

**AMENDED AND RESTATED TRANSMISSION CONTROL
AGREEMENT**

APPENDIX A

Facilities and Entitlements

**(The Diagrams of Transmission Lines and Associated
Facilities Placed Under the Operational Control of the CAISO
were submitted by the CAISO on behalf of the Transmission Owners
on March 31, 1997– any modifications are attached as follows)**

Modification of Appendix A1

Diagrams of Transmission Lines and Associated Facilities Placed Under the Operational Control of the CAISO

**(submitted by the CAISO on behalf of Pacific Gas and Electric Company
Transmission Owner)**

The diagrams of transmission lines and associated facilities placed under the Operational Control of the CAISO submitted by the CAISO on behalf of PG&E on March 31, 1997 are amended as follows.

Item 1: Port of Oakland 115 kV Facilities

Operational Control of the transmission facilities, shown on operating diagram, East Bay Region (East Bay Division), Sheet No. 1, serving the Port of Oakland and Davis 115 kV (USN) is not to be transferred to the CAISO. These are special facilities funded by and connected solely to a customer's substation and their operation is not necessary for Operational Control by the CAISO pursuant to the specifications of Section 4.1.1 of the TCA.

As of the date of execution of the TCA, the CAISO and PG&E are discussing further modifications to the diagrams of transmission lines and facilities placed under the control of the CAISO. A new version of the diagrams is to be filed with FERC prior to April 1, 1998. This subsequent version of the diagrams will reflect all modifications (including those described herein).

APPENDIX A2

List of Entitlements Being Placed Under CAISO Operational Control

(Includes only those where PG&E is a service rights-holder)

Ref. #	Entities	Contract / Rate Schedule #	Nature of Contract	Termination	Comments
1.	PacifiCorp, CAISO	PG&E Original Rate Schedule FERC No. 239	Transmission Exchange Agreement	12/31/2027 or per Section 4.2	Both entitlement and encumbrance. PG&E receives 800 MW north-to-south and 612.5 MW south-to-north transmission service on PacifiCorp's owned share of Malin-Round Mountain No. 2 500 kV line.
2.	PacifiCorp	PG&E Original Rate Schedule FERC No. 240	Lease of Transmission Capacity	12/31/2017	PG&E lease of varying amounts of PacifiCorp's share of the transmission capacity on the 500 kV No. 2 line between the Malin and Round Mountain substations. See also Section 2 of the Lease.
3.	SCE, Montana Power, Nevada Power, Sierra Pacific	WSCC Unscheduled Flow Mitigation Plan – PG&E Rate Schedule FERC No. 221	Operation of control facilities to mitigate loop flows	Evergreen, or on notice	No transmission services provided, but classified as an entitlement since loop flow is reduced or an encumbrance if PG&E is asked to cut.
4.	TANC, WAPA, and PacifiCorp	Owners Coordinated Operations Agreement – PG&E Rate Schedule FERC No. 229	Transmission system coordination, curtailment sharing, rights allocation, scheduling	1/1/2043, or on two years' notice, or earlier if other agreements terminate	Both entitlement and encumbrance

Supplement To PG&E's Appendix A

Notices Pursuant to Section 4.1.5

Pursuant to the Transmission Control Agreement Section 4.1.5 (iii), the transmission system¹ Pacific Gas and Electric Company (PG&E) is placing under the California Independent System Operator's Operational Control will meet the Applicable Reliability Criteria in 1998,² except (1) for the transmission facilities comprising Path 15, which do not meet the Western Systems Coordinating Council's (WSCC) Reliability Criteria for Transmission Planning with a simultaneous outage of the Los Banos-Gates and Los Banos-Midway 500 kV lines (for south-to-north power flow exceeding 2500 MW on Path 15),³ and (2) with respect to potential problems identified in PG&E's annual assessment of its reliability performance in accordance with Applicable Reliability Criteria, performed with participation from the ISO and other stakeholders; as a result of this process, PG&E has been developing solutions to mitigate the identified potential problems and submitting them to the ISO for approval.

¹ Including upgrades and operational plans for the transmission lines and associated facilities.

² Based upon PG&E's substation and system load forecasts for study year 1998, historically typical generation dispatch and the Applicable Reliability Criteria, including the current applicable WSCC Reliability Criteria for Transmission Planning issued in March 1997, the PG&E Local Reliability as stated in the 1997 PG&E Transmission Planning Handbook Criteria (submitted to the California ISO Transmission Planning, in writing, on October 20, 1997), and the NERC Reliability Performance Criteria in effect at the time PG&E was assessing its system (as of June 1, 1997). PG&E may not meet the WSCC's Disturbance Performance level 'D' (e.g. outage of three or more circuits on a right-of-way, an entire substation or an entire generating plant including switchyard), where the risk of such an outage occurring is considered very small and the costs of upgrades very high.

³ The ISO will operate Path 15 so as to maintain system reliability. In accepting this notice from PG&E, the ISO agrees to work with PG&E and the WSCC to achieve a resolution respecting the WSCC long-term path rating limit for Path 15, consistent with WSCC requirements. Pending any revision to the WSCC long-term path rating limit for Path 15, the ISO will continue to operate Path 15 at the existing WSCC long-term path rating limit unless, in the judgment of the ISO:

(a) the operating limit must be reduced on a short-term (e.g., seasonal) basis to maintain system reliability, taking into account factors such as the WSCC guidelines, determination of credible outages and the Operating Capability Study Group (OCSG) study process; or

(b) the operating limit must be reduced on a real-time basis to maintain system reliability.

In determining whether the operating limit of Path 15 must be changed to maintain system reliability, the ISO shall, to the extent possible, work with the WSCC and the PTOs to reach consensus as to any new interim operating limit.

Pursuant to Section 4.1.5(i), PG&E does not believe that transfer of Operational Control is inconsistent with any of its franchise or right of way agreements to the extent that ISO Operational Control is implemented as part of PG&E utility service pursuant to AB 1890. However, PG&E can't warrant that these right of way or franchise agreements will provide necessary authority for ISO entry or physical use of such rights apart from PG&E's rights pursuant to its physical ownership and operation of transmission facilities.

APPENDIX A.2: EDISON'S CONTRACT ENTITLEMENTS

	CONTRACT NAME	OTHER PARTIES	FERC NO.	CONTRACT TERMINATION	FACILITY/PATH, AMOUNT OF SERVICE
1.	City-Edison Pacific Intertie D-C Transmission Facilities Agreement	LADWP	4448	3/31/2041 or sooner by mutual agreement of the parties.	<ul style="list-style-type: none"> Edison owns 50% of the D-C transmission facility.
2.	Pasadena Interconnection Agreement	Pasadena	484	By Pasadena upon 24 months advance written notice; or by SCE upon default by Pasadena.	<ul style="list-style-type: none"> Goodrich-Gould and Goodrich-Laguna Bell 220 kV transmission lines interconnect Edison's system with Pasadena's system at Pasadena's T.M. Goodrich Substation. Edison maintains and operates T.M. Goodrich 220 kV Substation.
3.	Victorville-Lugo Interconnection Agreement	LADWP	51	11/20/2019, or sooner by mutual agreement.	<ul style="list-style-type: none"> 1950 MW towards Edison, 900 MW towards LADWP. Transfer capability of the interconnection is established through joint technical studies.
4.	City-Edison Sylmar Interconnection Agreement	LADWP	307	On 5 years notice by either party any time after the termination of the City-Edison Pacific Intertie DC Transmission Facilities Agreement.	<ul style="list-style-type: none"> Sylmar-Pardee #1&2, Sylmar-Gould and Sylmar-Eagle Rock 230 kV transmission line interconnections at Sylmar including circuit breakers and busses. Lines have been re-configured from arrangement described in contract. Edison owns one of the three regulating transformers at Sylmar.
5.	City-Edison Owens Valley Interconnection and interchange Agreement	LADWP	50	On 12 months' notice by either party.	<ul style="list-style-type: none"> At the request of either party and by mutual agreement, LADWP's and Edison's respective systems interconnected at LADWP's Haiwee 34.5 kV Substation, may be operated in parallel, which normally operates open at Haiwee.
6.	City-Edison 400,000 kVA Interconnection Agreement (Velasco)	LADWP	215	On 3 year written notice by either party.	<ul style="list-style-type: none"> Edison's portion of the normally open Laguna Bell-Velasco 230 kV transmission line from Laguna Bell to the point where ownership changes.

APPENDIX A.2: EDISON'S CONTRACT ENTITLEMENTS

	CONTRACT NAME	OTHER PARTIES	FERC NO.	CONTRACT TERMINATION	FACILITY/PATH, AMOUNT OF SERVICE
7.	Edison-Los Angeles Inyo Interconnection Agreement	LADWP	306	On 5 year advance written notice by either party or by mutual agreement.	<ul style="list-style-type: none"> Inyo 230/115 kV Substation, Inyo Phase Shifter, Control-Inyo 115 kV transmission line and 230 kV Tap to LADWP's Owens Gorge-Rinaldi 230 kV transmission line.
8.	Amended and Restated IID-Edison Mirage 230 kV Interconnection Agreement	IID	314	On one year notice but not prior to the termination date of the IID-Edison Transmission Service Agreement for Alternate Resources.	<ul style="list-style-type: none"> Edison's interconnection with IID at Mirage and the point of interconnection on the Devers – Coachella Valley line.
9.	IID Edison Transmission Service Agreement for Alternative Resources	IID		Earlier of Dec 31, 2015, or the termination date of the last Plant Connection Agreement.	<ul style="list-style-type: none"> Transmission Service on IID's 230 kV system to transmit the output of QFs resources to Edison's system, via Mirage Substation.
10.	Principles of Interconnected Operation for Four Corners Interconnection Agreement	APS, SRP, EPE, PSNM, TGE	47.0	None	<ul style="list-style-type: none"> Generation principles for emergency service. Edison's facility at Four Corners includes its portion of the Eldorado –Moenkopi from Eldorado to CA/NV border of the Eldorado-Moenkopi –Four Corners 500 kV transmission line. Edison can separate its wholly-owned facilities from parallel operation with others under abnormal operating conditions without prior notice. Edison can separate its wholly-owned facilities from parallel operation with others for maintenance on reasonable advance notice (see Co-tenancy Agreement for facilities).

APPENDIX A.2: EDISON'S CONTRACT ENTITLEMENTS

	CONTRACT NAME	OTHER PARTIES	FERC NO.	CONTRACT TERMINATION	FACILITY/PATH, AMOUNT OF SERVICE
					<ul style="list-style-type: none"> Edison has the right to schedule emergency service from each party.
11.	Four Corners Project Co-Tenancy Agreement and Operating Agreement	APS, SRP, EPE, PSNM, TGE	47.2	2016	<ul style="list-style-type: none"> Edison has co-tenancy ownership of 32% in the Four Corners 500 kV switchyard, 12% in the 345 kV switchyard and 48% in the 345/500 kV bus-tie transformer bank. Edison has rights to sufficient capacity in the switchyards and bus-tie transformer bank to permit its entitlement to Four-Corners Project power and energy to be delivered to the point where the Eldorado-Moenkopi-Four Corners transmission line connects to the Four Corners 500 kV Switchyard. Edison may use any unused capacity in the switchyard for any purpose, provided that any over subscription shall be subject to proration of the remaining capacity based on switchyard ownership of the requesting co-owners.
12.	Navajo Interconnection Principles	USA, APS, SRP, NPC, LADWP, TGE	76	None	<ul style="list-style-type: none"> Generation principles for emergency service.
13.	Edison – Navajo Transmission Agreement	USA, APS, SRP, NPC, LADWP, TGE	264	5/21/2023	<ul style="list-style-type: none"> In the event of a contingency in the Navajo-McCullough or Moenkopi-Eldorado transmission lines, Edison and the Navajo participants provide each other emergency transmission service without a charge. The amount of service provided is proportional to each party's entitlement to the total capability of the transmission system described above.
14.	ANPP High Voltage Switchyard Participation Agreement	APS, SRP, PSNM, EPE, SCPPA, LADWP	320	2031	<ul style="list-style-type: none"> Edison has 21.77% undivided ownership interest as a tenant-in-common in the ANPP High Voltage Switchyard. Edison has rights to transmit through the ANPP High

APPENDIX A.2: EDISON'S CONTRACT ENTITLEMENTS

	CONTRACT NAME	OTHER PARTIES	FERC NO.	CONTRACT TERMINATION	FACILITY/PATH, AMOUNT OF SERVICE
					<p>Voltage Switchyard up to its 15.8% share of generation from ANPP, or a substitute equal amount, plus any other generation up to the extent of its transmission rights in the Palo Verde-Devers 500 kV Transmission Line</p> <ul style="list-style-type: none"> Edison has additional rights to use any unused capacity in the ANPP High Voltage Switchyard, provided that any over subscription shall be subject to proration of the remaining capacity based on switchyard ownership.
15.	Mutual Assistance Transmission Agreement	IID, APS, SDG&E	1174	4/12/2034 or sooner by mutual agreement of the parties. A party may withdraw from this agreement upon giving 5 years advance written notice to the other parties.	<ul style="list-style-type: none"> In the event of a contingency in the Palo Verde-Devers, Palo Verde-North Gila-Imperial Valley transmission lines, participants to share the available capacity based on predetermined operating procedures set out in a separate operating bulletin.
16.	Midway Interconnection Agreement	PG&E	477	Upon one (1) year advance written notice by either party, but not prior to 1/1/2012.	<ul style="list-style-type: none"> Edison's share of 500 kV Midway-Vincent transmission system: <ul style="list-style-type: none"> Midway-Vincent #1 Midway-Vincent #2 Midway-Vincent #3 from Vincent Substation to mile 53, Tower 1
17.	Amended and Restated Eldorado System Conveyance and Co-Tenancy	NPC, SRP, LADWP	4424	12/31/2012 unless extended by agreement of all parties.	<ul style="list-style-type: none"> Edison's share of Eldorado System Components: Eldorado Substation: Edison 500 kV Capacity Entitlement = Eldorado Substation Capacity minus NPC transmission Entitlement [222 MW] minus SRP transmission Entitlement [158 MW] minus LADWP transmission Entitlement [316 MW];

APPENDIX A.2: EDISON'S CONTRACT ENTITLEMENTS

	CONTRACT NAME	OTHER PARTIES	FERC NO.	CONTRACT TERMINATION	FACILITY/PATH, AMOUNT OF SERVICE
					<ul style="list-style-type: none"> • Eldorado Substation: Edison 220 kV Capacity Entitlement = Eldorado Substation Capacity minus NPC transmission entitlement [222 MW], minus SRP transmission entitlement [158 MW]; • Mohave Switchyard: Edison Capacity Entitlement = 884 MW; • Eldorado – Mohave 500 kV line: (Edison Capacity Entitlement = Eldorado – Mohave 500 kV line capacity minus NPC transmission Entitlement [222 MW] minus SRP transmission Entitlement [158 MW] minus LADWP transmission Entitlement [316 MW]); • Eldorado – Mead 220 kV Line Nos. 1 & 2: (Edison Capacity Entitlement = Eldorado – Mead 220 kV Line No. 1 & 2 capacity minus NPC transmission Entitlement [222 MW] minus SRP Capacity Entitlement [158 MW].
18.	WAPA-Edison Contract for 161-kV Interconnection and Operation, Maintenance and Replacement at Blythe Substation	WAPA	482	Midnight September 30, 2028, or sooner by 1 year advance written notice by either party.	<ul style="list-style-type: none"> • WAPA's Blythe 161 kV Substation, and Edison's Eagle Mountain-Blythe 161 kV transmission line. System to System interconnection agreement.
19.	SONGS Ownership and Operating Agreements	SDG&E, Anaheim, Riverside	321	In effect until termination of easement for plant site.	<ul style="list-style-type: none"> • Edison's share of SONGS switchyard with termination of its 230 kV transmission lines: <ul style="list-style-type: none"> – SONGS – Santiago 1 and 2, – SONGS – Serrano, and – SONGS – Chino 230 kV
20.	District-Edison 1987 Service and Interchange Agreement	MWD	443	The earlier of: (1) the termination of the agreement, (2) upon 60 days written notice by	<ul style="list-style-type: none"> • Transmission is owned by District, but is in CAISO Balancing Authority Area. If not in use by District, or the United States under existing contracts, District's Transmission Line is available to transmit any electric energy to which Edison may be entitled. • Up to 320 MW is required to supply District's Colorado

APPENDIX A.2: EDISON'S CONTRACT ENTITLEMENTS

	CONTRACT NAME	OTHER PARTIES	FERC NO.	CONTRACT TERMINATION	FACILITY/PATH, AMOUNT OF SERVICE
				SCE following a determination by the CPUC that SCE was imprudent for entering into the Fourth Amendment, or (3) upon 30 days advance written notice by either party.	<p>River Aqueduct pump load.</p> <ul style="list-style-type: none"> District's Transmission Line is operated by the District as directed by Edison.
21.	Edison-Arizona Transmission Agreement	APS	282	Through the term of the Four Corners plant site New Lease as that term may be extended or renewed.	<ul style="list-style-type: none"> Edison has ownership-like rights to the 500 kV Transmission line from the Four Corners Project to the Arizona-Nevada border. Edison also owns the 500 kV line from Arizona-Nevada border to Edison's Eldorado substation.
22.	Mead Interconnection Agreement	WAPA	308	May 31, 2017	<ul style="list-style-type: none"> Edison has rights to transmit its Hoover power Edison's facilities include Eldorado-Mead 230 kV #1 and 2 transmission lines. Edison may request additional firm transmission service rights through Mead Substation subject to availability as determined by WAPA.
23.	Agreement for Mitigation of Major Loop Flow	Pacificorp, PG&E, SCE	Pacificorp R/S # 298	February 12, 2020	<ul style="list-style-type: none"> Pacificorp to operate Phase Shifting Transformers on the Sigurd-Glen Canyon and Pinto-Four Corners Transmission Lines in accord with contract.

Supplement to Edison Appendix A

Notices Pursuant to Section 4.1.5

Pursuant to the Transmission Control Agreement Section 4.1.5 (iii), Southern California Edison Company (Edison) is providing notice its transmission system¹⁴ being placed under the California Independent System Operator's (ISO) Operational Control will meet the Applicable Reliability Criteria in 1998,²⁵ except as noted in its bulk power program and described herein. Edison's transmission system has been developed in accordance with NERC and WSCC's reliability criteria. WSCC's most recent Log of System Performance Recommendations, dated April 15, 1997, does not show any instances where Edison's transmission system does not meet NERC and WSCC reliability criteria, absent approved exemptions.

Pursuant to Section 4.1.5 (i), Edison does not believe that transfer of Operational Control is inconsistent with any of its franchise or right of way agreements to the extent that ISO Operational Control is implemented as part of Edison's utility service pursuant to AB 1890. However, Edison can't warrant that these right of way or franchise agreements will provide necessary authority for ISO entry or physical use of such rights apart from Edison's rights pursuant to its physical ownership and operation of transmission facilities.

¹ Including upgrades and operational plans for the transmission lines and associated facilities.

² Edison's most recent assessment is based on Edison's substation and system load forecasts for study year 1998 and criteria in effect as of September 1, 1997. Edison meets WSCC's reliability criteria except for WSCC's Disturbance Performance level 'D' (e.g. outage of three or more circuits on a right-of-way, an entire substation or an entire generating plant including switchyard), where the risk of such an outage occurring is considered very small and the costs of upgrades very high. Assessments of Edison's transmission system using NERC Planning Standards and Guides, released September 16, 1997 will be performed in accordance with the ISO's coordinated transmission planning process as provided for in the ISO Tariff, Section 3.2.2. and under schedules adopted in that process.

Modification of Appendix A1

Diagrams of Transmission Lines and Associated Facilities Placed Under the Operational Control of the CAISO

**(submitted by the CAISO on behalf of San Diego Gas & Electric Company
Transmission Owner)**

The diagrams of transmission lines and associated facilities placed under the Operational Control of the CAISO submitted by the CAISO on behalf of SDG&E are amended as follows.

Item 1: Imperial Valley Switchyard 230kV Breakers Nos. 4132 and 5132 shown in the diagram as non-SDG&E facilities should be shown as SDG&E owned. Furthermore, these breakers are being placed under the Operational Control of the CAISO.

APPENDIX A.2: SDG&E'S CONTRACT ENTITLEMENTS

CONTRACT NUMBER	CONTRACT NAME	OTHER PARTIES	FERC NO.	CONTRACT TERMINATION	FACILITY/PATH, AMOUNT OF SERVICE
81-034	Mutual Assistance Transmission Agreement	IID, APS, Edison	62	4/12/2034 or sooner by mutual agreement of the parties. A party may withdraw from this agreement upon giving 5 years advance written notice to the other parties.	Should a contingency occur in the Palo Verde-Devers, Palo Verde-North Gila-Imperial Valley transmission lines, participants to share the available capacity based on predetermined operating procedures set out in a separate operating bulletin.
79-016	SONGS Participation Agreement	Edison, Anaheim, Riverside	321	None.	SDG&E's share of SONGS switchyard with termination of its 230 kV transmission lines: - San Luis Rey (3 Lines) - Talega (2 lines)
79-017	IID-SDG&E Interconnection and Exchange Agreement	IID	065	June 24, 2051, (schedule pertaining to emergency capacity/energy services is expected to be terminated upon execution by IID of the CAISO's Balancing Authority Area	Should a contingency occur due to loss or interruption of generating or transmission capabilities on either party's electric system, IID and SDG&E to provide each other emergency capacity and energy.

CONTRACT NUMBER	CONTRACT NAME	OTHER PARTIES	FERC NO.	CONTRACT TERMINATION	FACILITY/PATH, AMOUNT OF SERVICE
78-007	CFE-SDG&E Interconnection and Exchange Agreement	CFE		12 month notice (schedule pertaining to emergency capacity/energy services is expected to be terminated upon execution by CFE of the CAISO's Balancing Authority Area Agreement).	Should a contingency occur due to loss or interruption of generating or transmission capabilities on either party's electric system, CFE and SDG&E to provide each other emergency capacity and energy.
81-005	Palo Verde-North Gila Line ANPP High Voltage Switchyard Interconnection Agreement	APS, IID, PNM, SRP, El Paso, SCE, SCPPA	063	July 31, 2031	The parties are obligated to provide mutual switchyard assistance during emergencies to the extent possible. However, in the event that the capacity of the ANPP Switchyard is insufficient to accommodate all requests, the rights of the ANPP Switchyard Participants shall take precedence in all allocations.
81-050	IID-SDG&E California Transmission System Participation Agreement	IID		June 24, 2051	SDG&E and IID schedule power and energy over the California Transmission System for their respective accounts at the Yuma (North Gila) 500 kV Switchyard for delivery to the 500 kV breaker yard of the Imperial Valley in the following percentages of operating capacity: SDG&E -- 85.64%; and IID -- 14.36%.

