^c Costs in the table are rounded to the nearest whole number.

4.2.4.5. Four-Hour Notifications

Licenses subject to the provisions of 10 CFR 73.54 must make a telephonic notification of the cyber security events identified at 10 CFR 73.77(a)(2)(i)-(iii) to the NRC within four hours after discovery. Notifications must be made according to 10 CFR 73.77(c).

To estimate the costs associated with four-hour notifications, the analysis employs the following assumptions:

- On average, cyber security events occur once a year at each site that has reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license; cyber security events occur once every 10 years (i.e., at a rate of 0.10 event per year) at each site that has only reactors that currently are in decommissioning. This rate of occurrence is based on data collected by the NRC since inception of the voluntary reporting initiatives and 10 CFR 73.54.
- On average, each site will require 0.50 hour of licensee staff time to make a telephonic notification.
- On average, the NRC will require 5 hours of NRC staff time to respond to a cyber security event telephonic notification, including notifying the Cyber Assessment Team and determining necessary follow-up actions. The estimated hours are based on the NRC staff actions when a notification is received from the voluntary reporting initiatives.

Table 4-5 shows the estimated annual cost per site for four-hour notifications, by type of site.

Table 4-5. Estimated Annual Cost per Site for Four-Hour Notifications (2014 Dollars)

Type of Site	Annual Cost to Industry ^{a, c}	Annual Cost to the NRC ^{b, c}
Sites with only reactors that are currently in commercial operation	\$63	\$605
Sites with both operating reactors and projected new reactors under a Part 52 license	\$63	\$605
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$63	\$605
Sites with only reactors that currently are in decommissioning	\$6	\$61

^a Annual Cost to Industry = [Annual number of cyber security events per site] x [0.5 hour/event] x [\$125/hour]. The “annual number of cyber security events per site” is 1 for sites that have reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license and 0.10 for sites that have only reactors that currently are in decommissioning.

^b Annual Cost to the NRC = [Annual number of cyber security events per site] x [5 hours/event] x [\$121/hour]. The “annual number of cyber security events per site” is 1 for sites that have reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license and 0.10 for sites that have only reactors that currently are in decommissioning.

^c Costs in the table are rounded to the nearest whole number.

4.2.4.6. Eight-Hour Notifications

Licenses subject to the provisions of 10 CFR 73.54 must make a telephonic notification of the cyber security events identified at 10 CFR 73.77(a)(3) to the NRC within eight hours after discovery. Notifications must be made according to 10 CFR 73.77(c).

To estimate the costs associated with eight-hour notifications, the analysis employs the following assumptions:

- On average, cyber security events occur 2.5 times a year at each site that has reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license; cyber security events occur once every two years (i.e., at a rate of 0.50 event per year) at each site that has only reactors that currently are in decommissioning. This rate of occurrence is based on data collected by the NRC since inception of the voluntary reporting initiatives and 10 CFR 73.54.
- On average, each site will require 0.50 hour of licensee staff time to make a telephonic notification.
- On average, the NRC will require 5 hours of NRC staff time to respond to a cyber security event telephonic notification, including notifying the Cyber Assessment Team and determining necessary follow-up actions. The estimated hours are based on the NRC staff actions when a notification is received from the voluntary reporting initiatives.

Table 4-6 shows the estimated annual cost per site for eight-hour notifications, by type of site.

Table 4-6. Estimated Annual Cost per Site for Eight-Hour Notifications (2014 Dollars)

Type of Site	Annual Cost to Industry ^{a, c}	Annual Cost to the NRC ^{b, c}
Sites with only reactors that are currently in commercial operation	\$156	\$1,513
Sites with both operating reactors and projected new reactors under a Part 52 license	\$156	\$1,513
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$156	\$1,513
Sites with only reactors that currently are in decommissioning	\$31	\$303

^a Annual Cost to Industry = [Annual number of cyber security events per site] x [0.5 hour/event] x [\$125/hour]. The “annual number of cyber security events per site” is 2.5 for sites that have reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license and 0.50 for sites that have only reactors that currently are in decommissioning.

^b Annual Cost to the NRC = [Annual number of cyber security events per site] x [5 hours/event] x [\$121/hour]. The “annual number of cyber security events per site” is 2.5 for sites that have reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license and 0.50 for sites that have only reactors that currently are in decommissioning.

^c Costs in the table are rounded to the nearest whole number.

4.2.4.7. Twenty-Four-Hour Recordable Events

Under 10 CFR 73.77(b), licensees must use the site corrective action program to record vulnerabilities, weaknesses, failures and deficiencies in their 10 CFR 73.54 cyber security program. Licensees also must use the site corrective action program to record notifications made under section 73.77(a).

To estimate the costs associated with twenty-four-hour recordable events, the analysis employs the following assumptions:

- On average, each site that has reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license will record 10 entries per year in its corrective action program (i.e., 4 entries on notifications made under section 73.77(a) and 6 entries on vulnerabilities, weaknesses, deficiencies and failures within the cyber security program that do not fall into the cyber security events under section 73.77(a)). For each site that has only reactors that currently in decommissioning will record 2.5 entries per year in its corrective action program (i.e., 0.65 entries for notifications made under section 73.77(a) and 1.85 entries on vulnerabilities, weaknesses, deficiencies and failures within the cyber security program that do not fall into the cyber security events under section 73.77(a)). This rate of occurrence is based on data collected by the NRC since inception of the voluntary reporting initiatives and 10 CFR 73.54.
- On average, each site will require 0.50 hour of licensee staff time to record one entry in the site corrective action program. The time required to perform corrective actions, trends, etc., are not part of this regulation. Those hours are included in the regulatory baseline as required under the physical protection program per section 73.55.

Table 4-7 shows the estimated annual cost per site for twenty-four-hour recordable events, by type of site.

Table 4-7. Estimated Annual Cost per Site for Twenty-Four-Hour Recordable Events (2014 Dollars)

Type of Site	Annual Cost to Industry ^{a, b}	Annual Cost to the NRC
Sites with only reactors that are currently in commercial operation	\$625	Not applicable
Sites with both operating reactors and projected new reactors under a Part 52 license	\$625	Not applicable
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$625	Not applicable
Sites with only reactors that currently are in decommissioning	\$156	Not applicable

^a Annual Cost to Industry = [Annual number of recordable events per site] x [0.5 hour/event] x [\$125/hour]. The “annual number of recordable events per site” is 10 for sites that have reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license and 2.5 for sites that have only reactors that currently are in decommissioning.

^b Costs in the table are rounded to the nearest whole number.

4.2.4.8. Written Security Follow-Up Reports

Under 10 CFR 73.77(d), licensees making an initial telephonic notification of cyber security events to the NRC according to the provisions of 10 CFR 73.77(a)(1), (a)(2)(i) and (a)(2)(ii) also must submit a written security follow-up report to the NRC within 60 days of the telephonic notification. However, licensees are not required to submit a written security follow-up report following a telephonic notification made under 10 CFR 73.77(a)(2)(iii) (i.e., notification to a local, State, or other Federal agency) and 10 CFR 73.77(a)(3) (i.e., notification regarding activities that may indicate intelligence gathering or pre-operational planning related to a cyber attack).

