Seams & AFC Support: Available Transfer Capability Implementation Document (ATCID)

Effective: 4/1/17
Revised: 3/31/17
Version: 3.2

REVISION CHART

Modifications to this document will be documented in the following chart. There are no exceptions.

Version	Description of Modifications	Revision Date
1.0	Document creation	10/1/2007
1.1	Moved to standard format	10/15/2009
2.1	Updated document classification footer per PI	10/19/2009
2.2	Redraft of document per FERC Order 729	4/1/2011
2.3	Clerical corrections, addition of WAPA as sending entity	3/21/2013
2.4	Updated external mapping details	1/16/2014
2.5	Updated BA language with MOA	3/1/2014
2.6	Yearly review; updated business owner and wording change to Section: Description of Application of Generation and Transmission Outages	7/23/15
3.0	Added information for WAPA integration and MOD-029-2a	9/28/15
3.1	Add MHEB to the table of entities that SPP receives data from; update links to spp.org	11/6/15
3.2	Updated SPS references to RAS; updated MOD-029 & MOD-030 references to -2a and -3; added AECI to Description of Allocation Process	3/31/17

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PROCEDURE DETAILS

Purpose

NERC Reliability Standard MOD-001-1a (Available Transmission System Capability) requires each Transmission Service Provider (TSP) to prepare and keep current an Available Transfer Capability Implementation Document (ATCID) that describes the assumptions and methodology used in the determination of Available Flowgate Capability (AFC) and Available Transfer Capability (ATC). NERC Reliability Standard MOD-030-3 (Flowgate Methodology) requires additional information for TSPs that use the Flowgate Methodology.

NERC Reliability Standard MOD-029-2a (Rated System Path Methodology) requires that each Transmission Service Provider (TSP) that uses the Rated System Path Methodology to calculate Available Transfer Capabilities (ATCs) for ATC Paths.

PROCEDURE

Maintain an ATCID

> *(MOD-001-1a, R3) Each Transmission Service Provider shall prepare and keep current an Available Transfer Capability Implementation Document (ATCID) that includes, at a minimum, the following information:*

This document serves as SPP's Available Transfer Capability Implementation Document (ATCID) that contains the required information specified in MOD-001-1a and MOD-030-3. SPP's ATCID is available on SPP's OASIS at the ATC Information link as required by NAESB Business Practice Standard, WEQ 001-13.1.5.

Implementation of Methodology

> *(MOD-001-1a, R3.1) Information describing how the selected methodology (or methodologies) has been implemented, in such detail that, given the same information used by the Transmission Service Provider, the results of the ATC or AFC calculations can be validated.*
>
> *(MOD-030-3, R8) When calculating firm AFC for a Flowgate for a specified period, the Transmission Service Provider shall use the following algorithm (subject to allocation processes described in the ATCID):*
>
> $$AFC_F = TFC - ETC_{Fi} - CBM_i - TRM_i + Postbacks_{Fi} + counterflows_{Fi}$$
>
> *Where:*
>
> ***AFC_F*** *is the firm Available Flowgate Capability for the Flowgate for that period.*
>
> ***TFC*** *is the Total Flowgate Capability of the Flowgate.*
>
> ***ETC_{Fi}*** *is the sum of the impacts of existing firm Transmission commitments for the Flowgate during that period.*

CBM$_i$ *is the impact of the Capacity Benefit Margin on the Flowgate during that period.*

TRM$_i$ *is the impact of the Transmission Reliability Margin on the Flowgate during that period.*

Postbacks$_{Fi}$ *are changes to firm AFC due to a change in the use of Transmission Service for that period, as defined in Business Practices.*

counterflows$_{Fi}$ *are adjustments to firm AFC as determined by the Transmission Service Provider and specified in their ATCID.*

(MOD-030-3, R9) When calculating non-firm AFC for a Flowgate for a specified period, the Transmission Service Provider shall use the following algorithm (subject to allocation processes described in the ATCID):

$AFC_{NF} = TFC - ETCF_{Fi} - ETCF_{NFi} - CBM_{Si} - TRM_{Ui} + Postbacks_{NFi} + counterflows_{NF}$

Where:

AFC$_{NF}$ *is the non-firm Available Flowgate Capability for the Flowgate for that period.*

TFC *is the Total Flowgate Capability of the Flowgate.*

ETC$_{Fi}$ *is the sum of the impacts of existing firm Transmission commitments for the Flowgate during that period.*

ETC$_{NFi}$ *is the sum of the impacts of existing non-firm Transmission commitments for the Flowgate during that period.*

CBM$_{Si}$ *is the impact of any schedules during that period using Capacity Benefit Margin.*

TRM$_{Ui}$ *is the impact on the Flowgate of the Transmission Reliability Margin that has not been released (unreleased) for sale as non-firm capacity by the Transmission Service Provider during that period.*

Postbacks$_{NF}$ *are changes to non-firm AFC due to a change in the use of Transmission Service for that period, as defined in Business Practices.*

counterflows$_{NF}$ *are adjustments to non-firm AFC as determined by the Transmission Service Provider and specified in their ATCID.*

SPP uses the algorithm listed in the SPP Planning Criteria, Section 6.5.10, to calculate non-firm AFC.

Attachment C (Methodology to Assess Available Transfer Capability) of SPP's OATT gives details of the methodology used by SPP. SPP utilizes the Flowgate Methodology (MOD-030-3) for calculation of AFC and ATC. The algorithms applied are consistent with MOD-030-3, R8 and R9 for firm and non-firm AFC. Counterflows are specified in the ATCID section, ***Accounting and Rationale of Counterflow***.