CONTRACT NUMBER	CONTRACT NAME	OTHER PARTIES	FERC NO.	CONTRACT TERMINATION	FACILITY/PATH, AMOUNT OF SERVICE
78-003	APS-SDG&E Arizona Transmission System Participation Agreement	APS		July 31, 2031	SDG&E, APS, and IID schedule power and energy over the Arizona Transmission System for their respective accounts at the Palo Verde Switchyard for delivery at the Yuma (North Gila) 500 kV Switchyard in the following percentages of operating capacity: APS -- 11%; SDG&E – 76.22%; IID – 12.78%.
	The Funding Agreement For The Development Of A Satellite Switchyard To The ANPP High Voltage Switchyard Between Participating Interconnectors and Salt River Project Agricultural Improvement and Power District (Funding Agreement) incorporates the Memorandum of Understanding Between Arizona Public Service Company, San	Funding Agreement: Salt River Project Agricultural Improvement and Power District, Department of Water and Power of the City of Los Angeles, Southern California Edison Company, Duke Energy Maricopa, LLC, Gila Bend Power	SCE FERC Rate Schedule 420	July 31, 2031	The Funding Agreement provides that the owners of the North Gila and Kyrene transmission lines will act in good faith to negotiation agreements with respect to the loop in of these lines at the ANPP Satellite Switchyard (Hassayampa) on terms and conditions satisfactory to the ANPP High Voltage Switchyard Participants consistent with the MOU. Under the MOU, SDG&E retains ownership and control over the facilities associated with the loop-in of the Palo Verde-North Gila line in Hassayampa so as to ensure the unobstructed transfer of capacity and energy through Hassayampa equal to the capability of the existing Palo Verde-North Gila line.

	<p>Diego Gas & Electric Company, Imperial Irrigation District, and Salt River Project Agricultural Improvement and Power District Incorporated (MOU)</p>	<p>Partners, LLC, Harquahala Generating Company, LLC, Mesquite Power, LLC, Pinnacle West Energy Corporation, and NRG Mextrans, Inc.</p> <p>MOU: SDG&E, APS, IID, and SRP</p>			
	<p>SDG&E-Citizens Sunrise Transmission LLC Development and Coordination Agreement/Transfer Capability Lease</p>	<p>SDG&E, Citizens Sunrise Transmission LLC</p>			<p>SDG&E is solely entitled to decide upon, develop, design, engineer, procure, construct, commission, own, operate, maintain, and finance any upgrades to all or any portion of the Sunrise Powerlink Project ("Sunrise Powerlink") after the Commercial Operation Date of the Sunrise Powerlink for purposes of increasing the Transfer Capability of all or any portion of the Sunrise Powerlink. SDG&E shall be solely responsible to pay the costs of such upgrades. Citizens agrees that it will not oppose any upgrades proposed by SDG&E. SDG&E shall be solely entitled to determine whether any additional capital investment is needed for replacement or</p>

					<p>renewal of facilities of the Sunrise Powerlink resulting in no increases in the Transfer Capability of the Sunrise Powerlink, and if so, the timeframe for the same. SDG&E shall be solely entitled to itself undertake or undertake by way of contracts with others to develop, design, engineer, procure, construct, commission, own, operate, maintain, and finance such replacement or renewals of the facilities of the Sunrise Powerlink. SDG&E shall be responsible for all costs of such replacement or renewal. Subject to the CAISO Tariff and rules governing interconnection, as between SDG&E and Citizens, SDG&E will be the interconnection agent for the Sunrise Powerlink. In particular, SDG&E will process all requests for interconnection to the Sunrise Powerlink, SDG&E will develop, design, engineer, procure, construct, commission, own, operate, maintain, and arrange funding for such interconnection facilities, including all substations and switchyards connected to the Sunrise Powerlink, and SDG&E will retain all ownership and Transfer Capability interests in such interconnection facilities.</p>
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Supplement To SDG&E's Appendix A

Notices Pursuant to Section 4.1.5

Pursuant to the Transmission Control Agreement Section 4.1.5 (iii), the transmission system⁶ of San Diego Gas & Electric Company (SDG&E) is placing under the California Independent System Operator's Operational Control meets the Applicable Reliability Criteria,⁷ with the following exceptions: (1) SDG&E has not yet re-assessed its system performance for any reliability criteria added or modified by the new North American Electric Reliability Council (NERC) Planning Standards and Guides, released in September, 1997;⁸ (2) SDG&E has also not yet re-assessed its system performance for the revised simultaneous generator outage criteria which was approved by the WSCC Board of Trustees on October 27, 1997.⁹

Pursuant to Section 4.1.5(i), SDG&E does not believe that transfer of Operational Control is inconsistent with any of its franchise or right of way agreements to the extent that ISO Operational Control is implemented as part of SDG&E utility service pursuant to AB 1890. However, SDG&E cannot warrant that these right-of-way or franchise agreements will provide necessary authority for ISO entry or physical use of such rights apart from SDG&E's rights, pursuant to its physical ownership and operation of transmission facilities.

⁶ Including upgrades and operational plans for the transmission lines and associated facilities.

⁷ Based upon studies with SDG&E's forecast peak 1998 system loads and the Applicable Reliability Criteria, including the WSCC Reliability Criteria for Transmission Planning and WSCC Minimum Operating Reliability Criteria dated March 1997, and the SDG&E Local Reliability Criteria as submitted to the California ISO by letter dated December 15, 1997.

⁸ Assessments of SDG&E's transmission system using NERC Planning Standards and Guides, released September 16, 1997 will be performed in accordance with the ISO's coordinated transmission planning process as provided for in the ISO Tariff, Section 3.2.2 and under schedules adopted in that process.

⁹ The revised criteria will be cooperatively assessed by SDG&E and the ISO as soon as possible but not later than May 1, 1998. SDG&E also may not meet the WSCC's Disturbance Performance level 'D' (e.g. outage of three or more circuits on a right-of-way, an entire substation or an entire generating plant including switchyard), where the risk of such an outage occurring is considered very small and the costs of upgrades very high.

**APPENDIX A.2: CITY OF VERNON
TRANSMISSION ENTITLEMENTS**

POINT OF RECEIPT- DELIVERY	PARTIES	DIRECTION	CONTRACT-TITLE	FERC	CONTRACT TERMINATION	CONTRACT AMOUNT
1. Mead-Laguna Bell	Vernon, Edison	Bi-Directional	Edison-Vernon Mead FTS	207	(1) See Notes	26 MW
2. Victorville-Lugo Midpoint-Laguna Bell	Vernon, Edison	Bi-Directional	Edison-Vernon Victorville- Lugo Midpoint FTS	154	(2) See Notes	11 MW
3. Adelanto- Victorville/Lugo Midpoint (3a)	Vernon, Los Angeles	Bi-Directional	Los Angeles-Vernon Adelanto-Victorville/Lugo FTS		(3b) See Notes	81 MW

Summary - Details are in each agreement

APPENDIX A.2: CITY OF VERNON'S CONTRACT ENTITLEMENTS

Notes:

- (1) Contract Termination: Upon termination of Vernon's Hoover Power Sales contract with WAPA; or 12/31/2007 based on proper notice from Vernon to Edison.
- (2) Contract Termination: Upon permanent removal from operation of the Mead-Adelanto 500 kV Transmission Project; or 12/31/2007, based on proper notice from Vernon to Edison.
- (3a) DWP No. 10396.
- (3b) Contract Termination: Upon permanent removal from operation of the Mead-Adelanto 500 kV Transmission Project; or four years prior written notice by either party.

APPENDIX A: CITY OF ANAHEIM TRANSMISSION ENTITLEMENTS

	Point of Receipt-Delivery	Parties	Direction	Contract Title	FERC No.	Contract Termination	Contract Amount
1	IPP-Adelanto Switching Station	Anaheim-SCPPA	Bi-directional	Southern Transmission System Transmission Service Contract		15-Jun-27	424 MW (N-S) 247 MW (S-N)
2	Marketplace Substation-Adelanto	Anaheim-SCPPA	Bi-directional	Mead-Adelanto Project Transmission Service Contract		31-Oct-30	118 MW
	Marketplace Substation-McCullough	"	"	"		"	159 MW
3	Westwing-Mead 500 kV	Anaheim-SCPPA	Bi-directional	Mead-Phoenix Project Transmission Service Contract		31-Oct-30	70 MW
	Marketplace-Mead 500 kV	"	"	"		"	155 MW
	Mead 500 kV-Mead 230 kV	"	"	"		"	110 MW
	Marketplace Substation-McCullough	"	"	"		"	103 MW
4	Adelanto-Victorville/Lugo	Anaheim-LADWP	Bi-directional	Adelanto-Victorville/Lugo 110 MW Firm Transmission Service Agreement		See Note 1	110 MW
5	Adelanto-Victorville/Lugo	Anaheim-LADWP	North-South	IPP Base Capacity Transmission Service Agreement		See Note 2	238 MW
6	Adelanto-Victorville/Lugo	Anaheim-LADWP	North-South	IPP Additional Capacity Transmission Service Agreement		See Note 3	185 MW
7	IPP-Mona Substation	Anaheim-LADWP	West-East	Northern Transmission System Agreement		See Note 4	235 MW
	Mona Substation-IPP	"	East-West	"		"	257 MW
	IPP-Gonder Substation	"	East-West	"		"	36 MW
	Gonder Substation-IPP	"	West-East	"		"	23 MW
Notes							
1.	Agreement terminates on: (i) removal of Mead-Adelanto Project from Service; or (ii) removal of Los Angeles-SCE interconnection at Victorville/Lugo.						
2.	Agreement terminates on: (i) June 15, 2027; or (ii) the date Anaheim interconnects at Adelanto Switching Station.						
3.	Agreement terminates on: (i) June 15, 2027; (ii) the date Anaheim interconnects at Adelanto Switching Station; or (iii) 5-year's notice by LADWP.						
4.	Agreement terminates on: (i) termination of LADWP's rights to the Northern Transmission System; or (ii) termination of the IPP Additional Capacity Transmission Service Agreement.						

APPENDIX A: CITY OF AZUSA

CITY OF AZUSA'S TRANSMISSION ENTITLEMENTS

POINT OF RECEIPT-DELIVERY	PARTIES	DIRECTION	CONTRACT-TITLE	FERC	CONTRACT TERMINATION	CONTRACT AMOUNT
1. Mead-Adelanto Project (MAP)	SCPPA, MSR, Vernon	Bi-Directional	<ul style="list-style-type: none"> - MAP Joint Ownership Agreement - Adelanto Switching Station Interconnection Agreement - Marketplace-McCullough 500 kV Interconnection Agreement 		As agreed to by the owners and approved by the Project Coordinating Committee.	19 MW

POINT OF RECEIPT-DELIVERY	PARTIES	DIRECTION	CONTRACT-TITLE	FERC	CONTRACT TERMINATION	CONTRACT AMOUNT
2. Mead-Phoenix Project (MPP)	SCPPA, MSR, Vernon, SRP, APS		<ul style="list-style-type: none"> - MPP Joint Ownership Agreement - Westwing Substation Interconnection Agreement - Mead Interconnection Agreement - Marketplace-McCullough 500 kV Interconnection Agreement. 		As agreed to by the owners and approved by the Project Management Committee.	
a) Westwing-Mead b) Mead Substation c) Mead-Marketplace		Bi-Directional Bi-Directional Bi-Directional				4 MW 0 MW 4 MW
3. Mead - Rio Hondo	Azusa, Edison	Uni-Directional	Edison-Azusa Hoover FTS	372	(1) See Notes	4 MW
4. Victorville-Lugo - Rio Hondo	Azusa, Edison	Uni-Directional	Edison-Azusa Palo Verde Nuclear Generating Station FTS	373	(2) See Notes	4 MW
5. Victorville-Lugo - Rio Hondo	Azusa, Edison	Uni-Directional	Edison-Azusa Pasadena FTS	374	(3) See Notes	14 MW
6. Mead - Rio Hondo	Azusa, Edison	Bi-Directional	Edison-Azusa Sylmar FTS	375	(4) See Notes	8 MW

POINT OF RECEIPT-DELIVERY	PARTIES	DIRECTION	CONTRACT-TITLE	FERC	CONTRACT TERMINATION	CONTRACT AMOUNT
7. Victorville-Lugo - Adelanto	Azusa, Los Angeles	Bi-Directional	Los Angeles - Azusa Adelanto-Victorville/Lugo FTS	DWP No. 10345	(5) See Notes	19 MW

Summary- details are in each agreement.

NOTES:

(1) Contract Termination:	Upon written agreement between the Parties to terminate the FTS Agreement or termination of Electric Service Contract, provided that the termination of FTS Agreement shall not occur prior to January 1, 2003.					
(2) Contract Termination:	Upon written agreement between the Parties to terminate the FTS Agreement, termination of Azusa's entitlement to PVNGS, or termination of the Arizona Nuclear Power Project Participation, provided that the termination of the FTS Agreement shall not occur prior to January 1, 2003.					
(3) Contract Termination:	Upon written agreement between the Parties to terminate the FTS Agreement or termination of City's ownership in San Juan Unit 3, provided that termination of this Transmission Service Agreement shall not occur prior to January 1, 2003.					
(4) Contract Termination:	Same as (3)					
(5) Contract Termination:	This agreement shall be terminated upon the earlier of: (i) four years prior written notice by either Party, which notice shall not be given before one year after the Date of Firm Operation; (ii) the date of retirement of the Mead-Adelanto Project; (iii) the date the point of interconnection on the Victorville-Lugo transmission line is					

permanently removed from service; (iv) the in-service date of the Adelanto-Lugo transmission line, as such date is defined pursuant to the agreements relating thereto; (v) a date determined pursuant to Section 4.3 of the agreement; or (vi) a date mutually agreed upon by the Parties.

	Point of Receipt-Delivery	Parties	Direction	Contract Title	FERC No.	Contract Termination	Contract Amount
1.	Marketplace Substation-Adelanto	Banning-SCPPA	Bi-directional	Mead-Adelanto Project Transmission Service Contract		Oct 31, 2030	12 MW
2.	Westwing-Mead-Marketplace 500 kV	Banning-SCPPA	Bi-directional	Mead-Phoenix Project Transmission Service Contract		Oct 31, 2030	3 MW
3.	Marketplace-McCullough 500 kV	Banning-SCPPA	Bi-directional	Mead-Adelanto Project Transmission Service Contract Mead-Phoenix Project Transmission Service Contract		Oct 31, 2030	12 MW 3 MW
4.	Adelanto-Victorville/Lugo	Banning-LADWP	To Victorville	Adelanto-Victorville/Lugo Firm Transmission Service Agreement		See Note 1	12 MW
5.	Victorville/Lugo-Devers 115 kV	Banning-SCE	To Devers	Palo Verde Nuclear Generating Station Firm Transmission Service Agreement		See Note 2	3 MW
6.	Victorville/Lugo-Devers 115 kV	Banning-SCE	To Devers	Sylmar Firm Transmission Service Agreement		See Note 3	5 MW
7.	Mead 230 kV-Devers 115 kV	Banning-SCE	To Devers	Hoover Firm Transmission Service Agreement		See Note 4	2 MW
8.	Devers 500 kV-Devers 115 kV	Banning-SCE	To Devers	1995 San Juan Unit 3 Firm Transmission Service Agreement		See Note 5	15 MW
Notes							

1. Agreement terminates on: (i) 4-years written notice by either party; or (ii) the date of retirement of the Mead-Adelanto Project; (iii) the date the point of interconnection on the Victorville/Lugo line is permanently removed from service; (iv) the in-service date of the Adelanto-Lugo transmission line, as such date is defined pursuant to the agreements relating thereto.
2. Agreement terminates on: (i) twelve months notice by Banning; (ii) termination of Banning's interest in Palo Verde Nuclear Generating Station Unit 2; or (iii) unacceptable FERC modification.
3. Agreement terminates on: (i) twelve months notice by Banning; (ii) termination of Banning's interest San Juan Unit 3; or (iii) unacceptable FERC modification.

4. Agreement terminates on: (i) twelve months notice by Banning; (ii) termination of the Electric Service Contract between Western and Banning; or (iii) unacceptable FERC modification.
5. Agreement terminates on June 30, 2012.

**APPENDIX A: CITY OF RIVERSIDE
TRANSMISSION ENTITLEMENTS**

	Point of Receipt-Delivery	Parties	Direction	Contract Title	FERC No.	Contract Termination	Contract Amount
1.	IPP-Adelanto Switching Station	Riverside-SCPPA	Bi-directional	Southern Transmission System Transmission Service Contract		15-Jun-27	N-S 244 MW S-N 142 MW
2.	Marketplace Substation-Adelanto	Riverside-SCPPA	Bi-directional	Mead-Adelanto Project Transmission Service Contract		31-Oct-30	118 MW
3.	Westwing-Mead-Marketplace 500 kV	Riverside-SCPPA	Bi-directional	Mead-Phoenix Project Transmission Service Contract		31-Oct-30	18 MW
4.	Marketplace-McCullough 500 kV	Riverside-SCPPA	Bi-directional	Mead-Adelanto Project Transmission Service Contract Mead-Phoenix Project Transmission Service Contract		31-Oct-30 31-Oct-30	118 MW 17 MW
5.	Adelanto-Victorville/Lugo	Riverside-LADWP	Bi-directional	Adelanto-Victorville/Lugo 110 MW Firm Transmission Service Agmnt		See Note 1	118 MW
6.	Adelanto-Victorville/Lugo	Riverside-LADWP	To Victorville	IPP Base Capacity Transmission Service Agreement		See Note 2	137 MW
7.	Adelanto-Victorville/Lugo	Riverside-LADWP	To Victorville	IPP Additional Capacity Transmission Service Agreement		See Note 3	107 MW
8.	IPP-Mona Substation	Riverside-LADWP	Bi-directional	Northern Transmission System Agreement		See Note 4	W-E 135 MW E-W 126 MW
9.	IPP-Gonder Substation	Riverside-LADWP	Bi-directional	Northern Transmission System Agreement		See Note 4	W-E 19 MW E-W 12 MW
10.	San Onofre-Vista	Riverside-SCE	To Vista	San Onofre Nuclear Generating Station Firm Transmission Service Agmt.		See Note 5	42 MW
11.	Mead 230 kV-Vista	Riverside-SCE	To Vista	Hoover Firm Transmission Service Agreement		See Note 6	30 MW
12.	Lugo/Victorville-Vista	Riverside-SCE	To Vista	Intermountain Power Project Firm Transmission Service Agreement		See Note 7	156 MW
13.	Lugo/Victorville-Vista	Riverside-SCE	To Vista	Palo Verde Nuclear Generating Station Firm Transmission Service Agmt.		See Note 8	12 MW

Notes

1. Agreement terminates on: (i) removal of Mead-Adelanto Project from Service; or (ii) removal of Los Angeles-SCE interconnection at Victorville/Lugo.
2. Agreement terminates on: (i) June 15, 2027; or (ii) the date Riverside interconnects at Adelanto Switching Station.

APPENDIX A: CITY OF RIVERSIDE TRANSMISSION ENTITLEMENTS

3. Agreement terminates on: (i) June 15, 2027; (ii) the date Riverside interconnects at Adelanto Switching Station; or (iii) 5-year's notice by LADWP.
4. Agreement terminates on: (i) termination of LADWP's rights to the Northern Transmission System; or (ii) termination of the IPP Additional Capacity Agreement.
5. Agreement terminates on: (i) six months notice by Riverside; (ii) termination of Riverside's interest in San Onofre Nuclear Generating Station Units 2 and 3; or (iii) unacceptable FERC modification.
6. Agreement terminates on: (i) six months notice by Riverside; (ii) termination of Riverside's interest in the Boulder Canyon Project (Hoover); or (iii) unacceptable FERC modification.
7. Agreement terminates on: (i) six months notice by Riverside; (ii) termination of Riverside's interest in the Intermountain Power Project; or (iii) unacceptable FERC modification.
8. Agreement terminates on: (i) six months notice by Riverside; (ii) termination of Riverside's interest in the Palo Verde Nuclear Generating Station; or (iii) unacceptable FERC modification.

Appendix A
Atlantic Path 15, LLC
Transmission Entitlements

Path 15 Project Facilities

Atlantic Path 15, LLC is a participant in the Path 15 Upgrade Project, which will consist of a new, single, 83-mile, 500-kilovolt (kV) transmission line and associated substation facilities extending between the PG&E Los Banos Substation in the California Central Valley (the northern terminus of the Project) and the Gates Substation (the southern terminus of the Project), including modifications at the substations to connect the line as well as reconfigurations to the Gates – Midway 230-kV line and the 115 kV line north of Midway. Voltage support facilities will also be added at the Los Banos and Gates Substations as part of the Project. Atlantic Path 15, LLC will own Entitlements to certain capacity on the Path 15 Project Facilities.

Atlantic Path 15, LLC will provide the funding for the development of the Transmission Line and Land acquisition for the Path 15 Upgrade Project (Project), as well as funding for the ongoing operation and maintenance of the transmission line and will, as a result, be granted Entitlements to capacity on the Path 15 Upgrade Project.

Under the terms of the Letter Agreement (LA) approved by the Federal Energy Regulatory Commission and under the provisions of the Construction and Coordination Agreement (CCA) entered into by the Path 15 Upgrade Project participants, each participant will receive an allocation of Entitlement and the associated Transmission System Rights in the Project proportional to each party's contribution to the Project (save for a specified allocation to Western Area Power Administration – Sierra Nevada Region ("WAPA-SNR") that shall be no less than 10% of the Project). The initial allocation of Entitlements to Atlantic Path 15, LLC is as follows:

Allocation	72%
Capacity	1,080 MW (Based on an estimate of 1,500 MW)

The LA and CCA further provide that a final allocation of Entitlements will be determined based on the ratio of the contribution made by Atlantic Path 15, LLC to the Project relative to the contributions of other Project participants. Each Path 15 Upgrade Project participant will provide the Coordination Committee and the other Parties with a final accounting of the Project Costs within 180 days after the commencement of the commercial operations to determine the final allocation of Entitlements pursuant to the provisions of the LA and Section 15.4 of the CCA. Atlantic Path 15, LLC shall also provide a copy of the final accounting to the CAISO. The allocation of Entitlements set forth in this Appendix A is a preliminary estimate of the Entitlements to be granted to Atlantic

Path 15, LLC and will be amended following a final accounting for the Project, if applicable.

Appendix A
Western Area Power Administration, Sierra Nevada Region
Transmission Rights and Interests

Path 15 Project Facilities

Western is a participant in the Path 15 Upgrade Project, which will consist of a new, single, 83-mile, 500-kilovolt (kV) transmission line and associated substation facilities extending between the PG&E Los Banos Substation in the California Central Valley (the northern terminus of the Project) and the Gates Substation (the southern terminus of the Project), including modifications at the substations to connect the line as well as reconfigurations to the Gates – Midway 230-kV line and the 115 kV line north of Midway. Voltage support facilities will also be added at the Los Banos and Gates Substations as part of the Project. Western will own the portion of the Path 15 Project Facilities consisting of the 500 kV transmission line between the Los Banos and Gates Substations.

