Transmission Expansion Advisory Committee
JCPL Supplemental Projects

April 11, 2019
Needs

Stakeholders must submit any comments within 10 days of this meeting in order to provide time necessary to consider these comments prior to the next phase of the M-3 process.
Need Number:  JCPL-2019-008 to 021  
Process Stage:  Need Meeting  
Date:  04/11/2019  

Project Driver(s):  
Equipment Material Condition, Performance and Risk  
Operational Flexibility and Efficiency  

Specific Assumption Reference(s)  
System Performance Projects Global Factors  
- System reliability and performance  
- Substation/line equipment limits  
Upgrade Relay Schemes  
- Relay schemes that have a history of misoperation  
- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)  
- Communication technology upgrades  
- Bus protection schemes  

Continued on next slide…
Problem Statement

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>008</td>
<td>Atlantic – Red Bank (S1033) 230 kV Line</td>
<td>678 / 780</td>
<td>709 / 869</td>
<td>Substation Conductor</td>
</tr>
<tr>
<td>010</td>
<td>Pohatcong – West Wharton 230 kV Line</td>
<td>678 / 813</td>
<td>709 / 869</td>
<td>Line Relaying, Circuit Breaker, Line Trap, Substation Conductor</td>
</tr>
<tr>
<td>011</td>
<td>Gillette – Traynor 230 kV Line</td>
<td>678 / 802</td>
<td>843 / 1011</td>
<td>Line Relaying, Circuit Breaker, Line Trap, Substation Conductor</td>
</tr>
<tr>
<td>012</td>
<td>Greystone – West Wharton 230 kV Line</td>
<td>678 / 813</td>
<td>709 / 869</td>
<td>Substation Conductor, Current Transformer</td>
</tr>
<tr>
<td>013</td>
<td>Raritan River – Werner 230 kV Line</td>
<td>652 / 739</td>
<td>709 / 869</td>
<td>Circuit Breaker, Substation Conductor, Line Relaying, Current Transformer</td>
</tr>
<tr>
<td>014</td>
<td>Greystone – Portland 230 kV Line</td>
<td>830 / 1000</td>
<td>910 / 1077</td>
<td>Substation Conductor, Current Transformer</td>
</tr>
<tr>
<td>015</td>
<td>Gillette – Traynor 230 kV Line</td>
<td>678 / 813</td>
<td>709 / 869</td>
<td>Substation Conductor</td>
</tr>
</tbody>
</table>

Continued on next slide…
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>017</td>
<td>Atlantic – Smithburg 230 kV Line</td>
<td>678 / 813</td>
<td>709 / 869</td>
<td>Substation Conductor</td>
</tr>
<tr>
<td>019</td>
<td>Chester – Glen Gardner 230 kV Line</td>
<td>650 / 817</td>
<td>709 / 869</td>
<td>Substation Conductor</td>
</tr>
<tr>
<td>020</td>
<td>Gilbert – Glen Gardner 230 kV Line</td>
<td>815 / 923</td>
<td>1136 / 1311</td>
<td>Wave Trap, Line Relaying, Current Transformer, Breaker and Terminal Switches, Line Metering</td>
</tr>
<tr>
<td>021</td>
<td>Chester – West Wharton 230 kV Line</td>
<td>650 / 817</td>
<td>709 / 869</td>
<td>Substation Conductor</td>
</tr>
</tbody>
</table>
Problem Statement

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.
Problem Statement

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.
Need Number: JCPL-2019-010

Problem Statement

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.
Need Number: JCPL-2019-011

Problem Statement

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.
Need Number: JCPL-2019-012

Problem Statement

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.
Need Number: JCPL-2019-013

Problem Statement

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.
Need Number: JCPL-2019-014

Problem Statement

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.
Problem Statement

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.
Problem Statement

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.
Need Number: JCPL-2019-019

Problem Statement

FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.

Proper operation of the protection scheme requires all the separate components perform adequately during a fault.

In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.

Transmission line ratings are limited by terminal equipment.
Need Number: JCPL-2019-020

Problem Statement

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.
Problem Statement

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.
Need Number: JCPL-2019-028
Process Stage: Need Meeting
Date: 04/11/2019

Project Driver(s):
Equipment Material Condition, Operational Flexibility and Efficiency

Specific Assumption Reference(s)
System Performance Projects Global Factors
- Past system reliability and performance
Permanent Reactive Device Installations
- Reactive device with multiple trips in recent years
- Reactive device to reduce high voltage
Substation Condition Rebuild/Replacement
- Reactive power support system

Problem Statement
The Atlantic SVC has an increasing trend of outages and failures increasing maintenance needs.

High voltage on the 230 kV system has been observed at Atlantic substation with either the SVC in-service or out-of-service. The 230 kV voltage at Atlantic substation with the SVC in-service has been measured as high as 1.06 per unit. With the SVC out-of-service the measured system voltage was as high as 1.07 per unit.
Questions?
Appendix
<table>
<thead>
<tr>
<th>Assumptions</th>
<th>Activity</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Posting of TO Assumptions Meeting information</td>
<td>20 days before Assumptions Meeting</td>
</tr>
<tr>
<td></td>
<td>Stakeholder comments</td>
<td>10 days after Assumptions Meeting</td>
</tr>
<tr>
<td>Needs</td>
<td><strong>Activity</strong></td>
<td><strong>Timing</strong></td>
</tr>
<tr>
<td></td>
<td>TOs and Stakeholders Post Needs Meeting slides</td>
<td>10 days before Needs Meeting</td>
</tr>
<tr>
<td></td>
<td>Stakeholder comments</td>
<td>10 days after Needs Meeting</td>
</tr>
<tr>
<td>Solutions</td>
<td><strong>Activity</strong></td>
<td><strong>Timing</strong></td>
</tr>
<tr>
<td></td>
<td>TOs and Stakeholders Post Solutions Meeting slides</td>
<td>10 days before Solutions Meeting</td>
</tr>
<tr>
<td></td>
<td>Stakeholder comments</td>
<td>10 days after Solutions Meeting</td>
</tr>
<tr>
<td>Submission of Supplemental Projects &amp; Local Plan</td>
<td><strong>Activity</strong></td>
<td><strong>Timing</strong></td>
</tr>
<tr>
<td></td>
<td>Do No Harm (DNH) analysis for selected solution</td>
<td>Prior to posting selected solution</td>
</tr>
<tr>
<td></td>
<td>Post selected solution(s)</td>
<td>Following completion of DNH analysis</td>
</tr>
<tr>
<td></td>
<td>Stakeholder comments</td>
<td>10 days prior to Local Plan Submission for integration into RTEP</td>
</tr>
<tr>
<td></td>
<td>Local Plan submitted to PJM for integration into RTEP</td>
<td>Following review and consideration of comments received after posting of selected solutions</td>
</tr>
</tbody>
</table>
Revision History

4/1/2019 – V1 – Original version posted to pjm.com