UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

California Independent System Operator Corporation	))	**Docket No. OA09-17-000**

ANSWER OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION TO MOTIONS TO INTERVENE AND COMMENTS

The California Independent System Operator Corporation ("CAISO") submits this answer[1] to the motions to intervene and comments filed in this proceeding in response to the CAISO's January 16, 2009 filing to revise the CAISO's Market Redesign and Technology Upgrade Tariff ("MRTU Tariff"),[2] Appendix L, Methodology to Assess Available Transfer Capability ("Appendix L"), in compliance the requirements of Order No. 890[3] and the Commission's May 16, 2008 Order Accepting Compliance Filing As Modified.[4]

The CAISO does not oppose the intervention in this matter requested by the California Department of Water Resources State Water Project, the Transmission Agency of Northern California, Modesto Irrigation District, the City of Santa Clara, M-S-R Public Power Agency, Metropolitan Water District of Southern California or Powerex Corp. ("Powerex").

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1 The CAISO submits this answer pursuant to Rules 213 and 214 of the Commission's Rules of Practice and Procedure, 18 C.F.R. §§ 385.213 and 385.214 (2007).

2 Capitalized terms not otherwise defined have the same meaning set forth in the MRTU Tariff on file with the Commission.

3 *Preventing Undue Discrimination and Preference in Transmission Service*, Order No. 890, 72 Fed. Reg. 12,266 (March 15, 2007), FERC Stats. & Regs. ¶ 31,241 (2007), *order on reh'g*, Order No. 890-A, 73 Fed. Reg, 2984 (January 16, 2008, FERC Stats. & Regs. ¶ 31,261 (2007), *order on reh'g*, Order No. 890-B, 123 FERC ¶ 61,299 (2008) .

4 *California Independent System Operator Corporation*, 123 FERC ¶ 61,180 (2008)("May 16 Order").

However, the CAISO does disagree with Powerex's claim that Appendix L should be revised to include two additional items of information -- a process flow diagram and link to mathematical algorithms posted on the CAISO's website. Powerex has over looked the provisions in Appendix L that already contain this information.[5]

As required by Order No. 890, the process flow diagram is provided in the CAISO's MRTU Tariff Appendix L, Section L.3, entitled ATC Process Flowchart. Section L.3 was included in the CAISO's initial filing of MRTU Tariff Appendix L, which was approved by the Commission in the May 16 Order and was not revised in the filing in this matter.

The May 16 Order also required revisions to Appendix L to add a description of the specific mathematical algorithms used by the CAISO to calculate ATC for its scheduling, operating, and planning horizons, and to provide a link to the location of the CAISO Website where the actual algorithms are posted.[6] For the currently effective tariff, the CAISO met the requirements of the May 16 Order by revising Appendix L, Section L2, to add a narrative description of the ATC algorithms and to include the mathematical algorithms. By Order dated February 9, 2009 in Docket Nos. OA08-12-001, *et al*., the Commission accepted these revisions (and unrelated modifications to Appendix L) as being in compliance with the Commission's directives in Order No. 890 and the May 16 Order.[7] For the MRTU Tariff, the CAISO in this matter proposes similar

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[5] A copy of the full text of MRTU Tariff Appendix L is attached to this answer for reference.
[6] Id. at P 49.
[7] *California Independent System Operator Corp.,* 126 FERC ¶ 61,099 (2009)("February 9 Order").

revisions. The CAISO's filing revises MRTU Tariff Appendix L, Section L2 to add a narrative description of the ATC algorithms that will be used following the implementation of MRTU and to include the mathematical algorithms. The CAISO submits that these revisions fully satisfy the requirements of the May 16 Order and should be approved by the Commission, consistent with the February 9 Order.

For the foregoing reasons, the CAISO requests that the Commission decline to accept the modifications suggested by Powerex.

Respectfully submitted,

/s/ Beth Ann Burns
Nancy Saracino
General Counsel, Corporate Secretary
and Vice-President of Legal Affairs
Anthony J. Ivancovich
Assistant General Counsel –
Regulatory
Beth Ann Burns, Senior Counsel
California Independent System
Operator Corporation
151 Blue Ravine Road
Folsom, CA 95630
Tel: (916) 351-4400
Fax: (916) 608-7296

Dated: February 20, 2009

CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon the entities that are described in that document as receiving service, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated at Folsom, California this 20th day of February, 2009.