Under the terms of the Letter Agreement (LA) approved by the Federal Energy Regulatory Commission and under the provisions of the Construction and Coordination Agreement (CCA) entered into by the Path 15 Upgrade Project participants, each participant will receive an allocation of “Transmission System Rights” in the Project. Western’s allocation of Transmission System Rights under the LA and CCA is as follows:

Allocation	10%
Capacity	150 MW (Based on an estimate of 1,500 MW)

Western is turning over to CAISO Operational Control all of its rights and interests in both its ownership of the Project facilities and its contract Transmission System Rights.

**APPENDIX A: CITY OF PASADENA
TRANSMISSION ENTITLEMENTS**

Ref	Point of Receipt-Delivery (see note 2)	Parties	Direction	Contract Title	FERC No.	Contract Termination	Contract Amount
B1.	IPP - Adelanto Switching Station	Pasadena-SCPPA	Bi-directional	Southern Transmission System Transmission Service Contract		15-Jun-27	141 MW
B2.	Mead - Marketplace - Adelanto	Pasadena-SCPPA	Bi-directional	Mead-Adelanto Project Transmission Service Contract		31-Oct-30	75 MW
B3.a	Westwing – Mead 500 kV	Pasadena-SCPPA	Bi-directional	Mead-Phoenix Project Transmission Service Contract		31-Oct-30	33 MW
B3.b	Mead 500 kV - Marketplace 500 kV	Pasadena-SCPPA	Bi-directional	Mead-Phoenix Project Transmission Service Contract		31-Oct-30	60 MW
B3.c	Mead 500 kV - Mead 230 kV	Pasadena-SCPPA	Bi-directional	Mead-Phoenix Project Transmission Service Contract		31-Oct-30	25 MW
B4.	Marketplace 500 - McCullough 500 kV	Pasadena-SCPPA	Bi-directional	Mead-Phoenix and Mead-Adelanto Project Transmission Service Contracts		31-Oct-30	135 MW
B5.	Adelanto - Victorville	Pasadena-LADWP	Bi-directional	Hoover Transmission Service Agreement 14442		30-Sep 17	26 MW
B6.a	IPP - Mona Substation	Pasadena-LADWP -Utah Participants	Bi-directional	IPP Excess Power Sales Sales Agreement		15-Jun-27	104 MW [Note 3]
B6.b	IPP - Gonder Substation	Pasadena-LADWP -Utah Participants	Bi-directional	IPP Excess Power Sales Sales Agreement		15-Jun-27	16 MW [Note 3]
B8.a	Adelanto - Sylmar	Pasadena-LADWP	Bi-directional	IPP Transmission Service Agreement 14443		15-Jun-27	141 MW [Note 2]
B8.b	Adelanto - Sylmar	Pasadena-LADWP	Bi-directional	Hoover Transmission Service Agreement 14442		30-Sep 17	26 MW [Note 2]
B9.	Victorville – Sylmar	Pasadena-LADWP	Bi-directional	Victorville-Sylmar Transmission Service Agreement 14444		Note 1	26 MW [Note 1, Note 2]

B10.	Mead –McCullough	Pasadena-LADWP	Bi-directional	Hoover Transmission Service Agreement 14442		30-Sep 17	26 MW
B11.	McCullough - Victorville	Pasadena-LADWP	Bi-directional	Hoover Transmission Service Agreement 14442		30-Sep 17	26 MW
C1.	Nevada Oregon Border - Sylmar	Pasadena-LADWP	Bi-directional	Pacific Intertie D-C Transmission Facilities Agreement		14-Apr-41	N-S 72 MW S-N 69 MW [Note 2]
C2.	McCullough – Victorville	Pasadena-LADWP	Bi-directional	McCullough Victorville Line 2 Transmission Agreement 10463		31-May-30	26 MW

Notes

- 1 This contract is coterminous with the McCullough Victorville Line 2 Transmission Agreement.
- 2 Deliveries to Sylmar point of delivery are at the SCE/CAISO side of the 230kV bus.
- 3 The contract amount is subject to change by the terms of the contract.

Appendix A
Trans Bay Cable, LLC
Transmission Facilities and Entitlements

Trans Bay Cable Project Facilities

Trans Bay Cable LLC (TBC) will develop, finance and construct a high voltage, direct current transmission line of approximately fifty-five miles in length and associated facilities to establish a direct connection between Pacific Gas and Electric Company's (PG&E's) Pittsburg Substation located at a site adjacent to the City of Pittsburg, California in Contra Costa County to PG&E's Potrero Substation within the City of San Francisco (the Project). The transmission line will consist of an approximately 7,000-ton bundled cable consisting of a transmission cable, a fiber optic communications cable and a metallic return. The underwater portion of the transmission line will be laid by a ship or barge with special equipment in a single trench underneath San Francisco Bay. The remaining length of the transmission line (most likely a few hundred yards at either end of the line) will be buried underground, either through directional drilling or laid in a trench. In addition, the Project will involve the construction of two converter stations near each of the PG&E Substations to convert the alternating current received at the Pittsburg Substation to direct current and then back to alternating current at the Potrero Substation.

In accordance with the TCA and the TO Tariff, TBC will transfer the Project to CAISO Operational Control at the time the Project enters service.

**APPENDIX A: STARTRANS IO, L.L.C.
TRANSMISSION ENTITLEMENTS**

POINT OF RECEIPT-DELIVERY	PARTIES	DIRECTION	CONTRACT-TITLE	FERC	CONTRACT TERMINATION	CONTRACT AMOUNT
1. Mead-Adelanto Project (MAP)	SCPPA, MSR, Startrans IO (Operating Agent-LA)	Bi-Directional	<ul style="list-style-type: none"> - MAP Joint Ownership Agreement - Adelanto Switching Station Interconnection Agreement - Marketplace-McCullough 500 kV Interconnection Agreement 		As agreed to by the owners and approved by the Project Coordinating Committee.	81 MW
2. Mead-Phoenix Project (MPP)	SCPPA, MSR, Startrans IO, SRP, APR (Operating Managers – SRP, Western (DSW))		<ul style="list-style-type: none"> - MPP Joint Ownership Agreement - Westwing Substation Interconnection Agreement. - Mead Interconnection Agreement - Marketplace-McCullough 500 kV Interconnection Agreement 		As agreed to by the owners and approved by the Project Management Committee.	
a) Westwing-Mead		Bi-Directional				28 MW
b) Mead Substation		Bi-Directional				47 MW
c) Mead-Marketplace		Bi-Directional				75 MW

Appendix A
Citizens Sunrise Transmission LLC
Transmission Entitlement

San Diego Gas & Electric Company (“SDG&E”) and Citizens Energy Corporation (“Citizens Energy”) have agreed in their Development and Coordination Agreement of May 9, 2009 (“DCA”), as amended December 21, 2011, that Citizens Energy would have an opportunity to obtain an interest in the Sunrise Powerlink Project (“Sunrise Powerlink”), currently being constructed and developed by SDG&E. Specifically, Citizens Energy has an option to lease 50% of the transfer capability of the 500 kV segment of the Sunrise Powerlink located in Imperial County, California for 30 years (the “Border-East Line”). To perfect its interest, Citizens Energy is obligated, among other things, (1) to exercise its option on or before the scheduled date of commercial operation of the Sunrise Powerlink, (2) to pay SDG&E certain associated costs (one half of the actual cost of construction and development of the Border-East Line), and (3) to assume all operating costs related to its interest in the Border-East Line. Citizens Energy is further obligated to turn over operational control of its interest in the Border-East Line to the CAISO. Prior to exercising its option under the DCA, Citizens Energy will finalize its rights set forth in a Transfer Capability Lease as provided for in the DCA and will assign and transfer all of its rights and obligations thereunder, and all of the regulatory approvals it has obtained to date, to Citizens Sunrise Transmission LLC.

**Appendix A-2: Citizens Sunrise Transmission, LLC
Entitlements**

Point of Receipt-Delivery	Parties	Direction	Contract Title	FERC No.	Contract Start Date	Contract Termination	Contract Amount
Imperial Valley Substation*	SDG&E and Citizens Sunrise Transmission, LLC	Bi-directional	Development and Coordination Agreement of May 9, 2009, as amended December 21, 2011	NA	2012	2042	NA
Suncrest Substation/Sycamore Canyon Substations*	SDG&E and Citizens Sunrise Transmission, LLC	Bi-directional	Development and Coordination Agreement of May 9, 2009, as amended December 21, 2011	NA	2012	2042	NA

* Citizens Sunrise Transmission's interest extends westward from the Imperial Valley Substation only to the San Diego County/Imperial County Border

**APPENDIX A: CITY OF COLTON
TRANSMISSION ENTITLEMENTS**

REF #	POINT-OF-RECEIPT DELIVERY	PARTIES	DIRECTION	CONTRACT TITLE	FERC NO.	CONTRACT TERMINATION	CONTRACT AMOUNT
1	Marketplace-Adelanto	Colton-SCPPA	Bi-directional	Mead-Adelanto Project Transmission Service Contract	None	See note 1	23 MW
2	Westwing-Mead-Marketplace	Colton-SCPPA	Bi-directional	Mead-Phoenix Project Transmission Service Contract	None	See note 2	4 MW
3	Marketplace-McCullough	Colton-SCPPA	Bi-directional	Mead-Adelanto Project Transmission Service Contract	None	See note 3	33 MW
				Mead-Phoenix Project Transmission Service Contract			
4	Adelanto-Lugo/Victorville	Colton-LADWP	Bi-directional	Adelanto-Lugo/Victorville Firm Transmission Service Agreement	None	See Note 4	23 MW
5	Devers-Vista	Colton-SCE	To Vista	1995 San Juan Unit 3 Firm Transmission Service Agreement	365	See Note 5	14.043 MW
6	Mead-Vista	Colton-SCE	To Vista	Hoover Firm Transmission Service Agreement	361	See Note 6	3 MW
7	Lugo/Victorville-Vista	Colton-SCE	To Vista	Pasadena Firm Transmission Service Agreement	363	See Note 7	18 MW
8	Lugo/Victorville-Vista	Colton-SCE	To Vista	Palo Verde Nuclear	362	See Note 8	3 MW

				Generating Station Firm Transmission Service Agreement			
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Notes:

1. Agreement terminates on: (i) October 31, 2030; or (ii) such later date as all bonds used to finance the project have been paid or provisions for their payment have been made.

2. Agreement terminates on: (i) October 31, 2030; or (ii) such later date as all bonds used to finance the project have been paid or provisions for such payment has been made.

3. Agreement terminates concurrent with termination of the agreements referred to in notes 1 and 2 above.

4. Agreement terminates on: (i) four year notice by either party; (ii) the date of retirement of the Mead-Adelanto Project; (iii) the date the Lugo-Victorville point of interconnection is permanently removed from service; (iv) the in-service date of a new transmission line interconnecting LADWP's Adelanto Switching Station and SCE's Lugo Substation; or (v) upon 30 days notice if Colton elects to terminate the agreement following a change in the rate for transmission service charged by LADWP.

5. Agreement terminates on: (i) one year notice by Colton; (ii) termination of Colton's interest in San Juan Generating Station Unit 3; or (iii) unacceptable FERC modification.

6. Agreement terminates on: (i) one year notice by Colton; (ii) termination of Electric Service Contract providing for Colton's interest in the Boulder Canyon Project (Hoover); or (iii) unacceptable FERC modification.

7. Agreement terminates on: (i) one year notice by Colton; (ii) termination of Colton's interest in San Juan Generating Station Unit 3; or (iii) unacceptable FERC modification.

8. Agreement terminates on: (i) one year notice by Colton; (ii) termination of Colton's interest in the Palo Verde Nuclear Generating Station; (iii) termination of the Arizona Nuclear Power Project Participation Agreement; or (iv) unacceptable FERC modification.

Appendix A
Valley Electric Association, Inc.
Transmission Facilities and Entitlements

Valley Electric Association, Inc. (Valley Electric) will transfer operational control of its entitlements to the 230 kV and 138kV transmission facilities located in its service area to the CAISO, effective at 0100 hours on January 3, 2013, or such other time as agreed to by Valley Electric and the CAISO, in accordance with the Transition Agreement, dated October 13, 2011, between Valley Electric and the CAISO.

Valley Electric has an entitlement to transfer capability at the Mead substation pursuant to an agreement between Valley Electric and the Western Area Power Administration – Desert Southwest Region (Western DSR). In addition, Valley Electric has the exclusive entitlement and obligation to operate, use and maintain all of the transmission facilities and future transmission facilities located in its service area, which are owned by its wholly owned subsidiary, Valley Electric Transmission Association, LLC (“VETA”).

POINT-OF-RECEIPT DELIVERY	PARTIES	DIRECTION	CONTRACT TITLE	FERC	CONTRACT TERMINATION	CONTRACT AMOUNT
Mead Substation	Valley Electric Western (DSR)	Bi-Directional	Contract No. 94-PAO-10569	N/A	September 30, 2017	286 MW (normal) 382 MW (emergency) *Based on facility ratings in accordance with contract Section 13.3
VETA 138 kV and 230 kV Transmission Facilities	Valley Electric VETA	Exclusive Bi-Directional Use of all VETA Transmission Facilities	Use and Entitlement Agreement, dated September 11, 2012	N/A	Subject to Transmission Control Agreement	All capacity represented in the CAISO network model

TRANSMISSION CONTROL AGREEMENT

APPENDIX B

Encumbrances

PG&E APPENDIX B

List of Encumbrances on Lines, Facilities, and Entitlements Being Placed Under CAISO Operational Control (per TCA Appendix A1 & A2)¹⁰

(Includes only those where PG&E is a service provider)

Abbreviations Used: CDWR = California Department of Water Resources
 SCE = Southern California Edison Company
 SDG&E = San Diego Gas & Electric Company
 TANC = Transmission Agency of Northern California
 WAPA = Western Area Power Administration

Ref #	Entities	Contract / Rate Schedule #	Nature of Contract	Termination	Comments
1.	Bay Area Rapid Transit	Service Agreement Nos. 42 and 43 to FERC Electric Tariff, First Revised Volume No. 12	Network Integration Transmission Service Agreement and Network Operating Agreement - OAT	10/1/2016	
2.	CDWR	Comprehensive Agreement – PG&E Rate Schedule FERC No. 77	Interconnection and Transmission	12/31/2014	Transmission Related Losses
3.	Midway-Sunset Co-Generation	Cogeneration Project Special Facilities – PG&E Rate Schedule FERC No. 182	Interconnection, transmission	1/1/2017	
4.	NCPA, CSC, CDWR	Castle Rock-Lakeville CoTenancy Agreement – PG&E Rate Schedule FERC No. 139	Transmission facilities maintenance	Evergreen, or 1 year notice after 1/1/2015	
5.	Path 15 Operating Instructions		Implements curtailment priorities consistent with various Existing Transmission Contracts.	Upon request by PG&E, subject to FERC acceptance.	See Exhibit B-1 to this Appendix B to the TCA
6.	Puget Sound Power & Light	Capacity and Energy Exchange – PG&E Rate Schedule FERC No. 140	Power exchanges	Terminates on 5 years' advance notice.	
7.	San Francisco (City and County of)	Interconnection Agreement - PG&E Rate Schedule FERC No. 114	Interconnection, transmission and supplemental power sales	7/1/2015	Power sales are Firm Partial Requirements

¹⁰ The treatment of current rights, including scheduling priorities, relating to the listed Encumbrances are set forth in the operating instructions submitted by the PTO in accordance with the CAISO Tariff and the TCA.

Ref #	Entities	Contract / Rate Schedule #	Nature of Contract	Termination	Comments
8.	Santa Clara (City of)	Mokelumne Settlement and Grizzly Development Agreement – PG&E Service Agreement No. 20 under FERC Electric Tariff Sixth Revised Volume No. 5	Transmission, power sales	1/1/2034	
9.	SCE, Montana Power Nevada Power, Sierra Pacific	WSCC Unscheduled Flow Mitigation Plan – PG&E Rate Schedule FERC No. 221	Operation of control facilities to mitigate loop flows	Evergreen, or on notice	No transmission services provided, but classified as an entitlement since loop flow is reduced or an encumbrance if PG&E is asked to cut.
10.	TANC, WAPA, and PacifiCorp	Owners Coordinated Operations Agreement – PG&E Rate Schedule FERC No. 229	Transmission system coordination, curtailment sharing, rights allocation, scheduling.	1/1/2043, or on two years' notice, or earlier if other agreements terminate	Both entitlement and encumbrance
11.	TANC and other COTP Participants	COTP Interconnection Rate Schedule – PG&E Rate Schedule FERC No. 144	Interconnection	Upon termination of COTP	
12.	TANC	Midway Transmission Service / South of Tesla Principles – PGE& Rate Schedule FERC No. 143	Transmission, curtailment priority mitigation, replacement power	Same as the COTP Interim Participation Agreement, subject to exception	
13.	WAPA	San Luis Unit – Contract No. 2207A – PG&E Rate Schedule FERC No. 227 (superseding Original Tariff Sheet Nos. 104 through 137 of PG&E Rate Schedule FERC No. 79)	Transmission	4/1/2016	

* Includes use of PG&E's DC Intertie or PDCI for pre-specified mitigation of curtailments over Path 15.

Ref #	Entities	Contract / Rate Schedule #	Nature of Contract	Termination	Comments
14.	WAPA	New Melones – Contract No. 8-07-20-P0004 – PG&E Rate Schedule FERC No. 60	Transmission	6/1/2032	Per WAPA, commercial operation date for New Melones was 6/1/82
15.	PacifiCorp, CAISO	PG&E Rate Schedule FERC No. 239	Transmission Exchange Agreement	12/31/2027 or per Section 4.2	Through an exchange, (1) PG&E provides PacifiCorp 800 MW of transmission capacity north to south and 612 MW south to north on PG&E's portion of the 500-kV No. 2 Line between the Round Mountain substation and Indian Spring and (2) PacifiCorp provides PG&E 800 MW of transmission capacity north to south and 612 MW south to north on PacifiCorp's portion of the 500-kV No. 2 Line between Indian Spring and the Malin substation.

Lien Mortgage

The lien of the First and Refunding Mortgage dated December 1, 1920 between PG&E and BNY Western Trust Company, as trustee, as amended and supplemented and in effect of the date hereof (the "PG&E Mortgage"). The transfer of Operational Control to the CAISO pursuant to this Agreement shall in no event be deemed to be a lien or charge on the PG&E Property which would be prior to the lien of the PG&E Mortgage; however, no consent of the trustee under the PG&E Mortgage is require to consummate the transfer of Operational Control to the CAISO pursuant to this Agreement.

**EXHIBIT B-1
(TO PG&E APPENDIX B)**

**Path 15 Curtailment Instructions
For Existing Encumbrances Across the Path 15 Interface**

Purpose and Objective

Path 15 Curtailment Instructions provide direction to the CAISO regarding the management of Congestion on Path 15 and are submitted to the CAISO, as part of the Transmission Rights and Transmission Curtailment (TRTC) Instructions, by PG&E as the Responsible PTO for the Existing Transmission Contract (ETC) rights on the path.

These instructions are to be administered and adhered to by the CAISO except when the CAISO determines that system reliability requires that other steps be taken. The CAISO is solely responsible for continued system reliability and must unilaterally take all steps necessary to preserve the system in times of emergency.

TCA APPENDIX B: EDISON'S CONTRACT ENCUMBRANCES

REF #	POINT-OF-RECEIPT DELIVERY	PARTIES	DIRECTION	CONTRACT TITLE	FERC NO.	CONTRACT TERMINATION	CONTRACT AMOUNT
2.	Devers-- Vista	Colton	To Vista	1995 San Juan Unit 3 Firm Transmission Service Agreement	365	Earlier of termination of Colton's interest in San Juan Unit 3 or Colton's 1-year notice given after 1/1/03.	14.043 MW
3.	Hinds - Vincent	MWD	Bi-directional	District-Edison 1987 Service and Interchange Agreement	443	The earlier of: (1) the termination of the agreement, (2) upon 60 days written notice by SCE following a determination by the CPUC that SCE was imprudent for entering into the Fourth Amendment, or (3) upon 30 days advance written notice by either party.	110 MW

Footnotes:

1. The following is an additional encumbrance that does not fit into the format for existing contract encumbrances. The additional encumbrance is: The lien of the Trust Indenture dated as of October 1, 1923, between Edison and Harris Trust and Savings Bank and Pacific-Southwest Trust & Savings Bank (D. G. Donovan, successor trustee), as trustees ("the Edison Indenture"). The transfer of Operational Control to the CAISO pursuant to this Agreement (i) does not require any consent from the trustees under the Edison Indenture, (ii) shall not be deemed to create any lien or charge on the Edison Transmission Assets that would be prior to the lien of the Edison Indenture, and (iii) shall not otherwise impair the lien of the Edison Indenture.
2. The treatment of current rights, including scheduling priorities, relating to the listed Encumbrances are set forth in the operating instructions submitted by the PTO in accordance with the CAISO Tariff and the TCA.

REF #	POINT-OF-RECEIPT DELIVERY	PARTIES	DIRECTION	CONTRACT TITLE	FERC NO.	CONTRACT TERMINATION	CONTRACT AMOUNT
4.	Eldorado-Pastoria Vincent-Eldorado / Pastoria	CDWR	Bi-directional	Firm Transmission Service Agreement (Eldorado-Vincent)	113	Earlier of: (a) the in-service date of transmission facilities CDWR has obtained for replacement of the firm transmission service being made available by Edison to CDWR hereunder, (b) the date when CDWR is no longer entitled to receive a share of the electrical output from Reid Gardner Unit No. 4, (c) July 25, 2013, (d) the date when Reid Gardner Unit No. 4 is permanently retired from service, or (e) the date which is eight (8) months following advance written notice of termination by CDWR, or if Edison agrees, on lesser notice.	235 MW
5.	Eldorado / Mohave - Lugo	LADWP	Bi-directional	Victorville - Lugo Interconnection Agreement	51	11/20/2019, or sooner by mutual agreement.	Edison is required to provide capacity to LADWP equal to the product of LA's Capacity Share and the deemed capacity of the transmission system consisting of Mohave-Lugo, Mohave-Eldorado, Eldorado-Lugo, Eldorado-McCullough, McCullough-Victorville lines, and Victorville-Lugo 500 kV transmission lines.
6.	Moenkopi - Eldorado	USA,	Bi-directional	Edison - Navajo	264	5/21/2023	In the event of a contingency in

REF #	POINT-OF-RECEIPT DELIVERY	PARTIES	DIRECTION	CONTRACT TITLE	FERC NO.	CONTRACT TERMINATION	CONTRACT AMOUNT
		APS, SRP, NPC, LADWP, TGE		Transmission Agreement			the Navajo-McCullough or Moenkopi-Eldorado transmission lines, Edison and the Navajo participants provide each other emergency service transmission rights without a charge.
7.	Mohave – Eldorado	LADWP, NPC, SRP	to Eldorado	Amended and Restated Eldorado System Conveyance and Co-Tenancy Agreement; Eldorado System Conveyance 2 and Co-Tenancy Agreement, Amended and Restated Eldorado System Operating Agreement	424, 425	12/31/2012 unless extended by agreement of all parties.	If Mohave-Eldorado line is curtailed, pro-rata back up is provided on Mohave-Lugo and Eldorado-Lugo lines. If Mohave-Lugo is curtailed, pro-rata back-up is provided on Mohave-Eldorado. Amount of back up capacity is up to participant's Mohave Capacity Entitlement. For curtailment purposes, Capacity Entitlements are: Edison-884 MW; LADWP-316 MW; NPC-222 MW;SRP-158 MW.
8.	Eldorado - Mead	LADWP, NPC, SRP	to Eldorado	Amended and Restated Eldorado System Conveyance and Co-Tenancy Agreement; Eldorado System Conveyance 2 and Co-Tenancy Agreement, Amended and Restated Eldorado System Operating	424, 425	12/31/2012 unless extended by agreement of all parties.	If Eldorado-Mead lines are curtailed, line capacity is allocated pro rata in proportion to the following Capacity Entitlements: NPC-222 MW; SRP-158 MW; LADWP – 0 MW; Edison Capacity Entitlement is equal to entire capacity of the Eldorado-Mead Line Nos. 1&2 minus NPC Capacity Entitlement minus SRP Capacity Entitlement.

