Appendix A

REVIEW OF RELIABILITY TESTIMONY OF SDG&E WITNESS KORINEK

INTRODUCTION

In Chapter 2 of SDG&E's prefiled testimony David Korinek on behalf of the Applicant lays out the case that the Valley Rainbow Transmission Project (V-R) is a much needed addition to the States's Transmission Grid.[1],[2] As discussed in some detail in the body of this report, we disagree and , apparently, so does the ISO when it answered an ORA data request with:

> "As stated in the ISO's opening testimony, the VRTP was initially approved by the governing board as needed to meet the ISO Grid Planning Criteria. However, given revisions in SDG&E's load forecast, and the developments related to proposed new generation, the project is no longer needed to meet ISO Grid Planning Criteria in 2004-5."

We fully appreciate the position from which the ISO came. Given the set of possible futures expected in the late 1999s and early 2000 the project had value though perhaps not a positive benefit cost ratio when alternative options were considered. Now, however, reasonable expectations of future events coupled with a recognition of the current state of the electric system in California and Mexico suggests that the project affords negligible reliability benefits in the next half decade, at least. And that many options are available that can further delay the possible need for a major new transmission link in San Diego for which VRTP would be one of the more prominent candidates.

In the body of this Appendix we present some of the predominately reliability based arguments used by the Applicant and why we do not concur.

PAGE SPECIFIC COMMENTS

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[1] *Korinek, D.M., Prepared Testimony of SDG&E, Chapter II, A.01-03-036 dated October 5, 2001.*

[2] *SDG&E, Errata to October 5, 2001 Prepared Testimony of SDG&E dated January 23, 2002.*

Page II-1 Line 14 -- History of the Interconnect Project

In this section SDG&E makes repeated references to studies demonstrating the benefits and superiority of the V-R alternative. He includes studies done by the ISO and specifically references the joint CAISO/SCE/SDG&E "Southern California Long-Term Regional Transmission Study" dated February 15, 2001. However, this study is not supportive of the need for VRTP since it takes the VRTP as a given and makes no assessment of it or alternatives to it. It simply looks forward, with the V-R project included in its base cases. It therefore provides no judgement of the V-R project on it's own or as a basis for future expansion.

Likewise, SDG&E's own reports and its references to a GE report consider only these alternatives:

- Valley-Rainbow 500kV line project (VRTP)
- Devers-Rainbow 500kV line project
- Mira Loma-Rainbow 500kV line project
- Second Southwest Powerlink

The second and third of these alternatives are not significantly different than the VRTP project and offer little apparent competition for it. The second southwest Powerlink is different and might be a viable alternative, but it was considered only for the initial year of operation and even for that one year its benefits were narrowly construed to those directly afforded the SDG&E service area and did not extend to the evaluation of the overall impacts on the East of River transmission path or the Southern California Intertie Transmission limits which could have benefitted the entire state and particularly Edison, LADWP and SDG&E.[3] Thus this option was dismissed largely because of an expected longer licensing and construction time and thus was not given a fair trial in any studies available to us.

SDG&E, in its Valley-Rainblow 500 kV Project Feasibility Study Report, Final Report, states "The Valley-Rainbow alternative is expected to integrate well with future bulk power system expansion concepts as envisioned by SDG&E and the ISO, but no modeling of such long-term expansion scenarios was done in the current study due to the absence of credible resource planning assumptions beyond 2004." Without a long-term look at the future role of VRTP based on credible long-term scenarios, an endorsement of VRTP should not be made.

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[3] *SDG&E "Valley-Rainbow 500 kV Project Feasibility Study Report,"Final Report, June 30, 2000, Revision 2.*

Likewise, we feel that SD&GE neglected to look at a myriad of lesser upgrades that individually, or more likely several in concert, might at least significantly delay the need for a VRTP like project, ride out a temporary need, or potentially offer a better long-term alternative.

Options that we feel should have been considered include:

1. Dynamic line ratings or dual overload ratings
2. Series reactors to maximize use of SONGS 230 kV lines via load balancing
3. PARs on the SONGS or SWPL or other 230 kV lines
4. Bifurcation at SONGS
5. Upgrade 115 kV lines to 230 kV (e.g., south of SONGS)
6. Fixed phase shift transformers
7. Remedial Action Schemes, perhaps involving interruptible load
8. Demand side alternatives
9. Operating actions to mitigate events
10. Block transfer of SDG&E load to SCE in Orange County
11. Re-tension lines to eliminate sag bottlenecks (or add or raise towers)
12. Establish exceptions to reliability criteria on risks that could be taken (based on probability analysis)
13. Standby/Peaking generation/power barge
14. Series reactor or PAR on the 230 kV path through Mexico (to avoid overload tripping and maximize benefit of the path)
15. 230 kV reinforcements in Mexico
16. Interconnect Highline to El Centro
17. Uprate/rebuild the Escondido-El Centro ROW at 138 or 230 kV
18. Conservation
19. Replace 230 kV with compact 500 kV
20. Conversion of 230 kV double-circuit lines to higher capacity six-phase lines,
21. HVDC conversion or segmentation

Below we discuss a few of these options of significance. Others are described in the body of the document,.

