NERC Standards and Compliance 101

Center for Advanced Power Engineering Research

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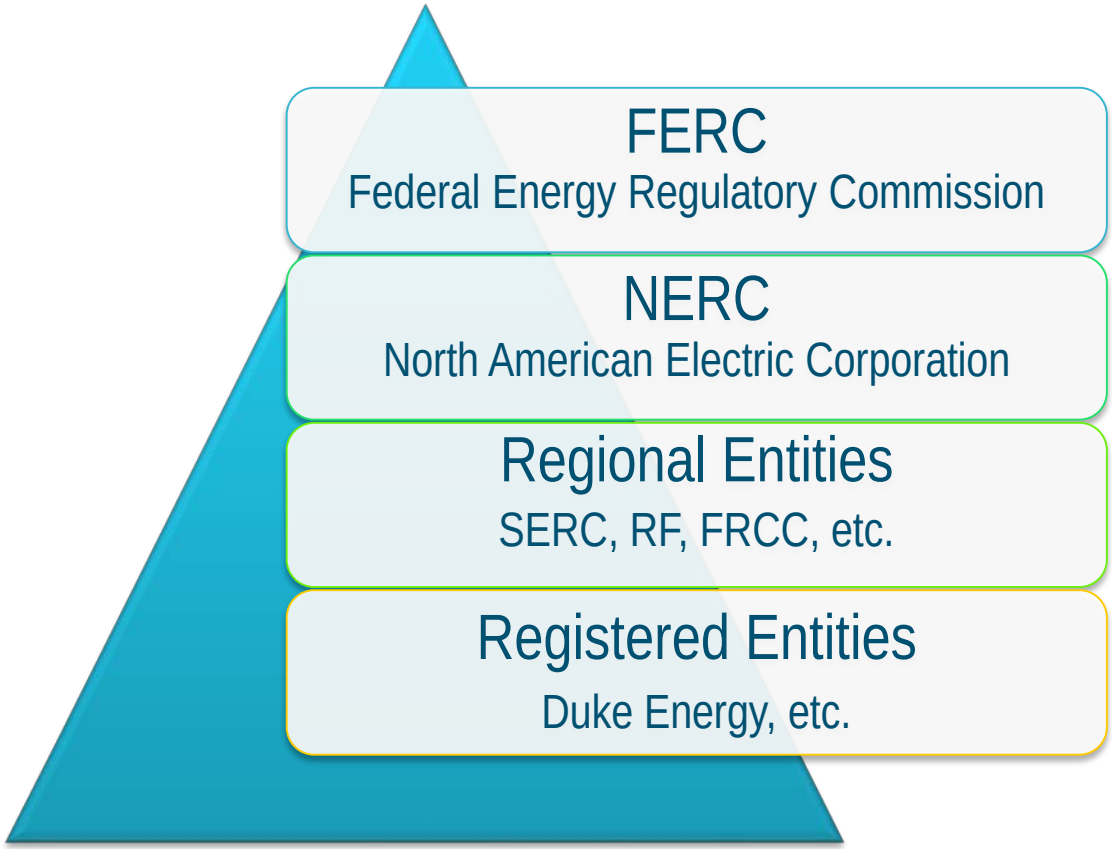
October 30th 2015

Topics of Discussion

- Roles of FERC, NERC and Regional Entities
- Background of NERC Standards
- Compliance at Duke Energy
- The Audit Process

