

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

IN THE MATTER OF THE APPLICATION OF )  
TRI-STATE GENERATION AND TRANSMISSION )  
ASSOCIATION, INC. FOR A CERTIFICATE OF )  
PUBLIC CONVENIENCE AND NECESSITY FOR ) PROCEEDING NO. 18A \_\_\_\_\_  
THE GATEWAY TRANSMISSION PROJECT, AND )  
FOR SPECIFIC FINDINGS WITH RESPECT TO )  
MAGNETIC FIELDS AND AUDIBLE NOISE )

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**DIRECT TESTIMONY AND ATTACHMENTS OF  
TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION, INC. WITNESS  
GRANT D. LEHMAN**

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1 **I. INTRODUCTION AND QUALIFICATIONS**

2 **Q: PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

3 A: My name is Grant D. Lehman. My business address is 1100 West 116<sup>th</sup> Avenue,  
4 Westminster, Colorado 80234.

5 **Q: BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

6 A: I am employed by Tri-State Generation and Transmission Association, Inc. ("Tri-  
7 State") as Senior Manager, Transmission Engineering and Construction.

8 **Q: ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS DOCKET?**

9 A: I am testifying on behalf of Tri-State.

10 **Q: HAVE YOU PREPARED A STATEMENT OF YOUR EXPERIENCE AND**  
11 **QUALIFICATIONS?**

12 A: Yes. A statement of my experience and qualifications is attached to my  
13 testimony as **Attachment GDL-1**.

14 **Q: PLEASE DESCRIBE BRIEFLY YOUR BACKGROUND AND EXPERIENCE IN**  
15 **THE ELECTRIC UTILITY INDUSTRY.**

16 A: I have over 20 years of experience in the electric utility industry. In my present  
17 position, I am responsible for the electrical and civil engineering functions,  
18 construction and construction management, asset management, and project  
19 management resources supporting additions and modifications to the Tri-State  
20 transmission system. Prior to joining Tri-State, I worked for a consulting  
21 engineering company managing a transmission and distribution department  
22 focused mainly on substation engineering. I have an undergraduate electrical  
23 engineering degree from the University of Colorado at Boulder and a master's  
24 degree in technology management with an emphasis in project management

1 from the University of Denver. I am a registered Professional Engineer in the  
2 State of Colorado.

3 **II. PURPOSE OF TESTIMONY**

4 **Q: WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?**

5 A: My testimony describes the engineering, design, and construction aspects of the  
6 proposed Gateway Transmission Project (the "Project"). I will discuss the  
7 engineering criteria that were considered and the process involved in selecting  
8 the specific design that is proposed for the substation and transmission line  
9 components of the Project. I will also discuss the facilities, structures,  
10 conductors, and right-of-way width planned for the Project. Further, I will discuss  
11 the construction schedule and estimated costs for the Project. Finally, I will  
12 discuss the Project design relative to mitigation of audible noise and exposure to  
13 magnetic fields. The specific noise and magnetic field exposure analyses,  
14 however, will be discussed in greater detail in the testimony of Tri-State witness  
15 Dr. Robert Pearson.

16 **III. GENERAL PROJECT OVERVIEW**

17 **Q: PLEASE DESCRIBE THE MAJOR COMPONENTS OF THE PROJECT.**

18 A: The "cornerstone" of the Project is a new 230/115/12.47 kV substation, to be  
19 known as the Gateway Substation. The existing Platte River Power Authority  
20 ("PRPA") Boyd – Longs Peak 230 kV transmission line will interconnect to the  
21 Gateway Substation, with PRPA having responsibility for sectionalizing that  
22 transmission line and constructing the additional transmission spans needed to  
23 connect the substation to the line. PRPA will own all of the 230 kV transmission  
24 line facilities outside the substation that will become a part of their existing line;

1 as a result, those facilities are not part of this CPCN Application. Nevertheless, I  
2 will describe the PRPA facilities from Tri-State's perspective to provide the  
3 Commission a complete picture of the transmission system improvements.