To estimate the costs associated with written security follow-up reports, the analysis employs the following assumptions:

- On average, each site that has reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license will submit 1.5 written security follow-up reports to the NRC every year; each site that has only reactors that currently are in decommissioning will submit 1 written security follow-up report to the NRC approximately every 6.67 years (i.e., at a rate of 0.15 reports per year). This rate of occurrence is based on the estimated rates of events per year for the one and four hour notifications.
- On average, each site will require 80 hours¹² of licensee staff time to prepare and submit a written security follow-up report. The estimated time to complete the NRC Form 366 to

¹² Includes recordkeeping (16 hrs), and time to prepare, review, approve, and submit the follow-up report (64 hrs).

report a cyber security event is similar to other reportable events already used by this form. No additional information is being collected beyond what is already required by the use of the form. The most recent information collection review included contacting nine licensees to refine the burden estimate. The data collected determined that the estimate of 80 hours of burden (including 16 hours of recordkeeping) is still valid.

- On average, the NRC will require 1 hour of NRC staff time to review a written security follow-up report. Information in these reports will be used by the NRC to get a clearer understanding of the event, and to assess trends and patterns.

Table 4-8 shows the estimated annual cost per site for written security follow-up reports, by type of site.

Table 4-8. Estimated Annual Cost per Site for Written Security Follow-Up Reports (2014 Dollars)

Type of Site	Annual Cost to Industry ^{a, c}	Annual Cost to the NRC ^{b, c}
Sites with only reactors that are currently in commercial operation	\$15,000	\$182
Sites with both operating reactors and projected new reactors under a Part 52 license	\$15,000	\$182
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$15,000	\$182
Sites with only reactors that currently are in decommissioning	\$1,500	\$18

^a Annual Cost to Industry = [Annual number of reports per site] x [80 hours/report] x [\$125/hour]. The “annual number of reports per site” is 1.5 for sites that have reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license and 0.15 for sites that have only reactors that currently are in decommissioning.

^b Annual Cost to the NRC = [Annual number of reports per site] x [1 hour/report] x [\$121/hour]. The “annual number of reports per site” is 1.5 for sites that have reactors that are currently in commercial operation, projected new reactors under a Part 52 license, and/or reactors under active construction under a Part 50 license and 0.15 for sites that have only reactors that currently are in decommissioning.

^c Costs in the table are rounded to the nearest whole number.

4.2.4.9. Inspections

Licensees must provide information on cyber security events recorded in the site corrective action program during an inspection. On average, each site will be inspected by the NRC once every two years (i.e., at a rate of 0.50 inspection per year). Inspectors are assumed to perform their own queries of the site CAP to assist with their inspection activities. Also, time spent on inspecting a site’s cyber security event notification requirements will be part of a larger security inspection of the licensee so any costs will be offset by equivalent efforts in other areas. Thus, although the inspection will occur, there will be no incremental cost to industry or the NRC.

4.2.4.10. Recurring Notification Training

Licensees are expected to deliver their notification training to designated personnel. To estimate the costs associated with the recurring notification training, the analysis employs the following assumptions:

- On average, each site will deliver the recurring notification training that includes the cyber security event notification requirements once a year as part of their annual training program.

Operating Reactors

- On average, each site will require 84 hours of licensee staff time to deliver the recurring notification training to 800 licensee staff members at each site for operating reactors.
 - Operations/Engineering/Administrative staff: 600 people * 0.083 hours = 50 hours
 - Security and CSAT staff: 200 people * 0.17 hours = 34 hours
 - *Total 84 hours*

Decommissioning Reactors

- On average, each site will require 34 hours of licensee staff time to deliver the recurring notification training for to 300 licensee staff members at each site decommissioning reactors.
 - Operations/Engineering/Administrative staff: 200 people * 0.083 hour = 17 hours
 - Security and CSAT staff: 100 people * 0.17 hours = 17 hours
 - *Total 34 hours*

Table 4-9 shows the estimated annual cost per site for recurring notification training, by type of site.

Table 4-9. Estimated Annual Cost per Site for Recurring Notification Training (2014 Dollars)

Type of Site	Annual Cost to Industry ^{a, b}	Annual Cost to the NRC
Sites with only reactors that are currently in commercial operation	\$10,500	Not applicable
Sites with both operating reactors and projected new reactors under a Part 52 license	\$10,500	Not applicable
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$10,500	Not applicable
Sites with only reactors that currently are in decommissioning	\$4,250 ^c	Not applicable

^a Annual Cost to Industry = [1 recurring notification training per year] x [84 hour/training] x [\$125/hour].

^b Costs in the table are rounded to the nearest whole number.

^c Annual Cost to Industry = [1 recurring notification training per year] x [34 hour/training] x [\$125/hour].

5. Results

This section organizes the analytical results into four separate sections. Section 5.1 presents results on the benefits and costs of the final rule as a whole, as well as disaggregated results for each of the regulatory requirements that comprise the final rule. Section 5.2 presents the results of a sensitivity analysis conducted to determine whether, and to what extent, the results of the analysis are sensitive to changes in key assumptions and numeric inputs. Section 5.3 evaluates disaggregation of the requirements in the final rule. Section 5.4 addresses the applicability of a safety goal evaluation to the final rule.

5.1. Benefits and Costs of the Final Rule

This section discusses the benefits and costs estimated for the final rule.

5.1.1. Summary of Benefits and Costs

Tables 5-1 through 5-3 summarize the benefits and costs of the final rule as a whole, and for each quantifiable regulatory requirement contained in the final rule.

The final rule as a whole (Option 2) would result in a quantitative cost estimated between \$27.9 million and \$42.6 million (at a 7 percent and 3 percent discount rate, respectively). These costs are associated with four affected attributes—industry implementation, industry operation, NRC implementation, and NRC operation. Section 4.2.4 provides detail on the incremental activities under the final rule, and estimates the one-time and annual costs associated with these activities.

The analysis does not quantify the benefits associated with Option 2, but it does describe them qualitatively in Table 5-1. The NRC staff assumes that Option 2 would result in qualitative benefits in the following attributes: safeguards and security considerations, regulatory efficiency, public health (accident), occupational health (accident), off-site property, on-site property, and other government agencies.

Overall, the benefits include an increased ability to protect digital computers, communication systems, and networks associated with safety-related; important-to-safety; security; emergency preparedness, to include offsite communications (SSEP); and support systems and equipment which, if compromised, would adversely impact SSEP functions. Notifications and written reports generated by licensees will be used by the NRC to respond to emergencies, monitor ongoing events, assess trends and patterns, identify precursors of more significant events, and inform other NRC licensees of cyber security-related events, enabling them to take preemptive actions if necessary (e.g., increase security posture).

