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Appendix L-1

The provisions of this Appendix L-1 apply to the calculation of ATC to establish Wheeling Through Priorities that will be effective beginning June 1, 2024 and thereafter.

Appendix L-1 Method 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.

For purposes of determining ATC in the market optimization, ATC is defined as the Total Transfer Capability (TTC) less the Transmission Reliability Margin (TRM), less the sum of any unused existing transmission commitments (ETComm), 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, under specified system conditions. In collaboration with owners of rated paths, the CAISO utilizes rated system path methodology to establish the TTC of CAISO Transmission Interfaces.

L.1.3 Existing Transmission Commitments (ETComm) include (1) transmission capacity for Existing Contracts (ETC) and Transmission Ownership Rights (TOR), (2) transmission capacity for Wheeling Through Priorities, and (3) Native Load needs determined in accordance with this Appendix L-1, including Native Load growth in the applicable horizon and ATC Load Serving Entities acquire in the daily request window.

L.1.3.1 Transmission Capacity for ETC and TOR – The CAISO uses the ETC Reservations Calculator (see Section L.1.3.1.1) to reserve 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 = TTC 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 = TTC/2000* ETC).

Existing Contract capacity reservations remain reserved during the Day-Ahead Market and through the FMM. To the extent that the reservations are unused after the FMM has been run for a given fifteen-minute interval, then the capacity reservations are released for the three RTD intervals within that fifteen-minute interval.

Transmissions Ownership Rights capacity reservations remain reserved during the Day-Ahead Market and Real-Time Market. 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.1.3.1.1 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 Market Close of the DAM and prior to Market Close of the RTM. The amount of transmission capacity reservation for ETC and TOR rights is determined based on the TTC 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 the Real-Time Market. 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.1.3.2 Wheeling Through Priorities – ETComm include transmission capacity for Wheeling Through Priorities pursuant to Sections 23.4, 23.5, and 23.6 of the CAISO Tariff.

The ATC for Wheeling Through Priorities is calculated based on the following formula which distinguishes it from ATC in the market optimization:

ATC = TTC – ETComm - TRM

L.1.3.3 Native Load Needs – ETComm include transmission capacity at the Interties that is set aside to meet Native Load needs. The amount of such transmission capacity (apart from the amount of transmission capacity to serve expected Native Load growth as described below) at each Intertie for each calendar month equals the highest MW quantity of total Resource Adequacy and non-Resource Adequacy import supply under contract to Load Serving Entities (LSEs) dedicated to serving their load as demonstrated by Resource Adequacy showings, and non-Resource Adequacy contract showings under Section 23.3 at the Intertie for that same calendar month during the previous two (2) years, as may be adjusted under Sections L.1.3.3.2 and L.1.3.3.3.

L.1.3.3.1 Native Load Growth – Transmission capacity at the Interties that is set aside in ETComm to meet Native Load needs also includes transmission capacity to serve expected

Native Load growth in the rolling thirteen (13)-month horizon. The amount of such transmission capacity at each Intertie set aside in ETComm to meet Native Load growth will be calculated by comparing the CEC load forecast for the applicable future period to the forecasts used to set CAISO Resource Adequacy requirements applicable to that period for the previous two (2) years to determine an overall Native Load growth amount and then assigning a portion of this expected Native Load growth amount to each Intertie using the highest ratio of Resource Adequacy imports shown for that calendar month to total Resource Adequacy capacity shown for that calendar month during the previous two (2) years.

L.1.3.3.2 Adjustments to Native Load Needs Based on New Contract Information – The CAISO will use applicable contract information provided in accordance with, and meeting the requirements of, Section 23.3 of the CAISO Tariff to update the historical RA import supply or non-RA import supply data described in this Section L.1.3.3 to improve the accuracy of the calculation of Native Load needs calculated thirteen (13) months before the applicable calendar month.

