



Forward Together • **ReliabilityFirst**

ANNUAL REPORT

FY 2018

TABLE OF CONTENTS

From our Chair	i
From Our President & CEO	ii
2018 Innovation Awards and Retreat	1
Risk Identification	2
Risk Mitigation	8
Risk Communication	11



Lisa Barton
Chair of the Board of Directors

From Our Chair,

The changing energy landscape and risks facing our industry underscores the importance of ReliabilityFirst's efforts to ensure the reliability and security of the Bulk Electric System. This year's annual report provides an overview of the activities ReliabilityFirst undertook in 2018, along with trending on key risks facing the regional footprint and the industry.

As you will see in the report, cyber security remains an area of focus for both ReliabilityFirst and the industry. The industry is taking these issues seriously, with entities self-reporting 93% of all noncompliances. ReliabilityFirst's outreach and education activities provide a valuable benefit to entities, particularly in the cyber area - I encourage you to attend ReliabilityFirst's workshops and consider their Assist Visit program, which provides tailored training on requested topics.

Also in the theme of cyber security, ReliabilityFirst joined the Cybersecurity Risk Information Sharing Program (CRISP) program in 2018. CRISP is a voluntary program that allows the timely exchange of detailed cyber security threat information between industry, the Electricity Information Sharing and Analysis Center (E-ISAC), the Department of Energy, and Pacific Northwest National Laboratory. This program will enhance ReliabilityFirst's internal corporate security, while advancing knowledge of the key cyber threats facing ReliabilityFirst's thirteen state footprint.

Jim Haney and Michael Bryson completed their terms on the Board of Directors at the end of 2018. On behalf of the entire Board of Directors, I would like to thank them both for their service and valuable contributions. I would also like to thank all of you who worked with ReliabilityFirst and the greater ERO Enterprise to advance reliability this year.

Forward Together,

Lisa



RELIABILITY FIRST



Timothy Gallagher
President & CEO

From Our President & CEO,

The industry continues to evolve around us at a rapid pace and we have several new leaders in the Regions (including here at ReliabilityFirst, with the addition of Rob Eckenrod as our new Vice President & General Counsel), making it a great time for fresh perspectives and transformation.

In this spirit, ReliabilityFirst held the first innovation awards and retreat in 2018, which you will read more about in this Annual Report. During this event, I was impressed by the creativity and dedication of ReliabilityFirst staff, and many of the ideas discussed at the innovation retreat are now in place and enhancing the effectiveness and reliability of our region.

The risks and threats facing Bulk Electric System also continue to evolve, especially in the CIP area. I encourage you to review the [2018 CIP Themes Report](#), a joint Regional effort to identify common issues entities encounter in their cyber security efforts, and techniques to address these issues.

I would like to thank Jim Haney and Michael Bryson, who ended their terms in 2018, for their many valuable contributions to the Board. I am pleased to welcome Jennifer Sterling, who was elected to the Board in early 2018, and Jennifer Curran and Bob Mattiuz, who were elected to the Board in December – we look forward to working with you.

I would also like to thank Lisa Barton and Simon Whitelocke for their leadership over the course of the year as our Board Chair and Vice Chair. They are continuing these important roles in 2019.

I am continually impressed by the people I am surrounded by, and I look forward to our work together to further our collective vision for reliability.

Forward together,

Tim

2018 Innovation Awards and Retreat

To effectively address continuously evolving risks, regulators must also continuously evolve and improve. In 2018, ReliabilityFirst hosted its first annual Innovation Awards and Retreat, similar to those held in other private industries. The purpose of this event is to encourage innovators to try new ideas and projects, recognize exceptional work in this area, and provide innovators access to individuals who can help them refine their innovations and bring them to fruition.

A team of members from the ERO determined the criteria for judging submittals of innovations, and all ReliabilityFirst employees had an opportunity to make submittals. Erik Johnson (Manager of Entity Development) and his team won the first annual Innovation Award for their Misoperations Improvement Project. The Misoperations Improvement Project is a hands on approach that involves partnering with the entity outside the compliance space, to assess and strengthen internal controls related to reducing Misoperations.

The award was presented during the Innovation Awards, which is a dinner and ceremony in honor of the winner and their team. During the ceremony, ReliabilityFirst executive leadership presents the Innovation Award, and guest speakers present on areas for potential future innovations. The Innovation Retreat (the day following the Innovation Awards) is a day set aside for all submitters to workshop their innovations. The leadership team is on hand to spend time brainstorming and advising attendees on ways to push their innovations forward. The guest speakers from the Innovation Awards also attend to provide expert assistance and advice.

The 2018 Innovation Awards and Retreat was held at the Cleveland Museum of Art in February. Guests included Mark Lauby, Senior Vice President and Chief Reliability Officer at NERC; Dr. Lorry Wagner, President of Lake Erie Energy Development Corporation (LEEDCo); and Dr. Brian Castellani, Professor of Sociology at Durham University. Attendees stationed themselves throughout the Museum and members of the leadership team and guests visited with each of them in small groups during breakout sessions lasting about 20 minutes each.

In December of 2018, Bhesh Krishnappa (Principal Analyst) won the Innovation Award for the Cyber Resiliency Metrics Project, which he received at the 2019 Innovation Awards and Retreat. The Cyber Resiliency Metrics Project is an effort to better measure the resilience of industrial control system networks. Working with Old Dominion University, Bhesh helped to create a novel qualitative process and tool that can help entities assess their strength in industrial control system resilience.



Risk Identification

ReliabilityFirst continually works to identify and understand the evolving risks facing our bulk-power system. This work includes the Regional Risk Assessment (identifying and prioritizing risks impacting the ReliabilityFirst Region); Inherent Risk Assessments (identifying risks impacting a specific entity); Risk-Harm Assessments (identifying risks caused by a specific violation); event analyses (determining root causes and risks associated with system events); voluntary maturity model engagements (collaborating with stakeholders to identify performance and capability to manage and mitigate identified risks); and reliability assessments and performance analysis (identifying risks associated with transmission performance and resource adequacy). Each of these efforts are discussed in turn below.

