

## A. Introduction

1. **Title:** Cyber Security — Configuration Change Management and Vulnerability Assessments
2. **Number:** CIP-010-1
3. **Purpose:** To prevent and detect unauthorized changes to BES Cyber Systems by specifying configuration change management and vulnerability assessment requirements in support of protecting BES Cyber Systems from compromise that could lead to misoperation or instability in the BES.
4. **Applicability:**
  - 4.1. **Functional Entities:** For the purpose of the requirements contained herein, the following list of functional entities will be collectively referred to as “Responsible Entities.” For requirements in this standard where a specific functional entity or subset of functional entities are the applicable entity or entities, the functional entity or entities are specified explicitly.
    - 4.1.1 **Balancing Authority**
    - 4.1.2 **Distribution Provider** that owns one or more of the following Facilities, systems, and equipment for the protection or restoration of the BES:
      - 4.1.2.1 Each underfrequency Load shedding (UFLS) or undervoltage Load shedding (UVLS) system that:
        - 4.1.2.1.1 is part of a Load shedding program that is subject to one or more requirements in a NERC or Regional Reliability Standard; and
        - 4.1.2.1.2 performs automatic Load shedding under a common control system owned by the Responsible Entity, without human operator initiation, of 300 MW or more.
      - 4.1.2.2 Each Special Protection System or Remedial Action Scheme where the Special Protection System or Remedial Action Scheme is subject to one or more requirements in a NERC or Regional Reliability Standard.
      - 4.1.2.3 Each Protection System (excluding UFLS and UVLS) that applies to Transmission where the Protection System is subject to one or more requirements in a NERC or Regional Reliability Standard.
      - 4.1.2.4 Each Cranking Path and group of Elements meeting the initial switching requirements from a Blackstart Resource up to and including the first interconnection point of the starting station service of the next generation unit(s) to be started.
    - 4.1.3 **Generator Operator**
    - 4.1.4 **Generator Owner**
    - 4.1.5 **Interchange Coordinator or Interchange Authority**

**4.1.6 Reliability Coordinator**

**4.1.7 Transmission Operator**

**4.1.8 Transmission Owner**

- 4.2. Facilities:** For the purpose of the requirements contained herein, the following Facilities, systems, and equipment owned by each Responsible Entity in 4.1 above are those to which these requirements are applicable. For requirements in this standard where a specific type of Facilities, system, or equipment or subset of Facilities, systems, and equipment are applicable, these are specified explicitly.

- 4.2.1 Distribution Provider:** One or more of the following Facilities, systems and equipment owned by the Distribution Provider for the protection or restoration of the BES:

**4.2.1.1** Each UFLS or UVLS System that:

**4.2.1.1.1** is part of a Load shedding program that is subject to one or more requirements in a NERC or Regional Reliability Standard; and

**4.2.1.1.2** performs automatic Load shedding under a common control system owned by the Responsible Entity, without human operator initiation, of 300 MW or more.

**4.2.1.2** Each Special Protection System or Remedial Action Scheme where the Special Protection System or Remedial Action Scheme is subject to one or more requirements in a NERC or Regional Reliability Standard.

**4.2.1.3** Each Protection System (excluding UFLS and UVLS) that applies to Transmission where the Protection System is subject to one or more requirements in a NERC or Regional Reliability Standard.

**4.2.1.4** Each Cranking Path and group of Elements meeting the initial switching requirements from a Blackstart Resource up to and including the first interconnection point of the starting station service of the next generation unit(s) to be started.

**4.2.2 Responsible Entities listed in 4.1 other than Distribution Providers:**

All BES Facilities.

**4.2.3 Exemptions:** The following are exempt from Standard CIP-010-1:

**4.2.3.1** Cyber Assets at Facilities regulated by the Canadian Nuclear Safety Commission.

**4.2.3.2** Cyber Assets associated with communication networks and data communication links between discrete Electronic Security Perimeters.

**4.2.3.3** The systems, structures, and components that are regulated by the Nuclear Regulatory Commission under a cyber security plan pursuant to 10 C.F.R. Section 73.54.

**4.2.3.4** For Distribution Providers, the systems and equipment that are not included in section 4.2.1 above.

**4.2.3.5** Responsible Entities that identify that they have no BES Cyber Systems categorized as high impact or medium impact according to the CIP-002-5 identification and categorization processes.

**5. Effective Dates:**

1. **24 Months Minimum** – CIP-010-1 shall become effective on the later of July 1, 2015, or the first calendar day of the ninth calendar quarter after the effective date of the order providing applicable regulatory approval.
2. In those jurisdictions where no regulatory approval is required, CIP-010-1 shall become effective on the first day of the ninth calendar quarter following Board of Trustees' approval, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities.

**6. Background:**

Standard CIP-010-1 exists as part of a suite of CIP Standards related to cyber security. CIP-002-5 requires the initial identification and categorization of BES Cyber Systems. CIP-003-5, CIP-004-5, CIP-005-5, CIP-006-5, CIP-007-5, CIP-008-5, CIP-009-5, CIP-010-1, and CIP-011-1 require a minimum level of organizational, operational and procedural controls to mitigate risk to BES Cyber Systems. This suite of CIP Standards is referred to as the *Version 5 CIP Cyber Security Standards*.

Most requirements open with, *“Each Responsible Entity shall implement one or more documented [processes, plan, etc] that include the applicable items in [Table Reference].”* The referenced table requires the applicable items in the procedures for the requirement's common subject matter.

