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CASE/COMPANY NAME: PANDA GILA RIVER, L.P. - Docket Number: L-00000Q-00-0099

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01 **NEW APPLICATIONS**

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____ EXTENTION OF CC&N (TERRITORY)
____ TARIFF - **NEW (NEXT OPEN MEETING)**
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____ (Telecommunication Act)
____ FULLY OR PARTIALLY
ARBITRATED INTERCONNECTION
AGREEMENT (Telecom. Act)
____ VOLUNTARY INTERCONNECTION
AGREEMENT (Telecom. Act)

____ MAIN EXTENSION
____ CONTRACT/AGREEMENTS
____ COMPLAINT (Formal)
____ RULE VARIANCE /WAIVER REQUEST
____ SITING COMMITTEE CASE
____ SMALL WATER COMPANY-SURCHARGE (Senate Bill 1252)
____ NOTICE OF OPPORTUNITY
____ SALE OF ASSETS & TRANSFER OF OWNERSHIP
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____ 02 **REVISIONS/AMENDMENTS TO PENDING OR APPROVED MATTERS**

____ APPLICATION
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DOCKET NO. ____
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DECISION NO. ____
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MISCELLANEOUS FILINGS

____ 04 AFFIDAVIT
____ 12 EXCEPTION
____ 18 REQUEST FOR INTERVENTION
____ 48 REQUEST FOR HEARING
____ 24 OPPOSITION
____ 50 COMPLIANCE ITEM FOR APPROVAL

____ 29 STIPULATION
____ 38 NOTICE OF INTENT
(Only notification of future action/no action necessary)
____ 43 PETITION
____ 46 NOTICE OF LIMITED APPEARANCE
X 39 **OTHER: February 14, 2003 Letter to Mr. Jerry Smith regarding Technical Study Attachments**

February 14, 2003

Jay L. Shapiro, Fennemore Craig
Attorney for Panda Gila River, L.P.
Print Name of Applicant/Company/contact person

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February 14, 2003

BY HAND DELIVERY

Mr. Jerry Smith
Arizona Corporation Commission
1200 W. Washington
Phoenix, Arizona 85007

Re: Docket No. L-00000Q-00-0099

Dear Mr. Smith:

In accordance with Condition No. 4 of Decision No. 62970, Panda Gila River L.P. ("Panda") hereby submits its updated technical study regarding transmission capacity to its Gila River Power Station located in Gila Bend, Arizona. In addition to the Executive Summary, there are five separate appendices attached in support of Panda's deliverability study. These documents include:

Appendix A: Summary of Optimal Power Flow and Contingency Analysis: Gila River Power Station

Appendix B: Analysis of Arizona Market for Certificate of Environmental Compatibility: ICF Consulting

Appendix C: 2003 Spring Palo Verde Transmission Operating Study Report: Salt River Project

Appendix D: Palo Verde Transmission System – Interchange Scheduling and Congestion Management Procedure, Revision No. 6: Salt River Project

Appendix E: Final Study Report of the Jojoba to Pinal West 500 kV Line Project: Salt River Project

Appendices B through E represent over five hundred (500) pages of detailed technical analysis and charts, including but not limited to various operational reports and transmission

constraint contingencies. Providing an original and 13 copies of the entire filing would be unduly burdensome to the Commission's Docket Control.

Therefore, as was previously discussed between us, Panda will provide three (3) sets of the Executive Summary and Appendices A through E (representing the entire filing) with you, which shall include one copy for your files and one copy for Docket Control. Additionally, Panda will also file an original and thirteen (13) copies of the Executive Summary and Appendix A for internal distribution at the Commission. Each Commissioners' office will also be provided with a courtesy copy of the Executive Summary and Appendix A.

Should you have any questions, please do not hesitate to call. Thank you for your time and consideration in this matter.

Sincerely,

Jay L. Shapiro

Enclosures

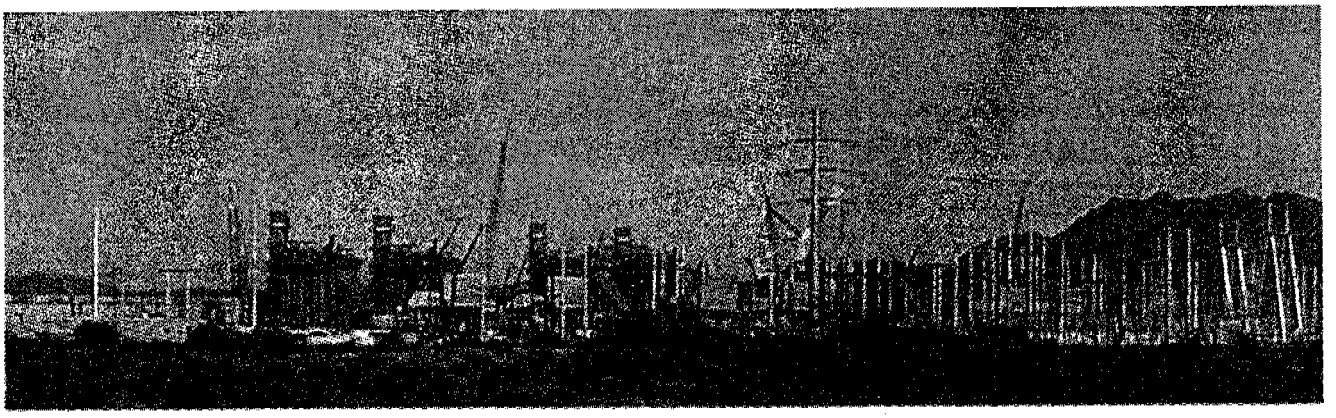
Cc: Bill Gehlen
Rebecca Turner

GILA RIVER POWER STATION

TECO PANDA ENERGY INTERNATIONAL, INC.

Certificate of Environmental Compatibility

Market Delivery Transmission Adequacy Assessment



Prepared by:

TECO EnergySource and Panda Energy International for

Panda Gila River, L.P.