2018 Regional Risk Assessment and 2019 Risk Elements

During the annual Regional Risk Assessment, ReliabilityFirst identifies high-priority risks within the Region (Risk Elements), along with a list of associated Reliability Standards and Requirements to help mitigate them. The Risk Elements help inform and guide ReliabilityFirst's Compliance Monitoring and Enforcement Program activities and risk-based communication throughout the year. Prior to the ReliabilityFirst Regional Risk Assessment, NERC identifies ERO-wide Risk Elements. The ERO-wide Risk Elements for 2019 are presented below:

2019 Risk Elements
Improper Management of Employee and Insider Access
Insufficient Long-Term Planning Due to Inadequate Models
Insufficient Operational Planning Due to Inadequate Models
Spare Equipment with Extended Lead Time
Inadequate Real-time Analysis During Tool and Data Outages
Improper Determination of Misoperations
Inhibited Ability to Ride Through Events
Gaps in Program Execution

Figure 1: 2019 ERO-wide Risk Elements

As NERC, ReliabilityFirst, and the other Regions continue to enhance our understanding of the risks facing the grid, these Risk Elements have become more focused on discrete issues.



To identify ReliabilityFirst's Risk Elements, staff evaluates Region-specific information and data, in conjunction with NERC's ERO-wide Risk Elements. In 2018, ReliabilityFirst identified the following Risk Elements:

1. Unknown Unknowns

The most troubling risks are those that are unexpected or unforeseen, and cannot be adequately identified based upon past experience. This lack of knowledge impairs our ability to prepare for, and mitigate against, their occurrence; however the existence of such risks are just as real as those that are known. For this reason, it is a continual effort by ReliabilityFirst staff and the industry to identify and address these unknown risks.

2. Protection System Misoperations

Protection System Misoperations are defined as "the failure of a Composite Protection System to operate as intended for protection purposes." Misoperations include a Protection System's failure to operate, slowness in operating, or operating when not required during either a fault or non-fault condition. Misoperations contribute to, and tend to exacerbate the impact of, automatic transmission outages, which adversely affect the reliability of the BES.

3. Information/Asset Security

The cyber and physical security of the equipment or assets that make up the BES and the information used to operate that equipment is of paramount importance for ReliabilityFirst. This is a complex risk category because it involves protecting against both cyber and physical vulnerabilities. One of the most prominent news stories throughout the last year involved cyber-attacks launched by state actors.

4. Situational Awareness and IROLs

In the past, situational awareness and Interconnection Reliability Operating Limits ("IROLs") have been treated as separate, discrete risks. In 2018, ReliabilityFirst considered these risks together due to their interdependencies. In other words, ReliabilityFirst examined how situational awareness can affect an entity's ability to anticipate, identify, and recover from exceeding an IROL or an IROL-like condition.

5. Environmental Factors

Given its geographic location, the ReliabilityFirst footprint is faced with several weather-related risks. Extreme weather events, like the 2014 Polar Vortex, as well as more regularly occurring weather events, such as storms, lightning, and wind can impact the reliability of the BES. In addition to weather-related risks, this risk category also includes other naturally occurring phenomena, including vegetation growth.

6. Planning and Modeling

Due to the interconnectedness of the grid, planning and modeling are two intertwined activities that are essential to the reliable operation of the BES. System modeling is critical to both operations and planning because all system components must be represented in the models with sufficient detail to provide accurate and complete simulations of actual system performance.

7. Changing Generation Mix

It is generally understood at this point that the generation resource mix has been, and continues to be, changing. This fact presents many challenges for the electric industry. The ReliabilityFirst footprint is particularly susceptible to this risk based on the fact that the Midwest has seen a changing mix over the last five years with an influx of renewables (partially to meet state Renewable Portfolio Standards) plus natural gas generation due to decreased fuel costs from fracking, specifically Marcellus shale in the Allegheny region.

8. Event Response

The industry has recognized that major events, although uncommon, can cause significant disruption to the BES, requiring the use of blackstart resources and coordinated, multi-entity efforts to restore the system. Consequently, entities' ability to respond to these types of events is critical. The changing nature of the generation mix in the ReliabilityFirst footprint complicates this issue in the region. The retirement of coal-fired generation plants presents a challenge in the planning and execution of System Restoration and Recovery Plans.

ReliabilityFirst continued to mature the Regional Risk Assessment program in 2018 by prioritizing the identified Risk Elements based on the likelihood of the risk occurring, the potential impact of the risk, and ReliabilityFirst's ability to influence conduct related to each risk to seek to reduce residual risk. The goal of this effort is to enhance ReliabilityFirst's ability to make informed, risk-based decisions to further improve grid reliability. To be a risk-based organization, it is imperative to determine the key risks, and act accordingly.

Inherent Risk Assessments

During the Inherent Risk Assessment (IRA), ReliabilityFirst assesses the inherent risk an entity poses to the reliability of the BPS, to determine the specific oversight needed for that entity. ReliabilityFirst conducted 102 IRAs in 2018, and also created and began using the Entity Profile Questionnaire (EPQ) Tool to aid in the development of IRAs. The EPQ tool is a secure tool housed on site at ReliabilityFirst, which consolidates and replaces a number of information requests previously issued to entities in connection with the IRA. The EPQ tool enhances and streamlines the IRA process and allows ReliabilityFirst to better evaluate and understand the potential impact of each entity on the Bulk Electric System, while reducing reporting burdens for our entities.

Risk-Harm Assessments

During the Risk-Harm Assessment, ReliabilityFirst subject matter experts quantify the risk and potential harm posed by a specific violation. In 2018, the large majority of violations were minimal risk in nature. CIP-007 (Cyber Security – Systems Security Management) and CIP-004 (Cyber Security – Personnel & Training), which govern high-frequency conduct, have historically been the most frequently violated Standards in the region. In 2018, CIP-007, CIP-010 (Cyber Security - Configuration Change Management and Vulnerability Assessments), CIP-004, and CIP-006 (Cyber Security - Physical Security of BES Cyber Systems) were the most frequently violated Standards.