L.1.3.3.3 Monthly Update of Native Load Needs – Following the RA and non-RA import contract showings at the end of the Resource Adequacy cure period under Section 40 of the CAISO Tariff, the CAISO will update or "true up" the amount of transmission capacity set aside in ETComm to meet Native Load needs at each Intertie to include the sum of the most recent actual showings of (i) Resource Adequacy import supply contained in monthly Resource Adequacy Plans and (ii) non-RA import supply to be delivered at the Intertie reported to the CAISO for that same calendar month. The CAISO will also use the updated ATC values for native load following the month-ahead Resource Adequacy and non-Resource Adequacy contract showings to calculate daily ATC for Native Load during the applicable month, while also accounting for any applicable CPM designations that utilize ATC. Any contract that is not shown to the CAISO by the end of the Resource Adequacy cure period under Section 40 cannot count for purposes of setting aside Native Load capacity for the applicable month.

If the amount of transmission capacity set aside at an Intertie to meet Native Load needs for a calendar month based on RA and non-RA import showings for that month under Sections L.1.1.1 and L.1.3.3.2 (and including transmission capacity to serve expected Native Load growth under Section L.1.3.3.1) is greater than the most recent actual showings of Resource Adequacy import supply contained in monthly Resource Adequacy Plans and non-Resource Adequacy import supply to be delivered at the Intertie for that same month, the resulting excess transmission capacity will be released as ATC and will be available for awarding as monthly Priority Wheeling Throughs pursuant to the monthly request window process in Section 23.4 of the CAISO Tariff. If the amount of transmission capacity set aside at an Intertie to meet Native Load needs for a calendar month based on Resource Adequacy and non-Resource Adequacy import showings for that month under Sections L.1.1.1 and L.1.3.3.2 (and including transmission capacity to serve expected Native Load growth under Section L.1.3.3.1) plus the amount of TRM set aside to account for uncertainty associated with actual monthly Resource Adequacy and non-Resource Adequacy showings, is less than the most recent actual showings of Resource Adequacy import supply contained in monthly Resource Adequacy Plans and non-Resource Adequacy import supply to be delivered at the Intertie for that same month, the ATC at the Intertie that has not been awarded in a prior monthly request window, will be reduced to account for the additional Resource Adequacy and non-Resource Adequacy import showings at the Intertie that are unrelated to any change in the planning reserve margin. If no ATC remains at an Intertie because it has been awarded in prior months' request windows pursuant to Section 23.4 of the CAISO Tariff, and the TRM cannot accommodate all native load needs, then the amount of transmission capacity set aside at the Intertie to meet Native Load needs for a calendar month, including transmission capacity to serve expected Native Load growth, will remain as originally calculated by the CAISO even if the actual Resource Adequacy and non-Resource Adequacy

import contract showings for the month exceed the amount of ATC the CAISO has set aside for Native Load in accordance with Sections L.1.3.3, L.1.3.3.1, and L.1.3.3.2. Under these circumstances, the CAISO will continue to honor the scheduling priority of the Wheeling Through transactions for which ATC has been awarded. The examples below in this Section L.1.3.3.3 illustrate the aforementioned processes.

For example, if the Native Load set-aside value under Sections L.1.3.3, L.1.3.3.1, and L.1.3.3.2 for a particular Intertie for the month of May is 1,000 MW, and only 900 MW of Resource Adequacy and non-Resource Adequacy import capacity is actually shown on that Intertie in the monthly showing process for the month of May, the CAISO will release an additional 100 MW of ATC on that Intertie that can be awarded a monthly Wheeling Through Priority for May through the request window that closed at the same time as the monthly Resource Adequacy and non-Resource Adequacy import showing deadline for May.

Also, for example, assume the following: the Native Load set-aside value under Sections L.1.3.3, L.1.3.3.1, and L.1.3.3.2 for the month of May is 1,000 MW; the amount set aside for Native Load based on historical showings is 10 MW at the Intertie; at the start of the monthly request window for May, there is 100 MW of ATC for the month of May that has not been awarded to Wheeling Throughs in prior months' request windows; and 1,100 MW of Resource Adequacy and non-Resource Adequacy import capacity is actually shown on the Intertie in the monthly showing process for the month of May. Under these circumstances, the CAISO will reduce the ATC on the Intertie by 100 MW assuming the 100 MW are not associated with an increase in the planning reserve margin for which an amount has been set aside in the load forecast uncertainty component of the TRM. If the 100 MW were associated with an increase in the planning reserve margin and not simply a difference between historic values and the monthly Resource Adequacy and non-Resource Adequacy contract values and assuming the CAISO had set aside 90 MW in the TRM load forecast uncertainty component to account for changes in the planning reserve margin, then ten (10) MW of the excess monthly showings will be supported by the TRM component, and 10 MW of ATC will be available for awarding as monthly Priority Wheeling Throughs for May.