Improvements of the SONGS Corridor

Though we have seen no study of the issues that limit power flow on the SONSGS corridor, our own brief power flows suggest possibilities such as bifurcation of the SONGS substation. This has been considered in the past and could enhance the power handling capability of the SONGS corridor. The 230 kV lines through SONGS do not inherently load in proportion to their ratings.

Inexpensive series reactors could be used to control the flow on each line so that each carries power in proportion to its rating. All lines would then approach thermal ratings during contingencies instead of just one, making currently untapped thermal capability available. There also appear to be reconductor and 138 kV upgrade options in the Corridor.

Replace 230 kV with 500 kV

At the large-project end of our list of suggestions is the possibility of replacing existing 230 kV transmission lines with compact 500 kV lines. Since the mid 70's, much research has been completed on line compaction. Early dramatic results were achieved at 115 and 138 kV and subsequent work has provided significant success at higher voltages extending up through 500 kV. Compact 500 kV structures use shorter spans and fixed insulators to control conductor swing. They require a much narrower right of way (ROW), on the order of traditional 230 kV ROWs. The engineering, material and labor costs are about 30% higher than for traditional 500 kV designs but ROW costs and the related administrative costs are less. Overall the cost is not significantly higher than for a standard 500 kV line on new ROW and much less on existing 230 kV ROW. A conversion from 230 to 500 kV can be done in stages and the circuit can be energized at 230 kV until it is completed. Compact 500 kV lines are operating in China, Colombia, Brazil, Russia, Kazakhstan and elsewhere. A Calgary-Edmonton 500 kV line that will fit wholly within an existing 240 kV ROW is being planned.

Whether or not an existing SDG&E 230 kV line could be replaced with a compact 500 kV line without ROW widening would require study (it depends on how wide the existing ROW is). However, the near and long-term benefits of a compact 500 kV line from Edison's 500kV Serrano station to any of several of SDG&E's more coastal 230 kV stations should be considered. Such a line would avoid a new corridor, need very little new land (i.e., possibly some widening of existing 230 kV ROW) and would seem likely to eliminate much of the 230 kV upgrades that SDG&E is planning. Such a line would eventually extended to Miguel without need for new ROW, providing a complete high-capacity route through SDG&E high power usage areas for very high reliability. Ultimately, two 230 kV lines might be upgraded to compact 500 kV so that outage of a 500 kV segment does not cause problems in the underlying 230 kV and 138 kV systems. This is a problem with new ROW or upgraded ROW that SDG&E has not addressed. We discuss it elsewhere in this report.

Interconnect Highline to El Centro

A new 230 kV line or upgrade of existing 115 kV could allow power flow from Highline area generators directly into SDG&E's system rather than the much longer route west through Valley

and Serrano and south through SONGS. We discuss this alternative in more detail in Section IV and provide supporting power flow cases.

Dynamic Line Rating & short- and long-time overload ratings

SDG&E seems to use traditional industry ratings for its transmission lines. Beginning about 1990, utilities have increasingly moved to more sophisticated line rating procedures. Overhead line ratings were historically calculated assuming conservative weather conditions and a conductor temperature which allows adequate electrical clearance and avoids annealing the aluminum or copper wires. As the need to increase power transfer has intensified, a number of approaches have been taken to increase line ratings without reconductoring or upgrading existing lines. Among the various methods used to increase line ratings, the following are now widely used:

- Assume less conservative weather conditions for calculation of line ratings,
- Use higher maximum conductor temperatures,
- Use real-time rather than fixed weather conditions,
- Monitor limiting spans for sag or temperature.

Increasingly, utilities are measuring actual conditions along a transmission line and setting ratings that follow current conditions. This is done by using conductors containing fiber elements or adding a fiber to an existing conductor.

Re-tention lines for more sag allowance or add towers or increase tower height in limiting locations. The thermal capabilities of transmission lines are often limited by just one or a few short sections of the line or even just one span of the line. Often it is feasible to re-tension a line or add support for the conductors in a limiting span to significantly increase the line rating. Industry investigations have delineated such constraints and listed solutions for them.

Page II-4 Line 4 – Other Reasons for Needing Rainbow-Valley

SDG&E states “Lastly, in addition to reliability, there are other reasons for needing the Valley-Rainbow project, as the ISO recognized when it last reviewed and re-confirmed the need for the project in March 2001 (March 23, 2001 Memorandum to ISO Board of Governors)”. There are also quotes of several paragraphs from the ISO report that provide general comments on the project. The Commission should recognize that in making its comments, the ISO staff did not perform an independent study, but relied heavily or entirely on SDG&E’s feasibility study which also fails to look at many potential alternatives that could defer or avoid the need for the VRTP investment.

