Introduction:

In order to avoid confusion due to lengthy sentences, this response will utilize the following acronyms for commonly use terms:

Acronym	Term
ATC	Active Transmission Constraint
CCF	Constraint Contribution Factor
CMC	Constraint Management Charge
DDC	Day-Ahead Deviation Charge
NDL	Notification Deadline
DA	Day Ahead
RT	Real Time
RSG	Revenue Sufficiency Guarantee

Topic 1: ***Schedule 46***

1. Explain in detail each step of the Constraint Management Charge Allocation Factor determination process under proposed Schedule 46.

MISO Response: The purpose of the CMC Allocation Factor Study is to determine the portion of the RT RSG Credits incurred to commit Resources for Active Transmission Constraints (ATCs) that also provide capacity benefits by reducing the costs that would otherwise have been incurred to satisfy MISO's capacity needs (energy, reserves and headroom requirements). In other words, when a Resource committed to manage an ATC receives a RT RSG MWP, an allocation factor of 0.9 would indicate that 10 percent of those RSG costs should be recovered through the Day-Ahead Schedule Deviation Rate or RSG Second Pass Distribution because they represent the other benefits of committing the Resource beyond management of the ATC.

MISO conducts the CMC Allocation Factor Study on a quarterly basis using historical data from the past year (i.e., prior 12 months). The data used in the study is on a rolling 12 month basis. For example, for a March 1, 2014 effective date, the data used to conduct the study and the study period will be from February 1, 2013 through January 31, 2014. For June 1, 2014 effective date, it would use data from May 1, 2013 through April 30, 2014.

Step One, Commitment Type Mapping, evaluates the specific commitment data for the study period. The type of commitment for Resources paid RT RSG MWP is classified into three categories; commitments for capacity, commitments for Transmission Reliability, and commitments for Voltage and Local Reliability. Each Resource commitment within the study period is classified with a single commitment type. For the purpose of the CMC Allocation Factor Study, only Resource commitments that are

classified as for Transmission Reliability are considered, as these are the commitments for managing ATCs.

Step Two, Headroom and Capacity Need Calculation, identify those hours during the study period that would have required a capacity commitment, absent the commitments for managing ATCs. In general, if there is no need for additional capacity, even when excluding those commitments for managing ATCs, then the entire cost of the commitment for managing the ATC should be attributed to the ATC. In any hour where there is a need for additional capacity, when excluding those commitments for managing ATCs, the study will evaluate what the cost would have been for the least-cost commitment that could have been made to satisfy the need for additional capacity.

Step Three, Capacity Resource Commitment Logic, uses the data from Step One and Step Two to evaluate specific hours where there is a need for additional capacity and a Resource commitment for managing an ATC. For such hours, Step Three calculates the RT RSG MWP that would have been made, if any, for the least-cost replacement Resource.

Step Four, CMC Allocation Factor Calculation, determines the costs attributable to Constraint Management and the cost attributable to the need for additional capacity. In general, if there is no need for additional capacity, the entire RT RSG MWP is attributed to Constraint Management. Finally, the CMC Allocation Factor is calculated based on the costs attributable to Constraint Management and the costs attributable to the need for additional capacity.

In addition to this written response, MISO has provided a numerical example that shows the process for calculating the CMC Allocation Factor in Schedule 46 in Exhibit A.

a. For step one, define the terms "Hourly Real-Time RSG MWP" and "Resource CMC Real-time RSG MWG" and explain why the terms are equal for each hour and active transmission constraint, as stated in Schedule 46. Also, explain the determination of the Constraint Management Charge capacity committed (CMC_CAP_COM).

MISO Response: The term "Hourly Real-Time RSG MWP" is defined in the MISO Tariff as "Real-Time Revenue Sufficiency Guarantee Credit", in section 1.538. In other words, it is the Hourly Real-Time RSG MWP paid to a Resource, before taking into consideration the commitment type. The term "Resource CMC Real-[T]ime RSG MW[P]" is a variable used in Schedule 46 that is the result of associating the defined Tariff term "Real-Time Revenue Sufficiency Guarantee Credit" to a specific commitment type. Specifically, it is the "Hourly Real-Time RSG MWP" for a Resource that is committed for Transmission Reliability (i.e., to manage an ATC). The term "Resource CMC Real-time RSG MWP" identifies the subset of all "Hourly Real-Time RSG MWP" for all Resources that is associated with Resource commitments for Transmission

Reliability. Therefore, the term "Hourly Real-Time RSG MWP" and "Resource CMC Real-Time RSG MWP" are equal for any Resource that is committed for Transmission Reliability.

In order to evaluate the need for additional capacity, absent the commitments for managing ATCs, the study utilizes the CMC_CAP_COM. The capacity committed (CMC_CAP_COM) is the sum of all Real-Time Hourly Economic Maximum Limits (RT_ECO_MAX) for all Resources committed for all ATCs in a given hour. This value is used as an input to the calculation of the Capacity MW Needed (CAP_MW_NEED) in Step Two. As discussed in MISO response 1, Step Two identifies those hours that would have required additional capacity, absent the commitments for managing ATCs.

> b. For step two, define the terms "RES_LP_VOL," "TP_Next_Hour," "$RT_BLL_MTR_{GEN}$," and "TP_Current_Hour." Explain the determination of the hourly Headroom Available (HR_AVAIL), the Operations Headroom Need (HR_NEED), and the Capacity MW Needed (CAP_MW_NEED).