4 **Q: DOES TRI-STATE PROPOSE TO CONSTRUCT ANY OTHER TRANSMISSION**  
5 **FACILITIES AT THE SAME TIME AS THE PROJECT?**

6 A: Yes. Tri-State also proposes to construct facilities to interconnect the Project  
7 with the existing Tri-State owned 115 kV Boyd – Lone Tree transmission line to  
8 provide a second source for the Gateway Substation. As discussed by Mr. Pink  
9 in his direct testimony, Tri-State considers these facilities to be “in the ordinary  
10 course of business.” Nevertheless, I will describe the 115 kV facilities later in my  
11 testimony so that the Commission has sufficient information regarding their  
12 purpose and design, and can confirm that they meet the Commission's  
13 requirements for being “in the ordinary course of business” such that they do not  
14 require a CPCN. Additional information concerning the audible noise and  
15 magnetic fields associated with these 115 kV facilities is provided by Dr.  
16 Pearson.

17 **Q: WHAT IS THE TIMELINE FOR CONSTRUCTION OF THE PROJECT?**

18 A: The plan is to start construction in the second quarter of 2019, and finish  
19 construction and place the Project in-service in the fourth quarter of 2019.

20 **Q: WHAT IS THE ESTIMATED TOTAL COST OF THE PROJECT?**

21 A: The estimated total cost of the Project is \$16.2 million. This includes the  
22 Gateway Substation and the necessary interconnections of the transmission lines  
23 described previously, further detail is shown in attached **Attachment GDL-2**.

1 **IV. PROJECT ENGINEERING DESCRIPTION**

2 **Q: WHERE IS THE PROJECT LOCATED?**

3 A: The Gateway Substation will be located in Weld County. It will connect to Tri-  
4 State's 115 kV Boyd – Lone Tree transmission line and to PRPA's 230 kV Boyd-  
5 Longs Peak transmission line. A map of the Project area is attached as  
6 **Attachment GDL-3.**

7 **Q: PLEASE DESCRIBE THE GATEWAY SUBSTATION THAT WILL BE**  
8 **CONSTRUCTED AS PART OF THE PROJECT.**

9 A: The proposed Gateway Substation is planned to be a 230 kV three-breaker ring  
10 bus substation, expandable to a future breaker-and-half configuration, with one  
11 230/115 kV, 150 MVA transformer, and a four-breaker ring bus on the 115 kV  
12 side, also expandable to a breaker-and-half configuration. A one-line diagram  
13 depicting the Gateway Substation is attached as **Attachment GDL-4.** A diagram  
14 depicting the proposed location of the Gateway Substation is attached as  
15 **Attachment GDL-5.**

16 **Q: PLEASE DESCRIBE THE 230 KV TRANSMISSION FACILITIES THAT WILL**  
17 **BE CONSTRUCTED BY PRPA IN COORDINATION WITH TRI-STATE'S**  
18 **PROJECT.**

19 A: PRPA will be responsible for the design and construction of the 230 kV  
20 transmission facilities that will become an integral part of its existing Boyd –  
21 Longs Peak 230 kV transmission line. PRPA will modify its line to add new  
22 structures that will allow the line to span into new steel deadend structures inside  
23 Tri-State's Gateway Substation, to ultimately create a new Boyd – Gateway 230  
24 kV transmission line and a Gateway – Longs Peak 230 kV transmission line.

1 **Q: WHERE DO YOU EXPECT THE 230 KV TRANSMISSION LINE SPANS WILL**  
2 **BE LOCATED?**

3 A: I expect that some parts of the 230 kV transmission line spans will be located  
4 within PRPA's existing right of way. In order to connect the line to the substation,  
5 Tri-State will allow PRPA to locate some of its facilities on the substation property  
6 as well. Tri-State estimates the PRPA line spans will be approximately 600' long.

7 **V. AUDIBLE NOISE AND MAGNETIC FIELD LEVELS**

8 **Q: IS TRI-STATE REQUESTING THAT THE COMMISSION MAKE SPECIFIC**  
9 **FINDINGS WITH REGARD TO THE REASONABLENESS OF THE MAGNETIC**  
10 **FIELDS AND AUDIBLE NOISE LEVELS ASSOCIATED WITH THE PROJECT?**

11 A: Yes.

12 **Q: WHY IS TRI-STATE REQUESTING SUCH REASONABLENESS FINDINGS?**

13 A: Colorado law (C.R.S. §25-12-103(12)) authorizes the Commission to determine,  
14 in the course of reviewing utility CPCN applications for electric transmission  
15 facilities, whether projected noise levels for the facilities are reasonable. The  
16 Commission may determine the permissible noise levels for such facilities  
17 notwithstanding the maximum permissible noise levels established elsewhere in  
18 the noise abatement law. Tri-State is requesting that the Commission make  
19 specific findings that the projected audible noise levels for the Project are  
20 reasonable.