Page II-7 Line 3 – Reliability Enhancement

SDG&E states "The Valley-Rainbow Interconnect Project would enhance reliability by providing a second geographically separated transmission interconnection between SDG&E's service territory and the rest of the state." There is further explanation of how the line improves reliability for SDG&E's customers. While any transmission addition is likely to improve reliability to some extent, the real question should be whether there is a definite need for the quanta of increased reliability provided by the project and whether there are ways to address such needs while deferring such a costly investment. SDG&E indicates the VRTP addition will increase SDG&E's import capability from 2500 MW to "about" 3200 MW and will "allow SDG&E to import sufficient power to meet local demand for years to come." Given the much reduced load forecast, the presence of new generation in San Diego and Baja and the additional generation under construction, we have to conclude that the VRTP offers simply no value in the next five years and potentially beyond depending on load and generation growth.

However, even assuming SDG&E is correct about the need for increased import capability in 2005 et seq,, they appear to simply propose the very large VRTP project without looking for smaller steps that might be a viable part of a long-range plan and defer or avoid this major investment. There is acceptance of a large project that provides for many years of growth as the definition of a proper long-range plan. Instead all the possible steps that could be taken should be examined and selected options should form a cohesive long-term plan with as much strategic flexibility as possible to address the very significant uncertainties in the growth of load and generation in San Diego.

There are many lesser steps that might meet a few years growth in import needs at low cost and delay the decision to invest in a costly transmission project that may not be necessary or may not be the best option. Earlier we outlined a number of opportunities that SDG&E has not explored. They range from small ones to major ones. Without detailed analysis we cannot say that some of these opportunities would ultimately avoid the need for a project like VRTP, but we believe they have merit and point out that they have not been given even a quick glance by SDG&E. SDG&E has gone directly to the large VRTP project without looking for smaller or more cost-effective steps.

SDG&E has not done proper long range planning. They excuse this mis-step by stating that uncertainty precludes long-range planning. The ISO in its Feb 15,2001 report "Southern California Long-Term Regional Transmission Study" states:

> "Because there remains considerable uncertainty about future generation resource development, it is recommended that a thorough market analysis be conducted to support identification of where new merchant generation will locate in the future and the quantity expected at these locations. This market analysis is required to support, with more certainty, building major transmission lines to specific locations."

Though the ISO conducted some longer-term studies, they assumed that VRTP was already present. No long-term studies and no market analysis were done by the ISO or SDG&E prior to choosing the VRTP project. The ISO may be starting to concur with our position based upon the response to an ORA data request in which they state that:

> "....Since, although it has reliability benefits, the VRTP is not needed to meet ISO Grid Planning Criteria in 2004-2005, it is important to assess the economic benefits of the project and to confirm economic need, in accordance with ISO Tariff section 3.2.1.1. While the ISO believes that the VRTP has economic benefits, without a thorough economic assessment, it is not possible to confirm economic need."[4]

Page II-6 Line 8 – Statcom at Mission

SDG&E states that a 230 kV statcom and shunt capacitors will be added at Mission as a part of the VRTP project. Mission is far removed from the point where the VRTP project would inject power into the existing SDG&E grid making it difficult to make a connection between VRTP and this equipment. Indeed, SDG&E has presented no studies showing a connection. SDG&E apparently simply tallied all voltage support needs for 2005 and seemingly arbitrarily assigned much of it to the VRTP project. We can guess that some of it was driven by expected generation in Mexico but we suggest such upgrades (as well as the export features of VRTP itself) should be the result of interconnection studies requested by the generators, not as part of an import project.

Page II-7 Line 7 – VRTP Provides an Independent Path?

SDG&E states that "The Interconnect Project would provide an independent and geographically separated path for power deliveries between the statewide grid and SDG&E's service territory, ..." There is limited truth to this statement, particularly insofar as imports are concerned. During import and a SWPL outage, VRTP delivers power to Rainbow where some of it flows west to Talega (north of SONGS) then to SONGS and south to Encina and San Luis Rey. When VRTP is

[4] *Op sit, CAISO data request*

delivering 1000 MW to Rainbow more than 300 MW take this route. The rest flows south from Rainbow to Escondido. VRTP thus depends heavily on the south of SONGS corridor to deliver about one third of the power it carries to SDG&E. It is thus not an independent source. In fact, this interdependence is why import is improved by only 700 MW or less even when VRTP is loaded to 1000 MW. The third of the 1000 MW that uses the already heavily loaded SONGS corridor limits the amount of power VRTP can deliver to SDG&E. VRTP is thus not only not an independent path from a reliability standpoint, but is crippled because it depends heavily on the existing SONGS corridor.

Page II-8 Line 15 – ISO Grid Planning Criteria Violation

SDG&E says the system will be short 46 MW in 2005 and 199 MW in 2006 of meeting the ISO's G-1/N-1 contingency criterion. The critical G-1/N-1 contingency that causes this shortage is overlapping loss of Encina unit 5 and the IV to Miguel 500 kV.

