Xcel Energy[SM]

PUBLIC SERVICE COMPANY

IN THE MATTER OF THE APPLICATION OF PUBLIC SERVICE COMPANY OF COLORADO FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE SAN LUIS VALLEY – CALUMET – COMANCHE TRANSMISSION PROJECT

DIRECT TESTIMONY AND EXHIBIT OF

THOMAS W. GREEN

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

IN THE MATTER OF THE APPLICATION OF PUBLIC SERVICE COMPANY OF COLORADO FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE SAN LUIS VALLEY – CALUMET - COMANCHE TRANSMISSION PROJECT	))))))	**DOCKET NO. 09A-____E**

DIRECT TESTIMONY AND EXHIBITS OF THOMAS GREEN

I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Thomas Green. My business address is 550 15th Street, Denver, Colorado 80202.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by Public Service Company of Colorado ("Public Service" or "Company"). I am an Electrical Engineer specializing in Transmission Planning, and work in the department of Transmission Asset Management.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS DOCKET?

A. I am testifying on behalf of Public Service. However I understand that my testimony may also be used in support of the Tri-State Generation and Transmission Association, Inc. ("Tri-State") companion CPCN application for this joint project.

Q. HAVE YOU PREPARED A STATEMENT OF YOUR EXPERIENCE AND QUALIFICATIONS?

A. Yes. That statement is included as Attachment A to my testimony.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to address the need for the San Luis Valley – Calumet - Comanche Transmission Project ("SLV–Comanche Project" or "Project"). I describe why the project is needed both for regional reliability and for accommodating potential resources in Energy Resource Zones ("ERZs" or "Zones") 4 and 5 consistent with Senate Bill 07-100 ("SB07-100"). I describe the evaluation of system alternatives, and explain the criteria and objectives used for the studies.

II. DESCRIPTION OF PROJECT

Q. DESCRIBE THE SAN LUIS VALLEY – CALUMET – COMANCHE TRANSMISSION PROJECT.

A. As the name implies, the Project consists of establishing new transmission between the San Luis Valley and the Comanche Substations, connecting to a new Calumet Substation in between. Although we view this transmission project as a single project, it is comprised of four major components:

1. The San Luis – Calumet Transmission Segment: The first transmission component consists of approximately 95 miles of new double-circuit 230 kV transmission between the San Luis Valley Substation and the new Calumet Substation. This is the San Luis Valley to Calumet Segment. Each transmission circuit in this Segment will have a thermal capability of at least 600 MVA each, using 1272 kcmil conductors.
2. The Calumet – Comanche Transmission Segment: The second transmission component consists of approximately 45 miles of new

double-circuit 345 kV transmission between the Calumet Substation and the existing Comanche Substation near Pueblo Colorado. This is the Calumet to Comanche Segment. Each line or circuit in this Segment is being designed to have a thermal capability of carrying at least 1700 MVA each, using bundled 1272 kcmil conductors.

3. The Calumet Substation: Another major component is the new Calumet Substation, which is planned to be located near Walsenburg, Colorado and the existing Walsenburg Substation. Original transmission plans contemplated building new transmission from the existing San Luis Valley Substation to the existing Walsenburg Substation. However, due to space limitations at Walsenburg Substation, a new substation will be required. The Calumet Substation will be located approximately six miles north of Walsenburg Substation. It will be located adjacent to, and also interconnect with the existing Walsenburg – Comanche 230 kV line. The substation will allow for 230 kV and 345 kV operation by including two 230/345 kV autotransformers, and transmission line termination equipment. The substation will be constructed so that it can accommodate potential generation interconnections.

4. The Calumet – Walsenburg Transmission Segment: The final component consists of a new six-mile 230 kV transmission line that will be added between Calumet Substation and the Walsenburg Substation. Since the new Calumet Substation will interconnect the existing Walsenburg – Comanche 230 kV line, it will create a Walsenburg – Calumet 230 kV line and a Calumet – Comanche 230 kV line. There is an existing 115 kV line that runs parallel to the Walsenburg – Calumet 230 kV line (the Walsenburg – West Station 115 kV line). Between Calumet and Walsenburg, that line will be rebuilt to a double-circuit 230 kV capable transmission line. One of the circuits will consist of the existing 115 kV line. The other circuit will create a second 230 kV circuit from Calumet to Walsenburg.