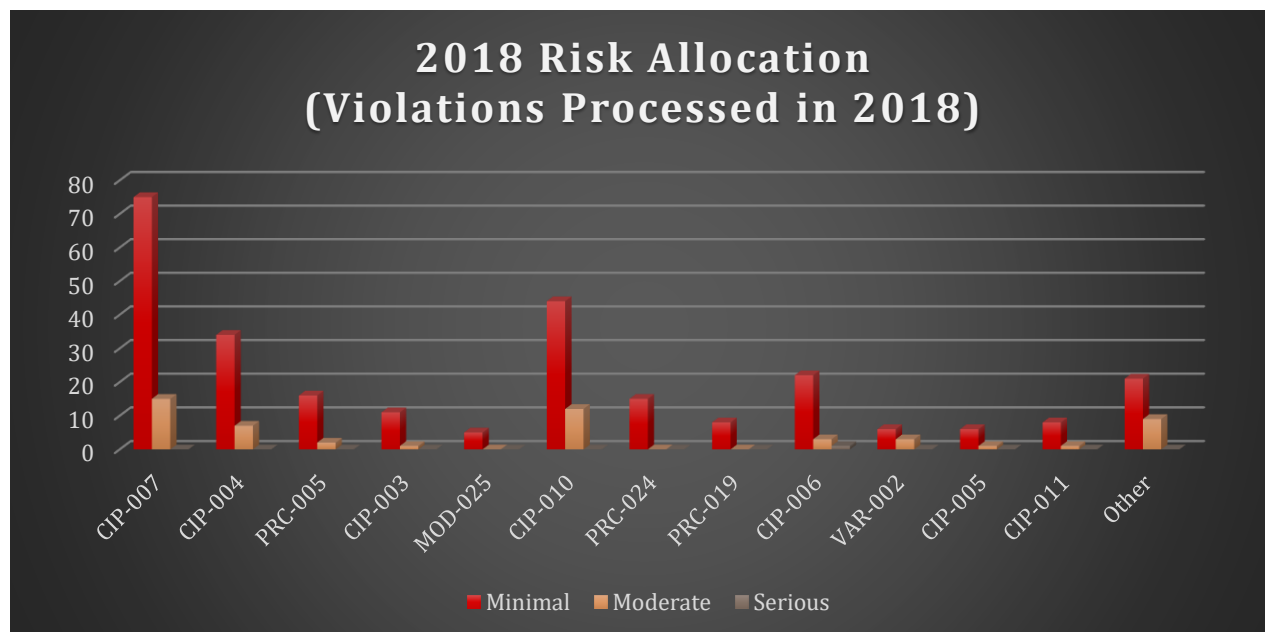


Figure 2: 2018 Risk Allocation of Violations

The majority of violations identified in 2018 were minimal risk. The most violated Standards were CIP-007, CIP-010, CIP-0004, and CIP-006, underscoring the need to remain vigilant in the cybersecurity area.

Event Analysis and Situational Awareness

During the event analysis process, ReliabilityFirst works with stakeholders to identify and analyze the root causes of system events, complete event analysis reports, and communicate information and lessons learned to the industry. In 2018, ReliabilityFirst completed analysis of six open events from 2017, and analyzed 64 new events that occurred in 2018. For the third consecutive year, ReliabilityFirst experienced no Category 2 or higher events in its footprint.¹

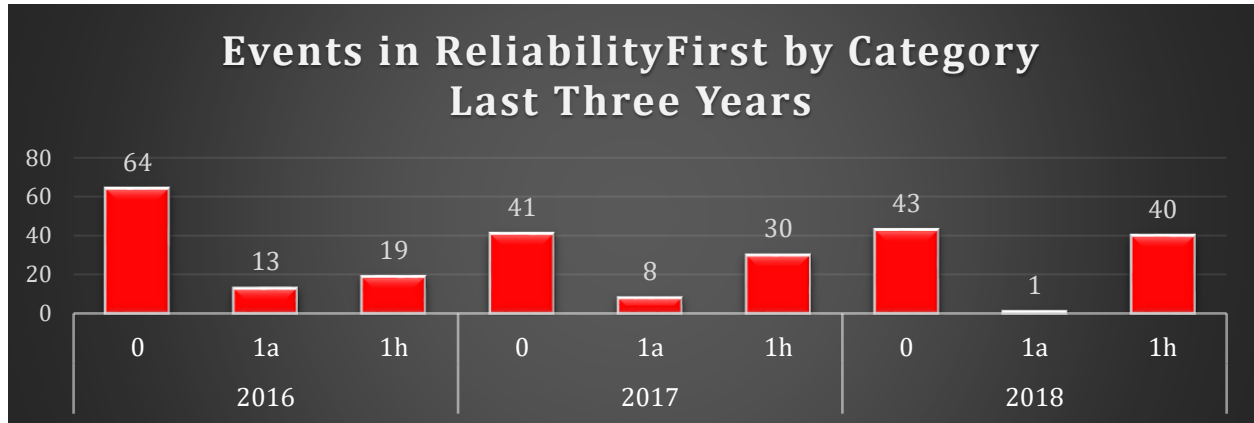


Figure 3: 2016, 2017, and 2018 Events by Category

The ReliabilityFirst region only experienced one Category 1a event in 2018 (an unexpected outage that is contrary to design of three or more BES Facilities caused by a common disturbance). Typically a Category 1a event is a severe misoperation or equipment failure that impacts a combination of three or more lines, transformers, or other facilities. The reduction of Category 1a events to a single event is a milestone and may be the result of ReliabilityFirst's continuous outreach and engagements focused on the risk of protection system misoperations.

A Category 0 event is a reported event that does not reach any of the category thresholds in NERC's Event Analysis Program. While these events are not typically cause-coded, ReliabilityFirst obtains additional detail and performs trending to identify risks and possible Lessons Learned. The figure below shows the types of Category 0 events submitted to ReliabilityFirst in 2018. (Removed from this graph are three EMS-related Category 0 events, which are discussed separately below).