21 With respect to the projected magnetic fields, Tri-State has complied with the  
22 Commission's rules by using prudent avoidance techniques to limit magnetic field  
23 exposure. To avoid future public nuisance claims that this Project should not  
24 have been constructed or operated as proposed in this Application due to

1 magnetic field exposures, Tri-State requests that the Commission make specific  
2 findings that projected magnetic field levels for the Project are reasonable.

3 Such determinations of reasonableness by the Commission are required to avoid  
4 civil claims under the Colorado Supreme Court's reasoning in *Public Service  
5 Company of Colorado v. Van Wyk*, 27 P.3d 377 (Colo. 2001). If the Commission  
6 finds that the Project's audible noise levels and magnetic fields are reasonable,  
7 Tri-State should be shielded from such claims so long as Tri-State constructs and  
8 operates the Project in the manner proposed in this Application.

9 *Audible Noise*

10 **Q: WHAT NOISE MITIGATION MEASURES DID TRI-STATE CONSIDER WHEN**  
11 **DESIGNING THE PROJECT?**

12 A: With regard to the Gateway Substation, Tri-State will use several techniques to  
13 mitigate noise on the Project, including using large conductors and corona-free  
14 hardware, maintaining conductor quality throughout the construction process  
15 through careful handling of conductors during installation, and providing for a  
16 setback from the roads and property line for where the substation fence is to be  
17 located.

18 **Q: HAS TRI-STATE STUDIED THE POTENTIAL NOISE LEVELS AT THE**  
19 **PROPERTY BOUNDARY FOR THE GATEWAY SUBSTATION?**

20 A: Yes. Tri-State commissioned studies of the potential noise levels relative to the  
21 boundary of the parcel on which the Gateway Substation will be located based  
22 on the proposed design and construction of the substation.

1 **Q: WHAT CONCLUSIONS DID TRI-STATE REACH AS A RESULT OF THE**  
2 **AUDIBLE NOISE STUDIES?**

3 A: As discussed by Dr. Pearson, the audible noise associated with the substation  
4 will be 50 dB(A) or less at points 25 feet beyond the edge of the right-of-way and  
5 the substation property boundary. Tri-State, therefore, concluded that the design  
6 and location of the substation provide the appropriate balance of cost-effective  
7 noise mitigation and operating capabilities to meet the purpose and need of the  
8 Project.

9 **Q: HOW DO THE AUDIBLE NOISE LEVELS FOR THE GATEWAY SUBSTATION**  
10 **COMPARE TO THE LEVEL THE COMMISSION HAS ESTABLISHED AS**  
11 **REASONABLE?**

12 A: Under the Commission's Rule 3206(f), the reasonableness of audible noise  
13 levels is determined by the land use category in which that audible noise level  
14 occurs. However, the Rule also provides that an audible noise level of 50 dB(A)  
15 or less is deemed reasonable without regard to the underlying land use category.  
16 Since the audible noise levels determined for the Gateway Substation are 50  
17 dB(A) or less at all relevant points along the property boundary and the right-of-  
18 way, there is no need to consider the underlying land uses, which are  
19 predominantly production agriculture, large lot residential, some oil and gas  
20 production as well as existing electric transmission infrastructure. Accordingly,  
21 the proposed substation meets the audible noise reasonableness standard  
22 established by the Commission.

23



1           *Magnetic Fields*

2   **Q:   WHAT ACTIONS OR TECHNIQUES RELATING TO AVOIDANCE OF**  
3           **EXPOSURE TO MAGNETIC FIELDS DID TRI-STATE CONSIDER WHEN**  
4           **DESIGNING AND SITING THE GATEWAY SUBSTATION?**

5   A:   Tri-State has a large, 76 acre parcel for the Gateway Substation under contract  
6           and is expected to close on the parcel following local land use permit approval,  
7           which allows for setbacks of the substation facilities from the property lines.