Q. DOES THE PROJECT PROVIDE FOR GENERATOR INTERCONNECTIONS?

A. Yes. As part of the project, Public Service intends to install termination equipment at both the San Luis Valley and Calumet Substations to allow for generator interconnections. This interconnection equipment is not included in the current cost estimates.

III. PURPOSE OF PROJECT

Q. WHY ARE YOU PROPOSING THE SAN LUIS VALLEY – CALUMET - COMANCHE TRANSMISSION PROJECT?

A. The Project is needed for two key reasons. First, to improve the reliability of the local electrical system in south-central Colorado. Second, to accommodate potential new generation resources. The Project enhances reliability by providing a second transmission source to Tri-State and Public Service loads in the San Luis Valley. In addition, the Project eliminates the Comanche - Walsenburg remedial action scheme, improving reliability between Pueblo and northeastern New Mexico. The Project will accommodate new resources by relieving transmission constraints in the region. As Mr. Stellern explains, the Company is proposing to construct this Project under SB07-100.

Q. WHY IS THE PROJECT NEEDED FOR RELIABILITY?

A. Presently, both Tri-State and Public Service have customers in the San Luis Valley region. The San Luis Valley customer loads are at the end of a radial transmission network that originates to the north, near Poncha Springs Colorado. The network consists of only two parallel transmission lines: a 115 kV line and a 230 kV line. Public Service owns the 115 kV line, which was constructed in the 1950's. The 230 kV line is jointly owned by Public Service and Tri-State and was built in the early 1980's. For several years, customers have risked losing electrical service during an outage of the 230 kV line. There is a small amount of generation in the region, but it is rarely used because of cost. As a result, Tri-State has been exploring a Walsenburg – San Luis Valley 230 kV transmission line for several years. The San Luis Project will provide a second transmission source to the region and increase reliability by allowing continuous service for both system intact and contingency conditions. This benefits both Public Service and Tri-State customers.

Another way that this Project improves reliability is the increased flexibility it creates for system operation and future improvements. By providing a second transmission source to the San Luis Valley, existing transmission elements can be taken out of service when needed for upgrades to allow the addition of more generation resources in the future.

In addition, the Project will eliminate Tri-State's Comanche - Walsenburg remedial action scheme. If a single outage event occurs on Tri-State's existing Comanche-Walsenburg 230 kV transmission line, the 115 kV West Station - Stem Beach - Walsenburg line overloads. The remedial action scheme immediately trips the Walsenburg-Gladstone 230 kV line, which reduces the load serving capability on the 115 kV system in northeast New Mexico. This forces Tri-State to remove load in northeast New Mexico.

Tri-State witness Andrew Leoni discusses the reliability issues in more detail in his direct testimony.

Q. HOW DOES THE PROJECT ACCOMMODATE NEW GENERATION RESOURCES?

A. As Mr. Stellern explains in his direct testimony, the Company has identified five ERZs pursuant to SB07-100. This Project will affect both Zones 4 and 5, which have been shown to have the highest potential in the state for solar generation development. Studies have demonstrated that the transmission capacity in Zones 4 and 5 is constrained. This Project creates new high-voltage transmission that will allow energy from Zones 4 and 5 to be delivered to customers along the Front Range and throughout Colorado.

Q. DESCRIBE HOW THE PROJECT WILL ALLEVIATE THE TRANSMISSION CONSTRAINTS IN ZONE 4.

A. The San Luis Valley lies within Zone 4. Just as there are constraints in bringing power into the area to serve loads, the same constraints limit the amount of power that can be delivered out. Any additional generation development would have to exit the region using the two lines described previously. An outage of either line would result in tripping off the generation and would likely cause loss of load as well. Some studies have shown that around 100 MW of new generation could be developed without any new transmission, but during peak loading conditions, most of the power would likely be consumed in the valley. Building two new high-voltage transmission circuits out of the San Luis Valley relieves the constraints that presently exist and will facilitate the development of new generation resources in Zone 4.

