

**IN THE MATTER OF THE APPLICATION OF TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION, INC. (A) FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE SAN LUIS VALLEY-CALUMET-COMANCHE TRANSMISSION PROJECT, (B) FOR SPECIFIC FINDINGS WITH RESPECT TO EMF AND NOISE, AND (C) FOR APPROVAL OF OWNERSHIP INTEREST TRANSFER AS NEEDED WHEN PROJECT IS COMPLETED.**

**IN THE MATTER OF THE APPLICATION OF  
PUBLIC SERVICE COMPANY OF COLORADO  
(A) FOR A CERTIFICATE OF PUBLIC  
CONVENIENCE AND NECESSITY FOR THE  
SAN LUIS VALLEY TO CALUMET TO  
COMANCHE TRANSMISSION PROJECT, (B)  
FOR SPECIFIC FINDINGS WITH RESPECT TO  
EMF AND NOISE, AND (C) FOR APPROVAL OF  
OWNERSHIP INTEREST TRANSFER AS  
NEEDED WHEN PROJECT IS COMPLETED.**

**DOCKET NO. 09A-325E**

BRUBAKER & ASSOCIATES, INC.  
CHESTERFIELD, MO 63017

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF COLORADO**

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IN THE MATTER OF THE APPLICATION OF TRI-  
STATE GENERATION AND TRANSMISSION  
ASSOCIATION, INC. (A) FOR A CERTIFICATE  
OF PUBLIC CONVENIENCE AND NECESSITY  
FOR THE SAN LUIS VALLEY-CALUMET-  
COMANCHE TRANSMISSION PROJECT, (B)  
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**Table of Contents to the  
Surrebuttal Testimony of James R. Dauphinais**

Summary to the Surrebuttal Testimony of James R. Dauphinais.....	1
I. Introduction.....	3
II. The Needs of the Companies.....	5
III. The Trinchera Ranch Alternatives Do Fully Meet The Reliability Need of the Companies .....	9
IV. The Trinchera Ranch Alternatives Fully Meet the Established Need of the Companies for Renewable Resource Delivery and are Comparable to the Companies' Proposed Project When Stability Limitations are Considered .....	14

A. <i>Thermal Limit</i> .....	17
B. <i>Transient Stability Limit</i> .....	21
C. <i>Summary of Surrebuttal Testimony on Physical Deliverability of New Renewable Resources</i> .....	28
V. CONCLUSIONS.....	30

**Summary to the Surrebuttal  
Testimony of James R. Dauphinais**

- 1 • While the Companies' Alternative 1 can support a thermal transmission limit of 925  
2 MW at San Luis Valley, it can only do so at the expense of limiting Calumet  
3 generation additions to 50 MW to 100 MW, which is less than the 200 MW to 250 MW  
4 range of the new resources at Calumet in Public Service's recently approved 2007  
5 Resource Plan. Trinchera Ranch's Alternative TR1AE does not face this same  
6 limitation and can accommodate the resources at Calumet. Trinchera Ranch  
7 Alternative TR1AE supports a thermal transmission limit of 850 MW at San Luis  
8 Valley and simultaneous additions of new resources at Calumet up to 300 MW.
- 9 • The Companies' rebuttal testimony does not change my answer testimony's  
10 conclusion that the Companies have not shown the need for the San Luis  
11 Valley-Calumet portion of their Proposed Project (Alternative 1). In addition, the  
12 Companies' rebuttal testimony confirms that they have not adequately studied  
13 feasible alternatives to the San Luis Valley-Calumet transmission line portion of the  
14 Companies' Proposed Project.
- 15 • The Companies' rebuttal testimony does not change my answer testimony's  
16 conclusion that the Trinchera Ranch alternatives resolve the voltage collapse-related  
17 reliability issue in the San Luis Valley for a cost of between \$15 million and \$66  
18 million, which is \$24 million to \$75 million less than the Proposed Project.
- 19 • The Trinchera Ranch alternatives provide redundancy and any potential reliability  
20 advantage of the Companies' Proposed Project in this respect is negligible and not  
21 justified by the substantial additional cost.
- 22 • While the Companies' rebuttal analysis correctly shows that Alternative TR1A will  
23 support 575 MW of new generation in the San Luis Valley area under peak load  
24 conditions and between 475 MW and 575 MW under lighter load conditions, this is  
25 still over 100 MW in excess of the upper range of the renewable resources that Public  
26 Service may purchase under its approved 2007 Resource Plan.
- 27 • If Trinchera Ranch's Alternative TR1A is extended 52 miles further north of Poncha to  
28 interconnect with Public Service's backbone 230 kV system at Malta substation, the  
29 line addition would be able to support up to 850 MW of new generation in the San  
30 Luis Valley area under peak load conditions and between 750 MW and 850 MW  
31 under lighter load conditions based on thermal transmission limitations. This  
32 extended version of Alternative TR1A (Alternative TR1AE) would still be \$18 million  
33 less expensive than the Proposed Project.
- 34 • After I corrected and broadened the Companies' analysis, when transient stability  
35 limits are considered, both the Companies' Proposed Project and Trinchera Ranch's  
36 Alternative TR1AE can only support generation additions in the San Luis Valley of  
37 approximately 600 MW without additional transmission reinforcements or a Remedial  
38 Action Scheme ("RAS").

- 1       • A generation-tripping RAS could be used to raise the transient stability limit to: (i) the  
2       750 MW to 850 MW thermal limit of the extended version of Trinchera Ranch's  
3       Alternative TR1A; or (ii) the 925 MW thermal limit of the Companies' Proposed  
4       Project.
  
- 5       • Both the extended version of Alternative TR1A and the Proposed Project could be  
6       expanded above the 750 MW to 925 MW level through similar additional transmission  
7       line reinforcements toward Poncha in the north and east from Poncha toward  
8       Comanche.
  
- 9       • The Trinchera Ranch alternatives are compatible with long-term plans and contribute  
10      toward achieving those long-term plans at a significantly lower cost than the  
11      Companies' Proposed Project by providing transmission capability in excess of that  
12      required for the delivery of reasonably foreseeable renewable resources while  
13      offering a base that can be built upon to accommodate future renewable resources  
14      that are less likely.

**DOCKET NO. 09A-324E**

**DOCKET NO. 09A-325E**

3 A James R. Dauphinais. My business address is 16690 Swingley Ridge Road, Suite  
4 140, Chesterfield, Missouri 63017.

1    **Q     ARE YOU THE SAME JAMES R. DAUPHINAIS WHO FILED ANSWER,**  
2       **SUPPLEMENTAL ANSWER AND CROSS-ANSWER TESTIMONY IN THIS**  
3       **PROCEEDING ON BEHALF OF BLANCA RANCH HOLDINGS, LLC AND**  
4       **TRINCHERA RANCH HOLDINGS, LLC (COLLECTIVELY, “TRINCHERA**  
5       **RANCH”)?**

6    **A     Yes, I am.**

7    **Q     WHAT IS THE SUBJECT OF YOUR SURREBUTTAL TESTIMONY?**

8    **A     I respond to the rebuttal testimony of Public Service Company of Colorado's (“Public**  
9       **Service”) witnesses Hyde, Stellern, Green, Taylor and Thompson, and Tri-State**  
10       **Generation and Transmission Association, Inc.’s (“Tri-State”) witness Leoni in regard**  
11       **to:**

- 12       • The reliability and renewable resource deliverability needs of Public Service and  
13       Tri-State (collectively, “the Companies”).
- 14       • The adequacy of the Trinchera Ranch alternatives in regard to meeting the  
15       reliability need of the Companies.
- 16       • The adequacy of the Trinchera Ranch alternatives in regard to meeting the  
17       renewable resource deliverability need of the Companies.
- 18       • The expandability of the Trinchera Ranch alternatives versus the Companies’  
19       Proposed Project.
- 20       • The cost of the Trinchera Ranch alternatives versus the Companies’ Proposed  
21       Project.