First, we understand loss of Encina 5 has been a problem because there has been little other in-basin generation that can be scheduled up to cover its loss. With the just installed peakers having more capacity in aggregate larger than Encina 5 and projected further new generation under construction or planned in San Diego and Mexico, we think this situation no longer applies. Adjustment after loss of Encina 5 could very well involve nearby generation rather than an increase in imports. This greatly diminishes the impact of a subsequent SWPL outage. Rather than imports increasing prior to the SWPL outage, they may remain virtually unchanged.

Also, as we've outlined elsewhere, there are many lesser steps that could be taken to defer the VRTP project until 2007 or beyond, opening the door to a much longer deferral if even modest on-system generation development occurs.

Page II-10 Line 21 Export Limit and Role of SWPL

SDG&E indicates that SDG&E's current northbound export capability is 720 MW. This is not as restrictive as it sounds. To reach this level would require enough generation to cover all of SDG&E's minimum load and enough more to cause 720 MW of export on the north of SONGS path. This condition is unlikely to be reached until well beyond the current planned date for VRTP if ever in our opinion. Additionally, if it is reached one must question whether it is reasonable to assume that all of the generation involved would be scheduled on when system loads are low.

Further, SDG&E makes no mention of options to reduce flows on SWPL to improve export capability. SWPL may be of limited help, but several potentially cost-effective measures should

be explored. For instance, a phase angle regulator (PAR) or fixed phase shift transformer might be very effective and cost-effective at reducing westerly flow on SWPL during conditions under which exports would be high.

Page II-10 Line 21 Is Export Capability Needed?

SDG&E may be correct that VRTP would increase SDG&E export capability by up to 1000 MW but does not make a strong case for the likelihood of much new generation that would be needed before this export capability would come into play. SDG&E should look for ways to defer VRTP until it is the only, or the most cost-effective, import/export upgrade. The economic benefit of several years deferral could cover the cost of a number of the alternative options that we have outlined. Delaying the build date for VRTP opens the door to other large-project alternatives that may be more appropriate to the then existing and expected conditions.

Page II-11 Line 9 – Loss of SONGS

SDG&E states that VRTP would avoid a "widespread voltage collapse" upon "loss" of both SONGS units. We have seen no studies to back up this suggestion and do not accept it for the following reasons:

- Simultaneous sudden trip of both SONGS units as necessary for his scenario is very unlikely and is not a contingency that is required by ISO reliability criteria to be addressed by system upgrades.

- A better solution to a sudden trip of both SONGS units, if a solution is needed, would be reactive support at SONGS. The SONGS substation is midway between Edison and SDG&E systems and is the ideal location for reactive support on the five 230 kV line system when both SONGS units are not available. Such reactive support would be markedly less expensive than VRTP

- A special protection system (SPS) is also a highly feasible and economic solution to such an event. If such an event could cause a full collapse of the SDG&E system, and is deemed to be sufficiently probable to make the modest risks associated with a SPS acceptable, then an SPS should be planned.

Page II-11 Line 20 – Consequences of a SONGS Switchyard Outage

SDG&E references ISO studies of the consequences of a SONGS "switchyard outage" (and consequent loss of SONGS generation) and the dire consequences of such an event. However,

SDG&E implies a criteria violation ("loss of both units and the switchyard") while the ISO study he references (with SDG&E as a co-author) looked at a permanent shutdown of the units, not "loss of the switchyard" and not as a contingency event, but as the possibility that SONGS may close because it does not remain economically viable when it's Incremental Cost Incentive Pricing (ICIP) expires 12-31-03.[5] Furthermore, the study addresses the 2008 time period and assumed VRTP would exist and did not look at VRTP as a candidate to solve the loss of the SONGS plant as SDG&E indicates. SDG&E indicates that the ISO chose "Valley-Rainbow-Miguel" as the solution. It did not. It chose Rainbow-Miguel on the assumption that VRTP would exist. It did not look at alternatives to VRTP. If it had, a Valley-Rainbow-Miguel line may not have been the selected solution. Lastly, the ISO study assumed no other generation would develop in the region, clearly an assumption that makes the study outdated. Further, we believe Edison has committed to advance notice of a SONGS shutdown sufficient to allow planning of remedial transmission additions if such additions are necessary (generation additions may make such additions unnecessary). Further yet, we understand that achieving a Rainbow Miguel line may be problematic or at least extremely costly.

Page II-13 Line 20 SONGS Off-site Power Supply

SDG&E argues that VRTP would improve the security and operability of the off-site power supply to SONGS. While there may be some truth to this, security and operability of off-site power to SONGS is not a problem. Were there such a problem, NERC and the Nuclear Regulatory Commission would have required that it be addressed long ago.

