

NERC Violation ID	Reliability Standard	Req.	Violation Risk Factor	Violation Severity Level	Violation Start Date	Violation End Date	Method of Discovery	Mitigation Completion Date	Date Regional Entity Verified Completion of Mitigation
RFC2017018162	FAC-008-3	R6	Medium	Lower	4/28/2015 (when the first incorrect substation conductor rating was entered into the Tool)	7/31/2017 (Mitigation Plan completion)	Self-Report	7/31/2017	5/11/2018
<b>Description of the Violation (For purposes of this document, each violation at issue is described as a “violation,” regardless of its procedural posture and whether it was a possible, or confirmed violation.)</b>			<p>On August 4, 2017, the entity submitted a Self-Report stating that, as a Transmission Owner, it was in violation of FAC-008-3 R6. The entity discovered inconsistencies with certain substation conductor ratings. Correcting these inconsistencies led to ratings changes for 30 substation conductor types. Overall, this resulted in a reduction of the overall Facility Rating for three transformers. This violation is not indicative of a systemic issue with Duquesne’s FAC-008 program. Only approximately three percent (3%) of Duquesne’s Bulk Electric System (BES) transmission Facilities were affected. Duquesne undertook an extensive extent of condition review as part of its mitigation for this violation and that extent of condition did not reveal any other Facility Ratings inconsistencies.</p> <p>More specifically, as background, during a proactive review of the entity’s System Ratings Database, the entity discovered possible inconsistencies with certain substation conductor ratings. Following this discovery, the entity conducted a deeper dive into the calculations used in the Substation Conductor Ratings Determination Tool (Tool). The Tool is used to calculate the ratings and create the ratings sheets for substation conductor's types. (The Tool, which is used to calculate the ratings and create the ratings sheets for substation conductor's types, was developed in November 2010 by the PJM Substation Bus Rating Task Force, which was a task force of the PJM Transmission and Substation Design Committee.)</p> <p>The entity adopted use of the Tool in 2012 in advance of the implementation date for FAC-008-3. The Tool uses user-based assumptions as well as equations from various Institute of Electrical and Electronic Engineers (IEEE) standards and other documented sources to calculate parameters for the equations and ultimately the ambient temperature ratings of the desired substation conductor types. The entity determined that the inconsistencies with certain substation conductor ratings it discovered arose from a data input error while using the Tool to calculate the ratings of new substation conductor types. The equations in the Tool were correct, but an input value to one of the equations was entered incorrectly, and the entity lacked an effective verification control to detect and correct that error quickly.</p> <p>Once the entity identified these inconsistencies, the entity began a review of all input assumptions and parameters used within the Tool to ensure that the parameters were in alignment with the accepted industry standards. During its review, the entity verified approximately 700 input parameters and 568 ratings for 71 substation conductors. The majority of these parameters were verified to be in accordance with accepted industry standards or methods. (For each of the entity’s eight temperature sets, the entity subsequently recalculated the normal, emergency, and load dump conductor ratings for all substation conductor types, which the entity utilizes.)</p> <p>Correcting these inconsistencies in input parameters led to ratings changes for 30 substation conductor types. The changes resulted in lower ratings for 24 BES conductor types, ratings increases for 3 conductor types, and a combination of increases and decreases of the various ratings sets for 3 conductor types. (Three of the 30 subject conductors were added to the Tool in 2015 following a comprehensive field review performed as part of the entity’s RFC2014013430 self-report and mitigation. When the conductors were added in 2015, the entity initially determined that the three conductors were the most limiting elements for three entity Facilities: Carson No. 1 - 345/138kV autotransformer and Cheswick Unit 1A &amp; 1B Generator Step Up transformers. During the current review of all input assumptions and parameters, the entity discovered that these three conductors were entered into the Tool incorrectly in 2015. After rerating these three conductors (which resulted in ratings reductions), the entity determined that the conductor for the Carson No. 1 – 345/138 kV autotransformer was the most limiting element, but the conductors for two Cheswick Step Up transformers were not the most limiting elements.)