

WECC-0141 FAC-501-WECC-3

Transmission Maintenance  
Posting 2, Final  
Request to Modify FAC-501-WECC-3, Transmission Maintenance

WECC-0141 Drafting Team

Executive Summary

Throughout 2018 and 2019, Arizona Public Service (APS) worked with WECC staff, the Reliability Assessment Committee, the Studies Subcommittee, and the affected entities to have Paths 22, 50, and 51 removed from the WECC Path Rating Catalog.[[1]](#footnote-1) After following an open and transparent process supported by technical studies, the three paths were removed from the catalog, effective January 1, 2020.

On December 19, 2019, APS filed Standard Authorization Request ([SAR](https://www.wecc.org/Reliability/WECC-0141%20FAC-501-WECC-3%20Transmission%20Maintenance%20-%20Attachment%20B%20-%20Standard%20Authorization%20Request%20-%20Final.pdf)) WECC-0141 FAC-501-WECC-3, Transmission Maintenance (FAC), requesting removal of APS Paths 22, 50, and 51 from FAC-501-WECC-2, Attachment B, Major WECC Transfer Paths in the Bulk Electric System (Attachment B).[[2]](#footnote-2) To implement that change, the APS request must be processed again using the WECC Reliability Standards Development Procedures (Procedures).

If approved, this project would:

1. Create a streamlined process whereby changes could be made to Attachment B, outside of the Procedures, subject to an information filing with NERC and FERC.
2. Establish the baseline of technical support required to add or remove an asset from Attachment B.
3. Remove Paths 22, 50, and 51 from Attachment B, acknowledging that APS has already met the spirit and intent of the proposed process (Attachment C, Revision Process) augmented by the full rigors of the Procedures.

*For clarity, Attachment C is not proposed as part of the FAC.*

Attachment C is a proposed streamlined process for revisions to the FAC, Attachment B, and creates the framework for establishing a baseline of technical knowledge supporting the future addition or removal of an asset from Attachment B. As such, it is intentionally not drafted with the same detail or voice afforded the requirements of a standard. For an example of how Attachment C interfaces with the rest of the standard, please see BAL-001-TRE—Primary Frequency Response in the ERCOT Region, Standards Attachment, Attachment 1, where a similar approach is already approved by FERC.

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# Structure and Overview—Posting 2

This posting is in two parts: 1) a redline version of FAC-501-WECC-2 containing proposed changes to the standard, and 2) this narrative explaining the developmental history of the standard and the open and transparent process used by APS in support of removing Paths 22, 50, and 51 from Attachment B.

In Posting 1, the majority of respondents concurred that the entire standard could be retired, largely because it is administrative in nature and provides a level of reliability that is only as stringent/lenient as the administrative plan it supports. A minority opinion raised concerns that, if the standard were retired, it would eliminate maintenance requirements contained in no other standards, even though the stringency of the maintenance performed (or lack thereof) is not specifically stated.

In Posting 2, the drafting team acknowledges the minority view and proposes to retain the standard with clarifying updates. The drafting team further proposes the addition of a more efficacious process whereby Attachment B can be modified (proposed Attachment C) while also establishing the parameters of the technical support required to make those changes.

# Development

## Historical Development

Before 1996, members of the Western Systems Coordinating Council (WSCC) [[3]](#footnote-3) voluntarily operated the Western Interconnection per the WSCC Reliability Criteria, Minimum Operating Reliability Criteria (MORC). [[4]](#footnote-4) Although the MORC contained provisions for coordinated transmission maintenance, the MORC did not specify maintenance for particular paths, nor did it specify the types of maintenance required.

In July and August of 1996, the Western Interconnection experienced two widespread outages resulting from inadequate vegetation management. In March 1997, noting that federal remedial legislation could take years to implement, the WSCC trustees created the WSCC Reliability Management System Policy Group[[5]](#footnote-5) establishing a contract-based operational agreement known as the Reliability Management System (RMS).[[6]](#footnote-6)

On April 14, 1999, FERC asserted jurisdiction over the RMS.