The TFC or rating of a Flowgate is a resultant of:

- Thermal limit under normal operating conditions or linked contingency events
- Voltage limits under normal operating conditions or linked contingency events
- Stability limits under normal operating conditions or linked contingency events
- Contractual limits

The TFC or rating of another Transmission Service Provider's Flowgate is provided by that entity. Notifications of rating changes that affect the TFC of a flowgate by other Transmission Service Providers or Transmission Operators will be updated within seven days of the notification.

Seasonal ratings are used in applying the TFC value and are defined as:

- Winter: December, January, February, March
- Spring: April, May
- Summer: June, July, August, September
- Fall: October, November

SPP uses the Real-Time Response Factor Calculator (RTRFCALC) application for updating the transmission model used in AFC calculations and calculating a component of ETC and Distribution Factors (DF). These updates occur for the following periods:

- Operating Horizon includes all hours of the current day (Day 1) and all hours of the next day (Day 2) after 12:00 p.m. Updated at least once per day (MOD-030-3 R3.2)
- Planning Horizon extends from the end of the Operating Horizon through the thirty-first day (Day 31). Updated at least once per day (MOD-030-3, R3.2)
- Study Horizon extends from the end of the Planning Horizon through the twelfth month (month 12). Updated at least once per month (MOD-030-3, R3.3)

The base case used for each of these horizons is the Real-Time Network (RTNET) model of the State Estimator of the Energy Management System (EMS) that is also used in SPP's real-time operations for its Reliability and Market functions that includes expected additions and retirements. This model is updated for each of the aforementioned horizons using the following data:

- Network topology
- Hourly load forecast data of the Balancing Authority Areas
- Net interchange of the Balancing Authority Areas
- Unit dispatch data

The base flows for each Flowgate for all horizons are the product of an AC powerflow calculation using the above inputs.

Operating Horizon

Network Topology - Network topology is established by the State Estimator. The models for the first four hours following the latest State Estimator snapshot includes all outages, both planned and contingency, that existed in the State Estimator snapshot. Models for the remaining hours of the Operating Horizon are adjusted with hour-to-hour outage data of generators, transmission lines and transformers as submitted by Transmission Operators within the SPP Balancing Authority and approved by the SPP Reliability Coordinator. This outage data includes both planned outages and contingency outages that are expected to remain in effect for each hour modeled. The Transmission Service Provider shall also include outage data from neighboring Reliability Coordinators that is available through NERC System Data Exchange (SDX).

Load Forecast - The hourly load forecast data (for day 1 – day 7) is created by the Transmission Provider for the State Estimator model from the short-term and mid-term load forecast tools that use weather data from weather stations spread over the Transmission System and historical actual load data received from the SPP Balancing Authority. The Transmission Service Provider also includes load forecast data from neighboring Reliability Coordinators that is available through NERC SDX. The Transmission Service Provider derives load forecast data for day 8 – day 31 from the data of day 1 – day 7 by applying a factor that represents an historical increase or decrease of load on weekly basis during the year.

Net Interchange - The net interchange of the Market Operating Areas within the SPP Balancing Authority and neighboring Balancing Authority Areas that are part of the State Estimator Model is based on the existing schedules at the time the RTRFCALC application perform its hourly Operating Horizon run. The schedule data is retrieved from NERC Tagdump and from SPP's scheduling system.

Unit dispatch - RTRFCALC utilizes unit dispatch data for all units of the SPP Balancing Authority Area within the Transmission System and for the Balancing Authority Areas adjacent to the Transmission System. The unit dispatch data of commonly dispatched units of a Balancing Authority Area is based on real time behavior of the units in the last three weeks. The unit dispatch data of units not commonly dispatched with the other units of a Balancing Authority Area is based on the Firm confirmed reservations that have the units' zone name identified as the source on the reservations.

Planning Horizon

Network Topology - Network topology is established by the State Estimator and adjusted with hour-to-hour outage data of generators, transmission lines and transformers. Such outage data shall be as submitted by Transmission Operators and Generation Operators that are within the SPP Reliability Coordination Area and approved by the Reliability Coordinator. This outage data includes both planned outages and contingency outages that are expected to remain in effect for each time period modeled. The Transmission Provider shall also include outage data from neighboring Reliability Coordinators that is available through NERC SDX.

Load Forecast - The hourly load forecast data (for day 1 – day 7) is created by the Transmission Provider for the State Estimator from the short-term and mid-term load forecast tools that use weather

data from weather stations spread over the Transmission System and historical actual load data received from Transmission Operators within the SPP Reliability Coordination Area. The Transmission Provider also includes load forecast data from neighboring Reliability Coordinators that is available through NERC SDX. The Transmission Provider derives load forecast data for day 8 – day 31 from the data of day 1 – day 7 by applying a factor that represents an historical increase or decrease of load on weekly basis during the year

Net Interchange - Initially, the model assumes the net interchange of the Balancing Authority Areas is 0, meaning all Balancing Authority Areas are supplying their native load. If a Balancing Authority Area has a confirmed network reservation from a Network Resource outside the Balancing Authority Area boundary, that reservation is incorporated into the net interchange of both Balancing Authority Areas. That particular network reservation will be added to the exclude file to prevent double counting of impacts.