22           I would like to note that my testimony addresses the physical delivery of  
23       power. Mr. Mark Clements is separately presenting surrebuttal testimony on behalf of  
24       Trinchera Ranch in regard to the contractual delivery of power.

25           My silence on any position taken by any witnesses in this proceeding should  
26       not be taken as a tacit endorsement of any position taken by them.

1    **Q     CAN YOU PLEASE SUMMARIZE YOUR CONCLUSIONS IN YOUR**  
2       **SURREBUTTAL TESTIMONY?**

3    **A     Yes. I conclude the Trinchera Ranch alternatives:**

- 4       • Are as readily expandable for delivering power out of the San Luis Valley area as  
5       the Companies' Proposed Project.
- 6       • Meet the reliability and renewable resource deliverability needs of the Companies.
- 7       • Cost less than the San Luis Valley to Calumet portion of the Proposed Project.

8           In addition, the extended version of Alternative TR1A (Alternative TR1AE)  
9       provides approximately the same ability to deliver power from additional generation in  
10      the San Luis Valley area as the Companies' Proposed Project when transient stability  
11      limits are considered.

12          Thus, I continue to conclude that the Companies still have not shown the need  
13      for the San Luis Valley to Calumet portion of the Proposed Project. The Companies  
14      have still not adequately studied feasible alternatives to the Companies' Proposed  
15      Project.

16    **II. The Needs of the Companies**

17    **Q     IN YOUR ANSWER TESTIMONY, YOU HAVE INDICATED THE MAIN ISSUES THE**  
18       **COMPANIES ARE PROPOSING TO ADDRESS WITH THE PROPOSED PROJECT**  
19       **ARE RELIABILITY ISSUES IN THE SAN LUIS VALLEY AND NORTHEASTERN**  
20       **NEW MEXICO AND THE ACCOMMODATION OF POTENTIAL NEW RENEWABLE**  
21       **RESOURCE COMMITMENTS IN THE SAN LUIS VALLEY AND CALUMET AREAS**  
22       **(DAUPHINAIS ANSWER TESTIMONY AT 7). HOW HAVE THE COMPANIES**  
23       **RESPONDED TO THAT STATEMENT?**

24    **A     The Companies' witnesses on rebuttal:**



- 1       • Have claimed the Companies' need is to accommodate potential future resources  
2       as well as those currently planned (Hyde Rebuttal at 6-7; Green Rebuttal at 2-3  
3       and 5; and Stellern Rebuttal at 4-6).
- 4       • Have claimed my view of the amount of renewable resources that need to be  
5       supported is "short-sighted" (Hyde Rebuttal at 3 and 7).
- 6       • Have claimed 370 MW of renewable resources is not the most Public Service  
7       would want to build or buy in the San Luis Valley and others may have interest in  
8       solar power from the San Luis Valley (Taylor Rebuttal at 4).
- 9       • Have claimed an additional 750 MW of thermal solar generation with storage is  
10      likely for the San Luis Valley by 2018 (Hyde Rebuttal at 8-9).

11    **Q     DO THE COMPANIES HAVE A NEED TO ACCOMMODATE RENEWABLE**  
12       **RESOURCES WELL IN EXCESS OF PUBLIC SERVICE'S PLANNED**  
13       **PURCHASES IN DOCKET NO. 07A-447E?**

14    A     No. The need is to accommodate the planned projects and do so in a manner that is  
15       efficient and consistent with supporting additional renewable resources in the future.  
16       This is precisely what the Trinchera Ranch alternatives accomplish. In contrast, there  
17       is not a need to actually construct the transmission facilities to support other potential  
18       renewable resource development at this time about which there is a large degree of  
19       uncertainty at this time. This is not a matter of "short-sightedness." It is a matter of  
20       prudence. Regardless, the additional analysis I have performed for this testimony  
21       shows that, when transient stability limits are considered, the Companies' Proposed  
22       Project provides approximately the same physical transfer capability for new San Luis  
23       Valley area generation as Trinchera Ranch's Alternative TR1AE.

**Q WHAT IS ALTERNATIVE TR1AE AND WHAT IS ITS PHYSICAL TRANSFER CAPABILITY?**

A It is a 52-mile extension of the proposed second San Luis Valley to Poncha single-circuit 230 kV transmission line that addresses various issues raised by the Companies in rebuttal. As I will show, this extension of Alternative TR1A will support, on a non-simultaneous basis for the San Luis Valley area a thermal limit for generation of 850 MW at peak load and between 750 MW and 850 MW at lighter loads. This is in excess of the original 750 MW non-simultaneous capability for San Luis Valley area that the Companies identified for their Proposed Project, which they have testified as being sufficient to meet their asserted need (Green Direct at 4-7). It should also be noted the production of power from new solar resources in the San Luis Valley area may be lower during lighter load periods due to the angular incident of the sun or other factors. Thus, the same level of transfer capability may not be needed under lighter load conditions as under peak load conditions and the potential effect on the transfer capability need has not been studied.

**Q MR. STELLERN OFFERS THE OPINION THAT THERE HAS BEEN A CHANGE IN THE TRANSMISSION PLANNING PARADIGM AND THERE IS A NEED TO EVALUATE BENEFICIAL RESOURCES IN THE 10-YEAR HORIZON AND BEYOND (STELLERN REBUTTAL AT 4-6). HOW DO YOU RESPOND?**

A There has been a prudent move in the industry in general toward evaluating transmission needs for resources out to 10 years and beyond. However, it is important to differentiate a long-term transmission plan from a demonstrated need to construct new transmission facilities. The purpose of a long-term transmission plan is to provide an efficient pathway to an expected future of 10 to 20 years out. However, things can dramatically change over 10 to 20 years and often in ways that are not

1 readily imagined. Thus, a long-term plan is only actually constructed as elements of it  
2 are actually needed. Furthermore, a long-term plan should not serve as a “straight  
3 jacket” in regard to the selection of which transmission facilities to proceed with when  
4 facilities are actually needed. Long-term plans are conceptual in nature and little in  
5 the way of optimization may have been performed for specific elements of the plan.  
6 Ultimately, the only real long-term requirement should be that the facilities actually  
7 constructed when needed are compatible with the long-term plan and contribute  
8 toward achieving that long-term plan. The Trinchera Ranch alternatives are  
9 compatible with long-term plans and contribute toward achieving those long-term  
10 plans by providing transmission capability in excess of that required for the delivery of  
11 established potential renewable resources while offering a base that can be built  
12 upon to accommodate future renewable resources for which there is a greater  
13 uncertainty. In particular, Trinchera Ranch’s Alternative TR1AE could be built in a  
14 phased approach such that it is first built to Poncha in time to accommodate the  
15 phase-in of Public Service’s actual generation purchases from the San Luis Valley  
16 area, and then later completed to Malta.

