Appendix A: Identifying Candidate Competitive Paths

Transmission path constraints in the network model used under MRTU are categorized in two groups, namely Competitive and Non-competitive paths. The distinction is central to local market power mitigation (Pre-IFM Passes 1 and 2).

Although, in the theory, the list of candidate competitive paths could include all paths, the approach taken reduced the set of paths to be tested to those with some frequency of proactive mitigation activity taken in real time by CAISO Operators. Since there is no existing MRTU data with which to determine what paths are most frequently congested under a nodal market system, we rely on historically frequently congested paths/transmission lines across the ISO Control Area as evidenced by real time mitigation activities per the following criteria:

(a) Frequently congested paths identified by high RMR dispatches incurred in real-time as RMR units are the first to be dispatched to relieve intra-zonal congestions; and

(b) Frequently congested paths identified by high re-dispatch costs (OOS) incurred in real-time if the RMR dispatches are not sufficient to alleviate the constraints.

In the following sections, each category of frequently congested paths is identified and a summary list of candidate competitive paths is provided

Frequently Congested Paths Identified by RT RMR Dispatches and Costs

RMR References

The ISO Operating Procedure M-401A (Reliability Must-Run References) identified locations on the CAISO grid that have experienced intra-zonal congestion. To prevent overloads on these systems, the dispatch of RMR resources may be necessary. Below are the intra-zonal congested areas that may need RMR resources:

- San Francisco and Bay Area,
- Humboldt Area,
- Lakeville-Fulton 230 kV Geysers Transmission System,
- North Geysers Area,
- Palermo-Rio Oso Area,
- Fresno Area,
- San Diego Area,
- Serrano 500/230kV Transformer Bank Area,
- Mira Loma 500/230kV Transformer Bank Area,
- South-of-Lugo 500kV Lines,
- Vincent 500-220kV AA Transformer Bank, and
- Lugo-Victorville 500kV Line Nomogram and Sylmar Transformer Banks.

For more detailed description on how RMR units are committed and dispatched, please refer to Operating Procedure G-203: Reliability Must Run Unit Commitment and Dispatch at

http://www.caiso.com/docs/2001/09/17/2001091716513411253.pdf. Table A1 summarizes the related transmission lines that may need RMR dispatches in RT.

Table A1: RMR Areas and Related Transmission Lines

RMR Areas	Sub Transmission Systems
San Francisco & Bay Area	San Mateo Substation Import Facilities
	San Mateo/Jefferson – Martin Corridor
	Jefferson Substation Import Facilities (North of martin Substation Cable network)
	Bay Area Transmission System
Humboldt Area	
South Geysers Area	
North Geysers Area	
Palermo – Rio Oso Area	
Fresno Area	Panoche
	McCall
San Diego Area	South of SONGS
	Miguel Imports
	Southwest Power Link (SWPL)
SCE Area	Mira Loma
	South of Lugo Area
	Serrano Transformer Bank Area
	Vicent
	North of Lugo
	Sylmar Transformer Bank Area
	Vincent Transformer Bank Area

RMR Dispatches in RT

The next table shows the monthly summary of real-time RMR dispatch MWs and frequencies for the four CAISO congestion zones from January 1, 2005 to May 31, 2006. Note that RT RMR dispatches are only reported at the four congestion zone level: NP15, SP15, San Francisco, and Humboldt. For each congestion zone, RMR dispatches are quite variable and are affected by the area load seasonal patterns and generation outage patterns. RMR dispatch MWs and frequencies are quite high for the Humboldt congestion zone throughout the year. In the NP15 zone, RMR dispatches are higher during summer season than winter season. The highest RMR RT dispatches in San Francisco Bay Area occurred in September. In SP15 congestion zone, RMR RT dispatches are also relatively high throughout the year.

Table A2: RMR Real Time Dispatch Frequency and MWh

Month	Mitigation Statistic	Congestion Zone			
		HUMB	NP15	SF	SP15
Jan-05	# of Hours	3,074	195	61	581
	RMR RT Dispatch (MWh)	24,349	4,553	1,158	10,191
Feb-05	# of Hours	2,593	64	47	808
	RMR RT Dispatch (MWh)	18,104	844	1,213	15,983
Mar-05	# of Hours	2,228	25	107	628
	RMR RT Dispatch (MWh)	18,871	507	3,140	23,255
Apr-05	# of Hours	1,577	320	94	648
	RMR RT Dispatch (MWh)	21,760	6,440	2,679	21,220
May-05	# of Hours	1,535	471	100	122
	RMR RT Dispatch (MWh)	19,119	18,898	2,494	3,666
Jun-05	# of Hours	1,157	299		108
	RMR RT Dispatch (MWh)	12,240	6,587		2,172
Jul-05	# of Hours	1,733	1,006	54	502
	RMR RT Dispatch (MWh)	21,577	26,866	1,204	30,410
Aug-05	# of Hours	3,128	453	132	1,073
	RMR RT Dispatch (MWh)	37,621	8,395	4,846	65,412
Sep-05	# of Hours	1,957	405	381	344
	RMR RT Dispatch (MWh)	18,914	6,430	13,316	16,245
Oct-05	# of Hours	3,943	155	167	745
	RMR RT Dispatch (MWh)	37,032	2,590	5,066	30,848
Nov-05	# of Hours	2,814	37	191	1,744
	RMR RT Dispatch (MWh)	34,619	917	4,735	49,303
Dec-05	# of Hours	2,064	21	158	9,698
	RMR RT Dispatch (MWh)	31,614	158	9,698	41,470
Jan-06	# of Hours	3,088	41	573	3,702
	RMR RT Dispatch (MWh)	38,226	80	23,471	61,778
Feb-06	# of Hours	2,428	568	882	3,878
	RMR RT Dispatch (MWh)	27,284	18,330	36,356	81,969
Mar-06	# of Hours	2,837	39	-	2,876
	RMR RT Dispatch (MWh)	33,393	528	-	33,921
Apr-06	# of Hours	1,877	469	-	2,346
	RMR RT Dispatch (MWh)	27,477	13,788	-	41,265
May-06	# of Hours	1,713	558	-	2,271
	RMR RT Dispatch (MWh)	18,840	7,982	-	26,823

In the following section, we will try to identify the frequently RMR units and transmission systems that are associated with these RMR units.