Table 5-1. Summary of Overall Benefits and Costs (Quantitative and Qualitative)

	Benefits	Costs (2014 Dollars)
<p>Option 2: Final Rule</p>	<p>Safeguards and Security Considerations – Increased NRC's ability to respond to cyber security events and to effectively monitor ongoing licensee actions and inform other licensees in a timely manner of cyber security-significant events and thus, protect public health and safety and the common defense and security.</p> <p>Regulatory Efficiency – The regulatory action will enhance regulatory efficiency by establishing staff-approved guidance that licensees may use to track, correct, and prevent cyber security events. Consequently, licensees and the NRC will face less uncertainty in determining compliance with the regulatory requirements in the final rule.</p> <p>Public Health (Accident) – Timely notification of potential and/or imminent cyber attacks will improve the ability of the NRC and other licensees to respond and take actions necessary to mitigate the adverse impacts of cyber attacks directed against nuclear power reactors. These actions are expected to avert potential radiation exposure to the public following an attack.</p> <p>Occupational Health (Accident) – Timely notification of potential and/or imminent cyber attacks will improve the ability of the NRC and other licensees to respond and take actions necessary to mitigate the adverse impacts of cyber attacks directed against nuclear power reactors. These actions are expected to avert potential radiation exposure to site workers following an attack.</p> <p>Off-Site Property – Timely notification of potential and/or imminent cyber attacks will improve the ability of the NRC and other licensees to respond and take actions necessary to mitigate the adverse impacts of cyber attacks directed against nuclear power reactors. These actions are expected to avert potential off-site property damage and costs that may result from an attack.</p> <p>On-Site Property – Timely notification of potential and/or imminent cyber attacks will improve the ability of the NRC and other licensees to respond and take actions necessary to mitigate the adverse impacts of cyber attacks directed against nuclear power reactors. These actions are expected to avert potential on-site property damage and costs that may result from an attack.</p> <p>Other Government Agencies – The CSEN final rule will not have an effect on other Government agencies because the reporting of suspicious or criminal activity related to terrorism (e.g., physical security, cyber security) is captured under the NIPP and part of the NRC's strategic communications mission. In addition, certain cyber security events reported to the NRC that fall within the scope of 10 CFR 73.54 will not need to be reported to other Government agencies.</p>	<p>Industry Implementation: \$3.0 million</p> <p>Industry Operation: \$22.5 million using a 7% discount rate \$35.9 million using a 3% discount rate</p> <p>NRC Implementation: \$166,375</p> <p>NRC Operation: \$2.2 million using a 7% discount rate \$3.5 million using a 3% discount rate</p> <p>Total Costs: \$27.9 million using a 7% discount rate \$42.6 million using a 3% discount rate</p>

**Table 5-2. Summary of Quantified One-Time, Annual,
and Overall Costs of the Final Rule (2014 Dollars)**

Cost Category	One-Time Costs	Annual Costs	Present Value	
			7% Discount Rate	3% Discount Rate
Rulemaking activities	\$166,375	\$0	\$166,375	\$166,375
Development of procedures	\$715,000	\$0	\$715,000	\$715,000
Initial notification training	\$2,248,750	\$0	\$2,248,750	\$2,248,750
One-hour notifications	\$0	\$22,470	\$309,810	\$494,647
Four-hour notifications	\$0	\$41,016	\$565,497	\$902,861
Eight-hour notifications	\$0	\$103,145	\$1,419,390	\$2,263,996
Recordable events	\$0	\$38,749	\$532,733	\$849,332
Written security follow-up reports	\$0	\$932,174	\$12,852,172	\$20,519,587
Inspections	\$0	\$0	\$0	\$0
Recurring notification training	\$0	\$657,500	\$9,013,419	\$14,348,917
Total	\$3,130,125	\$1,795,054	\$27,823,147	\$42,509,465

Table 5-3. Summary of Quantified One-Time, Annual, and Overall Costs to Industry and the NRC, by Regulatory Requirement (2014 Dollars)

Cost Category	Costs to Industry				Costs to the NRC			
	One-Time Costs	Annual Costs	Present Value		One-Time Costs	Annual Costs	Present Value	
			7% Discount Rate	3% Discount Rate			7% Discount Rate	3% Discount Rate
Rulemaking activities	\$0	\$0	\$0	\$0	\$166,375	\$0	\$166,375	\$166,375
Development of procedures	\$715,000	\$0	\$715,000	\$715,000	\$0	\$0	\$0	\$0
Initial notification training	\$2,248,750	\$0	\$2,248,750	\$2,248,750	\$0	\$0	\$0	\$0
One-hour notifications	\$0	\$3,867	\$53,320	\$85,134	\$0	\$18,603	\$256,490	\$409,512
Four-hour notifications	\$0	\$3,867	\$53,320	\$85,134	\$0	\$37,149	\$512,177	\$817,727
Eight-hour notifications	\$0	\$9,640	\$132,661	\$211,603	\$0	\$93,505	\$1,286,730	\$2,052,393
Recordable events	\$0	\$38,749	\$532,733	\$849,332	\$0	\$0	\$0	\$0
Written security follow-up reports	\$0	\$921,000	\$12,698,110	\$20,273,610	\$0	\$11,174	\$154,063	\$245,977
Inspections	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Recurring notification training	\$0	\$657,500	\$9,013,419	\$14,348,917	\$0	\$0	\$0	\$0
Total	\$2,963,750	\$1,634,623	\$25,447,313	\$38,817,482	\$166,375	\$160,431	\$2,375,834	\$3,691,983

5.1.2. Incremental Costs by Type of Site

Tables 5-4 and 5-5 show the costs to industry and the NRC based on type of site, respectively. The tables also show the per-site costs and number of sites used to estimate total costs.

Table 5-4. Summary of Estimated Costs to Industry under the Final Rule, by Type of Site (2014 Dollars)

Type of Site	Per-Site Costs	Number of Sites	Total Costs
One-Time Costs			
Sites with only reactors that are currently in commercial operation	\$46,750	58	\$2,711,500
Sites with both operating reactors and projected new reactors under a Part 52 license	\$46,750	2	\$93,500
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$46,750	1	\$46,750
Sites with only reactors that currently are in decommissioning	\$28,000	4	\$112,000
Total One-Time Costs			\$2,963,750
Annual Costs			
Sites with only reactors that are currently in commercial operation	\$26,407	58	\$1,531,606
Sites with both operating reactors and projected new reactors under a Part 52 license	\$26,407	2	\$52,814
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$26,407	1	\$26,407
Sites with only reactors that currently are in decommissioning	\$5,949	4	\$23,796
Total Annual Costs			\$1,634,623

**Table 5-5. Summary of Estimated Costs to the NRC
under the Final Rule, by Type of Site (2014 Dollars)**

Type of Site	Per-Site Costs	Number of Sites	Total Costs
One-Time Costs			
All sites	Not Applicable	65	\$166,375
Total One-Time Costs			\$166,375
Annual Costs			
Sites with only reactors that are currently in commercial operation	\$2,603	58	\$150,974
Sites with both operating reactors and projected new reactors under a Part 52 license	\$2,603	2	\$5,206
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$2,603	1	\$2,603
Sites with only reactors that currently are in decommissioning	\$412	4	\$1,648
Total Annual Costs			\$160,431

Tables 5-6 and 5-7 summarize the estimated per-site costs associated with each of the cost categories for industry and the NRC, respectively.