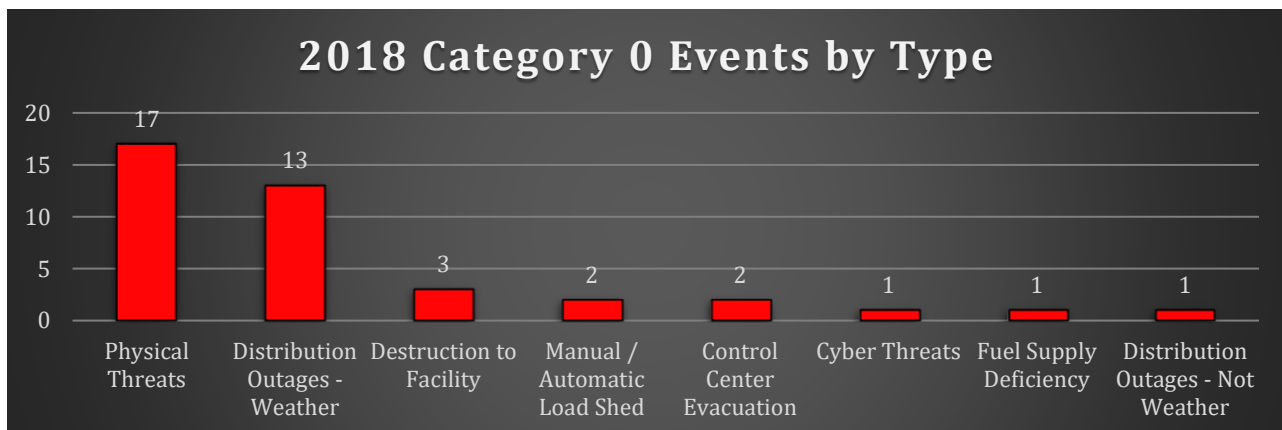


Figure 4: 2018 Category 0 Events (minus EMS related events)

The highest percentage of Category 0 events in the Region in 2018 were physical threat-related (typically suspicious activity such as a person approaching or taking pictures of a substation or facility).

¹ A Category 2 event is defined in the [ERO Event Analysis Process](#).

The highest percentage of non-Category 0 events in the ReliabilityFirst region continue to be connected to Energy Management System (EMS) issues. Figure 5 provides the themes of EMS events occurring in ReliabilityFirst's footprint in 2018. While the past two years featured a high percentage of Data-related EMS outages, one noticeable trend in 2018 was the increase in Loss of Power EMS events.

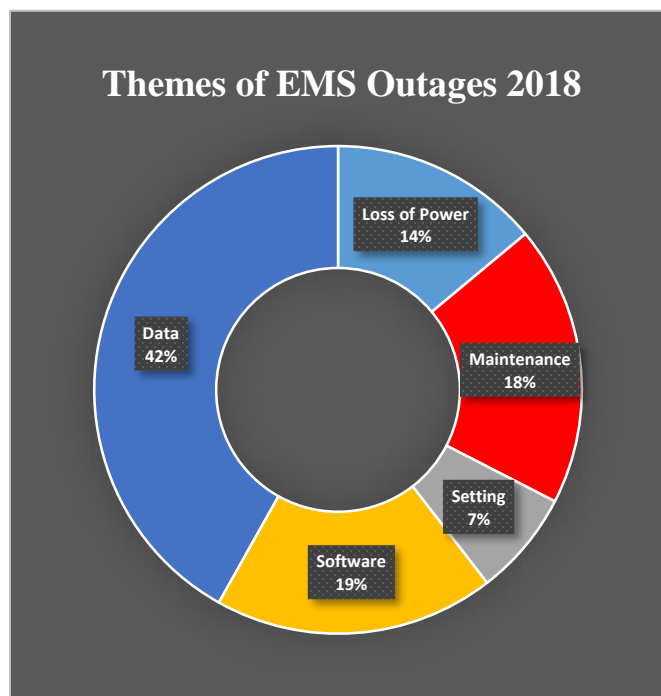


Figure 5: Themes of EMS Outages (2018)

Software: Outages due to a software bug or database issue with the EMS. Sometimes software crashes or fails, and the entity works with the vendor to repair, patch, or fix the software related concern.

Data: Primarily State Estimator outages due to external data that results in the State Estimator not converging. These issues are resolved by communicating with neighboring entities to enhance and upgrade the external model.

Loss of Power: Power outages to a control center or data center that result in some loss of EMS functionality. Mitigating actions include evaluating the design and redundancy of power supplies to ensure there is not a single point of failure.

Maintenance: Any type of change to the EMS system that results in a SCADA, ICCP, or State Estimator outage. These outages are often due to change-management issues.

Setting Issues: Any type of EMS outage due to modifying EMS system settings. Oftentimes settings are adequate upon installation, but due to topology changes or dispatch changes, must be adjusted to help the State Estimator to converge while maintaining a quality solution.

ReliabilityFirst worked with NERC to lead publication of three Lessons Learned documents on EMS outages involving: (1) [State Estimator outages requiring tuning/calibrating EMS settings](#); (2) [External model data causing State Estimators to not converge](#); and (3) [Back-office EMS support tools impacting Real-Time Situational Awareness](#). ReliabilityFirst also published two additional non-EMS related Lessons Learned documents: (1) [Initiatives to address and reduce misoperations](#); and (2) [Cascading analysis identifies need for pre-contingent load shed](#). Additionally, in 2018 ReliabilityFirst began documenting non-reported events that were identified through its situational awareness channels, to identify new and emerging risks to the Region's footprint and communicate Lessons Learned.