Overview of Regulatory Compliance Hierarchy



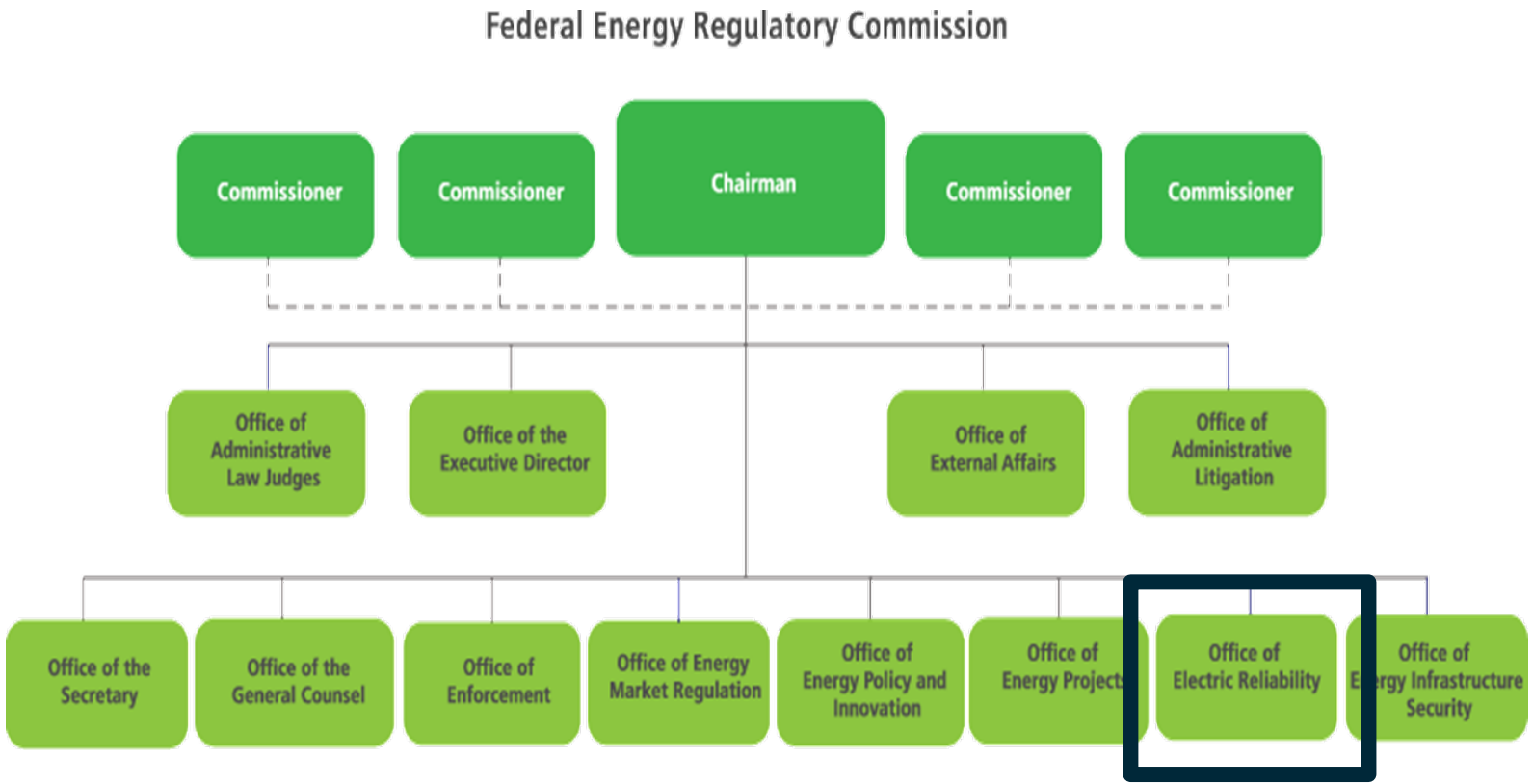
Federal Energy Regulatory Commission (FERC)

FERC, is an independent agency that regulates the interstate transmission of natural gas, oil, and electricity.

Protects the reliability of the high voltage interstate transmission system through mandatory reliability standards;

Regulates the transmission and wholesale sales of electricity in interstate commerce;

FERC Organizational Chart



FERC Office of Electric Reliability

- Development and Review of Reliability Standards
- Compliance with Mandatory Reliability Standards
- Monitors /Addresses Resource Adequacy and Reliability
- Directs Long-Term Strategic Research Programs to Identify Emerging Reliability Threats

NERC (ERO) Responsibilities

Subject to oversight by FERC and governmental authorities in Canada

educates, trains, and certifies industry personnel

annually assesses seasonal and long-term reliability

NERC develops and enforces Reliability Standards;

monitors the bulk power system through system awareness;

NERC History

- November 9, 1965 - Northeast Blackout
- 1968: National Electric Reliability Council (NERC) established by the electric industry
- 2002: NERC operating policy and planning standards became mandatory and enforceable in Ontario, Canada
- August 14, 2003 - Blackout
- 2005: U.S. Energy Policy Act of 2005 creates the Electric Reliability Organization (ERO)
- 2006: Federal Energy Regulatory Commission (FERC) certified NERC as the ERO; Memorandum of Understanding (MOUs) with some Canadian Provinces
- 2007: North American Electric Reliability Council became the North American Electric Reliability Corporation (NERC); FERC issued Order 693 approving 83 of 107 proposed reliability standards; became mandatory and enforceable