The SDT has incorporated within this standard a recognition that certain requirements should not focus on individual instances of failure as a sole basis for violating the standard. In particular, the SDT has incorporated an approach to empower and enable the industry to identify, assess, and correct deficiencies in the implementation of certain requirements. The intent is to change the basis of a violation in those requirements so that they are not focused on *whether* there is a deficiency, but on identifying, assessing, and correcting deficiencies. It is presented in those requirements by modifying “implement” as follows:

Each Responsible Entity shall implement, **in a manner that identifies, assesses, and corrects deficiencies, . . .**

The term *documented processes* refers to a set of required instructions specific to the Responsible Entity and to achieve a specific outcome. This term does not imply any particular naming or approval structure beyond what is stated in the requirements. An entity should include as much as it believes necessary in their documented processes, but they must address the applicable requirements in the table. The

documented processes themselves are not required to include the “. . . identifies, assesses, and corrects deficiencies, . . .” elements described in the preceding paragraph, as those aspects are related to the manner of implementation of the documented processes and could be accomplished through other controls or compliance management activities.

The terms *program* and *plan* are sometimes used in place of *documented processes* where it makes sense and is commonly understood. For example, documented processes describing a response are typically referred to as *plans* (i.e., incident response plans and recovery plans). Likewise, a security plan can describe an approach involving multiple procedures to address a broad subject matter.

Similarly, the term *program* may refer to the organization’s overall implementation of its policies, plans and procedures involving a subject matter. Examples in the standards include the personnel risk assessment program and the personnel training program. The full implementation of the CIP Cyber Security Standards could also be referred to as a program. However, the terms *program* and *plan* do not imply any additional requirements beyond what is stated in the standards.

Responsible Entities can implement common controls that meet requirements for multiple high and medium impact BES Cyber Systems. For example, a single training program could meet the requirements for training personnel across multiple BES Cyber Systems.

Measures for the initial requirement are simply the documented processes themselves. Measures in the table rows provide examples of evidence to show documentation and implementation of applicable items in the documented processes. These measures serve to provide guidance to entities in acceptable records of compliance and should not be viewed as an all-inclusive list.

Throughout the standards, unless otherwise stated, bulleted items in the requirements and measures are items that are linked with an “or,” and numbered items are items that are linked with an “and.”

Many references in the Applicability section use a threshold of 300 MW for UFLS and UVLS. This particular threshold of 300 MW for UVLS and UFLS was provided in Version 1 of the CIP Cyber Security Standards. The threshold remains at 300 MW since it is specifically addressing UVLS and UFLS, which are last ditch efforts to save the Bulk Electric System. A review of UFLS tolerances defined within regional reliability standards for UFLS program requirements to date indicates that the historical value of 300 MW represents an adequate and reasonable threshold value for allowable UFLS operational tolerances.

**“Applicable Systems” Columns in Tables:**

Each table has an “Applicable Systems” column to further define the scope of systems to which a specific requirement row applies. The CSO706 SDT adapted this concept from the National Institute of Standards and Technology (“NIST”) Risk Management Framework as a way of applying requirements more appropriately

based on impact and connectivity characteristics. The following conventions are used in the applicability column as described.

- **High Impact BES Cyber Systems** – Applies to BES Cyber Systems categorized as high impact according to the CIP-002-5 identification and categorization processes.
- **Medium Impact BES Cyber Systems** – Applies to BES Cyber Systems categorized as medium impact according to the CIP-002-5 identification and categorization processes.
- **Electronic Access Control or Monitoring Systems (EACMS)**– Applies to each Electronic Access Control or Monitoring System associated with a referenced high impact BES Cyber System or medium impact BES Cyber System. Examples may include, but are not limited to, firewalls, authentication servers, and log monitoring and alerting systems.
- **Physical Access Control Systems (PACS)**– Applies to each Physical Access Control System associated with a referenced high impact BES Cyber System or medium impact BES Cyber System with External Routable Connectivity.
- **Protected Cyber Assets (PCA)** – Applies to each Protected Cyber Asset associated with a referenced high impact BES Cyber System or medium impact BES Cyber System

**B. Requirements and Measures**

- R1.** Each Responsible Entity shall implement, in a manner that identifies, assesses, and corrects deficiencies, one or more documented processes that collectively include each of the applicable requirement parts in *CIP-010-1 Table R1 – Configuration Change Management*. [Violation Risk Factor: Medium] [Time Horizon: Operations Planning].
- M1.** Evidence must include each of the applicable documented processes that collectively include each of the applicable requirement parts in *CIP-010-1 Table R1 – Configuration Change Management* and additional evidence to demonstrate implementation as described in the Measures column of the table.

CIP-010-1 Table R1 – Configuration Change Management			
Part	Applicable Systems	Requirements	Measures
1.1	<p>High Impact BES Cyber Systems and their associated:</p> <ol style="list-style-type: none"> <li>1. EACMS;</li> <li>2. PACS; and</li> <li>3. PCA</li> </ol> <p>Medium Impact BES Cyber Systems and their associated:</p> <ol style="list-style-type: none"> <li>1. EACMS;</li> <li>2. PACS; and</li> <li>3. PCA</li> </ol>	<p>Develop a baseline configuration, individually or by group, which shall include the following items:</p> <ol style="list-style-type: none"> <li>1.1.1. Operating system(s) (including version) or firmware where no independent operating system exists;</li> <li>1.1.2. Any commercially available or open-source application software (including version) intentionally installed;</li> <li>1.1.3. Any custom software installed;</li> <li>1.1.4. Any logical network accessible ports; and</li> <li>1.1.5. Any security patches applied.</li> </ol>	<p>Examples of evidence may include, but are not limited to:</p> <ul style="list-style-type: none"> <li>• A spreadsheet identifying the required items of the baseline configuration for each Cyber Asset, individually or by group; or</li> <li>• A record in an asset management system that identifies the required items of the baseline configuration for each Cyber Asset, individually or by group.</li> </ul>