Q. DESCRIBE HOW THE PROJECT WILL ALLEVIATE THE TRANSMISSION CONSTRAINTS IN ZONE 5.

A. The Calumet, Walsenburg, and Comanche Substations are all within Zone 5. Public Service has done some preliminary analysis through generator interconnection request studies. The studies indicate that the transmission system as planned for 2011 can accommodate at least 300 MW in Zone 5 at or near Comanche. Any generation development beyond that level will require additional transmission to be built. With this Project, two new 345 kV transmission circuits will be built from Calumet Substation to Comanche. The two 345 kV lines from Calumet will carry power from the San Luis Valley 230 kV lines as well as new generation interconnected at Calumet, and deliver it to customers along the Front Range. This will relieve constraints and facilitate the development of new generation resources in Zone 5 at or near Walsenburg.

Q. HOW MUCH NEW GENERATION WILL THE PROJECT ACCOMMODATE?

A. The amount of generation varies, depending on how the generation is operated at each of the San Luis Valley and Calumet Substations. Studies indicate that the Project will accommodate at least 750 MW of generation at San Luis Valley, if no generation is added at Calumet. The Project can accommodate approximately 1400 MW of new generation at or near Calumet if there is no new generation at San Luis Valley. However, the numbers cannot be added together to get the overall simultaneous level, since there is interaction between the two locations. Depending on system conditions, the simultaneous level can be as low as 750 MW, and as high as 1500 MW.

The studies are described in Exhibit No. TWG-1, the San Luis Valley – Calumet - Comanche Transmission Project Study Report.

IV. SYSTEM ALTERNATIVES/STUDY REPORT

Q. WERE STUDIES PERFORMED TO DETERMINE THE APPROPRIATE TRANSMISSION UPGRADES TO ACCOMMODATE MORE GENERATION RESOURCES IN ZONES 4 AND 5?

A. Yes. Tri-State and Public Service led study efforts, including benchmark and alternative evaluations, and the results have been summarized in a Study Report, filed with my testimony as Exhibit No. TWG-1.

Q. COULD YOU DESCRIBE YOUR STUDY PROCESS?

A. According to requirements of the Federal Energy Regulatory Commission, the transmission planning process is open to all affected parties and interested stakeholders. The planning process is intended to facilitate the development of electric infrastructure that maintains reliability and responds to service requests.

In addition to their local transmission planning process, Public Service planners coordinate their transmission planning with other transmission providers and stakeholders in the Rocky Mountain region, and the Western Interconnection as a whole, including active participation in the Colorado Coordinated Planning Group ("CCPG"). After SB07-100 was passed, a Subcommittee was formed within the CCPG whose purpose was to focus on developing transmission plans for each of the SB07-100 ERZs. CCPG is a forum that facilitates open discussion and joint planning efforts for the transmission system in the Rocky Mountain Region, which is primarily Colorado and southeastern Wyoming. The purpose of the SB07-100 Workgroup is to provide an open forum for electric load-serving entities ("LSE's") and other interested stakeholders to participate in the SB07-100 transmission studies. The SB07-100 Workgroup met on a regular basis throughout 2008. In November 2008, Public Service filed with the Commission an informational document that listed each of the transmission plans that were developed. It also provided a priority ranking for each of the projects. The Project was listed as the top priority for proceeding with a CPCN.

Q WHAT OBJECTIVES WERE USED IN THE SYSTEM STUDIES?

A. The basic objectives were to:

1. Improve the reliability of the regional transmission networks in accordance with North American Electric Reliability Council ("NERC") Standards and Western Electricity Coordinating Council ("WECC") Criteria.
2. Identify a transmission plan that will reliably alleviate constraints to ERZs 4 and 5 to accommodate a reasonable amount of beneficial generation resources capable of meeting or exceeding resource needs.
3. Quantify the potential costs of the transmission plan.
4. Allow for future expansion of the transmission network when required.