/s/ Jane Ostapovich
Jane Ostapovich

CAISO TARIFF APPENDIX L

CAISO TARIFF APPENDIX L

Methodology to Assess Available Transfer Capability

METHODOLOGY TO ASSESS AVAILABLE TRANSFER CAPABILITY

L.1 Description of Terms

The following descriptions augment existing definitions found in Appendix A "Master Definitions Supplement."

L.1.1 **Available Transfer Capability (ATC)** is a measure of the transfer capability in the physical transmission network resulting from system conditions and that remains available for further commercial activity over and above already committed uses.

ATC is defined as the Total Transfer Capability (TTC) less applicable operating Constraints due to system conditions and Outages (i.e., OTC), less the Transmission Reliability Margin (TRM) (which value is set at zero), less the sum of any unused existing transmission commitments (ETComm) (i.e., transmission rights capacity for ETC or TOR), less the Capacity Benefit Margin (CBM) (which value is set at zero), less the Scheduled Net Energy from Imports/Exports, less Ancillary Service capacity from Imports.

L.1.2 **Total Transfer Capability (TTC)** is defined as the amount of electric power that can be moved or transferred reliably from one area to another area of the interconnected transmission system by way of all transmission lines (or paths) between those areas. In collaboration with owners of rated paths and the WECC Operating Transfer Capability Policy Committee (OTCPC), the CAISO utilizes rated path methodology to establish the TTC of CAISO Transmission Interfaces.

L.1.3 **Operating Transfer Capability (OTC)** is the TTC reduced by any operational Constraints caused by seasonal derates or Outages. CAISO Regional Transmission Engineers (RTE) determine OTC through studies using computer modeling.

L.1.4 **Existing Transmission Commitments (ETComm)** include Existing Contracts and Transmission Ownership Rights (TOR). The CAISO reserves transmission capacity for each ETC and TOR based on TRTC Instructions the responsible Participating Transmission Owner or Non-Participating Transmission Owner submits to the CAISO as to the amount of firm transmission capacity that should be reserved on each Transmission Interface for each hour of the Trading Day in accordance with Sections 16 and 17 of the CAISO Tariff. The types of TRTC Instructions the CAISO receives generally fall into three basic categories:

- The ETC or TOR reservation is a fixed percentage of the TTC on a line, which decreases as the TTC is derated (ex. TTC = 300 MW, ETC fixed percentage = 2%, ETC = 6 MWs. TTC derated to 200 MWs, ETC = 4 MWs);

- The ETC or TOR reservation is a fixed amount of capacity, which decreases if the line's TTC is derated below the reservation level (ex. ETC = 80 MWs, TTC declines to 60 MW, ETC = OTC or 60 MWs; or

- The ETC or TOR reservation is determined by an algorithm that changes at various levels of TTC for the line (ex. Intertie TTC = 3,000 MWs, when line is operating greater than 2,000 MWs to full capacity ETC = 400 MWs, when capacity is below 2000 MWs ETC = OTC/2000* ETC).

Existing Contract capacity reservations remain reserved during the Day-Ahead Market and Hour-Ahead Scheduling Process (HASP). To the extent that the reservations are unused, they are released in real time operations for use in the Real-Time Market.

Transmissions Ownership Rights capacity reservations remain reserved during the Day-Ahead Market and HASP, as well as through real-time operations. This capacity is under the control of the Non-Participating Transmission Owner and is not released to the CAISO for use in the markets.

L.1.5 **ETC Reservations Calculator (ETCC)**. The ETCC calculates the amount of firm transmission capacity reserved (in MW) for each ETC or TOR on each Transmission Interface for each hour of the Trading Day.

- **CAISO Updates to ETCC Reservations Table**. The CAISO updates the ETC and TOR reservations table (if required) prior to running the Day-Ahead Market and HASP. The amount of transmission capacity reservation for ETC and TOR rights is determined based on the OTC of each Transmission Interface and in accordance with the curtailment procedures stipulated in the existing agreements and provided to the CAISO by the responsible Participating Transmission Owner or Non-Participating Transmission Owner.

- **Market Notification.** ETC and TOR allocation (MW) information is published for all Scheduling Coordinators which have ETC or TOR scheduling responsibility in advance of the Day-Ahead Market and HASP. This information is posted on the Open Access Same-Time Information System (OASIS).