February 13, 2003

Gila River Power Station Deliverability Summary

Overview

As a condition of Gila River's Certification of Environmental Compatibility ("CEC"), the Arizona Corporation Commission ("ACC") has required Panda Gila River, L.P. ("PGR") to file a transmission sufficiency technical study demonstrating the adequacy of transmission capacity to deliver the plant's output to Arizona markets. To meet this requirement, PGR contracted with ICF Consulting ("ICF") to perform analyses to demonstrate Gila River's deliverability capability. The results of these analyses show that Gila River's unique location, southeast of the Palo Verde switching station, as well as its connections to both the 500 kV and 230 kV transmission system, provide the project with excellent access to the local bulk transmission grid and will allow Gila River to safely and reliably deliver its full plant output to the Arizona markets. Additional study work, independently completed by Salt River Project Agricultural Improvement and Power District ("SRP"), also support the conclusions of ICF, showing that the location and interconnections of the Gila River project provide unique benefits and improve the overall system reliability of the Phoenix metropolitan area.

Project Description

PGR will complete construction on the Gila River Power Station ("Gila River") in the fall of 2003. At completion, Gila River will be comprised of four 520 MW combined cycle units ("power blocks") with a total rated generation capability of 2080 MW. The four power blocks will be phased into commercial operation over a 5-month period, beginning in May of 2003 and completing in September of 2003. Unlike the majority of new generation sited in Arizona over the last few years, the Gila River project is not directly interconnected to Palo Verde, via the Hassayampa switching station, rather, the Gila River project is located approximately 30 miles southeast of the Palo Verde switchyard.

Transmission Interconnection

To achieve a high level of reliability and optimum market access, PGR opted to connect the Gila River plant to both the 230 kV and 500 kV transmission network. Gila River's integration into the 500 kV transmission system will be at the newly constructed Jojoba switching station. The Jojoba switching station, completed in November of 2002, is owned by the Arizona Nuclear Power Partners ("ANPP"), however, construction for this switching station was wholly funded by PGR. This switching station bisected, what was, the Palo Verde to Kyrene 500 kV line and divided this 70-mile line into two pieces -- a 20-mile segment from Palo Verde to Jojoba, and, a 50-mile segment from Jojoba to Kyrene. Two, 20 mile, 500 kV lines, either of which can carry the entire output of the Gila River facility, tie the Gila River 500 kV switchyard to the Jojoba switching station, completing the 500 kV interconnection.

It should be noted that the Palo Verde to Kyrene path is a critical component of Phoenix's transmission infrastructure and provides a significant power injection to the Kyrene substation to support the growing load requirements of the southeast Phoenix area. By segmenting this 70-mile transmission line into two shorter components, exposure to losing the direct feed to Kyrene has been reduced and the overall reliability of the 500 kV transmission network in this area improved. Also, for the loss of the Palo Verde to Jojoba segment, the Gila River facility can provide significant support to Kyrene as a direct power source to this station – another reliability enhancement for the Phoenix area.

Integration of Gila River into the 230 kV network will be at the newly constructed Panda substation. Ownership of the Panda substation resides with Arizona Public Service ("APS"), but funding for the construction of the substation was also provided by PGR. This substation is fed by one 500/230 kV transformer, owned by PGR, that ties to Gila River's 500 kV switchyard. APS' existing Liberty to Gila Bend 230 kV line was looped into the Panda substation to complete the Gila River 230 kV interconnection. This interconnection also improves the local reliability of APS' system in that Gila River can provide a power source for the Gila Bend substation in the event the Panda to Liberty line is out of service.

Power Deliverability

ICF OPF and Contingency Analysis

To determine Gila River's deliverability capability, PGR contracted with ICF to perform an Optimal Power Flow ("OPF") and Contingency Analysis. The OPF and Contingency Analysis was performed at forecasted 2003 summer peak load conditions, as provided in the most current WECC load flow case publicly available. This analysis work was completed two ways: 1) without the Palo Verde-Rudd 500 kV line in-service; and, 2) with the Palo Verde-Rudd 500 kV line in-service. The commercial operation date for the Palo Verde-Rudd 500 kV project is late May 2003. A detailed summary of the ICF study work "Summary of Optimal Power Flow and Contingency Analysis, Gila River Power Station", is attached as Appendix A, and the complete ICF studies "Analysis of Arizona Power Market for CEC, Gila River Power Station", cases with and without the Palo Verde-Rudd 500 kV line is attached as Appendix B.

The premise of the ICF analyses was to demonstrate sufficient transmission capability to deliver the Gila River plant output to the gates of the Phoenix market. This is demonstrated by ensuring there are no bulk power transmission constraints that would limit the full output of the Gila River plant from reaching the precincts of the market. For purposes of this Deliverability Summary, "Palo Verde generation" shall be defined to be all generation interconnected to the Hassayampa switchyard, the Palo Verde nuclear units (3,861 MW) and the Gila River plant. Table 1, below, provides a detailed summary of the existing and expected Palo Verde generation.

Table 1.
Palo Verde Generation

Owner	Name	Unit	COD	Output	Palo Verde Generation				
					May-03	Jun-03	Jul-03	Aug-03	Sep-03
ANPP	PV Nuc units	1, 2, 3	In-service	3,861	3,861	3,861	3,861	3,861	3,861
Duke	Arlington Valley	1	In-service	600	600	600	600	600	600
PWEC	Redhawk	1	In-service	500	500	500	500	500	500
	Redhawk	2	In-service	500	500	500	500	500	500
PG&E	Harquahala	1	9/1/2003	383	0	0	0	0	383
		2	9/1/2003	383	0	0	0	0	383
		3	9/1/2003	383	0	0	0	0	383
Sempra	Mesquite	1	6/1/2003	525	0	525	525	525	525
TECO/Panda	Gila River	1	5/1/2003	520	520	520	520	520	520
		2	6/1/2003	520	0	520	520	520	520
		3	7/1/2003	520	0	0	520	520	520
		4	9/1/2003	520	0	0	0	0	520
Palo Verde Generation									
Existing					**5,461**	**5,461**	**5,461**	**5,461**	**5,461**
Incremental to Existing					**520**	**1,565**	**2,085**	**2,085**	**3,754**
Total					**5,981**	**7,026**	**7,546**	**7,546**	**9,215**

ICF OPF Analysis Results

Palo Verde-Rudd 500 kV Line Out

The ICF OPF analysis showed that prior to completion of the Palo Verde-Rudd 500 kV line, a total of 7,945 MW of Palo Verde generation could be reliably delivered to the major Phoenix transmission gates, with the limiting transmission facility being the Jojoba-Kyrene 500 kV line. Incrementally, this results in an additional 2,483 MW of delivery capability over the Palo Verde generation that is currently commercially operational. In addition, with all transmission limits into the Phoenix metropolitan area enforced, a total of 6,594 MW of Palo Verde generation or incrementally 1,133 MW above the existing Palo Verde generation, could be reliably moved to the Phoenix load centers at sub-500 kV transmission levels. Table 3, below, shows the limiting facilities for this case.

