Southwest Power Pool

MODEL DEVELOPMENT WORKING GROUP

October 21, 2010

9:00 a.m. – 12:00a.m.

Conference Call

• M I N U T E S •

Agenda Item 1 - Administrative

The meeting was called to order at 9:06 a.m. The following Model Development Working Group (MDWG) members were in attendance:

Scott Rainbolt, Chair – American Electric Power (AEP)
Joe Fultz, Vice Chair – Grand River Dam Authority (GRDA)
Reené Miranda – Southwestern Public Service (SPS)
Mo Awad – Westar Energy (WR)
Nate Morris – Empire District Electric (EDE)
Mike Clifton – Oklahoma Gas & Electric (OGE)
Nathan McNeil – Midwest Energy (MIDW)
Jason Shook – GDS Associates (GDS)
John Boshears – City Utilities of Springfield (CUS)

SPP Staff in attendance included Anthony Cook (Secretary), Kelsey Allen, John Snyder, and Greg Sorenson (RE).

The following guests were also in attendance:
Liam Stringham – Sunflower Electric Power Corporation (SEPC)
Syed Ahmad – Federal Energy Regulatory Commission (FERC)
Brian Tomlinson – Rayburn Country Electric Cooperative (Rayburn)

Meeting Agenda
The agenda was reviewed and approved by the group (**Attachment 1 - MDWG Agenda 20101021.doc**).

Meeting Minutes
Mo Awad motioned to approve the September 8, 2010 meeting minutes; Jason Shook seconded the motion. The motion passed unopposed (**Attachment 2 - MDWG Minutes 20100908.doc**).

Agenda Item 2 – Review of Past Action Items

Anthony Cook opened discussion by updating the group on action item #1 with information gathered by SPP staff since the September 8, conference call. Anthony

informed the group that all other regions rely on the MMWG Powerflow Manual's definition of the summer shoulder. Also, a derivation of the 70% to 80% range or 85% value of summer peak case could not be found. Anthony had discussed this with Don Taylor at Westar Energy, who supplied background information of the inception of the 85% value for the summer shoulder model. Don explained that a load duration curve of a summer peak was studied several years ago and that the 85% of summer peak load value was determined. Mo Awad requested SPP perform a restudy of a summer peak duration curve to determine the sufficiency of the 85% value. Anthony agreed with the suggestion.

Action Item: Perform a study of a current summer load duration curve. (SPP Staff)

Agenda Item 3 – Modeling Practices:

Unit Pmax
The Transmission Working Group (TWG) has expressed concern about the modeling of Pmax on units without considering operating or planning reserves. Their concern is that the system isn't being protected.

The TWG requested the MDWG address modeling issues and provide a recommendation on generation reserves:

- Need clarity of Pmax definition in the MDWG manual
- Accounting for operating/planning reserves

Jason Shook explained that the primary concern is the effect of scaling generation during a study. Reené Miranda stated that there are several values that could be used for Pmax. His examples were: Transmission Service Study, NITS agreement, NERC FAC 9 Standard. Mo Awad and Nate Morris stated that they believe this is more of a resource planning issue. Nathan McNeil commented that during a short fall, all area generation is maxed out before other generation is used. Kelsey Allen stated that changing the Pmax for reserves would not be the correct action. Jason stated Pmax should represent real world. Kelsey asked if all generators should be scaled down below Pmax to account for spinning reserve. Nathan stated that all units shouldn't be scaled; however, specific units could be designated for reserve. John Boshears stated that this is more of a Balance Authority (BA) specific issue because City Utilities of Springfield (SPRM) buys spinning reserve from their BA. Reené stated that the MDWG should provide the base case model and rely on SPP to determine reserve. Nathan discussed looking at NERC MOD 24 Standard and SPP Criteria 12 and that capability of the unit should be modeled. Mo stated that it is better to have zero spinning reserve than to have fictitious generation. The group requested SPP staff discuss reserve modeling with the Generation Working Group (GWG).

Action Item: Discuss reserve modeling with the GWG. (SPP Staff)

Normally Open Lines
During the auditing process, SPP was asked to produce examples of normally open lines within the SPP footprint. This information is not readily available and could not be

quickly retrieved. Anthony Cook asked the group if "NO" would be a good identifier for these lines. Anthony also stated that Entergy already observes this in their modeling practice. Reené Miranda asked SPP to request PTI add a status mode for branches, as well as generators. This would include selections such as normally open, maintenance, rebuild, etc. Kelsey Allen suggested adding a list to the data submittal workbook.

Action Item: Discuss status mode for branches and generators with PTI and MMWG. (SPP Staff)

Agenda Item 4 – MOD Matrix:

Proposed Changes
Kelsey Allen discussed the proposed changes to the MOD Matrix and stated that there may be additional changes to the ITP section. He asked for members to submit comments and suggested changes.
(Attachment 3 - MOD Project Type-Status Matrix_proposed_20101018.xls)

Agenda Item 5 – DBU Meeting:

The group agreed to have the DBU meeting on December 6-8. The meeting will be the afternoon of the December 6, full day December 7, and morning of December 8 with the afternoon available if needed.

Agenda Item 6 – Model Improvement Task Force (MITF) White Paper:

Implementation
Kelsey Allen discussed removing specific entities from the MITF white paper and the approval by the TWG. He discussed implementation of several of the topics (sections 4E and 5 specifically) and the need for more involvement from the modeling contacts.
(Attachment 4 – Model Improvement White Paper_TWG Approved.doc)

Agenda Item 7 – Other
Anthony Cook gave an update on the building of the 2010 MMWG models. The models are a few weeks behind schedule and will be discussed at the MMWG meeting next week.

Agenda Item 8 - Closing Administrative Duties:

Next Meeting:
DBU Meeting: Little Rock on December 6-8.

Upcoming Meetings Topics:
TBD

Summary of New Action Items
1. Perform a study of a current summer load duration curve. (SPP Staff)

2. Discuss reserve modeling with the GWG. (SPP Staff)
3. Discuss status mode for branches and generators with PTI and MMWG. (SPP Staff)

(**Attachment 5 - SPP MDWG Action Items 20101021.xlsx**)

Adjourn Meeting

With no further business to discuss, the MDWG meeting was adjourned at 10:32 a.m.

Respectfully submitted,
Anthony Cook
SPP Staff Secretary

Southwest Power Pool

Southwest Power Pool
MODEL DEVELOPMENT WORKING GROUP
October 21, 2010
Conference Call
9:00 A.M. – 12:00 A.M.