Table 5-6. Estimated Per-Site Costs to Industry under the Final Rule (2014 Dollars)

Cost Category	Sites with Only Reactors that are Currently in Commercial Operation	Sites with Both Operating Reactors and Projected New Reactors under a Part 52 License	Sites with Both Operating Reactors and Reactors under Active Construction under a Part 50 License	Sites with Only Reactors that Currently are in Decommissioning
One-Time Costs				
Develop procedures	\$11,000	\$11,000	\$11,000	\$11,000
Develop and deliver initial notification training to designated personnel	\$35,750	\$35,750	\$35,750	\$17,000
Total One-Time Costs	\$46,750	\$46,750	\$46,750	\$28,000
Annual Costs				
Make one-hour notifications (10 CFR 73.77(a)(1) and (c))	\$63	\$63	\$63	\$6
Make four-hour notifications (10 CFR 73.77(a)(2)(i)-(iii) and (c))	\$63	\$63	\$63	\$6
Make eight-hour notifications (10 CFR 73.77(a)(3) and (c))	\$156	\$156	\$156	\$31
Record events in site's corrective action program (10 CFR 73.77(b))	\$625	\$625	\$625	\$156
Prepare and submit written security follow-up reports (10 CFR 73.77(d))	\$15,000	\$15,000	\$15,000	\$1,500
Provide information during Inspections (10 CFR 73.77(b))	\$0	\$0	\$0	\$0
Update and deliver recurring notification training to designated personnel (10 CFR 73.77)	\$10,500	\$10,500	\$10,500	\$4,250
Total Annual Costs	\$26,407	\$26,407	\$26,407	\$5,949

Table 5-7. Estimated Per-Site Costs to the NRC under the Final Rule (2014 Dollars)

Cost Category	Sites with Only Reactors that are Currently in Commercial Operation	Sites with Both Operating Reactors and Projected New Reactors under a Part 52 License	Sites with Both Operating Reactors and Reactors under Active Construction under a Part 50 License	Sites with Only Reactors that Currently are in Decommissioning
One-Time Costs				
Perform rulemaking activities	\$166,375			
Annual Costs				
Respond to one-hour notifications (10 CFR 73.77(a)(1) and (c))	\$303	\$303	\$303	\$30
Respond to four-hour notifications (10 CFR 73.77(a)(2)(i)-(iii) and (c))	\$605	\$605	\$605	\$61
Respond to eight-hour notifications (10 CFR 73.77(a)(3) and (c))	\$1,513	\$1,513	\$1,513	\$303
Review written security follow-up reports (10 CFR 73.77(d))	\$182	\$182	\$182	\$18
Review information during inspections (10 CFR 73.77(b))	\$0	\$0	\$0	\$0
Total Annual Costs	\$2,603	\$2,603	\$2,603	\$412

5.2. Sensitivity Analysis

This section presents a sensitivity analysis in order to determine whether, and to what extent, the results of the analysis are sensitive to costs according to the following alternative sets of parameters:

- **Best Estimate.** The NRC’s best estimate for key parameters is based on historic data from voluntary cyber security reports from licensees. These values reflect the key assumptions and numeric inputs discussed in Section 4.
- **Alternative Estimate.** Higher estimates for the frequency of cyber security events. These key parameters were selected for the sensitivity analysis because of the uncertainty resulting from limited availability of data on the frequency of cyber security events. The alternative estimates are based on the increased frequency of cyber security events within the Federal Government which could potentially affect other critical infrastructures and resources (i.e. nuclear sector). The NRC used these two parameters to estimate the alternative annual frequencies a site could see in a higher threat situation.

Table 5-8 presents the assumptions associated with key parameters used in the sensitivity analysis.

Table 5-8. Assumptions Associated with Key Parameters Used in Sensitivity Analysis

Data Element	Type of Site	Best Estimate	Alternative Estimate
Annual Number of Events that Will Require a One-Hour Notification	Sites with only reactors that are currently in commercial operation	0.50	5
	Sites with both operating reactors and projected new reactors under a Part 52 license	0.50	5
	Sites with both operating reactors and reactors under active construction under a Part 50 license	0.50	5
	Sites with only reactors that currently are in decommissioning	0.05	1
Annual Number of Events that Will Require a Four-Hour Notification	Sites with only reactors that are currently in commercial operation	1	10
	Sites with both operating reactors and projected new reactors under a Part 52 license	1	10
	Sites with both operating reactors and reactors under active construction under a Part 50 license	1	10
	Sites with only reactors that currently are in decommissioning	0.10	2
Annual Number of Events that Will Require an Eight-Hour Notification	Sites with only reactors that are currently in commercial operation	2.5	15
	Sites with both operating reactors and projected new reactors under a Part 52 license	2.5	15
	Sites with both operating reactors and reactors under active construction under a Part 50 license	2.5	15
	Sites with only reactors that currently are in decommissioning	0.50	3.5

Table 5-8. Assumptions Associated with Key Parameters Used in Sensitivity Analysis

Data Element	Type of Site	Best Estimate	Alternative Estimate
Annual Number of Entries in the Site's Corrective Actions Program	Sites with only reactors that are currently in commercial operation	10	30
	Sites with both operating reactors and projected new reactors under a Part 52 license	10	30
	Sites with both operating reactors and reactors under active construction under a Part 50 license	10	30
	Sites with only reactors that currently are in decommissioning	2.5	5
Annual Number of Written Follow-Up Report after Initial Cyber Security Event Notification	Sites with only reactors that are currently in commercial operation	1.5	20
	Sites with both operating reactors and projected new reactors under a Part 52 license	1.5	20
	Sites with both operating reactors and reactors under active construction under a Part 50 license	1.5	20
	Sites with only reactors that currently are in decommissioning	0.15	4.5

In conducting the sensitivity analysis, the NRC re-computed the annual costs of the final rule using the alternative estimate parameters shown in Table 5-8. The results of the sensitivity analysis are presented in Table 5-9. Appendix C provides additional detail on the estimation of the overall costs of the final rule based on the sensitivity analysis.

Table 5-9. Overall Costs of the Final Rule Based on the Sensitivity Analysis (2014 Dollars)

Set of Data Elements	7% Discount Rate		3% Discount Rate	
	Present Value	Annualized	Present Value	Annualized
Best Estimate	\$27.9 million	\$1.8 million	\$42.6 million	\$1.8 million
Alternative Estimate	\$203.4 million	\$14.6 million	\$322.5 million	\$14.8 million

As shown in the table, the overall costs of the final rule are estimated to be between \$27.9 million and \$322.5 million (2014 dollars), depending on the alternative set of parameters used to estimate the costs. In all cases, NRC concludes that the final rule is not an “economically significant regulatory action” under Section 3(f)(1) of Executive Order 12866.