Finally, assume the circumstances in the prior example except there is zero MW of ATC available prior to the Resource Adequacy and non-Resource Adequacy showing deadline and the start of the request window for ATC for the month of May. The CAISO will continue to honor all of the ATC that has been previously awarded to Priority Wheeling Throughs in prior monthly request windows, and no additional ATC will be available for the actual Resource Adequacy and non-Resource Adequacy showings above the historic values used to set ATC. If the excess Resource Adequacy and non-Resource Adequacy showings were associated with an increase in the planning reserve margin, 90 MW of the excess monthly showings will be supported by the TRM component that accounts for such load forecast uncertainty.

L.1.4 [Not Used]

L.1.5 Transmission Reliability Margin (TRM) is an amount of transmission transfer capability reserved at a CAISO Intertie point that is necessary to provide reasonable assurance that the interconnected transmission network will be secure. TRM accounts for the inherent uncertainty in system conditions and the need for operating flexibility to ensure reliable system operation as system conditions change.

The CAISO uses TRM at Intertie points to account for NERC-approved components of uncertainty as described in the Transmission Reliability Margin Implementation Document (TRM Document), including:

- Forecast uncertainty in transmission system topology, including forced or unplanned outages or maintenance outages.

- Allowances for parallel path (loop flow) impacts, including unscheduled loop flow.
- Allowances for simultaneous path interactions.
- Aggregate load forecast uncertainty.
- Variations in generation dispatch (including, but not limited to, forced or unplanned Outages, maintenance Outages, and future resource conditions).

The CAISO will establish TRM in all applicable horizons, including monthly and daily, and may change (increase or decrease) TRM values across all such horizons, including prior to Market Close of the DAM and RTM. To the extent TRM values are decreased in a given horizon, additional ATC would become available in that horizon.

The methodology the CAISO uses to establish each component of uncertainty is as follows:

The CAISO uses the transmission system topology component of uncertainty to address a potential ATC path limit reduction at an Intertie resulting from an emerging event, such as an approaching wildfire, that is expected to cause a derate of one or more transmission facilities comprising the ATC path. When the CAISO, based on existing circumstances, forecasts that such a derate is expected to occur, the CAISO may establish a TRM value for the affected ATC path in an amount up to, but no greater than, the amount of the expected derate. The CAISO will set the transmission system topology component of uncertainty as a percentage of TTC pursuant to the CAISO TRM Implementation Document, throughout the rolling thirteen (13)-month horizon set forth in Section L.3, on Interties where the CAISO has historically relied upon import supply to serve load. The CAISO can change the TRM for any applicable horizon as circumstances change.

The CAISO uses the parallel path component of uncertainty to address the impact of unscheduled flow (USF) over an ATC path that is expected, in the absence of the TRM, to result in curtailment of Intertie Schedules in Real Time as a result of the requirements established in WECC's applicable USF mitigation policies and procedures (WECC USF Policy). When the CAISO forecasts, based on currently observed USF conditions and projected scheduled flow for an upcoming Operating Hour(s), that in the absence of a TRM, scheduled flow will need to be curtailed in Real Time under the applicable WECC USF Policy, the CAISO may establish a TRM for the ATC path for the applicable hour(s) in an amount up to, but no greater than, the forecasted amount that is expected to be curtailed in Real Time pursuant to the WECC USF Policy.