Palo Verde-Rudd 500 kV Line In

The Phoenix area's bulk transmission infrastructure is significantly enhanced with the Palo Verde-Rudd 500 kV project and the ICF OPF analysis showed that this line increases the deliverability of Palo Verde generation to the gates of the Phoenix market by approximately 600 MW. Specifically, with this line in-service a total of 8,555 MW of Palo Verde generation, incrementally 3,094 MW above the existing Palo Verde generation, could be reliably delivered to the major Phoenix transmission gates. Again, the limiting transmission facility in this case was the Jojoba-Kyrene 500 kV line. Similar

improvement with the Palo Verde-Rudd line was observed with transmission limits into the Phoenix metropolitan area enforced, with the total delivery capability to the Phoenix sub-500 kV system of Palo Verde generation at 7,660 MW, incrementally 2,200 MW above the existing Palo Verde generation.

Tables 2 and Table 3, below, detail the results of the ICF OPF analysis.

Table 2
ICF OPF Deliverability Summary

Palo Verde Generation Deliverable to Phoenix Market		Transmision Limits into Phoenix Valley	
		230 kV & Below Relaxed	All Limits Enforced
Palo Verde-Rudd 500 kV Line Out			
Total Palo Verde Generation	(MW)	7,945	6,594
Existing Palo Verde Generation	(MW)	5,461	5,461
Incremental to existing Palo Verde Generation	(MW)	2,483	1,133
Palo Verde-Rudd 500 kV Line In			
Total Palo Verde Generation	(MW)	8,555	7,660
Existing Palo Verde Generation	(MW)	5,461	5,461
Incremental to existing Palo Verde Generation	(MW)	3,094	2,199

Table 3
ICF OPF Deliverability Limiting Elements

Palo Verde-Rudd 500 kV Line Out	Source Node		Destination Node		Facility Type	Facility Limit	Facility Loading	
	Name	kV	Name	kV		MVA	MVA	%
Transmision Limits into Phoenix Valley								
230 kV & Below Relaxed	Jojoba	500	Kyrene	500	Line	2000	2000	100%
All Limits Enforced	Glendale	230	Agua Fria	230	Line	457	457	100%
	Westwing	230	Agua Fria	230	Line	526	526	100%
	Orme	230	Liberty	230	Line	498	498	100%
	Pinnacle Peak (APS)	230	Pinnacle Peak	230	Line	637	637	100%
	Tortolita	138	Tortolita	500	Xfmr	600	600	100%
	Yucca	161	Yucca	69	Xfmr	75	75	100%
Palo Verde-Rudd 500 kV Line In								
Transmision Limits into Phoenix Valley								
230 kV & Below Relaxed	Jojoba	500	Kyrene	500	Line	2000	2000	100%
All Limits Enforced	Glendale	230	Agua Fria	230	Line	457	457	100%
	Tortolita	138	Tortolita	500	Xfmr	600	600	100%
	Yucca	161	Yucca	69	Xfmr	75	75	100%

ICF Contingency Analysis Results

The ICF Contingency Analysis examined the impact of seven major 500 kV line outages on the bulk transmission network serving the Phoenix area:

1. Palo Verde-Westwing (1 ckt.)
2. Palo Verde-Westwing (2 ckts.)
3. Palo Verde-Jojoba
4. Jojoba-Kyrene
5. Palo Verde-North Gila
6. Palo Verde-Rudd
7. Palo Verde-Devers.

The Palo Verde generation deliverability assessment under contingency conditions assumed that all 230 kV and below transmission limitations were enforced and, further, continuous, rather than emergency, facility ratings were imposed. Also, no operational procedures, such as transmission switching or use of timed transformer ratings, that may improve deliverability were assumed. This results in a conservative estimate of the delivery capability from the Palo Verde region to both the gates of the Phoenix market as well as to the load centers via the sub-500 kV transmission system.

Palo Verde-Rudd 500 kV Line Out

Prior to completion of the Palo Verde-Rudd 500 kV expansion, the most limiting contingency identified by ICF was the Jojoba-Kyrene outage, resulting in overloads on the sub-500 kV transmission system. The Palo Verde-Westwing 500 kV corridor outage also showed significant impacts with overloads on the Palo Verde-Jojoba-Kyrene path occurring. However, this impact should be expected, as the power would naturally flow on the remaining 500 kV line out of Palo Verde that directly ties to the Phoenix load center at Kyrene. The results showed that the severity of this outage might require existing Palo Verde generation to be curtailed to prevent overloading the 500 kV network. For the Palo Verde-Jojoba outage, Gila River fully dispatched and provided a significant source of the power to the Kyrene station. The remaining contingencies would allow for the existing Palo Verde generation to flow as well as some incremental Palo Verde generation, with the overloads occurring on the sub-500 kV system.

Palo Verde-Rudd 500 kV Line In

As seen in the OPF results, a significant improvement under contingency conditions occurs with the completion of the Palo Verde-Rudd 500 kV line. Again, the most limiting contingencies are still the Palo Verde-Kyrene outage and Westwing corridor outage, however, in both cases, the addition of the Palo Verde-Rudd line allows the full output of, as well as some incremental amount above, the existing Palo Verde generation to be delivered to the Phoenix markets. Again, the results show that for the loss of the Palo Verde-Jojoba 500 kV line, Gila River fully dispatches, picking up the majority of the load served from the Kyrene. In all of the remaining contingency cases, a significant increment above existing Palo Verde generation could be moved to the metropolitan Palo

Verde load area with the limiting facilities for these outages on the sub-500 kV transmission system.