17 **Q HOW DO YOU RESPOND TO MS. HYDE’S COMMENT THAT IT IS LIKELY THAT**  
18 **PUBLIC SERVICE WILL BE ACQUIRING AN ADDITIONAL 750 MW OF THERMAL**  
19 **SOLAR GENERATION THAT WILL BE LOCATED IN THE SAN LUIS VALLEY**  
20 **AREA (HYDE REBUTTAL AT 8-9)?**

21 **A** It is important to note that Public Service’s witness in the 2010 RES Compliance Plan  
22 proceeding has indicated that the 250 MW additions of thermal solar generation in  
23 years 2016, 2017 and 2018 in that plan are “placeholders” that should be viewed with  
24 a “great deal of caution” because of the “large degree of uncertainty for this period”  
25 (Kittel Direct Testimony in Docket No. 09A-772E at 24). There is no certainty that

Public Service will actually procure or build such generation and the generation may not necessarily be built in the San Luis Valley area. Regardless, as I will discuss in this testimony, neither the Companies' Proposed Project nor the Trinchera Ranch alternatives could accommodate anything over the first additional 250 MW facility in the San Luis Valley area without the use of a Remedial Action Scheme ("RAS") or additional transmission facilities due to transient stability limitations in the San Luis Valley area. Furthermore, for both the Companies' Proposed Project and Alternative TR1AE, the full 750 MW could be accommodated only if any voltage collapse issues at Poncha and the transient stability issue in the San Luis Valley area are resolved. Finally, the Trinchera Ranch transmission line alternatives are just as expandable as the Companies' Proposed Project. They could both be expanded by similar transmission facilities toward Poncha to the north and from Poncha east toward Comanche.

**III. The Trinchera Ranch Alternatives Do Fully  
Meet the Reliability Need of the Companies**

**Q HOW HAVE THE COMPANIES' WITNESSES RESPONDED TO YOUR ANSWER  
TESTIMONY IN REGARD TO HOW THE TRINCHERA RANCH ALTERNATIVES  
CAN MEET THE IDENTIFIED RELIABILITY NEEDS OF THE COMPANIES?**

**A** Tri-State witness Leoni claims the Trinchera Ranch transmission line alternatives would not perform as well as the San Luis Valley to Calumet portion of the Proposed Project. In Mr. Leoni's rebuttal testimony:

- He asserts that unlike the San Luis Valley to Calumet portion of the Proposed Project, the Trinchera Ranch transmission line alternatives will not remove the need for the San Luis Valley Undervoltage Load Shedding ("UVLS") system for N-2, N-1-1 and other credible North American Electric Reliability Corporation ("NERC") Category C contingencies (Leoni Rebuttal at 17-18).

- 1 • He asserts that unlike the San Luis Valley to Calumet portion of the Proposed  
2 Project, the Trinchera Ranch transmission line alternatives do not provide two  
3 distinct sources of power in widely separated corridors for the San Luis Valley  
4 area (Leoni Rebuttal at 19).
- 5 • He asserts that unlike the San Luis Valley to Calumet portion of the Proposed  
6 Project, the Trinchera Ranch transmission line alternatives do not provide two  
7 distinct sources of power in widely separated corridors for the Walsenburg area  
8 (Leoni Rebuttal at 19-21).

9 In addition, Public Service witness Thompson presents rebuttal testimony that  
10 generally discusses a potential risk of fire in the Poncha Pass area where the  
11 Trinchera Ranch transmission line alternatives would be built.

12 **Q HOW DO YOU RESPOND TO MR. LEONI'S CLAIM THE SAN LUIS VALLEY TO**  
13 **CALUMET PORTION OF THE COMPANIES' PROPOSED PROJECT WILL**  
14 **ELIMINATE THE NEED FOR THE UVLS SYSTEM, BUT THE TRINCHERA RANCH**  
15 **TRANSMISSION LINE ALTERNATIVES WILL NOT?**

16 A I disagree with Mr. Leoni. First, using Mr. Leoni's definition of N-2,<sup>1</sup> under the  
17 Trinchera Ranch transmission line alternatives, there are no credible NERC Category  
18 C N-2 contingencies in the San Luis Valley area or at Poncha that would involve loss  
19 of both 230 kV San Luis Valley to Poncha transmission lines since those transmission  
20 line alternatives, as I have proposed them, would not involve sharing common  
21 transmission structures or circuit breakers with the existing San Luis Valley to Poncha  
22 230 kV transmission line. Second, the exposure to UVLS load shedding under the  
23 Trinchera Ranch transmission line alternatives for an N-1-1<sup>2</sup> contingency would be  
24 very small. The Companies have not produced any record of any simultaneous

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<sup>1</sup>I understand his definition of a N-2 contingency as one involving the loss of two or more transmission elements through a single common mode event.

<sup>2</sup>For purpose of this testimony, I define a N-1-1 contingency as a contingency where two transmission system elements are lost due to two separate events. System adjustments are generally allowed between the occurrences of the two events. An example of such a contingency under this definition would be a NERC Category C.3 contingency.

1 outage of the existing San Luis Valley to Poncha 230 kV line and the existing San  
2 Luis Valley to Sargent to Poncha 115 kV line path. I have also reviewed the outages  
3 the Companies have provided in response to discovery in this proceeding and I have  
4 not identified any overlapping outage of these two lines (Exhibit JRD-13). Thus, the  
5 exposure to actual load shedding occurring would be *de minimus*.

6 **Q HOW DO YOU RESPOND TO MR. LEONI'S CLAIM THE UVLS SYSTEM WOULD**  
7 **NOT NEED TO BE RETAINED FOR MAINTENANCE OUTAGES UNDER THE**  
8 **COMPANIES' PROPOSED PROJECT?**

9 A Mr. Leoni is apparently not considering the need to operate to protect the Bulk Power  
10 System from the N-2 Category C contingency loss of both circuits of the Companies'  
11 proposed double-circuit 230 kV San Luis Valley to Calumet transmission line during  
12 maintenance outages of the existing San Luis Valley to Poncha 230 kV transmission  
13 line. Unless Tri-State and Public Service could demonstrate with an extended-term  
14 dynamic simulation that voltage collapse would not propagate out of the San Luis  
15 Valley area, something they have not done, Tri-State will need to retain its UVLS or  
16 risk having to manually shed load on a pre-contingency basis on those occasions  
17 where it does not have the option to perform required maintenance of the existing  
18 San Luis Valley to Poncha 230 kV transmission line during a period when San Luis  
19 Valley area load is above 65 MW.