By February 2000, the WSCC hastily translated the content of the RMS into what would become Version Zero of today’s mandatory Reliability Standards.[[7]](#footnote-7) In that process, the list of paths contained in the 2000 RMS, Table 4 migrated from the 2000 RMS into the Version Zero Standards virtually unchanged and without technical support to explain why the paths were originally selected or subsequently retained. [[8]](#footnote-8) [[9]](#footnote-9)

Twenty years after the list was created, subject matter experts cannot identify why these paths were originally identified for inclusion nor why they need to be retained in the FAC. The only documented explanation for original inclusion comes from the definition section of the 2000 RMS wherein the 40 paths were defined as those paths “monitored by the Security Coordinator.”[[10]](#footnote-10) [[11]](#footnote-11) No other explanation was offered.

As a result, the maintenance required for the 40 paths is higher than is required in any other NERC Standard.[[12]](#footnote-12) Paradoxically, 20 years after its creation, a new generation of subject matter experts cannot explain the origins of the path’s inclusion, nor can they identify any specific list of attributes common to the 40 paths that might explain why they should be retained. Restated, the 40 paths listed on Attachment B are subject to a higher standard of maintenance—but no one knows why.

## Procedural Development

FAC-501-WECC-1 and 2 serve as the permanent replacement for PRC-STD-005-1 (PRC), all of which have the same title, Transmission Maintenance. All three versions require specified maintenance on specified paths. The static list of paths was created circa 1997, codified in the WECC Reliability Management System (2000), then moved into the PRC (2007).

In FAC-501-WECC-1 (2011), the list of paths to which the standard applied was removed and replaced with a hyperlink referring the reader to the WECC website where the list was maintained. In FERC Order 751 approving FAC-501-WECC-1, FERC raised concerns that using the hyperlink “could change [the applicability] without review and approval by the ERO and the Commission.”[[13]](#footnote-13) Although FERC offered multiple options to address its concerns, one option was to provide the Commission with the criteria whereby the list was modified.[[14]](#footnote-14)

In FAC-501-WECC-2 (2018), WECC removed the hyperlink and reverted to the static list that had remained unchanged for nearly 20 years.

In FAC-501-WECC-3 (2021) as proposed, the WECC-0141 drafting team adopted FERC’s suggestion from FERC Order 751 by including Attachment C, Revision Process. Attachment C creates a streamlined process whereby Attachment B may be modified and also establishes a known baseline for inclusion.

# FAC-501-WECC-2—Approved versus Proposed

## FAC-501-WECC-2—Approved

As approved, the FAC requires the applicable Transmission Owner: 1) have a Transmission Maintenance Inspection Plan (TMIP), 2) annually update that plan, and 3) adhere to that plan.

The FAC does not cover all paths in the Western Interconnection. Rather, the FAC only applies to the 40 paths listed in Attachment B. The list of 40 paths has not been substantively updated since its creation circa 1997. After an extensive records review, no evidence was discovered to explain *why* the 40 paths were selected nor does there appear to be any specific common operational attribute that would warrant the specified level of maintenance for those paths. As a result, the impacted Transmission Owner(s) are provided a level of maintenance mandated by Attachment B, but there is not supporting record substantiating *why* that level of maintenance is required.

The facility applicability is further limited by Attachment A that is purely administrative in its language. Specifically, Attachment A requires a description of 1) impacted facilities, 2) methods used, 3) periodicity, and 4) the maintenance program used for the transmission lines and also specified station maintenance.

Whereas Requirement R1 and R2 are administrative in nature, Requirement R3 requires the Transmission Owner to “adhere” to the TMIP defined by Attachments A and B as referenced in R1 and R2. Any reliability value added by the standard is only as good as the stringency/leniency of the TMIP it supports.