• D R A F T A G E N D A •

1. Administrative ..... Scott Rainbolt
    a. Call to order
    b. Proxies
    c. Approve agenda
    d. Approve minutes of previous meetings
        i. September 8, 2010

2. Review of Past Action Items ..... Anthony Cook

3. Modeling Practices ..... All
    a. Unit Pmax
        i. Accounting for operating/planning reserves
        ii. Clarify definition of Pmax in the MDWG manual
    b. Normally Open Lines
        i. Generic ID

4. MOD Matrix ..... Kelsey Allen
    a. Proposed Changes

5. DBU Meeting ..... ALL
    a. Dates

6. Model Improvement Task Force White Paper ..... Kelsey Allen
    a. Implementation

7. Other ..... All

8. Closing Administrative Duties ..... Scott Rainbolt
    a. Next meeting place and date
    b. Next meeting topics
    c. Review of Action Items
    d. Adjourn meeting

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Southwest Power Pool

MODEL DEVELOPMENT WORKING GROUP

September 8, 2010

9:00 a.m. – 11:30 a.m.

Conference Call

• M I N U T E S •

Agenda Item 1 - Administrative

The meeting was called to order at 9:05 a.m. The following Model Development Working Group (MDWG) members were in attendance:

Scott Rainbolt, Chair – American Electric Power (AEP)
Joe Fultz, Vice Chair – Grand River Dam Authority (GRDA)
Reené Miranda – Southwestern Public Service (SPS)
Dustin Betz – Nebraska Public Power District (NPPD)
Mo Awad – Westar Energy (WR)
Nate Morris – Empire District Electric (EDE)
Mike Clifton – Oklahoma Gas & Electric (OGE)
Scott Schichtl – Arkansas Electric Cooperative (AECC)
Nathan McNeil – Midwest Energy (MIDW)
Jason Shook – GDS Associates (GDS)

SPP Staff in attendance included Anthony Cook (Secretary), Doug Bowman, Kelsey Allen, Scott Jordan, John Snyder, Bob Lux, Mitch Jackson, and Patrick DeLassus.

The following guests were also in attendance:
Liam Stringham – Sunflower Electric Power Corporation (SEPC)
Moses Harris – Arkansas Electric Cooperative (AECC)
Loyd Kolb – Golden Spread Electric Cooperative (GSEC)
Syed Ahmad – Federal Energy Regulatory Commission (FERC)
Kristen Rodriguez – Wind Coalition

Meeting Agenda
The agenda was reviewed by the group. Reené Miranda motioned to approve the agenda as is; Scott Schichtl seconded the motion. The motion passed unopposed (**Attachment 1 - MDWG Agenda 20100908.doc**).

Meeting Minutes
Scott Schichtl motioned to approve the August 5-6, 2010 meeting minutes; Mo Awad seconded the motion. The motion passed unopposed (**Attachment 2 - MDWG Minutes 20100805.doc**).

Agenda Item 2 – Review of Past Action Items

Anthony Cook reviewed action items that are currently in progress or have been completed since the August 5, 2010 meeting. Anthony opened discussion about item #1 with data that was provided by SPP Operations on summer peak loading for 2007 to present in the form of average and absolute values. When dividing the average value by the absolute value, the ranges were 75% to 85%. The MDWG procedure manual states that the on-peak average model, or shoulder, is 85% of the total seasonal peak load level; however, the MMWG procedure manual defines summer shoulder as 70% to 80% of the summer peak load. The members wish to use a range of 70% to 85% and will report to SPP the percentage used in the model. The members asked SPP staff to investigate the origin and intended principle behind the 85% requirement and to provide a derivation of this value.

For Item #2, the members asked for the Compliance and Participation worksheet to include dynamics in the future.

Doug Bowman discussed his investigation into Item #45 and revealed that the MDWG procedure manual requires SPP to perform an AC Contingency Analysis on the posted final current year and the farthest out summer peak models; however, it is silent concerning which are final models, Build 1 or Build 2. The group decided that N-1 analysis will be required on Build 1 for informational purposes and Build 2 for mitigation requirements.

Scott Jordan discussed Item # 48 regarding dynamics models and our contract with Powertech Labs Inc. (PLI). He stated that there is a base price for the first model and an incremental amount for each additional model. These amounts were divulged to the group. If additional models are requested subsequent to budget approval, an out-of-budget approval will be required.

Action Item: Investigate the origin and intended principle behind the 85% requirement and to provide a derivation of this value. (SPP Staff)

Agenda Item 3 – 2011 Series Schedule:

Powerflow
Reené Miranda and Kelsey Allen made minor changes to the task descriptions. Reené asked which models, Build 1 or Build 2, are considered the final models. Mo Awad stated that it depends on the time of year since the Build 1 models are considered the final models for many of the processes that use the MDWG models as the starting cases and the Build 2 models are considered the last set for a specific series. SPP agreed with Mo's statement.

Agenda Item 4 – 2011 Series Model Set:

Dynamics
The group decided that the MDWG 2010 series dynamics model set should be increased by 1 year, as done with the 2011 series powerflow model set. Mo Awad motioned to increase the 2010 series MDWG dynamic model set by 1 year for the MDWG 2011 series dynamic model set. Scott Schichtl seconded the motion. The motion passed unopposed.
(Attachment 3 - MDWG 2011 Series Model Set_Approved.xls)

Short Circuit
The members were given action item # 49 to determine their company needs for Short Circuit models. Mo Awad stated that Westar requires present year summer while several others also expressed interest in a 5 year model. Reené Miranda asked if these models will be classical models, to which Doug Bowman affirmed that they will be. Discussion ensued concerning the possibilities of building short circuit models for each powerflow model. Reené asked if a short circuit model was really necessary for every seasonal model. Nate Morris and Scott Schichtl stated that summer peak should be sufficient since the highest current flows occur during this time. The group decided that a summer short circuit model should be built for every summer powerflow model.

Agenda Item 5 – MOD:

Kelsey Allen briefly discussed posting a preliminary matrix that redefines the type, status, and description of projects to attain increased granularity and align with the new Attachment O Tariff language. Kelsey also mentioned having a MOD training net conference for those that would like a refresher course.

Agenda Item 6 – Model Improvement Task Force (MITF):

Kelsey Allen presented the suggested, member submitted, changes to the white paper. Upon reviewing all of the changes and discussing them, Mike Clifton motioned to accept the Model Improvement Task Force White Paper with the suggested changes. Scott Schichtl seconded the motion. The motion passed unopposed.
(Attachment 4 – Model Improvement White Paper_MDWG Approved.doc)

Agenda Item 11 - Closing Administrative Duties:

Next Meetings:
- Conference call will be held after the TWG discusses the MITF White Paper.
- Model Update Meeting will be held the first week of December. Dates will be decided in the above conference call.