Page II-14 Line 11 –- VRTP Contribution to SDG&E Power Quality

SDG&E argues that VRTP would improve power quality for SDG&E customers. He discusses the post-fault period and ignores the fault period itself which is far more damaging. While VRTP would reduce the depth of the voltage drop modestly but beneficially when the fault is at a remote location (such as the Palo Verde fault studied by SDG&E), it would be of virtually no benefit in the case of faults closer to San Diego. For faults in the San Diego area voltages will drop into the 0 to 50% range and VRTP will increase the voltages only a small amount (perhaps 5%). Unless fault voltage is increased to 85% to 90% or higher the impact of the disturbance on customers would not be reduced. Hence only for remote faults that are marginally evident to San Diego customers would VRTP be beneficial. Further, the benefit would be much less than indicated by SDG&E's table since the line will not raise fault period voltage nearly as much as it raises the less troublesome post-fault voltage.

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[5] *ISO Memorandum to ISO Grid Reliability/Operations Committee from Kellan Flukiger and Armando Perez, dated June 9, 2000.*

SDG&E also fails to recognize that the VRTP project would expand exposure of SDG&E customers to faults. After VRTP, more faults on the Edison system would become troublesome to SDG&E customers (there is currently some exposure via the SONGS ties though it is limited by the SONGS units). The increased frequency of voltage dips on the SDG&E system would, based on our experience, more than offset the small voltage-level benefit for remote faults that cause marginal voltage dip.

SDG&E also points to the statcom and UPFC as reducing the impact of faults on SDG&E customers. However, these devices have very little impact on the depth of the voltage dip during the fault and thus do not measurably improve power quality for SDG&E's customers.

In summary, SDG&E's chart for a Palo Verde 500 kV fault is misleading in that it addresses only the post-fault voltage and only for a far distant fault. It ignores the far more severe voltage drop during the fault and the vast majority of faults which are much closer to SDG&E's customers. It also ignores that VRTP greatly increases the exposure of SDG&E customers to faults on the Edison system. This new exposure will more than offset the slight reduction in fault voltage drop.

Page II-17 Line 5 – Improved Edison Reliability

SDG&E argues that the VRTP project would improve Edison's reliability by providing better emergency backup service from SDG&E to Edison. This is incorrect. Because SDG&E would be unable to energize this line and the lines out of Valley from their 230 kV system, the VRTP line will not help speed restoration following an Edison blackout. The 230 kV lines through SONGS provide a far more manageable vehicle for support to or from Edison following major grid outages.

Page II-17 Line 16 – Reducing SDG&E Outages

SDG&E says the VRTP project will save SDG&E's customers money by reducing outages and further states "Thus, a very significant reduction in economic risk would be realized through the increase in SDG&E import capability made possible by the Valley-Rainbow Interconnect Project along with the added reliability provided by a new major interconnection for its San Diego and Southern Orange County service area." SDG&E has provided no reliability studies demonstrating that the VRTP project will in fact measurably improve reliability let alone significantly improve it.

Most customer outages are the result of events that disable portions of the distribution system or events on the greater bulk power grid such as those that originated in the Northwest in 1996. Reinforcing the local ties to the greater grid will not address either of these problems. The result is

that any reliability improvement is likely to be minuscule. Simply meeting reliability criteria provides the accepted norm in reliability which is relatively high. Achieving incrementally higher reliability is difficult and costly and yields little. With current load projections and even a fraction of the expected new generation in San Diego or the adjacent Mexican system, criteria will not be violated under import or export conditions until well beyond the planned 2005 VRTP in-service date. New San Diego and Mexico generation beyond a few hundred MW and up to several thousand MW will create a situation in which imports and exports are rarely if ever at extremes. With little system stress, VRTP will provide virtually no reliability improvement. Further, SDG&E has many less costly options to improve reliability and delay the need for a major project like VRTP.

Any significant generation additions in San Diego or Mexico will do far more to improve reliability and will greatly reduce any residual reliability benefit of the VRTP project.

Page II-18 Line 13 – Reduce SDG&E's RMR Cost

SDG&E states that the VRTP project would reduce SDG&E's RMR costs. Given the increase in transfer capability from north Baja and even if only a portion of the prospective generation additions in San Diego and Mexico occur, SDG&E will have lower RMR costs. Further, even were these considerations not to obtain, SDG&E provides no analysis of why RMR costs would be reduced with the new line. Indeed, since the new line does not provide new firm generation which is needed in-Basin, such generation would still need to be procured at the Valley end of the transmission line.

Page II-23 Line 6 – Export Capability Increase May be Higher

SDG&E states that the VRTP Project will increase SDG&E's export capability from 720 MW to 1700 MW and the "increase may be even higher upon the completion of ISO stakeholder studies." We submit that the export capability may also be less than 1700 MW. No studies have been done to determine the upgrades on the Edison system or systems to the north to support 1700 MW of SDG&E exports. This is not a trivial increase and may require substantial investment beyond the boundary of SDG&E's system. We, of course, are also disinclined to assess any benefit to an extra 1000 MW of export capability when its value would only be realized after about 4000 MW of existing displacements and export capabilities would have already been expended.