## FAC-501-WECC-3—Proposed

As proposed, FAC-501-WECC-3 creates a streamlined process whereby Attachment B can be modified. Further, whereas the development record for Attachment B does not record *why* the paths were chosen (circa 1997), and whereas a review of the list conducted in 2020-2021 could not ascertain any common operational features, proposed Attachment C establishes the baseline of technical support for adding or subtracting paths and other assets from Attachment B.

Before filing the WECC-0141 SAR, APS took a number of steps to have Paths 22, 50, and 51 removed from the WECC Path Rating Catalog.[[15]](#footnote-15) Though not identical to the steps proposed in Attachment C, those steps provided the industry with the same adequacy of due process and technical review proposed in Attachment C. As such, if approved this project would modify Attachment B by removing Paths 22, 50, and 51 and also provide a more efficient means to modify Attachment B without applying the full rigors of the WECC Reliability Standards Development Procedures.

### Why the Paths Should be Removed

Due to changes occurring on the Bulk Electric System over the last two decades and changes in the way the system is planned and operated today, APS initiated a process, effective on January 1, 2020, to remove Paths 22, 50, and 51 from the catalog.

Because there was no existing method for updating Attachment B of FAC-501-WECC-2, APS initiated a SAR requesting removal of Paths 22, 50, and 51.

A description of the paths requested to be removed from Attachment B of FAC-501-WECC-2, a description of the circumstances necessitating the requested change, and a summary of relevant studies are outlined below.

#### Path 22

Path 22 facilities included the Four Corners – Moenkopi 500kV line and the 2 Four Corners to Cholla 345kV lines which were built to support the import of generation from the Four Corners Plant into Arizona and Southern California. Additionally, Four Corners interconnects with the Shiprock and San Juan generation plants and the Rio Puerco, Pinto, and Ambrosia transmission lines, each of which is generally regarded as an import point to adjacent utilities. In 2010, Four Corners units 1, 2, and 3 (500 MW) were retired. In 2014 APS acquired SCE’s rights to Four Corners units 4 and 5 (1,540 MW) which are planned to retire in 2030/2031. In 2017 San Juan units 2 and 3 (836 MW) were retired and units 1 and 4 (847 MW) are planned to retire in 2023/2025.

#### Path 50

Path 50 facilities included the Cholla–Preacher Canyon and Cholla to Mazatzal 345kV lines, which were primarily used for importing Four Corners and Cholla generation into the Phoenix area.[[16]](#footnote-16) Additionally, Cholla 500kV lines tie into the Coronado Generator (via Sugarloaf) and the Cholla 345kV line ties back into the Four Corners Plant 345kV switchyard. In 2016, Cholla unit 2 was retired (MW) and in 2020 Cholla Unit 4 was retired (MW). SRP has announced that it plans to retire Coronado units 1 and 2 (MW) by 2032.

#### Path 51

Path 51 facilities included the Navajo–Moenkopi and Navajo–Dugas 500kV lines, which were primarily used to bring Navajo generation into the Phoenix area via their interconnections to the Westwing 500kV switchyard and to areas west of the Navajo Plant via the Navajo–Crystal 500kv line to the west. In 2019, Navajo units 1, 2, and 3 were retired (2,409 MW).

Because of these past and planned retirements, there was a need to re-study and potentially de-rate WECC Paths due to an inability to achieve flows. Path rating studies are difficult if not impossible to stress to existing levels without these generators. Further, Transmission Operators no longer operate to nomograms or path limitations except for certain conditions. Instead, they use real-time contingency analysis and other tools.

APS has performed power flow analysis to assess the operational and planning reliability impacts of removing these WECC paths from the catalog. System Operations performed MOD-029 and operations horizons reliability studies with scheduled generation output and transmission outages to ensure acceptable pre- and post-contingency system performance, including the avoidance of load shedding. Additionally, APS Transmission Planning coordinated with its neighbors for base case development and performed FAC-013 and TPL-001 studies. After completing these studies, APS determined that reliability of the BES would not be affected by removing the paths from the WECC Path Rating Catalog or Attachment B of FAC-501-WECC-2.

