

# **EHV Transmission System Relay Loadability Review and Requests for Temporary and Technical Exceptions**



North American Electric Reliability Council

Prepared by the  
System Protection and Control Task Force  
of the  
NERC Planning Committee

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The NERC Planning Executive Committee approved this document for presentation to the NERC Board of Trustees on July 12, 2005.

This document was approved by the NERC Board of Trustees on August 2, 2005.

## **INTRODUCTION**

This report summarizes the System Protection and Control Task Force's (SPCTF) review of submittals made by transmission protection system owners (TPSOs) on their review of zone 3 relay loadability for lines 230 kV and above in accordance with criteria set forth in NERC Blackout Recommendation 8a as of December 31, 2004. That recommendation is shown below for reference.

Recommendation 8a: All transmission owners shall, no later than September 30, 2004, evaluate the zone 3 relay settings on all transmission lines operating at 230 kV and above for the purpose of verifying that each zone 3 relay is not set to trip on load under extreme emergency conditions.<sup>6</sup> In each case that a zone 3 relay is set so as to trip on load under extreme conditions, the transmission operator shall reset, upgrade, replace, or otherwise mitigate the overreach of those relays as soon as possible and on a priority basis, but no later than December 31, 2005. Upon completing analysis of its application of zone 3 relays, each transmission owner may no later than December 31, 2004 submit justification to NERC for applying zone 3 relays outside of these recommended parameters. The Planning Committee shall review such exceptions to ensure they do not increase the risk of widening a cascading failure of the power system.

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<sup>6</sup> The NERC investigation team recommends that the zone 3 relay, if used, should not operate at or below 150% of the emergency ampere rating of a line, assuming a .85 per unit voltage and a line phase angle of 30 degrees.

TPSOs also submitted requests for Temporary and Technical Exceptions to the relay loadability criteria in their December 2004 reportings to the NERC regions.

- **Temporary Exceptions** allow for a delayed implementation schedule for facilities that require modification due to the inability to complete the work within the prescribed time frame because of facility clearance or work force issues. Temporary Exceptions may also be granted for application of temporary mitigation plans until full implementation can be achieved.
- **Technical Exceptions** are justified on technical merit where facilities could not under any reasonable contingency be loaded to a level that would initiate a protective relay operation, under current system conditions. Technical Exceptions are subject to review in light of future system changes.

All exception requests were carefully reviewed by both the NERC regions and the SPCTF, and approved by the Planning Committee. This report presents the results of those reviews, along with recommendations for additional follow-on activities.

Preliminary review results and exception requests were presented to and approved by the NERC Planning Committee at its March 2005 meeting. The final summary results were also reviewed and discussed by the Planning Committee at its June 2005 meeting. At that meeting, the Planning Committee requested the SPCTF to complete the final report on the EHV transmission system relay loadability review in response to NERC Recommendation 8a for approval by the Planning Committee Executive Committee in early July 2005, and subsequent transmittal to the NERC Board of Trustees for approval at its August 2005 meeting.

## **Review Schedule**

The SPCTF conducted this review in accordance with the procedures approved by the NERC Planning Committee on July 20, 2004 in the SPCTF's document as excerpted below:

1. Each Region shall summarize the responses of its TPSOs and report to NERC on the each TPO's implementation of Recommendation 8a in the following manner:
  - a. By September 30, 2004 — Each TPO shall report to its Region on the review of its relaying systems in accordance with NERC Recommendation 8a, as modified in this document.
  - b. By October 31, 2004 — Each Region shall report to the NERC SPCTF on each TPO's evaluation of its relaying as of September 30, 2004, under Recommendation 8a, as modified in this document. That report shall include a list of the non-respondent and respondent TPSOs.
  - c. By December 31, 2004 — Each TPO shall submit to its Region one or more of the following:
    - i. Certification that its system meets all of the requirements of the loadability criteria.
    - ii. Identify non-conformance that will be mitigated by December 31, 2005.
    - iii. Identify non-conformance for which Technical or Temporary Exceptions are being applied.
  - d. By January 31, 2005 — Each Region shall summarize and forward to the NERC SPCTF the responses due from the TPSOs on December 31, 2004. Regions should report on any non-respondent TPSOs.
  - e. By December 31, 2005 — Each TPO shall submit to its Region one or more of the following:
    - i. Certifications that all non-conformances cited for mitigation by December 31, 2004, have been mitigated.
    - ii. Exception mitigation dates for any relay systems that do not conform to Recommendation 8a and/or justify why a late Temporary or Technical Exception should be granted.
  - f. By January 31, 2006 — Each Region shall summarize and forward to the NERC SPCTF the responses due from the TPSOs on December 31, 2005. Regions should report on any non-respondent TPSOs that have not already certified their systems fully conforming to Recommendation 8a, as modified in this document.