Regional Reliability Organization (RRO) Responsibilities

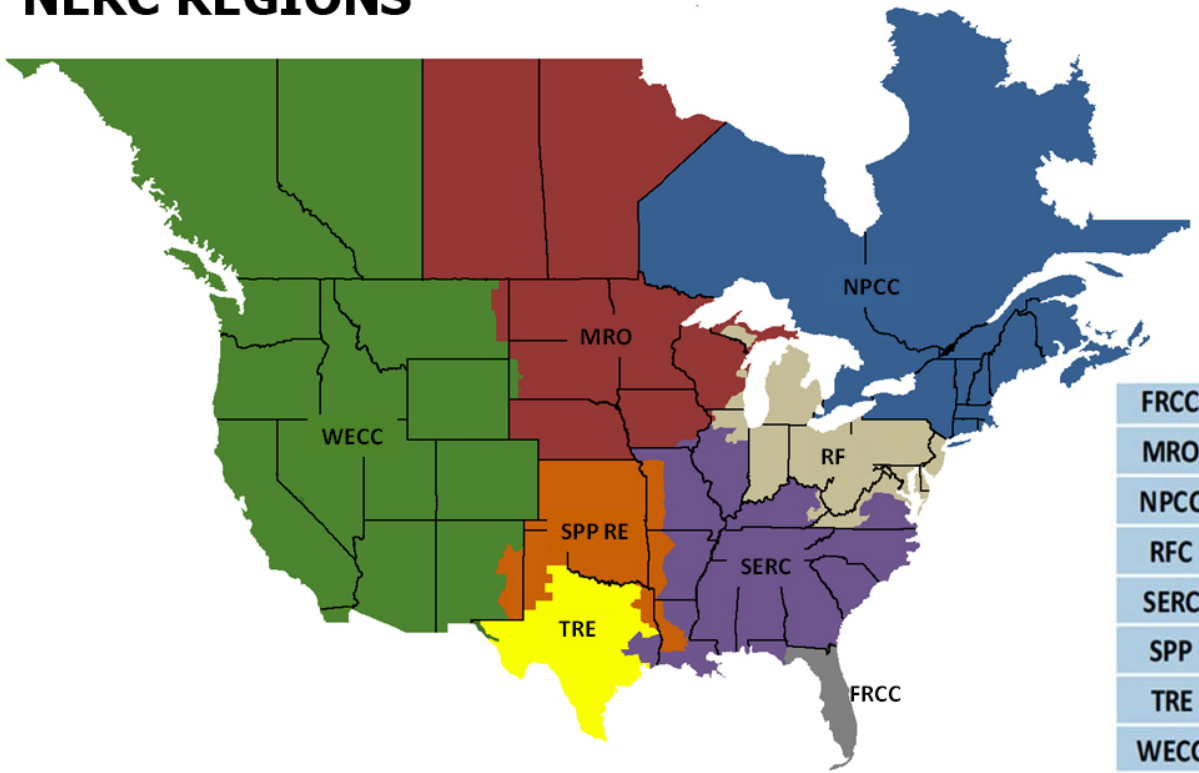
Compliance

Organization Registration

Regional Standards

Reliability Assessments

NERC REGIONS

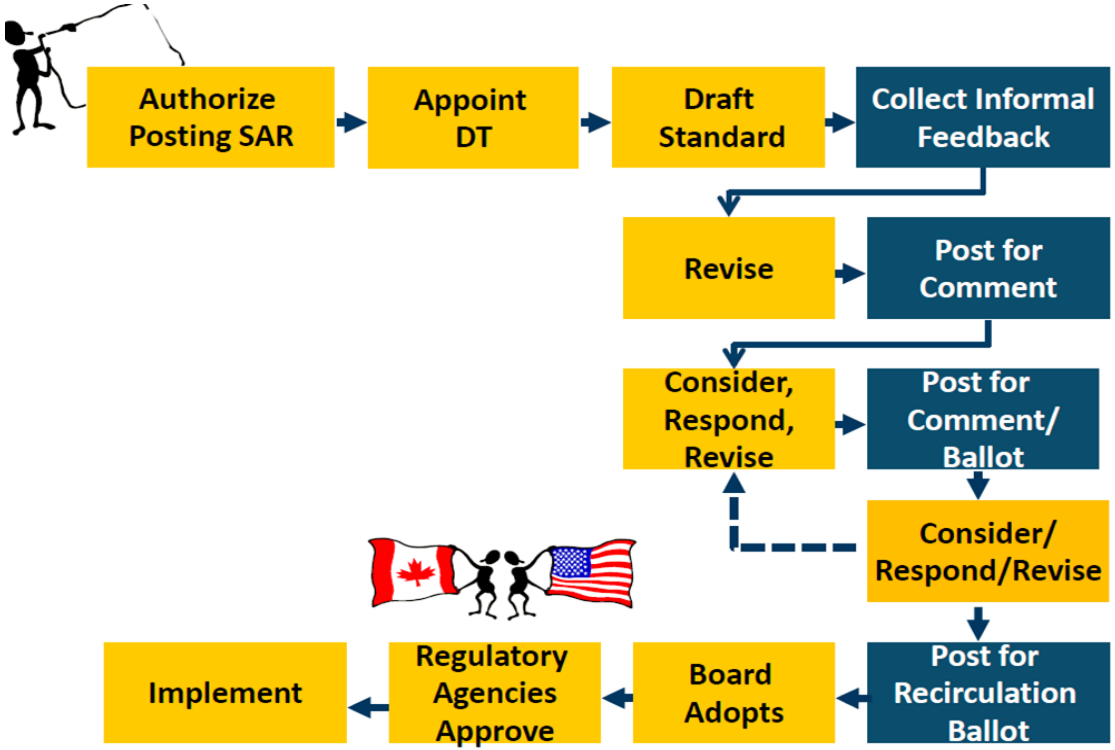


FRCC	Florida Reliability Coordinating Council
MRO	Midwest Reliability Organization
NPCC	Northeast Power Coordinating Council
RFC	ReliabilityFirst Corporation
SERC	SERC Reliability Corporation
SPP	Southwest Power Pool Regional Entity
TRE	Texas Reliability Entity
WECC	Western Electricity Coordinating Council

- NERC Reliability Standards define the reliability requirements for planning and operating the North American bulk power system and are developed using a results-based approach that focuses on performance, risk management, and entity capabilities.

- What is NERC protecting?
  - Bulk Electric System
    - Generation Plants
    - Transmission Stations
    - Transmission Lines
    - Transmission towers