Unit dispatch - RTRFCALC utilizes unit dispatch data for all units of the SPP Balancing Authority Area within the Transmission System and for the Balancing Authority Areas adjacent to the Transmission System. The unit dispatch data of commonly dispatched units of a Balancing Authority Area is based on real time behavior of the units in the last three weeks. The unit dispatch data of units not commonly dispatched with the other units of a Balancing Authority Area is based on the Firm confirmed reservations that have the units' zone identified as the source on the reservations.

Study Horizon

Network Topology - Network topology is established by the State Estimator and adjusted for outages of generators, transmission lines and transformers. Such outage data shall be as submitted by Transmission Operators and Generation Operators that are within the SPP Reliability Coordination Area and approved by the Reliability Coordinator. This outage data includes both planned outages and contingency outages that are expected to remain in effect for some period within this horizon. The Transmission Provider also includes outage data from neighboring Reliability Coordinators that is available through NERC SDX. The Transmission Provider includes approved planned outages and contingency outages which are active on 15th of the month and last more than 15 days.

Load Forecast - The Transmission Provider utilizes monthly forecast data from the EIA411 annual report. For Balancing Authority Areas not included in the EIA411 annual report, the Transmission Provider uses forecast data that is available through NERC SDX.

Net Interchange - Initially, the model assumes the net interchange of the Balancing Authority Areas is 0, meaning all Balancing Authority Areas are supplying their native load. If a Balancing Authority Area has a confirmed network reservation from a NR outside the Balancing Authority Area boundary, that reservation is incorporated into the net interchange of both Balancing Authority Areas. That particular network reservation will be added to the exclude file to prevent double counting of impacts.

Unit dispatch - RTRFCALC utilizes unit dispatch data for all units of the SPP Balancing Authority Area within the Transmission System and for the Balancing Authority Areas adjacent to the Transmission System. The unit dispatch data of commonly dispatched units of a Balancing Authority Area is based on

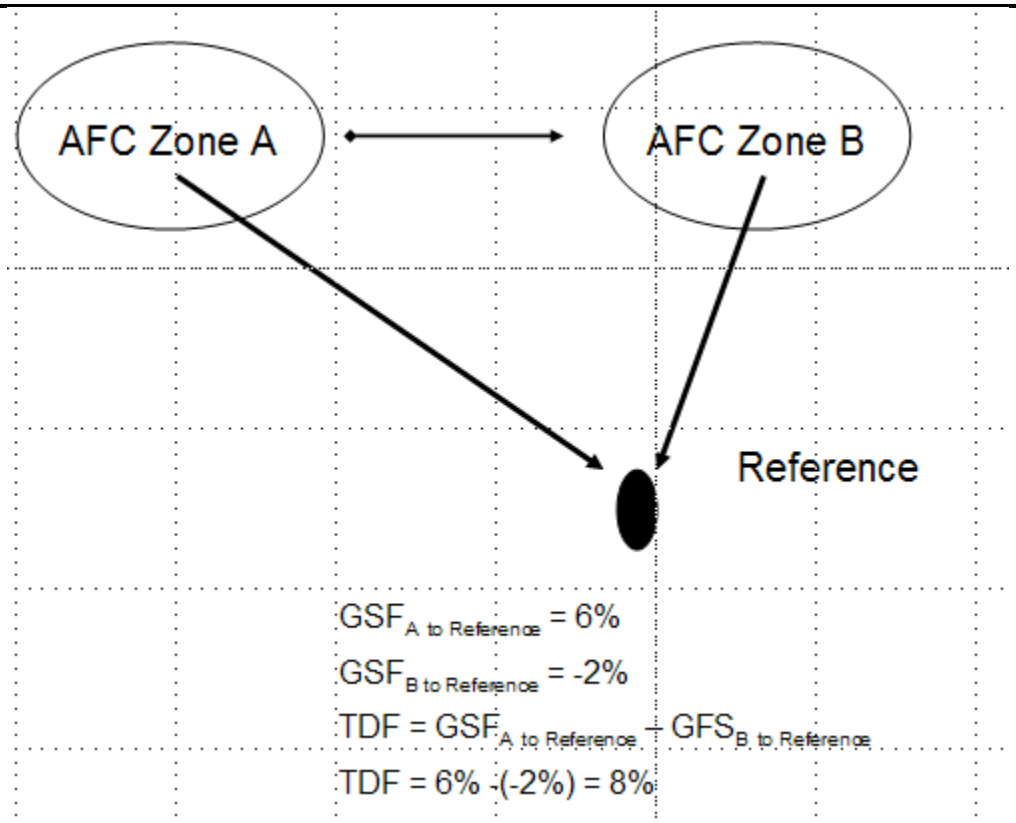
real time behavior of the units in the last three weeks. The unit dispatch data of units not commonly dispatched with the other units of a Balancing Authority Area is based on the Firm confirmed reservations that have the units' zone identified as the source on the reservations.

The base flows calculated for each Flowgate for each of these horizons is the component of ETC of generation serving load and interchange. The other component of ETC is Transmission Service Requests (TSR) impacts. SPP includes TSRs that have a Transfer Distribution Factor (TDF) of 3% or greater impact from SPP's OASIS and other entities that coordinate TSR information (see ATCID section, ***Identity of Entities from which SPP Receives Data***) with status Confirmed, Accepted, Counteroffer, or Study. TSRs coordinated between entities are filtered to not include double counting in ETC. SPP also excludes impacts of TSRs in ETC that each entity specifies for exclusion provided via an exclude file. For each horizon, 100% of forward impacts greater than 3% are included in ETC.