**Q HOW DO YOU RESPOND TO MR. LEONI'S CLAIM IN REGARD TO THE TRINCHERA RANCH TRANSMISSION LINE ALTERNATIVES NOT PROVIDING TWO INDEPENDENT SOURCES FROM WIDELY SEPARATED CORRIDORS FOR THE SAN LUIS VALLEY AREA?**

**A** Mr. Leoni makes more out of this than is reasonable. If the second San Luis Valley line going north is separated from the existing line by the greater of 500 feet or at least the longest single span length of the two lines, it will not be considered in the same transmission corridor under Western Electricity Coordinating Council ("WECC") standards (Exhibit JRD-14). That combined with the interconnection of the lines at Poncha and San Luis Valley such that a breaker fault or failure would not cause the loss of the two lines will provide substantial redundancy and independence. Any additional reliability benefit that would be derived from two widely spaced apart sources would be negligible.

**Q MR. THOMPSON DISCUSSES PRESCRIBED BURNS AND THE GENERAL RISK OF FIRE IN THE PONCHA PASS AREA WHERE BOTH THE EXISTING AND THE ALTERNATIVE TR1A TRANSMISSION LINES WOULD PASS (THOMPSON REBUTTAL AT 7-8). HOW DO YOU RESPOND?**

**A** Trinchera Ranch commissioned Forest Stewardship Concepts, Ltd to perform a study on the fire risk associated with Poncha Pass. I have attached a copy of the study as Exhibit JRD-15. This is the type of study that transmission planning experts rely upon when considering the risks and consequences associated with the loss of transmission lines that are near one another. The study concludes:

"... the risk of a fire in the Poncha Pass area that would be large enough to threaten multiple power lines over Poncha Pass is very remote. The Mountain Pine Beetle impact in the Poncha Pass area has been relatively small, and does not increase the risk of fire. This

1 remote risk can be further reduced using commonly accepted wildfire  
2 hazard mitigation practices.” (Exhibit JRD-15 at 6)

3 Based on this study result, I have no reason to change my conclusion that  
4 there is a negligible reliability benefit to be derived from having the two 230 kV lines  
5 serving the San Luis Valley come through widely separated transmission corridors.  
6 This confirms my initial conclusion that constructing an additional 230 kV transmission  
7 line through Poncha Pass is acceptable under NERC and WECC reliability criteria,  
8 even if built in a common corridor as defined by WECC, because the risk of loss of  
9 both 230 kV lines is not abnormally high.

10 **Q HOW DO YOU RESPOND TO MR. LEONI’S CLAIM IN REGARD TO THE**  
11 **TRINCHERA RANCH ALTERNATIVES NOT PROVIDING TWO INDEPENDENT**  
12 **SOURCES FROM WIDELY SEPARATED CORRIDORS FOR THE WALSENBURG**  
13 **230 KV SUBSTATION (LEONI REBUTTAL 19-20)?**

14 **A** This is even less of concern than for the San Luis Valley area. As Mr. Leoni admits,  
15 the corridor between Walsenburg and Comanche is relatively wide compared to the  
16 Poncha-San Luis Valley corridor. Furthermore, he admits the proposed San Luis  
17 Valley-Calumet line does not directly connect to Walsenburg. Any incremental  
18 reliability benefit provided to Walsenburg via a San Luis Valley-Calumet line is  
19 negligible and does not justify the substantial additional cost associated with that line.



**IV. The Trinchera Ranch Alternatives Fully Meet the  
Established Need of the Companies for Renewable  
Resource Delivery and are Comparable to the Companies'  
Proposed Project when Stability Limitations are Considered**

**Q CAN YOU PLEASE REVIEW THE ESTABLISHED NEED OF THE COMPANIES AS  
IT PERTAINS TO THE DELIVERY OF POWER FROM NEW RENEWABLE  
RESOURCES?**

A Yes. The established need of the Companies is to deliver no more than the proposed renewable resource purchase of Public Service from its 2009 All Source RFP to the Colorado Front Range area. It is not necessary for the Companies to support higher levels of renewable resource at this time. In addition, any transmission facilities pursued must fit into a longer-term plan that involves the delivery of power from additional solar generation facilities that may be located in the San Luis Valley area in the future. There must be both the physical ability to deliver power and a contract path to deliver that power. In my answer testimony, I addressed the physical ability to deliver power and my surrebuttal testimony herein responds to the Companies' rebuttal testimony on that issue. Trinchera Ranch witness Mark Clements' surrebuttal testimony responds to the Companies' rebuttal testimony regarding contract path issues, an issue the Companies did not address in their direct testimony and supporting studies.

**Q CAN YOU PLEASE EXPLAIN WHAT DETERMINES THE PHYSICAL ABILITY TO  
DELIVER POWER FROM THE SAN LUIS VALLEY AND CALUMET AREAS?**

A Yes. The physical ability to deliver power from the San Luis Valley and Calumet areas will be based on the lowest of the thermal, voltage and transient stability limits for delivery of power from those areas.

1           The thermal limit is the transfer limit associated with avoiding transmission  
2           facility overloads under non-contingency and contingency conditions.<sup>3</sup> Both the  
3           Companies' direct testimony power flow study (Exhibit TWG-1) and my answer  
4           testimony power flow analysis addressed the thermal limit to the delivery of power  
5           from new generation resources in the San Luis Valley and Calumet areas to the  
6           Colorado Front Range area.

7           The voltage limit is the transfer limit associated with avoiding voltage collapse  
8           under contingency conditions.<sup>4</sup> Neither the Companies' direct testimony power flow  
9           study (Exhibit TWG-1) nor rebuttal testimony power flow study (Exhibit GMS-8)  
10          uncovered a voltage limit to transferring power from the San Luis Valley and Calumet  
11          areas to the Colorado Front Range area. However, my answer testimony power flow  
12          study examined the voltage limit as it pertains to potential voltage collapse at Poncha  
13          if no new transmission lines are added to facilitate the delivery of power from new  
14          renewable resources in the San Luis Valley area (Alternative TR4A and TR4AR). I  
15          found the voltage limit to be less restrictive than the thermal limit for transfers under  
16          those two alternatives. In my power flow analysis for this testimony, I did not  
17          encounter any voltage limits up to the thermal limits identified.

18          The transient stability limit is the transfer limit associated with maintaining  
19          generator synchronism without sustained power system oscillations under  
20          contingency conditions. The Companies did not perform a transient stability study for  
21          their direct testimony and I did not perform one for my answer testimony. However, in  
22          response to Colorado Public Utilities Commission ("CPUC" or "Commission") Staff

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<sup>3</sup>The term "thermal" derives from the fact that most loading limits on individual facilities are related to their ability to withstand heating without permanent damage or the introduction of safety issues (e.g., line sags due to heating not meeting ground clearance requirements).

<sup>4</sup>I discussed the voltage collapse phenomenon in general in my answer testimony at pages 7-8 and specifically in regard to delivery of power from the San Luis Valley area in Exhibit JRD-1 and at pages 56-59.

witness Dominguez's answer testimony, Public Service had its consultant Siemens-PTI perform a limited transient stability study under the direction of Public Service witness Green (Exhibit TWG-3). The limited transient stability study examined both the Companies' Proposed Project and Trinchera Ranch's Alternative TR1A.