Palo Verde Transmission System Operating Study Results

In addition to the analysis completed by ICF, SRP, as operating agent for the ANPP, has recently completed their study to determine the impact to the Palo Verde Transmission System ("PVTS") of the Palo Verde generation. These documents are attached as Appendix C, "2003 Spring Palo Verde Transmission System Operating Study Report" and Appendix D, "Revision 6, Palo Verde Transmission System Interchange Scheduling and Congestion Management Procedures", collectively referred to herein as the "PVTS study work".

The PVTS study work was completed to determine the simultaneous PVTS operating limits given the expected generation and updated transmission system information for the spring of 2003. In performing the PVTS study work, the operating limit is defined as the maximum *equivalent* Palo Verde generation that can be safely injected into the PVTS as determined by transmission thermal capability, Palo Verde Nuclear plant stability and/or a transient voltage dip.

To understand the implication of the PVTS study work, a brief explanation of *equivalent* Palo Verde generation is required. Specifically, the PVTS study work concluded that due to Gila River's location and transmission interconnection, the impact of Gila River generation on the simultaneous operating limits of Palo Verde were found to be one-half of the impact of the generators interconnected to the Hassayampa switchyard. The practical interpretation of this are that for every 2 MWs generated from the Gila River plant, only 1 MW impacts the total thermal limit of the PVTS, or, alternately Gila River's *equivalent* impact on the PVTS is 50 percent that of the generators interconnected to the Hassayampa switchyard. This phenomenon allows Gila River to provide, incrementally, more generation to the Arizona markets without compromising the integrity of the PVTS or the reliable operation of the Palo Verde nuclear units.

The results of the PVTS study work show that the PVTS thermal capability for Palo Verde generation is 7,301 MW of *equivalent* Palo Verde generation, where the limitation were the Palo Verde-North Gila 500 kV line and the Palo Verde-Jojoba-Kyrene 500 kV path under base case conditions. Incrementally, this would be 1,840 MW of *equivalent* generation above the existing Palo Verde generation. Table 6, below, shows the expected *equivalent* Palo Verde generation.

Table 6
Equivalent Palo Verde Generation

Owner	Name	Unit	COD	Output	Palo Verde Generation				
					May-03	Jun-03	Jul-03	Aug-03	Sep-03
ANPP	PV Nuc units	1, 2, 3	In-service	3,861	3,861	3,861	3,861	3,861	3,861
Duke	Arlington Valley	1	In-service	600	600	600	600	600	600
PWEC	Redhawk	1	In-service	500	500	500	500	500	500
	Redhawk	2	In-service	500	500	500	500	500	500
PG&E	Harquahala	1	9/1/2003	383	0	0	0	0	383
		2	9/1/2003	383	0	0	0	0	383
		3	9/1/2003	383	0	0	0	0	383
Sempra	Mesquite	1	6/1/2003	525	0	525	525	525	525
TECO/Panda	Gila River	1	5/1/2003	520	260	260	260	260	260
		2	6/1/2003	520	0	260	260	260	260
		3	7/1/2003	520	0	0	260	260	260
		4	9/1/2003	520	0	0	0	0	260
Palo Verde Generation									
Existing					**5,461**	**5,461**	**5,461**	**5,461**	**5,461**
Incremental to Existing					**260**	**1,045**	**1,305**	**1,305**	**2,714**
Total					**5,721**	**6,506**	**6,766**	**6,766**	**8,175**

The PVTS study work also determined that the PVTS thermal limit may be reduced, depending on the net reactive generation available from the Palo Verde nuclear units and might only be achievable by "arming" the non-nuclear Palo Verde generation. The term "arming" refers to generators implementing a remedial action scheme ("RAS") that would automatically trip generation off-line in the event a specific contingency occurs that has been predetermined to overload the PVTS and/or result in unacceptable system stability. The quantity of generation that would be armed at any given time would be determined by SRP as operating agent for the ANPP, given the applicable system conditions. In the absence of arming generation, the output from generators would necessarily be reduced in anticipation of a particular event that resulted in unacceptable system impacts. Therefore, by implementing the RAS, the generators may safely operate at higher output levels and only be impacted should the particular event actually occur. Currently, all the generation interconnected to the Hassayampa switchyard have made provisions to participate in a RAS program. Gila River's participation in a RAS program is currently being evaluated to determine if such participation would be prudent given its location and reduced impact on the PVTS.

Study work to determine the beneficial impact of the Palo Verde-Rudd 500 kV line on the thermal capability of the PVTS is currently being completed by SRP. However, given the phased nature of the Hassayampa and Gila River generation projects, sufficient thermal capability on the PVTS through July of 2003 should exist, with approximately 875 MW of additional thermal capability needed to accommodate the full output of the expected 2003 Palo Verde generation.

PGR Transmission Activities

In the fall of 2002, PGR submitted a transmission service request to SRP for 650 MW of firm transmission service on the Kyrene to Palo Verde 500 kV path. Because of the recent integration of Gila River plant into the 500 kV network, via the Jojoba switching station, PGR funded and SRP completed a system impact study to determine how much firm service would be available on this path. The results indicated that there was 1,800 MW of firm capability, with 1,100 MW allocated to SRP, 500 MW allocated to APS and 220 MW to EPE.

PGR completed its 5-year purchase of the 650 MW of firm transmission service from SRP on the Kyrene to Palo Verde path in early 2003 with service commencing in June 2003. PGR has also purchased 333 MW of annual firm transmission to Palo Verde from APS and intends to purchase 101 MW of annual firm transmission service from EPE on the Palo Verde to Kyrene path. PGR is currently awaiting the service contract from EPE to finalize this transaction. In addition, 430 MW of firm service is available from APS on the Panda to Liberty 230 path that would facilitate access to the Liberty substation, a load serving delivery point for SRP and WAPA.

As described above, PGR has purchased nearly 1000 MW of firm transmission service to ensure Gila River can schedule delivery of its output to load serving and power marketing entities. These transmission purchases demonstrate PGR's commitment to maintaining a presence in the Arizona markets and give transmission providers surety of revenues to improve and expand their current transmission systems.