SPP can exclude TSRs from being included in ETC by adding these to an exclude file. These may be excluded to either prevent double counting or prevent unreasonable reductions in AFC. TSRs may be excluded if:

- the sum of TSRs impacting a corridor (i.e. DC tie) exceeds capacity of that corridor
- the sum of TSRs sinking a Balancing Authority exceed the total load of that area
- the sum of TSRs from an AFC Zone (see ATCID section, ***Accounting of Source/Sink in AFC Calculations***) exceeds the generation capability of that AFC Zone
- the TSR is already included in the base flow

RTRFCALC calculates the Generation Shift Factor (GSF) from all AFC Zones on all Flowgates for each horizon. The GSF impacts are calculated from the AFC Zone to a reference bus. Using superposition, the resultant of the difference in GSF between two AFC Zones is the TDF.



SPP does not maintain CBM, and therefore sets the CBM value to zero (0) when calculating AFC. The SPP CBM Process Document provides additional explanation and may be found on the SPP OASIS site in the ATC Info folder.

TRM applied to AFC is described in the TRMID as required by MOD-008-1 and may be found on the SPP OASIS site in the ATC Info folder. SPP reduces firm AFCs by the amount of TRM and thereby withholds TRM in the Planning and Study Horizon from firm sales. TRM is sold as non-firm service in the Operating, Planning, and Study Horizons.

Postbacks are in the form of a TSR with the status Recall. These will increase AFC only when the related TSR is included in the ETC component reducing AFC.

Counterflows are described in the ***Accounting and Rationale of Counterflow*** section below.

AFC for Flowgates on neighboring TSPs (see ATCID section***, Identity of Entities from which SPP Receives Data***) is used as an override value if that entity provides values and is based on that TSP's AFC methodology.

Converting Flowgate AFCs to ATCs for ATC Paths

SPP converts AFCs to ATCs for ATC Paths based on the following algorithm:

$$ATC = \min(P)$$

$$P = \{PATC_1, PATC_2, \ldots PATC_n\}$$

$$PATC_n = AFC_n / DF_{np}$$

Where:

ATC is the Available Transfer Capability.

P is the set of partial ATCs for all impacted Flowgates honored by the Transmission Provider; a Flowgate is considered impacted by a path if the Distribution Factor for that path is greater than the percentage threshold used for short-term transmission service used by the Transmission Provider on an OTDF Flowgate or PTDF Flowgate.

$PATC_n$ is the partial Available Transfer Capability for a path relative to a Flowgate *n*.

AFC_n is the Available Flowgate Capability of a Flowgate *n*.

DF_{np} is the Distribution Factor for Flowgate *n* relative to path *p*.

Accounting and Rationale of Counterflow

(MOD-001-1a, R3.2) A description of the manner in which the Transmission Service Provider will account for counterflows including:

(MOD-001-1a, R3.2.1) How confirmed Transmission reservations, expected Interchange and internal counterflow are addressed in firm and non-firm ATC or AFC calculations.

(MOD-001-1a, R3.2.2) A rationale for that accounting specified in R3.2.

Transmission Reservations Counterflow

Operating Horizon:

Firm: Only non-firm service is offered in this horizon.
Rationale: Not applicable for firm in the Operating Horizon.

Non-firm: No impacts of reservations in the opposite direction are used to account for counterflow.

Rationale: Non-firm AFC for the Operating Horizon is based on generation serving load plus expected interchange based only on reservation amounts that are scheduled. Reservations confirmed during this horizon are expected to be scheduled therefore accounting for the impacts in the interchange and no additional counterflow is required.

Planning Horizon:

Firm: No impacts of reservations in the opposite direction are used to account for counterflow.

Rationale: Reservations in the opposite direction that are scheduled would create counterflow, however, there is no assumption that these would be scheduled in consideration of selling firm service.

Non-firm: 50% of confirmed and accepted firm reservations in the opposite direction are used to account for counterflow.

Rationale: Reservations in the opposite direction that are scheduled would create counterflow, however, not all will be scheduled.

Study Horizon:

Firm: No impacts of reservations in the opposite direction are used to account for counterflow.

Rationale: Reservations in the opposite direction that are scheduled would create counterflow, however, there is no assumption that these would be scheduled in consideration of selling firm service.

Non-firm: No impacts of reservations in the opposite direction are used to account for counterflow.

Rationale: Reservations in the opposite direction that are scheduled would create counterflow, however, there is no assumption that these would be scheduled in consideration of selling non-firm service in this horizon. Nearer term transmission service (Planning and Operating Horizons) allows for more counterflow assumptions because of the greater accuracy in the operating data provided (outages, load forecast, etc.)

Expected Interchange counterflow

Operating Horizon:

Firm: Only non-firm service is offered in this horizon.

Rationale: Not applicable for firm in the Operating Horizon.

Non-firm: 100% counterflow from expected interchange based on schedules is inherently used since the scheduled interchange for each Balancing Authority is included in the model used for AFC.

Rationale: Non-firm AFC for the Operating Horizon is based on generation serving load plus expected interchange based only on reservation amounts that are scheduled. Since this service is scheduled, all can be counted as counterflow.

Planning Horizon and Study Horizon:

Firm and non-firm: Only confirmed network reservations from Network Resources between Balancing Authorities are included as counterflow. This reservation is excluded from impacts in the forward direction to prevent double counting.

Rationale: Expected interchange is zero for each Balancing Authority meaning each Balancing Authority is serving their native load. Network reservations between Balancing Authorities are expected to be used allowing counterflow to be used in calculations.