CIP-010-1 Table R1 – Configuration Change Management			
Part	Applicable Systems	Requirements	Measures
1.2	<p>High Impact BES Cyber Systems and their associated:</p> <ol style="list-style-type: none"><li>1. EACMS;</li><li>2. PACS; and</li><li>3. PCA</li></ol> <p>Medium Impact BES Cyber Systems and their associated:</p> <ol style="list-style-type: none"><li>1. EACMS;</li><li>2. PACS; and</li><li>3. PCA</li></ol>	Authorize and document changes that deviate from the existing baseline configuration.	<p>Examples of evidence may include, but are not limited to:</p> <ul style="list-style-type: none"><li>• A change request record and associated electronic authorization (performed by the individual or group with the authority to authorize the change) in a change management system for each change; or</li><li>• Documentation that the change was performed in accordance with the requirement.</li></ul>

CIP-010-1 Table R1 – Configuration Change Management			
Part	Applicable Systems	Requirements	Measures
1.3	<p>High Impact BES Cyber Systems and their associated:</p> <ol style="list-style-type: none"> <li>1. EACMS;</li> <li>2. PACS; and</li> <li>3. PCA</li> </ol> <p>Medium Impact BES Cyber Systems and their associated:</p> <ol style="list-style-type: none"> <li>1. EACMS;</li> <li>2. PACS; and</li> <li>3. PCA</li> </ol>	For a change that deviates from the existing baseline configuration, update the baseline configuration as necessary within 30 calendar days of completing the change.	An example of evidence may include, but is not limited to, updated baseline documentation with a date that is within 30 calendar days of the date of the completion of the change.
1.4	<p>High Impact BES Cyber Systems and their associated:</p> <ol style="list-style-type: none"> <li>1. EACMS;</li> <li>2. PACS; and</li> <li>3. PCA</li> </ol> <p>Medium Impact BES Cyber Systems and their associated:</p> <ol style="list-style-type: none"> <li>1. EACMS;</li> <li>2. PACS; and</li> <li>3. PCA</li> </ol>	<p>For a change that deviates from the existing baseline configuration:</p> <ol style="list-style-type: none"> <li>1.4.1. Prior to the change, determine required cyber security controls in CIP-005 and CIP-007 that could be impacted by the change;</li> <li>1.4.2. Following the change, verify that required cyber security controls determined in 1.4.1 are not adversely affected; and</li> <li>1.4.3. Document the results of the verification.</li> </ol>	An example of evidence may include, but is not limited to, a list of cyber security controls verified or tested along with the dated test results.



CIP-010-1 Table R1 – Configuration Change Management			
Part	Applicable Systems	Requirements	Measures
1.5	High Impact BES Cyber Systems	<p>Where technically feasible, for each change that deviates from the existing baseline configuration:</p> <p>1.5.1. Prior to implementing any change in the production environment, test the changes in a test environment or test the changes in a production environment where the test is performed in a manner that minimizes adverse effects, that models the baseline configuration to ensure that required cyber security controls in CIP-005 and CIP-007 are not adversely affected; and</p> <p>1.5.2. Document the results of the testing and, if a test environment was used, the differences between the test environment and the production environment, including a description of the measures used to account for any differences in operation between the test and production environments.</p>	<p>An example of evidence may include, but is not limited to, a list of cyber security controls tested along with successful test results and a list of differences between the production and test environments with descriptions of how any differences were accounted for, including of the date of the test.</p>

- R2.** Each Responsible Entity shall implement, in a manner that identifies, assesses, and corrects deficiencies, one or more documented processes that collectively include each of the applicable requirement parts in *CIP-010-1 Table R2 – Configuration Monitoring*. [Violation Risk Factor: Medium] [Time Horizon: Operations Planning].
- M2.** Evidence must include each of the applicable documented processes that collectively include each of the applicable requirement parts in *CIP-010-1 Table R2 – Configuration Monitoring* and additional evidence to demonstrate implementation as described in the Measures column of the table.

CIP-010-1 Table R2 – Configuration Monitoring			
Part	Applicable Systems	Requirements	Measures
2.1	High Impact BES Cyber Systems and their associated: <ol style="list-style-type: none"> <li>1. EACMS; and</li> <li>2. PCA</li> </ol>	Monitor at least once every 35 calendar days for changes to the baseline configuration (as described in Requirement R1, Part 1.1). Document and investigate detected unauthorized changes.	An example of evidence may include, but is not limited to, logs from a system that is monitoring the configuration along with records of investigation for any unauthorized changes that were detected.

- R3.** Each Responsible Entity shall implement one or more documented processes that collectively include each of the applicable requirement parts in *CIP-010-1 Table R3– Vulnerability Assessments*. [Violation Risk Factor: Medium] [Time Horizon: Long-term Planning and Operations Planning]
- M3.** Evidence must include each of the applicable documented processes that collectively include each of the applicable requirement parts in *CIP-010-1 Table R3 – Vulnerability Assessments* and additional evidence to demonstrate implementation as described in the Measures column of the table.