MISO Response: The term "$RT_BLL_MTR_{GEN}$" stands for "Real-Time Billable Meter Volume for a Generator". This term is the same as the MISO Tariff defined term, Actual Energy Injection, in section 1.1a. The term "RES_LP_VOL" stands for "Resource Load Profiled Volume". This term represents the Actual Energy Injection for each five-minute Dispatch Interval. The terms "TP_Next_Hour" and "TP_Current_Hour" refer to "Transmission Provider" current and next hour in order to isolate changes in data from one hour to the next.

To determine the Headroom Available (HR_AVAIL), each Resource is tested to determine if it is online and being dispatched for Energy in a given Dispatch Interval. If the Resource has Actual Energy Injection (i.e., RES_LP_VOL > 0) and is being dispatched (i.e., BP > 0) in a given Dispatch Interval, the calculation will include that Resource's Headroom (RES_HR). If a Resource is not online or not being dispatched for Energy the RES_HR is set equal to zero. If a Resource is online and being dispatch for Energy, the RES_HR determines the amount of capacity that is available from the Resource, but not otherwise being used for Energy or Operating Reserves. The calculation achieves this result by subtracting the amount being used for Energy and Operating Reserves (i.e., Dispatch Target for Energy, Regulating Reserve, Spinning Reserve and Supplemental Reserve) from the total available capacity for the Resource (i.e., its Real-Time Economic Maximum Limit). The RES_HR is then integrated into an hourly value for each hour of the study period to calculate the Headroom Available (HR_AVAIL).

Headroom Need (HR_NEED) is calculated on an hourly basis for all hours in the study period. HR_NEED is the maximum of the unloaded capacity requirement, currently 750 MW, and sixty percent of the hourly load change. MISO RT Operations has observed that when we have less than 750 MW of headroom during flat load periods or when we

have less than 60% of observed load change in any hour, it results in scarcity prices which are not indicative of actual system conditions. In other words, the Headroom Need represents the amount of on-line available capacity, not otherwise being used for Energy and Operating Reserves, necessary in order to ensure reliable and efficient operations.

Once the HR_AVAIL, HR_NEED, and CMC_CAP_COM (calculated in Step One and discussed in MISO response 1a) are known for each hour, the Capacity MW Need (CAP_MW_NEED) is calculated for each hour in the study period. CAP_MW_NEED is equal to the HR_AVAIL minus the HR_NEED minus the CMC_CAP_COM. In general, as discussed in MISO response 1, the calculation of CAP_MW_NEED in Step Two identifies the remaining amount of total Headroom Available (HR_AVAIL), after taking into account the amount of capacity needed for the Headroom Need (HR_NEED) and the amount of capacity associated with Resources committed for ATCs (CMC_CAP_COM).

Once the CAP_MW_NEED is known, each hour of the study period is evaluated to determine which hours required a commit in order to meet the capacity need, absent the capacity associated with the commitments made for managing ATCs. If the CAP_MW_NEED is positive or equal to zero, then there was enough Headroom Available (HR_AVAIL) to meet the capacity needs for the hour, even absent the capacity associated with the commitments made for managing ATCs. If the CAP_MW_NEED is negative, then there was not enough Headroom Available (HR_AVAIL) to meet the capacity needs for the hour, absent the capacity associated with the commitments made for managing ATCs (CMC_CAP_COM), thereby identifying an hour that would require a commitment in order to meet the capacity need.

c. For step three, explain the criteria for determining whether a resource was available for commitment for a capacity resource commitment analysis period. Also, explain how MISO will select the Constraint Management Charge Replacement Resource (CMC_RR) and determine the associated Capacity Commitment Make-Whole Payment (CAP_COM_MWP).

MISO Response: First, Step Three identifies the hours for which there is a Capacity MW Need (CAP_MW_NEED) and a Resource committed for an ATC. Each Resource commitment duration is then limited to those hours where there exists a CAP_MW_NEED (i.e., the Capacity Resource Commitment Analysis Period or CAP_RES_COM_AP). The commitment duration is from the earliest hour in which there is a CAP_MW_NEED to the last hour in which there is a CAP_MW_NEED.

Second, Step Three looks to identify a suitable replacement resource based on a set of criteria that compares the characteristics of the Resource committed to manage the ATC to that of a potential replacement resource. The criteria are meant to ensure that the replacement resource is available for commitment and not otherwise committed, has adequate capacity to meet the need, must not have a requirement to run for longer than is

needed, must be able to run for at least as long as is needed, and must be able to startup in time to meet the need. All Resources that meet these criteria are considered potential replacement resources.

Third, Step Three calculates the total commitment cost (CAP_COM_COST) for the potential replacement resource as the Start-up Cost, No Load Cost and Incremental Energy Cost up to the resource's Real-Time Hourly Economic Minimum Limit.

Fourth, once the CAP_COM_COST is calculated for each potential replacement resource, it is divided by sum of each Resource's Real-Time Hourly Economic Maximum Limit (RT_ECO_MAX) for the CAP_RES_COM_AP to calculate the per MW of capacity commitment cost (CAP_COM_COST). The replacement resource that will be used is identified as the specific replacement resource that has the least CAP_COM_COST per MW of all potential replacement resources. This approach is similar to the approach used in the Security Constraint Unit Commitment process.

Fifth, once the least-cost replacement Resource is identified, Step Three calculates the RT RSG MWP that would have been paid to the replacement resource, had it been committed (CAP_COM_MWP). Similar to RT RSG MWP, the CAP_COM_MWP is equal to the positive difference between the commitment costs (CAP_COM_COST) and the market revenue. The market revenue in this case is equal to the Real-Time Economic Minimum Limit (the same value used to calculate the Incremental Energy Cost) multiplied by the Real-Time Ex-Post LMP. The total CAP_COM_MWP is then distributed equally to each hour of the CAP_RES_COM_AP for use in Step Four.

d. For step four, explain the determination of the Capacity Contribution (CAP_CON), Constraint Management Charge Contribution (CMC_CON), and Constraint Management Charge Allocation Factor.