</p> <p>The entity operates 108 BES Transmission Facilities (which the entity defines as circuits, transformers, reactors, and capacitor banks). This violation resulted in a reduction of the overall Facility Rating for three transformers. This means that approximately 3% of the entity’s BES transmission Facilities were affected by this violation. For each transmission Facility, the entity maintains eight temperature sets where each temperature set contains a normal, emergency, and load dump rating. Therefore, each transmission Facility has a total of 24 normal, emergency, and load dump ratings. The total number of normal, emergency, and load dump rating reductions for the three aforementioned facilities was 23 out of a possible 72.</p> <p>This violation involves the management practices of validation and verification. The entity determined one cause to be a data input error while using the Tool to calculate the ratings of new substation conductor types. The equations in the Tool were correct but an input value to one of the equations was entered in error. The user entered an incorrect value for the material properties of the same conductor types leading to an incorrect calculation of the conductivity of the conductor types. This error was compounded by the fact that the entity did not have a validation and verification control in place to verify that all input values were correct. That input error is a root cause of this violation.</p>						
<b>Risk Assessment</b>			<p>This violation posed a moderate risk and did not pose a serious or substantial risk to the reliability of the bulk power system (BPS) based on the following factors. The risk posed by this violation is that incorrect and inconsistent substation conductor ratings could negatively affect the reliable operation of the BPS by allowing inconsistent Facility Ratings to exist for an entity’s solely and jointly owned facilities that could lead to equipment failure. The risk is increased because of the long multi-year duration of the violation but the risk is lessened (and not serious) because only one of the incorrect substation conductor ratings were the most limiting factor for these Facilities. (Historical data was gathered and verified against the most limiting rating of each Facility which had an overall Facility rating change. None of these Facilities experienced current flows at or above the updated overall rating of each Facility.) The changes that did result in a Facility Ratings change did not impact the load dump ratings at any ambient temperature set but did impact the normal and emergency ratings. Only 3% of the entity’s BES Transmission Facilities were affected by this violation. Additionally, none of the</p>						

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			equipment changes were associated with Facilities which have Interconnection Reliability Operating Limits (IROLs). Lastly, ReliabilityFirst notes that no harm to BES Facilities occurred due to these errors. No harm is known to have occurred.						
Mitigation			To mitigate this violation, the entity:  1) reviewed, validated, and implemented logic to the calculations within the Tool to reduce future data entry errors. A drop-down menu has been implemented in the Excel-based tool which will eliminate the need for the user to type in material parameters, such as conductivity, within the data entry page; 2) re-rated and peer reviewed all conductors with ratings calculated using the Tool and any changes were then updated in the Ratings Database; 3) updated the entity’s Transmission Planning Manual to include the changes of all new conductor rating additions within the Tool that will require a peer review; and 4) developed a procedure to explain in detail how to use the Tool and correctly apply the entity’s assumptions and the material properties.						
Other Factors			<p>ReliabilityFirst reviewed the entity’s internal compliance program (ICP) and considered it to be a mitigating factor in the penalty determination. ReliabilityFirst considered certain aspects of the entity’s compliance program and awarded mitigating credit. Although this violation contains a number of instances, the entity’s compliance program still deserved mitigating credit because of the aggressive and thorough mitigation that the entity undertook and completed for this violation which is indicative of its strong compliance culture. In the past several years, the entity has made many improvements to its processes, procedures, and training which support its FAC-008 program. These enhancements have resulted in increased awareness and collaboration between groups as well as a more sustainable Facility Ratings process. (Duquesne estimates that the total cost of performing the extensive reviews and field inspections was approximately \$296,000, which includes nearly \$200,000 in equipment rental costs with the remaining costs associated with labor.) ReliabilityFirst recognizes that this violation is a remnant of the entity’s less mature FAC-008 program and not an appropriate reflection of the entity’s current FAC-008 practices.