NERC Standards Development Process Overview

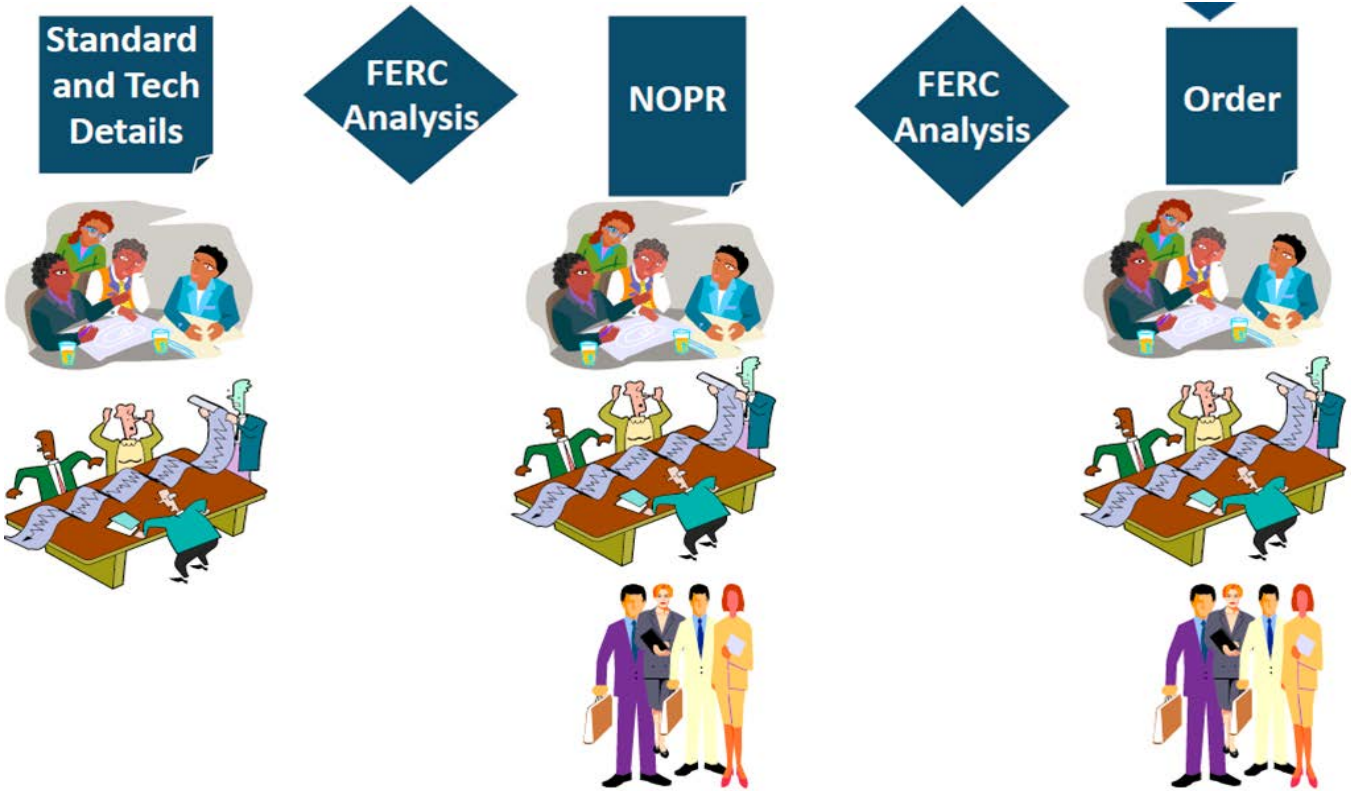


Drafting Team Responsibility and Formation

- Drafting Team Responsibility
  - Develop an excellent, technically correct standard that helps provide an adequate level of reliability and achieves consensus
    - Stay within the scope of the SAR
    - Address regulatory directives and stakeholder issues
    - Consider Independent Experts' Review Panel input
    - Ensure standard meets criterial for approval
  - Develop initial set of Violation Risk Factors and Violation Severity Levels and associated reasoning
  - Produce a realistic Implementation Plan
  - Develop supporting documents (optional)

- Drafting Team Formation and Support
  - If a team is formed to address the SAR, the same team develops the standard (Includes: stakeholder facilitator, NERC staff project manager, Subject Matter Expert, technical writer (if needed), legal support, FERC staff observers, industry observers)

Regulatory Approval Process



Summary of Agency Responsibilities for Standards

Agency	Regional Entity	NERC	FERC
Basic Responsibility for Standards	• Performs delegated functions: ▪ Regional Standards ▪ Compliance ▪ Organization registration ▪ Reliability assessments • Regional consistency is key, transparency, predictability, and uniform outcomes	• Holds the authority to develop Reliability Standards in the first instance. Provided that NERC do so through a process that provides notice and opportunity for public comment, due process, openness, and balance of interests	• Lacks authority to prescribe the specific content of a Standard, however, FERC can: 1. Approve a standard it deems fit 2. Remand a standard if it disapproves 3. Order NERC to submit a modification of a Standard to address a specific issue.