CIP-010-1 Table R3 – Vulnerability Assessments			
Part	Applicable Systems	Requirements	Measures
3.1	<p>High Impact BES Cyber Systems and their associated:</p> <ol style="list-style-type: none"> <li>1. EACMS;</li> <li>2. PACS; and</li> <li>3. PCA</li> </ol> <p>Medium Impact BES Cyber Systems and their associated:</p> <ol style="list-style-type: none"> <li>1. EACMS;</li> <li>2. PACS; and</li> <li>3. PCA</li> </ol>	At least once every 15 calendar months, conduct a paper or active vulnerability assessment.	<p>Examples of evidence may include, but are not limited to:</p> <ul style="list-style-type: none"> <li>• A document listing the date of the assessment (performed at least once every 15 calendar months), the controls assessed for each BES Cyber System along with the method of assessment,; or</li> <li>• A document listing the date of the assessment and the output of any tools used to perform the assessment.</li> </ul>

CIP-010-1 Table R3 – Vulnerability Assessments			
Part	Applicable Systems	Requirements	Measures
3.2	High Impact BES Cyber Systems	<p>Where technically feasible, at least once every 36 calendar months:</p> <p>3.2.1 Perform an active vulnerability assessment in a test environment, or perform an active vulnerability assessment in a production environment where the test is performed in a manner that minimizes adverse effects, that models the baseline configuration of the BES Cyber System in a production environment; and</p> <p>3.2.2 Document the results of the testing and, if a test environment was used, the differences between the test environment and the production environment, including a description of the measures used to account for any differences in operation between the test and production environments.</p>	An example of evidence may include, but is not limited to, a document listing the date of the assessment (performed at least once every 36 calendar months), the output of the tools used to perform the assessment, and a list of differences between the production and test environments with descriptions of how any differences were accounted for in conducting the assessment.

CIP-010-1 Table R3 – Vulnerability Assessments			
Part	Applicable Systems	Requirements	Measures
3.3	High Impact BES Cyber Systems and their associated: <ol style="list-style-type: none"> <li>1. EACMS;</li> <li>2. PCA</li> </ol>	Prior to adding a new applicable Cyber Asset to a production environment, perform an active vulnerability assessment of the new Cyber Asset, except for CIP Exceptional Circumstances and like replacements of the same type of Cyber Asset with a baseline configuration that models an existing baseline configuration of the previous or other existing Cyber Asset.	An example of evidence may include, but is not limited to, a document listing the date of the assessment (performed prior to the commissioning of the new Cyber Asset) and the output of any tools used to perform the assessment.
3.4	High Impact BES Cyber Systems and their associated: <ol style="list-style-type: none"> <li>1. EACMS;</li> <li>2. PACS; and</li> <li>3. PCA</li> </ol> Medium Impact BES Cyber Systems and their associated: <ol style="list-style-type: none"> <li>1. EACMS;</li> <li>2. PACS; and</li> <li>3. PCA</li> </ol>	Document the results of the assessments conducted according to Parts 3.1, 3.2, and 3.3 and the action plan to remediate or mitigate vulnerabilities identified in the assessments including the planned date of completing the action plan and the execution status of any remediation or mitigation action items.	An example of evidence may include, but is not limited to, a document listing the results or the review or assessment, a list of action items, documented proposed dates of completion for the action plan, and records of the status of the action items (such as minutes of a status meeting, updates in a work order system, or a spreadsheet tracking the action items).

## C. Compliance

### 1. Compliance Monitoring Process:

#### 1.1. Compliance Enforcement Authority:

The Regional Entity shall serve as the Compliance Enforcement Authority (“CEA”) unless the applicable entity is owned, operated, or controlled by the Regional Entity. In such cases the ERO or a Regional Entity approved by FERC or other applicable governmental authority shall serve as the CEA.

#### 1.2. Evidence Retention:

The following evidence retention periods identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the CEA may ask an entity to provide other evidence to show that it was compliant for the full time period since the last audit.

The Responsible Entity shall keep data or evidence to show compliance as identified below unless directed by its CEA to retain specific evidence for a longer period of time as part of an investigation:

- Each Responsible Entity shall retain evidence of each requirement in this standard for three calendar years.
- If a Responsible Entity is found non-compliant, it shall keep information related to the non-compliance until mitigation is complete and approved or for the time specified above, whichever is longer.
- The CEA shall keep the last audit records and all requested and submitted subsequent audit records.

#### 1.3. Compliance Monitoring and Assessment Processes:

- Compliance Audit
- Self-Certification
- Spot Checking
- Compliance Investigation
- Self-Reporting
- Complaint

#### 1.4. Additional Compliance Information:

- None

## 2. Table of Compliance Elements

R #	Time Horizon	VRF	Violation Severity Levels (CIP-010-1)			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
<b>R1</b>	<b>Operations Planning</b>	<b>Medium</b>	<p>The Responsible Entity has documented and implemented a configuration change management process(es) that includes only four of the required baseline items listed in 1.1.1 through 1.1.5. (1.1)</p> <p>OR</p> <p>The Responsible Entity has documented and implemented a configuration change management process(es) that includes all of the required baseline</p>	<p>The Responsible Entity has documented and implemented a configuration change management process(es) that includes only three of the required baseline items listed in 1.1.1 through 1.1.5. (1.1)</p> <p>OR</p> <p>The Responsible Entity has documented and implemented a configuration change management process(es) that includes four of the required baseline items listed in 1.1.1 through 1.1.5 and</p>	<p>The Responsible Entity has documented and implemented a configuration change management process(es) that includes only two of the required baseline items listed in 1.1.1 through 1.1.5. (1.1)</p> <p>OR</p> <p>The Responsible Entity has documented and implemented a configuration change management process(es) that includes three of the required baseline items listed in 1.1.1 through 1.1.5 and identified</p>	<p>The Responsible Entity has not documented or implemented any configuration change management process(es). (R1)</p> <p>OR</p> <p>The Responsible Entity has documented and implemented a configuration change management process(es) that includes only one of the required baseline items listed in 1.1.1 through 1.1.5. (1.1)</p> <p>OR</p> <p>The Responsible Entity has documented and</p>