**Q WHAT NEW ANALYSIS HAVE YOU PERFORMED FOR THIS SURREBUTTAL TESTIMONY?**

A I have reviewed the rebuttal power flow and transient stability analyses of the Companies and have expanded on those analyses as appropriate. I discovered that Siemens-PTI incorrectly introduced a 230/115 kV transformer between Poncha 115 kV substation and Waterton 230 kV substation in its light load transient stability model, which likely overstates the performance of the power system for contingencies in the San Luis Valley and Poncha areas in Siemens-PTI's transient stability simulations performed at light load. I also discovered that the Siemens-PTI stability study (Exhibit TWG-3) did not examine the most limiting NERC/WECC Category C contingency for the San Luis Valley area under the Companies' Proposed Project even though other Category C contingencies were examined at Poncha 230 kV substation in the Siemens-PTI analysis. I have corrected and expanded upon the Siemens-PTI transient stability analysis. My additional transient stability analysis shows that both the Companies' Proposed Project and Trinchera Ranch's Alternative TR1AE are physically limited to supporting the delivery of approximately 600 MW from new renewable resources in the San Luis Valley area due to transient stability limits unless additional transmission facilities are constructed or an RAS is installed to automatically trip generation in the San Luis Valley area when the limiting contingencies actually occur. Thus, I have found that when transient stability limits are considered, the physical capability to deliver power from new renewable

resources in the San Luis Valley provided by Alternative TR1A is approximately the same as that of the Companies' Proposed Project (Alternative 1).

**A. Thermal Limit**

**Q CAN YOU PLEASE SUMMARIZE THE COMPANIES' REBUTTAL TESTIMONY IN REGARD TO THE ABILITY OF THE TRINCHERA RANCH ALTERNATIVES TO SUPPORT THE DELIVERY OF POWER FROM THE SAN LUIS VALLEY AREA BASED ON THERMAL TRANSMISSION LIMITATIONS?**

**A** Yes. The Companies' rebuttal testimony:

- Asserts that Public Service finds Alternative TR4AR, which involves automatically tripping generation in the San Luis Valley area by a RAS when the existing San Luis Valley to Poncha 230 kV line is lost, is unacceptable because Public Service has always built its transmission system to withstand N-1 outages without tripping generation (Stellern Rebuttal at 12).
- Asserts that Alternative TR4, which supports 250 MW of additional generation in the San Luis Valley area without an RAS or any significant transmission upgrades, is insufficient for Public Service's purposes (Stellern Rebuttal at 13).
- Asserts that, based on new power flow analysis performed by Siemens-PTI under the direction of Public Service witness Stellern (Exhibit GMS-8), the Companies' Proposed Project can support 925 MW on a non-simultaneous basis under peak and lighter load conditions, but Trinchera Ranch's Alternative TR1A can only provide 575 MW at peak load and between 475 MW and 575 MW at lighter load (Stellern Rebuttal at 14).
- Asserts that Trinchera Ranch did not provide any evidence in its answer testimony that its alternatives could be expanded for future generation resources in a manner similar to that described by Public Service witness Green in his direct testimony (Stellern Rebuttal 11-12).

1    **Q     HOW DO YOU RESPOND TO MR. STELLERN'S STATEMENT THAT THE USE OF**  
2           **A GENERATION-TRIPPING RAS UNDER YOUR ALTERNATIVE TR4AR IS**  
3           **UNACCEPTABLE BECAUSE PUBLIC SERVICE HAS ALWAYS BUILT ITS**  
4           **TRANSMISSION SYSTEM TO WITHSTAND AN N-1 OUTAGE WITHOUT**  
5           **TRIPPING GENERATION AND FIRM GENERATION IS PLANNED TO BE THERE**  
6           **DURING SYSTEM PEAK CONDITIONS?**

7    **A     First, contrary to Mr. Stellern's assertion, all of the Public Service generation is**  
8           already planned for N-1 outages with generation tripping. Specifically, an N-1 outage  
9           of: (i) the generation leads to a generator's step up transformer, (ii) the generator's  
10          step up transformer, or (iii) any transmission voltage level line or cable between the  
11          generator's step up transformer and Public Service's transmission system would  
12          cause the associated Public Service generator to trip. In addition, the use of an RAS  
13          would have a minimal effect on availability of the generation under peak load  
14          conditions as the generation would only be tripped when the actual loss of the  
15          existing San Luis Valley to Poncha 230 kV line occurred. Since June 1, 2005 this has  
16          amounted to a total of 5 minutes (Exhibit JRD-13).

17   **Q     HOW DO YOU RESPOND TO MR. STELLERN IN REGARD TO THE LIMITED**  
18           **250 MW CAPABILITY OF YOUR ALTERNATIVE TR4?**

19   **A     The purpose of Alternative TR4 was to demonstrate the current ability of the**  
20           transmission system under peak load conditions to support additional generation in  
21           the San Luis Valley without the addition of a generation tripping RAS. My  
22           presentation of it was not to suggest the TR4 alternative could support the 2009 All  
23           Source RFP resource additions without the addition of a generation tripping RAS like  
24           that included in Trinchera Ranch's Alternative TR4AR.

1    **Q     HOW DO YOU RESPOND TO MR. STELLERN'S TESTIMONY THAT THE**  
2       **PROPOSED PROJECT COULD SUPPORT 925 MW OF NEW SAN LUIS VALLEY**  
3       **GENERATION ON A NON-SIMULTANEOUS BASIS UNDER BOTH LIGHT AND**  
4       **PEAK LOAD CONDITIONS, BUT ALTERNATIVE TR1A COULD ONLY SUPPORT**  
5       **575 MW UNDER PEAK LOAD CONDITIONS AND BETWEEN 475 MW AND**  
6       **575 MW UNDER LIGHTER LOAD CONDITIONS?**

7    **A**Mr. Stellern's statements in this regard are based on a new power flow study (Exhibit  
8       GMS-8) performed by Public Service's consultant under the direction of Mr. Stellern.  
9       I have reviewed the Exhibit GMS-8 analysis and agree the addition of the Poncha  
10      230/115 kV transformer would raise the non-simultaneous thermal transmission limit  
11      of the Proposed Project for new San Luis Valley generation to 925 MW under light  
12      load conditions. However, that limit is now based on the 128 MVA conductor rating  
13      for the Sargent-Poncha 115 kV transmission line and is no longer readily upgradable  
14      to 1,000 MW at San Luis Valley through a replacement or addition of 230/115 kV  
15      transformers at San Luis Valley substation as indicated in the Exhibit TWG-1 study.  
16      Also, I have performed additional power flow analysis that shows that this San Luis  
17      Valley limit restricts Calumet generation additions to 100 MW at peak load and 50 to  
18      100 MW under lighter load conditions. This additional analysis is summarized on  
19      Exhibit JRD-16.