MISO Response: The RT RSG MWP for the CMC Resource (CMC_RES_MWP) and the RT RSG MWP for the replacement Resource (CAP_CON_MWP) are assigned to the Capacity Contribution (CAP_CON) and the CMC Contribution (CMC_CON) based on a Capacity Commitment Need (CAP_COM_NEED) and the existence of a replacement Resource.

For hours in which the CAP_COM_NEED is zero, no capacity was needed from the CMC Resource in order to meet the need for additional capacity. As a result, the entire amount of CMC_RES_MWP is assigned to the CMC_CON. In hours where the CAP_COM_NEED is one and no replacement Resource exists, the entire amount of capacity from the CMC Resource was needed in order to meet the need for additional capacity. As a result, the entire amount of CMC_RES_MWP is assigned to the CAP_CON.

In hours where the CAP_COM_NEED is one and a replacement Resource exists, some portion of the CMC Resource capacity was need to meet the need for additional capacity. However, the study has identified the existence of a replacement Resource that may have been a less expensive alternative to the CMC Resource. Therefore, the amount assigned to the CAP_CON is equal to the CAP_COM_MWP, so long as it is less than the CMC_RES_MWP, otherwise it will be set equal to the CMC_RES_MWP. The amount assigned to the CMC_CON is equal to the positive difference between the CMC_RES_MWP and the CAP_COM_MWP. In other words, if the replacement Resource were a less expensive alternative to the CMC Resource, the RT RSG MWP for the replacement Resource would be assigned to the CAP_CON and the additional cost incurred from committing the CMC Resource as compared to the replacement Resource is assigned to the CMC_CON.

Once the CMC_RES_MWP and CAP_CON_MWP have been assigned to the CAP_CON and CMC_CON, the study determines the CMC Allocation Factor by dividing the amount of cost for the CMC_CON by the sum of all costs (i.e., CMC_CON plus CAP_CON). Finally the CMC Allocation Factor, which determines what of the CMC_RES_MWP and the CAP_COM_MWP is associated with the management of Active Transmission Constraints Can be determined based on the CMC_CON divided by the sum of the CAP_CON and CMC_CON.

In addition to this written response, MISO has provided additional detail along with a numerical example in Exhibit A.

2. Explain in detail how the calculation of the Constraint Management Charge Allocation Factor under proposed Schedule 46 accounts for real-time Revenue Sufficiency Guarantee (RSG) costs allocated to Voltage and Local Reliability, the RSG Second Pass Distribution, and Day-Ahead Schedule Deviation and Headroom Charges. For example, explain why the product of the aggregate applicable real-time RSG credits and the difference between one and the Constraint Management Charge Allocation Factor equals the RSG costs funded through Day-Ahead Schedule Deviation and Headroom Charges, pursuant to the proposed revisions to section 40.3.3.a.v.

MISO Response: Under the proposed methodology, the allocation of RT RSG MWP is broken down into 5 components: Voltage and Local Reliability, Constraint Management, Day-Ahead Schedule Deviation, Headroom, and Second Pass Distribution. The first three components utilize the type of Resource commitment to identify which component will be used to allocate the costs. The fourth component, Headroom, uses the same rate as the Day-Ahead Schedule Deviation, but is allocated as part of Second Pass Distribution. The fifth component, Second Pass Distribution, allocates the costs for Topology Adjustments and Transmission De-rates, Headroom, Market-wide Net Deviations, and any residual uncollected amount associated with Day-Ahead Schedule Deviation, *pro rata*, to Market Participants based on Market Load Ratio Share.

The CMC Allocation Factor proposed in Schedule 46 is applied to the subset of RT RSG MWPs made to Resource commitments for managing ATCs. It is not applied to Resource commitments for Voltage and Local Reliability or Resource commitments for Day-Ahead Schedule Deviation and Headroom (i.e., economics). Once the CMC Allocation Factor is applied to the RT RSG MWP, the remaining portion (one minus the CMC Allocation Factor) will flow to the Day-Ahead Schedule Deviation and Headroom component. This represents the portion of these commitments (those made to manage ATC) that are assumed to be providing capacity benefits as well.

By attributing the RT RSG MWP to Constraint Management based on the CMC Allocation Factor and attributing one minus the CMC Allocation Factor to Day-Ahead Schedule Deviation and Headroom, it ensures the entire amount of RT RSG MWP is allocated to the two rates.

In addition to this written response, MISO has provided additional process flow charts and numerical examples in response to this question in Exhibit A.

<u>Topic 2</u>: *Constraint Management Charges*

3. The description of the Constraint Management Charge in proposed Schedule 46 states that the Constraint Management Charge Allocation Factor Study determines the share of real-time RSG costs attributable to the "commitment of Resources for Active Transmission Constraints." Should this instead be "Resources committed in any R[eliability] A[ssessment] C[ommitment] process or the L[ook] A[head] C[ommitment] process for an Active Transmission constraint and not otherwise attributable to Topology Adjustment and Transmission De-rates," consistent with the definition of the Constraint Management Charge in section 1.537a of the existing MISO tariff?

MISO Response: MISO agrees that the language in proposed Schedule 46 could be modified to better align with the definition of the Constraint Management Charge in section 1.537. However, the phrase "and not otherwise attributable to Topology Adjustment and Transmission De-rates" should *not* be included in the modification to Schedule 46 because this is not correct.

The Constraint Management Charge (CMC) definition in section 1.537a refers to the outcome or final result of assessing the CMC Rate to the applicable CMC Adjusted Deviation Volume. Schedule 46, on the other hand, determines the amount of all RT RSG Credits that should be considered in the numerator of the CMC Rate.