R #	Time Horizon	VRF	Violation Severity Levels (CIP-010-1)			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
			<p>items listed in 1.1.1 through 1.1.5 and identified deficiencies but did not assess and correct the deficiencies. (1.1)</p> <p>OR</p> <p>The Responsible Entity has documented and implemented a configuration change management process(es) that includes all of the required baseline items listed in 1.1.1 through 1.1.5 but did not identify, assess, and correct the deficiencies. (1.1)</p> <p>OR</p> <p>The Responsible</p>	<p>identified deficiencies but did not assess and correct the deficiencies. (1.1)</p> <p>OR</p> <p>The Responsible Entity has documented and implemented a configuration change management process(es) that includes four of the required baseline items listed in 1.1.1 through 1.1.5 but did not identify, assess, and correct the deficiencies. (1.1)</p> <p>OR</p> <p>The Responsible Entity has a process(es) to determine required</p>	<p>deficiencies but did not assess and correct the deficiencies. (1.1)</p> <p>OR</p> <p>The Responsible Entity has documented and implemented a configuration change management process(es) that includes three of the required baseline items listed in 1.1.1 through 1.1.5 but did not identify, assess, and correct the deficiencies. (1.1)</p> <p>OR</p> <p>The Responsible Entity has a process(es) that requires authorization and documentation for</p>	<p>implemented a configuration change management process(es) that includes two or fewer of the required baseline items listed in 1.1.1 through 1.1.5 and identified deficiencies but did not assess and correct the deficiencies. (1.1)</p> <p>OR</p> <p>The Responsible Entity has documented and implemented a configuration change management process(es) that includes two or fewer of the required baseline items listed in 1.1.1 through 1.1.5 but did not identify, assess, and correct</p>



R #	Time Horizon	VRF	Violation Severity Levels (CIP-010-1)			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
			<p>Entity has a process(es) to perform steps in 1.4.1 and 1.4.2 for a change(s) that deviates from the existing baseline configuration and identified deficiencies in the verification documentation but did not assess or correct the deficiencies. (1.4.3)</p> <p>OR</p> <p>The Responsible Entity has a process(es) to perform steps in 1.4.1 and 1.4.2 for a change(s) that deviates from the existing baseline configuration but did not identify, assess, or correct</p>	<p>security controls in CIP-005 and CIP-007 that could be impacted by a change(s) that deviates from the existing baseline configuration and identified deficiencies in the determination of affected security controls, but did not assess, or correct the deficiencies. (1.4.1)</p> <p>OR</p> <p>The Responsible Entity has a process(es) to determine required security controls in CIP-005 and CIP-007 that could be impacted by a change(s) that deviates from the existing baseline</p>	<p>changes that deviate from the existing baseline configuration and identified deficiencies but did not assess or correct the deficiencies. (1.2)</p> <p>OR</p> <p>The Responsible Entity has a process(es) that requires authorization and documentation for changes that deviate from the existing baseline configuration but did not identify, assess, or correct the deficiencies. (1.2)</p> <p>OR</p> <p>The Responsible Entity has a process(es) to update</p>	<p>the deficiencies. (1.1)</p> <p>OR</p> <p>The Responsible Entity does not have a process(es) that requires authorization and documentation of changes that deviate from the existing baseline configuration. (1.2)</p> <p>OR</p> <p>The Responsible Entity does not have a process(es) to update baseline configurations within 30 calendar days of completing a change(s) that deviates from the existing baseline configuration.(1.3)</p> <p>OR</p>

R #	Time Horizon	VRF	Violation Severity Levels (CIP-010-1)			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
			the deficiencies in the verification documentation. (1.4.3)	configuration but did not identify, assess, or correct the deficiencies in the determination of affected security controls. (1.4.1)	<p>baseline configurations within 30 calendar days of completing a change(s) that deviates from the existing baseline configuration and identified deficiencies but did not assess or correct the deficiencies. (1.3)</p> <p>OR</p> <p>The Responsible Entity has a process(es) to update baseline configurations within 30 calendar days of completing a change(s) that deviates from the existing baseline configuration but did not identify, assess, or correct the</p>	<p>The Responsible Entity does not have a process(es) to determine required security controls in CIP-005 and CIP-007 that could be impacted by a change(s) that deviates from the existing baseline configuration. (1.4.1)</p> <p>OR</p> <p>The Responsible Entity has a process(es) to determine required security controls in CIP-005 and CIP-007 that could be impacted by a change(s) that deviates from the existing baseline configuration but did not verify and document that the</p>

R #	Time Horizon	VRF	Violation Severity Levels (CIP-010-1)			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
					<p>deficiencies. (1.3)</p> <p>OR</p> <p>The Responsible Entity has a process(es) to verify that required security controls in CIP-005 and CIP-007 are not adversely affected by a change(s) that deviates from the existing baseline configuration and identified deficiencies in required controls, but did not assess, or correct the deficiencies. (1.4.2)</p> <p>OR</p> <p>The Responsible Entity has a process(es) to verify that required security controls in</p>	<p>required controls were not adversely affected following the change. (1.4.2 &amp; 1.4.3)</p> <p>OR</p> <p>The Responsible Entity does not have a process for testing changes in an environment that models the baseline configuration prior to implementing a change that deviates from baseline configuration. (1.5.1)</p> <p>OR</p> <p>The Responsible Entity does not have a process to document the test results and, if using a test environment, document the differences between</p>

R #	Time Horizon	VRF	Violation Severity Levels (CIP-010-1)			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
					<p>CIP-005 and CIP-007 are not adversely affected by a change(s) that deviates from the existing baseline configuration but did not identify, assess, or correct the deficiencies in the required controls. (1.4.2)</p> <p>OR</p> <p>The Responsible Entity has a process for testing changes in an environment that models the baseline configuration prior to implementing a change that deviates from baseline configuration, and identified deficiencies but did not assess or correct the deficiencies.</p>	the test and production environments. (1.5.2)