- For further information, see CAISO Operating Procedure M-423, Scheduling of Existing Transmission Contract and Transmission Ownership Rights, which is publicly available on the CAISO Website.

L.1.6 **Transmission Reliability Margin (TRM)** is that amount of transmission transfer capability necessary reserved in the Day-Ahead Market (DAM) to ensure that the interconnected transmission network is secure under a reasonable range of uncertainties in system conditions. This DAM implementation avoids Real-Time Schedule curtailments that would otherwise be necessary due to:

- Demand Forecast error
- Anticipated uncertainty in transmission system topology
- Unscheduled flow
- Simultaneous path interactions
- Variations in Generation Dispatch
- Operating Reserve actions

The level of TRM for each Transmission Interface will be determined by CAISO Regional Transmission Engineers (RTE).

The ISO does not use TRMs. The TRM value is set at zero.

L.1.7 **Capacity Benefit Margin (CBM)** is that amount of transmission transfer capability reserved for Load Serving Entities (LSEs) to ensure access to Generation from interconnected systems to meet generation reliability requirements. In the Day-Ahead Market, CBM may be used to provide reliable delivery of Energy to CAISO Balancing Authority Area Loads and to meet CAISO responsibility for resource reliability requirements in Real-Time. The purpose of this DAM implementation is to avoid Real-Time Schedule curtailments and firm Load interruptions that would otherwise be necessary. CBM may be used to reestablish Operating Reserves. CBM is not available for non-firm transmission in the CAISO Balancing Authority Area. CBM may be used only after:

- all non-firm sales have been terminated,
- direct-control Load management has been implemented,
- customer interruptible Demands have been interrupted,
- if the LSE calling for its use is experiencing a Generation deficiency and its transmission service provider is also experiencing transmission Constraints relative to imports of Energy on its transmission system.

The level of CBM for each Transmission Interface is determined by the amount of estimated capacity needed to serve firm Load and provide Operating Reserves based on historical, scheduled, and/or forecast data using the following equation to set the maximum CBM:

CBM = (Demand + Reserves) - Resources

Where:

- Demand = forecasted area Demand
- Reserves = reserve requirements
- Resources = internal area resources plus resources available on other Transmission Interfaces

The ISO does not use CBMs. The CBM value is set at zero.

L.2 ATC Algorithm

The ATC algorithm is a calculation used to determine the transfer capability remaining in the physical transmission network and available for further commercial activity over and above already committed uses. The CAISO posts the ATC values in megawatts (MW) to OASIS in conjunction with the closing events for the Day-Ahead Market and HASP Real-Time Market process.

The following OASIS ATC algorithms are used to implement the CAISO ATC calculation for the ATC rated path (Transmission Interface):

OTC = TTC – CBM – TRM - Operating Constraints

ATC Calculation For Imports:
ATC = OTC – AS from Imports- Net Energy Flow - Hourly Unused TR Capacity.

ATC Calculation For Exports:
ATC = OTC – Net Energy Flow - Hourly Unused TR Capacity.