## **Review Process**

The regional protection groups first reviewed the TPO's exception requests for concurrence and provided summary reports to the SPCTF.

The SPCTF reviewed each exception request for its technical merit and either accepted or rejected the request. Statistics on the overall relay loadability review and the exception requests are shown in Table I. The disposition of the exception requests is shown in the SPCTF Exception Review Summary table (Table II).

## **RELAY LOADABILITY REVIEW SUMMARY**

### **Methodology**

The SPCTF used the following guidelines in evaluating exception requests for the relay loadability criteria.

1. All requests for Temporary Exceptions were reviewed for reasonableness to ensure that the TPSO is diligently and aggressively pursuing mitigation with priority placed on critical circuits.
2. All requests for Temporary Exceptions for relay setting changes were rejected. The SPCTF expects all settings changes to be completed by December 31, 2005.
3. All requests for Temporary Exceptions were scrutinized as to whether they included a definitive plan for final mitigations. Those without a definitive mitigation plan were rejected.
4. All requests for Technical Exceptions were judged for technical merit using the *Relay Loadability Exceptions – Determination and Application of Practical Relaying Loadability Ratings* report, Version 1.1, approved by the Planning Committee in November 2004, and the associated spreadsheets. Such requests were also evaluated to confirm that all conditions specified for the requested exception type had been satisfied.
5. Request for special Technical Exceptions (for which there was no identified pre-established criteria) were carefully examined for technical merit.

### **Review Results**

All NERC regions reported that the TPSOs had certified completion of the zone 3 relay loadability review as of September 30, 2004, and had provided summary reports and exception requests to the NERC regions as of December 31, 2004, with two late reports from within WECC.

A number of generation owners who own transmission terminal equipment did not report to the NERC regions, and were not reported as non-respondent by the NERC regions. A procedure needs to be established among the NERC regions, generator owners, and SPCTF on how to comprehensively identify these generation owners. It is important that this gap in reporting be identified and eliminated, and that conformance with this vitally important relay evaluation be confirmed.

A total of 10,914 EHV terminals were examined by the TPSOs in the zone 3 relay loadability reviews. Of these, 2,182 (20%) were found to be non-conforming with the loadability criteria, with only 297 (2.7%) Technical Exceptions required. The non-conformance of the remaining 1,885 terminals is being mitigated through settings changes, disabling functions, or equipment changes and additions. A total of 130 Temporary Exceptions were granted for equipment changes and additions beyond 2005. Follow up on Temporary Exceptions and ongoing reviews of Technical Exceptions that require annual review (due to changes in system conditions) are addressed in the “Ongoing Work Requirements” section of this document.

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The following table shows the statistics for the review of the zone 3 relay loadability for EHV circuits 200 kV and above.

**Table I — Summary Review Statistics**

| <b>Item Reviewed</b>   | <b>March 2005 Interim Report</b> | <b>July 2005 Final Report</b> |
|--|----------------------------------|-------------------------------|
| Terminals reviewed   | 10,901                           | 10,914                        |
| Non-conforming terminals                                       | 2,144                            | 2,182                         |
| Non-conforming terminals as a percentage of terminals reviewed | 19.7%                            | 20.0%                         |
| Technical Exception requests                                   | 323                              | 297                           |
| Accepted by SPCTF  | 248                              | 297                           |
| Unresolved   | 75                               | 0                             |
| Terminals requiring mitigation                                 | 1,821                            | 1,885                         |
| Settings changes   | 1,496                            | 1,520                         |
| Function disabled  | 65                               | 65                            |
| Other types of mitigation                                      | 2                                | 13                            |
| Equipment replacement or addition                              | 258                              | 287                           |
| Temporary Exception (beyond 2005) requests                     | 176                              | 130                           |
| Accepted by SPCTF  | 101                              | 130                           |
| Unresolved   | 75                               | 0                             |

Note that in some cases, settings changes were necessary for some terminals to qualify for Technical Exceptions.