20           I also agree that the thermal limit for Alternative TR1A is 575 MW at peak load  
21      and between 475 MW and 575 MW under lighter load conditions if the second San  
22      Luis Valley to Poncha line terminates at Poncha 230 kV switching station as  
23      presented in my answer testimony. This thermal limit is still adequate to deliver the  
24      entire 300 MW to 355 MW range of the Commission's suggested portfolio from Public  
25      Service's 2009 All Source RFP with over 100 MW to spare. In addition, if the line  
26      under Alternative TR1A is extended approximately 52 miles north to reach Public

1 Service's backbone 230 kV system at Malta substation, I have found through  
2 additional power flow analysis that the thermal limit of Alternative TR1A extended in  
3 this manner, which I will refer to as Alternative TR1AE, would be 850 MW for new  
4 generation in the San Luis Valley area at peak load conditions and between 750 MW  
5 and 850 MW under lighter load conditions. I also found that these levels of San Luis  
6 Valley thermal capacity would allow a thermal limit for additional San Luis Valley  
7 generation at Calumet of 300 MW at peak load and between 300 MW and 525 MW at  
8 lighter load conditions. The power flow analysis supporting this is summarized in  
9 Exhibit JRD-17. Even with such an extension to Malta, Alternative TR1A would have  
10 a lower estimated cost of approximately \$72 million<sup>5</sup> versus the \$90 million estimated  
11 cost for the Companies' Proposed Project and would provide more than twice the  
12 thermal capability necessary to deliver the upper range of the 2009 All Source RFP  
13 resources in the San Luis Valley area.

14 **Q PUBLIC SERVICE WITNESS THOMPSON ASSERTS THAT THE TRINCHERA**  
15 **RANCH ALTERNATIVES WOULD NEED TO BE ULTIMATELY BUILT OUT TO**  
16 **COMANCHE IN THE EAST (THOMPSON REBUTTAL AT 2). HOW DO YOU**  
17 **RESPOND?**

18 **A** This is incorrect. As Trinchera Ranch witness Clements testifies in his surrebuttal  
19 testimony, a contract path can be established to deliver power to the Colorado Front  
20 Range without building transmission facilities to Comanche.

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<sup>5</sup>This is based on scaling the \$39 million estimated cost of a new single-circuit 230 kV 62-mile transmission line down to 52 miles and adding it to the estimated \$39 million cost of Alternative TR1A.

**B. Transient Stability Limit**

**Q CAN YOU PLEASE OUTLINE THE TESTIMONY OF THE COMPANIES IN REGARD TO TRANSIENT STABILITY?**

A Yes. In response to Mr. Dominguez's answer testimony regarding potential transient stability concerns, the Companies identified a previously performed WECC simulation with a fault at the San Luis Valley 230 kV bus and the subsequent loss of both of the circuits of the Companies' proposed double-circuit 230 kV San Luis Valley to Calumet transmission line (Exhibit TWG-2). In addition, Public Service had its consultant Siemens-PTI, perform, under the direction of Mr. Green, a limited transient stability analysis (Exhibit TWG-3). Mr. Green reported that these two exhibits did not show any transient stability issues for the Companies' Proposed Project (Green Rebuttal at 17-18). Mr. Green also reported that the limited transient stability study performed by Siemens-PTI included some cursory analysis of Trinchera Ranch's Alternative TR1A. He indicated the results were stable for three-phase faults for Alternative TR1A, but exhibited some criteria violations and poorly damped oscillations involving faults with delayed clearing near Poncha (*Id.*)

**Q HAVE YOU, IN DETAIL, REVIEWED EXHIBITS TWG-2 AND TWG-3?**

A Yes. I found two significant deficiencies in the provided stability analysis – the failure to adequately examine a NERC contingency and likely accidental inclusion of a 230/115 kV transformer between the Poncha 115 kV bus and the Waterton 115 kV bus. First, Exhibit TWG-2 only amounts to a single page reporting on the results of a rough cursory simulation of a NERC Category C.5 contingency on the Companies' proposed double-circuit 230 kV San Luis Valley to Calumet transmission line at San Luis Valley. No information is provided in regard to the amount of generation online



1 and loaded in the San Luis Valley or the other new transmission lines that were  
2 specifically modeled in the simulation. Regardless, it does not tell us how the system  
3 would behave if the contingency was modeled using the same assumptions utilized  
4 for Exhibit TWG-3. The simulation cannot be relied upon as an indicator of whether a  
5 NERC Category C.5 on the proposed double-circuit 230 kV San Luis Valley to  
6 Calumet line will place a stability limit on the ability to deliver power from new  
7 generation facilities in the San Luis Valley area at the 625 MW level modeled in the  
8 Exhibit TWG-3 analysis never mind the 925 MW thermal limit the Companies have  
9 estimated in its Exhibit GMS-8 analysis for its Proposed Project. Simulation of the  
10 contingency needs to be conducted using the transient stability data base used by the  
11 Companies for Exhibit TWG-3 and explored where unacceptable system behavior is  
12 encountered below the 925 MW thermal limit.

13 **Q DID PUBLIC SERVICE INCLUDE A SIMULATION OF THIS NERC C.5**  
14 **CONTINGENCY IN THE EXHIBIT TWG-3 ANALYSIS PERFORMED BY ITS**  
15 **CONSULTANT SIEMENS-PTI?**

16 **A** No, and that is quite disturbing. By observation alone, Public Service should have  
17 recognized that for its Proposed Project a NERC C.5 contingency on the proposed  
18 double-circuit San Luis Valley to Calumet line is likely, from a transient stability  
19 standpoint, the most limiting NERC Category B or C contingency<sup>6</sup> for the delivery of  
20 power from new generating facilities in the San Luis Valley area. It would have taken  
21 very little additional effort for Siemens-PTI to run this one additional contingency as  
22 part of the Exhibit TWG-3 analysis.

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<sup>6</sup>Utilities are required to plan and operate their respective transmission systems to withstand both NERC Category B and Category C contingency events (Exhibit JRD-18).

1    **Q     HAS PUBLIC SERVICE OFFERED AN EXPLANATION IN REGARD TO WHY THIS**  
2    **NERC C.5 CONTINGENCY WAS NOT INCLUDED IN THE TWG-3 ANALYSIS?**

3    A     In response to Trinchera Ranch's Data Request 16-5 when asked why it did not  
4           simulate this contingency, Public Service indicated the Exhibit TWG-3 analysis was  
5           an initial analysis only designed to see if up to 1,200 MW of new generation could be  
6           accommodated under single contingency conditions. This response is contradictory  
7           with the fact that Public Service did have Siemens-PTI consider other contingencies  
8           for transmission lines at the Poncha 230 kV bus for Alternative TR1A that Public  
9           Service would consider a double contingency.<sup>7</sup>

10   **Q     WHAT WAS THE OTHER DEFICIENCY THAT YOU IDENTIFIED?**

11   A     In the power flow models used for the light load transient stability simulations  
12           performed in the TWG-3 analysis, Siemens-PTI incorrectly included a 280 MVA  
13           230/115 kV transformer between the Poncha 115 kV bus and the Waterton 230 kV  
14           bus. There is no such transformer between Poncha and Waterton, which are in the  
15           ballpark of being 100 miles apart. The transformer may have been accidentally  
16           added to the case in the process of adding the planned Poncha 230/115 kV  
17           transformer to the light load power flow model used for the light load transient stability  
18           simulations.