Page II-24 Line 13 – Impact of Other Projects Under Consideration

SDG&E mentions several transmission projects under consideration by IID, NRG Energy, and Sempra Energy that would cross the CA-AZ border west of Palo Verde and dismisses these as not being helpful. Quite the contrary, these lines might very well provide significant benefits if coupled with some of the less costly, smaller scale upgrades that SDG&E has failed to consider.

SDG&E also mentions possible "privately owned transmission lines from plants in Mexico to deliver power into the ISO grid." Building VRTP without letting these projects evolve could be very unfortunate. These projects are associated with generation that may greatly delay the need for the VRTP project. SDG&E has low-cost upgrade options that could defer VRTP several years, thus allowing these other projects to evolve and potentially make VRTP unnecessary or open the door for some other more or less ambitious project that is more suitable to the growth in the Border area or in Arizona and the CA-AZ border area. The low cost El Centro to Highline 230 kV ROW upgrade that we have suggested would, by itself, provide about 70% of the import capability that VRTP would produce.

Page II-25 Line 20 – Extreme Condition Planning Scenarios

SDG&E outlines four "key planning scenarios," three of which represent extreme conditions. Only one (Scenario C) reflects the much more likely middle ground. While the extremes might be reached, the much higher probability is that the system will land in the broad middle ground which is demonstrated in SDG&E's attachments 5 and 6 and will not require exports above 720 MW and imports over 2500 MW. This broad middle-ground will not require VRTP or any other large upgrades. Should conditions approach one of the extremes, SDG&E has more modest options that could accommodate the growth for several years. Planning for the low likelihood extremes is imprudent when there are lesser upgrades that could defer a major investment until it is clear that the unlikely event of an extreme will be reached.

Page II-28 Line 24 – VRTP Justified by Generation Uncertainty

SDG&E argues that uncertainty in generation developments results in the need to build VRTP and similar projects. While transmission investments may rise under deregulation due to uncertainty, it still behooves those responsible for transmission to defer major investments wherever possible to limit the extra investment. Building transmission prematurely or before the last possible moment raises the likelihood of investments that have a limited useful life or are less effective in the long term. Further SDG&E's argument ignores a class of projects that are certain; i.e. the approximately 350 MW of peaker generation just now installed in-Basin, the 550 MW Rosarita plant just completed in Baja and the just completed 400 MW increase in San Diego/Baja transfer capability . SDG&E should seek out smaller cost-effective steps to defer VRTP as long as

possible and await the outcome of the "generation gold rush" still apparently unabated in the San Diego-Baja area.

Page II-30 Line 13 – Build it and They Will Come

SDG&E's Korinek testifies that "it is also my belief that the total amount of new generation that will be constructed in the SDG&E area and the Mexico border region will depend in large part on whether or not the Valley-Rainbow Interconnect Project is built." He is speculating that if VRTP is built, generation will likely be built to utilize it. Just a page earlier they indicate that VRTP should be build because of uncertainty about future generation development. These seem to be at once inconsistent and circular and self-serving arguments. Further, one could as well argue that if VRTP is not built, then excessive generators will not come and it won't be needed. See Section V for our economic assessment of his hypothesis.

Page II-31 Line 16 – 230 kV Power Delivery to VRTP Not Determined

In response to a question from Commissioner Duque about how VRTP establishes a useful interconnection to export power from San Diego and Mexico, SDG&E states:

> "However, the extent to which SDG&E's 230 kV local system can deliver this power to Rainbow remains to be determined."

SDG&E has already studied the export of 2810 MW of new Mexican generation and several new "in-basin" generating plants that will cause up to 1700 MW of export (assuming that all of the high cost generation in San Diego remains on-line for some, unidentified reason) and proposes VRTP to handle it. The VRTP plan includes huge amounts of 230 kV system shunt compensation stretching to Miguel, much included in the VRTP project. Hence it seems that SDG&E has in fact already planned expenditures to accommodate generators in Mexico and that more should be known by the Applicant about this capability.

Page II-31 Line 20 – Cart Ahead of the Horse?

SDG&E notes:

> "Pursuant to procedures described in SDG&E's Transmission Owner Tariff, every merchant generator project that requests interconnection with the SDG&E-owned grid must arrange for a system impact study to be performed. The purpose of these studies is to determine the feasibility of interconnecting the proposed generator at their desired

location, as well as to determine any transmission system upgrades needed to deliver the output."

It seems to us that SDG&E is largely justifying VRTP based on the expectation of huge amounts of such generation from Intergen, SEMPRA, CFE and others in the basin and in Mexico. We would very much liked to have seen studies examining all possible alternatives to address SDG&E's expected import needs, with possible future export being a secondary consideration and fully addressed only when generators actually request more service than is available with SDG&E's existing or planned system.