5. Conduct joint studies in a coordinated, open and transparent manner, including coordination with CCPG planning activities and the plans of other load-serving entities.

Q. HOW WAS RELIABILITY MEASURED?

A. Public Service and Tri-State adhere to Planning Standards set forth by the NERC and Reliability Criteria published by the WECC. The specifics of those criteria are discussed in the Study Report. Reliability can be measured by how well an alternative meets study criteria. The NERC Standards and WECC Criteria state that following a disturbance and/or outage on the system, the power loading on transmission elements must remain within acceptable limits.

Q. DID YOU PERFORM A BENCHMARK ANALYSIS DURING YOUR STUDY PROCESS?

A. Yes. A normal practice in performing transmission planning studies is to perform benchmark analysis. This is done to determine the loading conditions of the existing system prior to including additional generation resources in our powerflow models. In the analysis, we benchmarked system performance without additional generation resources. Then, with the new generation added to the study models, transmission alternatives were evaluated based on their ability to achieve at least the same level of performance as was observed with the benchmark case.

Q. WHY IS PERFORMING A BENCHMARK ANALYSIS IMPORTANT?

A. It is important because it allows us to assess the system performance of the existing system to determine its limitations prior to making system modifications. When generation is added to the system, there is the potential for unacceptable loading conditions on the existing transmission network. By performing benchmark analysis, the impacts of new generation can be distinguished from the impacts due to other regional loading conditions. Unless other agreements are made, the mitigation of unacceptable transmission performance due to load growth is the responsibility of the utility that serves that load. In other words, if benchmarking studies show that a neighboring system needs to upgrade its transmission systems to serve its load growth regardless of other system changes or generation additions, it is not the responsibility of the entity interconnecting new generation to improve other transmission systems merely because new generation is being added.

When the transmission alternatives were evaluated, the resulting system performance was compared with the performance of the benchmark model without additional generation resources. The benchmarking analysis is explained in Exhibit No. TWG-1.

Q. WHAT TRANSMISSION PROJECTS WERE INCLUDED IN THE BENCHMARK MODELS?

A. Our study used system models that represented 2015 peak summer conditions. The transmission network, customer loads, and generation resources were adjusted for those conditions. In addition to the existing system, transmission that is planned to be in service in the 2015 time frame was modeled in the benchmark study cases. This includes Public Service planned projects such as the Comanche – Daniels Park 345 kV Transmission Project, the Midway – Waterton 345 kV Transmission Project, and the Pawnee – Smoky Hill 345 kV Transmission Project. Some projects identified through the Colorado Long Range Transmission Planning Group ("CLRTPG") and SB07-100 studies were also included such as new high-voltage transmission from Lamar to Comanche. Since Tri-State was already planning two 230 kV reliability projects in the region, the benchmark analysis included those projects. Those projects were the San Luis Valley – Walsenburg 230 kV project, and the Boone – Stem Beach – Walsenburg 230 kV project.

Q. WHAT DID THE BENCHMARK ANALYSIS CONCLUDE?

A. First, the benchmark analysis identified several areas of the regional transmission system that were susceptible to unacceptable performance, even without new generation additions. These areas were monitored during the course of studies. The benchmark analysis also identified areas of the system that appeared to be sensitive to the addition of generation in the area. These areas were also monitored. Overall, the studies concluded that the benchmark system, which included a single 230 kV line from San Luis Valley to Walsenburg to Boone, would provide the needed reliability to the region. The benchmark analysis also determined how much generation could be added at San Luis Valley and Walsenburg with only Tri-State's original 230 kV single-circuit transmission plan.

Q. HOW MUCH NEW GENERATION COULD THE BENCHMARK SYSTEM ACCOMMODATE?

A. The benchmark system, consisting of a single 230 kV line from San Luis Valley – Walsenburg – Boone, could accommodate at least 1100 MW on a simultaneous basis.