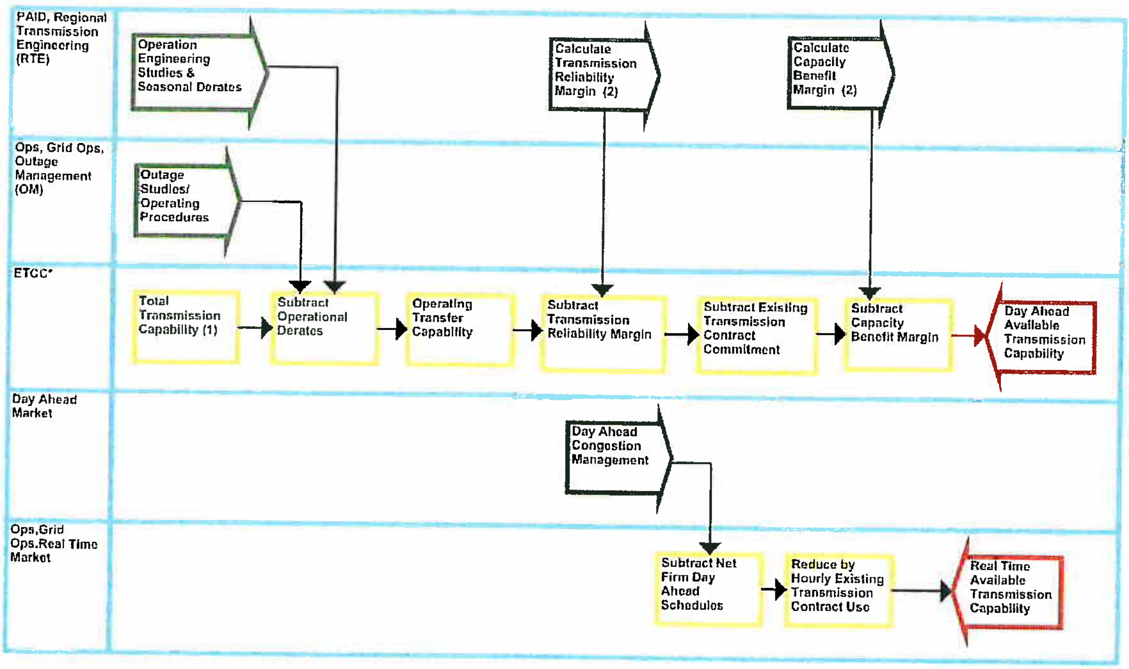
ATC Calculation For Internal Paths 15 and 26:
ATC = OTC – Net Energy Flow

The specific data points used in the ATC calculation are each described in the following table.

ATC	ATC MW	Available Transfer Capability, in MW, per Transmission Interface and path direction.
Hourly Unused TR Capacity	USAGE_MW	The sum of any unscheduled existing transmission commitments (scheduled transmission rights capacity for ETC or TOR), in MW, per path direction.
Scheduled Net Energy from Imports/Exports (Net Energy Flow)	ENE IMPORT MW	Total hourly net Energy flow for a specified Transmission Interface.
AS from Imports	AS IMPORT MW	Ancillary Services scheduled, in MW, as imports over a specified Transmission Interface.
OTC	OTC MW	Hourly Operating Transfer Capability of a specified Transmission Interface, per path direction, with consideration given to known Constraints and operating limitations.
Constraint	Constraint MW	Hourly transmission Constraints, in MW, for a specific Transmission Interface and path direction.
CBM	CBM MW	Hourly Capacity Benefit Margin, in MW, for a specified Transmission Interface, per Path Direction.
TRM	TRM MW	Hourly Transmission Reliability Margin, in MW, for a specified Transmission Interface, per path direction.
TTC	TTC MW	Hourly Total Transfer Capability, in MW, of a specified Transmission Interface, per path direction.

L.3 ATC Process Flowchart

Available Transmission Capability



* ETCC - Existing Transmission Contract Calculator
(1) WECC rated path methodology
(2) S-322

L.4 TTC – OTC Determination
All transfer capabilities are developed to ensure that power flows are within their respective operating limits, both pre-Contingency and post-Contingency. Operating limits are developed based on thermal, voltage and stability concerns according to industry reliability criteria (WECC/NERC) for transmission paths. The process for developing TTC or OTC is the same with the exception of inclusion or exclusion of operating Constraints based on system conditions being studied. Accordingly, further description of the process to determine either OTC or TTC will refer only to TTC.

L.4.1 Transfer capabilities for studied configurations may be used as a maximum transfer capability for similar conditions without conducting additional studies. Increased transfer capability for similar conditions must be supported by conducting appropriate studies.

L.4.1.2 At the CAISO, studies for all major inter-area paths (mostly 500 kV) OTC are governed by the California Operating Studies Subcommittee (OSS) as one of four sub-regional study groups of the WECC OTCPC (i.e., for California sub-region), which provides detailed criteria and methodology. For transmission system elements below 500 kV the methodology for calculating these flow limits is detailed in Section L.4.3 and is applicable to the operating horizon.

L.4.2 Transfer capability may be limited by the physical and electrical characteristics of the systems including any one or more of the following:

- **Thermal Limits** – Thermal limits establish the maximum amount of electric current that a transmission line or electrical facility can conduct over a specified time-period as established by the Transmission Owner.

- **Voltage Limits** – System voltages and changes in voltages must be maintained within the range of acceptable minimum and maximum limits to avoid a widespread collapse of system voltage.