5.3. Disaggregation

The NRC staff has evaluated the rulemaking to determine whether specific requirements have to be considered separately, but has determined that the requirements in the final rule are narrowly focused. Therefore, the analysis of disaggregated requirements is not necessary.

5.4. Safety Goal Evaluation

The analysis relies primarily on a qualitative (rather than quantitative) evaluation of several of the affected attributes (safeguards and security considerations, regulatory efficiency, public health (accident), occupational health (accident), off-site property, and on-site property) due to the difficulty in quantifying the impact of the current rulemaking. These attributes will be affected by the regulatory options through the associated reduction in the risks of radiological sabotage and damage to the reactor core and the spent fuel. Quantification of any of these attributes would require estimation of factors such as: (1) the frequency of attempted radiological sabotage, (2) the frequency with which radiological sabotage attempts are (i.e., pre-rule) and will be (i.e., post-rule) successful, and (3) the impacts associated with successful radiological sabotage attempts.

Safety goal evaluations are applicable only to regulatory initiatives considered to be generic safety enhancement backfit subject to the substantial additional protection standard at section 50.109(a)(3).4. Some aspects of this rule may qualify as generic safety enhancements because they may affect the likelihood of core damage or spent fuel damage, which generally are the focus of a quantitative safety goal evaluation. However, the magnitude of this change is not readily quantifiable due to uncertainties discussed in Section 4.2 above. A more dominant effect of this rule is to reduce the probability of other types of damage associated with a wide array of acts of sabotage, although this effect is equally difficult to quantify. Because the change in safety associated with the rulemaking cannot be quantified, the regulatory changes cannot be compared to the NRC's safety goals.

6. Decision Rationale for Selection of the Proposed Action

Relative to the "no-action" alternative, the final rule would cost industry between \$27.7 million and \$41.1 million (at a 7-percent and 3-percent discount rate, respectively). The NRC costs are estimated between \$2.4 million and \$3.7 million (at a 7-percent and 3-percent discount rate, respectively). Therefore, the total cost of this final rule is estimated to range from \$30.1 million (7-percent discount rate) to \$44.8 million (3-percent discount rate). (Costs are presented at a high level; more detailed information is presented in Sections 4 and 5).

Although the NRC did not quantify the benefits of this final rule, the staff did qualitatively examine benefits and concluded that the rule would provide safety and security-related benefits. The NRC believes that prompt notification of a cyber attack is vital to the NRC's ability to take immediate action in response to a cyber attack and, if necessary, to notify other NRC licensees, Government agencies, and critical infrastructure facilities, to defend against a multiple sector (e.g., energy, financial, etc.) cyber attack. Like the attacks of September 2001, a cyber attack has the capability to be launched against multiple targets simultaneously or spread quickly throughout multiple sectors of critical infrastructure. In addition, reporting suspicious cyber activities and incidents, even though their significance may seem minor, is a substantial safety enhancement because it increases awareness of cyber security threats and allows time to plan for appropriate response if an attack is substantiated.

Based on the NRC's assessment of the costs and benefits of the final rule on licensee facilities, the NRC has concluded that the final rule provisions would be justified to support the NRC's strategic communications mission as well as protecting the public health and safety or the common defense and security.

7. Implementation

The final rule is to take effect 30 days after publication in the *Federal Register* with a compliance date within 180 days after publication in the *Federal Register* for those licensed to operate under 10 CFR Parts 50 and 52, and subject to 10 CFR 73.54. The NRC staff does not expect this rule to have any impact on other requirements.

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Appendix A

Backfit Analysis

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Backfit Analysis

The U.S. Nuclear Regulatory Commission (NRC) is amending its regulations in Part 73 to add reporting and recordkeeping requirements related to certain cyber security events. The NRC is adding these requirements because cyber security event reporting and recordkeeping requirements were not included in the NRC's final rule that added section 73.54 to the NRC's regulations (74 *FR* 13925; March 27, 2009). Section 73.54 requires power reactor licensees to establish and maintain a cyber security program at their facilities to provide high assurance that digital computer and communication systems and networks are adequately protected against cyber attacks, up to and including the design basis threat as described in section 73.1. These new requirements are being added to the security event notification provisions of Part 73 as section 73.77.

Revisions that amend existing information collection and reporting requirements or impose new information and collection and reporting requirements are not considered to be backfits, as presented in the charter for the NRC's Committee to Review Generic Requirements (CRGR). Therefore, a backfit analysis has not been completed for this final rule.

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Appendix B
U.S. Commercial Nuclear Power Reactor Sites
Affected by the Final Rule

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Table B-1. U.S. Commercial Nuclear Power Reactor Sites Subject to the Cyber Security Event Notifications Rule

No.	Site Name	Location	Reactors at Site						Type of Site for Purposes of Analysis
			Operating Reactor 1 Unit	Operating Reactors 2 Units	Operating Reactors 3 Units	Projected New Reactor Issued Combined License under Part 52	Reactors under Active Construction under Part 50 License	Reactors Undergoing Decommissioning	
1	Arkansas Nuclear One	London, AR		X					Site with only reactors that are currently in commercial operation
2	Beaver Valley Power Station	Shippingport, PA		X					Site with only reactors that are currently in commercial operation
3	Braidwood Station	Braceville, IL		X					Site with only reactors that are currently in commercial operation
4	Browns Ferry Nuclear Plant	Athens, IL			X				Site with only reactors that are currently in commercial operation
5	Brunswick Steam Electric Plant	Southport, NC		X					Site with only reactors that are currently in commercial operation
6	Byron Station	Byron, IL		X					Site with only reactors that are currently in commercial operation
7	Callaway Plant	Fulton, MO	X						Site with only reactors that are currently in commercial operation
8	Calvert Cliffs Nuclear Power Plant	Lusby, MD		X					Site with only reactors that are currently in commercial operation
9	Catawba Nuclear Station	York, SC		X					Site with only reactors that are currently in commercial operation
10	Clinton Power Station	Clinton, IL	X						Site with only reactors that are currently in commercial operation
11	Columbia Generating Station	Benton County, WA	X						Site with only reactors that are currently in commercial operation
12	Comanche Peak Nuclear Power Plant	Glen Rose, TX		X					Site with only reactors that are currently in commercial operation
13	Cooper Nuclear Station	Brownville, NE	X						Site with only reactors that are currently in commercial operation
14	Crystal River	Crystal River, FL						X	Site with only reactors that currently are in decommissioning
15	Davis Besse Nuclear Power Station	Oak Harbor, OH	X						Site with only reactors that are currently in commercial operation