PGR has also been in discussions with Tucson Electric Power ("TEP") and SRP in regards to accelerating a segment of the proposed Southeast Valley 500 kV transmission expansion ("SEV") project. PGR and TEP have proposed that a phased approach to completing construction of this project be adopted, with Phase I consisting of a 500 kV line from the Jojoba switching station to a newly constructed substation to be named Pinal West. The Pinal West substation would initially have one 500/345 kV transformer with the existing Westwing to Vale 345 kV line looped in to tie Jojoba to TEP's systems. The target in-service date for SEV Phase I would be the 2nd quarter, 2005.

The initial study work for the proposed Jojoba-Pinal West project has been completed by SRP, as agent for the ANPP, in response to TEP's interconnection request at the Jojoba switching station. The results of this study, attached as Appendix E, "Final Study Report of the Jojoba-Pinal West 500 kV Line Project", showed that the thermal limitations, discussed above, on the PVTS would increase substantially with this interconnection. However, the magnitude of the increase was not determined because significant Palo Verde generation, in excess of all planned additions, needed to be modeled to stress the PVTS thermal capability. Determining the increase in the PVTS thermal capability was not in the scope of work for the Jojoba-Pinal West interconnection study. PGR will continue to pursue this project with TEP and SRP and move forward as appropriate.

Conclusions

The OPF results show that at peak summer conditions, prior to the completion of the Palo Verde-Rudd 500 kV line, 7,945 MW total or 2,483 MW incrementally of Palo Verde generation could be moved to the major gates of the Phoenix market. The results of the ICF OPF study are consistent with the PVTS study work after accounting for the 50 percent impact of the Gila River generation. That is, the PVTS study work shows that 7,301 MW of *equivalent* Palo Verde generation could be delivered from Palo Verde and by adding 670 MW, or doubling the assumed Gila River output for this study, the total Palo Verde generation that could be delivered would be 7,971 MW. Based on the information available on construction schedules for new Palo Verde generation and assuming that the Palo Verde-Rudd project is in-service by June 2003, the Palo Verde generation scheduled to be commercial prior to completion of the Palo Verde-Rudd project should be deliverable to the Phoenix market.

After the Palo Verde-Rudd project is in-service, 8,555 MW, an increment of 3,094 MW above the existing Palo Verde generation could be moved to the Phoenix market. This result indicates that a possible shortage in deliverability capacity, approximately 700 MW, may exist under peak load conditions, given the transmission system configuration modeled, transmission limitations assumed and the generation assumptions studied. However, the Gila River project will be fully commercial no later than Sept. 1, 2003, and the current focus is on bringing this last power block commercially on-line in early to mid August. The total Palo Verde generation expected to be commercial prior to this time would be 7,546 MW with the last phase of Gila River incrementally adding 520 MW, bringing the new total Palo Verde generation to 8,066 MW, below the limit determined in the ICF OPF study work.

The Contingency Analysis completed by ICF showed that some delivery limitations might exist in the event that a major 500 kV outage occur on the PVTS. However, these results should be viewed as conservative in that continuous ratings, as opposed to emergency ratings, on all facilities were assumed and no operational procedures implemented that may increase delivery to the metropolitan Phoenix markets. These results are provided to demonstrate that additional delivery of Palo Verde generation, in excess of that currently commercially available, would be feasible under major contingency conditions, overall benefiting the reliability of the Phoenix area.

In compliance with PGR's CEC requirement to provide the ACC with a technical study that demonstrates the adequacy of transmission capacity to deliver Gila River's output to the Arizona markets, PGR submits to the ACC and their staff that the ICF analyses and the PVTS study work show that the Gila River project will be able to safely and reliably deliver its output to the gates of the Phoenix market. In addition, due to its location and transmission interconnections, the Gila River facility will provide significant reliability benefits to the Phoenix area beyond those provided by generators located at the Hassayampa switchyard. And, lastly, to support and improve market access in Arizona, PGR has purchased a significant quantity of long-term firm transmission service and continues to demonstrate support for expansion projects in the region that benefit the overall transmission infrastructure.

Summary of Optimal Power Flow and Contingency Analysis
Gila River Power Station

Introduction

Panda Gila River, L.P., ("PGR"), is sponsoring the construction of the Gila River Power Station ("Gila River"). This facility, located in Maricopa County, Arizona, approximately 30 miles southeast of the Palo Verde switchyard, will be comprised of four combined cycle power blocks, currently under various stages of development. Each power block will be capable of producing up to 520 MW, for a total combined output of 2,080 MW.

The units are scheduled to come online in four phases over a five-month period from May 2003 through September 2003. As part of preparation for commercial operation, the Arizona Corporation Commission ("ACC") requires the plant to file a transmission sufficiency technical study as a condition of its existing Certificate of Environmental Compatibility ("CEC"). This technical study must demonstrate the adequacy of transmission capacity to deliver the plant's output to the Arizona markets. This report summarizes various technical analyses performed to show how the project meets this deliverability requirement.

The Arizona Power Market

The bulk power transmission facilities in Arizona are comprised of a network of 500 kV, 345 kV, and 230 kV lines. Four major utilities supply power in Arizona:

- Arizona Public Service ("APS")
- Salt River Project Agricultural Improvement and Power District ("SRP")
- Tucson Electric Power ("TEP")
- Western Area Power Administration ("WAPA ") Phoenix LC