REF #	POINT-OF-RECEIPT DELIVERY	PARTIES	DIRECTION	CONTRACT TITLE	FERC NO.	CONTRACT TERMINATION	CONTRACT AMOUNT
				Agreement			
9.	Mead - Mohave	NPC	To Mohave	Amended and Restated Agreement for Additional NPC Connection to Mohave Project	426	Co-terminous with the Eldorado System Conveyance and Co-Tenancy Agreement.	Up to 222 MW of Back-up transmission service through the Eldorado system and Mohave 500 kV switchyard.
10.	Mead - CAISO Grid Take Out Point serving Banning	Banning	E-W	Hoover Firm Transmission Service Agreement	378	Earliest effective date of: written agreement of the Parties; Banning's 1-year notice given after 1/1/2002; or termination of the Electric Service Contract between Western (WAPA) and City.	2 MW
11.	Mead - Rio Hondo	Azusa	Bi-directional	Sylmar Firm Transmission Service Agreement	375	Earliest effective date of: written agreement of the Parties; Azusa's 1-year notice given after 1/1/2002; or termination of Azusa's interest in San Juan Unit #3.	8 MW
12.	Mead - Rio Hondo	Azusa	E-W	Hoover Firm Transmission Service Agreement	372	Earliest effective date of: written agreement of the Parties; Azusa's 1-year notice given after 1/1/2002; or termination of the Electric Service Contract between Western (WAPA) and City.	4 MW
13.	Mead - Vista	Colton	E-W	Hoover Firm Transmission Service Agreement	361	Earliest effective date of: written agreement of the Parties; Colton's 1-year notice	3 MW

REF #	POINT-OF-RECEIPT DELIVERY	PARTIES	DIRECTION	CONTRACT TITLE	FERC NO.	CONTRACT TERMINATION	CONTRACT AMOUNT
						given after 1/1/2002; or termination of the Electric Service Contract between Western (WAPA) and City.	
14.	Mead - Riverside	Riverside	E-W	Hoover Firm Transmission Service Agreement	390	Earliest effective date of: written agreement of the Parties; 180 days notice by Riverside; or termination of the Electric Service Contract between Western (WAPA) and City.	30 MW
15.	Mead - Laguna Bell	Vernon	Bi-dir	Mead Firm Transmission Service Agreement	207	Earlier of: effective date of written agreement to terminate; or termination of Vernon's allocation to capacity and energy from Hoover Power Plant without a successor allocation of capacity and energy; or the date which is eight (8) months following advance written notice by Vernon to Edison, or if Edison agrees, on lesser notice.	26 MW
16.	Mead - Mountain Center	AEPCO	E-W	Firm Transmission Service Agreement	131	Earliest of: 7/1/2021; 10 years advance written notice by either Party*; by AEPCO upon eight (8) months advance written notice to Edison, or if Edison agrees, on lesser notice; or termination of the	10 MW

REF #	POINT-OF-RECEIPT DELIVERY	PARTIES	DIRECTION	CONTRACT TITLE	FERC NO.	CONTRACT TERMINATION	CONTRACT AMOUNT
						Load Control Agreement. *(Such notice tendered by SCE on 7/10/2008, to terminate agreement on 7/10/2018)	
17.	Palo Verde - Devers	LADWP	Bi-directional	Exchange Agreement	219	Earlier of (1) the date on which DPV#1 is permanently removed from service or (2) upon 12 months prior written notice by LADWP (which may be extended by Edison for an additional period not to exceed 24 months).	368 MW
18.	Palo Verde - Sylmar	LADWP	Bi-directional	Exchange Agreement	219	5/31/2012	100 MW
19.	Sylmar - Devers	LADWP	Bi-directional	Exchange Agreement	219	Earlier of (1) the date when DPV#1 is permanently removed from service or (2) upon 12 months' prior written notice by LADWP made within 12 months of full commercial operation of the Green Path North Project and prior to 1/1/2025.	368 MW
20.	Palo Verde - Devers Devers - Valley Valley - Serrano Serrano - SONGS	IID, APS, SDG&E	Bi-directional	Mutual Assistance Transmission Agreement	174	4/12/2034 or sooner by mutual agreement of the parties. A party may withdraw from this agreement upon giving 5 years advance written notice to the other parties.	In the event of a contingency in the Palo Verde-Devers, Palo Verde-North Gila-Imperial Valley transmission lines, participants to share the available capacity based on predetermined operating procedures set out in

REF #	POINT-OF-RECEIPT DELIVERY	PARTIES	DIRECTION	CONTRACT TITLE	FERC NO.	CONTRACT TERMINATION	CONTRACT AMOUNT
							an operating bulletin.
21.	SONGS - Vista	Riverside	To Vista	SONGS 2 & 3 Firm Transmission Service Agreement	393	180 day notice by Riverside or SONGS Participation termination.	42 MW
22.	Victorville/Lugo - Midway In addition: Beginning 1/1/2014: Victorville/Lugo - Midway Victorville/Lugo - Vincent Vincent - Midway	MSR	S-N	Firm Transmission Service Agreement (Victorville/Lugo-Midway)	339	In the event the Mead-Adelanto 500 kV Transmission Project is permanently removed from operation; or upon at least five (5) years' advance written notice by MSR to Edison; or upon eight (8) months advance written notice by MSR to Edison, or if Edison agrees, on lesser notice.	150 MW
23.	Victorville/Lugo - Vista	Riverside	To Vista	Intermountain Power Project Firm Transmission Service Agreement	391	180 day notice by Riverside or IPP Participation termination	156 MW
24.	Victorville/Lugo - Rio Hondo	Azusa	To Rio Hondo	PVNGS Firm Transmission Service Agreement	373	Earliest of: Azusa's 1-year notice given after 1/1/02, termination of PVNGS entitlement, or termination of PVNGS participation.	4 MW
25.	Victorville/Lugo - CAISO Grid Take Out Point serving Banning	Banning	To Banning	PVNGS Firm Transmission Service Agreement	379	Earliest of: Banning's 1-year notice given after 1/1/02, or termination of PVNGS entitlement, or termination of PVNGS participation.	3 MW
26.	Victorville/Lugo - Vista	Colton	To Vista	PVNGS Firm	362	Earliest of: Colton's 1-year	3 MW

REF #	POINT-OF-RECEIPT DELIVERY	PARTIES	DIRECTION	CONTRACT TITLE	FERC NO.	CONTRACT TERMINATION	CONTRACT AMOUNT
				Transmission Service Agreement		notice given after 1/1/02, or termination of PVNGS entitlement, or termination of PVNGS participation.	
27.	Victorville/Lugo - Vista	Riverside	To Vista	PVNGS Firm Transmission Service Agreement	392	Earliest of: Riverside's 1-year notice given after 1/1/02, or termination of PVNGS entitlement, or termination of PVNGS participation.	12 MW
28.	Victorville/Lugo - Laguna Bell	Vernon	Bi-directional	Victorville-Lugo Firm Transmission Service	360	Earlier of: permanent removal of Mead-Adelanto Project from service; or upon eight (8) months advance written notice by Vernon to Edison, or if Edison agrees, on lesser notice.	11 MW
29.	Victorville/Lugo - CAISO Grid Take Out Point serving Banning	Banning	Bi-directional	Sylmar Firm Transmission Service Agreement	380	Earliest of Banning's 1-year notice given after 1/1/02, or termination of Banning's interest in San Juan #3.	5 MW
30.	Victorville/Lugo - Rio Hondo	Azusa	to Rio Hondo	Pasadena FTS	374	Earliest of Azusa's 1-year notice given after 1/1/02, or termination of ownership in San Juan #3.	14 MW
31.	Victorville/Lugo - Vista	Colton	to Vista	Pasadena FTS	363	Earliest of Colton's 1-year notice given after 1/1/02, or termination of ownership in San Juan #3.	18 MW
32.	Hoover - Mead	WAPA	Bi-directional	Lease of Two 230-kV Transmission Lines	304	9/30/2017 or upon 3-years' notice by WAPA; WAPA entitled to renew through life	Entire capacity leased to WAPA.

REF #	POINT-OF-RECEIPT DELIVERY	PARTIES	DIRECTION	CONTRACT TITLE	FERC NO.	CONTRACT TERMINATION	CONTRACT AMOUNT
				Between Hoover Power Plant and Mead Substation		of Hoover.	

SDG&E APPENDIX B

SDG&E'S ENCUMBRANCES

I. Local Furnishing Transmission System Encumbrances

The CAISO shall exercise Operational Control over SDG&E's Local Furnishing Transmission System consistent with the following Encumbrances in accordance with the Local Furnishing Bonds Operating Procedures that SDG&E has provided the CAISO:

- A. Section 9600(a)(6) of the California Public Utilities Code provides that Participating TOs shall not be compelled to violate restrictions applicable to facilities financed with tax-exempt bonds or contractual restrictions and covenants regarding use of transmission facilities existing as of December 20, 1995.

SDG&E's transmission facilities and other electric properties are financed in part with the proceeds of Local Furnishing Bonds. Prior to December 20, 1995, pursuant to provisions of the loan agreements, engineering certificates, and tax certificates and agreements associated with outstanding Local Furnishing Bonds issued for its benefit, SDG&E has covenanted not to take or permit any action that would jeopardize the tax-exempt status of interest on Local Furnishing Bonds issued for its benefit. Accordingly, notwithstanding anything to the contrary contained in the Agreement, including SDG&E's agreement to be bound by the terms of the Restated and Amended CAISO Tariff and the Restated and Amended TO Tariff, SDG&E may not take (nor may SDG&E allow the CAISO to take) any action that would jeopardize the tax-exempt status of interest on Local Furnishing Bonds issued or to be issued for its benefit, including (without limitation) the actions specified below.

- B. Absent an approving written opinion of nationally recognized bond counsel selected by SDG&E, taking into account the adjustments outlined in paragraph C below, SDG&E will not operate its facilities (or allow its facilities to be operated) so as to cause or permit a cumulative annual net outbound flow of electric energy during any calendar year from the points of interconnection between (i) SDG&E's wholly-owned electric distribution facilities or SDG&E's wholly-owned electric transmission facilities which are directly connected to SDG&E's wholly-owned electric distribution facilities (the "Local T/D System"), and (ii) other electric utility properties. As of July 1, 2011, these interconnection points include:

1. the point at the International Border where SDG&E's ownership interest in the 230 kV Miguel/Tijuana transmission line interconnects with Comision Federal de Electricidad's ownership interest in the Miguel/Tijuana transmission line;
 2. the set of points at the San Onofre Nuclear Generating Station ("SONGS") switchyard bus where SDG&E's wholly-owned transmission facilities interconnect with facilities owned (in whole or in part) by Southern California Edison Company ("SCE");
 3. the point where SDG&E's wholly-owned segment of the 500 kV Miguel/Imperial Valley transmission line interconnects with the Imperial Valley Substation facilities which are owned in part by Imperial Irrigation District ("IID");
 4. the point at the San Diego/Imperial County border where SDG&E's ownership interest in a 2.5 mile-long radial distribution line intersects with IID's ownership interest in that same distribution line;
 5. the points at the Riverside/Orange County border and the Riverside/San Diego County border where SDG&E's ownership interest in several isolated distribution lines interconnect with SCE's ownership interest in those same distribution lines;
 6. the point where SDG&E's wholly-owned Narrows Substation interconnects with transmission facilities which are owned by IID.
- C. For purposes of paragraph B, net flows of electric energy shall be calculated after taking into account the following adjustments:
1. Treating as a deemed outbound flow (or as a reduction in inbound flow) SDG&E's share as owner or lessee of electric energy generated at SONGS and at other facilities which are not connected directly to the Local T/D System ("Owned/Leased Remote SDG&E Generating Units").
 - i. as of July 1, 2011, SDG&E's 20% ownership interests in SONGS Unit 1 and Unit 2 are the only Owned/Leased Remote SDG&E Generating Units.

- ii. in 2011, Owned/Leased Remote SDG&E Generating Units are expected to include SDG&E's 480 MW interest in the Desert Star Energy Center.
 - iii. in 2012, Owned/Leased Remote SDG&E Generating Units are expected to include SDG&E's 189 MW interest in the Rim Rock Project.
- 2. Excluding outbound flows (or reductions in inbound flows) attributable to or caused by wheeling of electric energy generated by independent power projects
 - i. which interconnect directly to the Local T/D System, and
 - ii. with bilateral contracts to sell the electric energy output at wholesale to electric utilities other than SDG&E.
- 3. Excluding outbound flows (or reductions in inbound flows) attributable to or caused by wholesale sales of excess electric energy from SDG&E's available generating units to the extent generation of that electric energy is required pursuant to federal or state regulations, rules, orders, decisions or mandatory protocols, but only if the total amount of electric energy supplied by SDG&E to its retail customers who receive both electric energy delivery service and electric energy supply service from SDG&E ("Native Load Customers") during the calendar year equals or exceeds
 - i. the total amount of SDG&E's share of electric energy generated during the calendar year by facilities which are either owned, leased, or controlled by or for the benefit of SDG&E, reduced by
 - ii. the sum of:
 - (a) assumed line losses, based on the most recent long-term demand forecast adopted by the California Energy Commission (as of December 16, 2010, 6.4% of electric energy delivered to SDG&E's retail customers);
 - (b) a pro rata share of electric energy actually produced by SDG&E's available generating units and allocable to CPUC-mandated reserves (15% as of July 1, 2011));

(c) electric energy actually produced by SDG&E's available generating units pursuant to least-cost, best-fit orders of the CPUC and/or the CAISO; and

(d) electric energy actually produced by SDG&E's available generating units which exceeds the requirements of SDG&E's Native Load Customers due to SDG&E's inability to reduce generation from peak levels during off-peak periods.

- D. SDG&E will not operate its facilities (or allow its facilities to be operated) so as to curtail delivery of electric energy to its Native Load Customers involuntarily in order to provide electric energy to customers outside of its electric service territory in San Diego and Orange Counties, unless such curtailment is necessitated by the failure of facilities either partially or wholly owned by SDG&E.
- E. Upon SDG&E's receipt of a written request from the CAISO to take (or to refrain from taking) any action that SDG&E believes might jeopardize the tax-exempt status of interest on Local Furnishing Bonds issued for its benefit, SDG&E in good faith shall promptly seek to obtain an opinion (of the type generally regarded in the municipal bond market as unqualified) from a nationally recognized bond counsel selected by SDG&E that the requested action (or inaction) will not adversely affect such tax-exempt status. Examples of actions the CAISO might request SDG&E to take (or refrain from taking) might include
1. closing (or refraining from opening) switches to allow electric energy to flow out of the Local T/D System,
 2. closing (or refraining from opening) switches to allow electric energy from local generating units to flow into the Local T/D System,
 3. acquiring or constructing new electric utility facilities or improving existing electric utility facilities,
 4. generating electric energy or refraining from generating electric energy at resources which are directly or indirectly under SDG&E's control, or
 5. bringing transmission or generation facilities or resources into service (or withholding transmission or generation facilities or resources from service).

Until the opinion of bond counsel described above is obtained, SDG&E shall not be required to take (or to refrain from taking) the specified action, and the CAISO shall exercise its Operational Control consistent with such limitation.

- F. If SDG&E has been unable to obtain the unqualified opinion of bond counsel described in paragraph E above, upon written request by an entity eligible to file an application under Section 211 of the Federal Power Act ("FPA") (or the CAISO acting as its agent) (collectively, the "Eligible Entity"), SDG&E in good faith shall promptly seek to obtain a ruling from the Internal Revenue Service that the requested action (or inaction) will not adversely affect the tax-exempt status of interest on Local Furnishing Bonds issued for the benefit of SDG&E. If such a ruling cannot be obtained, SDG&E will not object to an Eligible Entity seeking an order under Section 211 of the FPA with respect to the requested action (or inaction). Until such a ruling is obtained from the Internal Revenue Service, SDG&E shall not be required to take (or to refrain from taking) the specified action and the CAISO shall exercise its Operational Control consistent with such limitation.

II. Mortgage Lien

The CAISO shall acknowledge the mortgage lien set forth below:

- A. The lien of the Mortgage and Deed of Trust dated July 1, 1940 between San Diego Gas & Electric Company and The Bank of California, as trustee, as amended and supplemented and in effect on the date hereof (the "SDG&E Mortgage"). The transfer of Operational Control to the CAISO pursuant to this Agreement shall in no event be deemed to be a lien or charge on the property subject to the SDG&E Mortgage which would be prior to the lien of the SDG&E Mortgage; however, no consent of the trustee under the SDG&E Mortgage is required to consummate the transfer of Operational Control to the CAISO pursuant to this Agreement.

III. SDG&E-Citizens Sunrise Transmission LLC Development and Coordination Agreement/Transfer Capability Lease

- A. San Diego Gas & Electric Company ("SDG&E") and Citizens Energy Corporation ("Citizens Energy") have agreed in their Development and Coordination Agreement of May 9, 2009 ("DCA"), as amended December 21, 2011, that Citizens Energy would have an opportunity to obtain an interest in the Sunrise Powerlink Project ("Sunrise Powerlink"), currently being constructed and developed by SDG&E. Specifically, Citizens Energy has an option to lease

50% of the transfer capability of the 500 kV segment of the Sunrise Powerlink located in Imperial County, California for 30 years (the "Border-East Line"). To perfect its interest, Citizens Energy is obligated, among other things, (1) to exercise its option on or before the scheduled date of commercial operation of the Sunrise Powerlink, (2) to pay SDG&E certain associated costs (one half of the actual cost of construction and development of the Border-East Line), and (3) to assume all operating costs related to its interest in the Border-East Line. Citizens Energy is further obligated to turn over operational control of its interest in the Border-East Line to the CAISO. Prior to exercising its option under the DCA, Citizens Energy will finalize its rights set forth in a Transfer Capability Lease (collectively, the "Lease") as provided for in the DCA and will assign and transfer all of its rights and obligations thereunder, and all of the regulatory approvals it has obtained to date, to Citizens Sunrise Transmission LLC.

APPENDIX B.2

SDG&E's List of Contract Encumbrances^{1/2}

CONTRACT NUMBER	CONTRACT NAME	OTHER PARTIES	FERC NO.	CONTRACT TERMINATION	FACILITY/PATH, AMOUNT OF SERVICE
81-034	Mutual Assistance Transmission Agreement	IID, APS, Edison	62	4/12/2034 or sooner by mutual agreement of the parties. A party may withdraw from this agreement upon giving 5 years advance written notice to the other parties.	In the event of a contingency in the Palo Verde-Devers, Palo Verde-North Gila-Imperial Valley transmission lines, participants to share the available capacity based on predetermined operating procedures set out in a separate operating bulletin.
79-016	SONGS Participation Agreement	Edison, Anaheim, Riverside	321	None	SDG&E's share of SONGS switchyard with termination of its 230 kV transmission lines: <ul style="list-style-type: none"> - San Luis Rey (3 lines) - Talega (2 lines)
79-017	IID-SDG&E Interconnection and Exchange Agreement	IID	065	June 24, 2051 (schedule pertaining to emergency capacity/energy services is expected to be terminated upon execution by IID of the CAISO's Balancing Authority Area Agreement).	Should a contingency occur due to loss or interruption of generating or transmission capabilities on either party's electric system, IID and SDG&E to provide each other emergency capacity and energy without charge.

¹ An additional encumbrance pertaining to Local Furnishing Bonds that does not fit into the format for existing contract encumbrances is set forth in Section I of this SDG&E App. B.

² An additional encumbrance pertaining to SDG&E's lien of Mortgage and Deed of Trust that does not fit into the format for existing contract encumbrances is set forth in Section II of this SDG&E App. B.

CONTRACT NUMBER	CONTRACT NAME	OTHER PARTIES	FERC NO.	CONTRACT TERMINATION	FACILITY/PATH, AMOUNT OF SERVICE
78-007	CFE-SDG&E Interconnection and Exchange Agreement	CFE		12 month notice (schedule pertaining to emergency capacity/energy services is expected to be terminated upon execution by CFE of the CAISO's Balancing Authority Area Agreement).	Should a contingency occur due to loss or interruption of generating or transmission capabilities on either party's electric system, CFE and SDG&E to provide each other emergency capacity and energy.
81-005	Palo Verde-North Gila Line ANPP High Voltage Switchyard Interconnection Agreement	APS, IID, PNM, SRP, El Paso, SCE, SCPPA	063	July 31, 2031	In the event that the capacity of the ANPP Switchyard is insufficient to accommodate all requests, the rights of the ANPP Switchyard Participants shall take precedence in all allocations.
81-050	IID-SDG&E Transmission System Participation Agreement	IID		June 24, 2051	SDG&E and IID schedule power and energy over the California Transmission System for their respective accounts at the Yuma (North Gila) 500kV Switchyard for delivery to the 500 kV breaker yard of the Imperial Valley in the following percentages of operating capacity: SDG&E -- 85.64%; and IID -- 14.36%.
78-003	APS-SDG&E Transmission System Participation Agreement	APS		July 31, 2031	SDG&E, APS, and IID schedule power and energy over the Arizona Transmission System for their respective accounts at the Palo Verde Switchyard for delivery at the Yuma (North Gila) 500 kV Switchyard in the following percentages of operating capacity: APS -- 11%; SDG&E -- 76.22%; IID -- 12.78%.
QFD000.016	Power Sale Agreement between SDG&E-City of Escondido for the Rincon Indian Reservation	City of Escondido	76	Agreement to be terminated effective upon FERC acceptance of Notice of Termination.	Obligates SDG&E to sell and deliver electricity at stated prices to the City of Escondido for resale to the United States Indian Services at the Rincon Indian Reservation.