**Table II — SPCTF Exception Review Summary**

Note: Green highlights indicate changes in disposition of exception requests from the March 2005 interim report to the Planning Committee and the final July 2005 report.

| <b>Region</b> | <b>TPSO</b> | <b>Temporary Exceptions</b>   | <b>Technical Exceptions</b>   | <b>Pending</b> |
|---------------|-------------|---|---|----------------|
| <b>ECAR</b>   | <b>FE</b>   | SPCTF accepted the 2 requested Temporary Exceptions on Mansfield – Chamberlin and Sammis – Highland 345 kV lines.   | SPCTF accepted the 6 type 10 and 4 type 12 Technical Exceptions requests by FE. |                |
|               | <b>AEP</b>  | SPCTF accepted the 7 AEP requests for Temporary Exceptions.   | SPCTF accepted the 2 type 4 Technical Exceptions requested by AEP.              |                |
|               | <b>IPL</b>  | <p><u>Initial Action</u> – SPCTF rejected the 4 request for Temporary Exceptions by IPL and request a clearer mitigation plan.</p> <p><u>May 16, 2005</u> – SPCTF accepted the IPL withdrawal of its requests for Temporary Exceptions.</p> |   |                |

Table II – SPCTF Exception Review Summary

| Region          | TPSO   | Temporary Exceptions   | Technical Exceptions   | Pending |
|-----------------|--------|--|--|---------|
| ECAR<br>(cont.) | NIPSCO |  | <p><u>Initial Action</u> – SPCTF rejected the NIPSCO request for a special Technical Exception. The SPCTF consensus in this case is that NIPSCO should either use the emergency rating of the transformer under Exception 1, or use another exception.</p> <p><u>May 16, 2005</u> – SPCTF accepted NIPSCO’s revised request for a type 12 Technical Exception on the Reynolds-Arnold 345 kV line and a new request for a type 8 Technical Exception for Hiple station.</p> |         |
|                 |        |  |  |         |
| ERCOT           | Brazos |  | SPCTF accepted the 11 type 1 Technical Exceptions submitted by Brazos.   |         |
|                 | LCRA   | SPCTF accepted the 2 Temporary Exceptions submitted by LCRA. |  |         |



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| <b>Region</b> | <b>TPSO</b>            | <b>Temporary Exceptions</b> | <b>Technical Exceptions</b>   | <b>Pending</b>   |
|---------------|------------------------|-----------------------------|---|--|
| <b>FRCC</b>   | <b>Progress Energy</b> |                             |   | <p><u>Initial Indications</u> – Progress Energy is expected to request some Temporary Exceptions following discussions with SPCTF on 35 panel replacements needed to mitigate non-conforming terminals.</p> <p><u>May 4, 2005</u> – Progress Energy subsequently notified FRCC and SPCTF that it will not be seeking Temporary Exceptions.</p> |
|               |                        |                             |   |  |
| <b>MAAC</b>   | <b>MAAC</b>            | None                        | None  |  |
|               |                        |                             |   |  |
| <b>MAIN</b>   | <b>Ameren</b>          |                             | SPCTF accepted the request for one Technical Exception 8 submitted by Ameren. |  |
|               | <b>ComEd</b>           |                             | SPCTF accepted the 5 Technical Exception 3s & 4s submitted by ComEd.          |  |

Table II – SPCTF Exception Review Summary

| Region                         | TPSO                            | Temporary Exceptions | Technical Exceptions   | Pending |
|--------------------------------|---------------------------------|----------------------|--|---------|
| <p><b>MAIN<br/>(cont.)</b></p> | <p><b>ComEd<br/>(cont.)</b></p> |                      | <p><u>Initial Action</u> – SPCTF rejected the 2 ComEd requests for Technical Exception 10s on the Dresden and Goodings Grove terminals on the line to Powerton, pending concurrence by the Reliability Coordinator (PJM).</p> <p><u>March 8, 2005</u> – SPCTF accepted the 2 ComEd requests for Technical Exception 10s on the Dresden and Goodings Grove terminals on the line to Powerton when concurrence of the PJM Reliability Coordinator was received on March 7, 2005.</p> |         |
|                                |                                 |                      | <p><u>Initial Action</u> – SPCTF rejected the 6 ComEd requests for planning-study-based exceptions on the Plano, LaSalle, and Dresden terminals, pending concurrence by the Reliability Coordinator (PJM).</p> <p><u>March 8, 2005</u> – SPCTF accepted the 6 ComEd requests for planning-study-based exceptions on the Plano, LaSalle, and Dresden terminals when concurrence of the PJM Reliability Coordinator was received on March 7, 2005.</p>                               |         |