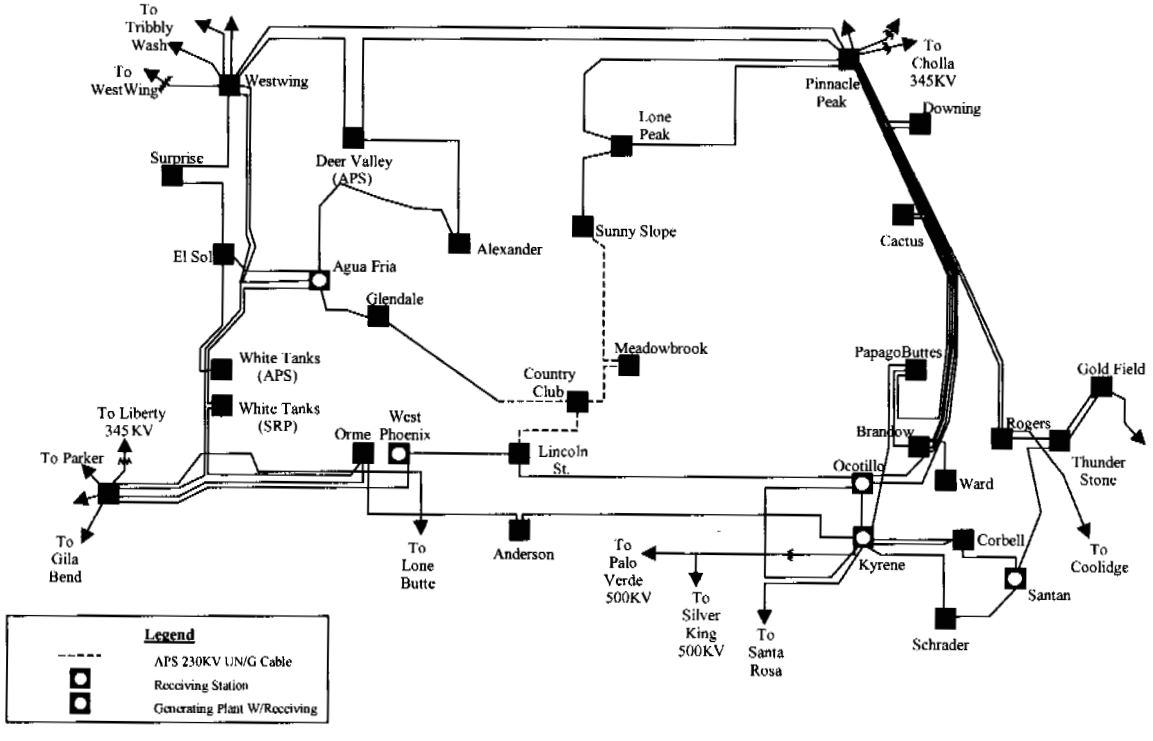
Although the region is internally interconnected with bulk power transmission lines, the major load centers are sometimes constrained by insufficient transmission import capability to serve load. The three major Arizona load centers are (i) Phoenix, (ii) Tucson, and (iii) Yuma.

The largest of the three load centers is Phoenix with a NERC projected 2003 peak demand which is about 64% of the 2003 projected demand for the state as a whole. The Arizona power market is interconnected with other large neighboring markets such as Southern California, Southern Nevada, New Mexico and the Rockies. Relatively low-cost power flows from the north and the east (i.e., from the Rockies and New Mexico) into Arizona. Arizona also supplies power into Southern Nevada and California.

The Phoenix Valley

The Phoenix load center is often referred to as the Phoenix Valley. Geographically, the Pinnacle Peak substation on the northeast, the Westwing substation on the northwest, the Liberty substation on the southwest and the Kyrene substation on the southeast bound the Phoenix Valley.

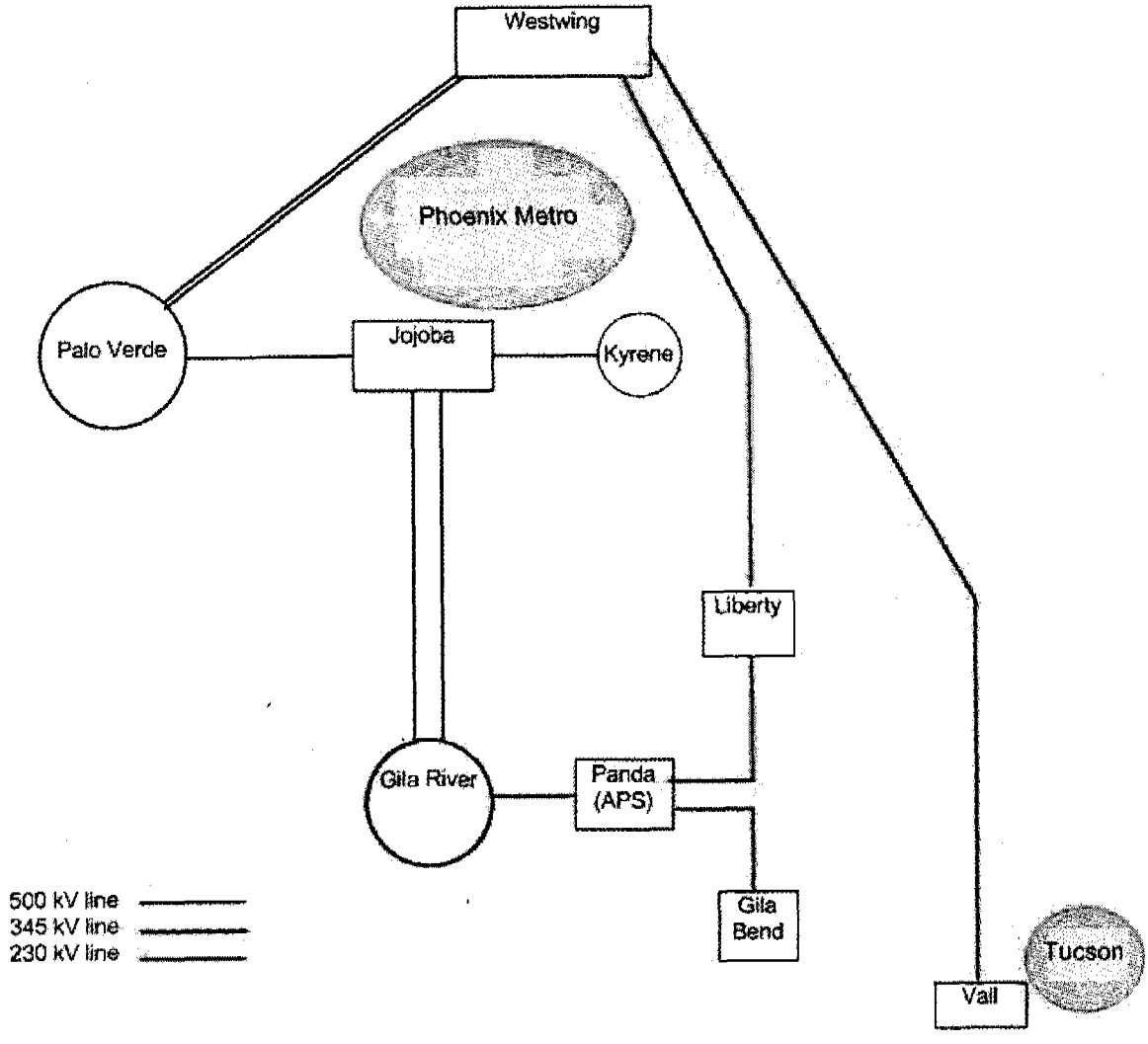
Exhibit 1-1
The Phoenix Valley



Gila River Transmission Interconnections

Gila River is interconnected to the Arizona transmission network at both 500 kV and the 230 kV levels. Interconnection to the 500 kV transmission network is via two dedicated 20-mile long lines, either of which can carry the entire plant output, to the new Jojoba substation, which became operational in November 2002. Also, Gila River connects to the 230 kV transmission network via a 500/230 kV transformer to the new APS 230 kV Panda substation that intersects the APS Liberty to Gila Bend line. See Exhibit 1-2, Gila River Interconnection to the Arizona Transmission System for a schematic layout of these interconnections.