R #	Time Horizon	VRF	Violation Severity Levels (CIP-010-1)			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
					<p>(1.5.1)</p> <p>OR</p> <p>The Responsible Entity has a process for testing changes in an environment that models the baseline configuration prior to implementing a change that deviates from baseline configuration but did not identify, assess, or correct the deficiencies. (1.5.1)</p> <p>OR</p> <p>The Responsible Entity has a process to document the test results and, if using a test environment, document the differences between the test and production environments and</p>	

R #	Time Horizon	VRF	Violation Severity Levels (CIP-010-1)			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
					<p>identified deficiencies but did not assess or correct the deficiencies. (1.5.2)</p> <p>OR</p> <p>The Responsible Entity has a process to document the test results and, if using a test environment, document the differences between the test and production environments, but did not identify, assess, or correct the deficiencies. (1.5.2)</p>	
<b>R2</b>	<b>Operations Planning</b>	<b>Medium</b>	N/A	N/A	N/A	The Responsible Entity has not documented or implemented a process(es) to monitor for, investigate, and

R #	Time Horizon	VRF	Violation Severity Levels (CIP-010-1)			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
						<p>document detected unauthorized changes to the baseline at least once every 35 calendar days. (2.1)</p> <p>OR</p> <p>The Responsible Entity has documented and implemented a process(es) to monitor for, investigate, and document detected unauthorized changes to the baseline at least once every 35 calendar days and identified deficiencies but did not assess or correct the deficiencies. (2.1)</p> <p>OR</p> <p>The Responsible Entity has documented and</p>

R #	Time Horizon	VRF	Violation Severity Levels (CIP-010-1)			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
						implemented a process(es) to monitor for, investigate, and document detected unauthorized changes to the baseline at least once every 35 calendar days but did not identify, assess, or correct the deficiencies. (2.1)
<b>R3</b>	<b>Long-term Planning and Operations Planning</b>	<b>Medium</b>	The Responsible Entity has implemented one or more documented vulnerability assessment processes for each of its applicable BES Cyber Systems, but has performed a vulnerability assessment more than 15 months, but less than 18	The Responsible Entity has implemented one or more documented vulnerability assessment processes for each of its applicable BES Cyber Systems, but has performed a vulnerability assessment more than 18 months, but less than 21, months since the last	The Responsible Entity has implemented one or more documented vulnerability assessment processes for each of its applicable BES Cyber Systems, but has performed a vulnerability assessment more than 21 months, but less than 24 months, since the last	The Responsible Entity has not implemented any vulnerability assessment processes for one of its applicable BES Cyber Systems. (R3)  OR The Responsible Entity has implemented one or more documented vulnerability



R #	Time Horizon	VRF	Violation Severity Levels (CIP-010-1)			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
			<p>months, since the last assessment on one of its applicable BES Cyber Systems. (3.1)</p> <p>OR</p> <p>The Responsible Entity has implemented one or more documented active vulnerability assessment processes for Applicable Systems, but has performed an active vulnerability assessment more than 36 months, but less than 39 months, since the last active assessment on one of its applicable BES Cyber Systems.</p>	<p>assessment on one of its applicable BES Cyber Systems. (3.1)</p> <p>OR</p> <p>The Responsible Entity has implemented one or more documented active vulnerability assessment processes for Applicable Systems, but has performed an active vulnerability assessment more than 39 months, but less than 42 months, since the last active assessment on one of its applicable BES Cyber Systems. (3.2)</p>	<p>assessment on one of its applicable BES Cyber Systems. (3.1)</p> <p>OR</p> <p>The Responsible Entity has implemented one or more documented active vulnerability assessment processes for Applicable Systems, but has performed an active vulnerability assessment more than 42 months, but less than 45 months, since the last active assessment on one of its applicable BES Cyber Systems. (3.2)</p>	<p>assessment processes for each of its applicable BES Cyber Systems, but has performed a vulnerability assessment more than 24 months since the last assessment on one of its applicable BES Cyber Systems. (3.1)</p> <p>OR</p> <p>The Responsible Entity has implemented one or more documented active vulnerability assessment processes for Applicable Systems, but has performed an active vulnerability assessment more than 45 months since the last active assessment on one of</p>

R #	Time Horizon	VRF	Violation Severity Levels (CIP-010-1)			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
			(3.2)			<p>its applicable BES Cyber Systems.(3.2)</p> <p>OR</p> <p>The Responsible Entity has implemented and documented one or more vulnerability assessment processes for each of its applicable BES Cyber Systems, but did not perform the active vulnerability assessment in a manner that models an existing baseline configuration of its applicable BES Cyber Systems. (3.3)</p> <p>OR</p> <p>The Responsible Entity has implemented one or more documented vulnerability</p>

R #	Time Horizon	VRF	Violation Severity Levels (CIP-010-1)			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
						assessment processes for each of its applicable BES Cyber Systems, but has not documented the results of the vulnerability assessments, the action plans to remediate or mitigate vulnerabilities identified in the assessments, the planned date of completion of the action plan, and the execution status of the mitigation plans. (3.4)

**D. Regional Variances**

None.

**E. Interpretations**

None.

**F. Associated Documents**

None.

## Guidelines and Technical Basis

### Section 4 – Scope of Applicability of the CIP Cyber Security Standards

Section “4. Applicability” of the standards provides important information for Responsible Entities to determine the scope of the applicability of the CIP Cyber Security Requirements.