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| Region | TPSO      | Temporary Exceptions | Technical Exceptions  | Pending |
|--------|-----------|----------------------|---|---------|
| MRO    | SaskPower |                      | SPCTF accepted 4 type 4 Technical Exceptions submitted by SaskPower.  |         |
|        |           |                      | SPCTF accepted 3 type 10 Technical Exceptions submitted by SaskPower.   |         |
|        |           |                      | <p><u>Initial Action</u> – SPCTF agreed with the MRO PRWG rejection of type 11 and 12 Technical Exceptions requested for the Swift Current – McNeill 230 kV line associated with DC terminals as inappropriate.</p> <p><u>May 28, 2005</u> – Upon further investigation, SaskPower determined that the Swift Current – McNeill 230 kV line conforms to the loadability criteria, as limited by the transfer capability of the back-to-back DC tie at McNeill.</p> |         |

Table II – SPCTF Exception Review Summary

| Region         | TPSO                 | Temporary Exceptions | Technical Exceptions   | Pending |
|----------------|----------------------|----------------------|--|---------|
| MRO<br>(cont.) | SaskPower<br>(cont.) |                      | <p>Initial Action – SPCTF agreed with the MRO PRWG rejection of 2 type 11 and 2 type 12 Technical Exceptions requested by SaskPower associated with the E. B. Campbell – Beatty and Beatty – Codette 230 kV lines.</p> <p><u>May 16, 2005</u> – SPCTF accepted 2 type 11 and 2 type 12 Technical Exceptions requested by SaskPower associated with the E. B. Campbell – Beatty and Beatty – Codette 230 kV lines, after resubmittal and concurrence by the MRO PRWG.</p> |         |
|                |                      |                      | <p>SPCTF accepted 1 type 7 Technical Exception requested by Manitoba for the Reston – Boundary Dam 230 kV line..</p>   |         |
|                | Manitoba<br>Hydro    |                      | <p><u>Initial Action</u> – SPCTF agreed with the MRO PRWG rejection of 8 Technical Exceptions requested by Manitoba associated with zone 3 used as backup for Rapids, Ashern, and Vermillion stations.</p> <p><u>May 16, 2005</u> – SPCTF accepted 12 type 11 &amp; 12 Technical Exception requests for Rapids, Ashern, and Vermillion stations.</p>   |         |

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| <b>Region</b>          | <b>TPSO</b>                                | <b>Temporary Exceptions</b>  | <b>Technical Exceptions</b>  | <b>Pending</b> |
|------------------------|--|--|--|----------------|
| <b>MRO<br/>(cont.)</b> | <b>Minnkota<br/>Power Coop</b>             |  | SPCTF accepted 2 type 4s<br>Technical Exceptions requested by<br>Minnkota Power for the Running<br>– Moranville and Prairie –<br>Ramsey 230 kV lines..   |                |
|                        | <b>Minnkota<br/>Power Coop<br/>(cont.)</b> |  | <u>Initial Action</u> – SPCTF agreed<br>with the MRO PRWG rejection of<br>2 type 4 Technical Exceptions<br>requested by Minnkota associated<br>with the Drayton – Letellier 230<br>kV and Moranville – Richer 230<br>kV lines.<br><br><u>June 28, 2005</u> – SPCTF accepted<br>the resubmitted a type 4 Technical<br>Exception request for the<br>Moranville – Richer 230 kV line. |                |
|                        |  |  |  |                |
| <b>NPCC</b>            | <b>NYSEG</b>                               |  | SPCTF accepted the Technical<br>Exception 1 request submitted by<br>NYSEG.   |                |
|                        | <b>TransÉnergie</b>                        | SPCTF accepted TransÉnergie’s 6<br>requests for Temporary<br>Exceptions. |  |                |
|                        |  |  |  |                |