Upcoming Meetings/Topics:
Standard for stability load data

MOD matrix
MITF white paper
December Modeling meeting

Summary of New Action Items

1. Investigate the origin of summer shoulder value being 85% of summer peak load for MDWG models and provide a derivation of the 85%. (SPP Staff)

(**Attachment 5 - SPP MDWG Action Items 20100908.xls**)

Adjourn Meeting

Scott Schichtl motioned to adjourn the meeting; Reené Miranda seconded the motion. With no further business to discuss, the MDWG meeting was adjourned at 12:00 p.m.

Respectfully submitted,
Anthony Cook
SPP Staff Secretary

Type	Status	Description	Model Set				Notes
			MDWG	ITP	TS/GI	Special Study	
TS	w/ NTC (Approved)	Transmission upgrades identified through an Aggregate Trasmission Service Study with an executed Transmission Service Agreement and a Notification To Construct from SPP which has been accepted by the Transmission Owner.	X	X	X	X	
	Proposed (No NTC)	Proposed transmission upgrades identified through an Aggregate Trasmission Service Study that have not been issued a Notification To Construct by SPP.				X	
GI	w/ IA	Projects identified through the Large or Small Generator Interconnection Procedure (LGIP, SGIP) with an executed Interconnection Agreement and not on suspension.	X	X	X	X	
	w/ IA on Suspension	Projects identified through the Large or Small Generator Interconnection Procedure (LGIP, SGIP) with an executed Interconnection Agreement and on suspension.				X	
	No IA	Projects identified through the Large or Small Generator Interconnection Procedure without an executed Interconnection Agreement.				X	
ITP	w/ NTC	STEP Appendix B transmission upgrades determined through the ITP study process that have a Notification to Construct from SPP which has been accepted by the Transmission Owner.	X	X	X	X	
	w/ NTC (Under Review)	STEP Appendix B transmission upgrades determined through the ITP study process that have a Notification to Construct from SPP and have been requested by the Transmission Owner to be re-evaluated.				X	
	w/ ATP	STEP Appendix A transmission upgrades determined through the ITP study process that have an Authorization to Plan from SPP which has been accepted by the Transmission Owner.	X		X	X	
Reliability	~~STEP (w/NTC) or TO Planned~~	~~Appendix B Projects that have a Notification to Construct or Transmission Owner Planning Criteria with an issued Notification To Construct~~	~~X~~	~~X~~		~~X~~	The **default MOD Project Type** for projects that are to be built in the future is **Reliability**. For projects that are speculative, but needed to meet compliance issues, the default status is ***NERC Standard Compliance*** and would be modeled in the MDWG and Special Study model sets. For projects that are approved and budgeted, which need to go in all models, the default status is ***TO Planned*** .
	TO Planned	Planned projects that have been bugdeted by an individual Transmission Owning company with firm commitment to build.	X	X	X	X	
	~~STEP Proposed (No NTC)~~	~~Appendix A Project and projects that are being studied as part of the current STEP process, or are under consideration~~				X	
	~~NERC Standard Compliance~~	~~Projects needed to comply with NERC Reliability Standards or SPP Criteria that have not been identified in the STEP.~~	X			X	
	NERC Standard Compliance (Transmission)	Transmission upgrades needed to comply with NERC Reliability Standards, SPP Criteria, or individual Transmission Owner planning criteria that have not been identified in the STEP.	X			X	
	NERC Standard Compliance (Generation)	Generation projects needed to comply with NERC Reliability Standards, SPP Criteria, individual Transmission Owner planning criteria that have not been identified in the STEP.	X			X	
~~Economic~~	~~Approved (Sponsored)~~	~~Projects identified through Attachment O that have been shown to provide regional economic benefit that have a contract that financially commits a Project Sponsor.~~	~~X~~	~~X~~	~~X~~	~~X~~	

	~~Approved (Not Sponsored)~~	~~Projects identified through Attachment O identified that have been shown to provide regional economic benefit that have no contract to build.~~				~~X~~	
Requested	~~Stakeholder Driven~~	~~Transmission upgrades, requested by a Transmission Customer or other entity, which do not meet the definition of any other category of Network Upgrades.~~	~~X~~			~~X~~	
	Stakeholder Driven (Budgeted)	Transmission upgrades, requested by a Transmission Customer or other entity, which are budgeted and are moving forward.	X	X	X	X	
	Stakeholder Driven (Proposed)	Transmission upgrades, requested by a Transmission Customer or other entity, which do not meet the definition of any other category of Network Upgrades.	X			X	
	High Priority	Transmission upgrades recommended by SPP through a stakeholder requested or internally initiated high priority study or Balanced Portfolio evaluation which provide economic benefit to SPP stakeholders and have a Notification to Construct from SPP which has been accepted by the Transmission Owner.	X	X	X	X	
	Sponsored Upgrade	Transmission upgrades requested by any entity and evaluated by SPP, which have a an executed contract financially committing the Project Sponsor to the upgrade.	X	X	X	X	Replacement for the removed "Economic" Type projects
	Alternative	Transmission upgrades that are alternatives to any STEP or other project that will be kept in the MOD database for possible inclusion in a future model set.					
Network	Energized	Transmission upgrades that are in-service from a previous MOD Type & Status. Constructed facilities that are in-service.	X	X	X	X	The MOD ***Network type*** is reserved for projects that are in the ground, in-service as of the current day, i.e. the MOD base case. The ***Correction status*** is for corrections to existing MOD base case, or network, data. The ***Energized status*** is intended for projects that are newly completed; this would be any project that has previously been modeled in the planning horizon and are now built and in-service.
	Outage	Projects that change network topology status. Constructed facilities that are out-of-service or normally open.	X	X	X	X	
	~~Update~~	~~Projects that update network data.~~	~~X~~	~~X~~	~~X~~	~~X~~	
	Correction	Projects that update existing MOD network data and will be immediately committed to the MOD base case upon review.	X	X	X	X	

Definitions		
MOD	Model On Demand	
TS	Transmission Service	
GI	Generation Interconnection	
NTC	Notification to Construct	
MOD network	MOD "base case" data intended to be equivalent to a current season, as built, SPP transmission system.	
NERC	North American Electric Reliability Council	
SPP	Southwest Power Pool	
ITP	Integrated Transmission Planning	
ATP	Authorization to Plan	
STEP	SPP Transmission Expansion Plan as defined in Attachment O to the SPP Tariff	

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SPP Model Improvement White Paper

Prepared by: Model Improvement Task Force **October 18, 2010**

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History and Background

The Model Improvement Task Force (MITF) was formed by the Transmission Working Group (TWG) to address increasing concern regarding the modeling process and the models produced by SPP. The MITF began work in February of 2010, comprised of members from the TWG and the Model Development Working Group (MDWG).

Purpose and Objective

The MITF was instructed to identify areas for process improvement within modeling. This group aimed efforts at adjusting and expanding the current set of practices associated with the MDWG in order to allow that group to develop a common base data set that will expand stakeholder input and instill efficiency and accuracy into each of the model sets it supports.