The phrase "determines the share of real-time RSG costs attributable to the commitment of Resources for Active Transmission Constraints" in Schedule 46 is referring to section 40.3.3.a.v of the Tariff. Specifically it refers to the phrase, "(1) the product of: (a) the aggregate Real-Time Revenue Sufficiency Guarantee Credit in that Hour attributed to

Resources committed in any RAC processes or the LAC process and (b) the Constraint Management Charge Allocation Factor, pursuant to Schedule 46".

Therefore, MISO does not believe Schedule 46 should be updated to directly align with the definition in section 1.537a because it is only meant to refer to a portion of the CMC Rate; specifically the numerator. However, in order to provide additional clarity in Schedule 46, MISO proposes to replace the phrase "the share of Real-Time Revenue Sufficiency Guarantee (RSG) Make-whole Payments (MWP) attributable to the commitment of Resources for Active Transmission Constraints" with "the share of Real-Time Revenue Sufficiency Guarantee Credits attributable to Resources committed in any RAC processes or the LAC process for Active Transmission Constraints, pursuant to Section 40.3.3.a.v", should the Commission agree this change provides additional clarity.

4. Provide numerical examples demonstrating (a) MISO's existing Constraint Management Charge formula under sections 40.3.3.a.iv and v, and (b) how MISO's proposed revisions to its tariff will change this formula. Provide examples illustrating these formulas in the event that the Constraint Management Charge rate cap does and does not apply.

MISO Response: MISO has provided numerical examples in Exhibit A in response to this question.

5. MISO states that the Constraint Management Charge Allocation Factor should be a better indicator than the Constraint Contribution Factor of the real-time RSG costs attributable to an active transmission constraint and that the Constraint Management Charge should "no longer be limited by the C[onstraint] C[ontribution] F[actor] of the Resource committed to address the relevant constraint."

MISO Response: The CMC Charge was intended to be based on the principle of cost causation. However, the IMM identified that the use of the CCF to as an Allocation Factor violated this principle as it indicated in its 2011 State of the Market Report:

> "The CMC formula currently under-allocates congestion-related RSG costs to the deviations that contribute to the need to incur these costs. The primary issue is that these RSG costs are multiplied by the GSF [(i.e., CCF)] for the committed resource as one step in determining the share that will be allocated to congestion-related deviations. While it is true that this will indicate the share of the resource's output that will provide relief on the constraint, it fails to recognize that in most cases all of the commitment costs were incurred because of the constraint, regardless of the magnitude of the GSF. Our studies have shown the average GSF of units committed for congestion management is roughly 35 percent, but is often as low as 5 or 10 percent. Consequently, a CMC deviation that might be entirely responsible for causing a commitment and any associated RSG payments frequently bears only a small fraction (e.g., 5 percent) of the costs.

> Additionally, most of the costs that are not borne by deviations affecting the constraint are then borne by market-wide deviations under the current Tariff. While there are times when constraint commitments would contribute to capacity needs (such as VLR commitments), we believe the share of costs appropriately allocated to the DDC should be limited to a share that reflects MISO's estimate of the typical capacity benefit of these commitments. In the case of VLR commitments, this share is approximately 10 percent."

The creation of the CMC Allocation Factor, and its application in the share of RT RSG Credits attributable to Resources committed in any RAC process or LAC process for the ATC, are a direct result of this recommendation. The CMC Allocation Factor represents the IMM's statement that "the share of costs appropriately allocated to the DDC should be limited to a share that reflects MISO's estimate of the typical capacity benefit of these commitments [(i.e., commitments made to manage Active Transmission Constraints)]".

However, as the IMM also states, "it is true that this [CCF] will indicate the share of the resource's output that will provide relief on the constraint". In other words, while the CCF is not a good indicator for the share of RT RSG Credits attributable to Resources committed in any RAC process or LAC process for the ATC (i.e., cost causation driver 1), it is a good indicator for the amount of impact a given deviation or the Resource committed to manage the ATC has on the ATC (i.e., cost causation driver 2).

a. Explain in detail why MISO should continue using the Constraint Contribution Factor in section 40.3.3.a.iv to calculate the "adjusted deviations" used to determine the real-time RSG Constraint Management Charges to be paid by market participants in sections 40.3.3.a.iv(a) and 40.3.a.iv(b).

MISO Response: In order for the CMC to satisfy the cost-causation principle, the deviations at various network locations must be converted to be measured based on their flow over the ATC. The direction (helping or hurting) and magnitude of a deviation's effect on an ATC can only be calculated using a CCF. Without the CCF, one cannot even distinguish whether a deviation at a particular location is helping or hurting the constraint.

For example, consider a supply-increasing deviation (e.g., a real-time Import Schedule that is not scheduled in the day-ahead market). The CCF is used to determine if the deviation increased the flow on the ATC, decreased the flow on the ATC, or neither increased nor decreased flow on the ATC.

If the supply-increasing deviation increases the flow on an ATC, it may cause the need to commit additional generation in order to manage the ATC. Since this supply increasing

deviation may have caused the need to commit additional generation, it should share in the responsibility of paying for any resultant RT RSG MWP to Resources committed to manage the ATC.

If the supply-increasing deviation decreases the flow on the ATC or has no effect on the ATC, it could not have caused the need to commit additional generation in order to manage the ATC. Since the supply-increasing deviation did not cause the need to commit additional generation, it should not share in the responsibility of paying for any resultant RT RSG MWP to Resources committed to manage the ATC.

