

Black Hills/Colorado Electric Utility Company, LP
2018 Rule 3627 Report – Appendix D – Black Hills Project Summary

Appendix D

Black Hills Project Summary

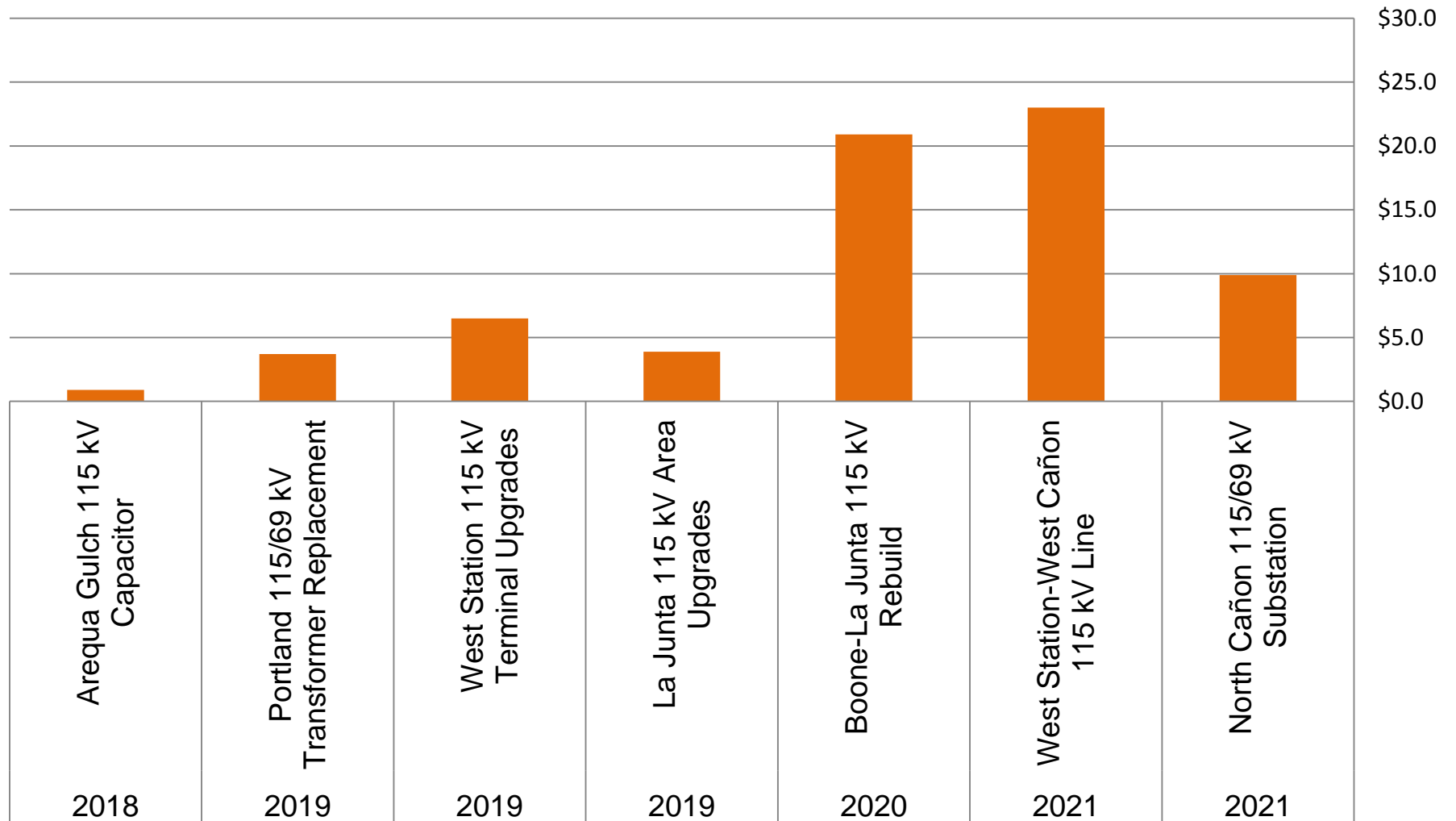
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Colorado PUC E-Filings System

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**Black Hills Colorado Electric - Planned Project Timeline
Est. Cost, in Millions, 2017 Dollars**



Note: Projects completed prior to 2018 were omitted from this chart but included in the detailed project sheets for reference.

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Boone-Nyberg 115 kV Project

Project Sponsor:	Black Hills Colorado Electric
Additional Project Participants:	
Project Description:	Rebuild existing Boone-DOT Tap-Nyberg 115 kV line and add a new parallel circuit on double circuit structures.
Voltage Class:	115 kV
Facility Rating:	221 MVA
Point of Origin/Location:	Boone 115 kV
Point of Termination:	Nyberg 115 kV
Intermediate Points:	DOT Tap 115 kV load tap
Length of Line (in Miles):	9
Type of Project:	Transmission Line
Development Status:	In-service
Routing:	
Subregional Planning Group:	CCPG
Purpose of Project:	Increase reliability.
Estimated Cost (in 2016 Dollars):	\$8.7 Million
Schedule:	
Construction Date:	2015
Planned Completion/In-Service Date:	October 2016
Regulatory Info:	Approved - Colorado PUC: Decision No. C13-0879.
Regulatory Date:	July 26, 2013
Permitting Info:	
Permitting Date:	
Contact Information:	Wes Wingen, Manager of Transmission Planning
Email	wes.wingen@blackhillscorp.com
Phone	605-721-2268

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Boone-Nyberg 115 kV Transmission Project

This project was identified as the preferred alternative to adding a second 230/115 kV transformer at PSCo's Boone substation in late 2012. The 'Second Boone 230/115 kV Transformer' project was subsequently cancelled.

This project consisted of rebuilding the existing 9 mile segment of 115 kV line between the Boone 115 kV substation and the Nyberg 115 kV substation, as well as adding a second 115 kV circuit between the aforementioned substations. The project placed the new line and the rebuilt line on double circuit monopole steel structures, and was located within the existing right-of-way. Both lines utilized 795 kcmil 26/7 Strand ACSR "Drake" conductor. The project was not designed for future 230 kV operation.

The total estimated cost for the project was \$8.7M, which is a \$1.3M reduction from the previous estimate. The overall project was completed and placed into service on October 2016. In 2013 the Colorado Public Utilities Commission found that the project was in the ordinary course of business and that a CPCN was not necessary.

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Map Printed 11/18/13
Line Route shown is for informational purposes only.

0 2.5 5 Miles



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Rattlesnake Butte 115 kV Substation Terminal

Project Sponsor:	Black Hills Colorado Electric
Additional Project Participants:	
Project Description:	Add a new terminal to the Rattlesnake Butte 115 kV substation and convert to a ring bus configuration to accommodate a new generation interconnection.
Voltage Class:	115 kV
Facility Rating:	221 MVA
Point of Origin/Location:	Rattlesnake Butte 115kV Substation
Point of Termination:	
Intermediate Points:	
Length of Line (in Miles):	
Type of Project:	Substation
Development Status:	In-Service
Routing:	
Subregional Planning Group:	CCPG
Purpose of Project:	Generation Interconnection.
Estimated Cost (in 2016 Dollars):	\$1.85M
Schedule:	
Construction Date:	2016
Planned Completion/In-Service Date:	Sept. 2016
Regulatory Info:	Approved - Colorado PUC: Decision No. C16-0627.
Regulatory Date:	July 6, 2016
Permitting Info:	
Permitting Date:	
Contact Information:	Wes Wingen, Manager of Transmission Planning
Email	wes.wingen@blackhillscorp.com
Phone	605-721-2268

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Rattlesnake Butte 115 kV Terminal Addition

The Rattlesnake Butte 115 kV terminal addition was planned as part of the BHCT-G18 large generator interconnection process for a new 60 MW wind generation facility. The project converted the existing two terminal straight bus to a three terminal ring bus. The project was completed in Q3 2016 at an estimated cost of \$1.85 million. Construction on the project was initiated in 2016 after a CPCN was granted for the Peak View Wind Project in Decision No. C15-1182, Proceeding No. 15A-0502E. The work associated with the terminal addition at Rattlesnake Butte Substation was performed entirely within the existing substation footprint. In 2016 the Colorado Public Utilities Commission found that the project was in the ordinary course of business and that a CPCN was not necessary.

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Fountain Lake 115/69 kV Substation

Project Sponsor:	Black Hills Colorado Electric
Additional Project Participants:	
Project Description:	New 115/69 kV substation at Belmont Tap on the West Station - Overton 69 kV line.
Voltage Class:	115 kV
Facility Rating:	80 MVA
Point of Origin/Location:	Fountain Lake 115 kV (near Pueblo, CO)
Point of Termination:	
Intermediate Points:	
Length of Line (in Miles):	0
Type of Project:	Substation
Development Status:	In Service
Routing:	
Subregional Planning Group:	CCPG
Purpose of Project:	Additional voltage support and load growth capacity.
Estimated Cost (in 2017 Dollars):	\$10.5 Million
Schedule:	
Construction Date:	2016
Planned Completion/In-Service Date:	6/28/2017
Regulatory Info:	Approved - Colorado PUC: Decision No. C07-0553.
Regulatory Date:	6/29/2007
Permitting Info:	
Permitting Date:	
Contact Information:	Wes Wingen, Manager of Transmission Planning
Email	wes.wingen@blackhillscorp.com
Phone	605-721-2268

Fountain Lake 115 kV Substation Project

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The Fountain Lake (previously known as Overton) 115 kV distribution substation project was initially developed to address low system voltage issues by shifting load off of existing distribution lines that were near their allowable capacity. Additional benefits to the 69 kV system were identified through reduced power flow on the 115/69 kV transformers in the Pueblo area, as well as local 69 kV lines. The project provided additional operating flexibility in the area as well as help accommodate future loads in an area with good growth potential.

The scope of the project was subsequently modified to include a 115/69 kV transformer as well as the original 115/13.2 kV distribution transformer. The expanded scope provided additional operational flexibility as well as the ability to maintain reliability during potential future replacements of the West Station 115/69 kV transformers. The location of the substation was reviewed to optimize local land use as well as minimize unnecessary line crossings in the area. The project is currently planned for completion and operation in Q2 2017 at an estimated cost of \$10.5 million. There has been a slight delay in the in-service date from Q1 2017 to Q2 2017. In the 2007 decision C07-0553 the Colorado Public Utilities Commission found that the project was in the ordinary course of business and that a CPCN was not necessary.

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Baculite Mesa-Fountain Lake 115 kV Line Rebuild

Project Sponsor:	Black Hills Colorado Electric
Additional Project Participants:	
Project Description:	Rebuild existing 115 kV line between Baculite Mesa and planned new Fountain Lake (previously known as Overton) substation as well as reconfigure the connection to the Northridge 115 kV substation.
Voltage Class:	115 kV
Facility Rating:	221 MVA
Point of Origin/Location:	Baculite Mesa 115 kV
Point of Termination:	Future Fountain Lake 115 kV substation site
Intermediate Points:	
Length of Line (in Miles):	4
Type of Project:	Transmission Line
Development Status:	In-service
Routing:	
Subregional Planning Group:	CCPG
Purpose of Project:	Increased reliability, generation interconnection.
Estimated Cost (in 2016 Dollars):	\$2.0 Million
Schedule:	
Construction Date:	2016
Planned Completion/In-Service Date:	January 6, 2017
Regulatory Info:	Approved - Colorado PUC: Decision No. C11-0749.
Regulatory Date:	June 29, 2011
Permitting Info:	
Permitting Date:	
Contact Information:	Wes Wingen, Manager of Transmission Planning
Email	wes.wingen@blackhillscorp.com
Phone	605-721-2268

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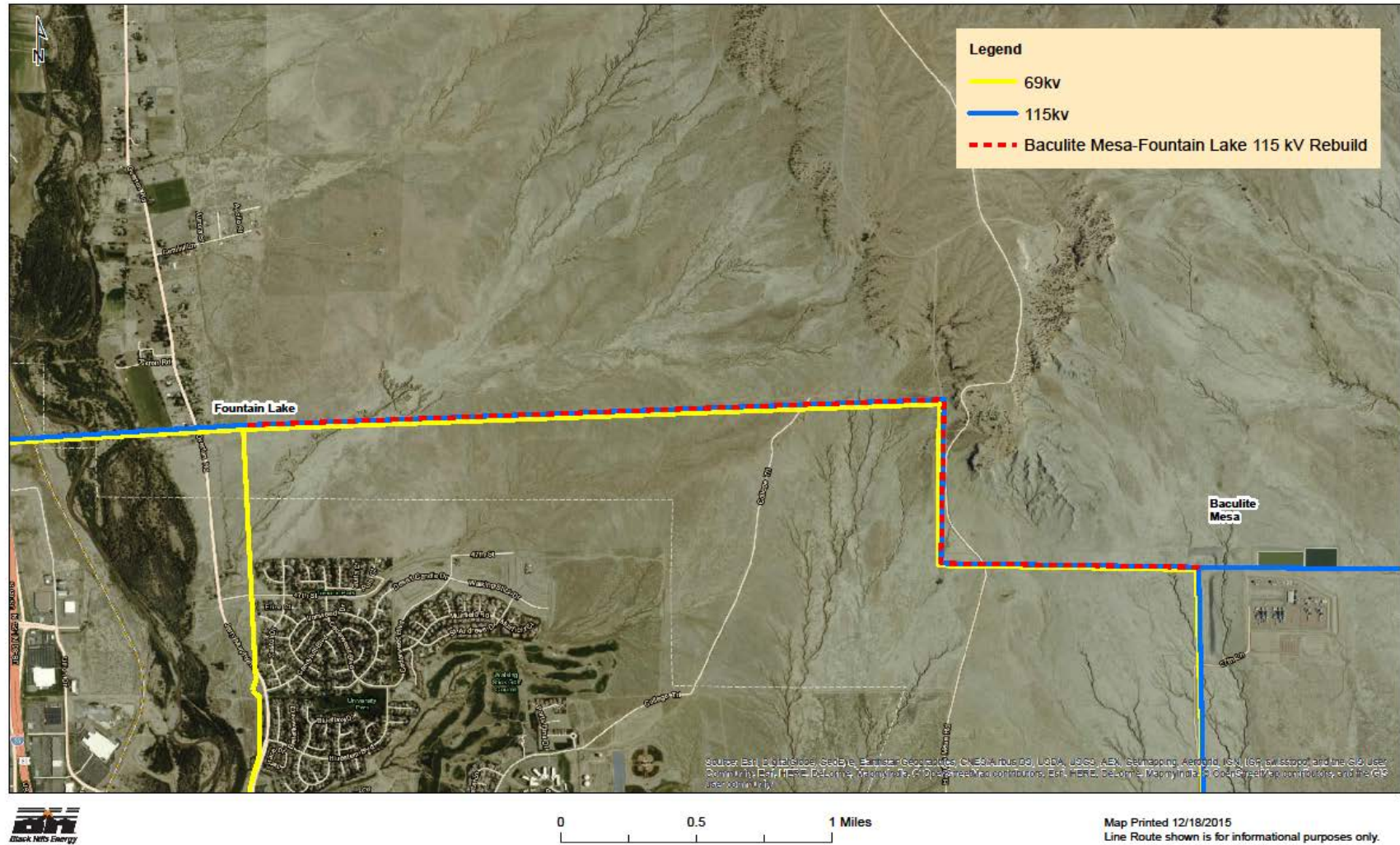
Baculite Mesa-Fountain Lake 115 kV Project

Three individual line segments comprise the parallel path between Baculite Mesa and West Station/Midway. The Baculite Mesa-Fountain Lake 115 kV line is one of those segments that has reached its maximum utilization in planning assessments. The planned project rebuilt the 4 mile line segment between Baculite Mesa and the planned Fountain Lake substation (previously known as Overton) using 795 kcmil 26/7 Strand ACSR “Drake” conductor. The project utilized the existing line right-of-way. The original scope of this project was expanded to reconfigure the termination into the Northridge substation from the line corridor. The line flow from Baculite Mesa-Midway previously flowed through the Northridge substation and the reconfiguration converted the Northridge substation connection to a single radial tap. This was done to avoid unnecessary reductions in the thermal rating of the rebuilt line between Baculite Mesa and Northridge and to minimize disruption to the short residential corridor feeding Northridge.

The Northridge termination part of the project was completed and placed into operation in December 2016 and the Baculite Mesa-Fountain Lake line rebuild was completed in January 2017. The total estimated cost of the overall project was \$2 million, which was a \$1M reduction from previous estimates. In 2011 the Colorado Public Utilities Commission found that the project was in the ordinary course of business and that a CPCN was not necessary.

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Baculite Mesa-Fountain Lake 115 kV Rebuild



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Portland 115/69 kV #2 Transformer Replacement

Project Sponsor:	Black Hills Colorado Electric
Additional Project Participants:	
Project Description:	Replace existing 25MVA Portland #2 transformer with an 80MVA unit. Also potentially replace 42 MVA unit with 80 MVA unit.
Voltage Class:	115 kV
Facility Rating:	80 MVA
Point of Origin/Location:	Portland 115kV Substation (near Florence, CO)
Point of Termination:	
Intermediate Points:	
Length of Line (in Miles):	
Type of Project:	Transformer
Development Status:	Planned
Routing:	
Subregional Planning Group:	CCPG
Purpose of Project:	Improve reliability and add transformation capacity.
Estimated Cost (in 2017 Dollars):	\$3.7 Million
Schedule:	
Construction Date:	2018
Planned Completion/In-Service Date:	Q4 2019
Regulatory Info:	Approved - Colorado PUC: Decision No. C13-0879.
Regulatory Date:	July 26, 2013
Permitting Info:	
Permitting Date:	
Contact Information:	Wes Wingen, Manager of Transmission Planning
Email	wes.wingen@blackhillscorp.com
Phone	605-721-2268

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Portland 115/69 kV Transformer Project

The Portland 115/69 kV transformer project was identified to replace the smaller of two existing parallel transformers at Portland with a larger capacity 80 MVA unit to accommodate load growth. A second stage of the project may replace the larger 42 MVA transformer with an 80 MVA unit, but that phase of the project is under review to determine the best overall solution for the area. The first stage of the project is currently planned for completion in Q4 2018 and the second stage is planned for completion in Q4 2019 at a total estimated cost of \$3.7 million. In Decision C13-0879 the Colorado Public Utilities Commission found that the project was in the ordinary course of business and that a CPCN was not necessary.

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Arequa Gulch 115 kV Capacitor Bank Project

Project Sponsor:	Black Hills Colorado Electric
Additional Project Participants:	
Project Description:	A 12 MVAR switched shunt capacitor at the Arequa Gulch 115 kV substation for voltage support due to increased load growth
Voltage Class:	115 kV
Facility Rating:	12 MVAR
Point of Origin/Location:	Arequa Gulch 115 kV (near Cripple Creek, CO)
Point of Termination:	
Intermediate Points:	
Length of Line (in Miles):	
Type of Project:	Substation
Development Status:	Planned
Routing:	
Subregional Planning Group:	CCPG
Purpose of Project:	Improved voltage support and reliability in the Cripple Creek area.
Estimated Cost (in 2017 Dollars):	\$850,000
Schedule:	
Construction Date:	2018
Planned Completion/In-Service Date:	Q4 2018
Regulatory Info:	Approved - Colorado PUC: Decision No. C15-0590.
Regulatory Date:	June 24, 2015
Permitting Info:	
Permitting Date:	
Contact Information:	Wes Wingen, Manager of Transmission Planning
Email	wes.wingen@blackhillscorp.com
Phone	605-721-2268

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Arequa Gulch 115 kV Capacitor Project

A 115 kV capacitor was specified for the Arequa Gulch substation to maintain post-contingency voltage levels. The need for the capacitor was driven by planned local load growth. The estimated cost of the capacitor is \$850,000. The in-service date is Q4 2018 to align with the realization of the planned load growth. In 2015 the Colorado Public Utilities Commission found that the project was in the ordinary course of business and that a CPCN was not necessary.

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West Station 115 kV Substation Terminal Upgrades

Project Sponsor:	Black Hills Colorado Electric
Additional Project Participants:	
Project Description:	Increase terminal ratings at the West Station 115 kV substation
Voltage Class:	115 kV
Facility Rating:	239 MVA
Point of Origin/Location:	Black Hills Colorado Electric West Station 115 kV substation
Point of Termination:	
Intermediate Points:	
Length of Line (in Miles):	
Type of Project:	Substation
Development Status:	Planned
Routing:	
Subregional Planning Group:	CCPG
Purpose of Project:	Improved reliability and transfer capability in the West Station area.
Estimated Cost (in 2017 Dollars):	\$6.5 Million
Schedule:	
Construction Date:	2018
Planned Completion/In-Service Date:	Q4 2019
Regulatory Info:	Approved - Colorado PUC: Decision No. C16-0627.
Regulatory Date:	July 6, 2016
Permitting Info:	
Permitting Date:	
Contact Information:	Wes Wingen, Manager of Transmission Planning
Email	wes.wingen@blackhillscorp.com
Phone	605-721-2268

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West Station 115 kV Substation Terminal Upgrades

The need to upgrade the terminal ratings at West Station 115 kV have been identified in previous BHCE TCPC and SB-100 studies. The post-contingency loading on the West Station - Desert Cove 115 kV and Hyde Park – West Station 115 kV lines exceed the West Station terminal equipment facility ratings. New substation bays will be added to the newer part of the West Station substation and the lines connected to the old part of the substation will be terminated into the new line positions. The purpose of the project is to increase reliability as well as transfer capability on the lines terminating at West Station. The construction will begin in 2018 with the termination of a portion of the lines into the newer section of the substation, with all lines to be moved to the new part of the substation by Q4 2019. The total cost of the West Station 115 kV substation upgrades is \$6.5M. In the 2016 Decision C16-0627 the Colorado Public Utilities Commission found that the project was in the ordinary course of business and that a CPCN was not necessary.

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La Junta 115 kV Area Upgrades

Project Sponsor:	Black Hills Colorado Electric
Additional Project Participants:	
Project Description:	Increase 115/69kV transformation capacity at BHCE's La Junta substation by 50 MVA; add new 1 x 6 MVAR 69 kV cap bank at Rocky Ford
Voltage Class:	115 & 69 kV
Facility Rating:	Varies
Point of Origin/Location:	Black Hills Colorado Electric La Junta 115 kV substation
Point of Termination:	
Intermediate Points:	
Length of Line (in Miles):	
Type of Project:	Substation
Development Status:	Planned
Routing:	
Subregional Planning Group:	CCPG
Purpose of Project:	Improved reliability in the La Junta area.
Estimated Cost (in 2017 Dollars):	\$3.9 Million
Schedule:	
Construction Date:	2019
Planned Completion/In-Service Date:	Q4 2019
Regulatory Info:	Approved - Colorado PUC: Decision No. C09-1240.
Regulatory Date:	October 28, 2009
Permitting Info:	
Permitting Date:	
Contact Information:	Wes Wingen, Manager of Transmission Planning
Email	wes.wingen@blackhillscorp.com
Phone	605-721-2268

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La Junta 115 kV Area Upgrades

The La Junta 115 kV Interconnection project as initially scoped consisted of a new parallel 115 kV and 69 kV line between the Tri-State and Black Hills La Junta substations. The connection of the two substations, which are approximately 0.5 miles apart, would provide increased reliability to the local area. An increase in 115/69 kV transformation capacity at the BHCE-owned La Junta substation, a 69 kV capacitor, a larger 115/69 kV transformer at Boone and local terminal equipment upgrades were also a part of this project to enhance load service in the area. As the project drivers evolved over time, the need to operate the 115 kV tie line normally open became apparent. Joint participation in the project was no longer of value to Tri-State G&T. The scope of the project was reviewed in 2015 and it was determined that the benefits of the project did not justify the cost. The 115 kV and 69 kV lines between the two La Junta substations were removed from the project scope, and the other projects remained.