This document addresses issues put forth by SPP staff and members of the MITF.

1. Modeling Data Requirements

The following topics are addressed to highlight, adjust and expand the current MDWG data requirements in order to increase granularity and consistency of the modeling data being used for the different SPP model sets.

A. Uniform Generation Modeling

Issue: No uniform requirements exist to model generation.

- ✓ Seasonal maximum and minimum capabilities and forecasted capabilities are often not accounted for.
- ✓ Some members model station service or auxiliary load and others do not.
- ✓ Municipal Generation listed in EIA reports is often netted with load.

Solution:

- ✓ Any distributive or otherwise generation registered with the SPP market shall be represented appropriately in the base model set such that generation is not netted with customer load.
- ✓ Net capability of units as listed in data reporting vehicles, such as EIA reports or SPP NITS applications, should be reflected in the base model set.
- ✓ Generator auxiliary load should be included in net capability of units. If an individual member company prefers to model gross generator capability, reports shall be provided detailing the bus number and ID for auxiliary load associated with each generator or plant.
- ✓ Ownership assignments ~~per Load Serving Entity (LSE)~~ shall be modeled with each machine.

Benefit: More effort spent to accurately model generator data will help to improve efficiency and accuracy of study processes and results.

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B. Uniform Load Modeling

Issue: The modeling world can vary from the real world in some respects. Often, methods used by members to model special loads (location or owner issues) skew the area interchange numbers. Some of the examples are:

- ✓ Pseudo-Tie Modeling
- ✓ Varying methods of assigning one's Load in another Area

Solution:

- ✓ Zero-impedance tie lines shall not be used to connect a load bus.
  - o Load shall be represented as it physically exists on the transmission system as accurately as the base model set will allow.
- ✓ Load shall be modeled on the metering bus (as allowed by the base model set) and shall be identified ~~per LSE~~ by the assignment of ownership, load area, or both.
  - o See Appendix A: Methods 1 and 2 will be used to model load for those members who have a modeling area and serve load which physically exists in another modeling area.

Benefit: This improvement will enhance model granularity and allow SPP Staff to accurately validate the area interchange when constructing the models.

C. Stability Load Modeling

Issue: More representative load modeling needs to be utilized for dynamic studies. 100% constant current data, which may be worst case, is unrealistic.

Solution: Each ~~LSE~~data reporting member ~~shall should~~may provide more detailed dynamic load data for each dynamic model supported by the MDWG. If this data is not provided, staff should assume data based on recognized national standards. ~~(day/night, summer/winter/spring/fall)~~

Benefit: This will provide consistency and help prevent unrealistic dynamic studies.

D. Explicit Modeling of Reactive Control Devices

Issue: Net var modeling is sometimes used in power flow cases instead of showing the discrete capacitor or reactor banks that are available for switching.

Solution:

- ✓ All capacitor banks shall be modeled as switched shunts as specified in section 5.10 of the MDWG Power Flow Manual.
- ✓ Reactive devices shall be modeled to show individual blocks and steps available for switching.
- ✓ The MDWG should provide ~~guidance~~ modeling assistance to SPP members and the Multi-Regional Modeling Working Group on voltage bandwidth for switched shunts.

Benefit: This improvement will provide additional guidance of what can be done in contingencies to remedy voltage problems.

E. Identification of Generation Types

Issue: Proper identification of generation types, especially with respect to wind, does not currently exist in the base model set. Some study processes currently mix in non-firm generation that should not be dispatched.

Solution:

Comment [KJA1]: It is a lot of work to obtain day/night load data per bus per season. Why not utilize IEEE or EPRI research papers and use some combination like 60% constant current and 20% constant admittance and 20% constant power or some combination based on research?

Comment [KJA2]: This could be accomplished using scalers summer loading data - staff could do.

Comment [KJA3]: This statement is a bit confusing. Do you mean each dynamic model of load or each dynamic seasonal case that MDWG supports?

Comment [KJA4]: Make it clear in the document that SPP is not trying to tell utilities how to set cap banks.

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- ✓ The MDWG should discuss the implementation of uniform generator identification as done with load.
- ✓ Develop a set of generator IDs for the purpose of identifying different generation types ~~including but not limited to~~such as:
  - o Long-term firm
  - o EIS market (non-firm)
  - o Wind QF
  - o Customer owned (behind the meter)

Benefit: Better rules for identifying generation "buckets" will aid those using models developed by SPP and the MDWG in discerning what generation is dispatchable.

2. Detailed Reporting and Data Synching

The following topics are addressed to expand the current practices of the MDWG and SPP staff in order to reconcile data sources within SPP and help bridge the gaps between models developed by the MDWG and those developed by SPP staff for the current STEP processes.

A. Joint-Owned Unit Coordination and Reports

Issue: The information staff receives for the dispatching of jointly owned units is simply a generation output value as modeled which makes it very difficult to determine which owners are using what amount of power.

Solution: Data reporting ~~M~~members shall provide reports detailing Inter-area and intra-area transactions that represent the modeling of the dispatched power from each jointly owned unit or plant.

Benefit: This improvement will remove any guesswork done by staff and improve efficiency in verifying usage rights.

B. Delivery Point Changes and Load Owner Reports

Issue: Additions, modifications, and abandonment of delivery points are not clearly documented.

- ✓ Each year staff has to correct intra-area transfers between Host TO and Load Serving Entities (Load Owners, Municipals, Coops, etc.).
- ✓ With the new tariff addition of Attachment AQ, "new" loads cannot be added to the model without first being studied.
- ✓ With the new tariff addition of Attachment AR the transfer of an existing load is studied.

Solution: In conjunction with implementation of the new SPP modeling assignments, which will create more granularity in defining load ownership, load reports should be provided on a per LSE basis. These reports would include, as necessary:

- ✓ Load values
- ✓ Generation required to serve load
- ✓ Transactions and any resulting changes to area interchange
- ✓ Losses incurred in serving load

SPP must work with each data reporting member to ensure that all LSE reports are provided.

Benefit: These detailed reports will help facilitate and instill accuracy into SPP processes.

- ✓ Transmission Service Studies

Comment [KJA5]: What if the generator participates in both long-term firm and EIS market?

Comment [KJA6]: We do identify generation type in the Generator Workbook. We can come up with an ID strictly for wind and everything else stays as is but not break it down into long-term firm and EIS market.

Comment [KJA7R6]: Kelsey Allen: We are proposing to imbed this detail in the load flow model so that when SPP data is handed off to other departments and companies both within and outside of SPP, there is less confusion about dispatchable generation. This becomes even more important when users of the MDWG models have no knowledge of the generator workbook. I think this topic is one of the few that are intended to spark discussion rather than simply laying out a specific solution. We can discuss at the next MDWG meeting.