Reliability Standards

Standard Abbreviation	Function
BAL	Resource and Demand Balancing
COM	Communications
CIP	Critical Infrastructure Protection
EOP	Emergency Preparedness and Operations
FAC	Facilities Design, Connections, and Maintenance
INT	Interchange Scheduling and Coordination
IRO	Interconnection Reliability Operations and Coordination
MOD	Modeling, Data, and Analysis
NUC	Nuclear
PER	Personnel Performance, Training, and Qualifications
PRC	Protection and Control
TOP	Transmission Operations
TPL	Transmission Planning
VAR	Voltage and Reactive

EXAMPLE OF O&P TRANSMISSION PLANNING STANDARDS

Standard TPL-001-4 — Transmission System Planning Performance Requirements

A. Introduction

1. **Title:** **Transmission System Planning Performance Requirements**
2. **Number:** **TPL-001-4**
3. **Purpose:** Establish Transmission system planning performance requirements within the planning horizon to develop a Bulk Electric System (BES) that will operate reliably over a broad spectrum of System conditions and following a wide range of probable Contingencies.
4. **Applicability:**
   - **4.1. Functional Entity**
     - **4.1.1.** Planning Coordinator.
     - **4.1.2.** Transmission Planner.
5. **Effective Date:** Requirements R1 and R7 as well as the definitions shall become effective on the first day of the first calendar quarter, 12 months after applicable regulatory approval. In those jurisdictions where regulatory approval is not required, Requirements R1 and R7 become effective on the first day of the first calendar quarter, 12 months after Board of Trustees adoption or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities.