Since the CCF indicates the amount of flow a given deviation has on the ATC as demonstrated above, MISO should continue to use the CCF in section 40.3.3.a.iv to calculate the "adjusted deviations", as it aligns with the principle of cost causation, appropriately allocating RT RSG MWP for Resource committed to manage the ATC to those deviations that may have caused the need to commit additional generation to manage the ATC.

> b. In the event that the Constraint Management Charge rate cap does not apply, explain in detail why MISO should continue using the Constraint Contribution Factor in the denominator of the Constraint Management Charge formula provided in section 40.3.3.a.v to calculate the "adjusted deviations," pursuant to section 40.3.3.a.iv, and to adjust topology adjustments or transmission de-rates.

MISO Response: As discussed in the MISO response 5a, the CCF must be used to calculate the flow-based impact of both the deviations and the Resource committed to manage the ATC has on an ATC. Likewise, it is needed in some cases to calculate the effects of topology adjustments.

As described in MISO response 5, the CMC Rate utilizes two primary values to achieve a cost causative rate methodology; the share of RT RSG Credits attributable to Resources committed in any RAC processes or the LAC process for ATCs and the amount of impact a given deviation or the Resource committed to manage the ATC has on the ATC. When considering a situation where the rate cap does not apply, by dividing the share of RT RSG Credits attributable to Resources committed in any RAC processes or LAC process for ATCs by the sum of the amount of impact deviations have on the ATC, it produces a per MW of deviation rate.

Topology Adjustments and Transmission De-rates are simply another form of deviations that may impact a given ATC. And as such, are included in the denominator of the rate and appropriately allocated a share of the costs in the CMC Charge. Like other deviations, the CCF is needed to translate the Topology Adjustment to a per MW of flow over the ATC

For example, consider a Topology Adjustment like a change in loop flow. A change in loop flow is similar to the impact of a Wheel-Through Schedule. While the amount of injection at one point is equal to the amount of withdrawal at some other point, it can have the net effect of increasing or decreasing the flow on an ATC. Similar to a Wheel-Through Schedule, Topology Adjustments are evaluated to determine the net impact they have on an ATC. This net impact is derived from looking at the one side of the flow as a supply-increasing deviation and the other side as a supply-decreasing deviation. Then the CCF is used to determine if and by how much the supply-increasing deviation and supply-decreasing deviation are increasing or decreasing the flow on the ATC. However, unlike the Adjusted Deviation Volume for which there is a define Market Participant; Topology Adjustments and Transmission De-rates do not have a defined Market Participant. As a result, the net impact of these deviations is assessed, *pro rata*, to Market Participants based on their Market Load Ratio Share.

A Transmission De-rate is also adjusted by the CCF; however, for Transmission De-rates, the CCF is always 100%. Since a Transmission De-rate represents a decrease in available capacity on a specific ATC, a 1 MW Transmission De-rate on the ATC will always result in 1 MW decrease in available flow on the ATC.

c. In the event that the Constraint Management Charge rate cap applies, explain in detail why MISO should use the Constraint Management Charge Allocation Factor, rather than the Constraint Contribution Factor, to adjust the applicable hourly economic maximum dispatch amounts in the denominator of the Constraint Management Charge rate.

MISO Response: After discussing this question with MISO's IMM, MISO believes that the applicable hourly economic maximum dispatch in the denominator of the CMC Rate should be adjusted for *both* the CMC Allocation Factor and the CCF. In other words, MISO now believes that it was incorrect to not multiply the hourly economic maximum dispatch by the CCF in the denominator. This is necessary in order to calculate the rate cap on the basis of the flow relief over the ATC provided by the committed resource. Hence, MISO will propose modifications necessary to effectuate this change.

The CMC Allocation Factor identifies the amount of RT RSG MWP for a given commitment that will be attributed to CMC and DDC. The application of the CMC Allocation Factor to the hourly economic maximum dispatch aligns the denominator of the rate cap with the portion of the costs allocated to the CMC in the numerator.

MISO would also like to first provide the rationale for having a 'rate cap'. When MISO first developed a rate methodology to allocate RT RSG MWP, MISO identified the possibility that absent a rate cap, a single or small amount of deviations could incur an exorbitant amount of RT RSG Costs.

For example, consider a scenario where MISO commits a Resource that provides 100 MW of flow relief (hourly economic maximum dispatch * CCF) that results in a $10,000 RT RSG Credit. Further, assume that only 1 MW of flow deviations are identified to have contributed to the need to commit the Resource. Absent a rate cap, the 1 MW deviation would incur the entire $10,000 in RT RSG (at a rate of $10,000 per MW).

However, considering the principle of cost causation, in reality the 1 MW of flow deviation is likely only responsible for 1 MW of the Resource's 100 MW of flow relief. In order to ensure the 1 MW deviation only incurs the portion of the costs for which it is responsible, the rate methodology 'caps' the rate at the per MW of hourly economic maximum dispatch cost multiplied by its CCF. In this example, the rate would be capped at $100 { $10,000 / 100 MW hourly relief }. As such, the 1 MW of flow deviation would incur $100 of cost and the remaining $9,900 represents a residual amount that is appropriately allocated elsewhere.

6. MISO proposes in section 40.3.3.a.v to modify the numerator of the Constraint Management Charge rate by multiplying the aggregate real-time RSG credits in an hour attributable to resources committed in the Reliability Assessment Commitment or Look-Ahead Commitment processes by "the Constraint Management Charge Allocation Factor, pursuant to Schedule 46."

MISO Response: In addition to the written response provided below, MISO has included additional numerical examples in Exhibit A in response to this question.

> a. In the event that the Constraint Management Charge rate cap does not apply, explain in detail how MISO's proposal to begin adjusting the numerator of the rate by the Constraint Management Charge Allocation Factor, while continuing to use the existing Constraint Contribution Factor to calculate adjusted deviations and adjust topology adjustments or transmission de-rates in the denominator of the rate, will affect the applicable Constraint Management Charge rate. For example, will the proposal result in a decrease in Constraint Management Charge rates?