Comment [KJA8]: We already do this in the Transaction Workbook. Are we eliminating the workbook or adding duplicate work?

Comment [KJA9R8]: While I agree that some of these transfers are in the transaction workbook, there is still always a question about intra-area usage, especially for those companies that may have multiple LSE's within their footprint, all with rights to a portion of a JOU.

Comment [KJA10]: Should not apply to all members. Example: AECC provides load to SPP, but AEP provides generation information that covers the amount of load needed. Transactions are also provided by AEP, SWPA and Entergy.

Comment [KJA11R10]: We develop these sheets internally to determine loadflow changes for scenario models so providing SPP with the reports an LSE may provide to their BA would reduce staff man hours and improve accuracy.

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- ✓ Studies pursuant to Attachment AR
- ✓ Studies pursuant to Attachment AQ

C. MDWG Transaction Improvement

Issue: Currently, connectivity to both MDWG Models and OASIS Data is limited. This leads to a significant amount of time spent to validate, correct and expand the transactions in the MDWG Transaction Workbook by hand in order to create the STEP base scenario models. Non-firm transactions or exploratory and proposed transactions above reserved amounts are currently included in the MDWG models. In order to build the STEP base scenario models these transactions are removed; staff also adds transmission service that is not included in the MDWG models:

- ✓ DNR and PTP DC tie adjustments
- ✓ Inter-area DNR at reserved amount
- ✓ Intra-area DNR not in TO or TDU dispatch order
- ✓ Intermittent wind generation at reserved amount
- ✓ PTP (inter-regional, intra-regional, intra-area, designated resource) at reserved amount.

Netting and combining transactions practices:

- ✓ Transactions are netted from A to B with B to A transactions making it difficult to correlate with OASIS reservation amounts
- ✓ Transactions summed together making it difficult to correlate with OASIS reservation amounts

Solution: Staff would like to work with members to bridge the gap in the development of models suitable for NERC Compliance versus studies governed by SPP Tariff requirements in relation to transaction schedules and OASIS reservations.

- ✓ The MDWG transaction workbook should be expanded to include data from SPP OASIS.
- ✓ Transactions should be more comprehensive with all inter-area and intra-area reservations accounted for thereby allowing the members to make their own forecasts about usage of these capacity and roll-over rights.
- ✓ Eliminate the practice of netting and summing transactions.
  - o Transactions should only be summed if they are from the same resource/source and load owner/sink.

Benefit: The amount of hours spent by engineers to develop transactions correlation can be reduced and thereby reducing STEP base model development time, making the process more efficient.

3. Modeling Methods

The following topics are addressed to highlight and better define modeling methods that will help create more uniformity across the SPP footprint.

A. Forecasting of Rollover Rights

Issue: Currently, the MDWG manual encourages planners to model roll-over rights for transmission service. However, this assumption can result in the identification of reliability issues where none would have been identified otherwise.

Solution:

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- ✓ In developing transaction schedules, e~~E~~ach data reporting member~~LSE~~ should continue to project the~~ir~~ use of long-term firm transmission roll-over rights in the base model set.
- ✓ SPP will continue to address boundary conditions associated with modeling any unused roll-over rights in the scenario models, as required by Section III.1.d. of Attachment O to the SPP Tariff.

Benefit: This improvement will lead to more accurate and realistic modeling.

B. Modeling New Generation and Transmission Projects

Issue: No common practice currently exists for including new generation and transmission projects in the MDWG model set. Transmission Owners are allowed to add any new transmission and generation projects to meet load requirements and NERC reliability standards.

Solution:

- ✓ STEP Base Models (Used by SPP as the base for ITP Reliability, Transmission Service, and Generation Interconnection studies):
  - o New Generation
    - ▪ New generation will only be modeled if it has a signed Interconnection Agreement and not on suspension.
    - ▪ New generation modeled will only be dispatched if it has an executed transmission service agreement.
    - ▪ Exceptions to the above requirements will be based on the TWG approved "Rules and Exceptions for Generation Deficiencies".
      - This rule set will aid in reducing the reliance on heavily weighted transmission solutions until the SPP ITP can give more guidance on resource planning.
  - o New Transmission will only be modeled if:
    - ▪ There is an existing Notification to Construct issued by SPP which has been accepted by the Transmission Owner.
    - ▪ It has been budgeted and approved by the Transmission Owner with firm commitment to build.
- ✓ MDWG Base Models (Used by SPP for NERC Compliance studies)
  - o In addition to generation and transmission meeting the STEP base model requirements, projects may be modeled as necessary to meet load requirements and/or NERC reliability standards.
- ✓ The MDWG manual should be updated to reflect the following for generation deficiencies:
  - o Inclusion of proposed generation to meet load requirements within the LSE
  - o Inclusion of existing generation and proposed transactions based on the method described in Appendix B.

Benefit: This set of rules will provide guidance in modeling new projects in order to create more consistent modeling practices across the SPP footprint.

C. Review, Expansion, and Implications of MOD Project Types

Issue: The current MOD project type/status matrix contains errors and is incomplete.

Solution: The MDWG should review and adjust the current MOD project matrix to account for issues addressed in this white paper and Tariff changes made to implement the ITP.

Comment [KJA12]: This will presume knowing future business decisions. We can't forecast what transactions will be scheduled in the long-term or forecast future business decisions.

Comment [KJA13]: This should be more clearly explained in the document.

Comment [KJA14]: What exactly are the problems that this paper refers to?

Comment [KJA15]: What adjustments to the matrix are suggested?

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Benefit: This will aid members and staff alike in classifying projects correctly to feed into study processes and project tracking.

D. Modeling Projects in MOD before the RTO Need Date

Issue: It has been noted that often a member~~TO~~ will submit a project in MOD with an effective date before the RTO Determined Need Date which can result in masking inherent reliability issues or allowing SPP to oversell the transmission system.

Solution: Any transmission project that has been issued an NTC by SPP shall not be modeled earlier than the later of the RTO Determined Need Date or the Transmission Owner Projected In-Service Date unless energized.

Benefit: This improvement would eliminate inherent ATC provided by projects modeled with no commitment to build. It would also allow the ITP reliability and transmission service analyses to accurately complete the following:

- ✓ Determine the need for Reliability Projects.
- ✓ Reassess the need for Reliability Projects without a NTC or with a NTC under review.
- ✓ Rescind the need for Reliability Projects with a NTC.
- ✓ Minimize the number of reliability analysis studies needed to determine whether a modeled TO Planned Project has reliability need.
- ✓ Protect SPP and its members against selling transmission service on ATC that may not exist due the delay of a transmission project.

4. Data Errors and Coordination

The following topics are addressed to expand the current practices of the MDWG and SPP staff in order to better address modeling errors and increase effectiveness of coordination efforts with neighboring regions and members.