Humboldt

There were four RMR units in the Humboldt area. During the evaluation period, the total number of hours where real time RMR dispatches were made to units in the Humboldt area exceed the 500 hour threshold set to identify candidate paths. Thus we designate the Humboldt

local area transmission interfaces as candidate competitive paths and the interfaces will be assessed using the 3-supplier feasibility test.

NP15

NP15 is a broad region and contains multiple local area transmission system bottlenecks. Also it is possible that multiple RMR units can be dispatched to solve the same local congestion, or a RMR unit can be used to solve different local congestion problems. Based on RMR dispatch frequencies observed in NP15, we designate the local transmission system in the Bay Area and Palermo – Rio Oso area as candidate competitive paths.

San Francisco Bay Area

There were five RMR units in the San Francisco Bay Area. Based on the 12-month RMR dispatch frequency, we designate the San Francisco transmission system as candidate competitive paths and will test them using the 3 pivotal supplier feasibility indexes.

SP15 Region

Four generation units had significant real time RMR dispatch frequencies in SP15 primarily to mitigate local congestion occurred near the Serrano 500/220kV Transformer Banks, South of Lugo area congestion, and for Vincent 500/220kV Transformer Bank Overload. Based on the observed real time RMR dispatch frequencies relative to the 500 hour threshold, we designate the Miguel transmission system and the South of Lugo transmission system as candidate competitive paths and will test them using the 3 pivotal supplier feasibility test.

Frequent Congested Paths Identified by High OOS Dispatch Frequencies and Costs

According to ISO's Operating Procedure M-401 "Real-Time Intra-Zonal Congestion Management", the CAISO approach mitigating intra-zonal congestion in RT is non-emergency conditions is, in sequence, to:

(1) Dispatch in-sequence market bids (incremental or decremental, as required), from any resource, to resolve the intra-zonal congestion.
(2) If RMR units can be used to mitigate the intra-zonal congestion, increment RMR units under their RMR contracts or reduce their RMR schedules (but not their RMR unit market schedules) as needed.
(3) Disptach incremental out-of sequence market bids for intra-zonal congestion that primarily requires incremental energy to alleviate the congestion.
(4) Dispatch decremental reference bids based on reference level curves for intra-zonal congestion that primarily requires decremental energy to alleviate congestion. This may include utilization of generator shutdown reference pricing to dispatch units from P-min to zero.

Real time out-of-sequence dispatch frequencies are good indications of real time intra-zonal congestion. The next table shows the frequently mitigated areas for OOS that had more than 500 hours mitigation in the 12-month period from June 1, 2005 to May 31, 2006.

Table A3: 12-Month Frequently OOS Mitigated Paths with Frequency > 500 hours (June 1, 2005 – May 31, 2006)

Congestion Zone	Frequently Congested Transmission Path	Number of Hours Mitigated for OOS	Related Transmission Line /Transformers
SCE	South of Pastoria	2142	(List is confidential)
San Diego	Miguel Imports	2187	(List is confidential)
PG&E	Cortina/North Geysers Imports	775	(List is confidential)

Note that the most frequently congested local areas may change in the future due to transmission upgrades or other system changes. For example, the Cornita/North Geyser area was frequently mitigated in January and February 2005 using OOS dispatches, but was much less so in the second half of 2005 due to a major transmission upgrade in the Cortina area in the fall of 2005. Also a major upgrade to the South of Pastoria transmission system was completed in April 2006 and significantly reduced the frequency and magnitude of OOS dispatches for this area. Nevertheless, we still designate all three areas as candidate competitive paths.

Summary List of Candidate Competitive Paths

Based on the RT RMR dispatches and the OOS dispatch frequencies, the following list of frequently congested paths is recommended as the initial set of competitive paths. All other paths that are not on the list and are not grandfathered competitive paths are considered non-competitive paths.

Table A4: Summary List of Candidate Competitive Paths

Congestion Area	Candidate Path	Identification Method	Specific Transmission Line/Transformers
SCE	South of Lugo	RMR dispatch frequency > 500 hrs in the past 12-month period	(List is confidential)
	South of Pastoria	OOS dispatch frequency > 500 hours in the past 12-month period	(List is confidential)
San Diego	Miguel Imports	RMR and OOS dispatch frequency >500 hours in the past 12-month period	(List is confidential)
PG&E	San Francisco Bay Area	RMR dispatch frequency > 500 hours in the past 12-month period	(List is confidential)
			(List is confidential)
			(List is confidential)
	Cortina/North Geysers Imports	OOS dispatch frequency > 500 hours in the past 12-month period	(List is confidential)
	Humboldt Area	RMR dispatch frequency > 500 hours in the past 12-month period	(List is confidential)
	Palermo – Rio Oso	RMR dispatch frequency > 500 hours in the past 12-month period	(List is confidential)