## Continuing Maintenance for Paths 22, 50, and 51

If Paths 22, 50, and 51 are removed from Attachment B, maintenance on associated facilities will still continue per APS’s Transmission Maintenance and Inspection Plan (Plan). That Plan includes additional inspection and maintenance programs for APS’s Transmission Line and Substations included in Attachment A of the FAC. These programs include visual inspections, predictive maintenance activities such as Thermography and Corona Scanning, and periodic time- or condition-based maintenance. In addition, our high-voltage transformer and shunt reactor fleet also have on-line gas monitors that monitor their condition in real time and send alerts if issues are detected.

## Open and Transparent Process for Modifying Attachment B

Addressing FERC’s due process concerns, APS vetted the removal of Paths 22, 50, and 51 from the WECC Path Rating Catalog in numerous forums and ultimately for removal from Attachment B via the WECC-0141 FAC-501-WECC-3 project developed using the Procedures.

As part of its communication and coordination effort, APS met with WECC staff on two occasions in 2018 for guidance on removing these WECC paths; however, it was determined that no formal process existed. For this reason (and due to a lack of other regionally defined criteria) APS worked with WECC to self-develop a process that included analyzing reliability risk (described above) and communication with joint owners of path facilities, adjacent utilities, and industry stakeholders.

APS had numerous meetings and communications with the entities that are co-owners of the paths. The Engineering and Operating Committees of the respective paths approved the decision to remove those paths. In addition, APS sent notification letters to all adjacent utilities, and held one-on-one discussions with key entities to address any concerns and to ensure there were no negative impacts to their systems due to the removal of these paths from the catalog (and by inference Attachment B).

On August 21, 2019, APS provided a public presentation to the Southwest Area Transmission (SWAT) Oversight group highlighting the removal of the paths from the WECC Path Rating Catalog. No concerns were raised by stakeholders.

On September 3, 2019, APS notified the WECC Studies Subcommittee (StS) of its intent to remove the paths from the catalog with an effective date of January 1, 2020.

On October 18, 2019, APS provided a presentation to the WECC Reliability Assessment Committee (RAC) summarizing the procedural background for removing paths from the catalog, comments received during the process, and the technical reasons why the removal of the paths was proposed.

APS also presented its proposal to remove the paths from the catalog to the WestConnect and WECC Production Cost Model Development Work Group committees. APS was able to satisfactorily answer all questions and written comments that it received from stakeholders.

To ensure due process and stakeholder inclusion, APS posted notification on the APS Open Access Same-time Information System (OATI) announcing the proposed removal of the paths from the catalog as well as a proposed effective date of January 1, 2020.

After gaining industry consensus that the paths are no longer high profile for reliability as they do not serve the same purpose as they did at the time that Attachment B was developed, APS filed the WECC-0141 SAR to have the paths removed from Attachment B, using the Procedures. It should be noted that currently there is no technical baseline for inclusion of assets on Attachment B nor is there any known criteria explaining why the list was created, circa 1997.

# Conclusion

Although APS’s actions were originally undertaken to remove Paths 22, 50, and 51 from the catalog, the spirit and intent of those actions equates to the process proposed in Attachment C, Revision Process. Having met the spirit and intent of the proposed Attachment C, Revision Process, if this project is approved, Paths 22, 50, and 51 will be removed from Attachment B. Further, this project will create a new baseline whereby assets are added to or removed from Attachment B, and create a streamlined process for those actions.