</p> <p>The entity’s compliance program has significant support from its Board of Directors and Executive leadership. The entity’s dedicated internal compliance program (Corporate Compliance) operates under the overall direction and guidance of the Vice President, Rates and Regulatory Affairs, General Counsel and Corporate Secretary who is a member of the executive leadership team and reports directly to the entity’s President and Chief Executive Officer. Corporate Compliance provides an independent oversight and advisory function for the entity’s internal compliance program and is the core of the entity’s NERC and PJM compliance efforts. The Chief Compliance Officer is a key member of the entity’s management team, and has full access to all officers and the Board of Directors, and provides periodic updates directly to the Audit Committee of the Board. The entity’s senior management is active in compliance with NERC Reliability Standards, as evidenced by the entity Executive Compliance Committee’s monthly meetings to review compliance matters and discuss any necessary changes to the entity’s internal compliance program. Furthermore, the entity emphasizes compliance training for its employees that is customized based on job function and self-assessments to identify compliance issues.</p> <p>ReliabilityFirst considered the entity’s cooperation during the Settlement Agreement process and awarded mitigating credit. The entity has been extremely cooperative throughout the entire enforcement process. The entity met and communicated with ReliabilityFirst on a regular basis, including monthly calls, to discuss the violation, the mitigation, and the status of mitigation. Throughout the enforcement process, the entity voluntarily provided ReliabilityFirst with an abundance of information regarding the violation in a manner that was detailed and timely. The entity also timely responded to requests for information with accurate and relevant information. The entity’s cooperation is deserving of mitigating credit.</p> <p>ReliabilityFirst considered the entity’s relevant FAC-008/FAC-009 compliance history in determining the penalty and disposition track. ReliabilityFirst considered entity’s compliance history to be an aggravating factor in the penalty determination.</p>						

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RFC2017018903	FAC-008-3	R6	Medium	Lower	8/13/2014 (when the corrected Facility Rating in the revision of the Clairton-West Mifflin (Z-14) circuit map was not communicated to Transmission Planning)	11/14/2017 (when the entity finished adjusting all of the necessary Facility Ratings)	Compliance Audit	3/31/2018	5/30/2018
<b>Description of the Violation (For purposes of this document, each violation at issue is described as a “violation,” regardless of its procedural posture and whether it was a possible, or confirmed violation.)</b>			<p>On December 21, 2017, the entity, as a Transmission Owner, discovered a violation with FAC-008-3 R6 identified during a Compliance Audit conducted from December 4, 2017 through December 13, 2017. Duquesne discovered an incorrect rating for a 138 kV circuit where a section of overhead 795 Aluminum Conductor Steel Reinforced (ACSR) 45/7 stranded conductor was not shown in Duquesne’s circuit map, but was determined to be installed on that Facility upon a physical inspection. This was the result of the stranding of the conductor not being labeled. Duquesne also undertook a thorough extent of condition review as part of its mitigation for this violation and that extent of condition revealed only two other instances where the 795 ACSR overhead stranded conductor was mislabeled and the overall facility ratings were incorrect.</p> <p>More specifically, as background, during the Compliance Audit, the entity discovered that its Ratings Database was in error for the Clairton-West Mifflin (Z-14) 138kV circuit, where a section of overhead 795 ACSR 45/7 stranded conductor was not shown, but upon completion of a physical inspection, the entity determined to be installed on this Facility. (The entity utilizes two different stranding ratios for 795 ACSR - 45/7 and 26/7. These stranding ratios refer to the number of aluminum strands and number of steel strands which comprise the conductor. This is the only overhead transmission conductor where the entity uses multiple stranding ratios for the same conductor type. The 795 ACSR 26/7 conductor was utilized until the 1960s at which point the entity transitioned to the 795 ACSR 45/7 conductor. All recent construction has been with the 795 ACSR 45/7 conductor.) The error began in August of 2014.</p> <p>The entity had a procedure in place to notify Transmission Planning when updated transmission circuit maps were issued to make sure that Transmission Planning ensured that all of the updated maps were being used. The source documentation did not contain the appropriate amount of detailed stranding information to fully describe certain sections of overhead conductor. This led to incorrect equipment ratings within the Ratings Database. As such, Transmission Planning was not aware that a new circuit map had been issued. The new revision of the circuit map identified all the variations of 795 ACSR that are actually installed.</p> <p>After discovering this mistake, the entity updated its circuit map, and Transmission Planning conducted a new analysis which resulted in the entity reducing the overall Facility Rating for the Facility. The summer 95°F (35°C) continuous rating was reduced from 932 amperes (A) to 919A; a difference of 13A. The entity subsequently updated its Ratings Database and appropriate operational models on October 18, 2017.