Voluntary Maturity Model Engagements

ReliabilityFirst conducts voluntary maturity model engagements during which we identify and evaluate high-level risks faced by the entity, and the entity's performance and capability to manage those risks (see Figure 6 below). These proactive engagements focus on continuous improvement in pursuit of reliability excellence. In 2018, Misoperations risks were a focus for maturity model engagements, and ReliabilityFirst identified a number of good practices, including: (1) linking tools so operators do not have to enter outage information into multiple locations/systems; (2) tools for tracking and managing the Misoperations investigation process; (3) a structured mentorship program to foster the development of less experienced employees; (4) commissioning procedures that include critical steps and Human Performance steps that could identify potential for errors; and (5) a data quality team that looks at completed maintenance and commissioning actions on a weekly basis to ensure adherence with established procedures.

Management Practices for Maturity Model Engagements



Figure 6: Management Practices

Management Practices help entities identify, assess, and improve the capability to effectively address reliability risks above-and-beyond the minimum levels established by the Reliability Standards. For additional information, contact ReliabilityFirst.

Reliability Assessment and Performance Analysis Activities

ReliabilityFirst's reliability assessment and performance analysis activities identify key risks facing the Region. These activities include performing assessments; participating in PJM Interconnection, LLC (PJM) and Midcontinent Independent System Operator (MISO) stakeholder groups; and facilitating the corporation's technical stakeholder groups (the Reliability Committee, Generator Subcommittee, Protection Subcommittee, and Transmission Performance Subcommittee).

Seasonal Reliability Assessments

For each upcoming summer and winter season, ReliabilityFirst reviews the projected resource adequacy for PJM and MISO, the two Regional Transmission Organizations that operate in the Region. For the 2018 summer season and the 2018/2019 winter season, ReliabilityFirst concluded that the Region was projected to have sufficient resources. Additionally, ReliabilityFirst conducted confidential summer and winter transmission assessments on: (1) the actual operating performance for the 2017 seasons, and (2) the projected operating performance for the 2019 seasons. This included a verification of the power flow models used to perform the transmission assessment studies.

Transmission Reliability Assessments

In 2018, ReliabilityFirst conducted five additional transmission assessments using power flow models created by the Eastern Interconnection Reliability Assessment Group's (ERAG) Multi-Regional Modelling Working Group (MMWG). These models simulate various future loading conditions along with associated transmission system topology. The assessment reports were shared with the Transmission Performance Subcommittee:

- (1) **Phase Angle Assessment of Transmission System Performance in 2023:** analyzed the opening of every transmission line segment at 200 kV and above within the Region under four different loading condition models for the year 2023.
- (2) **2022 Near-Term Assessment of Transmission System Performance of Right-of-Way Outages:** analyzed the loss of all transmission lines in a common right-of-way concurrent with the loss of all transmission lines in another right-of-way in four 2022 models. These outages were limited to lines operating at 230 kV or above.
- (3) **2022 Near-Term Assessment of Transmission System Performance for Selected N-3 Outages:** analyzed selected third contingencies (i.e., N-3) of four different loading conditions for the year 2022.²
- (4) **Operational review of a 2018 Spring Light Load Period:** reviewed 2018 spring light load operations within the Region, which provides knowledge to apply in future spring light load seasons.
- (5) **2022 Near-Term Assessment of Transmission System Performance Generating Plant Outages:** analyzed transmission and generation plant outages in the four power flow models representing different timeframes in the year 2022 from the 2017 Series of MMWG power flow models.³

Long-Term Resource Assessment

ReliabilityFirst annually reviews the future demand and capacity resource balance for the Region, and analyzes the amount of capacity resource reserves compared to the target reserves to determine excess or shortage in expected planning reserves for the future summer peak demands. Based on the data for the next 10-year period, PJM meets its reserve margin target through 2028, and MISO meets its reserve margin target through 2022. However, MISO's reserve margin is 313 MW below target for 2023. Continuing in 2024 and beyond, MISO's projected reserve margins are below target, reaching a maximum of 3,708 MW below its target in 2027 and rebounding slightly to 3,291 MW below its target in 2028. While five years lead-time should be sufficient to manage these projected issues, ReliabilityFirst will continue to monitor this area.

Risk Mitigation

ReliabilityFirst works with industry to mitigate identified risks to the reliability of the Bulk Electric System. These efforts include compliance monitoring and enforcement, Reliability Standard commenting and development, and registration and certification activities.

Compliance Monitoring and Enforcement Activities

In 2018, ReliabilityFirst enhanced its annual planning process for compliance monitoring engagements and activities. This enhanced process provides a method to better focus ReliabilityFirst's efforts on the highest risks in the Region, by entity. ReliabilityFirst also matured its processes for assessing internal controls during engagements, and added a new, voluntary option for a period of open dialog with the entity during the audit (this discussion can include internal controls, risks, or questions regarding the application of the Standards).

² The assessment focused on southern Indiana, southern Ohio, and Michigan, and N-3 contingencies evaluated were limited to either a) two transmission outages at 345kV or above with the third outage being a 500 MVA or larger generator; or b) two 500 MVA or larger generators out of service with the third outage being a 345 kV or above transmission facility.

³ The plant outages evaluated were limited to generating plants and immediately adjacent plants with a total capability in excess of 2,000 MW. The analysis performed was a steady state thermal and voltage screening.

ReliabilityFirst performed 61 Operations & Planning Audits and 11 CIP audits in 2018. ReliabilityFirst also conducted 20 Operations and Planning Spot Checks, 80 compliance assessment reviews of system events, and five Guided Self-Certifications. The chart below shows the most frequently identified possible violations during compliance audits in 2018.