APS has performed due diligence in examining the operational impact of removing Paths 22, 50, and 51 from Attachment B. Finding neither a record explaining why the paths were first included in the attachment nor further reason to identify the paths for enhanced maintenance per Attachment A, APS has provided adequate evidence that Paths 22, 50, and 51 should be removed from FAC-501-WECC-2, Attachment B, and that in so doing, their removal will have no negative impact on reliability. Further, if the paths are removed from Attachment B, APS will continue to maintain its Transmission Lines and Substation Facilities under APS’s existing inspection and maintenance programs. Finally, if approved, this project will establish the technical baseline for including assets on Attachment B coupled with a streamlined process whereby changes can be approved via an informational filing with NERC and FERC.

1. The WECC Path Rating Catalog is a collection of information on path ratings in the WECC system. A path rating can be related to a single transmission line or a group of parallel transmission lines. The transfer path may be composed of transmission lines between Balancing Authorities, internal to a Balancing Authority, or a combination of both. WECC Path Rating Catalog, Introduction, page 1. [↑](#footnote-ref-1)
2. Listed in Attachment B: 1) Path 22, Southwest Four Corners, 2) Path 50, Cholla–Pinnacle Peak, and 3) Path 51, Southern Navajo Transmission System. [↑](#footnote-ref-2)
3. WSCC is one of the three predecessor entities to WECC. The Western Electricity Coordinating Council (WECC) was formed on April 18, 2002, by the merger of the Western Systems Coordinating Council (WSCC), Southwest Regional Transmission Association (SWRTA), and Western Regional Transmission Association (WRTA). [↑](#footnote-ref-3)
4. MORC, Maintenance Coordination: 1. Sharing information. The security and reliability of the interconnected power system depends upon periodic inspection and adequate maintenance of generators, transmission lines and associated equipment, control equipment, communication equipment, relaying equipment, and other system facilities. Entities and coordinated groups of entities shall establish procedures and responsibility for disseminating information on scheduled outages and for coordinating scheduled outages of major facilities that affect the security and reliability of the interconnected power system. [↑](#footnote-ref-4)
5. Following the enactment of EPAct 2005 and the establishment of mandatory Reliability Standards applicable to all owners, operators, and users of the BPS, WECC sought to translate certain of its existing practices under its RMS reliability criteria into regional Reliability Standards to supplement the continent-wide Reliability Standards the Commission approved in Order No. 693. To that end, WECC established a task force to identify criteria in the RMS that should be binding on all BPS users, owners, and operators in the Western Interconnection, not just the Transmission Operators subject to the RMS. The task force chose eight of the identified criteria, which had the highest priority and could be implemented in the near-term for translation into regional Reliability Standards. United States of America Before the Federal Energy Regulatory Commission, North American Electric Reliability Corporation (NERC), Docket No. RM16-10-000, Supplemental Information for Petition of the NERC and WECC for Approval of retirement of Regional reliability Standard TOP-007-WECC-1a, page 5. [↑](#footnote-ref-5)
6. Electric Reliability Corporation, Helping Owners, Operators, and Users of the Bulk Power System Assure Reliability and Security for More Than 50 Years, By David Nevius, Senior Vice President 1979–2012, Page 40-41. [↑](#footnote-ref-6)
7. “[D]ue to timing concerns, WECC submitted the first set of Regional Reliability Standards to NERC with very little modification from the RMS Agreements’ format. NERC filed the WECC Regional Reliability Standards with FERC on March 26, 2007.” WECC Statement of Activities and Accomplishments in Carrying Out Its Delegated Responsibilities for the Period January 1, 2007 through October 31, 2008. Page 4. [↑](#footnote-ref-7)
8. Within the RMS, the FAC Attachment B is referred to as Table 1, Existing WSCC Transfer Paths (BPTP) (Revised Table 1—June 7, 2000), later updated as Table 4 in the 2000 RMS. Whereas the 2000 RMS Table 4 has 41 paths, the current FAC Attachment lists 40 paths. Path 53, "Billings–Yellowtail" (which consisted of the lines between Billings and Yellowtail) was replaced in 2006 or 2007 by Path 80, "Montana Southeast" (which consists of the lines between Billings–Yellowtail and between Huntly Tap–Hardin). Thus, there has been no substantive change to the Attachment B since June 7, 2000. [↑](#footnote-ref-8)
9. Circa February 2000, final changes to the Attachment B/Table list were made as part of the RMS Phase Two review. “Additions to Table 1 are Path 41–Sylmar LDWP to Sylmar SCE, Path 55–Brownlee East, Path 61 Lugo–Victorville 500 kV, and Path 76–Alturas. Reference to TOT 2 was removed from Table 1 since TOT 2A, TOT 2B, and TOT 2C are included and cover the entire path. CPTF reviewed Table 3 to ensure that all RAS were included that could potentially affect one of the major transmission paths or the RAS failure has the potential to result in cascading. Additions to Table 3 are Path 30–TOTIA, Path 31– TOT2A, Path 34 TOT2B, Path 39–TOTS, Path 16–Idaho–Sierra, Path 45–SDGE–CFE, Meridian 500/230 kV transformers, and SDGE RAS. A revised list of transmission paths and RAS are included in Tables 4 and 5 (see pages 35 and 36).” WSCC Analysis of RMS Phase 2 Evaluation Period, September 1998 through February 2000, page 6. [↑](#footnote-ref-9)
10. Later versions update the phrase to “Reliability Coordinator.” [↑](#footnote-ref-10)
11. During the course of developing the RMS criteria, the identified transfer paths and RAS were organized into the Tables by the WSCC task force. The Tables were posted for, and revised through, public comment. The Tables were also evaluated and revised through field tests during the RMS reliability criteria development process. The resulting tables were later named the “Major WECC Transfer Paths in the Bulk Electric System Table” and the “Major WECC Remedial Action Schemes (RAS) Table.” [↑](#footnote-ref-11)
12. “Specifically, according to NERC, FAC-501-WECC-1 requires, for specified transmission paths, a highly detailed maintenance and inspection plan for all transmission and substation equipment components, beyond the relay and communication system maintenance and testing required by the corresponding NERC Reliability Standard.” FERC Order 751, P.15. [↑](#footnote-ref-12)
13. FERC Order 751, P18. WECC Transfer Path Table, P18. In response, WECC committed to publicly post any revisions to the WECC Transfer Path Table on the WECC website with concurrent notification to the Commission, NERC, and industry. [↑](#footnote-ref-13)
14. “WECC could include its criterion for identifying and modifying major transmission paths listed in the WECC Transfer Path Table and make an informational filing each time it makes a modification to the table. Another option would be for WECC to file its criterion with the Commission and post revised transfer path tables and referenced catalogs on its website before they become effective with concurrent notification to NERC and the Commission. Alternatively, the Regional Entity could include the WECC Transfer Path Table as an attachment to the modified Reliability Standard. In this way, the Commission would be able to verify that the Regional Entity is applying the requirements of the regional Reliability Standard in a just and reasonable manner.” FERC Order 751, P19. [↑](#footnote-ref-14)
15. The WECC Path Rating Catalog is intended to be: 1) a reference document for planning purposes, 2) a primary source of currently available information on maximum, non-simultaneous path ratings to Members, and 3) a resource for discussion of simultaneous interactions between major transmission paths. WECC Path Rating Catalog 2020, Purpose, pages 1-2. [↑](#footnote-ref-15)
16. Cholla consisted of the following units:

    |  |  |  |  |
    | --- | --- | --- | --- |
    | Unit | Nameplate capacity ([MW](https://en.wikipedia.org/wiki/MWe)) | Commissioning | Notes |
    | 1 | 113.6 | 1962 | Retirement scheduled for 2025 |
    | 2 | 288.9 | 1978 | Retired April 2016 |
    | 3 | 312.3 | 1980 | Retirement scheduled for 2025 |
    | 4 | 414 | 1981 | Retirement scheduled for 2020 |

    [↑](#footnote-ref-16)