**Appendix B: Citizens Sunrise Transmission, LLC
Encumbrances**

POINT-OF-RECEIPT DELIVERY	PARTIES	DIRECTION	CONTRACT TITLE	FERC NO.	CONTRACT START DATE	CONTRACT TERMINATION	CONTRACT AMOUNT
Imperial Valley Substation*	SDG&E and Citizens Sunrise Transmission, LLC	Bi-directional	Transmission Control Agreement, SDG&E Appendix B, SDG&E's Encumbrances, Local Furnishing Transmission System Encumbrances	NA	2012	2042	NA
Suncrest Substation/Sycamore Canyon Substations*	SDG&E and Citizens Sunrise Transmission, LLC	Bi-directional	Transmission Control Agreement, SDG&E Appendix B, SDG&E's Encumbrances, Local Furnishing Transmission System Encumbrances	NA	2012	2042	NA

* Citizens Sunrise Transmission's interest extends westward from the Imperial Valley Substation only to the San Diego County/Imperial County Border

TRANSMISSION CONTROL AGREEMENT

APPENDIX C

CAISO TRANSMISSION MAINTENANCE STANDARDS

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1. DEFINITIONS¹

Availability - A measure of time a Transmission Line Circuit under CAISO Operational Control is capable of providing service, whether or not it actually is in service.

Availability Measures - Within each Voltage Class in a calendar year: 1) the average Forced Outage^(IMS) frequency for all Transmission Line Circuits, 2) the average accumulated Forced Outage^(IMS) duration for only those Transmission Line Circuits with Forced Outages^(IMS), and 3) the proportion of Transmission Line Circuits with no Forced Outages^(IMS).

Availability Measure Targets - The Availability performance goals jointly established by the CAISO and a PTO for that PTO's Transmission Facilities.

Forced Outage^(IMS) – An event that occurs when a Transmission Facility is in an Outage^(IMS) condition for which there is no Scheduled Outage^(IMS) request in effect.

CAISO Transmission Maintenance Standards - The Maintenance standards set forth in this Appendix C.

Maintenance - Maintenance as used herein, unless otherwise noted, encompasses inspection, assessment, maintenance, repair and replacement activities performed with respect to Transmission Facilities.

Maintenance Practices - A confidential description of methods used by a PTO, and adopted by the CAISO, for the Maintenance of that PTO's Transmission Facilities.

¹ A term followed by the superscript "(IMS)" denotes a term which has a special, unique definition in this Appendix C.

Maintenance Procedures – Documents developed by the Transmission Maintenance Coordination Committee for use by the CAISO and the PTOs to facilitate compliance with the CAISO Transmission Maintenance Standards. These documents shall serve as guidelines only.

Outage^(IMS) - Any interruption of the flow of power in a Transmission Line Circuit between any terminals under CAISO Operational Control.

PTO - A Participating TO as defined in Appendix D of the Transmission Control Agreement.

Scheduled Outage^(IMS) - The removal from service of Transmission Facilities in accordance with the requirements of Section 7.1 of the Transmission Control Agreement and the applicable provisions of the CAISO Tariff and CAISO Protocols.

Station – Type of Transmission Facility used for such purposes as line termination, voltage transformation, voltage conversion, stabilization, or switching.

Transmission Facilities - All equipment and components transferred by a PTO to the CAISO for Operational Control, pursuant to the Transmission Control Agreement, such as overhead and underground transmission lines, Stations, and associated facilities.

Transmission Line Circuit - The continuous set of transmission conductors, under the CAISO Operational Control, located primarily outside of a Station, and apparatus terminating at interrupting devices, which would be isolated from the transmission system following a fault on such equipment.

monitoring system. Each PTO's adherence to its Maintenance Practices will be assessed through a CAISO review.

In developing these CAISO Transmission Maintenance Standards, both the CAISO Maintenance Standards Task Force and TMCC determined that it is impractical to develop and/or impose on the PTOs a single uniform set of prescriptive practices delineating conditions or time-based schedules for various Maintenance activities that account for the myriad of equipment, operating conditions, and environmental conditions within the CAISO Controlled Grid. For this reason, these CAISO Transmission Maintenance Standards provide requirements for the PTOs in preparing their respective Maintenance Practices.

2.1. OBJECTIVE

This Appendix C provides for a high quality, safe, and reliable CAISO Controlled Grid by meeting the following objectives:

- Ensuring that the Availability performance levels inherent to the Transmission Facilities are maintained,
- Restoring Availability to the levels inherent to the Transmission Facilities when degradation has occurred,
- Economically extending the useful life of the Transmission Facilities while maintaining inherent levels of Availability, and
- Achieving the aforementioned objectives at a minimum reasonable total cost for Maintenance with the intent of minimizing customer impacts.

2.2. AVAILABILITY

CAISO Controlled Grid reliability is a function of a complex set of variables, including accessibility of alternative paths to serve Load, Generating

Unit availability, Load forecasting and resource planning; speed, sophistication and coordination of protection systems; and the Availability of Transmission Line Circuits owned by the PTOs. Availability Measures have been chosen as the principal determinant of each PTO's Maintenance effectiveness.

When using Availability Measures as a general gauge of Maintenance effectiveness, several things must be considered to avoid misinterpreting performance. Availability is a function of several variables, including Transmission Facility Maintenance, initial design, extreme exposure, capital improvements, and improvements in restoration practices. These factors should be taken into account when assessing Availability Measures and Maintenance effectiveness. It is important to consider that Maintenance is one of many variables that impact changes in Availability. For example, certain Forced Outages^(IMS) that impact Availability may be due to events that generally cannot be controlled by Maintenance.

If Availability Measures are either improving or declining, it is important to investigate the cause(s) and any trends that are causing change before drawing conclusions. If Maintenance is being performed by a PTO consistent with Good Utility Practice, increasing Maintenance activities by a significant order may not result in a corresponding increase in Availability and if Maintenance is not performed consistent with Good Utility Practice, Availability may decline. Thus, while Maintenance is important to ensure Availability, unless a PTO fails to perform Maintenance on a basis consistent with Good Utility Practice, significant increases in Maintenance activities will generally not lead to substantial improvements in Availability and associated CAISO Controlled Grid reliability.

A variety of techniques can be used to monitor Maintenance effectiveness. However, techniques that do not account for random variations in processes have severe limitations in that they may yield inconsistent and/or erroneous assessments of Maintenance effectiveness. To account for random/chance

variations while enabling monitoring for shifts and trends, control charts have been widely accepted and utilized. Control charts are statistically based graphs which illustrate both an expected range of performance for a particular process based on historical data, and discrete measures of recent performance. The relative positions of these discrete measures of recent performance and their relationship to the expected range of performance are used to gauge Maintenance effectiveness.

To enhance the use of Availability Measures as a gauge of Maintenance effectiveness, it is necessary to exclude certain types of Outages^(IMS). These excluded Outages^(IMS), as set forth in more detail in Section 4.1.3 of this Appendix C, are:

- Scheduled Outages^(IMS);
- Outages^(IMS) classified as “Not a Forced Outage” in the Maintenance Procedures;
- Forced Outages^(IMS) caused by events originating outside the PTO’s system; or
- Forced Outages^(IMS) demonstrated to have been caused by earthquakes.

Additionally, as described in Section 4.1.2 of this Appendix C, the Forced Outage^(IMS) duration used to calculate the Availability control charts has been capped at 72 hours so that excessively long Forced Outages^(IMS) do not skew the data as to detract from the meaningfulness and interpretation of the control charts for accumulated Forced Outage^(IMS) duration. This is not to say that an excessively long Forced Outage^(IMS) is not a concern. Rather, such Forced Outages^(IMS) should be investigated to assess the reasons for their extended duration.

Establishing Availability Measures requires each PTO to use separate control charts for each Voltage Class. Existing Forced Outage^(IMS) data contains

significant differences in the Availability between Voltage Classes and between PTOs. These differences may be attributable to factors such as the uniqueness of operating environments, Transmission Facility designs, and PTO operating policies. Regardless of the cause of these differences, review of the Forced Outage^(IMS) data makes it eminently apparent that differences are such that no single set of control chart parameters for a particular Voltage Class could be applied to all PTOs.

Three types of control charts are utilized to provide a complete representation of historical Availability Measures, and to provide a benchmark against which future Availability Measures can be gauged. The three types of control charts for each PTO and Voltage Class are:

- The annual average Forced Outage^(IMS) frequency for all Transmission Line Circuits;
- The annual average accumulated Forced Outage^(IMS) duration for those Transmission Line Circuits which experience Forced Outages^(IMS); and
- The annual proportion of Transmission Line Circuits that experienced no Forced Outages^(IMS).

These three control charts assist the CAISO and PTOs in assessing the Maintenance effectiveness of each Voltage Class over time. To accommodate this process on a cumulative basis, data is made available to the CAISO by each PTO at the beginning of each new calendar year to assess past calendar years.

2.3. MAINTENANCE DOCUMENTATION REQUIREMENTS

Two specific requirements regarding Maintenance documentation are incorporated into these CAISO Transmission Maintenance Standards. First, these standards require that each PTO develop and submit a description of its Maintenance Practices to the CAISO. Second, these standards require that each

PTO retain Maintenance records as set forth in Section 6.1 of this Appendix C and make those records available to the CAISO as set forth in the Maintenance Procedures, in order to demonstrate compliance with each element of its Maintenance Practices.

2.4. AVAILABILITY DATA STANDARDS

To facilitate processing Forced Outage^(IMS) data for the Availability Measures, and to enable consistent and equitable interpretation of PTO Maintenance records by the CAISO, these standards address the need for data recording and reporting. The TMCC has also developed standardized formats for transmitting Forced Outage^(IMS) data to the CAISO for the Availability Measures. These standard formats are provided in the Maintenance Procedures. To facilitate review of the data by the CAISO, the TMCC has developed a standard Availability Measures reporting system detailed in the Maintenance Procedures and in Section 4 of this Appendix C. This system will provide for consistent gathering of information that can be used as the basis for analyzing Availability Measures trends.

3. FACILITIES COVERED BY THESE CAISO TRANSMISSION MAINTENANCE STANDARDS

The CAISO Transmission Maintenance Standards set forth in this Appendix C shall apply to all Transmission Facilities. Each PTO shall maintain its Transmission Facilities in accordance with its Maintenance Practices as adopted by the CAISO in accordance with these CAISO Transmission Maintenance Standards.

4. AVAILABILITY MEASURES

4.1. CALCULATION OF AVAILABILITY MEASURES FOR INDIVIDUAL TRANSMISSION LINE CIRCUITS

4.1.1 FREQUENCY AND DURATION

The calculation of the Availability Measures will be performed utilizing Forced Outage^(IMS) data through December 31st of each calendar year. Separate Forced Outage^(IMS) frequency and accumulated Forced Outage^(IMS) duration Availability Measures shall be calculated as follows for each Transmission Line Circuit under CAISO Operational Control within each Voltage Class. The calculations shall be performed annually for each of the Transmission Line Circuits utilizing all appropriate Forced Outage^(IMS) data for the calendar year in question.

Forced Outage^(IMS) Frequency:

The Forced Outage^(IMS) frequency (f_{ik}) of the i^{th} Transmission Line Circuit shall equal the total number of Forced Outages^(IMS) that occurred on the i^{th} Transmission Line Circuit during the calendar year “k”. See Notes 1 and 2.

NOTES:

1. Multiple momentary Forced Outages^(IMS) on the same Transmission Line Circuit in the span of a single minute shall be treated as a single Forced Outage^(IMS) with a duration of one minute. When the operation of a Transmission Line Circuit is restored following a Forced Outage^(IMS) and the Transmission Line Circuit remains operational for a period exceeding one minute, i.e., 61 seconds or more, followed by another Forced Outage^(IMS), then these should be counted as two Forced Outages^(IMS). Multiple Forced Outages^(IMS) occurring as a result of a single event should be handled as multiple Forced Outages^(IMS) only if subsequent operation of the Transmission Line Circuit between events exceeds one minute. Otherwise they shall be considered one continuous Forced Outage^(IMS).
2. If a Transmission Line Circuit, e.g., a new Transmission Line Circuit, is only in service for a portion of a calendar year, the Forced Outage^(IMS) frequency and accumulated duration data shall be treated as if the Transmission Line Circuit had been in service for the entire calendar year, i.e., the Forced Outage^(IMS) data for that Transmission Line Circuit shall be handled the same as those for any other Transmission Line Circuit.

Accumulated Forced Outage^(IMS) Duration:

The accumulated Forced Outage^(IMS) duration in minutes shall be calculated as follows for each of the Transmission Line Circuits having a Forced Outage^(IMS) frequency (f_{ik}) greater than zero for the calendar year “k”:

$$d_{ik} = \sum_{j=1}^{f_{ik}} o_{ijk}$$

where

d_{ik} = accumulated duration of Forced Outages^(IMS) (total number of Forced Outage^(IMS) minutes) for the “ith” Transmission Line Circuit having a Forced Outage^(IMS) frequency (f_{ik}) greater than zero for the calendar year “k”.

f_{ik} = Forced Outage^(IMS) frequency as defined above for calendar year “k”.

o_{ijk} = duration in minutes of the “jth” Forced Outage^(IMS) which occurred during the “kth” calendar year for the “ith” Transmission Line Circuit. See Notes 1 and 2.

The durations of extended Forced Outages^(IMS) shall be capped as described in Section 4.1.2 of this Appendix C for the purposes of calculating the Availability Measures. In addition, certain types of Outages^(IMS) shall be excluded from the calculations of the Availability Measures as described in Section 4.1.3 of this Appendix C.

If a PTO makes changes to its Transmission Line Circuit identification, configuration, or Forced Outage^(IMS) data reporting schemes, the PTO shall notify the CAISO at the time of the change. In its annual report to the CAISO, the PTO shall provide recommendations regarding if and how the Availability Measures and Availability Measure Targets should be modified to ensure that they (1) remain consistent with the modified Transmission Line Circuit identification or

Forced Outage^(IMS) data reporting scheme, and (2) provide an appropriate gauge of Availability.

4.1.2. CAPPING FORCED OUTAGE^(IMS) DURATIONS

The duration of each Forced Outage^(IMS) which exceeds 72 hours (4320 minutes) shall be capped at 4320 minutes for the purpose of calculating the accumulated Forced Outage^(IMS) duration.

4.1.3. EXCLUDED OUTAGES^(IMS)

The following types of Outages^(IMS) shall be excluded from the calculation of the Availability Measures and the Availability Measure Targets:

- Scheduled Outages^(IMS)
- Outages^(IMS) classified as “Not a Forced Outage” in the Maintenance Procedures.
- Forced Outages^(IMS) which: (1) were caused by events outside the PTO’s system including Outages^(IMS) which originate in other TO systems, other electric utility systems, or customer equipment, or (2) are Outages^(IMS) which can be demonstrated to have been caused by earthquakes.

4.2. AVAILABILITY MEASURE TARGETS

The Availability Measure Targets described herein shall be phased in over a period of five calendar years beginning on the date a Transmission Owner becomes a PTO in accordance with the provisions of the Transmission Control Agreement. The adequacy of each PTO’s Availability Measures shall be monitored through the use of charts. These charts, called control charts as shown in Figure 4.2.1, are defined by a horizontal axis with a scale of calendar years and a vertical axis with a scale describing the expected range of

magnitudes of the index in question. Annual performance indices shall be plotted on these charts and a series of tests may then be performed to assess the stability of annual performance, shifts in performance and longer-term performance trends.

Control charts for each of the following indices shall be developed and utilized to monitor Availability Measures for each Voltage Class within each PTO's system:

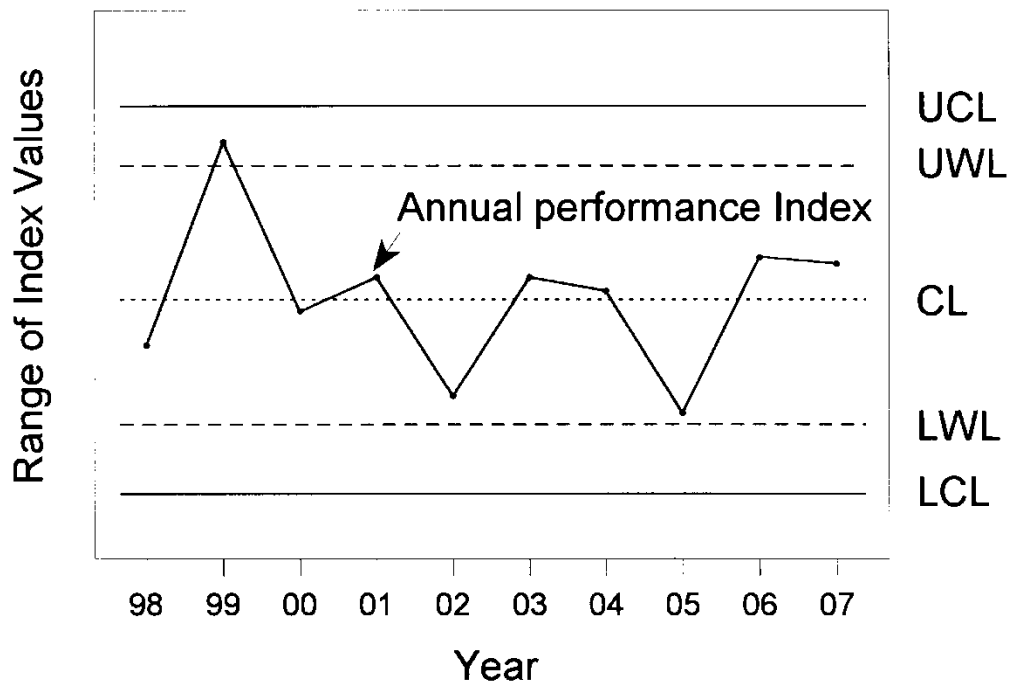


Figure 4.2.1 Sample Control Chart

- Index 1: Annual Average Forced Outage^(IMS) Frequency for All Transmission Line Circuits.
- Index 2: Annual Average Accumulated Forced Outage^(IMS) Duration for those Transmission Line Circuits with Forced Outages^(IMS).

- Index 3: Annual Proportion of Transmission Line Circuits with No Forced Outages^(IMS).

The control charts incorporate a center control line (CL), upper and lower control limits (UCL and LCL, respectively), and upper and lower warning limits (UWL and LWL, respectively). The CL represents the average annual historical performance for a period prior to the current calendar year. The UCL and LCL define a range of expected performance extending above and below the CL. For the annual proportion of Transmission Line Circuits with no Forced Outages^(IMS), the limits are based on standard control chart techniques for binomial proportion data. For the other two indices, bootstrap resampling techniques are used to determine empirical UCL and LCL at 99.75% and 0.25% percentile values, respectively, for means from the historical data. The bootstrap procedure is described in Section 4.2.2 of this Appendix C. Similarly, the UWL and LWL define a range of performance intending to cover the percentiles from 2.5% to 97.5%. The bootstrap algorithm is also used to determine these values. Thus, the UCL and LCL will contain about 99.5% of resampling means from the Voltage Class of interest. UWL and LWL will contain about 95% of the resampling means. These limits coincide with the usual choices for control charts when the means are approximately normal. Bootstrap estimation procedures are used here since the sampling means do not follow the normal distribution model. The bootstrap estimation procedures ensure consistent control chart limits by using a starting base number (“seed”) for its random number generator. Accuracy or reduced variances in the control chart limits are attained by using the average control chart limits generated from applying ten repetitions or cycles of the bootstrap sampling method. Collectively, the CL, UCL, LCL, UWL and LWL provide reference values for use in evaluating performance as described in Section 4.2.3 of this Appendix C.

For the special case where there is a Voltage Class with only one Transmission Line Circuit, individual and moving range control charts should be

used for Index 1 and 2. The method used herein for calculating Index 3 is not applicable for those Voltage Classes containing less than six Transmission Line Circuits. The Maintenance Procedures will be used by the PTOs to calculate Index 1, 2, or 3 where the methods provided herein do not apply. More information on the individual and moving range control charts can be found in the user manuals of the statistical software recommended by the TMCC and approved by the CAISO Governing Board for use in creating the control charts.

4.2.1. CALCULATIONS OF ANNUAL AVAILABILITY MEASURES INDICES FOR INDIVIDUAL VOLTAGE CLASSES

Separate annual Availability Measures indices shall be calculated for each Voltage Class and each PTO as described below by utilizing the calculations discussed in Section 4.1 of this Appendix C.

Annual Average Forced Outage^(IMS) Frequency for All Transmission Line Circuits (Index 1):

$$F_{vc,k} = \frac{1}{N_k} \sum_{i=1}^{N_k} f_{ik}$$

where

$F_{vc,k}$ = frequency index for the Voltage Class, vc, (units = Forced Outages^(IMS)/Transmission Line Circuit). The frequency index equals the average (mean) number of Forced Outages^(IMS) for all Transmission Line Circuits within a Voltage Class for the calendar year “k”.

N_k = number of Transmission Line Circuits in Voltage Class in calendar year “k”. See Note 2, Section 4.1.1 of this Appendix C.

f_{ik} = frequency of Forced Outages^(IMS) for the “ith” Transmission Line Circuit as calculated in accordance with Section 4.1.1 of this Appendix C for calendar year “k”.

Annual Average Accumulated Forced Outage^(IMS) Duration for those Transmission Line Circuits with Forced Outages^(IMS) (Index 2):

$$D_{vc,k} = \frac{1}{N_{o,k}} \sum_{i=1}^{N_{o,k}} d_{ik}$$

where

$D_{vc,k}$ = duration index for the Voltage Class (units = minutes/Transmission Line Circuit). The duration index equals the average accumulated duration of Forced Outages^(IMS) for all Transmission Line Circuits within a Voltage Class which experienced Forced Outages^(IMS) during the calendar year “k”.

$N_{o,k}$ = number of Transmission Line Circuits in the Voltage Class for which the Forced Outage^(IMS) frequency Availability Measure (f_{ik}) as calculated in accordance with Section 4.1.1 of this Appendix C is greater than zero for the calendar year “k”. See Note 2, Section 4.1.1 of this Appendix C.

d_{ik} = accumulated duration of Forced Outages^(IMS) for the “ith” Transmission Line Circuit having a Forced Outage^(IMS) frequency Availability Measure (f_{ik}) greater than zero for calendar year “k” as calculated in accordance with Section 4.1.1 of this Appendix C.

Annual Proportion of Transmission Line Circuits with No Forced Outages^(IMS) (Index 3):

$$P_{vc,k} = \frac{N_k - N_{o,k}}{N_k}$$

where

$P_{vc,k}$ = index for the proportion of Transmission Line Circuits for the Voltage Class with no Forced Outages^(IMS) for the calendar year “k”.

N_k = number of Transmission Line Circuits in Voltage Class for calendar year “k”. See Note 2, Section 4.1.1 of this Appendix C.

$N_{o,k}$ = number of Transmission Line Circuits in the Voltage Class for which the Forced Outage^(IMS) frequency Availability Measure (f_{ik}) as calculated in accordance with Section 4.1.1 of this Appendix C is greater than zero for the calendar year “k”. See Note 2, Section 4.1.1 of this Appendix C.