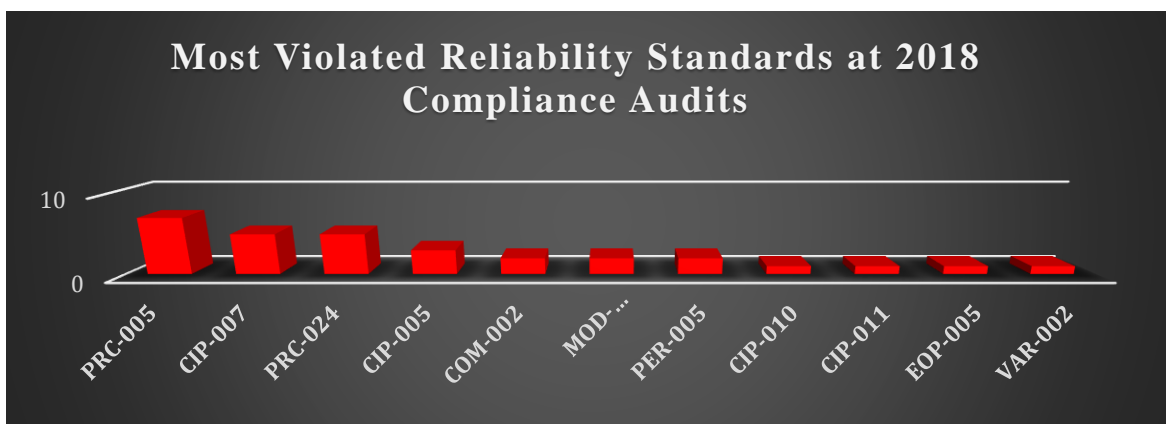


Figure 7: Most Violated Reliability Standards at 2018 Compliance Audits

PRC-005 (Protection System Maintenance) was again the most violated Reliability Standard identified at audits, followed by CIP-007 (Cyber Security – Systems Security Management).

ReliabilityFirst is responsible for enforcing noncompliance using a risk-based approach. This involves understanding the noncompliance and its root cause, and working with the entity to ensure mitigation and prevention of recurrence. In 2018, ReliabilityFirst continued to focus its efforts on improving risk-based enforcement practices, including processing lower risk noncompliance through streamlined enforcement processes. Enforcement also grew the self-logging program, adding several qualified entities to the program in 2018. Additionally, ReliabilityFirst enhanced its data-driven tools by creating automated dashboards for entities, which track trends on the duration, risk, and identification method for noncompliances.

In 2018, ReliabilityFirst processed 329 noncompliances, the majority of which were CIP-related and the overwhelming majority of which were compliance exceptions. Entities self-reported 93% of noncompliances.

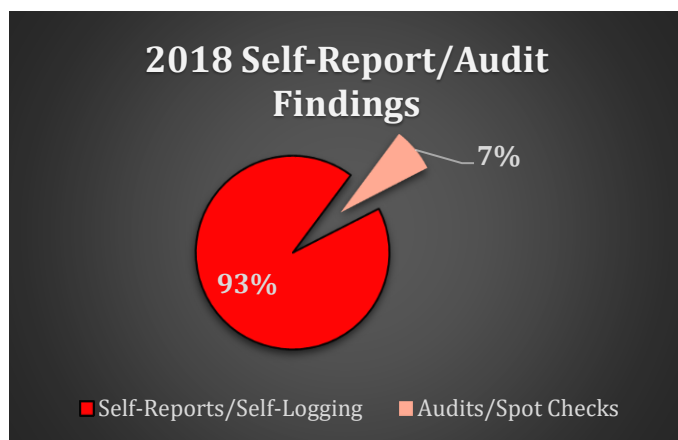


Figure 8: 2018 Self-Report/Audit Findings

93% of violations in 2018 were self-reported. ReliabilityFirst applauds this proactive behavior.



Figure 9: CIP vs. Operations & Planning (O&P)

71% of violations concerned the CIP Standards, and 29% concerned the O&P Standards. This is a slight shift from 75% CIP vs. 25% O&P in 2017.

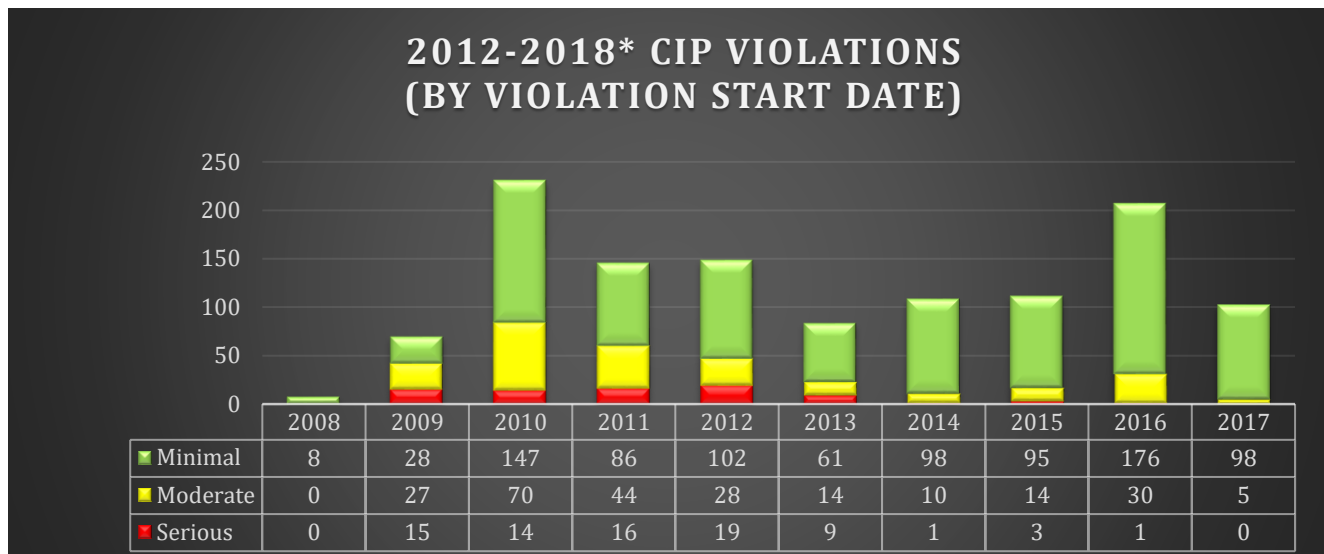


Figure 10: Volume and Severity of CIP Violations over Time

The severity of violations has gone down over time. *2018 data is not included, as risk determination for violations that started in 2018 generally takes place in 2019.