Internal counterflow

Operating Horizon:

Firm: Only non-firm service is offered in this horizon.

Rationale: Not applicable for firm in the Operating Horizon.

Non-firm: In addition to counterflow of schedules, 100% of counterflow due to generation serving native load is inherent in the model used for AFC.

Rationale: The model used for this horizon assumes a specific generation dispatch to serve forecasted load and scheduled interchange, therefore, all counterflows are used since this is a projection of actual flow on the system for the given period.

Planning Horizon and Study Horizon:

Firm and non-firm: Counterflow in the AFC model due to each Balancing Authority serving their native load is used.

Rationale: Expected interchange is zero for each Balancing Authority meaning each Balancing Authority is serving their native load. This counterflow created from generation serving native load is assumed to be present.

Identity of Entities from which SPP Receives Data

(MOD-001-1a, R3.3) The identity of the Transmission Operators and Transmission Service Providers from which the Transmission Service Provider receives data for use in calculating ATC or AFC.

In addition to Tariff Administration, SPP also provides several functions or services for its membership including but not limited to Reliability Coordination, Market Operations and Reserve Sharing. In addition to SPP receiving data from its Members (http://www.spp.org/about-us/members/) for these functions, SPP also receives and utilizes data from neighboring areas listed in Table 1 that serve as either Transmission Operator or Transmission Service Provider. The agreements with each entity or the Congestion Management Process contain the exchange of specific information and data. These agreements can be found at http://www.spp.org/spp-documents-filings/?id=18378 under *SPP Documents >> Governing >> Seams Agreements*. SPP also receives data from NERC System Data Exchange (SDX) for outages and load forecast of neighboring Reliability Coordinators and receives data via NERC the NERC Tag Dump for schedule information for neighboring Reliability Coordinators.

Entity
Associated Electric Cooperative (AECI)
Midwest ISO (MISO)
PJM

Tennessee Valley Authority (TVA)
Manitoba Hydro Electric Board (MHEB)

Table 1

Identity of Entities SPP Provides Data

(MOD-001-1a, R3.4) The identity of the Transmission Service Providers and Transmission Operators to which it provides data for use in calculating transfer or Flowgate capability.

SPP provides data for AFC or ATC calculations to each of the entities listed in Table 1. SPP also provides outage and load forecast information for Reliability Coordination via the NERC SDX process which can be used by entities for AFC or ATC calculations.

Description of Allocation Process

(MOD-001-1a, R3.5) A description of the allocation processes listed below that are applicable to the Transmission Service Provider:

- *Processes used to allocate transfer or Flowgate capability among multiple lines or sub-paths within a larger ATC Path or Flowgate.*
- *Processes used to allocate transfer or Flowgate capabilities among multiple owners or users of an ATC Path or Flowgate.*
- *Processes used to allocate transfer or Flowgate capabilities between Transmission Service Providers to address issues such as forward looking congestion management and seams coordination.*

SPP's process for allocating transfer of Flowgate capability among multiple owners or users of an ATC Path or Flowgate is described in Section 6 of the Congestion Management Process (CMP.) This section describes the calculation of Available Share of Total Flowgate Capability (ASTFC) which is used in analysis of transmission service in addition to AFC. Both values (AFC and ASTFC) are used in analyzing firm transmission service on Reciprocal Flowgates. The link to the CMP document is posted under *SPP Documents >> Governing >> Seams Agreements* at http://www.spp.org/spp-documents-filings/?id=18378. The CMP also details the process to allocate or transfer Flowgate capabilities between Transmission Service Providers to address issues such as forward looking congestion management and seams coordination. These TSPs include: AECI, MHEB, MISO, PJM, SPP, and TVA. SPP does not allocate transfer or Flowgate capability among multiple lines or sub-paths within a larger ATC Path or Flowgate.

Description of Application of Generation and Transmission Outages

(MOD-001-1a, R3.6) A description of how generation and transmission outages are considered in transfer or Flowgate capability calculations, including:

(MOD-001-1a, R3.6.1) The criteria used to determine when an outage that is in effect part of a day impacts a daily calculation.

(MOD-001-1a, R3.6.2) The criteria used to determine when an outage that is in effect part of a month impacts a monthly calculation.

(MOD-001-1a, R3.6.3) How outages from other Transmission Service Providers that cannot be mapped to the Transmission model used to calculate transfer or Flowgate capability are addressed.

Members of SPP's Reliability and Tariff footprints submit generation and transmission outages via an outage reporting portal utilizing a common name that is mapped to the Transmission model using name mapping files. These outages (100 kV and above) are applied to AFC calculations for the applicable time period and are shared with other entities via the NERC SDX process. Outages 230kV low side and above for 1st tier areas received via the NERC SDX are also mapped to the Transmission model using mapping files. Daily calculations use hour 1700 as reference hour for applying outages meaning any outage active for hour 1700 is considered out in AFC calculations. Outages lasting more than 15 days and active on the 15th day of the month are applied to monthly AFC calculations. Outages from 1st tier areas 230 kV low side and above that cannot be mapped to the Transmission model are not used in calculation of AFC. Log files and alert emails are received for unmapped outages that meet criteria and corrected if the aforementioned criteria is met and the elements exist in the Transmission model (State Estimator.) The State Estimator is compared with SPP's Model Development Working Group (MDWG) models to identify upcoming changes, additions, or retirements and expected dates are verified with Transmission Owners.