Table II – SPCTF Exception Review Summary

| Region | TPSO          | Temporary Exceptions  | Technical Exceptions   | Pending |
|--------|---------------|---|--|---------|
| SERC   | Georgia Power | SPCTF accepted Georgia Power’s single request for a Temporary Exception.  | SPCTF accepted the 3 type 10s and 3 type 9s for Georgia Power and Southern Generation for the line in and out of a CT plant. |         |
|        | Alabama Power | SPCTF accepted Alabama Power’s requests for 4 Temporary Exceptions.   |  |         |
|        | Entergy       | <p><u>Initial Action</u> – SPCTF rejected Entergy’s 42 requests for Temporary Exceptions related to settings changes (17 scheduled for 2006 and 25 scheduled for 2007); SPCTF expects all setting changes to be completed within 2005.</p> <p><u>May 9, 2005</u> – Entergy affirmed that it will complete the 42 setting changes prior to the March 16, 2006 deadline, noted in the letter to SERC on March 24, 2005.</p> |  |         |
|        |               | SPCTF accepted Entergy’s 42 Temporary Exception requests related to equipment changes; that schedule is deemed reasonable for the number of terminals and the amount of work involved. SPCTF will suggest acceleration of the equipment replacement schedule.   |  |         |

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| <b>Region</b>           | <b>TPSO</b>                | <b>Temporary Exceptions</b>                                      | <b>Technical Exceptions</b>  | <b>Pending</b> |
|-------------------------|----------------------------|--|--|----------------|
| <b>SERC<br/>(cont.)</b> | <b>Progress<br/>Energy</b> |  | SPCTF accepted Progress Energy's Technical Exception 11 request.   |                |
|                         |                            |  |  |                |
| <b>SPP</b>              | <b>WEPL /<br/>Aquila</b>   |  | SPCTF accepted the WEPL/Aquila request for a type 4 Technical Exception.   |                |
|                         |                            |  |  |                |
| <b>WECC</b>             | <b>AltaLink</b>            | SPCTF accepted the 7 Temporary Exceptions requested by AltaLink. | SPCTF accepted all 42 Technical Exception 1s requested by AltaLink.  |                |
|                         |                            |  | <u>Initial Action</u> – SPCTF accepted AltaLink's request for a Technical Exception 8.<br><br><u>June 28, 2005</u> – AltaLink changed the type 8 request to a type 12, which was accepted by WECC and SPCTF. |                |
|                         |                            |  | SPCTF accepted AltaLink's 2 Technical Exception 11 request.  |                |

Table II – SPCTF Exception Review Summary

| Region          | TPSO                | Temporary Exceptions  | Technical Exceptions  | Pending  |
|-----------------|---------------------|---|---|--|
| WECC<br>(cont.) | AltaLink<br>(cont.) |   | <p><u>Initial Action</u> – The 8 Technical Exception 10s requested by AltaLink were not reviewed by SPCTF because they were rejected by WECC. WECC will resubmit those requests by the next SPCTF meeting, after WECC approves AltaLink’s requests.</p> <p><u>June 28, 2005</u> – AltaLink changed 6 of the type 10 requests to type 12s and were accepted by SPCTF. SPCTF accepted the 2 remaining type 10 Technical Exception requests.</p> |  |
|                 | Avista              | SPCTF accepted Avista’s single Temporary Exception request. |   |  |
|                 | ATCO                |   | SPCTF accepted ATCO’s 4 Technical Exception 4 requests.   |  |
|                 | BCTC                |   | SPCTF accepted BCTC’s 5 Technical Exception requests (four 12s and one 9).  |  |
|                 | BPA                 |   | SPCTF accepted all 16 of BPA’s Temporary Exception requests.  | SPCTF accepted all of BPA’s type 2 and 5 Technical Exceptions. |
|                 |                     |   | SPCTF accepted all of BPA’s 4 type 9 and 17 type 10 Technical Exceptions that are for single lines.   |  |



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| Region          | TPSO           | Temporary Exceptions | Technical Exceptions  | Pending |
|-----------------|----------------|----------------------|---|---------|
| WECC<br>(cont.) | BPA<br>(CONT.) |                      | SPCTF accepted BPA's all 30 type 10 Technical Exceptions.   |         |
|                 |                |                      | <p><u>Initial Action</u> – SPCTF rejected BPA's 29 type 11s, pending concurrence of the Reliability Coordinator (PNSC) and WECC, and additional flow information necessary for verification provided.</p> <p><u>July 1, 2005</u> – Upon further analysis by BPA, changed 3 type 11 Technical Exception requests to type 6 and they were accepted by WECC and SPCTF. BPA changed 6 type 11 requests to mitigation in 2005, and deleted 3 other type 11 requests due to the circuits being retired. SPCTF approved the remaining 17 type 11s.</p> |         |