Exhibit 1-2
Gila River Interconnection to the Arizona Transmission System



Assessment of Transmission Adequacy to Deliver Power to Arizona Markets

Various technical analyses were performed to assess the adequacy of the transmission system to deliver the full output of Gila River to the Arizona markets. Two types of simulations were performed: 1) an Optimal Power Flow (OPF) simulation; and, 2) a Contingency Analysis. The OPF simulation examined power deliverability assuming all transmission facilities were in service, and the Contingency Analysis examined power deliverability assuming that key transmission facilities were unavailable. For each type of simulation, various scenarios were examined. A projected 2003 summer peak representation of the power system was used for the analyses. An additional sensitivity was done assuming the Palo Verde to Rudd 500 kV line was not in service.

For the purposes of this Summary, "Palo Verde generation" shall be defined to be all generation interconnected to the Hassayampa switchyard, the Palo Verde nuclear units (3,861 MW) and the Gila River plant. Both the OPF simulation and the Contingency Analysis considered three case scenarios of Palo Verde generation for the summer of 2003: Case 1 assumed a total of 7,941 MW on-line; Case 2 assumed a total 7,991 MW on-line and Case 3 assumed a total of 9,091 MW on-line. See Exhibit 1-3 below for details of Palo Verde generation assumptions.

Exhibit 1-3
Scenarios of Units online in the Palo Verde Region by Summer 2003

Unit Name	Case 1	Case 2	Case 3
Gila River	2080	2080	2080
Duke Arlington	550	550	550
PG&E Harquahala	0	0	1100
Sempra Mesquite	0	500	500
Pinnacle West Red Hawk	1000	1000	1000
Palo Verde Nuclear Units 1,2 and 3	3861	3861	3861
Total out of PV Region	**7491**	**7991**	**9091**

Optimal Power Flow Simulation

OPF simulation is a commonly performed analysis used to determine line loadings and the economic dispatch ("merit") of units in the interconnected power system, while enforcing transmission limit constraints.

Using the cases described above, a number of scenarios were evaluated to demonstrate the ability of Gila River to deliver its output under a wide range of conditions. In each case, transmission limits were enforced in one of two ways. In option one, all limits on transmission lines rated 69 kV and higher were enforced and in the second option only transmission limits on lines rated higher than 230 kV were enforced. This was done to isolate some of the known existing problems on the 230 kV transmission network inside the Phoenix Valley. The only exception to this was the 230 kV, APS Panda to Liberty line that has a direct interconnection to the Gila River plant. The limits on this line were strictly enforced at all times.

In each case, the Palo Verde nuclear units were fully dispatched, while the Gila River units were dispatched in three different ways among the Palo Verde generation combined cycle units: 1) dispatched last, 2) merit dispatch, and 3) dispatched first. This was done to determine the total megawatts available to the region and how the plant would fare compared to other combined cycle units in the region under the worst and best case

scenarios. A total of 13 discrete OPF cases were analyzed. These cases are summarized in Exhibit 1-4 below.

Exhibit 1-4
Dispatch and Constrained Transmission Scenarios Examined

Case	Generation Units Modeled in the PV Region	Transmission Constraints Enforced	Notes
1A	GR (2,080 MW), Duke Arlington (550 MW), Pinnacle West Redhawk (1,124 MW) and PV Nuclear Units (3816)	All transmission lines	GR constrained to dispatch last in the PV region
1B			GR under merit dispatch in the PV region
1C			GR constrained to dispatch first in the PV region
1D		Transmission lines rated above 230 kV	GR constrained to dispatch last in the PV region
2A	Case 1 and Sempra Mesquite (500 MW)	All transmission lines	GR constrained to dispatch last in the PV region
2B			GR under merit dispatch in the PV region
2C			GR constrained to dispatch first in the PV region
2D		Transmission lines rated above 230 kV	GR constrained to dispatch last in the PV region

Case	Generation Units Modeled in the PV Region	Transmission Constraints Enforced	Notes
3A	Case 2 and PG&E Harquahala	All transmission lines	GR constrained to dispatch last in the PV region
3B			GR under merit dispatch in the PV region
3C			GR constrained to dispatch first in the PV region
3D		Transmission lines rated above 230 kV	GR constrained to dispatch last and under merit in the PV region
3E			GR constrained to dispatch first in the PV region

Contingency Analysis

In contrast to the OPF analysis, contingency analysis is a simulation that examines the impact of various transmission line or equipment and/or generation unit outages on the delivery of power from generators to loads. Seven major transmission contingency outages were examined and the dispatch of the Gila River facility was monitored in each case until there was no reliability constraint.

Similar to the OPF analysis, in each case Gila River was dispatched under three different constraints – forced to dispatch last, under merit dispatch and forced to dispatch first. The Palo Verde nuclear units were fully dispatched in each contingency case.

Study Results

OPF Analysis

Limits on Transmission Facilities at or below 230 kV Relaxed

The OPF results show that with limits on transmission facilities at or below 230 kV relaxed, Gila River fully dispatches in Case 1 and Case 2 under all dispatch scenarios. In Case 3, if both the Mesquite plant and the Harquahala plant are fully dispatched first with the existing Palo Verde generation, Gila River dispatches to 74% (1,544 MW) of it's total output. These results indicate that 8,555 MW of total Palo Verde generation can be delivered to the major gates of the Arizona markets, 4,694 MW incrementally above the existing Palo Verde nuclear generation.