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No.	Site Name	Location	Reactors at Site						Type of Site for Purposes of Analysis
			Operating Reactor 1 Unit	Operating Reactors 2 Units	Operating Reactors 3 Units	Projected New Reactor Issued Combined License under Part 52	Reactors under Active Construction under Part 50 License	Reactors Undergoing Decommissioning	
16	Diablo Canyon Nuclear Power Plant	Avila Beach, CA		X					Site with only reactors that are currently in commercial operation
17	Donald C. Cook Nuclear Plant	Bridgman, MI		X					Site with only reactors that are currently in commercial operation
18	Dresden Nuclear Power Station	Morris, IL		X				X	Site with only reactors that are currently in commercial operation ^a
19	Duane Arnold Energy Center	Palo, IA	X						Site with only reactors that are currently in commercial operation
20	Edwin I. Hatch Nuclear Plant	Baxley, GA		X					Site with only reactors that are currently in commercial operation
21	Fermi	Newport, MI	X					X	Site with only reactors that are currently in commercial operation ^a
22	Fort Calhoun Station	Ft. Calhoun, NE	X						Site with only reactors that are currently in commercial operation
23	Grand Gulf Nuclear Station	Port Gibson, MS	X						Site with only reactors that are currently in commercial operation
24	H.B. Robinson Steam Electric Plant	Hartsville, SC	X						Site with only reactors that are currently in commercial operation
25	Hope Creek Generating Station	Hancocks Bridge, NJ	X						Site with only reactors that are currently in commercial operation
26	Indian Point Nuclear Power Plant	Buchanan, NY		X				X	Site with only reactors that are currently in commercial operation ^a
27	James A. FitzPatrick Nuclear Power Plant	Scriba, NY	X						Site with only reactors that are currently in commercial operation
28	Joseph M. Farley Nuclear Plant	Columbia, AL		X					Site with only reactors that are currently in commercial operation
29	Kewaunee	Kewaunee, WI						X	Site with only reactors that currently are in decommissioning
30	LaSalle County Station	Marseilles, IL		X					Site with only reactors that are currently in commercial operation

Table B-1. U.S. Commercial Nuclear Power Reactor Sites Subject to the Cyber Security Event Notifications Rule

No.	Site Name	Location	Reactors at Site						Type of Site for Purposes of Analysis
			Operating Reactor 1 Unit	Operating Reactors 2 Units	Operating Reactors 3 Units	Projected New Reactor Issued Combined License under Part 52	Reactors under Active Construction under Part 50 License	Reactors Undergoing Decommissioning	
31	Limerick Generating Station	Limerick, PA		X					Site with only reactors that are currently in commercial operation
32	McGuire Nuclear Station	Huntersville, NC		X					Site with only reactors that are currently in commercial operation
33	Millstone Power Station	Waterford, CT		X				X	Site with only reactors that are currently in commercial operation ^a
34	Monticello Nuclear Generating Plant	Monticello, MN	X						Site with only reactors that are currently in commercial operation
35	Nine Mile Point Nuclear Station	Scriba, NY		X					Site with only reactors that are currently in commercial operation
36	North Anna Power Station	Mineral, VA		X					Site with only reactors that are currently in commercial operation
37	Oconee Nuclear Station	Seneca, SC			X				Site with only reactors that are currently in commercial operation
38	Oyster Creek Nuclear Generating Station ^c	Forked River, NJ	X						Site with only reactors that are currently in commercial operation
39	Palisades Nuclear Plant	Covert, MI	X						Site with only reactors that are currently in commercial operation
40	Palo Verde Nuclear Generating Station	Wintersburg, AZ			X				Site with only reactors that are currently in commercial operation
41	Peach Bottom Atomic Power Station	Delta, PA		X				X	Site with only reactors that are currently in commercial operation ^a
42	Perry Nuclear Power Plant	Perry, OH	X						Site with only reactors that are currently in commercial operation
43	Pilgrim Nuclear Power Station	Plymouth, MA	X						Site with only reactors that are currently in commercial operation
44	Point Beach Nuclear Plant	Two Rivers, WI		X					Site with only reactors that are currently in commercial operation
45	Prairie Island Nuclear Generating Plant	Welch, MN		X					Site with only reactors that are currently in commercial operation

Table B-1. U.S. Commercial Nuclear Power Reactor Sites Subject to the Cyber Security Event Notifications Rule

No.	Site Name	Location	Reactors at Site						Type of Site for Purposes of Analysis
			Operating Reactor 1 Unit	Operating Reactors 2 Units	Operating Reactors 3 Units	Projected New Reactor Issued Combined License under Part 52	Reactors under Active Construction under Part 50 License	Reactors Undergoing Decommissioning	
46	Quad Cities Nuclear Power Station	Cordova, IL		X					Site with only reactors that are currently in commercial operation
47	R.E. Ginna Nuclear Power Plant	Ontario, NY	X						Site with only reactors that are currently in commercial operation
48	River Bend Station	St. Francisville, LA	X						Site with only reactors that are currently in commercial operation
49	Salem Nuclear Generating Station	Hancocks Bridge, NJ		X					Site with only reactors that are currently in commercial operation
50	San Onofre Nuclear Generating Station	San Clemente, CA						X	Site with only reactors that currently are in decommissioning
51	Seabrook Station	Seabrook, NH	X						Site with only reactors that are currently in commercial operation
52	Sequoyah Nuclear Plant	Soddy-Daisy, TN		X					Site with only reactors that are currently in commercial operation
53	Shearon Harris Nuclear Power Plant	New Hill, NC	X						Site with only reactors that are currently in commercial operation
54	South Texas Project	Bay City, TX		X					Site with only reactors that are currently in commercial operation
55	St. Lucie Plant	Jensen Beach, FL		X					Site with only reactors that are currently in commercial operation
56	Surry Power Station	Surry, VA		X					Site with only reactors that are currently in commercial operation
57	Susquehanna Steam Electric Station	Berwick, PA		X					Site with only reactors that are currently in commercial operation
58	Three Mile Island Nuclear Station	Middletown, PA	X					X	Site with only reactors that are currently in commercial operation ^a
59	Turkey Point Nuclear Generating	Homestead, FL		X					Site with only reactors that are currently in commercial operation
60	Vermont Yankee Nuclear Power Station	Vernon, VT						X	Site with only reactors that currently are in decommissioning ^b

Table B-1. U.S. Commercial Nuclear Power Reactor Sites Subject to the Cyber Security Event Notifications Rule

No.	Site Name	Location	Reactors at Site						Type of Site for Purposes of Analysis
			Operating Reactor 1 Unit	Operating Reactors 2 Units	Operating Reactors 3 Units	Projected New Reactor Issued Combined License under Part 52	Reactors under Active Construction under Part 50 License	Reactors Undergoing Decommissioning	
61	Virgil C. Summer Nuclear Station	Jenkinsville, SC	X			X			Site with both operating reactors and projected new reactors under a Part 52 license
62	Vogtle Electric Generating Plant	Waynesboro, GA		X		X			Site with both operating reactors and projected new reactors under a Part 52 license
63	Waterford Steam Electric Station	Killona, LA	X						Site with only reactors that are currently in commercial operation
64	Watts Bar Nuclear Plant	Spring City, TN	X				X		Site with both operating reactors and reactors under active construction under a Part 50 license
65	Wolf Creek Generating Station	Burlington, KS	X						Site with only reactors that are currently in commercial operation

^a Site has operating reactor(s) and decommissioning reactor(s). Because the final rule applicability period for an operating reactor exceeds the period for a reactor that already is decommissioning, the site is categorized as a "site with only reactors that are currently in commercial operation" for purposes of this analysis.