Table II – SPCTF Exception Review Summary

| Region                  | TPSO                   | Temporary Exceptions   | Technical Exceptions  | Pending |
|-------------------------|------------------------|--|---|---------|
| <b>WECC<br/>(cont.)</b> | <b>BPA<br/>(cont.)</b> |  | <p><u>Initial Action</u> – SPCTF rejected BPA’s 18 type 12s, pending concurrence of the Reliability Coordinator (PNSC) and WECC, and additional flow information necessary for verification provided.</p> <p><u>July 1, 2005</u> – Upon further analysis by BPA, changed 12 type 12 requests to type 6s and they were accepted by WECC and SPCTF. BPA changed 5 type 12 requests to mitigation in 2005. SPCTF approved the remaining type 12 request.</p> |         |
|                         |                        |  | SPCTF accepted BPA’s 2 type 6s.   |         |
|                         | <b>Deseret</b>         |  | SPCTF accepted Deseret’s 2 type 4 Technical Exceptions.   |         |
|                         | <b>ENMAX</b>           |  | SPCTF accepted ENMAX’s single type 1 Technical Exception.   |         |
|                         | <b>Idaho Power</b>     | SPCTF accepted Idaho’s single Temporary Exception request, requesting that the work be done as soon as possible. | SPCTF accepted the 2 type 2s, 1 type 4, and 1 type 5 requests submitted by Idaho.   |         |

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| <b>Region</b>           | <b>TPSO</b>       | <b>Temporary Exceptions</b>   | <b>Technical Exceptions</b>   | <b>Pending</b> |
|-------------------------|-------------------|---|---|----------------|
| <b>WECC<br/>(cont.)</b> | <b>NPC</b>        |   | <p><u>Initial Action</u> – SPCTF rejected NPC’s 2 type 10 Technical Exceptions out of Ardern 230 kV, which are for multiple lines, for additional documentation of loop flow.</p> <p><u>June 28, 2005</u> – SPCTF accepted the 2 type 10 Technical Exceptions after receiving documentation of bus configuration mitigating possible loop flow, and concurrence by the Reliability Coordinator.</p> |                |
|                         |                   |   | SPCTF accepted NPC’s 2 type 10 Technical Exceptions to Mirant and Pinnacle West out of Harry Allen.   |                |
|                         | <b>PacifiCorp</b> | <p><u>Initial Action</u> – SPCTF rejected PacifiCorp’s 29 Temporary Exceptions that are listed as 2008 completion.</p> <p><u>July 1, 2005</u> – SPCTF accepted PacifiCorp’s 29 Temporary Exception requests re-submitted with mitigation planned in 2007.</p> | SPCTF accepted PacifiCorp’s 3 type 4 Technical Exceptions.  |                |
|                         |                   | SPCTF accepted PacifiCorp’s 2 Temporary Exceptions listed for 2006. One of these subsequently slipped to 2007 mitigation.   |   |                |
|                         |                   |   |   |                |

Table II – SPCTF Exception Review Summary

| Region          | TPSO           | Temporary Exceptions                                | Technical Exceptions  | Pending   |  |
|-----------------|----------------|---|---|---|--|
| WECC<br>(cont.) | PG&E           |   | SPCTF accepted PG&E's 4 Technical Exceptions (7s & 8s).   |   |  |
|                 | Puget          |   | Initial Action – SPCTF rejected Puget's single Technical Exception, pending Reliability Coordinator (PNSC) concurrence.<br><br>July 1, 2005 – SPCTF accepted Puget's Technical Exception request once concurrence was received from the PNSC Reliability Coordinator. |   |  |
|                 | SCE            |   | SPCTF accepted SCE's 5 Technical Exceptions (4s and 5s).  |   |  |
|                 | SDGE           |   | SPCTF accepted SDGE's Technical Exception (type 1).   |   |  |
|                 | Sierra Pacific |   |   | SPCTF accepted Sierra Pacific's 18 type 4 Technical Exception requests. |  |
|                 |                |   |   | SPCTF accepted Sierra Pacific's 6 type 6 Technical Exceptions.          |  |
|                 | Tri State      | SPCTF accepted Tri State's 10 Temporary Exceptions. |   | SPCTF accepted Tri State's 3 type 1 Technical Exceptions.               |  |
|                 | WAPA RMR       |   |   | SPCTF accepted WAPA-RMR's type 7 Technical Exception.                   |  |