8   **Q:   HAS TRI-STATE STUDIED THE POTENTIAL MAGNETIC FIELD LEVELS AT**  
9           **THE PROPERTY BOUNDARY OF THE GATEWAY SUBSTATION?**

10 A:   Yes.   Tri-State commissioned studies of the potential magnetic field levels  
11           relative to the boundary of the parcel on which the Gateway Substation will be  
12           located based on the proposed design and construction of the substation. Dr.  
13           Pearson discusses these studies in greater detail in his testimony.

14 **Q:   WHAT CONCLUSIONS DID TRI-STATE REACH AS A RESULT OF THESE**  
15           **MAGNETIC FIELD STUDIES?**

16 A:   As discussed by Dr. Pearson, the projected magnetic field levels for the  
17           substation are below 150 mG at all points along the substation property  
18           boundary. Therefore, Tri-State concluded that the design and location of the  
19           substation include appropriate steps to reduce magnetic field exposure at  
20           reasonable costs, while still meeting Tri-State's purpose and need for the Project.

21 **Q:   HOW DO THE MAGNETIC FIELD LEVELS FOR THE GATEWAY**  
22           **SUBSTATION COMPARE TO THE LEVEL THE COMMISSION HAS**  
23           **ESTABLISHED AS REASONABLE?**

1 A: Under the Commission's Rule 3206(e), magnetic fields of 150 mG or less are  
2 deemed reasonable and need not be mitigated to a lower level. The magnetic  
3 fields projected for the substation are below 150 mG and, therefore, should be  
4 deemed reasonable based on the Commission's Rule.

5 **VI. FACILITIES NOT INCLUDED IN CPCN APPLICATION**

6 **Q: YOU PREVIOUSLY STATED CERTAIN 230 KV TRANSMISSION FACILITIES**  
7 **WILL ALSO BE CONSTRUCTED AND OWNED BY PRPA IN CONJUNCTION**  
8 **WITH THE PROJECT. PLEASE DESCRIBE THESE FACILITIES.**

9 A: As described in Mr. Pink's testimony, PRPA will sectionalize its line to  
10 accommodate the Gateway Substation, and will also construct 230 kV  
11 transmission spans to connect the substation to the line. The planned PRPA  
12 facilities will be designed, constructed, and owned by PRPA. Tri-State will work  
13 closely with PRPA to coordinate the connection of the PRPA 230 kV line to the  
14 Gateway Substation, however, Tri-State will not own or control PRPA's 230 kV  
15 facilities. As such, the PRPA facilities associated with this project are not part of  
16 Tri-State's CPCN request.

17 **Q: IS TRI-STATE REQUESTING THAT THE COMMISSION MAKE ANY**  
18 **FINDINGS WITH RESPECT TO THE PRPA TRANSMISSION FACILITIES?**

19 A: No. Tri-State's testimony regarding these PRPA facilities is intended only to  
20 provide additional background information and context for the project as a whole.  
21 Tri-State is not seeking any findings or approvals for these facilities.

22 **Q: IN ADDITION TO THE TRANSMISSION FACILITIES THAT WILL BE**  
23 **CONSTRUCTED AND OWNED BY PRPA, YOU PREVIOUSLY STATED**  
24 **CERTAIN 115 KV TRANSMISSION FACILITIES WILL ALSO BE**

1           **CONSTRUCTED IN CONJUNCTION WITH THE PROJECT. PLEASE**  
2           **DESCRIBE THESE FACILITIES.**

3    A:    As described in Mr. Pink's Direct Testimony, certain 115 kV transmission facilities  
4           are needed to provide a second source for the Gateway Substation. Tri-State  
5           plans to construct a short 115 kV transmission interconnection with Tri-State's  
6           existing Boyd – Lone Tree 115 kV transmission line that will create a Boyd –  
7           Gateway 115 kV transmission line and a Gateway – Lone Tree 115 kV  
8           transmission line. Similar to the 230 kV interconnection described previously, the  
9           substation facility is located directly across the county road from the existing  
10          Boyd – Lone Tree 115 kV transmission line so there is minimal new 115 kV  
11          transmission being added.