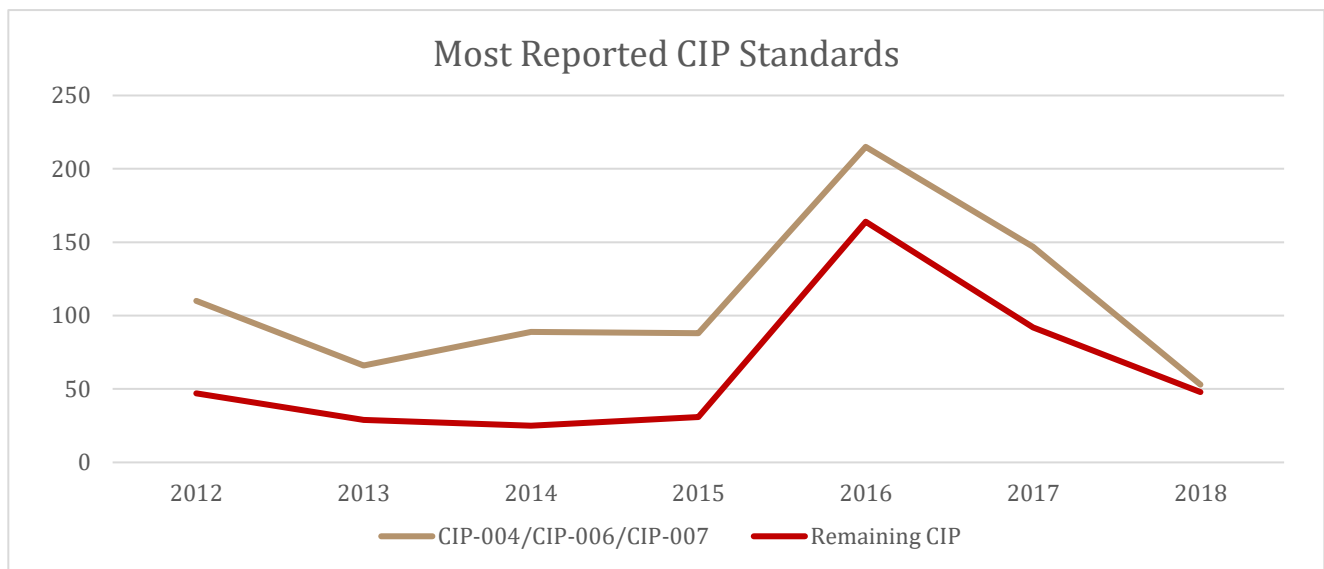


Figure 11: Most Reported CIP Standards

A small number of Standards that govern high frequency conduct (CIP-004, CIP-006, CIP-007) have a greater percentage of violations than the other CIP Standards, and entities should keep a close eye on these areas.

There was an uptick of CIP violations from 2015-2016 (due to the implementation of the CIP Version 5 Standards), which is now back on a downward trajectory.

Standards, Registration, and Certification Activities

ReliabilityFirst provides input during the NERC Reliability Standards development process and maintains regional Reliability Standards as needed, to ensure that Reliability Standards effectively mitigate the risks facing our footprint. In 2018, ReliabilityFirst analyzed, voted on, and provided feedback on 29 NERC Reliability Standards.

ReliabilityFirst facilitated the registration of 28 new entities on the NERC Compliance Registry and deregistration of 24 entities in 2018. ReliabilityFirst worked on an ERO Enterprise-wide effort to implement a Coordinated Functional Registration tool, and to plan, design, and develop a Centralized Organization Registration ERO System (CORES) Registration tool. ReliabilityFirst also performs certification reviews, to ensure that entities applying to perform the critical Balancing Authority, Transmission Operator and/or Reliability Coordinator reliability functions are capable of performing those functions. In 2018, ReliabilityFirst performed four certification reviews: two for entities that elected to update their Energy Management Systems, one for an entity that moved operations to a new Primary Control Center, and another for a Reliability Coordinator/Balancing Authority/Transmission Operator footprint change.

Risk Communication

Part of ReliabilityFirst's role as a risk-based organization with a unique view of regional trends is to communicate risks and mitigation strategies to Registered Entities. ReliabilityFirst uses a variety of vehicles to communicate this information, including the Assist Visit Program, bimonthly newsletters, website, and various training events and workshops throughout the year.

Assist Visit Program

Through the popular, voluntary [Assist Visit](#) program, ReliabilityFirst provides tailored training to entities. Because Assist Visits are tailored to the needs of the entity, they are dynamic and can range from recurring engagements to address significant programmatic improvements, to onsite engagements, to a simple conference call. In 2018, there was continued high demand for the Assist Visit program, as shown in the chart below.

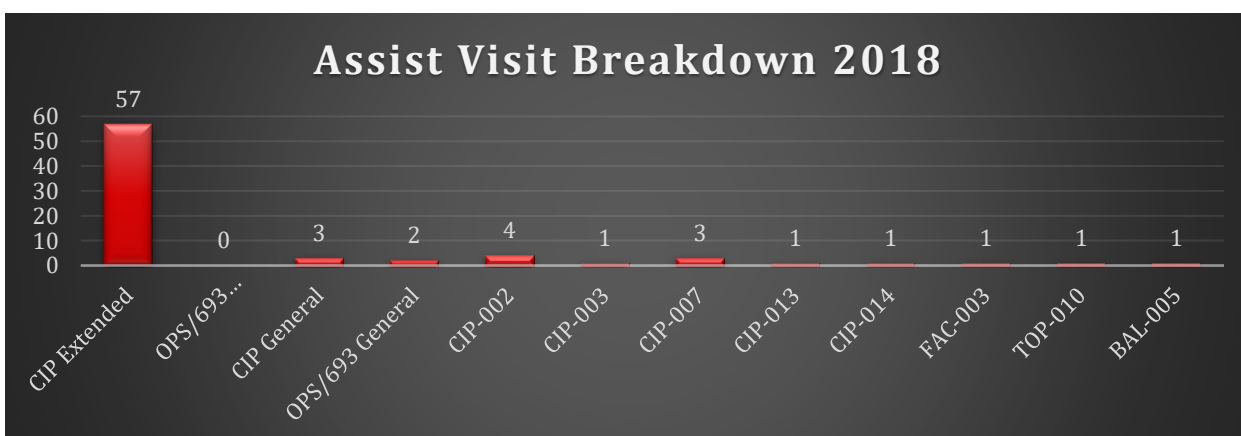


Figure 12: Breakdown of Assist Visits Conducted in 2018

The large majority of Assist Visits concerned the CIP Standards. Of the 75 Assist Visits performed, 57 were extended Assist Visit activities. Extended Assist Visits are an ongoing series of communications with participating entities to provide risk, internal control, and compliance guidance. All extended Assist Visits in 2018 involved the CIP Standards.