4.2.2. DEVELOPMENT OF LIMITS FOR CONTROL CHARTS

The CL, UCL, LCL, UWL and LWL for the three control charts (Annual Average Forced Outage^(IMS) Frequency for All Transmission Line Circuits; Annual Average Accumulated Forced Outage^(IMS) Duration for those Transmission Line Circuits with Forced Outages^(IMS); and Annual Proportion of Transmission Line Circuits with No Forced Outages^(IMS)) on which the annual Availability Measures indices are to be plotted shall be calculated as described below. The CL, UCL, LCL, UWL and LWL for each of the three control charts shall be determined using continuously recorded Forced Outage^(IMS) data for the ten calendar year period immediately preceding the date a Transmission Owner becomes a PTO in accordance with the provisions of the Transmission Control Agreement.

In the event that a PTO does not have reliable, continuously recorded Forced Outage^(IMS) data for this 10 calendar year period, that PTO may determine the control chart limits using data for a shorter period. However, if data for a shorter period are to be used, that PTO shall prepare a brief report to the CAISO providing reasonable justification for this modification. This report shall be submitted to the CAISO within 90 days after the date a TO becomes a PTO in accordance with the provisions of the Transmission Control Agreement.

The CAISO shall periodically review the control chart limits and recommend appropriate modifications to each PTO in accordance with this Appendix C.

4.2.2.1. CENTER CONTROL LINES (CLs)

The calculation of the CLs for each of the three control charts is similar to the calculation of the annual Availability Measures indices described in Section 4.2.1 of this Appendix C except that the time period is expanded from a single calendar year to ten calendar years, unless a shorter period is justified by a PTO, for the period preceding the date a TO becomes a PTO in accordance with the provisions of the Transmission Control Agreement. To account for this change, a count of Transmission Line Circuit years is included in the equations as shown below to enable derivation of CLs which represent average performance during a multi-year period.

CL for Annual Average Transmission Line Circuit Forced Outage^(IMS)
Frequency

$$CL_{fvc} = \sum_{k=1}^Y \sum_{i=1}^{N_k} f_{ik} / \left(\sum_{k=1}^Y N_k \right)$$

where

CL_{fvc} = center control line value for the Forced Outage^(IMS)

frequencies for each of the Transmission Line Circuits in the Voltage Class for “Y” calendar years prior to the date a TO becomes a PTO.

Y = number of calendar years prior to the date a TO becomes a PTO for which the PTO has reliable, continuously recorded Forced Outage^(IMS) data. Y=10 is preferred.

CL for Annual Average Accumulated Forced Outage^(IMS) Duration for those
Transmission Line Circuits with Forced Outages^(IMS)

$$CL_{dvc} = \sum_{k=1}^Y \sum_{i=1}^{N_{o,k}} d_{ik} / \left(\sum_{k=1}^Y N_{o,k} \right)$$

where

CL_{dvc} = center control line value for accumulated Forced Outage^(IMS) duration for each of the Transmission Line Circuits in the Voltage Class for “Y” calendar years prior to the date a TO becomes a PTO in which the Forced Outage^(IMS) frequency (f_{ik}) was greater than zero.

CL for Annual Proportion of Transmission Line Circuits with No Forced Outages^(IMS)

$$CL_{Pvc} = \frac{\sum_{k=1}^Y (N_k - N_{o,k})}{\sum_{k=1}^Y N_k}$$

where

CL_{Pvc} = center control line value for the proportion of Transmission Line Circuits in the Voltage Class with no Forced Outages^(IMS) for “Y” calendar years prior to the date a TO becomes a PTO.

4.2.2.2. UCLs, LCLs, UWLs AND LWLs

UCLs, LCLs, UWLs and LWLs for Index 1 and 2 for Voltage Classes Containing Four or More Transmission Line Circuits with Forced Outages^(IMS) for Five or More Calendar Years

The UCLs, UWLs, LWLs, and LCLs for the control charts for each Voltage Class containing four or more Transmission Line Circuits with Forced Outages^(IMS) shall be determined by bootstrap resampling methods as follows: The available historical data for Index 1 and 2 will each be entered into columns. A “seed” is then selected prior to beginning the sampling process. The CAISO assigns a number for the “seed” prior to each calendar year’s development of the control charts. The “seed” allows the user to start the sampling in the same place and get the same results provided the data order hasn’t changed. For Index 1, sampling with replacement will occur for the median number of

Transmission Line Circuits per calendar year in a Voltage Class for the time period being evaluated. A sample, the size of which is the median number of all Transmission Line Circuits for the period being evaluated, is taken from the column of actual frequency values for all Transmission Line Circuits. A mean is calculated from this sample and the resulting number will be stored in a separate column. This process will be repeated 10,000 times in order to create a column of sampling means from the historical database. The column of sampling means is then ordered from the smallest to largest means. From this column percentiles are determined for a UCL (99.75), a LCL (0.25), a UWL (97.5), and a LWL (2.5). Thus, for one cycle, the limits are determined by resampling from the historical database, calculating statistics of interest, in this case means, and then estimating appropriate limits from the resampling means. Ten cycles of this same process are necessary to get ten values each of UCLs, LCLs, UWLs, and LWLs. The average for the ten values of each limit is taken to provide the UCL, LCL, UWL, and LWL values used in analyzing annual performance. The procedure is repeated for Index 2, forming means for the median number of Transmission Line Circuits with Forced Outages^(IMS) in this Voltage Class for the time period being evaluated. See **Bootstrapping - A Nonparametric Approach to Statistical Inference** (1993) by Christopher Z. Mooney and Robert D. Duval, Sage Publications with ISBN 0-8039-5381-X, and **An Introduction to the Bootstrap** (1993) by Bradley Efron and Robert J. Tibshirani, Chapman and Hall Publishing with ISBN 0-412-04231-2 for further information.

Consider an example to illustrate how the bootstrap procedure works for one cycle of the ten required. Assume that a Voltage Class has approximately 20 Transmission Line Circuits per calendar year with a history of ten calendar years. Furthermore, assume that about 15 Transmission Line Circuits per calendar year experience Forced Outages^(IMS). Therefore, there are $10 \times 15 = 150$ Forced Outage^(IMS) durations available for bootstrap sampling. Place these 150 Forced Outage^(IMS) durations in a column, say "outdur," in a specified order. The order is automatically provided in the bootstrap algorithm

developed by the CAISO and made available to the PTO. The bootstrap algorithm will sample 15 rows from “outdur” with replacement. That is, any row may, by chance, be sampled more than once. From these 15 values determine the sample mean and place this in another column, say ”boot”. Repeat this sampling process 10,000 times adding the new means to “boot”. The column “boot” now has 10,000 means from samples of size 15 from the original Forced Outage^(IMS) duration data for this Voltage Class. The next step is to locate the appropriate percentiles from these means for use in determining the control chart limits for one cycle. This is accomplished by ordering the column “boot” from smallest-to-largest mean and restoring these ordered means in “boot”. The percentiles which are needed are 99.75% (UCL), 97.50% (UWL), 2.50% (LWL) and 0.25% (LCL). These are easily estimated from the sorted means by finding the associated rows in the column “boot”. For example, LWL will be estimated as the average of the 250th and 251st rows in column “boot”. Likewise the other limits will be determined. Of course, the CL is the actual mean average for 15 Transmission Line Circuits over the ten calendar years using the formulas in Section 4.2.2.1 of this Appendix C. This example is for one cycle. Nine more cycles of this process will establish the more accurate control and warning limits necessary to evaluate a PTO’s annual performance.

UCLs, LCLs, UWLs and LWLs for Index 1 and 2 for All Other Voltage Classes

When data for less than four Transmission Line Circuits with Forced Outages^(IMS) are available per calendar year in a Voltage Class for fewer than five calendar years, an exhaustive enumeration of all possible selections with replacement may need to be performed. This is because the number of possible samples for bootstrap resampling will be less than the aforementioned 10,000 resampling frequency used for Voltage Classes containing four or more Transmission Line Circuits with Forced Outages^(IMS) for five or more calendar years. For example, if a Voltage Class has only two Transmission Line Circuits per calendar year for five calendar years, the data base will consist of $2*5 = 10$

accumulated Forced Outage^(IMS) durations assuming both Transmission Line Circuits experience one Forced Outage^(IMS) or more per calendar year. Resampling two values from the column of ten yields only $10^{**}2 = 100$ possible means. Thus, bootstrap resampling of 10,000 would over-sample the original data $10,000/100 = 100$ times.

For the general case, let M = the number of accumulated Forced Outage^(IMS) durations (or Forced Outage^(IMS) frequencies) from the historical database. If n is the median number of Transmission Line Circuits per calendar year, there are $M^{**}n = U$ possible enumerated means for this Voltage Class. The procedure to determine the appropriate limits for a Voltage Class is to order the column containing “U” enumerated means from smallest to largest means. Then, the UCL, LCL, UWL, and LWL are determined from this vector as described above (i.e., at the 99.75, 0.25, 97.5, and 2.5 percentiles, respectively).

UCLs, LCLs, UWLs and LWLs for Index 3 When Number of Transmission Line Circuits is > 125

According to standard procedures for proportion control charts for Voltage Classes where the median number of Transmission Line Circuits in service is greater than 125 for any given calendar year, the upper and lower control chart limits (UCL, LCL, UWL, and LWL) for the “kth” calendar year are determined using the normal approximation to the binomial distribution. The formulas are:

$$UCL = CL_{PVC} + 3S_{PVC,k} \qquad LCL = CL_{PVC} - 3S_{PVC,k}$$

UWL and LWL are calculated by replacing the “3” above with “2”.

and

$$S_{PVC,k} = \sqrt{CL_{PVC}(1 - CL_{PVC}) / N_k}$$

where

$S_{P_{VC,k}}$ = standard deviation for the annual proportion of Transmission Line Circuits in the Voltage Class with no Forced Outages^(IMS) for each “kth” year of the “Y” calendar years prior to the date a TO becomes a PTO. If LCL or LWL is less than zero, they should be set to zero by default.

UCLs, LCLs, UWLs and LWLs for Index 3 when Number of Transmission Line Circuits is less than or equal to 125 and greater than or equal to six

The UCLs, LCLs, UWLs, and LWLs for the control charts for each Voltage Class shall be based on exact binomial probabilities for those Voltage Classes having equal to or more than six, but less than or equal to 125 median Transmission Line Circuits per calendar year. A customized macro and a statistical software package approved by the CAISO creates the proportion control charts. The macro determines the control limits and use of the exact binomial or the normal approximation to the binomial for computing the control chart limits. This macro ensures the UCL and LCL contain about 99.5% and the UWL and LWL contain about 95% of the binomial distribution. The percentile values of the UCL, UWL, LWL, and LCL are respectively 99.75%, 97.5%, 2.5%, and 0.25%.

The UCL, UWL, LWL, and LCL are calculated using the following formulas:

$$\text{UCL} = (X_1 + (P_2 - P_1)/(P_3 - P_1)) / n$$

$$\text{UWL} = (X_1 + (P_2 - P_1)/(P_3 - P_1)) / n$$

$$\text{LWL} = (X_1 + (P_2 - P_1)/(P_3 - P_1)) / n$$

$$\text{LCL} = (X_1 + (P_2 - P_1)/(P_3 - P_1)) / n$$

Where

P_1 = A cumulative binomial probability that if not equal to the P_2 value is representing the percentile value that is less than and closest to the 99.75, 97.50, 2.5, and 0.25 percentile values used respectively in the UCL, UWL, LWL, and LCL formulas (e.g., if $P_1 = 0.99529$ and is closest to the 99.75 percentile value, from the low side, $P_1 = 0.99529$ should be used in the UCL formula).

P_2 = A cumulative binomial probability equal to the 0.9975, 0.9750, 0.025, and 0.0025 values used respectively in the UCL, UWL, LWL, and LCL above formulas (e.g., $P_2 = 0.9975$ in the UCL formula and = 0.025 in the LWL formula).

P_3 = A cumulative binomial probability that if not equal to the P_2 value is representing the percentile value that is greater than and closest to the 99.75, 97.50, 2.5, and 0.25 percentile values used respectively in the UCL, UWL, LWL, and LCL formulas (e.g., if $P_3 = 0.99796$ and is closest to the 99.75 percentile value, from the high side, then $P_3 = 0.99796$ should be used in the UCL formula).

X_1 = The number of Transmission Line Circuits with no Forced Outages^(IMS) associated with the P_1 cumulative binomial probability values used respectively in the UCL, UWL, LWL, and LCL formulas (e.g., if $P_1 = 0.99529$ and represents the closest percentile from below the 99.75 percentile for the case where 19 Transmission Line Circuits had no Forced Outages^(IMS), then $X_1 = 19$ should be used in the UCL formula).

n = The median number of Transmission Line Circuits that are in service in a given calendar year. This number remains the same in each of the UCL, UWL, LWL, and LCL formulas.

4.2.3. EVALUATION OF AVAILABILITY MEASURES PERFORMANCE

The control charts shall be reviewed annually by the CAISO and PTOs in order to evaluate Availability Measures performance. The annual evaluation shall consist of an examination of each of the control charts to determine if one or more of the following four tests indicate a change in performance. The four tests have been selected to enable identification of exceptional performance in an

individual calendar year, shifts in longer-term performance, and trends in longer-term performance.

Tests

- **Test 1:** The index value for the current calendar year falls outside the UCL or LCL.
- **Test 2:** At least v1 consecutive annual index values fall above the CL or v2 consecutive annual index values fall below the CL. The actual values of v1 and v2 will be output from the bootstrap resampling procedures. The choices for v1 and v2 are designed to keep the probability of these events less than one percent.

Table 1. Values of v1 and v2 for Percentiles of the CL in Specified Ranges

Percentile	v1	v2
35 - 39	10	5
40	10	6
41 - 43	9	6
44 - 46	8	6
47 - 48	8	7
49 - 51	7	7
52 - 53	7	8
54 - 56	6	8
57 - 59	6	9
60	6	10
61 - 65	5	10

Thus, for example, if for a particular Voltage Class the percentile of the historical CL is 55%, this Table indicates that the CL is located at the 55 percentile of all bootstrap means in the “boot” column. From Table 1, v1=6, and v2=8.

- **Test 3:** At least two out of three consecutive annual index values fall outside the UWL or LWL on the same side of the CL.

- **Test 4:** Six or more values are consecutively increasing or consecutively decreasing.

Therefore, Test 1 is designed to detect a short-term change or jump in the average level. Tests 2 and 4 are looking for long-term changes. Test 2 will detect a shift up in averages or a shift to a lower level. Test 4 is designed to detect either a trend of continuous increase in the average values or continuous decrease. Test 3 is designed to assess changes in performance during an intermediate period of three calendar years. If Test 3 is satisfied, the evidence is of a decline (or increase) in Availability over a three calendar year period. Together the four tests allow the CAISO to monitor the Availability performance of a Voltage Class for a PTO.

If none of these tests indicate that a change has occurred, performance shall be considered to be stable and consistent with past performance. If one or more of these tests indicates a change then Availability performance shall be considered as having improved or degraded relative to the performance defined by the control chart. Table 4.2.1 provides a summary of the performance indications provided by the tests. The control chart limits may be updated annually if the last calendar year's Availability performance indices did not trigger any of the four tests. If none of the four tests are triggered, the new limits will be constructed including the last calendar year's data.

The control chart limits may be modified each year to reflect the number of Transmission Line Circuits in service during that calendar year if necessary. However, it is suggested that unless the number of Transmission Line Circuits changes by more than 30% from the previous calendar year, the use of the median number of Transmission Line Circuits should continue. Consider an example; suppose after the control chart has been prepared for a Voltage Class, next calendar year's data arrives with the number of Transmission Line Circuits

30% higher than the median used in the past. New limits will be generated in order to assess the Availability performance for that calendar year.

For the special case where only one Transmission Line Circuit has a Forced Outage^(IMS) in a Voltage Class during a calendar year, the assessment process for Index 2 is as follows; if Index 2 for this Transmission Line Circuit does not trigger any of the four tests, no further action is necessary. If, however, one or more of the tests are triggered, then limits for this Transmission Line Circuit for that calendar year should be recalculated based on the historical data for this Transmission Line Circuit alone using an individual and moving range control chart. The only test warranted here is Test 1. More information on the individual and moving range control charts can be found in the user manuals of the statistical software used in creating the control charts.

Table 4.2.1 Performance Indications Provided by Control Chart Tests

Control Chart Type	Test		Performance Status Indicated by Test Results	
	Number	Results	Improvement	Degradation
Annual Average Forced Outage ^(IMS) Frequency	1	value is above the UCL		X
		value is below the LCL when LCL>0	X	
	2	v1 or more consecutive values above the CL		X
		v2 or more consecutive values below the CL	X	
	3	2 out of 3 values above the UWL		X
		2 out of 3 values below the LWL	X	
	4	6 consecutive values increasing		X
		6 consecutive values decreasing	X	
Annual Average Accumulated Forced Outage ^(IMS) Duration	1	value is above the UCL		X
		value is below the LCL when LCL>0	X	
	2	v1 or more consecutive values above the CL		X
		v2 or more consecutive values below the CL	X	
	3	2 out of 3 values above the UWL		X
		2 out of 3 values below the LWL	X	
	4	6 consecutive values increasing		X
		6 consecutive values decreasing	X	
Annual Proportion of Transmission Line Circuits with No Forced Outages ^(IMS)	1	value is above the UCL	X	
		value is below the LCL when LCL>0		X
	2	v1 or more consecutive values above the CL	X	
		v2 or more consecutive values below the CL		X
	3	2 out of 3 values above the UWL	X	
		2 out of 3 values below the LWL		X
	4	6 consecutively increasing values	X	
		6 consecutively decreasing values		X

4.3. AVAILABILITY REPORTING

Each PTO shall submit an annual report to the CAISO within 90 days after the end of each calendar year describing its Availability Measures performance. This annual report shall be based on Forced Outage^(IMS) records. All Forced Outage^(IMS) records shall be submitted by each PTO to the CAISO and shall include the date, start time, end time, affected Transmission Facility, and the probable cause(s) if known.

5. MAINTENANCE PRACTICES

5.1. INTRODUCTION

These CAISO Transmission Maintenance Standards, as they may be periodically revised in accordance with the provisions of the Transmission Control Agreement and this Appendix C, and as they may be clarified by the Maintenance Procedures, shall be followed by each PTO in preparing, submitting, and amending its Maintenance Practices. The Maintenance Practices will provide for consideration of the criteria referenced in Section 14.1 of the TCA, including facility importance.

5.2. PREPARATION OF MAINTENANCE PRACTICES

5.2.1. TRANSMISSION LINE CIRCUIT MAINTENANCE

As may be appropriate for the specific Transmission Line Circuits under the CAISO's Operational Control, each PTO's Maintenance Practices shall describe the Maintenance activities for the various attributes listed below:

5.2.1.1. OVERHEAD TRANSMISSION LINES

- Patrols and inspections, scheduled and unscheduled
- Conductor and shield wire
- Disconnects/pole-top switches
- Structure grounds

- Guys/anchors
- Insulators
- Rights-of-way
- Structures/Foundations
- Vegetation Management

5.2.1.2. UNDERGROUND TRANSMISSION LINES

- Patrols and inspections, scheduled and unscheduled
- Cable/Cable systems
- Cathodic Protection
- Fluid pumping facilities
- Terminations
- Arrestors
- Rights-of-way
- Splices
- Structures/vaults/manholes
- Vegetation Management

5.2.2. STATION MAINTENANCE

As may be appropriate for the specific Stations under the CAISO's Operational Control, each PTO's Maintenance Practices shall describe Maintenance activities for the various attributes listed below:

- Inspections, scheduled and unscheduled
- Battery systems
- Circuit breakers
- Direct Current transmission components
- Disconnect switches
- Perimeter fences and gates
- Station grounds
- Insulators/bushings/arrestors
- Reactive power components
- Protective relay systems
- Station Service equipment
- Structures/Foundations
- Transformers/regulators
- Vegetation Management

5.2.3. DESCRIPTIONS OF MAINTENANCE PRACTICES

Each PTO's Maintenance Practices shall include a schedule for any time-based Maintenance activities and a description of conditions that will initiate any performance-based activities. The Maintenance Practices shall describe the Maintenance methods for each substantial type of component and shall provide any checklists/report forms, which may be required for the activity. Where appropriate, the Maintenance Practices shall provide criteria to be used to assess the condition of a Transmission Facility. Where appropriate, the Maintenance Practices shall specify condition assessment criteria and the requisite response to each condition as may be appropriate for each specific type of component or feature of the Transmission Facility.

5.3. REVIEW AND ADOPTION OF MAINTENANCE PRACTICES

5.3.1. INITIAL ADOPTION OF MAINTENANCE PRACTICES

In conjunction with its application to become a PTO, each prospective PTO shall provide to the CAISO its proposed Maintenance Practices which comply with the requirements set forth in this Appendix C and Section 14.1 of the Transmission Control Agreement. This information shall provide sufficient detail for the CAISO to assess the proposed Maintenance Practices.

The CAISO shall review the proposed Maintenance Practices and may provide recommendations for an amendment. To the extent there is any disagreement between the CAISO and the prospective PTO regarding the prospective PTO's proposed Maintenance Practices, such disagreement shall be resolved by the CAISO and prospective PTO so that the CAISO and the prospective PTO will have adopted Maintenance Practices, consistent with the requirements of this Appendix C and the Transmission Control Agreement, for the prospective PTO at

the time that the CAISO assumes Operational Control of the prospective PTO's Transmission Facilities. To the extent there are no recommendations, the proposed Maintenance Practices will be adopted by the CAISO and the prospective PTO as the Maintenance Practices for that prospective PTO.

5.3.2. AMENDMENTS TO THE MAINTENANCE PRACTICES

5.3.2.1. AMENDMENTS PROPOSED BY THE CAISO

Each PTO shall have in place Maintenance Practices that have been adopted by the CAISO as set forth in this Appendix C. The CAISO shall periodically review each PTO's Maintenance Practices having regard to these CAISO Transmission Maintenance Standards and Maintenance Procedures. Following such a review, the CAISO may recommend an amendment to any PTO's Maintenance Practices by means of a notice delivered in accordance with Section 26.1 of the Transmission Control Agreement. The PTO may draft amended language in response to the CAISO's recommendation. If the PTO exercises its option to draft amended language to the CAISO's proposed amendment, the PTO shall so notify the CAISO within 30 days after the receipt of notice from the CAISO. The PTO will provide the CAISO with its proposed amendment language in a time frame mutually agreed upon between the PTO and the CAISO. If, after the CAISO receives the proposed amendment language from the PTO, the CAISO and the PTO are unable to agree on the language implementing the CAISO recommendation, then the provisions of Section 5.3.3.2 of this Appendix C shall apply.

5.3.2.2. AMENDMENTS PROPOSED BY A PTO

Each PTO may provide to the CAISO its own recommendation for an amendment to its own Maintenance Practices, by means of a notice delivered in accordance with Section 26.1 of the Transmission Control Agreement.