EXAMPLE OF O&P TRANSMISSION PLANNING STANDARDS

B. Requirements

R1. Each Transmission Planner and Planning Coordinator shall maintain System models within its respective area for performing the studies needed to complete its Planning Assessment. The models shall use data consistent with that provided in accordance with the MOD-010 and MOD-012 standards, supplemented by other sources as needed, including items represented in the Corrective Action Plan, and shall represent projected System conditions. This establishes Category P0 as the normal System condition in Table 1. *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*

1.1. System models shall represent:

1.1.1. Existing Facilities

1.1.2. Known outage(s) of generation or Transmission Facility(ies) with a duration of at least six months.

1.1.3. New planned Facilities and changes to existing Facilities

1.1.4. Real and reactive Load forecasts

1.1.5. Known commitments for Firm Transmission Service and Interchange

1.1.6. Resources (supply or demand side) required for Load

EXAMPLE OF O&P PROTECTION SYSTEM STANDARDS

Standard PRC-004-2.1(i)a – Analysis and Mitigation of Transmission and Generation Protection System Misoperations

A. Introduction

1. **Title:** Analysis and Mitigation of Transmission and Generation Protection System Misoperations
2. **Number:** PRC-004-2.1(i)a
3. **Purpose:** Ensure all transmission and generation Protection System Misoperations affecting the reliability of the Bulk Electric System (BES) are analyzed and mitigated.
4. **Applicability**
   - **4.1.** Transmission Owner.
   - **4.2.** Distribution Provider that owns a transmission Protection System.
   - **4.3.** Generator Owner.
5. **Effective Date:** See the Implementation Plan for this Standard.

EXAMPLE OF O&P PROTECTION SYSTEM STANDARDS

B. Requirements

R1. The Transmission Owner and any Distribution Provider that owns a transmission Protection System shall each analyze its transmission Protection System Misoperations and shall develop and implement a Corrective Action Plan to avoid future Misoperations of a similar nature according to the Regional Entity's procedures.

R2. The Generator Owner shall analyze its generator and generator interconnection Facility Protection System Misoperations, and shall develop and implement a Corrective Action Plan to avoid future Misoperations of a similar nature according to the Regional Entity's procedures.

- For Misoperations occurring on the Protection Systems of individual dispersed power producing resources identified under Inclusion I4 of the BES definition where the Misoperations affected an aggregate nameplate rating of less than or equal to 75 MVA of BES facilities, this requirement does not apply.

R3. The Transmission Owner, any Distribution Provider that owns a transmission Protection System, and the Generator Owner shall each provide to its Regional Entity, documentation of its Misoperations analyses and Corrective Action Plans according to the Regional Entity's procedures.

- For Misoperations occurring on the Protection Systems of individual dispersed power producing resources identified under Inclusion I4 of the BES definition where the Misoperations affected an aggregate nameplate rating of less than or equal to 75 MVA of BES facilities, this requirement does not apply.