A. Improve Identification of Major Model Changes and Errors

Issue: Tools in our model building processes should be implemented both external and internal to SPP modeling that flag major data changes and errors.

Solution:

- ✓ The Docucheck program now being used by SPP will aid in correcting model errors.
  - o This python script developed for the MMWG produces reports of errors and warnings for review by each transmission owner.
  - o SPP and the MDWG should work to adjust and expand the data errors flagged in these reports.
- ✓ MOD Anomalies and MOD Detailed Case Build posted with each model set.
- ✓ SPP will develop tools and processes to compare the models to other data sources available to SPP, which will aid in data verification.
- ✓ SPP should provide a summary of changes between each final build of any one model series year.

Benefit: More effort in implementing secondary checks to validate major changes to the models will result in increased reliability of study results, avoiding project proposals and other issues that stem from simple modeling errors.

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B. Improve Regional Data Coordination and Checks

Issue: Due to the selection of seasons for a model series and the differing cycles of model building, SPP models inherently contain missing ties lines and outdated topology and transactional data for neighboring systems. The SPP MDWG attaches the "best match" MMWG model as the external case and this can create confusion if not coordinated between the regions.

Solution:

- ✓ SPP shall coordinate with external regions to ensure understanding of seams throughout the model series.
- ✓ The MDWG should consider all internal and external processes it supports when selecting the seasons for an annual a model series.
  - o A one-to-one match for external regions is not always available and may require data modification.
  - o SPP shall swap data with 1st tier companies consistent with the obligations of seams agreements.
- ✓ All members within SPP and all regions shall use the MMWG Master Tie File for all updates to NERC regional ties.

Benefit: SPP and first tier data will be more accurate and produce more realistic representation of powerflow across seams.

C. Coordination Between G.I. and Modeling

Issue: New generation (especially wind) with signed interconnection agreements interconnecting to the SPP footprint is often not coordinated directly into the MDWG Models by SPP Staff or SPP members.

- ✓ In the case of wind generation, accurate reactive capabilities are often not modeled if the generation is modeled at all.
- ✓ Proprietary stability models are being provided to the SPP for the purpose of the GI process and cannot be added to the MDWG models due to confidentiality reasons.
- ✓ Lack of good generic wind models in PSS/E Rev 30 is also an issue. Often wind generation plants are modeled with generic CIMTR1 or CIMTR3 models in lieu of more detailed generic wind models which are available in Rev 32.

Solution:

- ✓ Once a generator meets requirements to be included in the base model set, SPP Staff shall verify the data used in the SPP Generation Interconnection study and ensure that accurate data is submitted to MOD by Staff or the ~~host SPP~~responsible SPP data reporting member.
- ✓ SPP shall step up enforcement of current data requirements of members and customers.
- ✓ SPP shall require that non-SPP member GI customers supply non-proprietary modeling data that can be added to the MDWG models.*
  - o If this data cannot be supplied in order to meet NERC MOD standards and SPP Tariff requirements then the GI request should be rejected.

**Staff Note: No SPP Tariff requirements currently exist that allow SPP reject GI requests based on failure to meet this criteria.*

Benefit: This will ensure all planned or operational generators with a signed interconnection agreement are included in the MDWG models, thereby improve accuracy of SPP models and provide for much better inputs into SPP study processes.

D. Model Sharing Instructions

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Issue: SPP transmission owning members are not allowed access to certain models sets because of sensitive data. This lack of access puts a burden on transmission owners when developing solutions for responding to study-related data requests.
Solution: The SPP non-disclosure agreement (NDA) shall be sufficient to allow full access and use of the various models developed in support of administration of the tariff to be used by signatories to validate study results.
Benefit: FERC jurisdictional or Public Power Entity SPP transmission owning members who have completed the necessary requirements will have model access to better replicate SPP study results and provide more accurate solutions for system violations.

E. Auxiliary Files Coordination and Organization

Issue: Currently, staff members that are involved in the STEP model building process are responsible for requesting updates to the auxiliary files used for analysis and reporting (monitor, subsystem, contingency, invalid contingency and common name). These requests can potentially come from a number of different SPP employees from different engineering groups.
Solution: In keeping with the effort to create a common data set for all study tracks, the MDWG shall take over coordination and organization of auxiliary files used for study analysis.

- ✓ A single contingency file should be used for a full planning horizon.
- ✓ The MDWG needs to develop a process to identify and track contingencies that change due to topology changes through a model series.

Benefit: Stakeholders will have more control over the schedule of updating and maintaining these files producing more accurate results in all study processes.

F. Integrity of Forecasted Load Data

Issue: SPP staff has noted that discrepancies exist between load forecasts as they appear in the models produced by the MDWG and load forecasts submitted via other processes. No uniformity exists across the SPP footprint for developing load forecasts; each LSE or reporting BA has their own process.
Solution: The MITF believes that these concerns expressed by SPP staff are a non-issue.

- ✓ There is no one-for-one match of the different sources used to report load.
- ✓ EIA-411 is a separate data vehicle and should not be used for model verification.
  - o Load and losses are not separated in the reports as they are in the powerflow models.
  - o EIA-411 doesn't have the granularity of load forecasts as represented in the models.
- ✓ Some companies have multiple forecasts per year that are fed into different processes at different times.
- ✓ SPP should assess the need and consider the elimination of October updates to NITS Applications as required by the Tariff. These are redundant data updates that can be found in the powerflow models developed by the MDWG.
- ✓ MITF does not recommend pursuing a common load forecasting tool.
  - o Each company has developed a process that has been vetted by their own staff and necessary State Commissions.

Comment [KJA16]: Not opposed to going to a single contingency file as long as a process goes along with it to make sure it gets updated with every single project that gets committed in MOD that might affect existing contingencies. We might end up have 2 contingencies for every MOD project. One before and one after a project goes in-service.

Comment [KJA17R16]: Agreed. This should be a step in the MOD project review procedure. SPP will also need to rely on data submitters to be aware of this and make comments in project submissions if a non-single contingency is impacted. Even more important, helping SPP stay current with the invalid contingency file and non-singles that may need to be added because of breaker configurations that we may not be aware of.

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5. Uniform Generation Dispatch

The following topics address the gap in process related to generation dispatch and resulting interchange between the current MDWG practices and those employed by SPP staff to develop the different STEP model sets.

A. Generation Dispatch Coordination and Expansion

Issue: Generation dispatch is currently being requested by multiple groups within SPP Engineering for different model sets. For the MDWG and STEP models, these requests for generation profiles and generation dispatch orders are generally provided by the same member staff. Once the MDWG models are developed, SPP Planning and Transmission Service staff uses an automated process to redispatch generation when performing reliability analysis and studying new requests for transmission service.