MISO Response: No. In most cases, the proposal will increase the CMC rates. The effect on the CMC rate of the proposal will be based on the expected difference between the CMC Allocation Factor and the CCF.

In its 2011 State of the Market Report the MISO IMM, Potomac Economics, stated, "… [their] studies have shown the average GSF [(i.e., CCF)] of units committed for congestion management is roughly 35 percent". In anticipation of implementing the changes to the CMC Rate, MISO conducted preliminary studies consistent with Schedule 46 to calculate the CMC Allocation Factor. These preliminary studies resulted in a CMC Allocation Factor of approximately 95 percent. Hence, raising the factor in the numerator from 35 percent to 95 percent will increase the total costs allocated via the

CMC rate by more than 2.5 times. This increase is appropriate because it brings the CMC rate into alignment with the cost causation principle.

This outcome is consistent with the MISO IMM's statement in the 2011 State of the Market Report that, "[t]he CMC formula currently under-allocates congestion-related RSG costs to the deviations that contribute to the need to incur these costs".

b. In the event that the Constraint Management Charge rate cap applies, explain in detail how MISO's proposal to begin using the Constraint Management Charge Allocation Factor to adjust the numerator and denominator of the rate will affect the applicable Constraint Management Charge rate. Specifically, by multiplying both the numerator and denominator of the rate by the same term, does MISO intend those terms to cancel (e.g., so that the Constraint Management Charge rate cap will equal the applicable Economic Maximum Dispatch amounts)?

MISO Response: Yes. We intend the term to cancel. Essentially, this aligns the portion of the costs of the ATC-related commitment (in the numerator) with the portion of the relief estimated to be provided by the committed resource (in the denominator). Hence, of the CMC Allocation Factor is 70 percent, the cap would be calculated by including 70 percent of the costs of the committed resource in the numerator and 70 percent of the estimated relief provided by the resource in the denominator.

However, the last sentence of the question is incorrect. After the CMC Allocation Factor cancels in the numerator and denominator, the rate cap will be based on a denominator equal to the Economic Maximum of the Resource *multiplied by the CCF* because the rate must be calculated based on the flow relief provided over the ATC.

Under the proposed rate methodology, the under-collected residual amount is allocated via Second Pass Distribution to load. The proposed rate methodology applies this logic because the proposed CMC Allocation Factor identifies the amount of RT RSG Credits for Resources committed to manage ATCs that is attributable to Day-Ahead Deviations and Headroom. Therefore, any under-collected residual amount should not be collected via the Day-Ahead Deviation Charge or Headroom Charge, but rather appropriately allocated elsewhere; in this case Second Pass Distribution.

<u>Topic 3</u>: *Day-Ahead Schedule Deviation and Headroom Charge*

7. MISO states that load zones with net injections "impact the management of congestion and may also result in a Post-Notification Deadline deviation in the Day-Ahead Schedule Deviation Charge rate formula." Explain in detail how load zones with

net injections cause the incurrence of real-time RSG costs, including any costs associated with Headroom Need.

MISO Response: MISO would like to first clarify that a load zone with net injections has two potential effects:

- It provides additional capacity in real time and is, therefore, a "helping" deviation from a capacity perspective; and
- It may cause deviations on transmission constraints that may be helping or hurting depending on the CCF.

These two effects are independent and are treated independently in the development of the DDC and CMC rates. Under the proposed changes in the RSG allocation, MISO seeks to appropriately charge load zones with net injections (and all other types of deviations) based on the extent to which they cause MISO to commit resources for capacity and to manage an ATC.

In order to demonstrate how a deviation that results from a Load Zone with net injections may cause RSG, consider the following example.

Consider a Load Zone that does not submit a demand Bid for the Day-Ahead Market, resulting in a Day-Ahead Schedule of zero MW and the Load Zone owner submits a Real-Time Load Zone Demand Forecast of zero MW. Two hours prior to the market hour, assume the Load Zone owner brings on behind-the-meter-generation that results in net injections of 50 MW at the Load Zone. This 50 MW net injection at the Load Zone was not accounted for in the Day-Ahead Market and was also not accounted for in any LAC or RAC process prior to the NDL. The 50 MW net injections could cause the need to commit additional generation, if the existence of the 50 MW inject increased the flow on an ATC, necessitating the commitment of additional generation in order to manage the ATC.

In addition to the impact on the management of congestion, a Load Zone with net injections may also impact the commitment for capacity. Consider the same Load Zone as described in the preceding example; however assume the Load Zone owner submits a Real-Time Load Zone Demand Forecast representative of 100 MW net injections. MISO would like to note that due to differences in the granularity of the data utilized by the LAC and RAC processes (e.g., Local Balancing Authority load forecasts) and the granularity of data necessary to calculate rates for RT RSG (e.g. nodal data), MISO introduced the ability for Market Participants to submit a Real-Time Load Zone Demand Forecast to more granularly reflect changes in the data utilized by the RAC and LAC processes.

When the LAC and RAC processes run prior to the NDL, they will assume that the Load Zone will have a net injections of 100 MW. However, once the LAC and RAC processes identify that the net injections will only be 50 MW, MISO may need to commit additional generation due to this decrease in available capacity.

Load Zones with net injections do not cause the incurrence of real-time RSG costs associated with Headroom Need. As discussed in MISO response 1, Headroom Need is a variable in Schedule 46 that is an input to identifying the capacity commitment need and is also an input used to determine the Day-Ahead Deviation Headroom Credit (DDHC). The calculation of Headroom Need utilizes Actual Energy Injections for Resource only, and therefore would not be impacted by the existence of a Load Zone with net injections.