Page II-32 Line 8 – No Clear Options Without VRTP?

SDG&E states "Unfortunately there are not clear options for this turn of events" when asked by Commissioner Duque about what SDG&E will do if VRTP or a similar scale project is not completed by 2005. Statements continue to say that SDG&E will be "at the mercy of the merchant generation developers" and may have to "incentivize the needed demand or generation response." We suggest that there are no "clear" options because SDG&E has not looked for them. We have listed many potential options in this report. We also suggest that the idea of "incentivizing" is not a bad one and should be explored for it's multiple benefits (reduced RMR and deferral of import capability expansion).

Page II-33 Line 9 – VRTP Versus a Line to Miguel

Regarding a question from Commissioner Duque about why SDG&E proposes only the VRTP project and not a line to Miguel as presented in the ISO's Southern California Long-Term Regional Transmission Study (dated February 15, 2001) SDG&E states "the ISO study evaluates alternative long-term expansion concepts which may or may not be later proposed and implemented as projects." This is not quite true. The ISO can direct IOUs to do detailed studies and submit them to the ISO. To our knowledge the ISO has never directed SDG&E to study and present a VRTP project plan, let alone a continuation to Miguel.

SDG&E goes on to say "Indeed, which alternatives may be later identified as needed projects and where and when they may be constructed is unknown. I am unaware of any firm plans for such projects at this time." He is saying that the VRTP project was conceived and promoted without regard for what other transmission elements might be built in the future to ensure an effective 500 kV grid. To propose VRTP without consideration of a longer-term plan deviates from the professional norm. It is also inconsistent with SDG&E's arguments in section 3 of their Chapter II testimony that the ISO has done long-term studies and endorsed VRTP as "an important building block" in a long-term plan that includes 500 kV from Rainbow to Miguel

(notwithstanding the fact that the ISO just assumed VRTP would exist). Furthermore, all ISO studies have been "conceptual" as SDG&E calls them, and so do not provide a definitive proven plan. Thus SDG&E is going ahead with VRTP even without sufficient study to know that a 500 kV link from Rainbow to Miguel is feasible (e.g., can the needed ROW be gotten to achieve a reasonable length line and a viable line cost). SDG&E does not need to have "firm" plans for a future grid that includes VRTP, but is remiss to promote it without at least looking hard at the feasibility of extending it southward.

Page II-34 Line 7 – VRTP Independent of Future SDG&E 500 kV Projects?

SDG&E says "Although the ISO study assumed that the Interconnect Project would be installed in advance of any such longer-term projects....." Here SDG&E is inconsistent with their statements elsewhere in which they indicate that the ISO has studied the need for VRTP and concluded that it is necessary and appropriate (i.e., did the ISO assume it or did the ISO study it?).

SD&GE also states "the justification for the Interconnect Project itself is independent of these conceptual expansion projects" in discussing why a Rainbow-Miguel line was not also considered in developing plans for VRTP. Again, as mentioned above, this is not a good answer. The line will have a 40-50 year life and its benefit in 2005 is only a small part of what it might offer. The VRTP project like all others should have been born of a long-range plan that looked at a wide range of options and well into the future and narrowed the choices down to a series of additions that collectively and over the long haul strategically address all potential future transmission needs.

Page II-34 Line 21 – ISO Says VRTP Needs Economic Evaluation

SDG&E states "However, the ISO recognizes the need for developing a suitable methodology and tools to perform such long-range economic analysis and has recently solicited and evaluated proposals for this purpose." He fails to mention that the ISO stated in its long-range report that the VRTP project should be subjected to whatever evaluation process results from this study. This has not been done.

Page II-35 Line 12 – El Centro to Devers Too Remote from SDG&E to be Useful?

SDG&E states that any transmission upgrade associated with the IID El Centro station and the Highline station is "too remove from SD&GE to be useful." This is hardly the case. We have conducted power flows that indicate that a new line from El Centro to Highline allows generation in that area to reach San Diego directly, by displacement reducing the power that must flow through the SONGS corridor. Further, coupled with reconductoring of the Metropoli – Tijuana

230 kV line, imports are enhanced by as much as 500 MW (we have not studied the export potential of this alternative).

Page II-36 Line 8 – VRTP a Key Element in State-wide Grid?

SDG&E argues that VRTP must be 500 kV because to build at 230 kV would perpetuate a weak link in the State-wide 500 kV grid between 500 kV lines in Orange and Riverside Counties and SWPL. This is an overstatement . SDG&&E is near the end of the 500 kV grid and so SDG&E's transmission does not bear the burden of regional power swings during events that test angular stability. Indeed, SD&GE's studies of VRTP show no angular stability problem whatsoever before or after VRTP.