If measures are taken to mitigate contingency overloads on the San Luis Valley 230/115 kV transformers, approximately 600 MW of generation could be added at San Luis Valley. Without making those improvements, approximately 450 MW of generation could be added at or near San Luis Valley. When we analyzed adding 450 MW to the San Luis Valley 230 kV bus, the San Luis 230/115 kV transformers showed a tendency to load to 100% of their rated capacity. In addition, approximately 500 MW could be added at Walsenburg when San Luis Valley generation is at 600 MW.

Q. HOW WERE TRANSMISSION ALTERNATIVES DEVELOPED?

A. As I stated, studies showed that the benchmark system could accommodate 1100 MW with a single 230 kV line from San Luis Valley to Walsenburg to Boone. However, transmission alternatives were developed to evaluate how the benchmark 230 kV system could be expanded to get even higher amounts of generation out of Zones 4 and 5. Each of the alternatives looked at increasing the transmission capacity from San Luis Valley to Calumet to Comanche.

Q. WHAT TRANSMISSION ALTERNATIVES DID THE COMPANY CONSIDER?

A. Five basic alternatives were considered:

Alternative 1: San Luis Valley – Calumet double-circuit 230 kV; Calumet – Comanche double-circuit 345 kV and Calumet – Walsenburg single-circuit 230 kV.

Alternative 2: San Luis Valley – Walsenburg double-circuit 230 kV; Walsenburg – Stem Beach – Comanche – Boone single-circuit 230 kV.

Alternative 3: San Luis Valley – Comanche single-circuit 345 kV; San Luis Valley – Walsenburg single-circuit 230 kV; Walsenburg – Stem Beach – Comanche - Boone single-circuit 230 kV..

Alternative 4: San Luis Valley – Calumet double-circuit 230 kV; Calumet – Walsenburg single-circuit 230 kV; Calumet – Comanche single-circuit 345 kV.

Alternative 5: San Luis Valley – Calumet double-circuit 345 kV; Calumet – Comanche double-circuit 345 kV; Calumet – Walsenburg single-circuit 230 kV.

Alternative 1 is the Project. Alternatives 2 and 3 were evaluated prior to evaluating the Project. These two alternatives were briefly studied, but were discarded early in the process. Although they provided reliability benefits and could allow new generation at San Luis Valley, they did not allow for new generation injections in Zone 5. Therefore other alternatives looked at developing a new Calumet Substation that could provide generator interconnections in Zone 5.

Alternative 3 also did not accommodate new generation in Zone 5, or near Walsenburg, so it was also discarded.

The remaining alternatives (4 and 5) were variations of the Project (Alternative 1). Alternative 4 looked at having only a single 345 kV line between Calumet and Comanche. That alternative did not allow a significant amount of generation to be added to Zone 5, so it was discarded. Alternative

5 evaluated replacing the double-circuit 230 kV line between San Luis Valley and Calumet with double-circuit 345 kV transmission.

Q. HOW DID ALTERNATIVE 5 COMPARE TO THE PROPOSED ALTERNATIVE 1?

A. Studies showed that if the transmission system between San Luis Valley and Calumet were operated at 345 kV instead of 230 kV, the level of simultaneous generation from Zones 4 and 5 did not change significantly.

Alternative 5 was not preferred for several reasons. First, the additional cost to construct the San Luis Valley to Calumet Segment at 345 kV is estimated to be $54 million. Second, Alternative 5 did not improve performance from Zone 5 compared to the Project. Perhaps most important, both Alternative 1 and Alternative 5 are limited by similar regional performance issues that constrain injection capacity, thus there is no clear advantage to Alternative 5 over the Project.

Q. CAN YOU EXPLAIN WHAT YOU MEAN BY OTHER REGIONAL ISSUES?

A. One of the significant findings from the studies is that the level of San Luis Valley generation is not limited by the Project, but by other transmission limitations in the region and beyond. In other words, the amount of generation that could be added at San Luis Valley was limited by several transmission elements, but not the new transmission alternatives. This was found to be true for both Alternative 1 and Alternative 5. In order to fully utilize the capabilities of either alternative, each of these other limitation issues will need to be addressed.