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| <b>Region</b>           | <b>TPSO</b>         | <b>Temporary Exceptions</b> | <b>Technical Exceptions</b>   | <b>Pending</b> |
|-------------------------|---------------------|-----------------------------|---|----------------|
| <b>WECC<br/>(cont.)</b> | <b>WAPA<br/>SNR</b> |                             | SPCTF accepted all 7 of WAPA-SNR's Technical Exceptions (1s, 2s, & 5s). |                |

## **ONGOING WORK REQUIREMENTS**

### **Activities Associated with EHV Zone 3 Relaying (Recommendation 8a)**

As noted by the review schedule cited earlier, the status of planned mitigation will be reviewed at the end of 2005 by the NERC regions and forwarded to the SPCTF by January 31, 2006. Additional requests for Temporary Exceptions may be identified at that time due to possible inability of some TPSOs to complete the mitigation according to their current plans. The results of the SPCTF's review of any incomplete conformance or mitigation plan issues will be presented for review and approval by the Planning Committee at the March 2006 PC meeting.

In addition, system changes, rating changes, and equipment replacements are almost certain to result in needed changes to zone 3 relay settings on the EHV transmission systems and concomitant possible new violations of the relay loadability criteria. Therefore, a mechanism needs to be established to trigger reporting reviews and corrections of any changes to zone 3 relay settings and any new violations, as well as reviews of requests and evaluations of Technical Exceptions for any such new violations.

Further, several of the established Technical Exceptions will require regular periodic review, probably on an annual basis. A procedure also needs to be established to address this regular periodic review of the Technical Exceptions.

In addition, as explained in the "Review Results" section, the EHV transmission terminal equipment that is owned by generator owners needs to be identified and zone 3 relay setting reviews conducted. These reviews and the implementation of any mitigation plans need to be completed by the December 2006 Planning Committee meeting.

### **Zone 3 Activities Associated with Lower Voltage (100 to 200 kV) Transmission Facilities (Task Force Recommendation 21A)**

The U.S.-Canada Power System Outage Task Force, in its April 2004 report on the August 14, 2003 blackout, recommends (Recommendation 21A) that NERC broaden its Recommendation 8a to include operationally significant 115 kV and 138 kV lines, e.g., lines that are part of monitored flowgates or interfaces. Further, transmission owners should also look for zone 2 relays set to operate like zone 3 relays.

In response, the NERC Planning Committee at its June 2005 meeting requested its SPCTF to perform this broadened review for lower voltage transmission (100 to 200 kV) lines using the same time frame as that under which the EHV transmission line relaying was reviewed. This review is to be initiated in August 2005 with the NERC regions defining the operationally significant lower voltage circuits by December 2005. The NERC regions will submit their reports to NERC (SPCTF) on the review results and mitigation plans, including requests for Temporary and Technical Exceptions, by March 31, 2007. The SPCTF will provide its summary report on the lower voltage protection review to the Planning Committee at its June 2007 meeting with the PC-approved report presented to the NERC board for approval at its subsequent board meeting. The TPSOs will be required to implement their mitigation plans by June 30, 2008.

In parallel with this review activity, the lower voltage (100 to 200 kV) transmission terminal equipment that is owned by generation owners needs to be identified and reviewed with mitigation plans implemented by the June 2007 Planning Committee meeting.

## **Follow-on Relaying Activities to Recommendations 8a and 21A**

In the SPCTF's review of zone 3 relay reliability requirements of Recommendation 8a, the SPCTF concluded that limiting the emergency loadability of Recommendation 8a to only the zone 3 relays fails to adequately address other relays that must operate securely in the presence of emergency loading conditions and needs to be expanded. Therefore, the SPCTF proposed a second stage relay review to include all other distance and phase-overcurrent protection relays, other than zone 3, applied to trip either directly or as a backup on the bulk (200 kV and above) electric system and the lower voltage (100 to 200 kV) system.

The lower voltage (100 to 200 kV) system facilities to be addressed in the second stage will be only those operationally significant facilities that are to be identified by the NERC regions for the application of Recommendation 21A.