5.3.3. DISPOSITION OF RECOMMENDATIONS

5.3.3.1. If the CAISO makes a recommendation to amend the Maintenance Practices of a PTO, as contemplated in Section 5.3.2.1 of this Appendix C, that PTO shall have 30 Business Days to provide a notice to the CAISO, pursuant to Section 26.1 of the Transmission Control Agreement, stating that it does not agree with the recommended amendment or that it intends to draft the language implementing the amendment, as set forth in Section 5.3.2.1 of this Appendix C. If the PTO does not provide such a notice, the amendment recommended by the CAISO shall be deemed adopted.

If a PTO makes a recommendation to amend its own Maintenance Practices, as contemplated in Section 5.3.2.2 of this Appendix C, the CAISO shall have 30 Business Days to provide a notice to that PTO, pursuant to Section 26.1 of the Transmission Control Agreement, that it does not concur with the recommended amendment. If the CAISO does not provide such a notice, then the recommended amendment shall be deemed adopted. Notwithstanding the foregoing, if an amendment proposed by a PTO to its own Maintenance Practices meets the objectives of Section 2.1 of this Appendix C and is submitted in accordance with the requirements in Section 5.2 of this Appendix C, the CAISO shall adopt said amendment.

If any amendment to a PTO's Maintenance Practices is adopted, the PTO will specify the transition time to implement the adopted amendment so as to ensure the CAISO and PTO are clear as to the implementation time frame where Maintenance may be performed under both sets of practices.

5.3.3.2. If the CAISO or a PTO makes a recommendation to amend Maintenance Practices and if the CAISO or PTO provides notice within the 30 Business Days specified in Section 5.3.3.1 of this Appendix C that the CAISO or PTO does not agree with the recommended amendment, the PTO and the CAISO shall make good faith efforts to reach a resolution relating to the

recommended amendment. If, after such efforts, the PTO and the CAISO cannot reach a resolution, the pre-existing Maintenance Practices shall remain in effect. Either Party may, however, seek further redress through appropriate processes, including non-binding discussions at the TMCC and/or the dispute resolution mechanism specified in Section 15 of the Transmission Control Agreement. The PTO may also request, during the initial attempts at resolution and at any stage of the redress processes, a deferral of the CAISO recommended amendment and the CAISO shall not unreasonably withhold its consent to such a request. Following the conclusion of any and all redress processes, the PTO's Maintenance Practices, as modified, if at all, by these processes, shall be deemed adopted by the CAISO, as the Maintenance Practices for that PTO, pursuant to the implementation time frame agreed to between the PTO and the CAISO.

5.3.3.3. If the CAISO determines, that prompt action is required to avoid a substantial risk to reliability of the CAISO Controlled Grid, it may direct a PTO to implement certain temporary Maintenance activities in a period of less than 30 Business Days, by issuing an advisory to the PTO to that effect, by way of a notice delivered in accordance with Section 26.1 of the Transmission Control Agreement. Any advisory issued pursuant to this Section 5.3.3.3 shall specify why implementation solely under Sections 5.3.3.1 and 5.3.3.2 of this Appendix C is not sufficient to avoid a substantial risk to reliability of the CAISO Controlled Grid, including, where a substantial risk is not imminent or clearly imminent, why prompt action is nevertheless required. The CAISO shall consult with the relevant PTO before issuing a Maintenance advisory. Upon receiving such an advisory, a PTO shall implement the temporary Maintenance activities in question, as of the date specified by the CAISO in its advisory, unless the PTO provides a notice to the CAISO, in accordance with Section 26.1 of the Transmission Control Agreement, that the PTO is unable to implement the temporary Maintenance activities as specified. Even if the PTO provides such a notice, the PTO shall use its best efforts to implement the temporary

Maintenance activities as fully as possible. All Maintenance advisories shall cease to have effect 90 Business Days after issuance by the CAISO or on such earlier date as the CAISO provides in its notice. Any Maintenance advisories required to remain in effect beyond 90 Business Days shall require a recommendation process pursuant to Section 5.3.3.1 or Section 5.3.3.2 of this Appendix C.

5.4. QUALIFICATIONS OF PERSONNEL

All Maintenance of Transmission Facilities shall be performed by persons who, by reason of training, experience and instruction, are qualified to perform the task.

6. MAINTENANCE RECORD KEEPING AND REPORTING

A PTO shall maintain and provide to the CAISO records of its Maintenance activities in accordance with this Section 6 of this Appendix C.

6.1. PTO MAINTENANCE RECORD KEEPING

The minimum record retention period for Transmission Facilities subject to time based scheduled intervals shall be the designated Maintenance cycle plus two years. The minimum record retention period for all other Transmission Facility Maintenance activities identified through inspection, assessment, diagnostic or another process shall be a minimum of 2 years after the date completed.

A PTO's Maintenance records shall, at a minimum, include the: 1) responsible person; 2) Maintenance date; 3) Transmission Facility; 4) findings (if any); 5) priority rating (if any); and 6) description of Maintenance activity performed.

6.2. PTO MAINTENANCE REPORTING

Each PTO will submit a Standardized Maintenance Report as outlined in the Maintenance Procedures. The CAISO will accept, at the PTO's option, a Standardized Maintenance Report in either electronic or paper form.

If a PTO retains records in a manner that includes additional information, such records may be submitted in that manner.

Each PTO shall provide to the CAISO Maintenance records as described in Section 6.1 and as set forth in the Maintenance Procedures.

6.3. CAISO VISIT TO PTO'S TRANSMISSION FACILITIES

The CAISO may visit Transmission Facilities in accordance with Section 18.3 of the Transmission Control Agreement to determine if the Maintenance Practices are being followed by a PTO.

7. CAISO AND TRANSMISSION MAINTENANCE COORDINATION COMMITTEE

The CAISO shall establish and convene a Transmission Maintenance Coordination Committee (TMCC). The TMCC shall develop and, if necessary, revise the Maintenance Procedures, including conveying information to and seeking input from PTOs and other interested stakeholders regarding these Maintenance Procedures and any proposed amendments or revision thereto. The TMCC will also make recommendations on the CAISO Transmission Maintenance Standards and any proposed revisions or amendments thereto. The TMCC will convey information to and seek input from the PTOs and other interested stakeholders on these CAISO Transmission Maintenance Standards and any proposed revisions or amendments thereto. The TMCC will also perform any other functions assigned in this Appendix C.

Although the role of the Transmission Maintenance Coordination Committee is advisory in nature, the CAISO will strive to achieve a consensus among committee members.

8. REVISION OF CAISO TRANSMISSION MAINTENANCE STANDARDS AND MAINTENANCE PROCEDURES

8.1 REVISIONS TO CAISO TRANSMISSION MAINTENANCE STANDARDS

The CAISO, PTOs, or any interested stakeholder may submit proposals to amend or revise these CAISO Transmission Maintenance Standards. All proposals shall be initially submitted to the TMCC for review in accordance with this Appendix C. Any revisions to these CAISO Transmission Maintenance Standards shall be made only upon recommendation by the TMCC and only in accordance with the provisions and requirements of the Transmission Control Agreement and this Appendix C.

8.2 REVISIONS TO AND DEVIATIONS FROM MAINTENANCE PROCEDURES

The CAISO or any PTO may submit proposals to the TMCC to amend or revise the Maintenance Procedures. Any deviations from the Maintenance Procedures should be held to a minimum and will be negotiated between the CAISO and the affected PTO.

9. INCENTIVES AND PENALTIES

9.1 DEVELOPMENT OF A FORMAL PROGRAM

The TMCC shall periodically investigate and report to the CAISO on the appropriateness of a formal program of incentives and penalties associated with Availability Measures. Should the TMCC ever recommend that the CAISO adopt

a formal program of incentive and penalties, the formal program will only be adopted as set forth in Section 9.2 of this Appendix C.

9.2 ADOPTION OF A FORMAL PROGRAM

Any formal program of incentives and penalties adopted by the CAISO in connection with matters covered in Section 14 of the Transmission Control Agreement or this Appendix C, shall be established only: 1) with respect to Availability Measures; 2) upon recommendation of the TMCC as set forth in Section 9.1 of this Appendix C; 3) by express incorporation into this Appendix C in accordance with the provisions of the Transmission Control Agreement; and 4) upon approval by the FERC. Nothing in this Appendix C shall be construed as waiving or limiting in any way the right of any party or PTO to oppose or protest any formal program of incentives and penalties filed, proposed or adopted by the CAISO and/or FERC or any portion thereof.

9.3 IMPOSITION OF PENALTIES IN THE ABSENCE OF A FORMAL PROGRAM

In the absence of a formal program of incentives and penalties, the CAISO may seek FERC permission for the imposition of specific penalties on a PTO on a case-by-case basis in the event that the relevant PTO 1) exhibits significant degradation trends in Availability performance due to Maintenance, or 2) is grossly or willfully negligent with regard to Maintenance.

9.4 NO WAIVER

Nothing in this Appendix C shall be construed as waiving the rights of any PTO to oppose or protest any incentive, penalty or sanction proposed by the CAISO to the FERC, the approval by FERC of any specific penalty or sanction, or the specific imposition by the CAISO of any FERC approved penalty or sanction on the PTO.

9.5 LIMITATIONS ON APPLICABILITY TO NEW PTOs

For a new PTO, the Availability Measures system needs to be used and updated during a five calendar year phase in period, as set forth in Section 4.2 of this Appendix C, to be considered in connection with any formal program of incentives and penalties associated with Availability Measures.

10. COMPLIANCE WITH OTHER REGULATIONS/LAWS

Each PTO shall maintain and the CAISO shall operate Transmission Facilities in accordance with Good Utility Practice, sound engineering judgment, the guidelines as outlined in the Transmission Control Agreement, and all other applicable laws and regulations.

10.1 SAFETY

Each PTO shall take proper care to ensure the safety of personnel and the public in performing Maintenance duties. The CAISO shall operate Transmission Facilities in a manner compatible with the priority of safety. In the event there is conflict between safety and reliability, the jurisdictional agency regulations for safety shall take precedence.

11. DISPUTE RESOLUTION

Any dispute between the CAISO and a PTO relating to matters covered in this Appendix C shall be subject to the provisions of the Transmission Control Agreement, including the dispute resolution provisions set forth therein.

TRANSMISSION CONTROL AGREEMENT

APPENDIX D

Master Definitions Supplement

Actual Adverse Tax Action

A plan, tariff provision, operating protocol, action, order, regulation, or law issued, adopted, implemented, approved, made effective, taken, or enacted by the CAISO, the FERC, the IRS or the United States Congress, as applicable, that likely adversely affects the tax-exempt status of any Tax Exempt Debt issued by, or for the benefit of, a Tax Exempt Participating TO or that, with the passage of time, likely would adversely affect the tax-exempt status of any Tax Exempt Debt issued by, or for the benefit of, a Tax Exempt Participating TO if the affected facilities were to remain under the Operational Control of the CAISO; provided, however, no Actual Adverse Tax Action shall result with respect to a Tax Exempt Participating TO that initiates such a plan, tariff provision, operating protocol, action, order, regulation, or law; provided further, however, that the immediately preceding proviso shall not include private letter ruling requests or related actions; provided further, that no Actual Adverse Tax Action shall result in connection with Local Furnishing Bonds if the adverse effect on the tax-exempt status of the Local Furnishing Bonds reasonably could be avoided by application of the procedures set forth in Section 4.1.2 or in Section 2.3.2 and Appendix B.

Adverse Tax Action Determination

A determination by a Tax Exempt Participating TO, as supported by (i) an opinion of its (or its joint action agency's) nationally recognized bond counsel, or (ii) the IRS (e.g., through a private letter ruling received by a Tax Exempt Participating TO or its joint action agency), that an Impending Adverse Tax Action or an Actual Adverse Tax Action has occurred.

Ancillary Services

As used in this Agreement, the term Ancillary Services shall have the definition set forth in Appendix A of the CAISO Tariff.

Applicable Reliability Criteria

The Reliability Standards and reliability criteria established by NERC and WECC and Local Reliability Criteria, as amended from time to time, including any requirements of the NRC.

Approved Maintenance Outage

A Maintenance Outage which has been approved by the CAISO through the CAISO Outage Coordination Office.

Balancing Authority

The responsible entity that integrates resource plans ahead of time, maintains load-interchange-generation balance within a Balancing Authority Area, and supports interconnection frequency in real time.

Balancing Authority Area

The collection of generation, transmission, and loads within the metered boundaries of the Balancing Authority. The Balancing Authority maintains load-resource balance

within this area.

Black Start

The procedure by which a Generating Unit self-starts without an external source of electricity thereby restoring a source of power to the CAISO Balancing Authority Area following system or local area blackouts.

Business Day

Monday through Friday, excluding federal holidays and the day after Thanksgiving Day.

CAISO

The California Independent System Operator Corporation, a state chartered, California non-profit public benefit corporation that operates the transmission facilities of all Participating TOs and dispatches certain Generating Units and Loads.

CAISO ADR Procedures

The procedures for resolution of disputes or differences set out in Section 13 of the CAISO Tariff, as amended from time to time.

CAISO Code of Conduct

For employees, the code of conduct for officers, employees and substantially full-time consultants and contractors of the CAISO as set out in exhibit A to the CAISO bylaws; for governors, the code of conduct for governors of the CAISO as set out in exhibit B to the CAISO bylaws.

CAISO Control Center

The control center established by the CAISO pursuant to Section 7.1 of the CAISO Tariff.

<u>CAISO Controlled Grid</u>	The system of transmission lines and associated facilities of the Participating TOs that have been placed under the CAISO's Operational Control.
<u>CAISO Governing Board</u>	The Board of Governors established to govern the affairs of the CAISO.
<u>CAISO Operations Date</u>	March 31, 1998.
<u>CAISO Outage Coordination Office</u>	The office established by the CAISO to coordinate Maintenance Outages in accordance with Section 9.3 of the CAISO Tariff.
<u>CAISO Protocols</u>	The rules, protocols, procedures and standards promulgated by the CAISO (as amended from time to time) to be complied with by the CAISO, Scheduling Coordinators, Participating TOs and all other Market Participants in relation to the operation of the CAISO Controlled Grid and the participation in the markets for Energy and Ancillary Services in accordance with the CAISO Tariff.
<u>CAISO Register</u>	The register of all the transmission lines, associated facilities and other necessary components that are at the relevant time being subject to the CAISO's Operational Control.

CAISO Tariff

The California Independent System Operator Corporation Agreement and Tariff, dated March 31, 1997, as it may be modified from time to time.

CAISO Website

The CAISO internet home page at <http://www.caiso.com> or such other internet address as the CAISO shall publish from time to time.

Congestion

A characteristic of the transmission system produced by a binding Transmission Constraint (as that term is defined in Appendix A of the CAISO Tariff) to the optimum economic dispatch to meet Demand such that the LMP (as that term is defined in Appendix A of the CAISO Tariff), exclusive of Marginal Cost of Losses (as that term is defined in Appendix A of the CAISO Tariff), at different Locations (as that term is defined in Appendix A of the CAISO Tariff) of the transmission system is not equal.

Congestion Management

The alleviation of Congestion in accordance with applicable CAISO procedures, the CAISO Tariff, and Good Utility Practice.

CPUC

The California Public Utilities Commission, or its successor.

Critical Protective System

Facilities and sites with protective relay systems and Remedial Action Schemes that the CAISO determines may have a direct impact on the ability of the CAISO to maintain system security and over which the CAISO exercises Operational Control.

Demand

The instantaneous amount of Power that is delivered to Loads and Scheduling Points by Generation, transmission or distribution facilities. It is the product of voltage and the in-phase component of alternating current measured in units of watts or standard multiples thereof, e.g., 1,000W=1kW, 1,000kW=1MW, etc.

Eligible Customer

(i) any utility (including Participating TOs, Market Participants and any power marketer), Federal power marketing agency, or any person generating Energy for sale or resale; Energy sold or produced by such entity may be Energy produced in the United States, Canada or Mexico; however, such entity is not eligible for transmission service that would be prohibited by Section 212(h)(2) of the Federal Power Act; and (ii) any retail customer taking unbundled transmission service pursuant to a state retail access program or pursuant to a voluntary offer of unbundled retail transmission service by the Participating TO.

Encumbrance

A legal restriction or covenant binding on a Participating TO that affects the operation of any transmission lines or associated facilities and which the CAISO needs to take into account in exercising Operational Control over such transmission lines or associated facilities if the Participating TO is not to risk incurring significant liability. Encumbrances shall include Existing Contracts and may include: (1) other legal restrictions or covenants meeting the definition of Encumbrance and arising under other arrangements entered into before the CAISO Operations Date, if any; and (2) legal restrictions or covenants meeting the definition of Encumbrance and arising under a contract or other arrangement entered into after the CAISO Operations Date.

End-Use Customer or End-User

A consumer of electric power who consumes such power to satisfy a Load directly connected to the CAISO Controlled Grid or to a Distribution System (as that term is defined in Appendix A of the CAISO Tariff) and who does not resell the power.

Energy

The electrical energy produced, flowing or supplied by generation, transmission or distribution facilities, being the integral with respect to time of the instantaneous power, measured in units of watt-hours or standard multiples

thereof, e.g., 1,000 Wh=1kWh, 1,000 kWh=1MWh, etc.

Energy Management System (EMS)

A computer control system used by electric utility dispatchers to monitor the real time performance of the various elements of an electric system and to control Generation and transmission facilities.

Entitlements

The right of a Participating TO obtained through contract or other means to use another entity's transmission facilities for the transmission of Energy.

Existing Contracts

The contracts which grant transmission service rights in existence on the CAISO Operations Date (including any contracts entered into pursuant to such contracts) as may be amended in accordance with their terms or by agreement between the parties thereto from time to time.

Existing Rights

The transmission service rights and obligations of non-Participating TOs under Existing Contracts, including all terms, conditions, and rates of the Existing Contracts, as they may change from time to time under the terms of the Existing Contracts.

FERC

The Federal Energy Regulatory Commission or its successor.

Forced Outage

An Outage for which sufficient notice cannot be given to allow the Outage to be factored into the Day-Ahead Market, HASP, or RTM bidding processes, as the terms for those bidding processes are defined in Appendix A of the CAISO Tariff.

FPA

Parts II and III of the Federal Power Act, 16 U.S.C. § 824 et seq., as they may be amended from time to time.

Generating Unit

An individual electric generator and its associated plant and apparatus whose electrical output is capable of being separately identified and metered or a Physical Scheduling Plant that, in either case, is:

- (a) located within the CAISO Balancing Authority Area;
- (b) connected to the CAISO Controlled Grid, either directly or via interconnected transmission, or distribution facilities; and
- (c) that is capable of producing and delivering net Energy (Energy in excess of a generating station's internal power requirements).

Generation

Energy delivered from a Generating Unit.

Generator

The seller of Energy or Ancillary Services produced by a Generating Unit.

Good Utility Practice

Any of the practices, methods, and acts engaged in or

approved by a significant portion of the electric utility industry during the relevant time period, or any of the practices, methods, and acts which, in the exercise of reasonable judgment in light of the facts known at the time the decision was made, could have been expected to accomplish the desired result at a reasonable cost consistent with good business practices, reliability, safety, and expedition. Good Utility Practice is not intended to be limited to any one of a number of the optimum practices, methods, or acts to the exclusion of all others, but rather to be acceptable practices, methods, or acts generally accepted in the region, including those practices required by Federal Power Act section 215(a)(4).

Hydro Spill Generation

Hydro-electric Generation in existence prior to the CAISO Operations Date that: i) has no storage capacity and that, if backed down, would spill; ii) has exceeded its storage capacity and is spilling even though the generators are at full output, iii) has inadequate storage capacity to prevent loss of hydro-electric Energy either immediately or during the forecast period, if hydro-electric Generation is reduced; or iv) has increased regulated water output to avoid an impending spill.

Impending Adverse Tax Action

A proposed plan, tariff, operating protocol, action, order,

regulation, or law that, if issued, adopted, implemented, approved, made effective, taken, or enacted by the CAISO, the FERC, the IRS or the United States Congress, as applicable, likely would adversely affect the tax-exempt status of any Tax Exempt Debt issued by, or for the benefit of, a Tax Exempt Participating TO if the affected facilities were to remain under the Operational Control of the CAISO; provided, however, that with respect to a proposed federal law, such proposed law must first have been approved by (i) one of the houses of the United States Congress and (ii) at least one committee or subcommittee of the other house of the United States Congress; provided further, however, no Impending Adverse Tax Action shall result with respect to a Tax Exempt Participating TO that initiates such a plan, tariff provision, operating protocol, action, order, regulation, or law; provided further, however, that the immediately preceding proviso shall not include private letter ruling requests or related actions; provided further, that no Impending Adverse Tax Action shall result in connection with Local Furnishing Bonds if the adverse effect on the tax-exempt status of the Local Furnishing Bonds reasonably could be avoided by application of the

procedures set forth in Section 4.1.2 or in Section 2.3.2 and Appendix B.

IRS

The United States Department of Treasury, Internal Revenue Service, or any successor thereto.

Load

An end-use device of an End-Use Customer that consumes Power. Load should not be confused with Demand, which is the measure of Power that a Load receives or requires.

Local Furnishing Bond

Tax-exempt bonds utilized to finance facilities for the local furnishing of electric energy, as described in section 142(f) of the Internal Revenue Code, 26 U.S.C. § 142(f).

Local Furnishing Participating TO

Any Tax Exempt Participating TO that owns facilities financed by Local Furnishing Bonds.

Local Regulatory Authority

The state or local governmental authority, or the board of directors of an electric cooperative, responsible for the regulation or oversight of a utility.

Local Reliability Criteria

Reliability Criteria unique to the transmission systems of each of the Participating TOs established at the later of: (1) CAISO Operations Date, or (2) the date upon which a New Participating TO places its facilities under the control of the CAISO.

Maintenance Outage

A period of time during which an Operator (as that term is defined in Appendix A of the CAISO Tariff) takes its

transmission facilities out of service for the purposes of carrying out routine planned maintenance, or for the purposes of new construction work or for work on de-energized and live transmission facilities (e.g., relay maintenance or insulator washing) and associated equipment.

Market Participant

An entity, including a Scheduling Coordinator, who either: (1) participates in the CAISO Markets (as that term is defined in Appendix A of the CAISO Tariff) through the buying, selling, transmission, or distribution of Energy, capacity, or Ancillary Services into, out of, or through the CAISO Controlled Grid; (2) is a CRR Holder or Candidate CRR Holder (as those terms are defined in Appendix A of the CAISO Tariff), or (3) is a Convergence Bidding Entity (as that term is defined in Appendix A of the CAISO Tariff).

Municipal Tax Exempt Debt

An obligation the interest on which is excluded from gross income for federal tax purposes pursuant to Section 103(a) of the Internal Revenue Code of 1986 or the corresponding provisions of prior law without regard to the identity of the holder thereof. Municipal Tax Exempt Debt does not include Local Furnishing Bonds.

Municipal Tax Exempt TO

A Transmission Owner that has issued Municipal Tax

Exempt Debt with respect to any transmission facilities, or rights associated therewith, that it would be required to place under the CAISO's Operational Control pursuant to the Transmission Control Agreement if it were a Participating TO.