Solution: In addition to the generation profiles developed for the MDWG models used for compliance, MDWG modeling contacts will aid SPP staff in developing generation dispatch orders during the annual model update.

- ✓ The dispatch orders used for these purposes need to include both intra-area and inter-area generation.
- ✓ Dispatch orders would be per LSE where remote generation would be dispatched according to the transaction workbook net scheduled interchange (NSI) requirements.
- ✓ Since the majority of joint owned resources and purchases are base load generation per LSE, joint ownership and purchases would be included in the host TO dispatch order with the Pmax being equal to the sum of the allocated amounts if the host TO has a Joint Ownership or purchase of the same resource.
    - o Exceptions to this would initially be manually dispatched when building models due to interchange and usage accounting requirements.
- ✓ The automated process incorporates:
    - o Must-run unit commitments
    - o Unit Outages
    - o Transmission operating directives
- ✓ Non-dispatchable generation (wind, hydro, ect…) profiles will not be changed by the automated dispatch and would still need to be developed by members.

Benefit: In developing both sets concurrently, the base models for all study tracks will have a more consistent generation dispatch. Once the automated process becomes more refined, consideration should be given to implementing it to develop the MDWG models. This would eliminate SPP staff's work to adjust MDWG models for ITP Reliability, Transmission Service, and Generation Interconnection studies as well as reduce the burden on the members to create separate MDWG dispatches by hand.

B. LSEs That Cannot Meet Their Load

Issue: Clear guidelines are not available to account for the issue of how to solve cases where a LSE doesn't have enough designated network resources to serve their load in a far-term case. Currently, ~~LSEs~~ members add fictitious generation or transactions to address this deficit. To build the STEP base models, these generators are removed; when there is a shortfall between Interchange, generation and load, the process described in Appendix B is used.

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Solution: The shortfall process described in the document referenced above is implemented through the automated dispatch process described in the Generation Dispatch Coordination and Expansion issue and would be fine-tuned to prepare for future implementation at the MDWG level. The MDWG should include this detailed process as an option to modeling proposed generation in the MDWG model set used for compliance.
Benefit: Any LSE that is not able to meet their load in a far term case will have specific guidelines to solving their case in a manner that is uniform across the SPP footprint. Additionally, this will improve the documentation of SPP Processes.

C. Determining Generation and NSI Profiles

Issue: Generation and Net Scheduled Interchange (NSI) data rely heavily on our transmission owners to develop snap shots. Additional profiles are needed for other model sets which would require much more work from the transmission owners to develop these following the current MDWG process.
Solution: SPP processes are available to aid in the development of the generation and NSI profiles for the Transmission owners to review. Profiles are already being developed by staff for other STEP model sets, yet these processes need to be expanded.
Benefit: Applying these processes at the MDWG level will save both staff and members time in creating and verifying generation and NSI profiles.

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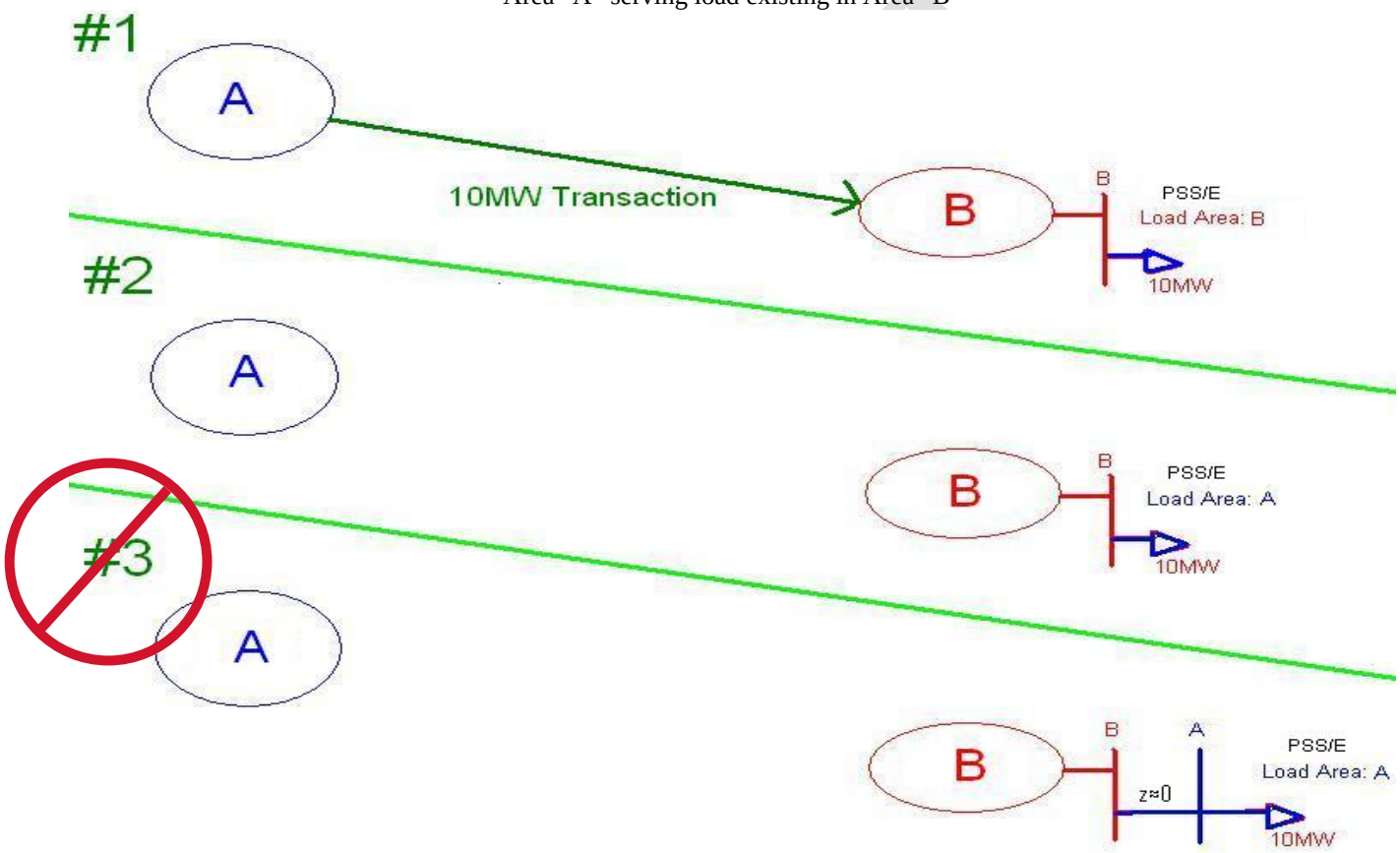
Appendix A

External Load Modeling Methods

Area “A” serving load existing in Area “B”



Appendix B

LSEs That Cannot Meet Their Load

1. MDWG Compliance Models - The dispatch orders will include a NERC Standard Compliance flag to allow for new generation and existing generation capacity changes that do not meet the requirements for inclusion in the STEP and ATSS to be dispatched in merit order. If there is a shortfall between generation and load then the detailed shortfall process for the STEP and ATSS will be utilized.