SDG&E does, however, have a well recognized voltage stability problem. The most damaging contingencies in systems with voltage stability risk are usually associated with loss of higher voltage transmission lines whereby a large amount of power is dumped on the underlying system. In this case it would be loss of any element of a 500 kV loop from Valley to Miguel. Hence a 500 kV loop through the SDG&E system, especially if it carries significant through-power (e.g., from Mexico to Edison) would be a significant problem for SDG&E. Trip of an element of this loop would result in heavy flows on the underlying 230 kV lines and severe reactive demands and possible voltage collapse or overload cascading.

The only viable solution, once a 500 kV line is in service, would be to build a second 500 kV line that could pickup the power dropped by outage of a segment of the first one. Currently, SDG&E's relatively substantial 230 kV system does not have this problem. There are multiple 230 kV circuits and outage of any one of them dumps power on the others and thus does not create a huge increase in reactive losses as would outage of a single 500 kV line that passes through the area. Adding more 230 kV lines rather than a 500 kV line would greatly reduce the SDG&E exposure to voltage collapse. Building such lines for 500 kV but operating them at 230 kV would defer the problem of having only one 500 kV line. Ideally, such a line would only be moved up to 500 kV operation after a second 500 kV line is ready for service (or a second 230 kV ROW has been replaced with a compact 500 kV line).

In the SD&GE territory the only good reason to move to 500 kV is to limit the proliferation of 230 kV lines. Generally, when large amounts of power need to be moved, 500 kV lines will require less land for ROW because fewer lines are necessary. SDG&E may be approaching a situation in which a move to 500 kV is warranted. However, we are not convinced of this. It would be especially unfortunate if more 230 kV or a second 500 kV line needed to be built to mitigate the impact of a first 500 kV line. The result might be more ROW rather than less. A smarter move might be to build 230 kV on towers that could be upgraded to compact 500 kV in the future.

Because SDG&E has not looked at the many potential alternatives to the 500 kV VRTP option, and has not studied the impact of a future 500 kV loop extending down to Miguel, they may be unknowingly embarking on an unfortunate path.

Page II-37 Line 18 – 230 kV VRTP Not a Viable Option?

SDG&E says that building VRTP at 230 kV could result in both 230 and 500 kV ROW south of Valley and costly excess investment. He overlooks the opportunity to build at 230 and upgrade to compact 500kV later when and if needed. Further, when asked to consider 230 kV, SDG&E limits their thinking to building VRTP at 230 kV. There are various other 230 kV upgrades that could defer or possibly avoid the large VRTP investment.

Additionally, might 138 or 230 kV upgrades eventually be needed to serve local load along the path from Valley to Rainbow? If so, maybe the possibility of having both 500 and 230 kV should not be ruled out so summarily. Both could be on a single tower with the lower 230 built first and the upper 500 kV added later.

Page II-37 Line 22 – Voltage Stability Benefit of 500 kV Not as Presented

SDG&E explains the voltage stability benefit of 500 kV but he is wrong in our opinion. In SDG&E's case, loss of a segment of the 500 kV loop could be disastrous as we explained earlier. As SDG&E has clearly indicated, they have not studied the future ramifications of the VRTP project.

Page II-38 Line 6 – Higher 230 kV Losses Based on Invalid Assumption

SDG&E explains that transmission losses on a 230 kV VRTP would be 10 MW higher than on the proposed 500 kV project. This is misleading They assume 1000 MW loading while their studies indicate the loading will normally be 400 MW at high import hours and less the rest of the time. The line will be loaded to 1000 MW only during overlapping outage of the Encina 5 unit and the SWPL line or similar events that will account for onlya few hours of operation in a typical year. Hence the actual loss difference would be less than 2 MW. However, we are not arguing for a 230 kV VRTP project. We feel there are numerous options that need to be examined before any project is selected.

Appendix B

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TOTAL COST OF VRTP BASED UPON APPLICANT'S ESTIMATES

VRTP Total Estimated Cost				
		2001 $	Escalated to 2005$	Escalated $ w/AFUDC
a	Rainbow Substation	$112,420,000	$115,277,000	$131,767,000
b	Valley-Rainbow 500 kV Transmission Line	99,385,000	105,504,000	125,974,000
c	Edison & VRTP Substation Additions	28,340,000	28,552,000	34,592,000
d	230 kV System Upgrades (230 kV 2nd ckt)	14,591,000	15,334,000	16,915,000
e	230 kV System Upgrades (move 69 kV)	3,631,000	3,726,000	4,123,000
f	Voltage Support Additions	28,991,000	31,314,000	36,244,000
	TOTALS	$287,358,000	$299,707,000	$349,615,000

NOTES

1. Basic cost data and escalation rates from SDG&E's November 16, 2001 response to ORA data request 74 as modified by errata provided on November 30, 2001.

2. Allowance for funds used during construction was assumed to remain at the current SDG&E level of 7.92 percent which was provided via e-mail from Mr. Steven Nelson, Esq., SEMPRA on January 18, 2002.