Notifications for New or Revised ATCID

(MOD-001-1a, R4) The Transmission Service Provider shall notify the following entities before implementing a new or revised ATCID:

(MOD-001-1a, R4.1) Each Planning Coordinator associated with the Transmission Service Provider's area.

(MOD-001-1a, R4.2) Each Reliability Coordinator associated with the Transmission Service Provider's area.

(MOD-001-1a, R4.3) Each Transmission Operator associated with the Transmission Service Provider's area.

(MOD-001-1a, R4.4) Each Planning Coordinator adjacent to the Transmission Service Provider's area.

(MOD-001-1a, R4.5) Each Reliability Coordinator adjacent to the Transmission Service Provider's area.

(MOD-001-1a, R4.6) Each Transmission Service Provider whose area is adjacent to the Transmission Service Provider's area.

SPP as Transmission Service Provider will notify the following entities before implementing a new or revised ATCID:

- Each Planning Coordinator associated with SPP's TSP area

- Each Reliability Coordinator associated with SPP's TSP area
- Each Transmission Operator associated with SPP's TSP area
- Each Planning Coordinator adjacent to SPP's TSP area
- Each Reliability Coordinator adjacent to SPP's TSP area
- Each Transmission Service Provider whose area is adjacent to SPP's TSP area

Making current ATCID available

(MOD-001-1a, R5) The Transmission Service Provider shall make available the current ATCID to all of the entities specified in R4.

SPP as Transmission Service Provider will make available the current ATCID to all of the entities specified in the ***Notifications for New or Revised ATCID*** section.

TSP to include Requirements of R1 thru R1.2.4

(MOD-030-3, R1) The Transmission Service Provider shall include in its "Available Transfer Capability Implementation Document" (ATCID):

Criteria Used to Identify Flowgates in AFC Calculations

(MOD-030-3, R1.1) The criteria used by the Transmission Operator to identify sets of Transmission Facilities as Flowgates that are to be considered in Available Flowgate Capability (AFC) calculations.

Section 6.4.2 of SPP Planning Criteria contains the criteria and periodicity of the review for identifying sets of Transmission Facilities as Flowgates that are to be considered in AFC calculations. SPP Criteria can be found under *SPP Documents >> Governing* at http://www.spp.org/documents/33003/spp%20effective%202016%20planning%20criteria.pdf . Flowgates may be added on a temporary or permanent basis when required to maintain system reliability by either the Transmission Owner or SPP Reliability Coordinator.

(MOD-030-3, R2.1) Include Flowgates used in the AFC process based, at a minimum, on the following criteria:

(MOD-030-3, R2.1.1) Results of a first Contingency transfer analysis for ATC Paths internal to a Transmission Operator's system up to the path capability such that at a minimum the first three limiting Elements and their worst associated Contingency combinations with an OTDF of at least 5% and within the Transmission Operator's system are included as Flowgates.

For Transmission Operators in SPP's Tariff footprint, there are no ATC paths internal to a Transmission Operator's system.

(MOD-030-3, R2.1.2) Results of a first Contingency transfer analysis from all adjacent Balancing Authority source and sink (as defined in the ATCID) combinations up to the path capability such that at a minimum the first three limiting Elements and their worst associated Contingency combinations with an Outage Transfer Distribution Factor (OTDF) of at least 5% and within the Transmission Operator's system are included as Flowgates unless the interface between such adjacent Balancing Authorities is accounted for using another ATC methodology.

(MOD-030-3, R2.1.2.1) Use first Contingency criteria consistent with those first Contingency criteria used in planning of operations for the applicable time periods, including use of Remedial Action Schemes.

All Market Operating Areas in the SPP Balancing Authority and 1st tier Balancing Authorities are defined as a POR and POD. Each POR/POD combination is used in determination of flowgates as required in MOD-030-3 R2.1.2. This POR/POD list representative of these Balancing Authorities can be found on the SPP OASIS site under the ATC Info link.

Remedial Action Schemes are used in the first Contingency criteria used in planning of operations when identifying Flowgates used in the AFC process.

(MOD-030-3, R2.3) At a minimum, establish a list of Flowgates by creating, modifying, or deleting Flowgates that have been requested as part of R2.1.4 within thirty calendar days from the request.

Flowgates requested by other Transmission Service Providers will be established within thirty days from the request. These flowgates are subject to the terms of the applicable Seams Agreement or Congestion Management Process with SPP and the corresponding entity. These links for these agreements is found in the ***Description of Allocation Process*** section.

Accounting of Source/Sink in AFC Calculations

(MOD-030-3, R1.2) The following information on how source and sink for transmission service is accounted for in AFC calculations including:

(MOD-030-3, R1.2.1) Define if the source used for AFC calculations is obtained from the source field or the Point of Receipt (POR) field of the transmission reservation.

(MOD-030-3, R1.2.2) Define if the sink used for AFC calculations is obtained from the sink field or the Point of Delivery (POD) field of the transmission reservation.

Each Market Operating Area in SPP's Balancing Authority and 1st tier Balancing Authorities are defined as an AFC Zone in the Transmission model and mapped to a POR and POD. A single unit or group of units not commonly dispatched with the other units of a Market Operating Area in SPP's Balancing Authority are also defined as an AFC Zone and are mapped to a source or sink. Some 2nd tier Balancing Authorities are also defined as an AFC Zone for more granularity in TDF calculations. These AFC Zones are used for calculating TDFs that are used in applying TSR impacts. The source or sink of a transmission reservation will be used if it is mapped to a specific AFC Zone. If no mapping exists, the POR or POD of the transmission reservation is used.