NERC

The North American Electric Reliability Corporation or its successor.

New Participating TO

A Participating TO that is not an Original Participating TO.

Nomogram

A set of operating or scheduling rules which are used to ensure that simultaneous operating limits are respected, in order to meet NERC and WECC reliability standards, including any requirements of the NRC.

Non-Participating TO

A TO that is not a party to this Agreement or, for the purposes of Section 16.1 of the CAISO Tariff, the holder of transmission service rights under an Existing Contract that is not a Participating TO.

NRC

The Nuclear Regulatory Commission or its successor.

Operating Procedures

Procedures governing the operation of the CAISO Controlled Grid as the CAISO may from time to time develop, and/or procedures that Participating TOs currently employ which the CAISO adopts for use.

Operational Control

The rights of the CAISO under this Agreement and the CAISO Tariff to direct Participating TOs how to operate

their transmission lines and facilities and other electric plant affecting the reliability of those lines and facilities for the purpose of affording comparable non-discriminatory transmission access and meeting Applicable Reliability Criteria.

Original Participating TO

A Participating TO that was a Participating TO as of January 1, 2000.

Outage

Disconnection, separation or reduction in capacity, planned or forced, of one or more elements of an electric system.

Participating Generator

A Generator or other seller of Energy or Ancillary Services through a Scheduling Coordinator over the CAISO Controlled Grid (1) from a Generating Unit with a rated capacity of 1 MW or greater, (2) from a Generating Unit with a rated capacity of from 500 kW up to 1 MW for which the Generator elects to be a Participating Generator, or (3) from a Generating Unit providing Ancillary Services or submitting Energy Bids (as that term is defined in Appendix A of the CAISO Tariff) through an aggregation arrangement approved by the CAISO, which has undertaken to be bound by the terms of the CAISO Tariff, in the case of a Generator through a Participating Generator Agreement or QF PGA (as those terms are

defined in Appendix A of the CAISO Tariff).

Participating TO

A party to this Agreement whose application under Section 2.2 has been accepted and who has placed its transmission assets and Entitlements under the CAISO's Operational Control in accordance with this Agreement. A Participating TO may be an Original Participating TO or a New Participating TO.

Physical Scheduling Plant

A group of two or more related Generating Units, each of which is individually capable of producing Energy, but which either by physical necessity or operational design must be operated as if they were a single Generating Unit and any Generating Unit or Units containing related multiple generating components which meet one or more of the following criteria: i) multiple generating components are related by a common flow of fuel which cannot be interrupted without a substantial loss of efficiency of the combined output of all components; ii) the Energy production from one component necessarily causes Energy production from other components; iii) the operational arrangement of related multiple generating components determines the overall physical efficiency of the combined output of all components; iv) the level of coordination required to schedule individual generating

components would cause the CAISO to incur scheduling costs far in excess of the benefits of having scheduled such individual components separately; or v) metered output is available only for the combined output of related multiple generating components and separate generating component metering is either impractical or economically inefficient.

Power

The electrical work produced by a Generating Unit that is absorbed by the resistive components of Load or other network components, measured in units of watts or standard multiples thereof, e.g., 1,000 Watt = 1 kW; 1,000 kW = 1 MW, etc.

Project Sponsor

A Market Participant, group of Market Participants, a Participating TO or a project developer who is not a Market Participant or Participating TO that proposes the construction of a transmission addition or upgrade in accordance with Section 24 of the CAISO Tariff.

Regulatory Must-Run Generation

Hydro Spill Generation and Generation which is required to run by applicable federal or California laws, regulations, or other governing jurisdictional authority. Such requirements include but are not limited to hydrological flow requirements, environmental requirements, such as minimum fish releases, fish pulse releases and water

quality requirements, irrigation and water supply requirements, or the requirements of solid waste Generation, or other Generation contracts specified or designated by the jurisdictional regulatory authority as it existed on December 20, 1995, or as revised by federal or California law or Local Regulatory Authority.

Reliability Criteria

Pre-established criteria that are to be followed in order to maintain desired performance of the CAISO Controlled Grid under Contingency (as that term is defined in Appendix A of the CAISO Tariff) or steady state conditions.

Reliability Standard

A requirement approved by FERC under Section 215 of the Federal Power Act to provide for reliable operation of the bulk power system. The term includes requirements for the operation of existing bulk power system facilities, including cyber security protection, and the design of planned additions or modifications to such facilities to the extent necessary for reliable operation of the bulk power system; but the term does not include any requirement to enlarge such facilities or to construct new transmission capacity or generation capacity.

Remedial Action Schemes (RAS)

Protective systems that typically utilize a combination of conventional protective relays, computer-based

processors, and telecommunications to accomplish rapid, automated response to unplanned power system events. Also, details of RAS logic and any special requirements for arming of RAS schemes, or changes in RAS programming, that may be required. Remedial Action Schemes are also referred to as Special Protection Systems (as that term is defined in Appendix A of the CAISO Tariff).

SCADA (Supervisory Control and Data Acquisition)

A computer system that allows an electric system operator to remotely monitor and control elements of an electric system.

Scheduling Coordinator

An entity certified by the CAISO for the purposes of undertaking the functions specified in Section 4.5.3 of the CAISO Tariff.

Scheduling Point

A location at which the CAISO Controlled Grid or a transmission facility owned by a Transmission Ownership Right holder is connected, by a group of transmission paths for which a physical, non-simultaneous transmission capacity rating has been established for Congestion Management, to transmission facilities that are outside the CAISO's Operational Control.

System Emergency

Conditions beyond the normal control of the CAISO that affect the ability of the CAISO Balancing Authority Area to

function normally, including any abnormal system condition which requires immediate manual or automatic action to prevent loss of Load, equipment damage, or tripping of system elements which might result in cascading Outages or to restore system operation to meet Applicable Reliability Criteria.

System Reliability

A measure of an electric system's ability to deliver uninterrupted service at the proper voltage and frequency.

Tax Exempt Debt

Municipal Tax Exempt Debt or Local Furnishing Bonds.

Tax Exempt Participating TO

A Participating TO that is the beneficiary of outstanding Tax Exempt Debt issued to finance any electric facilities, or rights associated therewith, which are part of an integrated system including transmission facilities the Operational Control of which is transferred to the CAISO pursuant to this Agreement.

TO Tariff

A tariff setting out a Participating TO's rates and charges for transmission access to the CAISO Controlled Grid and whose other terms and conditions are the same as those contained in the document referred to as the Transmission Owners Tariff approved by FERC as it may be amended from time to time.

Transmission Control Agreement (TCA)

This Agreement between the CAISO and Participating TOs establishing the terms and conditions under which

TOs will become Participating TOs and how the CAISO and each Participating TO will discharge their respective duties and responsibilities, as may be modified from time to time.

Transmission Owner (TO)

An entity owning transmission facilities or having firm contractual rights to use transmission facilities.

Transmission Ownership Right

The ownership or joint ownership right to transmission facilities within the CAISO Balancing Authority Area of a Non-Participating TO that has not executed this Agreement, which transmission facilities are not incorporated into the CAISO Controlled Grid.

Uncontrollable Force

Any act of God, labor disturbance, act of the public enemy, war, insurrection, riot, fire, storm or flood, earthquake, explosion, any curtailment, order, regulation, or restriction imposed by governmental, military, or lawfully established civilian authorities or any other cause beyond a Party's reasonable control which could not be avoided through the exercise of Good Utility Practice.

Voltage Support

Services provided by Generating Units or other equipment such as shunt capacitors, static var compensators, or synchronous condensers that are required to maintain established grid voltage criteria. This service is required under normal or System Emergency conditions.

**Western Electricity
Coordinating Council
(WECC)**

The Western Electricity Coordinating Council or its successor.

Wheeling Out

Except for Existing Rights exercised under an Existing Contract in accordance with Section 16.1 of the CAISO Tariff, the use of the CAISO Controlled Grid for the transmission of Energy from a Generating Unit located within the CAISO Controlled Grid to serve a Load located outside the transmission and distribution system of a Participating TO.

Wheeling Through

Except for Existing Rights exercised under an Existing Contract in accordance with Section 16.1 of the CAISO Tariff, the use of the CAISO Controlled Grid for the transmission of Energy from a resource located outside the CAISO Controlled Grid to serve a Load located outside the transmission and distribution system of a Participating TO.

**Withdraw for Tax
Reasons or Withdrawal
for Tax Reasons**

In accordance with Section 3.4 of this Agreement, withdrawal from this Agreement, or withdrawal from the CAISO's Operational Control of all or any portion of the transmission lines, associated facilities, or Entitlements that were financed in whole or in part with proceeds of the Tax Exempt Debt that is the subject of an Impending Adverse Tax Action or an Actual Adverse Tax Action.

TRANSMISSION CONTROL AGREEMENT

APPENDIX E

Nuclear Protocols

DIABLO CANYON NUCLEAR POWER PLANT UNITS 1 & 2

For purposes of this Appendix E, the requirements applicable to Pacific Gas and Electric Company's Diablo Canyon Nuclear Power Plant are set forth in Attachment A to Appendix 2 of the Nuclear Plant Interface Requirement Coordination Agreement between Pacific Gas and Electric Company (NCR005299), Generation-Diablo Canyon Nuclear Power Plant Electric Operations and Engineering Department, and California Independent System Operator (NCR050548) Concerning Nuclear Plant Interface Requirements For the Diablo Canyon Nuclear Power Plant, as that agreement may be amended from time to time.

SONGS 2&3 REQUIREMENTS FOR OFFSITE POWER SUPPLY OPERABILITY

Revised as of October 10, 2006

I. OVERVIEW

The preferred source of electrical power for the San Onofre Nuclear Generating Station (SONGS) electrical loads (safety-related and non safety-related) is the **offsite power supply** or 230 kV grid. The offsite power supply is sometimes referred to as the **preferred power supply** in the applicable regulatory documents.

The offsite power supply is considered "Operable" with respect to the SONGS Operating License and Technical Specifications when it can provide sufficient capacity and capability to supply electrical loads needed to safely shut down the reactor and mitigate certain specified accident scenarios.

The offsite power supply is considered "Inoperable" with respect to the SONGS Operating License and Technical Specifications if it is degraded to the point that it cannot provide sufficient capacity and capability to supply electrical loads needed to safely shut down the reactor and to mitigate the effects of an accident at SONGS.

It is a necessary condition of the SONGS Operating License and Technical Specifications that the offsite power supply be Operable at all times. If the offsite power supply is declared Inoperable, action must be taken to shut down an online SONGS unit(s) and, for an offline unit, to suspend activities as required by the SONGS Operating License and Technical Specifications.

This level of degradation that would result in inoperability can be caused by an unstable offsite power system, or any condition which renders the offsite power supply unavailable to safely shutdown the units or to supply emergency electrical loads.

Since accident scenarios for which the SONGS plant is designed can result in a unit trip, it is imperative that this trip not impair the operability of the offsite power supply.

If both SONGS units are online and one unit trips (due to an accident or otherwise), the non-tripped unit will provide local voltage support to the SONGS switchyard, and 230 kV system voltage will remain within the required range. In cases where one SONGS unit is online and one unit offline, the offsite power supply must be sufficiently robust to survive a trip of the online unit and meet the SONGS voltage requirements in the post-trip condition. A dual unit trip is not the limiting condition since a plant accident is not postulated simultaneous with a dual unit trip. System Operating Procedures (see Reference 9 below) and programs shall be in place to ensure that various system operating conditions (generating unit outages, line outages, system loads, spinning reserve, etc.), including multiple contingency events, are evaluated and understood, such that impaired or potentially degraded grid conditions are recognized, assessed and communicated to the SONGS Control Room.

The SONGS switchyard is made up of the Southern California Edison Company (SCE) switchyard and the San Diego Gas & Electric Company (SDG&E) switchyard. Unless specifically stated otherwise, SONGS switchyard requirements contained in this document apply to both the SCE switchyard and the SDG&E switchyard.

II. REQUIREMENTS

Note: This section identifies the operational requirements for the SONGS offsite power supply. These requirements are part of the SONGS design basis and licensing basis. Failure to meet these requirements may render the offsite power supply Inoperable, thus requiring the operating SONGS unit(s) to shutdown. Failure to meet these requirements must be communicated to SCE and the SONGS Control Room for operability determination as soon as practicable, but in any case, within one hour. Changes in the operation of the transmission network that conflict with these requirements must have prior approval by SCE.

Note: Specific requirements, procedures, operating bulletins, division orders, and analysis that support or provide the basis for the specific operational requirements may be revised periodically subject to prior approval of the affected parties.

1. Nine transmission lines into the SONGS switchyard are normally in service. Any increase or decrease in the number of lines into the SONGS switchyard requires prior approval of SCE. (Reference 7 below)

No line may be removed from service for greater than 30 days without prior notification to SCE. At least two independent transmission lines (one from SCE and one from SDG&E) between the transmission network (grid) and SONGS switchyard shall be in service at all times. (References 1, 2, 3, 4, 7, 8 below)

2. With both San Onofre units off-line, the SONGS offsite power source shall be capable of providing 158 MW and 96 MVAR to SONGS for normal operation and for shutting down the units during plant Design Basis Accident (DBA) conditions. (References 9, 10 below)
3. The minimum grid voltage at the SONGS switchyard shall be maintained at or above 218 kV. In the event of a system disturbance that can cause the voltage to dip below 218 kV, including the trip of a SONGS unit, the grid voltage shall recover to 218 kV or above within 2.5 seconds. (References 9, 10, 12, 13, 18 below)
4. The following initiating events shall not result in the loss of grid stability or availability:
 - a. The loss of a SONGS Unit (with the other unit already offline), or
 - b. The loss of any generating unit on the SCE and SDG&E grids, or
 - c. The loss of any major transmission circuit or intertie on the SCE and SDG&E grids, or
 - d. The loss of any large load or block of load (e.g., due to a bus section outage) on the SCE and SDG&E grids. (References 2, 3, 4, 8 below)
5. The maximum grid voltage at the SONGS switchyard shall be maintained at or below 234 kV. (References 10, 11, 18 below)
6. The normal operating voltage of the SONGS switchyard shall be maintained at 229 kV. The SONGS switchyard voltage shall not exceed 232 kV unless required to preserve transmission network integrity. (References 10, 11, 18 below)
7. The 3 limiting conditions for SONGS offsite power supply operability are defined as follows:

1. One SONGS unit is off- line, and
2. One of the critical line (s) outages, in GCC Operating Procedure, OP-13: SONGS Voltage (reference 19) occurs, and
3. VAR flows north and south of SONGS are above the threshold levels for the existing combined SCE and SDG&E import level as defined by the nomograms referenced in the GCC Operating Procedure, OP-13: SONGS Voltage.

Based on these nomograms and SONGS offline unit's status, whenever limiting conditions 1 and 2, as set forth in this Requirement 7, occur, the CAISO (or the SCE Grid Control Center (SCE GCC), as directed by the CAISO) shall, as soon as practicable but, in any case, within one hour of the event, perform an evaluation of system conditions to determine whether or not the SONGS off site power supply remains Operable as defined herein. If the SONGS offsite power supply is Inoperable or cannot be determined to be Operable as defined herein, the CAISO (or the SCE GCC, as directed by the CAISO) shall notify the SONGS Control Room immediately of entry into the event. Subsequent to notification, the SONGS Control Room shall declare the offsite power supply Inoperable (in anticipation of losing the second SONGS unit) and shall declare the time period within which the on-line unit will have to initiate shutdown if conditions are not corrected. The time period shall be within 1 to 24 hours, based on the SONGS plant and equipment conditions.

In order to ensure the continued ability to meet the 3 limiting conditions identified above in this Requirement 7, the following six requirements (a-f) must be met:

- a. Systems studies shall be performed and updated based on changing grid conditions (load growth, etc.) to identify critical conditions that could render the offsite power supply Inoperable.
- b. Procedures and programs shall be in effect to ensure that the SONGS Control Room is notified as soon as practicable but, in any case, within one hour of an event that renders the offsite power supply Inoperable.
- c. Grid conditions that are more severe with respect to SONGS switchyard voltage, or are otherwise unanalyzed, shall render the offsite power supply Inoperable.
- d. Auditable records of current system studies shall be made available to SCE as needed to demonstrate compliance with regulatory requirements. Study results, including revisions and updates, shall be formally transmitted to SCE.

- e. Study results and conclusions shall be assessed at least annually and updated, if needed, based on changing grid conditions. Results of the annual assessments shall be formally transmitted to Vice President Nuclear Engineering and Technical Services, San Onofre Nuclear Generating Station. (References 1, 2, 19, and 21 below)
 - f. System studies shall consider the interconnections between SCE, SDG&E, and other utilities in the Western Electricity Coordinating Council (WECC). (Reference 7 below)
8. In the event of loss of the SONGS offsite power:
- Note: SONGS 2 and 3 are required by NRC regulations to be able to safely cope with a loss of all AC power (Station Blackout) for a maximum of four hours. The four hour coping duration is based on the expectation that at least one source of AC power (offsite transmission line or onsite diesel generator) will be restored to the blacked-out unit within the four hours to ensure the proper functioning of systems required for plant safety.**
- a. Highest possible priority shall be given to restoring power to the SONGS switchyard. Procedures and training should consider several potential methods of transmitting power from black-start capable units to the SONGS switchyard. This includes such items as nearby gas turbine generators, portable generators, hydro generators, and black-start fossil power plants. (References 15, 26, 28 below)
 - b. Should incoming lines to the SONGS switchyard be damaged, highest priority shall be assigned to repair and restoration of at least one line into the SONGS switchyard.
 - c. Repair crews engaging in power restoration activities for SONGS shall be given the highest priority for manpower, equipment, and materials.
 - d. Formal programs and procedures shall be in place to effect items a, b and c above. (References 14, 15, 16, 17, 26, 27 below)
9. Grid frequency shall be maintained at 60 Hertz (nominal). A trip of one SONGS unit shall not cause the grid frequency to dip below 59.7 Hertz. SCE and SDG&E shall comply with the WECC Coordinated Off-Nominal Frequency Load Shedding and Restoration Plan. (References 7, 20 below)

10. SCE and SDG&E Bulk Power Transmission System Reliability Criteria as described in the SONGS Updated Final Safety Analysis Report (UFSAR) shall be maintained. It is recognized that the SCE and SDG&E Bulk Power Transmission System Reliability Criteria as described in the SONGS 2&3 Updated Final Safety Analysis Report may be revised from time to time. In the event the reliability criteria are revised, a system assessment and/or study (as described under specification 7) shall be performed to determine if the revised reliability criteria adversely impact grid reliability and availability as defined in this specification. Results of the assessment and/or study together with a copy of the revised reliability criteria shall be provided to SCE. Changes in grid operation based on the revised criteria and associated studies shall not be implemented without prior approval of SCE. (Reference 7 below)
11. Patrol and inspection of SCE and SDG&E transmission lines, to ensure that the physical and electrical integrity of transmission components are maintained, shall be performed as required by the SONGS UFSAR or in accordance with the current CAISO approved Overhead Electric Transmission Line Maintenance Practice, whichever requirement is more stringent. (Reference 7 below)
12. Line insulators on lines which carry power from the plant to the grid shall be washed as required by the SONGS UFSAR or on an appropriate wash cycle in accordance with the current CAISO approved Overhead Electric Transmission Line Maintenance Practice, whichever requirement is more stringent. The purpose and frequency of which is proven to prevent line outages that may result from flashovers due to accumulated contamination. (Reference 7 below)
13. Maintenance, testing and calibration of SCE and SDG&E station equipment and protective relays shall be performed as required by the SONGS UFSAR or in accordance with the current CAISO approved Electrical Station Maintenance Practice, whichever requirement is more stringent. (Reference 7 below)
14. Preventive maintenance and testing of SONGS switchyard batteries shall be performed in accordance with IEEE 450-1985 or IEEE 450-2002 subsequent to SONGS converting its battery maintenance program to IEEE 450-2002 requirements. (Reference 7, 23 below)
15. Updates to applicable portions of Section 8.0, Electric Power of the SONGS UFSAR shall be provided annually to facilitate periodic updates to the UFSAR by SONGS that are required by 10CFR50.71(e).

REFERENCES: (Current approved revision except as noted)

- 1) SONGS 2&3 Operating License and Technical Specifications, Section 3.8, Electrical Power Systems
- 2) 10CFR50 Appendix A, General Design Criterion 17 (GDC-17), Electrical Power Systems
- 3) NUREG 75/087, Standard Review Plan Revision 1, Section 8.2, Offsite Power System
- 4) NUREG 0800, Standard Review Plan Revision 2, Section 8.2, Offsite Power System
- 5) NUREG 0800, Standard Review Plan Revision 2, Branch Technical Position ICSB-11 (PSB), Stability of Offsite Power Systems
- 6) NUREG 0712, SONGS 2&3 Safety Evaluation Report, Section 8.0, Electric Power Systems
- 7) SONGS 2 & 3 Updated Final Safety Analysis Report, Section 8.0, Electric Power
- 8) ANSI/IEEE Std. 765-2002 Preferred Power Supply for Nuclear Power Generating Stations
- 9) SONGS Design Calculation E4C-082, System Dynamic Voltages During Design Basis Accident
- 10) SONGS Design Calculation E4C-090, Auxiliary System Voltage Regulation
- 11) SONGS Design Calculation E4C-092, Short Circuit Studies
- 12) SONGS Design Calculation E4C-098, 4 kV Swgr Protective Relay Setting
- 13) DBD-SO23-120, SONGS Design Basis Document, 6.9KV, 4.16KV and 480V Electrical Systems
- 14) 90051, SONGS Station Blackout Analyses
- 15) NUMARC 87-00 Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors
- 16) Letter from M. O. Medford (SCE) to the Document Control Desk (NRC), dated April 17, 1989, Subject: "Response to 10 CFR 50.63, `Loss of all

Alternating Current Power,' San Onofre Nuclear Generating Station Units 1, 2 and 3"

- 17) Letter from F. R. Nandy (SCE) to the Document Control Desk (NRC), dated May 1, 1990, Subject: "Supplemental Response to 10 CFR 50.63, 'Loss of All Alternating Current Power,' Station Blackout (TAC No. 68599/600), San Onofre Nuclear Generating Station Units 1, 2, and 3"
- 18) System Operating Bulletin 17 Appendix, System Voltage Control for San Onofre Nuclear Generating Station
- 19) GCC Operating Procedure, OP-013: SONGS Voltage
- 20) System Operating Bulletin 113, San Onofre 220 kV System Separation
- 21) Regulatory Guide 1.93, Revision 0, Availability of Electric Power Sources
- 23) SCE Division Order 60.20, Storage Batteries
- 26) System Operating Bulletin 1-A, Thermal Station Start-up and Power System Restoration
- 27) System Operating Bulletin 254, Emergency Orders—San Onofre Nuclear Generating Station 220 kV
- 28) SDG&E Control Procedure 1150, Capacity & Energy Emergencies - SDG&E System Emergencies
- 29) IEEE Std, 450-1985 IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations
- 30) IEEE Std. 450-2002 IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications