Direct Testimony and Exhibits
Eric M. Egge

Before the Public Service Commission
of the State of Wyoming

Joint Application of
Cheyenne Light, Fuel and Power Company and Black Hills Power, Inc.
For a Certificate of Public Convenience
and Necessity for a Gas-Fired Electric
Generating Power Plant and
Related Facilities

Docket No.20003-___-EA-11

Docket No. 20002-___-EA-11

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EXHIBIT
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I. INTRODUCTION AND BACKGROUND

1 **Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

2 A. My name is Eric M. Egge, 409 Deadwood Avenue, Rapid City, South Dakota, 57702.

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

4 A. I am employed by Black Hills Utility Holdings, Inc. ("BHUH"), as Director of
5 Transmission Services. BHUH is an affiliate of Cheyenne Light, Fuel and Power
6 Company ("Cheyenne Light") and Black Hills Power, Inc. ("Black Hills Power").

7 **Q. FOR WHOM ARE YOU TESTIFYING ON BEHALF OF TODAY?**

8 A. I am testifying on behalf of Cheyenne Light and Black Hills Power.

9 **Q. PLEASE DESCRIBE YOUR EDUCATIONAL AND BUSINESS BACKGROUND.**

10 A. I graduated from North Dakota State University in 2000 with a Bachelor of Science
11 degree in Electrical Engineering. I am currently a Registered Professional Engineer in
12 the State of South Dakota. I was hired by Black Hills Corporation ("Black Hills") in
13 2004 and have worked in Transmission Planning prior to being promoted to my current
14 position in September 2011. I have over 10 years of electric utility industry experience in
15 areas of transmission operations, regional reliability coordination, long-range
16 transmission planning, and North American Electric Reliability Corporation ("NERC")
17 and Federal Energy Regulatory Commission ("FERC") regulatory compliance. I have
18 also represented Black Hills on a number of sub-regional transmission planning groups
19 including the Colorado Coordinated Planning Group, WestConnect Planning
20 Management Committee, Northern Tier Transmission Group Planning Committee and
21 the Western Electricity Coordinating Council ("WECC") Technical Studies
22 Subcommittee.

1 **Q. PLEASE DESCRIBE YOUR RESPONSIBILITIES AS DIRECTOR OF**
2 **TRANSMISSION SERVICES.**
3 A. As Director of Transmission Services, I am responsible for Black Hills Corporation's
4 long-range transmission planning function including overall transmission strategy that
5 ensures safe, reliable and economic transmission services for our customers. I also am
6 responsible for the 24/7 reliability centers, NERC compliance and FERC compliance
7 relating to the electric transmission system and the Open Access Transmission Tariff
8 ("Tariff") Large Generator Interconnection Procedures ("LGIP").

9 **II. PURPOSE OF TESTIMONY**

10 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**
11 A. The purpose of my testimony is to describe the Cheyenne Light and Western Area Power
12 Administration ("Western") transmission system in the Cheyenne area, the effect the
13 simple cycle combustion turbine generator ("CTG") and the combined cycle combustion
14 turbine ("CC") (collectively referred to with related facilities as the "Facility") will have
15 on Western's system, Cheyenne Light's system and other neighboring systems, and
16 transmission facilities that will be necessary to reliably interconnect the Facility.

17 **III. TRANSMISSION SYSTEM**

18 **Q. PLEASE DESCRIBE THE CURRENT CHEYENNE AREA TRANSMISSION**
19 **SYSTEM.**
20 A. The Cheyenne area transmission system ("Cheyenne System") consists of 115 kV
21 transmission facilities owned by either Cheyenne Light or Western. The area is generally
22 bounded by the Happy Jack substation in the west, the Archer substation in the east and
23 the Cheyenne substation in the center. Cheyenne Light owns approximately 24 miles of

115 kV lines along with full or partial ownership of five 115 kV substations. The remainder of the Cheyenne System is owned primarily by Western. The Cheyenne System is primarily supported by 230:115 kV transformation at both Cheyenne substation and Archer substation and one 115 kV connection at Happy Jack substation.

Exhibit EE-1 provides a one-line diagram of the Cheyenne System, noting ownership and voltage.

Q. WHAT STUDIES HAVE BEEN CONDUCTED WITH REGARD TO THE EFFECT OF THE FACILITY ON THE TRANSMISSION SYSTEM?

A. BHUH Transmission Planning performed a System Impact Study for Large Generator Interconnection request CLPT-G2 (G2 Study) to evaluate the potential effect the addition of 120 MW of gas-fired generation would have on the Cheyenne area transmission system as prescribed in Cheyenne Light's Tariff on file with FERC. The Study evaluated the impact of the Facility on the Cheyenne System using power flow and transient dynamic analysis, the Facility's potential effect on the TOT3 WECC rated path between Wyoming and Colorado, and identified the transmission facilities needed to reliably interconnect the Facility to the Cheyenne area transmission system. Black Hills Transmission Planning is currently performing a System Impact Study for Large Generator Interconnection request CLPT-G4 (G4 Study) which requests an additional 20 MW injection on the Cheyenne System through conversion of two simple-cycle combustion turbines into a combined cycle configuration with a heat recovery steam generator.

1 **Q. WHAT EFFECT WILL THE ADDITION OF THE FACILITY HAVE ON THE**
2 **STABILITY AND RELIABILITY OF CHEYENNE LIGHT'S SYSTEM AS WELL**
3 **AS THAT OF OTHERS?**
4 A. The G2 Study results indicate that the addition of the Facility to the Cheyenne System
5 will positively impact reliability and, outside of the additions necessary to reliably
6 interconnect the Facility to the Cheyenne System discussed below, will not necessitate
7 any upgrades to the existing Cheyenne System. The power flow analysis indicates that
8 the Facility will reduce the loading on the area transmission system. For example, in the
9 2015 time frame under projected peak loading the 230:115 kV transformers at the Archer
10 substation would exceed their nameplate capacity for certain contingency events. The
11 addition of the Facility reduces the loading on these transformers, potentially delaying the
12 replacement of the transformers. The dynamic stability analysis indicates similar results
13 to the power flow in that the Facility will have a negligible impact on the area
14 transmission system's response to faults. The preliminary G4 Study results indicate that
15 the incremental 20 MW addition will have no adverse impacts to the Cheyenne System.
16 **Q. WHAT EFFECT WILL THE ADDITION OF THE FACILITY HAVE ON THE**
17 **TOT3 WECC RATED PATH?**
18 A. The G2 Study showed that the addition of the Facility will not have a negative effect on
19 the TOT3 WECC rated path. Conversely, the results indicated that the addition of the
20 Facility may increase the TOT3 transfer capability. Further analysis, in coordination with
21 the TOT3 participants, will need to be conducted to verify and more accurately quantify
22 these results. It is anticipated that the G4 Study will show similar results to that of the G2
23 Study. However this analysis has not been completed at this time.

1 **Q. IS THERE A BENEFIT TO THE TRANSMISSION SYSTEM IN GENERAL BY**
2 **HAVING THE GENERATION RESOURCE LOCATED AT THE SOURCE OF**
3 **THE LOAD?**
4 A. While many factors must be considered when determining the location of new generation
5 resources, locating the generating resource at or near the load typically provides benefits
6 to the area transmission system through enhanced voltage support and control, reduced
7 loading on transmission lines and delayed or deferred capital projects. As mentioned
8 previously, addition of the Facility to the planned Cheyenne System will mitigate loading
9 on the Archer transformers, potentially delaying the replacement of those transformers.
10 **Q. WHAT ADDITIONS TO THE CHEYENNE SYSTEM WILL BE NECESSARY TO**
11 **RELIABLY INTERCONNECT THE FACILITY?**
12 A. Interconnecting the Facility to the Cheyenne System will require the addition of a new
13 substation and a new double circuit 115 kV transmission line segment. The new
14 substation will consist of a four position 115 kV ring bus to accommodate the Facility
15 generator step-up transformers as well as the new 115 kV double circuit transmission line
16 segment. The new 115 kV double circuit transmission line segment will tap the existing
17 Cheyenne Light Archer to Skyline 115 kV line where that line turns north, approximately
18 3 miles from the Archer substation. The new 115 kV line segment will be approximately
19 2 miles in length and will be designed and constructed using single pole, self-supported
20 steel poles with a vertical conductor arrangement. Exhibit EE-2 provides a map showing
21 a potential transmission line route. No upgrades to the existing or planned Cheyenne
22 System will be required to support the Facility.
23 **Q. WHAT IS THE ANTICIPATED COMPLETION DATE OF THE ADDITIONS?**

1 A. The additions necessary to accommodate the Facility are anticipated to be complete and

2 in-service prior to June 1, 2014.

3 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

4 A. Yes, it does.