Source/Sink or POR/POD Mapping to Model

MOD-030-3, R1.2.3) The source/sink or POR/POD identification and mapping to the model.

The AFC Zone mappings to source/sink or POR/POD can be found on the SPP OASIS site under the ATC info link.

Grouping of Generators

(MOD-030-3, R1.2.4) If the Transmission Service Provider's AFC calculation process involves a grouping of generators, the ATCID must identify how these generators participate in the group.

Participation for generators in an AFC Zone is based on the maximum capacity of the generators unless the generator is known not to respond to Net Scheduled Interchange (NSI) changes and Area Control Error (ACE) deviations (i.e. nuclear, coal.) These generators are grouped into their own zone and defined with a small participation factor, compared to the host control zone, within that AFC Zone.

Include Generator and Transmission Outages, Additions, and Retirements

(MOD-030-3, R5) When calculating AFCs, the Transmission Service Provider shall:

(MOD-030-3, R5.2) Include in the transmission model expected generation and Transmission outages, additions, and retirements within the scope of the model as specified in the ATCID and in effect during the applicable period of the AFC calculation for the Transmission Service Provider's area, all adjacent Transmission Service Providers, and any Transmission Service Providers with which coordination agreements have been executed.

[**See* ATCID section, Description of Application of generation and Transmission Outages]***

[**See* ATCID section, ***Implementation of Methodology]

Unit Commitment and Dispatch Order for Designated Network Resources and Other Resources

(MOD-030-3, R6) When calculating the impact of ETC for firm commitments (ETC_{Fi}) for all time periods for a Flowgate, the Transmission Service Provider shall sum the following:

(MOD-030-3, R6.1) The impact of firm Network Integration Transmission Service, including the impacts of generation to load, in the model referenced in R5.2 for the Transmission Service Provider's area, based on:

(MOD-030-3, R6.1.2) Unit commitment and Dispatch Order, to include all designated network resources and other resources that are committed or have the legal obligation to run as specified in the Transmission Service Provider's ATCID.

(MOD-030-3, R6.2) The impact of any firm Network Integration Transmission Service, including the impacts of generation to load in the model referenced in R5.2 and has a distribution factor equal to or greater than the percentage[1] used to curtail in the Interconnection-wide congestion management procedure used by the Transmission Service Provider, for all adjacent Transmission Service Providers and any other Transmission Service Providers with which coordination agreements have been executed based on:

(MOD-030-3, R6.2.2) Unit commitment and Dispatch Order, to include all designated network resources and other resources that are committed or have the legal obligation to run as specified in the Transmission Service Provider's ATCID.

[1] A percentage less than that used in the Interconnection-wide congestion management procedure may be utilized.

SPP includes in its unit commitment and Dispatch Order all designated network resources and other resources that are committed or have the legal obligation to run. As described in the ***Implementation of Methodology*** section, unit dispatch data of commonly dispatched units of a Balancing Authority is based on real time behavior of the units in the last 3 weeks. The sum of the unit commitment data of a Balancing Authority matches the forecasted load plus expected interchange specific to the horizon. This dispatch is for the SPP Balancing Authority and 1st tier Balancing Authorities. The unit dispatch data of units not commonly dispatched with the other units of a Balancing Authority Area is based on the Firm confirmed reservations that have the units' zone identified as the source on the reservations.

Firm AFC Algorithm (subject to allocation processes)

(MOD-030-3, R8) When calculating firm AFC for a Flowgate for a specified period, the Transmission Service Provider shall use the following algorithm (subject to allocation processes described in the ATCID):

[*See* ATCID section, ***Implementation of Methodology*** for algorithm***]***

Non-firm AFC Algorithm (subject to allocation processes)

(MOD-030-3, R9) When calculating non-firm AFC for a Flowgate for a specified period, the Transmission Service Provider shall use the following algorithm (subject to allocation processes described in the ATCID):

[*See* ATCID section, ***Implementation of Methodology*** section for algorithm***]***

Allocation processes are not used for non-firm.

ATC PATHS

SPP will calculate ATCs for ATC Paths for the WAUW in the Western Electricity Coordinating Council (WECC) region as the Transmission Service Provider per MOD-029-2a. Variables and rationale used in

the algorithms below are consistent with SPP's rationale for the corresponding assumptions. Exceptions to those variables and rationale are outlined below.

Implementation of Methodology

(MOD-001-1a, R3.1) Information describing how the selected methodology (or methodologies) has been implemented, in such detail that, given the same information used by the Transmission Service Provider, the results of the ATC or AFC calculations can be validated.

Firm ETC Algorithm

(MOD-029-2a, R5) When calculating ETC for firm Existing Transmission Commitments (ETC_F) for a specified period for an ATC Path, the Transmission Service Provider shall use the algorithm below:

$$ETC_F = NL_F + NITS_F + GF_F + PTP_F + ROR_F + OS_F$$

Where:

NLF is the firm capacity set aside to serve peak Native Load forecast commitments for the time period being calculated, to include losses, and Native Load growth, not otherwise included in Transmission Reliability Margin or Capacity Benefit Margin.

NITSF is the firm capacity reserved for Network Integration Transmission Service serving Load, to include losses, and Load growth, not otherwise included in Transmission Reliability Margin or Capacity Benefit Margin.

GFF is the firm capacity set aside for grandfathered Transmission Service and contracts for energy and/or Transmission Service, where executed prior to the effective date of a Transmission Service Provider's Open Access Transmission Tariff or "safe harbor tariff."