The project previously included the replacement of the Boone 115/69 kV transformer, which was completed in October 2016 at a cost of \$2.7M. The addition of a second La Junta 115/69 kV transformer (50 MVA) is currently planned for completion and operation in Q4 2019 at an estimated cost of \$2.0 million. Upgrades to the La Junta area 115 and 69 kV system include replacement of limiting terminal equipment as well as a new 6 MVAR, 69 kV capacitor. A second 69 kV capacitor was previously planned but has been postponed until a later date as required by local load growth. The estimated cost for the La Junta area terminal upgrades and capacitor is approximately \$1.9M and will be completed in Q4 2019 which is a slight delay from the previously filed in-service date of Q1 2018. The total cost for all of the individual upgrades listed for the La Junta area is \$3.9M. In Decision C09-1240, the Colorado Public Utilities Commission found that the original project was in the ordinary course of business and that a CPCN was not necessary. A subsequent ruling was not pursued due to the 69 kV voltage level of the remaining projects.

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Boone-La Junta 115 kV Line Rebuild

Project Sponsor: Black Hills Colorado Electric
Additional Project Participants:
Project Description: Rebuild the 115 kV line from Boone to La Junta.

Voltage Class: 115 kV
Facility Rating: 221 MVA
Point of Origin/Location: Boone 115kV
Point of Termination: La Junta 115kV
Intermediate Points:
Length of Line (in Miles): 45
Type of Project: Transmission Line Rebuild
Development Status: Planned
Routing:
Subregional Planning Group: CCPG

Purpose of Project: Increased reliability.

Estimated Cost (in 2017 Dollars): \$20.9 Million

Schedule:

Construction Date: 2018
Planned Completion/In-Service Date: 2020
Regulatory Info: Approved - Colorado PUC: Decision No. C17-0539.

Regulatory Date: June 28, 2017
Permitting Info:
Permitting Date:

Contact Information: Wes Wingen, Manager of Transmission Planning
Email: wes.wingen@blackhillscorp.com
Phone: 605-721-2268

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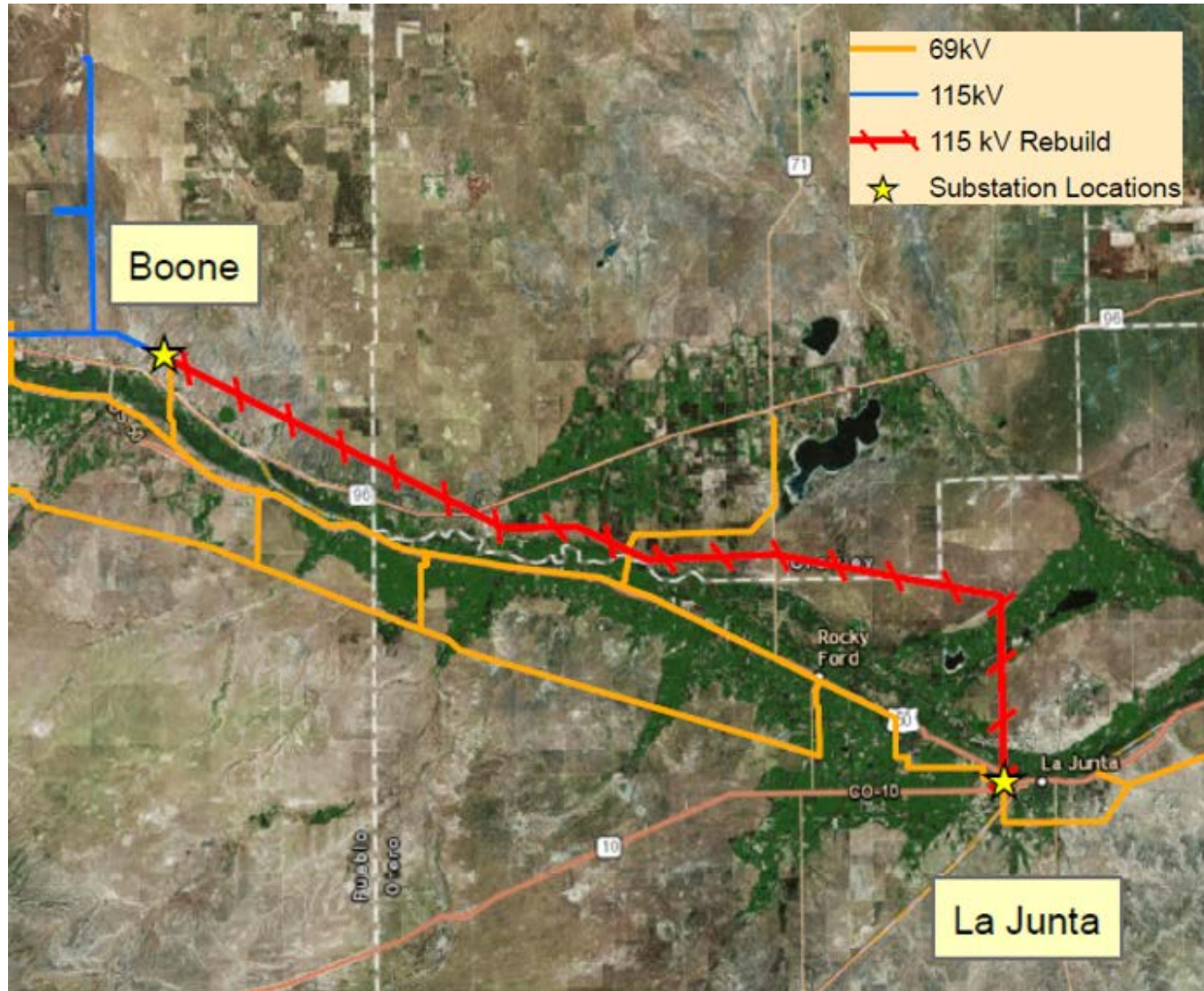
Boone-La Junta 115 kV Rebuild Project