Risk-Based Outreach and Training

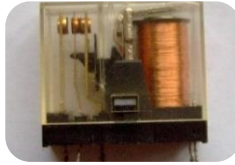
Upon the identification of key risks, ReliabilityFirst performs outreach and training activities to help address and mitigate these risks. In 2018, ReliabilityFirst's communications included a focus on the following high priority risks:



Critical Infrastructure Protection



Human Performance



Protection System Misoperations



Supply Chain



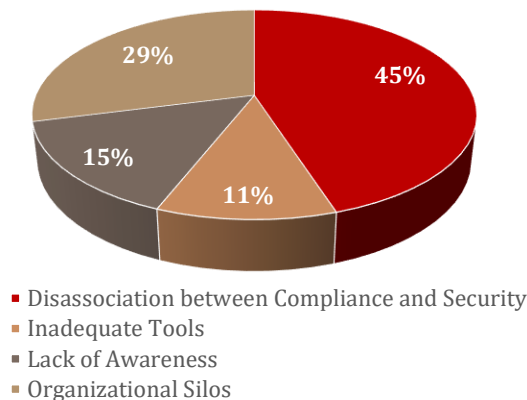
Situational Awareness and IROLs

Critical Infrastructure Protection (CIP)

As cyber security risks and the CIP Standards continually evolve, ReliabilityFirst continued its efforts to communicate cyber risks and mitigation strategies across the industry. In addition to performing 70 CIP-related Assist Visits in 2018 (discussed above), ReliabilityFirst addressed CIP topics in our [bimonthly newsletters](#), social media, board meetings, and [fall and spring workshops](#). ReliabilityFirst staff also facilitated and presented on relevant CIP topics at the [focus group for entities with low impact assets](#), and the [Critical Infrastructure Protection Committee \(CIPC\)](#).

In early 2018, ReliabilityFirst issued a joint report with SERC and WECC entitled [2018 CIP Themes and Lessons Learned: Mitigating Risks behind the Critical Infrastructure Protection Standards](#). The 2018 CIP Themes Report updates the original CIP Themes Report ReliabilityFirst created in 2015, when staff identified risk themes that have made it difficult for some entities to mitigate against risks associated with the CIP Standards (e.g., issues with corporate structure, culture, or resources). To create the new 2018 CIP Themes Report, ReliabilityFirst, SERC, and WECC worked together to analyze the data in the three Regions around potential CIP themes and possible resolutions.

CIP Themes Associated with Significant Compliance Program Deficiencies



Later in the year, ReliabilityFirst hosted two panels of experts from several of its Registered Entities who discussed strategies to address two of the four CIP themes: (1) organizational silos and (2) inadequate tools or ineffective use of tools. In 2019, ReliabilityFirst will continue this focused outreach on the remaining two themes (disassociation between compliance and security and lack of awareness of an entity's needs or deficiencies) along with other outreach efforts regarding trends in noncompliance and mitigation techniques.

ReliabilityFirst also takes its own corporate cyber security seriously. In 2017, ReliabilityFirst subscribed to the U.S. Department of Homeland Security Cyber Hygiene program, to help identify potential cyber vulnerabilities. In late 2018, ReliabilityFirst joined the U.S. Department of Energy Cybersecurity Risk Information Sharing Program (CRISP) along with NERC and the other Regional Entities. CRISP provides additional information sharing and analysis related to security issues.

Human Performance

The area of human performance has wide-ranging impacts on all areas of reliability and security. On a day to day basis, ReliabilityFirst staff work closely with our entities to ensure that they identify and address the root cause or causes of each violation (which often involve human performance issues). In 2018, several newsletter articles focused on human performance topics, and in August, ReliabilityFirst conducted its first annual Human Performance Workshop, designed to focus on practical application of human performance techniques and concepts for front-line workers.

Protection System Failures (Misoperations)

ReliabilityFirst continued its ongoing communications on misoperations throughout the year. These efforts included microprocessor relay training for the ReliabilityFirst Protection Subcommittee, and the fourth annual Protection System Workshop for Technical Personnel. To better understand entity efforts to reduce transmission protection system misoperations, ReliabilityFirst conducted site visits to entities to review their misoperations performance and better understand their misoperations processes and procedures. ReliabilityFirst also launched a [misoperations knowledge center](#) containing lessons learned.

Supply Chain Management

Supply chain management poses a unique risk to the industry, and the new Supply Chain Risk Management Standards further underscore the need for effective outreach in this area. In 2018, ReliabilityFirst focused on supply chain topics during its spring workshop, and issued supply chain-related newsletter articles. These efforts complemented NERC's outreach efforts and supply chain small group advisory sessions.

Situational Awareness and IROLs

Given the dynamic nature of the BPS, operators need to have certain essential capabilities and up-to-date information that allow for informed decision-making to ensure reliability. ReliabilityFirst has observed an increase in EMS-related events, and in addition to monitoring and analyzing these events, escalated communications on this topic. Over the course of the year, ReliabilityFirst presented on EMS related events at the spring workshop and March and December Board Meetings, dedicated a newsletter issue to EMS topics, and created an [EMS knowledge center](#) on our website. ReliabilityFirst also worked with NERC to issue several Lessons Learned (described in further detail on in the Event Analysis section of this report).

ReliabilityFirst Member Companies