The CAISO uses the simultaneous path interactions component of uncertainty to address the impact that transmission flows on an ATC path located outside the CAISO's Balancing Authority Area may have on the transmission transfer capability of an ATC path located at an Intertie. In the event of such path interactions, the CAISO uses a TRM value to prevent the risk of a system operating limit violation in Real Time for the CAISO ATC path. The amount of the TRM value may be set at a level up to, but not greater than, the forecasted impact on the CAISO ATC path's capacity imposed by expected flow on the non-CAISO ATC path.

The CAISO uses the aggregate load forecast component of uncertainty to address load forecast uncertainty at selected Interties. The CAISO will set this component of uncertainty as a percentage of TTC pursuant to the CAISO TRM Implementation Document, across the rolling thirteen (13)-month horizon and the rolling seven (7)-day horizon, on Interties where the CAISO has historically relied upon import supply to serve load. The load forecast component of the TRM may include sub-components to account for (1) changes ordered by Local Regulatory Authorities in planning reserve margins or resource procurement requirements for Load Serving Entities, and (2) load forecast changes.

The CAISO uses the variations in generation dispatch component of uncertainty to address variations in generation dispatch driven by resource outages or other conditions to recognize that, in some circumstances, supply may have to be replaced or additional supply may have to be brought into the system to meet the changing needs. For example, the TRM may account for the unavailability of solar energy during the net-peak load period, the unavailability of hydroelectric capacity during drought conditions, or wind capacity not performing at its Net Qualifying Capacity. The CAISO will set this component of uncertainty as a percentage of TTC pursuant to the CAISO TRM Implementation Document, across the rolling thirteen (13)-month horizon and the rolling seven (7)-day horizon, on Interties where the CAISO has historically relied upon import supply to serve load.

The CAISO uses the following databases or information systems, or their successors, in connection with establishing TRM values: the CAISO's outage management system pursuant to Section 9, Existing Transmission Contract Calculator (ETCC), PI, EMS, and CAS.

L.1.6 Capacity Benefit Margin (CBM) is that amount of transmission transfer capability reserved for 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 CAISO does not use CBMs. The CBM value is set at zero.

L.2 ATC Algorithm for Market Optimization

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

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

ATC Calculation For Imports:

ATC = TTC - CBM - TRM - AS from Imports- Net Energy Flow - Hourly Unused TR Capacity.

ATC Calculation For Exports:

ATC = TTC - CBM - TRM - Net Energy Flow - Hourly Unused TR Capacity.

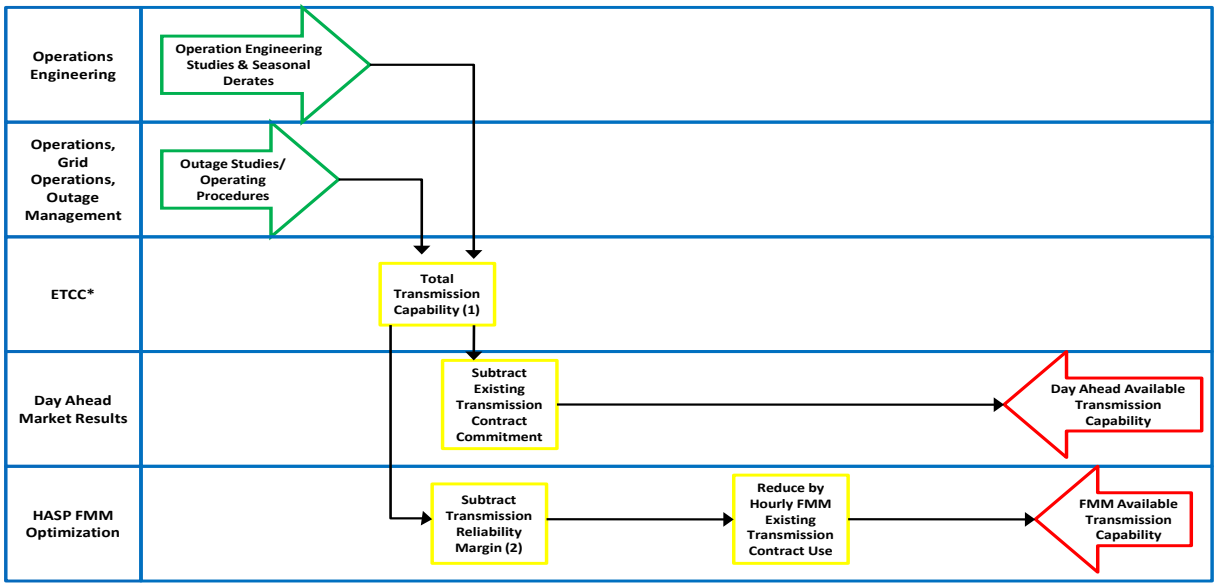
The specific data points used in the ATC calculation are each described in the following table.