The Boone-La Junta 115 kV line is at a point late in its lifecycle and needs to be rebuilt. The project will rebuild the 45 mile line with single circuit 115 kV construction utilizing 795 kcmil 26/7 Strand ACSR “Drake” conductor utilizing the existing right-of-way. The noise and electromagnetic field impacts associated with the West Station-West Cañon transmission project were considered more impactful than this project and still met the established noise and magnetic field requirements as stated in Rule 3206 (f) and Rule 3206 (e), respectively. Therefore that analysis was referenced rather than repeated for this project. The project will rebuild approximately 15 miles per year with construction beginning in 2018 and will continue into 2020.

In Decision C17-0539, the Colorado Public Utilities Commission found that the original project was in the ordinary course of business and that a CPCN was not necessary.

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Boone-La Junta 115 kV Rebuild



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West Station-West Cañon 115 kV Transmission Project

Project Sponsor:	Black Hills Colorado Electric
Additional Project Participants:	
Project Description:	New 115 kV line from West Station to West Cañon with load service substation at North Cañon.
Voltage Class:	115 kV
Facility Rating:	221 MVA
Point of Origin/Location:	West Station 115kV
Point of Termination:	West Cañon 115kV
Intermediate Points:	New North Cañon 69 kV
Length of Line (in Miles):	42
Type of Project:	Transmission Line and Substation
Development Status:	Planned
Routing:	
Subregional Planning Group:	CCPG
Purpose of Project:	Increased reliability.
Estimated Cost (in 2017 Dollars):	\$23 Million
Schedule:	
Construction Date:	2019
Planned Completion/In-Service Date:	Q4 2021
Regulatory Info:	Approved - Colorado PUC: Decision No. C17-0539-E.
Regulatory Date:	July 10, 2017
Permitting Info:	
Permitting Date:	
Contact Information:	Wes Wingen, Manager of Transmission Planning
Email	wes.wingen@blackhillscorp.com
Phone	605-721-2268

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North Cañon 115/69 kV Substation

Project Sponsor:	Black Hills Colorado Electric
Additional Project Participants:	
Project Description:	New 115/69 kV substation near North Cañon on the West Station – West Cañon 115 kV line.
Voltage Class:	115 kV
Facility Rating:	80 MVA
Point of Origin/Location:	North Cañon 69 kV substation (near Cañon City, CO)
Point of Termination:	
Intermediate Points:	
Length of Line (in Miles):	0
Type of Project:	Substation
Development Status:	Planned; this is change from Conceptual status in last year's report.
Routing:	
Subregional Planning Group:	CCPG
Purpose of Project:	Increased reliability and load growth capacity.
Estimated Cost (in 2017 Dollars):	\$9.9 Million
Schedule:	
Construction Date:	2021
Planned Completion/In-Service Date:	Q4 2021
Regulatory Info:	Approved - Colorado PUC: Decision No. C17-0539-E.
Regulatory Date:	July 10, 2017
Permitting Info:	
Permitting Date:	
Contact Information:	Wes Wingen, Manager of Transmission Planning
Email	wes.wingen@blackhillscorp.com
Phone	605-721-2268

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West Station-West Cañon 115 kV Line and New North Cañon Substation