The Planning Committee at its June 2005 meeting, with some minor modifications to the SPCTF's proposed plan and schedule, directed the SPCTF to conduct the above second stage review for all other distance and phase-overcurrent relays on the 200 kV and above transmission system as addressed in this July 2005 EHV relay loadability report. As these relays are sometimes used as backup protection for series or network transformers, this review will include transformers with secondary windings of 200 kV and above. The transformer loadability requirements for this review will be finalized by SPCTF and approved by the Planning Committee before implementation.

The schedule for this second stage review will follow the same the time frame as that used to conduct the Recommendation 8a review. It calls for the results for the 200 kV and above portion of the system to be presented to the Planning Committee for review and approval at the December 2006 Planning Committee meeting. The Planning Committee-approved report will then be presented for approval to the NERC Board of Trustees at its subsequent meeting. In addition, the TPSOs will be required to implement their mitigation plans by December 31, 2007.

The schedule to complete the second stage protection system review on the operationally significant 100 to 200 kV portion of the electric system (including transformers with secondary windings of 100 to 200 kV) calls for the Planning Committee to receive the SPCTF's summary report for review and approval at its June 2007 meeting. The NERC Board of Trustees will receive the Planning Committee-approved second stage report for the 100 to 200 kV portion of the system at its meeting subsequent to the June 2007 Planning Committee meeting. In addition, the TPSOs will be required to implement their mitigation plans by June 30, 2008.

Please note that the TPSOs requested that the zone 3 and second stage protection system reviews for the operationally significant 100 to 200 kV facilities be conducted in parallel for improved efficiency. The Planning Committee was in agreement with this request.

## **RECOMMENDATIONS**

The SPCTF, based on its EHV transmission system relay loadability review for zone 3 relays as defined in NERC Blackout Recommendation 8a, recommends the following:

### **EHV (200 kV and Above) Zone 3 Relay Review Activities**

1. The Planning Committee is to complete its review of any Recommendation 8a follow-on transmission protection system owner (TPSO) conformance or mitigation plan issues by its March 2006 meeting.
2. The Planning Committee, in conjunction with the NERC regions, is to conduct technical reviews of the relay loadability criteria and the TPSO requests for Temporary and Technical Exceptions to the criteria on an ongoing basis.
3. The Planning Committee is to work with the NERC regions to identify those generator owners that own transmission terminal equipment so that the appropriate zone 3 EHV (200 kV and above) (Recommendation 8a) protection system reviews can be performed and completed on those terminals by the December 2006 Planning Committee meetings.

### **Lower Voltage (100 to 200 kV) Zone 3 Relay Review Activities**

4. The Planning Committee, in conjunction with the NERC regions, is to oversee the completion of the zone 3 protection system review of lower voltage (100 to 200 kV) operationally significant circuits (as determined by the NERC regions) as requested by the U.S.-Canada Power System Outage Task Force in its Recommendation 21A by the June 2007 Planning Committee meeting. The TPSOs are to complete the implementation of their associated mitigation plans by June 30, 2008.
5. Similar to Recommendation 3 above, the Planning Committee is to work with the NERC regions to also identify those generator owners that own lower voltage (100 to 200 kV) transmission terminal equipment (associated with the operationally significant lower voltage circuits to be identified by the NERC regions) so that the appropriate zone 3 lower voltage reviews (Recommendation 21A) can be performed and completed on these terminals by the June 2007 Planning Committee meeting.

### **Second Stage Relay Review Activities**

6. The Planning Committee, in conjunction with the NERC regions, is to oversee the completion of the second stage protection system review of other distance and phase-overcurrent relays on the EHV (200 kV and above) electric transmission system, including transformers with secondary windings of 200 kV and above, by the December 2006 Planning Committee meeting. The TPSOs are to complete the implementation of their associated mitigation plans by December 31, 2007.
7. The Planning Committee, in conjunction with the NERC regions, is to oversee the completion of the second stage protection system review of other distance and phase-overcurrent relays on the operationally significant (as determined by the NERC regions) 100 to 200 kV transmission system, including operationally significant transformers with secondary windings of 100 to 200 kV, by the June 2007 PC meeting. The TPSOs are to complete the implementation of their associated mitigation plans by June 30, 2008.



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**EHV Transmission System Relay Loadability Review  
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