Section “4.1. Functional Entities” is a list of NERC functional entities to which the standard applies. If the entity is registered as one or more of the functional entities listed in Section 4.1, then the NERC CIP Cyber Security Standards apply. Note that there is a qualification in Section 4.1 that restricts the applicability in the case of Distribution Providers to only those that own certain types of systems and equipment listed in 4.2. Furthermore,

Section “4.2. Facilities” defines the scope of the Facilities, systems, and equipment owned by the Responsible Entity, as qualified in Section 4.1, that is subject to the requirements of the standard. As specified in the exemption section 4.2.3.5, this standard does not apply to Responsible Entities that do not have High Impact or Medium Impact BES Cyber Systems under CIP-002-5’s categorization. In addition to the set of BES Facilities, Control Centers, and other systems and equipment, the list includes the set of systems and equipment owned by Distribution Providers. While the NERC Glossary term “Facilities” already includes the BES characteristic, the additional use of the term BES here is meant to reinforce the scope of applicability of these Facilities where it is used, especially in this applicability scoping section. This in effect sets the scope of Facilities, systems, and equipment that is subject to the standards.

#### Requirement R1:

##### Baseline Configuration

The concept of establishing a Cyber Asset’s baseline configuration is meant to provide clarity on requirement language found in previous CIP standard versions. Modification of any item within an applicable Cyber Asset’s baseline configuration provides the triggering mechanism for when entities must apply change management processes.

Baseline configurations in CIP-010 consist of five different items: Operating system/firmware, commercially available software or open-source application software, custom software, logical network accessible port identification, and security patches. Operating system information identifies the software and version that is in use on the Cyber Asset. In cases where an independent operating system does not exist (such as for a protective relay), then firmware information should be identified. Commercially available or open-source application software identifies applications that were intentionally installed on the cyber asset. The use of the term “intentional” was meant to ensure that only software applications that were determined to be necessary for Cyber Asset use should be included in the baseline configuration. The SDT does not intend for notepad, calculator, DLL, device drivers, or other applications included in an operating system package as commercially available or open-source application software to be

included. Custom software installed may include scripts developed for local entity functions or other custom software developed for a specific task or function for the entity's use. If additional software was intentionally installed and is not commercially available or open-source, then this software could be considered custom software. If a specific device needs to communicate with another device outside the network, communications need to be limited to only the devices that need to communicate per the requirement in CIP-007-5. Those ports which are accessible need to be included in the baseline. Security patches applied would include all historical and current patches that have been applied on the cyber asset. While CIP-007-5 R2.1 requires entities to track, evaluate, and install security patches, CIP-010 R1.1.5 requires entities to list all applied historical and current patches.

Further guidance can be understood with the following example that details the baseline configuration for a serial-only microprocessor relay:

### Asset #051028 at Substation Alpha

- R1.1.1 – Firmware: [MANUFACTURER]-[MODEL]-XYZ-1234567890-ABC
- R1.1.2 – Not Applicable
- R1.1.3 – Not Applicable
- R1.1.4 – Not Applicable
- R1.1.5 – Patch 12345, Patch 67890, Patch 34567, Patch 437823

Also, for a typical IT system, the baseline configuration could reference an IT standard that includes configuration details. An entity would be expected to provide that IT standard as part of their compliance evidence.

## Cyber Security Controls

The use of cyber security controls refers specifically to controls referenced and applied according to CIP-005 and CIP-007. The concept presented in the relevant requirement sub-parts in CIP-010 R1 is that an entity is to identify/verify controls from CIP-005 and CIP-007 that could be impacted for a change that deviates from the existing baseline configuration. The SDT does not intend for Responsible Entities to identify/verify all controls located within CIP-005 and CIP-007 for each change. The Responsible Entity is only to identify/verify those control(s) that could be affected by the baseline configuration change. For example, changes that affect logical network ports would only involve CIP-007 R1 (Ports and Services), while changes that affect security patches would only involve CIP-007 R2 (Security Patch Management). The SDT chose not to identify the specific requirements from CIP-005 and CIP-007 in CIP-010 language as the intent of the related requirements is to be able to identify/verify any of the controls in those standards that are affected as a result of a change to the baseline configuration. The SDT believes it possible that all requirements from CIP-005 and CIP-007 may be identified for a

major change to the baseline configuration, and therefore, CIP-005 and CIP-007 was cited at the standard-level versus the requirement-level.

### **Test Environment**

The Control Center test environment (or production environment where the test is performed in a manner that minimizes adverse effects) should model the baseline configuration, but may have a different set of components. For instance, an entity may have a BES Cyber System that runs a database on one component and a web server on another component. The test environment may have the same operating system, security patches, network accessible ports, and software, but have both the database and web server running on a single component instead of multiple components.

Additionally, the Responsible Entity should note that wherever a test environment (or production environment where the test is performed in a manner that minimizes adverse effects) is mentioned, the requirement is to “model” the baseline configuration and not duplicate it exactly. This language was chosen deliberately in order to allow for individual elements of a BES Cyber System at a Control Center to be modeled that may not otherwise be able to be replicated or duplicated exactly; such as, but not limited to, a legacy map-board controller or the numerous data communication links from the field or to other Control Centers (such as by ICCP).

### **Requirement R2:**

The SDT’s intent of R2 is to require automated monitoring of the BES Cyber System. However, the SDT understands that there may be some Cyber Assets where automated monitoring may not be possible (such as a GPS time clock). For that reason, automated technical monitoring was not explicitly required, and a Responsible Entity may choose to accomplish this requirement through manual procedural controls.