Limits on Transmission Facilities at or below 230 kV Enforced

The OPF results show that with limits on transmission facilities at or below 230 kV enforced, Gila River dispatches to 96% (1,998 MW) when dispatched after the existing Palo Verde generation. In Case 2, if the Mesquite plant is fully dispatched first with the existing Palo Verde generation, Gila River dispatches to 85% of its total output (1,758 MW). In Case 3, if both the Mesquite plant and the Harquahala plant are fully dispatched first with the existing Palo Verde generation, Gila River's output would be significantly limited, to approximately 3% of its total capability. However, if the Harquahala plant is assumed to be dispatched to 33% of its output (1 power block for this plant) then Gila River dispatches to approximately 65% of its capability to 1,350 MW.

Exhibit 1-5 summarizes the incremental available PV export for the cases examined with the Rudd line both in and out of service.

Exhibit 1-5 below details the limiting facilities for the OPF analysis:

Exhibit 1-5
Major Elements Limiting Gila River Power Station Dispatch by Location

Element	Location
Glendale –Aqua Fria 230 kV line	Inside valley
Yucca 161/69 kV transformer	Outside valley
Tortolita 500/138 kV transformer	Outside valley

There were no significant voltage violations in any of the scenarios evaluated. In the base case, the voltage at the San Manuel node was greater than 10% of its nominal rating. The voltage at that node improved from 1.14 p.u. to 1.13 p.u. in all the cases, showing the dispatch from the Gila River plant improves the existing voltage problems.

Contingency Analysis

Seven major transmission contingency outages were examined and are summarized in Exhibit 1-6 below.

Exhibit 1-6
Line Contingencies Evaluated

Scenario	Line Segment	Contingency
1	Palo Verde to Westwing 500 kV	Single line outage
2	Palo Verde to Westwing 500 kV	Double line outage
3	Palo Verde to Jojoba 500 kV	Single line outage
4	Jojoba to Kyrene 500 kV	Single line outage
5	Palo Verde to North Gila 500 kV	Single line outage
6	Palo Verde to Rudd 500 kV	Single line outage
7	Palo Verde to Devers 500 kV	Single line outage

In each contingency scenario, Gila River was dispatched under three different priorities compared to the other Palo Verde generation combined cycle units. In the contingency scenarios, Gila River was dispatched first, under merit and last. This was done to determine: 1) the plant's output; and, 2) the output from of Palo Verde generation in the best, middle and worst cases of Gila River plant dispatch scenarios. In all but two of the scenarios of major transmission contingency outages, ICF's analysis shows that the total Palo Verde generation was between 286 MW and 1,700 MW higher when Gila River was dispatched first or under merit, rather then forced to dispatch last. This supports the results of the OPF analysis, which showed the beneficial impact of Gila River on the overall deliverability of Palo Verde generation. See Exhibit 1-7 below for the details of the contingency analysis.

Exhibit 1-7:
Impact on Palo Verde Generation Output by Gila River Dispatch
(Rudd line in service)

			PV Region Generation Export		Increase	
Scenario	**Line Segment**	**Contingency**	**PGR Dispatched Last**	**PGR Merit Dispatch**	**MW**	**%**
1	PV - Westwing	Single line	7257	7543	286	3.9%
2	PV - Westwing	Double line	5450	5819	369	6.8%
3	PV - Jojoba	Single line	5834	7541	1707	29.3%
4	Jojoba - Kyrene	Single line	5801	5795	-6	-0.1%
5	PV - North Gila	Single line	6938	7308	370	5.3%
6	PV - Rudd	Single line	6171	6595	424	6.9%
7	PV - Devers	Single line	7105	7413	308	4.3%

Exhibit 1-8
Impact on Palo Verde Generation Output by Gila River Dispatch
(Pre-Rudd line)

			PV Region Generation Export		Increase	
Scenario	**Line Segment**	**Contingency**	**PGR Dispatched Last**	**PGR Merit Dispatch**	**MW**	**%**
1	PV - Westwing	Single line	6750	6750	0	0.0%
2	PV - Westwing	Double line	4645	4645	0	0.0%
3	PV - Jojoba	Single line	4494	6520	2026	45.1%
4	Jojoba - Kyrene	Single line	4485	4485	0	0.0%
5	PV - North Gila	Single line	6077	6204	127	2.1%
6	PV - Rudd	NA	Not in service	Not in service		
7	PV - Devers	Single line	6588	6317	-271	-4.1%

One of the two contingency scenarios where the total Palo Verde generation was less when Gila River dispatched under merit was post Rudd Scenario 4 – outage of the 500 kV line from Jojoba to Kyrene. However, even in this case -- the outage of the closest networked 500 kV line to the plant -- the reduction of Palo Verde generation was merely 6 MW. The other case where this occurs, pre-Rudd Scenario 7, the PV to Devers line outage, is due to the 437 MVA continuous rating of the Liberty line.

Conclusion

The technical analyses demonstrate that even if limits on all transmission facilities, including the 230 kV sub-transmission system in the Phoenix Valley are enforced, Gila River can deliver the full output of the plant to market if the total Palo Verde generation is 7,991 MW or less. Gila River can dispatch its full capacity to market for a total Palo

Verde generation of 8,500 MW when the plant is dispatched in merit order or transmission limits on the sub-transmission system within the Phoenix Valley are not enforced. This is true because in some cases, 230 kV lines within the Phoenix Valley were the limiting elements. It is important to note that the limitation is not in delivering power to the major trading hubs of the Arizona markets, but rather moving the power to lower voltage levels.

With a total Palo Verde generation of 9,091 MW, Gila River can deliver its full output to Arizona markets when dispatched first after the Palo Verde nuclear units.

The purpose of the analysis was to demonstrate, that under steady state conditions, the adequacy of transmission capacity to deliver Gila River's output to the Arizona markets, As the OPF and Contingency Analysis performed by ICF show, Gila River can deliver its full output to the gates of the Arizona markets under all capacity scenarios for Palo Verde generation at 8500 MW or less. For Palo Verde generation greater than 8500 MW, the amount of Palo Verde generation that can be safely moved into the Arizona markets is the highest when Gila River is dispatched in merit order.