The proposed West Station – West Cañon 115 kV line would provide additional import capacity along with increased reliability into the Cañon City 115 kV system. Past TPL-001-4 reliability¹ and interconnection studies along with current summer peak operational studies have shown overloads on the Portland-Skala, Skala-Cañon City, and Portland-West Station #1 and #2 115 kV lines. Also the West Cañon 230/69 kV transformer, which supports the Cañon City network from the west end, is a long lead time piece of equipment that adds additional overload scenarios to the above mentioned 115 kV lines if the transformer were to fail. A corrective action plan has been developed per the TPL-001-4 standard to provide a solution. Limited options due to the geographic area and transmission system were considered to alleviate the 115 kV line overloads, including rebuilding the existing 115 kV lines. Due to the nature of the system, rebuilding the existing 115 kV lines feeding into the Cañon City network would be challenging due to operational constraints as they are the only source into Cañon City. The best overall option was identified as a new 115 kV line that would feed into the Cañon City network from the 115 kV West Station substation. The new line will provide additional capacity into the load center and eliminate the need to sectionalize the existing 115 kV system to prevent post-contingency overloads. The new line will also provide the ability to reliably rebuild the constrained 115 kV line segments between Portland and Cañon City at a future time. The addition of a new North Cañon 115:69 kV substation was added to the project since it would decrease the overloading issues on the existing Portland & Cañon City 115:69 kV transformers as identified in in past reliability studies, and provide increased operational flexibility. A summary of the project components is as follows:

- The West Station - Desert Cove 115 kV rebuild project was previously completed using double circuit structures to accommodate the new West Station to West Cañon 115 kV circuit up to Desert Cove. The new transmission line will continue on from Desert Cove to West Cañon. This project will be constructed within existing right-of-way where possible, and new right-of-way will be obtained in a manner to minimize disruption.
- Construct a new 115/69 kV substation located in the North Cañon area to support the Cañon City 69 kV network. Upgrades to the existing 69 kV facilities are required to integrate the new substation into the 69 kV network.
- Obtain new right-of-way westward from the Desert Cove transmission corridor to the new North Cañon substation for 115 kV single circuit H-Frame structures. The new North Cañon substation will intersect the Cañon City Plant-West Cañon 115 kV line in the northwest corner of Cañon City which will complete the circuit to West Cañon.
- Since the West Cañon-Arequa Gulch 115 kV line is geographically nearby the proposed site of the new North Cañon substation, bisecting it with the new substation would add additional reliability. This option will not be implemented initially, but the new substation will be designed to accommodate the additional terminals later to balance initial cost with future flexibility.
- New right-of-way is being explored that may run parallel to the existing Midway -West Cañon 230 kV line for a majority of the line length to minimize disruption to the surrounding area. Per WECC's Long Term Planning Tool, the existing corridor is considered WECC Risk Class 1: Area Following Existing Linear Corridor and is preferable to higher Risk Class corridors.

¹ Including both BHCT TCPC & CCPG studies

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- The routing of the new transmission line is under evaluation to potentially accommodate a future distribution substation in Pueblo West. The accommodation of the new substation would increase reliability and load serving capability in the Pueblo West area of the Black Hills system without materially impacting project costs or the planned benefits to the Cañon City area.
- The facility rating of the West Station – North Cañon 115 kV circuit should be at least 221 MVA Summer and 274 MVA Winter (795 ACSR Drake @ 100°C).
- The engineering and design work associated with the substation portion of the project will be performed to ensure that the completed project will meet the established noise and magnetic field requirements as stated in Rule 3206 (f) and Rule 3206 (e), respectively. Namely, the noise level of the substation will not exceed 50 db(A) at a distance of 25 feet beyond the property line, and the magnetic field level at the property line, one meter above the ground will not exceed 150 MilliGauss.
- The engineering and design work associated with the transmission line portion of the project was performed and also meets the established noise and magnetic field requirements.

Black Hills initially included this project in the 2015 Rule 3206 filing for informational purposes only. Transmission planning analysis has subsequently refined the project scope. Potential joint participation in the project was under consideration in the San Luis Valley Subcommittee within the Colorado Coordinated Planning Group (CCPG). There was absence of interest in joint participation in the project by other entities as well as any foreseeable long term drivers to justify constructing the project at a higher voltage. The best-cost solution was determined to have the project designed, constructed, and operated as a single 115 kV circuit. The additional right-of-way that will be acquired for this project will be 125 feet wide to accommodate an additional circuit or an increase in operating voltage if needed. The total overall cost of the project is estimated at \$32.9M, including the transmission line and the new North Cañon substation. The completion date of the line and substation portion of the project is scheduled for Q4 2021.

In Decision C17-0539-E, the Colorado Public Utilities Commission found that the original project was in the ordinary course of business and that a CPCN was not necessary.

Black Hills/Colorado Electric Utility Company, LP 2018 Rule 3627 Report – Appendix D – Black Hills Project Summary