2. ITP Near-Term Reliability Assessment and ATSS Models - When there is a shortfall between the amount of designated network resources and designated network load for a LSE or transmission customer, the following sequential steps are outlined below.

    i. Step One: Exhaust the customer's designated network resources until the network resources are sufficient to meet network load.

        a. Dispatch generation by using dispatch orders provided by the transmission planning personnel of the SPP ~~Transmission Owners~~data reporting members and by representatives of the transmission service customers.

        b. Add generation from behind the meter generating units. This generation consists of dispatchable behind the meter generation that may not already included in the SPP Model Development Working Group Base Cases.

        c. Non-dispatchable wind generation or other generation with operating restrictions or forecasted projections shall not be used.

    ii. Step Two: If the customer's designated load cannot be served after Step One, then exhaust the customer's other operational generation that is not designated.

        a. Dispatch generation by using dispatch orders provided by the transmission planning personnel of the SPP data reporting members~~Transmission Owners~~ and by representatives of the transmission service customers.

        b. Add generation from behind the meter generating units. This generation consists of behind the meter generation that may

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not already included in the SPP Model Development Working Group Base Cases.

c. Non-dispatchable wind generation or other generation with operating restrictions or forecasted projections shall not be used.

iii. Step Three: If the customer's designated load cannot be served after Step One and Step Two, Exhaust the Host Transmission Owner's existing generation. These intra-area transfers will be documented in the LSE reports.

a. Dispatch generation by using dispatch orders provided by the transmission planning personnel of the SPP data reporting members~~Transmission Owners~~ and by representatives of the transmission service customers.

b. Non-dispatchable wind generation or other generation with operating restrictions or forecasted projections shall not be used.

iv. Step Four: If the customer's network load cannot be served after the above steps, exhaust Independent Power Producer's ("IPP") existing generation in the Host Transmission Owner's modeling area.

a. Exhaust IPP generation on a pro rata, as available basis accounting for firm transmission commitments. In other words, Use power from each IPP to meet the customer's designated load. The amount of power from each IPP will be determined using the total amounts available based on the IPP's historical generating levels minus the amount of power to model existing transmission service from the IPP.

b. Non-dispatchable wind generation or other generation with operating restrictions or forecasted projections shall not be used.

v. Step Five: Finally, if a customer's network load cannot be served after applying the above steps, exhaust existing primary modeling area generation with includes IPP's existing generation and existing primary modeling area generation.

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a. Similar to Step Four, exhaust this generation on a pro rata, as available basis for firm transmission commitments. The amount of power from each IPP and from each primary modeling area generation will be determined using the total amounts available based on the maximum generating levels minus the amount of power to model existing transmission service from the IPP and primary modeling area generation.

b. Non-dispatchable wind generation or other generation with operating restrictions or forecasted projections shall not be used.

3. ITP 10 Year and 20 Year - The studies will use ESWG approved resource plans and futures for the SPP region.

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	Action Item	Responsible Parties	Date Originated	Progress	Notes
1	Ask SPP Operations to derive the average coincident peak value for SPP System during the 4 month summer	Anthony Cook	5/19/2009	Incomplete	Is the 85% accurate for the summer shoulder model? Where did 85% originate from and provide derivation of 85%.
2	SPP Staff will add the NERC TPL (Transmission Planning) and MOD (Modeling, Data, and Analysis) Standards that are applicable to each required item in the SPP Compliance Template Form	Anthony Cook	8/7/2009	In Progress	Staff to update the template with Dynamics.
3	Members are to ensure that all generation conform to the Remote Generation Modeling Procedure beginning with the second build of the 2010 Model Series	Modeling Contacts	8/7/2009	In Progress	
6	Staff will add a member editing process for the Master Tie Line Procedure to the MDWG Powerflow Manual	Anthony Cook	9/16/2009	In Progress	
10	Staff will add MOD project names to the generator Workbook	Anthony Cook	9/16/2009	Complete	
11	Staff will add a member editing process for the SPP Data Submittal Form to the MDWG Powerflow Manual	Anthony Cook	9/16/2009	In Progress	
14	Staff will update the Web Based Power Flow Model Development Procedure Manual after MOD version 7 has been released and installed on the production server	SPP Staff	11/17/2009	In Progress	
30	Staff will talk to the ESWG secretary for more information about MDWG involvement in the ITP process	SPP Staff	1/7/2010	Complete	Extended with Item # 44.
42	Review the new MOD standards approved by FERC and how they will apply to the MDWG and SPP planning modeling	SPP Staff	3/1/2010	In Progress	
43	Send notice to all modeling contacts reminding members of their obligation to adhere to the remote generation modeling procedure	SPP Staff	3/5/2010	Complete	Staff to remind members in the model building kick-off email.
44	Modeling staff will inform Planning staff that the MDWG would like more involvement in review and/or development of generation and transmission plans for the 20 year study model	SPP Staff	3/5/2010	Complete	
45	Determine which model build set N-1 analysis and mitigation plans are required	Doug Bowman	3/5/2010	Complete	N-1 ran on B1 for information purposes. N-1 ran on B2 for mitigation requirements.
46	Staff to add a list of what the final Build 1 models are used for to the data request email	SPP Staff	3/5/2010	In Progress	
47	Send out notification of MMWG vote on PSSE version 32 after MMWG meeting in September	Anthony Cook	3/5/2010	Complete	
50	Reformat the MDWG procedure manual and add hyperlinks for referenced documents	Anthony Cook	3/6/2010	In Progress	
52	Determine if MOD will allow a load to be added to an external bus that is not in the database and what validation errors might arise	Kelsey Allen	3/6/2010	In Progress	
53	Clean up the profile list currently in MOD	SPP Staff	3/6/2010	In Progress	
56	Discuss with Entergy about SPP members modeling load with zero impedance lines	SPP Staff	3/6/2010	In Progress	
57	Determine the standards for stability load data	Scott Jordan	3/6/2010	In Progress	
58	MDWG members to supply docucheck changes to staff	MDWG Members	3/6/2010	Complete	

59	Provide updated docucheck program to modeling contacts	SPP Staff	3/6/2010	In Progress	
60	Perform a study of current summer load duration curve	SPP Staff	10/21/2010	In Progress	This is in conjunction with Item # 1.
61	Discuss reserve modeling with the GWG	SPP Staff	10/21/2010	In Progress	
62	Discuss status mode for branches and generators with PTI and MMWG	SPP Staff	10/21/2010	In Progress	