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<sup>7</sup>Based on Public Service's response to Trinchera Ranch's Data Request 15-8, it is clear Public Service considers a single common mode event that causes the loss of two system elements (e.g., two transmission circuits) to be a double contingency.

1    **Q     WHAT WOULD BE THE LIKELY IMPACT OF THE ACCIDENTALLY INCLUDED**  
2    **TRANSFORMER?**

3    A     It likely overstated the performance of the power system in all of the light load  
4    transient stability simulations performed by Siemens-PTI for faults at Poncha and San  
5    Luis Valley.

6    **Q     DOES THIS ISSUE EXIST IN THE PEAK LOAD STABILITY SIMULATIONS**  
7    **PERFORMED BY SIEMENS-PTI?**

8    A     No. The transformer was not accidentally included in any of the power flow models  
9    used for the peak load stability simulations. However, the additional analysis I have  
10   performed with this error corrected shows that transient stability is more limiting for  
11   San Luis Valley generation during light load periods than peak load periods.

12   **Q     WHAT TRANSIENT STABILITY ANALYSIS HAVE YOU PERFORMED TO**  
13   **CORRECT AND EXPAND THE TWG-3 ANALYSIS?**

14   A     First, I corrected the Exhibit TWG-3 models to remove the accidentally included  
15   230/115 kV transformer and also the Parlin 230/115 kV transformer. In response to  
16   Trinchera Ranch's Data Request 20-1, Public Service indicated it had removed this  
17   latter transformer from the Exhibit GMS-8 power flow models because it understands  
18   Tri-State is not currently committed to pursuing it. Therefore, I removed it from the  
19   Exhibit TWG-3 transient stability model.

20            I then ran the NERC Category C.5 contingency at San Luis Valley on the  
21   Companies' proposed double-circuit 230 kV San Luis Valley to Calumet line at light  
22   and peak loads for the Companies' Proposed Project. I then ran a Category B.2  
23   contingency on one of the San Luis Valley-Poncha 230 kV lines under  
24   Alternative TR1A extended to Malta (Alternative TR1AE) at light and peak load

1 conditions. For Alternative TR1AE, this contingency would be most limiting of those  
2 at San Luis Valley. Finally, I performed transient stability simulations of Trinchera  
3 Ranch's Alternative TR1A extended to Malta substation to examine whether it would  
4 resolve the transient stability issues Public Service identified at Poncha for certain  
5 NERC Category C contingencies that involved delayed fault clearing.

6 **Q WHAT WAS THE RESULT OF YOUR RUN OF A NERC CATEGORY C.5**  
7 **CONTINGENCY AT SAN LUIS VALLEY ON THE DOUBLE-CIRCUIT SAN LUIS**  
8 **VALLEY TO CALUMET LINE FOR THE COMPANIES' PROPOSED PROJECT**  
9 **THAT THE COMPANIES DID NOT RUN IN ITS EXHIBIT TWG-3 STUDY?**

10 A With only 675 MW of generation added at San Luis Valley, the simulations were  
11 unstable with a loss of synchronism by San Luis Valley area generation at peak load.  
12 Under light load, the results were unstable at only 600 MW of added generation at  
13 San Luis Valley. Applying the WECC voltage behavior requirements of WECC  
14 Standard TPL-(001 thru 004)-WECC-CR-System Performance criteria  
15 (Exhibit JRD-14), the transient stability limit for new generation is 600 MW at peak  
16 load and between 575 MW and 600 MW under lighter load conditions. These results  
17 are summarized in Exhibit JRD-19.

18 **Q WOULD CONSTRUCTING A DOUBLE-CIRCUIT 345 KV TRANSMISSION LINE**  
19 **FROM SAN LUIS VALLEY TO CALUMET AS PROPOSED BY MR. DOMINGUEZ**  
20 **IN HIS ANSWER TESTIMONY RAISE THIS STABILITY LIMIT?**

21 A No, the limit would be the same. Such a reinforcement would only strengthen the two  
22 transmission circuits that are already being lost under this contingency. It would not  
23 decrease the fault current drain on the San Luis Valley area generators during the  
24 fault, nor strengthen the network that the San Luis Valley area generation is left on

1 after the fault clears. Therefore, it is not an option that would improve transient  
2 stability performance for this contingency.

3 **Q YOU HAVE IDENTIFIED A THERMAL LIMIT OF 850 MW AT PEAK LOAD AND**  
4 **BETWEEN 750 MW AND 850 MW AT LIGHTER LOADS FOR THE EXTENDED**  
5 **VERSION OF ALTERNATIVE TR1A (“ALTERNATIVE TR1AE”). HAVE YOU**  
6 **EXAMINED WHETHER THIS IS REALIZABLE FROM A TRANSIENT STABILITY**  
7 **PERSPECTIVE?**

8 A Yes. The simulations I performed showed that a Category B contingency on either of  
9 the San Luis Valley to Poncha 230 kV lines under Alternative TR1AE did not exhibit  
10 unstable results up to at least 650 MW of added San Luis Valley generation at peak  
11 load and at least 575 MW of added San Luis Valley generation at light load.  
12 However, WECC voltage behavior criteria was not met at these generation levels.  
13 Enforcing, WECC voltage behavior criteria, the transient stability limit for  
14 Alternative TR1AE added for San Luis Valley generation is 575 MW at peak load and  
15 between 550 and 575 MW at lighter loads. These simulations were performed using  
16 the same models in the same manner as in my simulations of the Companies’  
17 Proposed Project (Alternative 1). These simulations are also summarized in  
18 Exhibit JRD-19. These results are not surprising as this contingency leaves the San  
19 Luis Valley area generation on the same network configuration after the fault is  
20 cleared as the NERC C.5 contingency does under the Companies’ Proposed Project.  
21 However, it is very important to note that these results show that when transient  
22 stability is considered, Alternative TR1AE and the Companies’ Proposed Project  
23 provide nearly the same physical delivery capacity for new San Luis Valley  
24 generation – approximately 600 MW.

**Q     COULD THE TRANSIENT STABILITY LIMIT WHICH CAPS THE DELIVERY OF  
POWER FROM NEW GENERATION FROM THE SAN LUIS VALLEY AREA TO  
APPROXIMATELY 600 MW FOR BOTH THE COMPANIES' PROPOSED PROJECT  
AND YOUR ALTERNATIVE TR1AE BE RAISED BY ADDING ADDITIONAL  
TRANSMISSION FACILITIES OUT OF THE SAN LUIS VALLEY AREA?**

**A**     Yes, absolutely. Adding additional transmission facilities out of the San Luis Valley area would allow the transient stability limit to be raised for both Alternative TR1AE and the Companies' Proposed Project.

**Q     COULD THE STABILITY LIMIT BE RAISED FOR BOTH ALTERNATIVES WITH A  
GENERATION RAS?**

**A**     Yes. The transient stability limit for both Alternative TR1AE and the Companies' Proposed Project could be increased through the use of a generation tripping RAS for the San Luis Valley contingencies that set the transient stability limit.