12   **Q:    WHAT ARE THE NECESSARY COMPONENTS OF THIS SHORT 115 KV**  
13          **LINE?**

14   A:    We expect to add two new structures in the same right of way as the existing  
15          Boyd – Lone Tree 115 kV transmission line in order to allow for a new span of  
16          conductor from those structures, across the county road, and onto Tri-State's  
17          new substation steel deadend structures. There are no new transmission line  
18          structures expected outside of our existing 115 kV transmission line right of way.

19   **Q:    WHAT TYPE OF SUPPORT STRUCTURES ARE PROPOSED FOR THE 115**  
20          **KV LINE?**

21   A:    The 115 kV transmission line is planned to utilize self-supporting steel structures.  
22          Representative structures are depicted in **Attachment GDL-6**.

23   **Q:    HOW WAS THIS SUPPORT STRUCTURE DESIGN SELECTED?**

1 A: The structure type was selected after consideration of span lengths, design  
2 loadings, minimizing ground disturbance and impacts, maintenance  
3 considerations, land use constraints, and visual impacts.

4 **Q: WHAT WILL BE THE HEIGHT OF THE 115 KV TRANSMISSION LINE**  
5 **STRUCTURES?**

6 A: The structures depicted in **Attachment GDL-6** are expected to typically be  
7 around 70-90 feet in height.

8 **Q: WHAT WIDTH OF RIGHT-OF-WAY WILL TRI-STATE ACQUIRE FOR THE 115**  
9 **KV LINES?**

10 A: Any right-of-way required for that portion of the new 115 kV transmission line  
11 located outside the substation and outside the existing right-of-way is planned to  
12 be 50 feet wide on either side of the transmission line. More specifically,  
13 because there will be two 115 kV transmission tie lines next to each other  
14 separated by a distance of 75 feet, the right-of-way for the two lines combined  
15 will be 175 feet wide (50 feet on the outside of the two lines, plus 75 feet between  
16 them).

17 **Q: WHAT IS THE OVERALL LENGTH OF THE TWO NEW PLANNED 115 KV**  
18 **TRANSMISSION LINE SPANS?**

19 A: The two new spans of transmission from the two new structures are expected to  
20 be less than 500 feet each.

21 **Q: WHAT TYPE OF CONDUCTOR WILL BE USED FOR THE TWO NEW 115 KV**  
22 **SPANS ENTERING THE STATION?**

23 A: The 115 kV transmission line spans will use a 477 ACSR Hawk conductor.

1 **Q: WHAT CONSIDERATIONS WENT INTO THE SELECTION OF THIS**  
2 **CONDUCTOR?**

3 A: In selecting the conductor for the two short 115 kV transmission line spans, we  
4 are using a conductor that is typical for Tri-State at this voltage and that we stock  
5 material for this conductor type. This will allow for a more standardized  
6 maintenance approach in terms of inventory, maintenance experience, and  
7 necessary tools for repair purposes, while also meeting the operational needs.

8 **Q: WILL THE 115 KV LINE MEET THE REASONABLENESS LEVELS**  
9 **ESTABLISHED IN COMMISSION RULES 3206(e) AND (f) FOR MAGNETIC**  
10 **FIELDS AND AUDIBLE NOISE?**

11 A: Yes. The 115 kV line will be designed so that magnetic fields are at or below 150  
12 mG and audible noise is at or below 50 dB(A), and therefore, will be at or below  
13 the levels the Commission has established by Rule as reasonable. Additional  
14 information concerning the magnetic field and audible noise levels associated  
15 with the 115 kV transmission lines is provided in Dr. Pearson's Direct Testimony.

16 **Q: IS TRI-STATE REQUESTING THAT THE COMMISSION DETERMINE THAT**  
17 **THE 115 KV TRANSMISSION LINES YOU DESCRIBED ARE "IN THE**  
18 **ORDINARY COURSE OF BUSINESS" AND, THEREFORE, DO NOT REQUIRE**  
19 **A CPCN?**

20 A: Yes. Tri-State believes that all of the 115 kV facilities I described meet the  
21 Commission's definition of being "in the ordinary course of business" and  
22 requests that the Commission make an affirmative determination confirming that  
23 conclusion.

1 Q: DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

2 A: Yes.