PTPF is the firm capacity reserved for confirmed Point-to-Point Transmission Service.

RORF is the firm capacity reserved for Roll-over rights for contracts granting Transmission Customers the right of first refusal to take or continue to take Transmission Service when the Transmission Customer's Transmission Service contract expires or is eligible for renewal.

OS_F is the firm capacity reserved for any other service(s), contract(s), or agreement(s) not specified above using Firm Transmission Service as specified in the ATCID.

Non-Firm ETC Algorithm

(MOD-029-2a, R6) When calculating ETC for non-firm Existing Transmission Commitments (ETC_{NF}) for all time horizons for an ATC Path the Transmission Service Provider shall use the following algorithm:

$$ETC_{NF} = NITS_{NF} + GF_{NF} + PTP_{NF} + OS_{NF}$$

Where:

NITS$_{NF}$ is the non-firm capacity set aside for Network Integration Transmission Service serving Load (i.e., secondary service), to include losses, and load growth not otherwise included in Transmission Reliability Margin or Capacity Benefit Margin.

GF$_{NF}$ is the non-firm capacity set aside for grandfathered Transmission Service and contracts for energy and/or Transmission Service, where executed prior to the effective date of a Transmission Service Provider's Open Access Transmission Tariff or "safe harbor tariff."

PTP$_{NF}$ is non-firm capacity reserved for confirmed Point-to-Point Transmission Service.

OS$_{NF}$ is the non-firm capacity reserved for any other service(s), contract(s), or agreement(s) not specified above using non-firm transmission service as specified in the ATCID.

Firm ATC Algorithm

(MOD-029-2a, R7) When calculating firm ATC for an ATC Path for a specified period, the Transmission Service Provider shall use the following algorithm:

$$ATC_F = TTC - ETC_F - CBM - TRM + Postbacks_F + counterflows_F$$

Where:

ATC$_F$ is the firm Available Transfer Capability for the ATC Path for that period.

TTC is the Total Transfer Capability of the ATC Path for that period.
ETC$_F$ is the sum of existing firm commitments for the ATC Path during that period.

CBM is the Capacity Benefit Margin for the ATC Path during that period.

TRM is the Transmission Reliability Margin for the ATC Path during that period.

Postbacks$_F$ are changes to firm Available Transfer Capability due to a change in the use of Transmission Service for that period, as defined in Business Practices.

counterflows$_F$ are adjustments to firm Available Transfer Capability as determined by the Transmission Service Provider and specified in their ATCID.

Non-Firm ATC Algorithm

(MOD-029-2a, R8) When calculating non-firm ATC for an ATC Path for a specified period, the Transmission Service Provider shall use the following algorithm:

$$ATC_{NF} = TTC - ETC_F - ETC_{NF} - CBM_S - TRM_U + Postbacks_{NF} + counterflows_{NF}$$

Where:

ATCNF is the non-firm Available Transfer Capability for the ATC Path for that period.
TTC is the Total Transfer Capability of the ATC Path for that period.

ETCF is the sum of existing firm commitments for the ATC Path during that period.

ETCNF is the sum of existing non-firm commitments for the ATC Path during that period.

CBMS is the Capacity Benefit Margin for the ATC Path that has been scheduled during that period.

TRMU is the Transmission Reliability Margin for the ATC Path that has not been released for sale (unreleased) as non-firm capacity by the Transmission Service Provider during that period.

PostbacksNF are changes to non-firm Available Transfer Capability due to a change in the use of Transmission Service for that period, as defined in Business Practices.

counterflowsNF are adjustments to non-firm Available Transfer Capability as determined by the Transmission Service Provider and specified in its ATCID.

TTC

TTC assumptions and methodologies are performed by WAPA and provided to SPP as the Transmission Service Provider.

TRM

Transmission Reliability Margin (TRM) values, for all WAUW paths, will be established by WAPA using their assumptions and methodologies. WAPA's TRMID can be found at the following link: https://www.oasis.oati.com/woa/docs/WAPA/WAPAdocs/TRMID.pdf

Description of Allocation Process

(MOD-001-1a, R3.5) A description of the allocation processes listed below that are applicable to the Transmission Service Provider:

- *Processes used to allocate transfer or Flowgate capability among multiple lines or sub-paths within a larger ATC Path or Flowgate.*
- *Processes used to allocate transfer or Flowgate capabilities among multiple owners or users of an ATC Path or Flowgate.*
- *Processes used to allocate transfer or Flowgate capabilities between Transmission Service Providers to address issues such as forward looking congestion management and seams coordination.*

SPP's process for allocating transfer of Flowgate capability among multiple owners or users of an ATC Path is not applicable. ATC Paths for the WAUW are not part of the Congestion Management Process (CMP), therefore no allocation transfer among any of the sub-bullets of MOD-001-1, R3.5.

Description of Application of Generation and Transmission Outages

(MOD-001-1a, R3.6) A description of how generation and transmission outages are considered in transfer or Flowgate capability calculations, including:

(MOD-001-1a, R3.6.1) The criteria used to determine when an outage that is in effect part of a day impacts a daily calculation.

(MOD-001-1a, R3.6.2) The criteria used to determine when an outage that is in effect part of a month impacts a monthly calculation.

(MOD-001-1a, R3.6.3) How outages from other Transmission Service Providers that cannot be mapped to the Transmission model used to calculate transfer or Flowgate capability are addressed.

Generation and Transmission Outages are not applicable