### **Requirement R3:**

The Responsible Entity should note that the requirement provides a distinction between paper and active vulnerability assessments. The justification for this distinction is well-documented in FERC Order No. 706 and its associated Notice of Proposed Rulemaking. In developing their vulnerability assessment processes, Responsible Entities are strongly encouraged to include at least the following elements, several of which are referenced in CIP-005 and CIP-007:

#### **Paper Vulnerability Assessment:**

1. Network Discovery - A review of network connectivity to identify all Electronic Access Points to the Electronic Security Perimeter.
2. Network Port and Service Identification - A review to verify that all enabled ports and services have an appropriate business justification.

3. Vulnerability Review - A review of security rule-sets and configurations including controls for default accounts, passwords, and network management community strings.
4. Wireless Review - Identification of common types of wireless networks (such as 802.11a/b/g/n) and a review of their controls if they are in any way used for BES Cyber System communications.

### Active Vulnerability Assessment:

1. Network Discovery - Use of active discovery tools to discover active devices and identify communication paths in order to verify that the discovered network architecture matches the documented architecture.
2. Network Port and Service Identification – Use of active discovery tools (such as Nmap) to discover open ports and services.
3. Vulnerability Scanning – Use of a vulnerability scanning tool to identify network accessible ports and services along with the identification of known vulnerabilities associated with services running on those ports.
4. Wireless Scanning – Use of a wireless scanning tool to discover wireless signals and networks in the physical perimeter of a BES Cyber System. Serves to identify unauthorized wireless devices within the range of the wireless scanning tool.

In addition, Responsible Entities are strongly encouraged to review NIST SP800-115 for additional guidance on how to conduct a vulnerability assessment.

## Rationale:

During the development of this standard, references to prior versions of the CIP standards and rationale for the requirements and their parts were embedded within the standard. Upon BOT approval, that information was moved to this section.

### Rationale for R1:

The configuration change management processes are intended to prevent unauthorized modifications to BES Cyber Systems.

**Reference to prior version:** (Part 1.1) New Requirement

**Change Rationale:** (Part 1.1)

*The baseline configuration requirement was incorporated from the DHS Catalog for Control Systems Security. The baseline requirement is also intended to clarify precisely when a change management process must be invoked and which elements of the configuration must be examined.*

**Reference to prior version:** (Part 1.2) CIP-007-3, R9; CIP-003-3, R6



**Change Rationale:** (Part 1.2)

*The SDT added requirement to explicitly authorize changes. This requirement was previously implied by CIP-003-3, Requirement R6.*

**Reference to prior version:** (Part 1.3) CIP-007-3, R9; CIP-005-3, R5

**Change Rationale:** (Part 1.3)

*Document maintenance requirement due to a BES Cyber System change is equivalent to the requirements in the previous versions of the standard.*

**Reference to prior version:** (Part 1.4) CIP-007-3, R1

**Change Rationale:** (Part 1.4)

*The SDT attempted to provide clarity on when testing must occur and removed requirement for specific test procedures because it is implicit in the performance of the requirement.*

**Reference to prior version:** (Part 1.5) CIP-007-3, R1

**Change Rationale:** (Part 1.5)

*This requirement provides clarity on when testing must occur and requires additional testing to ensure that accidental consequences of planned changes are appropriately managed.*

*This change addresses FERC Order No. 706, Paragraphs 397, 609, 610, and 611.*

**Rationale for R2:**

The configuration monitoring processes are intended to detect unauthorized modifications to BES Cyber Systems.

**Reference to prior version:** (Part 2.1) New Requirement

**Change Rationale:** (Part 2.1)

*The monitoring of the configuration of the BES Cyber System provides an express acknowledgement of the need to consider malicious actions along with intentional changes.*

*This requirement was added after review of the DHS Catalog of Control System Security and to address FERC Order No. 706, Paragraph 397.*

*Thirty-five Calendar days allows for a “once-a-month” frequency with slight flexibility to account for months with 31 days or for beginning or endings of months on weekends.*

**Rationale for R3:**

The vulnerability assessment processes are intended to act as a component in an overall program to periodically ensure the proper implementation of cyber security controls as well as to continually improve the security posture of BES Cyber Systems.

The vulnerability assessment performed for this requirement may be a component of deficiency identification, assessment, and correction.

**Reference to prior version:** (Part 3.1) CIP-005-4, R4; CIP-007-4, R8

**Change Rationale:** (Part 3.1)

*As suggested in FERC Order No. 706, Paragraph 644, the details for what should be included in the assessment are left to guidance.*

**Reference to prior version:** (Part 3.2) New Requirement

**Change Rationale:** (Part 3.2)

*FERC Order No. 706, Paragraphs 541, 542, 543, 544, 545, and 547.*

*As suggested in FERC Order No. 706, Paragraph 644, the details for what should be included in the assessment are left to guidance.*

**Reference to prior version:** (Part 3.3) New Requirement

**Change Rationale:** (Part 3.3)

*FERC Order No. 706, Paragraphs 541, 542, 543, 544, 545, and 547.*

**Reference to prior version:** (Part 3.4) CIP-005-3, R4.5; CIP-007-3, R8.4

**Change Rationale:** (Part 3.4)

*Added a requirement for an entity planned date of completion as per the directive in FERC Order No. 706, Paragraph 643.*

## Version History

Version	Date	Action	Change Tracking
1	11/26/12	Adopted by the NERC Board of Trustees.	Developed to define the configuration change management and vulnerability assessment requirements in coordination with other CIP standards and to address the balance of the FERC directives in its Order 706.
1	11/22/13	FERC Order issued approving CIP-010-1. (Order becomes effective on 2/3/14.)	

**\* FOR INFORMATIONAL PURPOSES ONLY \***

**Enforcement Dates: Standard CIP-010-1 — Cyber Security - Configuration Change Management and Vulnerability Assessments**

null

Standard	Requirement	Enforcement Date	Inactive Date
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This standard has not yet been approved by the applicable regulatory authority.