Q. WHAT ARE THE OTHER TRANSMISSION LIMITATION ISSUES?

A. As the study report Exhibit No. TWG-1 shows, there are several areas of the system that limit the generation output at San Luis Valley. These include:

1. The San Luis Valley 230/115 kV transformer;
2. The San Luis Valley – Poncha 115 kV line;
3. The 69 kV system between San Luis Valley and Poncha;
4. The West Canon 230/115 kV transformer;
5. The Walsenburg 230/115 kV transformer;
6. The transmission system west of Poncha;
7. The Black Hills system north of Comanche;
8. The Colorado Springs Utilities system north of Midway; and
9. The transmission system in the South Metro Denver area.

Some of these issues may be addressed through operating procedures, or by allowing higher loading during contingency conditions. However, those measures will only work to a certain extent before significant upgrades or additional transmission will be required. Due to the number of issues, and also since some of the issues are on other entities' systems, it is impossible to quantify the cost of complete resolution. Additional detailed studies involving all affected parties will be required to develop recommendations and costs for mitigation.

Q. WHY CAN'T PUBLIC SERVICE DEVELOP A PROJECT THAT AVOIDS OTHER SYSTEM LIMITATIONS?

A. That is generally a primary goal of transmission planning. One of the major objectives is to develop projects that can increase transfer capacity or allow for generator interconnections without impacting other transmission systems. However, given the integrated nature of the transmission systems, that cannot always be the case. In Zones 4 and 5, we are looking at building large-scale transmission to accommodate around 1000 MW of new generation. We are required to evaluate performance based on the loss of any single element. This is referred to as contingency, or N-1 analysis. Due to the fact that the transmission system is interconnected, new generation gets distributed over the existing network and the new transmission network, regardless of the size of the new transmission project. As the generation level is increased, the impacts to the parallel networks also increase. Regardless of whether the San Luis Valley – Calumet Segment is 230 kV or 345 kV, the regional contingency issues will have to be addressed to achieve more than 1500 MW of simultaneous generation in Zones 4 and 5. Since those issues could easily run into the hundreds of millions of dollars, Tri-State and Public Service did not feel it was cost effective to "upsize" the proposed project. In addition, a project that can allow upwards of 1500 MW of new generation can meet resource requirements for years to come.

Q. WHAT DID THE STUDY REPORT CONCLUDE REGARDING THE PREFERRED ALTERNATIVE?

A. The Project meets study objectives and is the preferred alternative. As mentioned previously, there are currently significant transmission constraints between the Zones 4 and 5 and the Front Range load centers. The Project is a prudent solution that will allow approximately 1500 MW of new resources from Zones 4 and 5 to Front Range loads under the study conditions. As it is now designed, the Project will be a building block for future upgrades when the needs or resource development requires it. Building the San Luis Valley – Calumet - Comanche Transmission Project is the recommended project. The Project:

1. Improves the reliability of the regional transmission networks
2. Alleviates constraints to Energy Resource Zones 4 and 5 and accommodates approximately 1500 MW of new generation resources.
3. Is the most cost-effective solution. Alternative 1 costs are estimated to be $180 million. Alternative 5 costs are estimated to be about $54 million higher, or $234 million. Included in that cost is the requirement for more right-of-way, and larger structures, each of which degrade the aesthetic impacts of the project.
4. Allows for future expansion. The report lists several areas of the system for which future upgrades and expansion can increase the amount of generation that can be allowed in the region. These include replacing or adding 230/115 kV transformers at San Luis Valley, replacing or adding 230/115 kV transformers at Walsenburg, building new transmission from San Luis Valley to Poncha, and building new transmission from Poncha to Midway or Comanche.