- **Stability Limits** – The transmission network must be capable of surviving disturbances through the transient and dynamic time-periods (from milliseconds to several minutes, respectively) following the disturbance so as to avoid generator instability or uncontrolled, widespread interruption of electric supply to customers.

L.4.3 **Determination of transfer capability** is based on computer simulations of the operation of the interconnected transmission network under a specific set of assumed operating conditions. Each simulation represents a single "snapshot" of the operation of the interconnected network based on the projections of many factors. As such, they are viewed as reasonable indicators of network performance and may ultimately be used to determine Available Transfer Capability. The study is meant to capture the worst operating scenario based on the RTE experience and good engineering judgment.

L.4.3.1 **System Limits** – The transfer capability of the transmission network may be limited by the physical and electrical characteristics of the systems including thermal, voltage, and stability consideration. Once the critical Contingencies are identified, their impact on the network must be evaluated to determine the most restrictive of those limitations. Therefore, the TTC_1 becomes:

$$TTC_1 = \text{lesser of } \{\text{Thermal Limit, Voltage Limit, Stability Limit}\} \text{ following } N\text{-}1_{worst}$$

L.4.3.2 Parallel path flows will be considered in determining transfer capability and must be sufficient in scope to ensure that limits throughout the interconnected network are addressed. In some cases, the parallel path flows may result in transmission limitations in systems other than the transacting systems, which can limit the TTC between two transacting areas. This will be labeled TTC_2. Combined with **Section L**.4.3.1 above TTC becomes:

$$TTC = \text{lesser of } \{TTC_1 \text{ or } TTC_2\}$$

L.5 Developing a Power Flow Base-Case

L.5.1 **Base-cases** will be selected used to model reality to the greatest extent possible including attributes like area Generation, area Load, Intertie flows, etc. At other times (e.g., studying longer range horizons), it is prudent to stress a base-case by making one or more attributes (Load, Generation, line flows, path flows, etc.) of that base-case more extreme than would otherwise be expected.

L.5.2. Power Flow Base-Cases Separated By Geographic Region

The standard RTE base-cases are split into five geographical regions in the CAISO Controlled Grid including the Bay Area, Fresno Area, North Area, SDG&E Area, and SCE Area.

L.5.3. Power Flow Base-Cases Selection Methodology

The RTE determines the studied geographical area of the procedure. This determines the study base-cases from the Bay Area, Fresno Area, North Area, SCE Area, or SDG&E Area.

The transfer capability studies may require studying a series of base-cases including both peak and off-peak operation conditions.

L.5.4 Update a Power Flow Base-Case

After the RTE has obtained one or more base-case studies, the base-case will be updated to represent the current grid conditions during the applicable season. The following will be considered to update the base-cases:

- Recent transmission network changes and updates
- Overlapping scheduled and Forced Outages
- Area Load level
- Major path flows
- Generation level
- Voltage levels
- Operating requirements

L.5.4.1 Outage Consideration

Unless detailed otherwise, the RTE considers modeling Outages of:

- Transmission lines, 500 kV
- Transformers, 500/230 kV
- Large Generating Units
- Generating Units within the studied area
- Transmission elements within the studied area

At the judgment of the RTE, only the necessary Outages will be modeled to avoid an unnecessarily burdensome and large number of base-cases.

L.5.4.2 Area Load Level

Base-case Demand levels should be appropriate to the current studied system conditions and customer Demand levels under study and may be representative of peak, off-peak or shoulder, or light Demand conditions. The RTE estimates the area Load levels to be utilized in the peak, partial-peak and/or off-peak base-cases. The RTE will utilize the current CAISO Load forecasting program (e.g., ALFS), ProcessBook (PI) or other competent method to estimate Load level for the studied area. Once the RTE has determined the correct Load levels to be utilized, the RTE may scale the scale the base-case Loads to the area studied, as appropriate.

L.5.4.3 Modify Path Flows

The scheduled electric power transfers considered representative of the base system conditions under analysis and agreed upon by the parties involved will be used for modeling. As needed, the RTE may estimate select path flows depending on the studied area. In the event that it is not possible to estimate path flows, the RTE will make safe assumptions about the path flows. A safe assumption is more extreme or less extreme (as conservative to the situation) than would otherwise be expected. If path flow forecasting is necessary, if possible the RTE will trend path flows on previous similar days.