^b The Vermont Yankee Nuclear Power Station is assumed to be in decommissioning on the effective date of the final rule (i.e., in 2015) and thus, is categorized as "site with only reactors that currently are in decommissioning." The Vermont Yankee Nuclear Power Station plans to terminate commercial operation in December 2014. The operating license renewal applications for Indian Point Nuclear Generating Units 2 and 3 are currently under NRC consideration and it was assumed that these license renewals will be granted.

^c Oyster Creek Nuclear Generating Station plans to terminate commercial operation in 2019.

Sources:

- (1) NRC, "Operating Nuclear Power Reactors (by Location or Name)" Web page, www.nrc.gov. Data current as of March 19, 2014. Available at: <http://www.nrc.gov/info-finder/reactor/>, last accessed on May 26, 2014.
- (2) NRC, "Locations of Power Reactor Sites Undergoing Decommissioning" Web page, www.nrc.gov. Data current as of April 24, 2014. Available at: <http://www.nrc.gov/info-finder/decommissioning/power-reactor/>, last accessed on May 26, 2014.
- (3) NRC, 2013-2014 Information Digest (NUREG-1350, Volume 25), "Appendix A: U.S. Commercial Nuclear Power Reactors - Operating Reactors under Active Construction or Deferred Policy," August 2013. Available at: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1350/#pubinfo>, last accessed on May 26, 2014.
- (4) NRC, "Combined License Applications for New Reactors" Web page, www.nrc.gov. Data current as of April 17, 2014. Available at: <http://www.nrc.gov/reactors/new-reactors/col.html>, last accessed on May 26, 2014

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Appendix C
Estimation of Overall Costs of the Final Rule
Based on the Sensitivity Analysis

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Table C-1. Industry Implementation (One-Time Costs): Develop Procedures

Type of Site	Cost per Site	Cost for All Sites	For All Sites			
			Present Value 7% Discount Rate	Present Value 3% Discount Rate	Annualized Value 7% Discount Rate	Annualized Value 3% Discount Rate
Sites with only reactors that are currently in commercial operation	\$11,000	\$638,000	\$638,000	\$638,000	\$46,387	\$29,312
Sites with both operating reactors and projected new reactors under a Part 52 license	\$11,000	\$22,000	\$22,000	\$22,000	\$1,466	\$777
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$11,000	\$11,000	\$11,000	\$11,000	\$737	\$399
Sites with only reactors that currently are in decommissioning	\$11,000	\$44,000	\$44,000	\$44,000	\$4,515	\$3,578
Total for all sites		\$715,000	\$715,000	\$715,000	\$53,106	\$34,066

Table C-2. Industry Implementation (One-Time Costs): Revise and Deliver Initial Notification Training to Designated Personnel

Type of Site	Cost per Site	Cost for All Sites	For All Sites			
			Present Value 7% Discount Rate	Present Value 3% Discount Rate	Annualized Value 7% Discount Rate	Annualized Value 3% Discount Rate
Sites with only reactors that are currently in commercial operation	\$35,750	\$2,073,500	\$2,073,500	\$2,073,500	\$150,758	\$95,264
Sites with both operating reactors and projected new reactors under a Part 52 license	\$35,750	\$71,500	\$71,500	\$71,500	\$4,766	\$2,524
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$35,750	\$35,750	\$35,750	\$35,750	\$2,397	\$1,296
Sites with only reactors that currently are in decommissioning	\$17,000	\$68,000	\$68,000	\$68,000	\$6,978	\$5,530
Total for all sites		\$2,248,750	\$2,248,750	\$2,248,750	\$164,898	\$104,614

Table C-3. Industry Operation (Annual Costs): Make One-Hour Notifications (10 CFR 73.77(a)(1) and (c))

Type of Site	Cost per Site	Cost for All Sites	For All Sites			
			Present Value 7% Discount Rate	Present Value 3% Discount Rate	Annualized Value 7% Discount Rate	Annualized Value 3% Discount Rate
Sites with only reactors that are currently in commercial operation	\$625	\$36,250	\$498,575	\$789,010	\$36,250	\$36,250
Sites with both operating reactors and projected new reactors under a Part 52 license	\$625	\$1,250	\$18,754	\$35,414	\$1,250	\$1,250
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$625	\$625	\$9,322	\$17,236	\$625	\$625
Sites with only reactors that currently are in decommissioning	\$125	\$500	\$4,873	\$6,148	\$500	\$500
Total for all sites		\$38,625	\$531,524	\$847,808	\$38,625	\$38,625

Table C-4. Industry Operation (Annual Costs): Make Four-Hour Notifications (10 CFR 73.77(a)(2) and (c))

Type of Site	Cost per Site	Cost for All Sites	For All Sites			
			Present Value 7% Discount Rate	Present Value 3% Discount Rate	Annualized Value 7% Discount Rate	Annualized Value 3% Discount Rate
Sites with only reactors that are currently in commercial operation	\$625	\$36,250	\$498,575	\$789,010	\$36,250	\$36,250
Sites with both operating reactors and projected new reactors under a Part 52 license	\$625	\$1,250	\$18,754	\$35,414	\$1,250	\$1,250
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$625	\$625	\$9,322	\$17,236	\$625	\$625
Sites with only reactors that currently are in decommissioning	\$125	\$500	\$4,873	\$6,148	\$500	\$500
Total for all sites		\$38,625	\$531,524	\$847,808	\$38,625	\$38,625

Table C-5. Industry Operation (Annual Costs): Make Eight-Hour Notifications (10 CFR 73.77(a)(3) and (c))

Type of Site	Cost per Site	Cost for All Sites	For All Sites			
			Present Value 7% Discount Rate	Present Value 3% Discount Rate	Annualized Value 7% Discount Rate	Annualized Value 3% Discount Rate
Sites with only reactors that are currently in commercial operation	\$938	\$54,404	\$748,261	\$1,184,146	\$54,404	\$54,404
Sites with both operating reactors and projected new reactors under a Part 52 license	\$938	\$1,876	\$28,146	\$53,149	\$1,876	\$1,876
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$938	\$938	\$13,991	\$25,868	\$938	\$938
Sites with only reactors that currently are in decommissioning	\$219	\$876	\$8,537	\$10,771	\$876	\$876
Total for all sites		\$58,094	\$798,936	\$1,273,934	\$58,094	\$58,094

Table C-6. Industry Operation (Annual Costs): Record Events in Site Corrective Action Program (10 CFR 73.77(b))