8. Explain why MISO proposes in section 40.3.3.a.viii(6) to use "any positive difference" between a load zone's actual energy withdrawal or injection adjusted by any associated demand response injections and its demand forecast in effect at the notification deadline when determining Day-Ahead Schedule Deviation and Headroom Charges. Contrast this with MISO's use, pursuant to section 40.3.3.a.iii(4), of "any difference" between a load zone's demand forecast in effect at the notification deadline and its actual energy withdrawal or injection adjusted by any associated demand response injections when determining Constraint Management Charges.

MISO Response: Section 40.3.3.a.viii(6) refers to the section of the Day-Ahead Schedule Deviation Charge and Headroom Charge that calculates post-NDL deviations for Load Zones. As discussed in MISO's transmittal letter associated with the proposed changes to the Day-Ahead Schedule Deviation and Headroom Charge, the proposed rate design would no longer charge post-NDL supply-increasing deviations. By considering only the positive difference, the proposed rate design will only apply the Day-Ahead Schedule Deviation Rate to post-NDL supply-decreasing deviations.

For example, consider a Load Zone that does not have any associated demand response injections. Assume that Load Zone has an Actual Energy Withdrawal of 100 MW, a Day-Ahead Schedule of 110 MW, and submits a Real-Time Load Zone Demand Forecast prior to the NDL for the same 110 MW value. This means that four hours prior to the market hour, the Load Zone was expecting to consume 110 MW, yet in real-time the Load Zone only consumed 100 MW. If the rate design used the term "any difference", the result of the calculation would be -10 MW. This result is inconsistent with the intended outcome of not charging the Day-Ahead Schedule Deviation Rate to post-NDL supply-increasing deviations, while also not allowing the supply-increasing deviations after the NDL to net against other supply-decreasing post-NDL deviations. In order to not charge post-NDL supply-increasing deviations, and also not allow them to net against other supply-decreasing post-NDL deviations, the proposed rate design uses the phrase "any positive difference". In this example, the application of the term "any positive difference" results in the correct outcome of 0 MW { MAX (100 – 110 , 0) }.

Section 40.3.3.a.iii refers to the section of the Constraint Management Charge that calculates post-NDL deviations. Specifically, section 40.3.3.a.iii(4) calculates the post-NDL deviations for Load Zones.

This section calculates the post-NDL deviations, the CMC Rate utilizes the Adjusted Deviation Volume from Section 40.3.3.a.iv to calculate the rate. Contrasting the DDC with the CMC, it is important to note that they are dissimilar in their approach to determining the relevant deviations for determining the rate. The cost driver for the DDC is the economic commitment of Resources for capacity, while the cost drive for the CMC is the commitment of Resources in order to manager ATCs. Therefore, the DDC simply categorizes deviations into supply-increasing and supply-decreasing buckets, ultimately charging only the supply-decreasing deviations the DDC Rate, under the proposed rate design.

Alternately, the CMC categorizes deviations into deviations that increase the flow on a given ATC and deviations that decrease the flow on a given ATC. The process of identifying deviations as either increasing or decreasing the flow on the ATC is a two-step process.

First, the process must calculate all deviations, regardless of whether they are supply-increasing or supply-decreasing deviations. The utilization of the term “any difference” in section 40.3.3.a.iii(4) accomplishes this intended result.

Second, the deviation is multiplied by the CCF to determine if the resulting Adjusted Deviation Volume increased or decreased the flow on the ATC. This is accomplished in section 40.3.3.a.iv. The Adjusted Deviation Volume calculation ensures that the impact of a deviation on an ATC is based on whether or not it is supply-increasing or supply-decreasing in conjunction with the use of the CCF, only those deviations that increased the flow on the ATC are utilized in the determination of the CMC Rate and are assessed a CMC.

9. Explain in detail the determination of Day-Ahead Schedule Deviation and Headroom Charges if the sum of the Market-Wide Net Deviations and Headroom Need is (1) less than or equal to zero, (2) greater than or equal to the Economic Committed Capacity, or (3) greater than zero but less than the Economic Committed Capacity. Explain how this calculation accounts for situations where the Market-Wide Net Deviations are negative but the Headroom Need is positive, such that their sum is greater than zero.

MISO Response: MISO’s proposed rate design compares the sum of Market-Wide Net Deviations and Headroom Need to Economically Committed Capacity, in order to attribute the appropriate quantity of RT RSG MWP for economically committed Resource to the Day-Ahead Deviation and Headroom Charge Rate. In order to accomplish this result, the proposed rate design utilizes the Day-Ahead Deviation and

Headroom Credit (DDHC) as the numerator of the Day-Ahead Deviation and Headroom Charge Rate.

Under the proposed rate design, Market-Wide Net Deviations is equal to the sum for all Asset Owners of all pre-NDL deviations and all post-NDL deviations. Headroom Need represents an after-the-fact requirement that approximates the amount of unloaded capacity needed in real-time in order to meet capacity and Operating Reserve requirements. This is the same value that is also used in Schedule 46. Economically Committed Capacity is the available capacity for all capacity Resource commitments less the capacity considered in the CMC Rate and the VLR Charge.

There are three scenarios to consider when comparing the Market-Wide Net Deviations, Headroom Need, and Economically Committed Capacity: (1) the sum of Market-Wide Net Deviations and Headroom need is less than or equal to zero; (2) the sum of Market-Wide Net Deviations and Headroom need is greater than or equal to the Economically Committed Capacity; and (3) the sum of Market-Wide Net Deviations and Headroom need is greater than zero but less than the Economically Committed Capacity.