L.5.4.4 Generation Level

Utility and non-utility Generating Units will be updated to keep the swing Generating Unit at a reasonable level. The actual unit-by-unit Dispatch in the studied area is more vital than in the un-studied areas. The RTE will examine past performance of select Generating Units to estimate the Generation levels, focusing on the Generating Units within the studied area. In the judgment of the RTE, large Generating Units outside the studied area will also be considered.

L.5.4.5 Voltage Levels

Studies will maintain appropriate voltage levels, based on operation procedures for critical buses for the studied base-cases. The RTE will verify that bus voltage for critical busses in within tolerance. If a bus voltage is outside the tolerance band, the RTE will model the use of voltage control devices (e.g., synchronous condensers, shunt capacitors, shunt reactors, series capacitors, generators).

L.6 Contingency Analysis

The RTE will perform Contingency analysis studies in an effort to determine the limiting conditions, especially for scheduled Outages, including pre- and post-Contingency power flow analysis modeling pre- and post-Contingency conditions and measuring the respective line flows, and bus voltages.

Other studies like reactive margin and stability may be performed as deemed appropriate.

L.6.1 Operating Criteria and Study Standards

Using standards derived from NERC and WECC Reliability Standards and historical operating experience, the RTE will perform Contingency analysis with the following operating criteria:

Pre-Contingency

- All pre-Contingency line flows shall be at or below their normal ratings.
- All pre-Contingency bus voltages shall be within a pre-determined operating range.

Post-Contingency

- All post-Contingency line flows shall be at or below their emergency ratings.
- All post-Contingency bus voltages shall be within a pre-determined operating range.

The RTE models the following Contingencies:

- Generating Unit Outages (including combined cycle Generating Unit Outages which are considered single Contingencies).
- Line Outages
- Line Outages combined with one Generating Unit Outage
- Transformer Outages
- Synchronous condenser Outages
- Shunt capacitor or capacitor bank Outages
- Series capacitor Outages
- Static VAR compensator Outages
- Bus Outages – bus Outages can be considered for the following ongoing Outage conditions.
    - For a circuit breaker bypass-and-clear Outage, bus Contingencies shall be taken on both bus segments that the bypassed circuit breaker connects to.
    - For a bus segment Outage, the remaining parallel bus segment shall be considered as a single Contingency.
    - Credible overlapping Contingencies – Overlapping Contingencies typically include transmission lines connected to a common tower or close proximity in the same right-of-way.

L.6.2 Manual Contingency Analysis

If manual Contingency analysis is used, the RTE will perform pre-Contingency steady-state power flow analysis and determines if pre-Contingency operating criteria is violated. If pre-Contingency operating criteria cannot be preserved, the RTE records the lines and buses that are not adhering to the criteria. If manual post-Contingency analysis is used the RTE obtains one or more Contingencies in each of the base cases. For each Contingency resulting in a violation or potential violation in the operating criteria above, the RTE records the critical post-Contingency facility loadings and bus voltages.

L.6.3 Contingency Analysis Utilizing a Contingency Processor

For a large area, the RTE may utilize a Contingency processor.

L.6.4 Determination of Crucial Limitations

After performing Contingency analysis studies, the RTE analyzes the recorded information to determine limitations. The limitations are conditions where the pre-Contingency and/or post-Contingency operating criteria cannot be conserved and may include a manageable overload on the facilities, low post-Contingency bus voltage, etc. If no crucial limitations are determined, the RTE determines if additional studies are necessary.

L.7 Traditional Planning Methodology to Protect Against Violating Operating Limits

After performing Contingency analysis studies, the RTE next develops the transfer capability and develops procedures, Nomograms, RMR Generation requirements, or other Constraints to ensure that transfer capabilities respect operating limits.

L.8 Limits for Contingency Limitations

Transfer limits are developed when the post-Contingency loading on a transmission element may breach the element's emergency rating. The type of limit utilized is dependent on the application and includes one of the following limits:

- Simple Flow Limit - best utilized when the derived limit is repeatable or where parallel transmission elements feed radial Load.

- RAS or SPS – existing Remedial Action Schemes (RAS) or special protection systems (SPS) may impact the derivation of simple flow limits. When developing the limit, the RTE determines if the RAS or SPS will be in-service during the Outage and factors the interrelationship between the RAS or SPS and the derived flow limit. RTE will update the transfer limits in recognition of the changing status and/or availability of the RAS or SPS.