5. Has been coordinated through CCPG planning activities and the plans of other load-serving entities.

Q. HOW DOES THE SAN LUIS VALLEY – CALUMET – COMANCHE PROJECT FIT IN WITH LONGER RANGE TRANSMISSION PLANS IN THE STATE?

A. The Project has also been identified in studies performed by the CLRTPG and in studies for SB07-100. The CLRTPG and SB07-100 study groups are workgroups of the CCPG. The CLRTPG was formed to jointly evaluate the development of coordinated long-range (2018) transmission plans for the CCPG footprint. Most of the participants in the SB07-100 Work Group were also involved with the CLRTPG Workgroup. The CLRTPG and SB07-100 groups performed studies and concluded that a high-voltage transmission project from San Luis Valley to Walsenburg to Comanche could accommodate approximately 2000 MW in Zones 4 and 5. However, the goal of the report was to develop high-voltage backbone plans, and not all underlying system issues were addressed in that study. This study is consistent with the CLRTPG study in that it recommends high voltage transmission between San Luis Valley and Comanche. However, since the analysis evaluated impacts to the underlying system, the simultaneous injection level was found to be reduced to 1500 MW.

Q. DID YOU CONSIDER HOW THE TRANSMISSION SYSTEM COULD BE FURTHER DEVELOPED IN THE FUTURE TO ACCOMMODATE EVEN MORE RESOURCES IN THE REGION?

A. Yes. As mentioned previously, studies identified several areas of the system that are susceptible to contingency overloads, and therefore limit the amount of generation development in Zones 4 and 5. The first step towards increasing the amount of generation in Zones 4 and 5 is to address each of the local area issues. The issues are not confined to a single area, and would entail improvements to other entity's systems, including Black Hills, Colorado Springs, and Western Area Power Administration.

The next step would be to implement low cost options such as operating procedures including opening lines and curtailing generation. Higher cost options, but less than the incremental cost of Alternative 5, would include additional high-voltage transmission out of the San Luis Valley. One alternative would be to build new, or rebuild existing transmission north of the San Luis Valley to Poncha and then on into the Front Range. Generally speaking, if an additional 230 kV line was built out of the San Luis Valley, there would be four 230 kV lines to deliver power out of Zone 4. Theoretically, if each 230 kV line had a continuous rating of 600 MW, then a total of approximately 2000 MW of generation could be developed in the San Luis Valley alone under that configuration; however, the limitations outside of the San Luis Valley would still exist so these levels would not be possible without significant, costly and wide spread upgrades to the transmission system

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

Attachment A
Statement of Qualifications
Thomas W. Green

B.S., Electrical Engineering, University of Colorado, 1984.
Registered Professional Engineer, State of Colorado.

Over twenty-five years experience in performing planning and operating studies to analyze the power transmission system. Over ten years experience with Public Service Company of Colorado (PSCo) Transmission Asset Management. Interim Manager of Transmission Reliability and Assessment between July 2004 and November 2005. Helped manage the planning studies for the 2003 Least Cost Resource Plan. Directly or indirectly involved with the preparation of transmission studies, testimonies and exhibits during Certificate of Public Convenience and Necessity (CPCN) processes for the following projects:

- Pawnee – Smoky Hill 345 kV Transmission Project
- Midway – Waterton 345 kV Transmission Project
- Comanche – Daniels Park 345kV Transmission Project
- Chambers 230/115kV Interconnection Project
- Midway – Daniels Park Rebuild Project
- Steamboat Looped 230kV Transmission Line.

Broad comprehension of the Western Electricity Coordinating Council ("WECC") electrical system, with particular understanding of the Denver-metro and Colorado regions. Experienced in the evaluation of electrical system performance and capabilities, and planning for necessary system upgrades. Ability to determine transfer capability for both static and dynamic limitations. Knowledge of regional and federal guidelines and criteria for system planning, including WECC and North American Electric Reliability Council ("NERC") regulations. Familiar with processes of load forecasting, regional planning, and modern concepts and technologies such as HVDC operation. Participant on many engineering committees and study groups, both regional and WECC wide.