NERC's Actively Monitored List

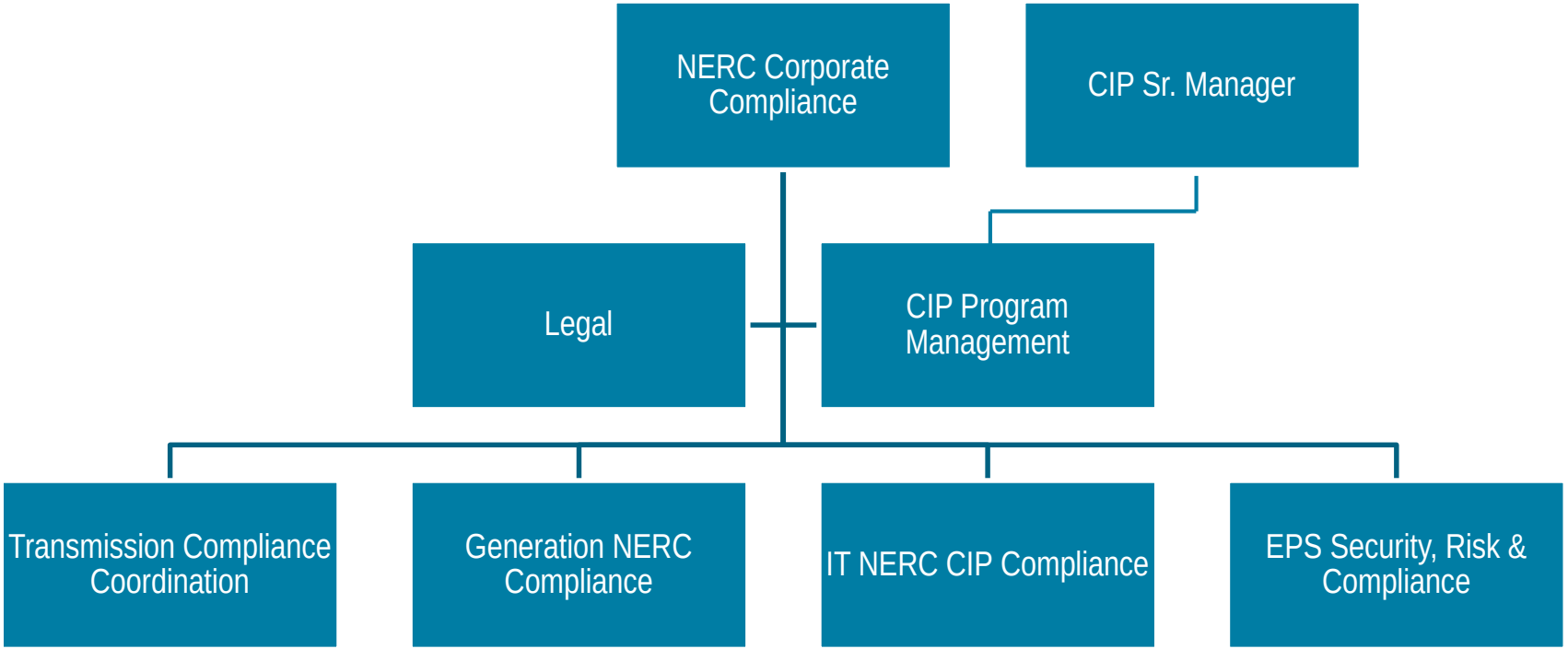
- The ERO produces an Actively Monitored List (AML), which communicates the priority given to the monitoring of certain standards.

- Requirements from each Reliability Standard considered to be a High Risk priority are subdivided into tiers.
  - Tier 1 (COM-001-1.1) (CIP-002-3)
  - Tier 2 (IRO-006-5) (CIP-004-3.R2,R3)
  - Tier 3 (BAL-002-1.R1,R2) (EOP-002-3,R1-R6)

- Violation Risk Factor (VRF):
  - High, Medium, Low
  - Assesses impact to reliability of violating a specific requirement
  - Used to determine sanctions when requirement is violated

- Violation Severity Level (VSL):
  - Low, Moderate, High, Severe
  - Used to define the degree to which compliance with a requirement was not achieved

Duke Energy's Compliance Organization



How does Duke Energy stay compliant?

- Keep up with what's on the Horizon
  - Industry Training
  - Webinars, NERC ALERTS, etc.
  - Seminars and Webinars
- Assist Subject Matter Experts (SME) maintain compliance
- Internal Monitoring
  - Internal audits
  - Peer checks
- Participating in Standards Development and Balloting process

- NERC's Compliance efforts are comprised of three main efforts:
  - Compliance Monitoring is the process to assess, investigate, evaluate, and audit in order to measure compliance with NERC standards.
  - Compliance Enforcement ensures that corrective actions are taken when standards are violated. These actions may include financial penalties and sanctions for such violations.
  - Due Process provides registered entities the opportunity to contest any finding of a violation of a NERC reliability standard.

What are Auditors looking for?

- Auditors must obtain sufficient, appropriate evidence to provide reasonable basis for their findings and conclusions.
  - Evidence must persuade someone that the findings for compliance and non-compliance are reasonable
- To be persuasive, evidence should
  - Be of sufficient quantity
  - Be relevant to the requirement
  - Be valid to accurately reflect entity's sections
  - Successfully pass professional judgment by auditors
- Test the evidence to ensure sufficiency, quality, and validity
  - Do not always assume that what you are given is accurate, complete, or correct
  - Follow up if evidence or situation is not clear
  - Ask questions, interview others, and seek corroborating evidence to ensure evidence quality
- Remember that your findings must withstand scrutiny by other.

Questions?

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