</p> <p>The entity operates 85 Bulk Electric System (BES) transmission circuits. This violation resulted in a reduction of the overall Facility Rating for three BES transmission circuits, which means that approximately 4% of the entity’s BES transmission circuits were affected by this violation. The entity operates 108 solely and jointly owned bulk power system (BPS) Facilities which the entity defines as transmission circuits, transformers, reactors, and capacitor banks. As such, this violation resulted in a reduction of the overall Facility Rating for approximately 3% of the entity’s solely and jointly owned BPS Facilities.</p> <p>This violation involves the management practice of asset and configuration management because the entity failed to include a section of overhead 795 ACSR stranded conductor in its ratings database. The entity did not have an effective control in place to ensure that all relevant conductors were included in its Ratings Database and then communicated to Transmission Planning. That lack of an effective control is a root cause of this violation.</p>						
<b>Risk Assessment</b>			<p>This violation posed a minimal risk and did not pose a serious or substantial risk to the reliability of the bulk power system (BPS) based on the following factors. The risk posed by this violation is that the incorrect rating for a 138 kV circuit could negatively affect the reliable operation of the BPS by allowing an inconsistent Facility Rating to exist for an entity’s solely and jointly owned facilities, which could lead to equipment failure. The risk is increased because of the long multi-year duration of the violation, but the risk is lessened (and still minimal) because the change in rating on the 138 kV circuit was minimal: just 13 amperes. The rating changed from 932 amperes to 919 amperes. The other two ratings changes were also minimal. (After a reduction of 3 amperes to correct the rating, (a 0.3% change), the Dravosburg-Wilmerding (Z-76) 138 kV circuit historically did not exceed 52% of its new normal current rating. After a reduction of 3 amperes to correct the rating, (a 0.3% change), the Dravosburg-Wilmerding (Z-77) 138 kV circuit historically did not exceed 49% of its new normal current rating.) Additionally, the entity confirmed that during the violation, all impacted 138 kV lines were rarely heavily loaded so the potential for failure was correspondingly low. (In order to evaluate risk to the entity transmission system, the entity performed a comprehensive review of historical data to summarize the loading of potentially affected circuits under the most conservative assumption of conductor rating. Based on over eight million hourly measurements from the entity’s PI historian from November 2010 to November 2018, for all of the applicable circuits, the seasonal peak load is below the limit of the Assumed Limiting Conductor and the seasonal average loading is below 50% of the normal rating, which indicates a low average utilization of these circuits.) No harm is known to have occurred.</p>						
<b>Mitigation</b>			<p>To mitigate this violation, the entity:</p>						

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			<div>1) conservatively chose to include the 795 ACSR 45/7 stranded conductor in the Ratings Database entry for Z-14, updated all of its operational models, and communicated the ratings reduction to PJM until the conductor could be field verified. (When the possible error was discovered, the entity took immediate action to perform an exhaustive search of its drawing repository to find supporting documentation [e.g., sag data sheets, construction drawings, etc.] that could verify the stranding of the installed 795 ACSR conductor. While the investigation was pending, the entity proactively updated the Facility Rating in the Database with the more conservative of the two possible rating sets for the 795 stranded conductors until the conductor type could be field verified. Although the difference in the rating sets was minimal, all operational models were updated and the ratings reduction was communicated to PJM.);</div> <div>2) verified that the 795 ACSR 45/7 conductor was installed through a physical inspection and hand counting the number of outside strands;</div> <div>3) reviewed each circuit map that has been updated since January 1, 2014, in order to confirm all circuit map revisions were appropriately incorporated into the Ratings Database since the review, and verified that the conductors shown on these circuit maps matched the equipment contained within the Ratings Database. This review did not result in any changes to the Ratings Database; and</div> <div>4) identified all instances of 795 ACSR overhead conductor used on its transmission system. The entity completed this through a review of the circuit maps for each of the entity’s 84 BPS circuits which contain an overhead or underground conductor. In order to prevent errors, each circuit map was independently reviewed by two separate engineers. Through this review, the entity identified 34 BPS Facilities which utilize either variation of the 795 ACSR conductor. (The entity has not used either version of the 795 ACSR conductor on any of its 345 kV