(1) Negative or Zero: If the sum of the Market-Wide Net Deviations and the Headroom Need is less than or equal to zero, the DDHC is equal to zero. This implies that due to a negative sum of Market-Wide Net Deviations and Headroom Need there was no need for a capacity commitment and the deviations and Headroom Need are not the cause of the RT RSG MWP.

(2) Equal or Greater: If the sum of the Market-Wide Net Deviations and Headroom Need is greater than or equal to the Economically Committed Capacity, the DDHC is equal to 100 percent of the RT RSG MWP designated for distribution via the Day-Ahead Schedule Deviation and Headroom Charge Rate. This indicates that the deviations and Headroom Need is entirely responsible for the RT RSG MWP.

(3) Positive or Less: If the sum of the Market-Wide Net Deviations and Headroom Need is less than the Economically Committed Capacity, yet greater than zero, the DDHC is equal to only a fraction of the RT RSG MWP. This fraction should be based on: the sum of the Market-Wide Net Deviations and Headroom Need divided by quantity of Economically Committed Capacity.

MISO would like to note an error in the “Positive or Less” scenario. Under the proposed rate design, the Real-Time Revenue Sufficiency Guarantee Market-Wide Net Rate is applied to only the Market-Wide Net Deviations to determine the DDHC amount. However, the correct application of this rate is to apply it to the sum of Market-Wide Net Deviations and Headroom Need. By only applying the rate to the Market-Wide Net Deviations, the DDHC could be negative and this would result in a negative Day-Ahead Schedule Deviation and Headroom Charge Rate.

To correct this error and the potential for a negative DDHC amount, MISO is proposing the following change to Section 40.3.3.a.ix of the MISO Tariff:

"If the sum of (i) the Market-Wide Net Deviations; and (ii) Headroom Need is greater than zero, but less than the Economic Committed Capacity, the Day-Ahead Schedule Deviation and Headroom Credit is equal to the product of: (i) the sum of (a) the Market-Wide Net Deviations and (b) Headroom Need; and(ii) the Real-Time Revenue Sufficiency Guarantee Market-Wide Net Rate."

This ensures the RT RSG Day-Ahead Deviation Charge and Headroom Charge Rate will remain positive by using a positive numerator where the sum of Market-Wide Net Deviations and Headroom Need is greater than zero and Less than the Economically Committed Capacity.

In addition to this written response, MISO has provided additional detail along with numerical examples in Exhibit A.

10. MISO maintains that deviations that cause the commitment of additional resources are "the most relevant" causes of real-time RSG costs and that "the operative fact is the commitment of additional Resources in [sic] R[eliability] A[ssessment] C[ommitment], not the pricing circumstances of the market into which those Resources will be committed."

a. Describe the extent to which supply-increasing deviations that occur after the notification deadline affect the incurrence of real-time RSG costs, such as by reducing costs by augmenting available capacity and increasing costs by reducing real-time prices.

MISO Response: As the Commission notes in this question, there are two potential impacts of supply-increasing deviations that occur after the NDL on RSG costs; a decrease in the Real-Time LMP and a decrease in the need to commit additional generation. However, while such supply-increasing deviations can affect real-time RSG costs, this is a secondary effect that MISO does not agree is a relevant cause of real-time RSG costs for allocation purposes. Given the size and scope of the MISO market, this effect is generally very small and would likely be much smaller than the RSG benefits of these deviations (i.e., that they reduce the need to commit resources through the RAC and LAC processes). Quantifying these secondary effects would be extremely difficult. Since both MISO and the IMM believe the incorporating such secondary effects in the cost allocation would not be appropriate, the analysis necessary to address this question has not been conducted.

b. Using actual 2012 data, explain the extent to which supply-increasing deviations that occurred after the notification deadline caused the incurrence of

real-time RSG costs.

MISO Response: MISO analyzed settlements data for the entire year of 2012. Based on the outcome of that study, MISO was able to identify the amount of post-NDL deviations by Hour. The average post-NDL supply increasing deviations equaled 1,750 MW. In many cases, these deviations would have reduced the RAC and LAC commitments made by MISO and, therefore, directly reduced RT RSG. Although these deviations occurred post-NDL, they often occurred prior to running the LAC model and some of the RAC process that result in resource commitments close to the operating timeframe.

For the reasons discussed in the answer to 6.a., MISO has not estimated the impacts described in this question. Such an analysis would require substantial time and resources, and was not feasible in advance of the Technical Conference. MISO hopes to discuss the need for such a study and, if a need is established, to discuss methodologies that may be feasible for conducting such a study.

c. Explain whether the implementation of MISO's Look-Ahead Commitment process would affect the incurrence of real-time RSG costs due to supply-increasing deviations that occur after the notification deadline.

MISO Response: Yes, it does. With the implementation of the LAC, MISO is relying more heavily on the Security Constrained Unit Commitment (SCUC) in LAC to commit resources closer to the operating hour. Many of the post-NDL deviations are known at the time that LAC runs, and those that increase supply will tend to reduce commitments by LAC that may otherwise generate RT RSG payments.

For example, prior to Look-Ahead Commitment, if a supply-increasing deviation was known 3.5 hours prior to the given market hour (e.g., a deviation for the 10:00 hour is known at 6:30) may not have been evaluated in a SCUC via a Reliability Assessment Commitment (RAC) for a number of hours. With the introduction of the Look-Ahead Commitment, the deviation would be included in the next Look-Ahead Commitment process.

Therefore, MISO believes that the Look-Ahead Commitment does impact the incurrence of real-time RSG costs. By executing the SCUC more frequently, MISO's commitment is more efficient and will recognize a much larger share of the post-NDL supply-increasing deviations.