Type of Site	Cost per Site	Cost for All Sites	For All Sites			
			Present Value 7% Discount Rate	Present Value 3% Discount Rate	Annualized Value 7% Discount Rate	Annualized Value 3% Discount Rate
Sites with only reactors that are currently in commercial operation	\$1,875	\$108,750	\$1,495,725	\$2,367,030	\$108,750	\$108,750
Sites with both operating reactors and projected new reactors under a Part 52 license	\$1,875	\$3,750	\$56,263	\$106,241	\$3,750	\$3,750
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$1,875	\$1,875	\$27,967	\$51,708	\$1,875	\$1,875
Sites with only reactors that currently are in decommissioning	\$313	\$1,252	\$12,201	\$15,395	\$1,252	\$1,252
Total for all sites		\$115,627	\$1,592,156	\$2,540,374	\$115,627	\$115,627

Table C-7. Industry Operation (Annual Costs): Prepare and Submit Written Security Follow-Up Reports (10 CFR 73.77(d))

Type of Site	Cost per Site	Cost for All Sites	For All Sites			
			Present Value 7% Discount Rate	Present Value 3% Discount Rate	Annualized Value 7% Discount Rate	Annualized Value 3% Discount Rate
Sites with only reactors that are currently in commercial operation	\$200,000	\$11,600,000	\$159,543,964	\$252,483,185	\$11,600,000	\$11,600,000
Sites with both operating reactors and projected new reactors under a Part 52 license	\$200,000	\$400,000	\$6,001,383	\$11,332,402	\$400,000	\$400,000
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$200,000	\$200,000	\$2,983,147	\$5,515,532	\$200,000	\$200,000
Sites with only reactors that currently are in decommissioning	\$45,000	\$180,000	\$1,754,184	\$2,213,293	\$180,000	\$180,000
Total for all sites		\$12,380,000	\$170,282,679	\$271,544,412	\$12,380,000	\$12,380,000

Table C-8. Industry Operation (Annual Costs): Update and Deliver Recurring Notification Training to Designated Personnel (10 CFR 73.77)

Type of Site	Cost per Site	Cost for All Sites	For All Sites			
			Present Value 7% Discount Rate	Present Value 3% Discount Rate	Annualized Value 7% Discount Rate	Annualized Value 3% Discount Rate
Sites with only reactors that are currently in commercial operation	\$10,500	\$609,000	\$8,376,058	\$13,255,367	\$609,000	\$609,000
Sites with both operating reactors and projected new reactors under a Part 52 license	\$10,500	\$21,000	\$315,073	\$594,951	\$21,000	\$21,000
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$10,500	\$10,500	\$156,615	\$289,565	\$10,500	\$10,500
Sites with only reactors that currently are in decommissioning	\$10,500	\$17,000	\$165,673	\$209,033	\$17,000	\$17,000
Total for all sites		\$657,500	\$9,013,419	\$14,348,917	\$657,500	\$657,500

Table C-9. NRC Implementation (One-Time Costs): Perform Rulemaking Activities

Type of Site	Cost per Site	Cost for All Sites	For All Sites			
			Present Value 7% Discount Rate	Present Value 3% Discount Rate	Annualized Value 7% Discount Rate	Annualized Value 3% Discount Rate
All Sites	Not Applicable	\$166,375	\$166,375	\$166,375	\$11,089	\$5,873
Total for all sites		\$166,375	\$166,375	\$166,375	\$11,089	\$5,873

Table C-10. NRC Operation (Annual Costs): Respond to One-Hour Notifications (10 CFR 73.77(a)(1) and (c))

Type of Site	Cost per Site	Cost for All Sites	For All Sites			
			Present Value 7% Discount Rate	Present Value 3% Discount Rate	Annualized Value 7% Discount Rate	Annualized Value 3% Discount Rate
Sites with only reactors that are currently in commercial operation	\$3,025	\$175,450	\$2,413,102	\$3,818,808	\$175,450	\$175,450
Sites with both operating reactors and projected new reactors under a Part 52 license	\$3,025	\$6,050	\$90,771	\$171,403	\$6,050	\$6,050
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$3,025	\$3,025	\$45,120	\$83,422	\$3,025	\$3,025
Sites with only reactors that currently are in decommissioning	\$605	\$2,420	\$23,584	\$29,756	\$2,420	\$2,420
Total for all sites		\$186,945	\$2,572,578	\$4,103,390	\$186,945	\$186,945

Table C-11. NRC Operation (Annual Costs): Respond to Four-Hour Notifications (10 CFR 73.77(a)(2) and (c))

Type of Site	Cost per Site	Cost for All Sites	For All Sites			
			Present Value 7% Discount Rate	Present Value 3% Discount Rate	Annualized Value 7% Discount Rate	Annualized Value 3% Discount Rate
Sites with only reactors that are currently in commercial operation	\$6,050	\$350,900	\$4,826,205	\$7,637,616	\$350,900	\$350,900
Sites with both operating reactors and projected new reactors under a Part 52 license	\$6,050	\$12,100	\$181,542	\$342,805	\$12,100	\$12,100
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$6,050	\$6,050	\$90,240	\$166,845	\$6,050	\$6,050
Sites with only reactors that currently are in decommissioning	\$1,210	\$4,840	\$47,168	\$59,513	\$4,840	\$4,840
Total for all sites		\$373,890	\$5,145,155	\$8,206,779	\$373,890	\$373,890

Table C-12. NRC Operation (Annual Costs): Respond to Eight-Hour Notifications (10 CFR 73.77(a)(3) and (c))

Type of Site	Cost per Site	Cost for All Sites	For All Sites			
			Present Value 7% Discount Rate	Present Value 3% Discount Rate	Annualized Value 7% Discount Rate	Annualized Value 3% Discount Rate
Sites with only reactors that are currently in commercial operation	\$9,075	\$526,350	\$7,239,307	\$11,456,425	\$526,350	\$526,350
Sites with both operating reactors and projected new reactors under a Part 52 license	\$9,075	\$18,150	\$272,313	\$514,208	\$18,150	\$18,150
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$9,075	\$9,075	\$135,360	\$250,267	\$9,075	\$9,075
Sites with only reactors that currently are in decommissioning	\$2,118	\$8,472	\$82,564	\$104,172	\$8,472	\$8,472
Total for all sites		\$562,047	\$7,729,544	\$12,325,072	\$562,047	\$562,047

Table C-13. NRC Operation (Annual Costs): Review Written Security Follow-Up Reports (10 CFR 73.77(d))

Type of Site	Cost per Site	Cost for All Sites	For All Sites			
			Present Value 7% Discount Rate	Present Value 3% Discount Rate	Annualized Value 7% Discount Rate	Annualized Value 3% Discount Rate
Sites with only reactors that are currently in commercial operation	\$2,420	\$140,360	\$1,930,482	\$3,055,047	\$140,360	\$140,360
Sites with both operating reactors and projected new reactors under a Part 52 license	\$2,420	\$4,840	\$72,617	\$137,122	\$4,840	\$4,840
Sites with both operating reactors and reactors under active construction under a Part 50 license	\$2,420	\$2,420	\$36,096	\$66,738	\$2,420	\$2,420
Sites with only reactors that currently are in decommissioning	\$545	\$2,180	\$21,245	\$26,805	\$2,180	\$2,180
Total for all sites		\$149,800	\$2,060,440	\$3,285,712	\$149,800	\$149,800