**Q     WHAT WERE THE RESULTS OF YOUR RERUN OF THE PONCHA AREA  
CONTINGENCIES WHICH THE COMPANIES' EXHIBIT TWG-3 ANALYSIS  
SUGGESTED MAY BE AN ISSUE FOR ALTERNATIVE TR1A?**

**A**     I reran the four most limiting of those contingencies under Alternative TR1AE with 600 MW of added San Luis Valley generation at peak load and 550 MW of added San Luis Valley generation at light load. I modeled the Malta extension as a new 52-mile single circuit 230 kV transmission line from the Malta 230 kV substation that is interconnected into the Poncha 230 kV ring bus between the existing Poncha-Curecahti 230 kV line and the proposed Poncha 230/115 kV transformer as these latter facilities are shown interconnected on page 21 of Exhibit TWG-3. A new 230 kV circuit breaker would be needed at Poncha to facilitate this interconnection.

My simulations, which are detailed in Exhibit JRD-20, all yielded stable results and met WECC voltage behavior criteria. Therefore, the Malta extension to Alternative TR1A (Alternative TR1AE) fully resolves any potential issues with NERC Category C contingencies at Poncha.

***C. Summary of Surrebuttal Testimony on Physical  
Deliverability of New Renewable Resources***

**Q CAN YOU PLEASE SUMMARIZE YOUR TESTIMONY ON PHYSICAL  
DELIVERABILITY?**

A Yes. The limit on physical deliverability is set by the lower of the thermal, voltage and stability limits on power transfers. Exhibit TWG-1 and Exhibit JRD-1 studies only examined thermal limits. Neither the Companies nor I have identified a voltage limit that is more limiting than the thermal limit.

As expanded by the Exhibit GMS-8 power flow analysis and the supplemental power flow analysis summarized in Exhibits JRD-16 and JRD-17, on a non-simultaneous basis, the thermal limits for new San Luis Valley area generation are as follows:

<b><u>Description</u></b>	<b><u>Companies' Alternative 1</u></b>	<b><u>Trinchera Ranch's Alternative TR1AE</u></b>
Peak Load	925 MW	850 MW
Light Load	925 MW	750 MW

1                   However, my surrebuttal transient stability analysis revealed the following  
2 transient stability limits that can undercut both the thermal limits:

<b><u>Description</u></b>	<b><u>Companies' Alternative 1</u></b>	<b><u>Trinchera Ranch's Alternative TR1AE</u></b>
Peak Load	600 MW	575 MW
Light Load	575 MW	550 MW

3                   When combined to reflect the most restrictive of the limits for each alternative  
4 load level, the following physical limits for the non-simultaneous delivery of power  
5 from new San Luis Valley generation result:

<b><u>Description</u></b>	<b><u>Companies' Alternative 1</u></b>	<b><u>Trinchera Ranch's Alternative TR1AE</u></b>
Peak Load	600 MW	575 MW
Light Load	575 MW	550 MW

6                   Thus, when transient stability limits are considered, both the Companies'  
7 Proposed Project and Trinchera Ranch's Alternative TR1A support up to  
8 approximately 600 MW of additional generation in the San Luis Valley area on a  
9 non-simultaneous basis. However, Alternative TR1AE can do so at a considerable  
10 \$18 million lower cost than the Companies' Proposed Project.

11                   In addition, of the respective thermal limits of the two alternatives, Trinchera  
12 Ranch's Alternative TR1AE fully accommodates the 2009 All Source RFP resources  
13 of Public Service at Calumet, while the Companies' Alternative 1 would only  
14 accommodate 50 MW to 100 MW of added generation at Calumet.



**V. Conclusions**

**Q CAN YOU PLEASE SUMMARIZE YOUR TESTIMONY?**

- A
- While the Companies' Alternative 1 can support a thermal transmission limit of 925 MW at San Luis Valley, it can only do so at the expense of limiting Calumet generation additions to 50 MW to 100 MW, which is less than the 200 MW to 250 MW range of the new resources at Calumet in Public Service's recently approved 2007 Resource Plan. Trinchera Ranch's Alternative TR1AE does not face this same limitation and can accommodate the resources at Calumet. Trinchera Ranch Alternative TR1AE supports a thermal transmission limit of 850 MW at San Luis Valley and simultaneous additions of new resources at Calumet up to 300 MW.
  - The Companies' rebuttal testimony does not change my answer testimony's conclusion that the Companies have not shown the need for the San Luis Valley-Calumet portion of their Proposed Project (Alternative 1). In addition, the Companies' rebuttal testimony confirms that they have not adequately studied feasible alternatives to the San Luis Valley-Calumet transmission line portion of the Companies' Proposed Project.
  - The Companies' rebuttal testimony does not change my answer testimony's conclusion that the Trinchera Ranch alternatives resolve the voltage collapse-related reliability issue in the San Luis Valley for a cost of between \$15 million and \$66 million, which is \$24 million to \$75 million less than the Proposed Project.
  - The Trinchera Ranch alternatives provide redundancy and any potential reliability advantage of the Companies' Proposed Project in this respect is negligible and not justified by the substantial additional cost.
  - While the Companies' rebuttal analysis correctly shows that Alternative TR1A will support 575 MW of new generation in the San Luis Valley area under peak load conditions and between 475 MW and 575 MW under lighter load conditions, this is still over 100 MW in excess of the upper range of the renewable resources that Public Service may purchase under its approved 2007 Resource Plan.
  - If Trinchera Ranch's Alternative TR1A is extended 52 miles further north of Poncha to interconnect with Public Service's backbone 230 kV system at Malta substation, the line addition would be able to support up to 850 MW of new generation in the San Luis Valley area under peak load conditions and between 750 MW and 850 MW under lighter load conditions based on thermal transmission limitations. This extended version of Alternative TR1A (Alternative TR1AE) would still be \$18 million less expensive than the Proposed Project.
  - After I corrected and broadened the Companies' analysis, when transient stability limits are considered, both the Companies' Proposed Project and Trinchera Ranch's Alternative TR1AE can only support generation additions in the San Luis Valley of approximately 600 MW without additional transmission reinforcements or a Remedial Action Scheme ("RAS").

- 1 • A generation-tripping RAS could be used to raise the transient stability limit to: (i)  
2 the 750 MW to 850 MW thermal limit of the extended version of Trinchera  
3 Ranch's Alternative TR1A; or (ii) the 925 MW thermal limit of the Companies'  
4 Proposed Project.
- 5 • Both the extended version of Alternative TR1A and the Proposed Project could be  
6 expanded above the 750 MW to 925 MW level through similar additional  
7 transmission line reinforcements toward Poncha in the north and east from  
8 Poncha toward Comanche.
- 9 • The Trinchera Ranch alternatives are compatible with long-term plans and  
10 contribute toward achieving those long-term plans at a significantly lower cost  
11 than the Companies' Proposed Project by providing transmission capability in  
12 excess of that required for the delivery of reasonably foreseeable renewable  
13 resources while offering a base that can be built upon to accommodate future  
14 renewable resources that are less likely.

15 **Q DOES THIS CONCLUDE YOUR SURREBUTTAL TESTIMONY?**

16 **A** Yes, it does.

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