circuits. The entity utilizes transmission voltages of 69 kV, 138 kV, and 345 kV.) For these 34 BPS Facilities, the entity engineers performed an exhaustive search of its drawing repository to locate drawings that document circuit changes and corroborated the conductor stranding shown in the Ratings Database. The review found 13 instances where sufficient drawing information could not be obtained to validate conductor type. Duquesne then scheduled Facility outages for each of the 13 Facilities in accordance with the PJM outage scheduling requirements and physically inspected the conductor in order to verify its type. As a precautionary measure, Duquesne proactively derated applicable Facilities to more conservative ratings in its operational models and communicated the ratings change to PJM until the inspections could be performed. (In order to reduce the risk to the BPS until these conductors have been field verified, Duquesne adjusted the ratings for these Facilities with the conservative approach to assume that the lower rated 795 ACSR 45/7 conductor is installed. The largest percentage reduction in ratings that would potentially be experienced by these Facilities is 2.3% (44A) for the summer 95°F (35°C) continuous rating. All available historical data was collected for the three circuits where the ratings could potentially decrease as well as for Z-14. The historical data for all four circuits reaches back to approximately 2010 and has shown that the reduced seasonal ratings for each Facility were not exceeded in that timeframe.) Of the 13 instances, seven Facilities did not result in a change to the Facility Rating or the Ratings Database, two Facilities did not result in a change to the Facility Rating but did require updates to the Ratings Database, three Facilities resulted in minor reductions to the Facility Rating as a result of an update to the Ratings Database, and one Facility resulted in minor increases to the Facility Rating as a result of an update to the Ratings Database;</div> <div>5) adjusted the ratings for all four Facilities; and</div> <div>6) reviewed and made improvements to its procedures related to the communication of changes to circuit map drawings. Specifically, the transmission circuit map notification procedure has been updated to formalize a distribution to communicate all circuit map revisions to internal stakeholders including the Transmission Planning group. Duquesne also provided all required notifications of these ratings changes to its Reliability Coordinator, Balancing Authority, and Transmission Operator.</div>						
<b>Other Factors</b>			<p>ReliabilityFirst reviewed the entity’s internal compliance program (ICP) and considered it to be a mitigating factor in the penalty determination. ReliabilityFirst considered certain aspects of the entity’s compliance program and awarded mitigating credit. Although this violation contains a number of instances, the entity’s compliance program still deserved mitigating credit because of the aggressive and thorough mitigation that the entity undertook and completed for this violation which is indicative of its strong compliance culture. In the past several years, the entity has made many improvements to its processes, procedures, and training which support its FAC-008 program. These enhancements have resulted in increased awareness and collaboration between groups as well as a more sustainable Facility Ratings process. (Duquesne estimates that the total cost of performing the extensive reviews and field inspections was approximately \$296,000, which includes nearly \$200,000 in equipment rental costs with the remaining costs associated with labor.) ReliabilityFirst recognizes that this violation is a remnant of the entity’s less mature FAC-008 program and not an appropriate reflection of the entity’s current FAC-008 practices.</p> <p>The entity’s compliance program has significant support from its Board of Directors and Executive leadership. The entity’s dedicated internal compliance program (Corporate Compliance) operates under the overall direction and guidance of the Vice President, Rates and Regulatory Affairs, General Counsel and Corporate Secretary who is a member of the executive leadership team and reports directly to the entity’s President and Chief Executive Officer. Corporate Compliance provides an independent oversight and advisory function for the entity’s internal compliance program and is the core of the entity’s NERC and PJM compliance efforts. The Chief Compliance Officer is a key member of the entity’s management team, and has full access to all officers and the Board of Directors, and provides periodic updates directly to the Audit Committee of the Board. The entity’s senior management is active in compliance with NERC Reliability Standards, as evidenced by the entity Executive Compliance Committee’s monthly meetings to review compliance matters and discuss any necessary changes to the entity’s internal compliance program. Furthermore, the entity emphasizes compliance training for its employees that is customized based on job function and self-assessments to identify compliance issues.</p>						

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