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.
TTC	TTC MW	Hourly Total Transfer Capability of a specified Transmission Interface, per path direction, with consideration given to known Transmission Constraints and operating limitations.
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.

Actual ATC mathematical algorithms and other ATC calculation information are located in the CAISO's ATC Implementation Document (ATCID) posted to the CAISO Website.

L.3 ATC Process Flowchart and Calculation Periods

Available Transmission Capability



*ETCC – Existing Transmission Contract Calculator
(1) – WECC rated path methodology
(2) - See TRMID posted on OASIS

The CAISO will calculate ATC on the Interties each calendar month across a rolling thirteen (13)-month horizon. The CAISO will also calculate ATC on the Interties each day prior to the close of the Day-Ahead Market across a rolling seven (7)-day horizon, and will publish the resulting ATC values daily on OASIS.

L.4 TTC 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 also requires the inclusion or exclusion of operating Transmission Constraints based on system conditions being studied.

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) TTC are governed by the California Operating Studies Subcommittee (OSS), 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 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 becomes:

TTC = lesser of {Thermal Limit, Voltage Limit, Stability Limit} following contingencies consistent with requirements of the NERC Reliability Standards

L.4.4 The CAISO may update the determination of TTC to be used in the calculation of daily ATC across a rolling seven (7)-day horizon to reflect current information on the anticipated transfer capability of the transmission network, including information on Outages affecting the transfer capability on Interties.

L.5 Developing a Power Flow Base-Case

L.5.1 **Base-cases** will be selected 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 Update a Power Flow Base-Case

The selected 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.5.2.1 Outage Consideration

Unless detailed otherwise, the CAISO 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 CAISO, only the necessary Outages will be modeled to avoid an unnecessarily burdensome and large number of base-cases.

L.5.2.2 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 CAISO estimates the area Load levels to be utilized in the peak, partial-peak and/or off-peak base-cases. The CAISO 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 appropriate Load levels are determined, the CAISO may scale the base-case Loads to the area studied, as appropriate.

L.5.2.3 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 CAISO may estimate select path flows depending on the studied area. In the event that it is not possible to estimate path flows, the CAISO 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 CAISO will trend path flows on previous similar days.

L.5.2.4 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 CAISO 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 CAISO, large Generating Units outside the studied area will also be considered.

L.5.2.5 Voltage Levels

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

capacitors, generators).

L.6 Contingency Analysis

Contingency analysis studies are performed 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 CAISO 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 CAISO simulates the appropriate Contingencies as required by applicable NERC and WECC Reliability Standards and criteria.

L.6.2 Manual Contingency Analysis

If manual Contingency analysis is used, the CAISO 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 CAISO records the lines and buses that are not adhering to the criteria. If manual post-Contingency analysis is used the CAISO 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 CAISO records the critical post-Contingency facility loadings and bus voltages.

L.6.3 Contingency Analysis Utilizing a Contingency Processor

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

L.6.4 Determination of Crucial Limitations

After performing Contingency analysis studies, the CAISO 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 CAISO determines if additional studies are necessary.

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

After performing Contingency analysis studies, the CAISO next develops the transfer capability and develops procedures, Nomograms, RMR Generation requirements, or other Transmission 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 - existing Remedial Action Schemes (RAS) may impact the derivation of simple flow limits. When developing the limit, the CAISO determines if the RAS will be in-service during the Outage and factors the interrelationship between the RAS and the derived flow limit. The CAISO will update the transfer limits in recognition of the changing status and/or availability of the RAS.