BEFORE THE IDAHO PUBLIC UTILITIES COMMISSION

IN THE MATTER OF IDAHO POWER COMPANY'S APPLICATION FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY TO CONSTRUCT SYSTEM IMPROVEMENTS TO SECURE ADEQUATE AND RELIABLE SERVICE TO CUSTOMERS IN THE WOOD RIVER VALLEY.	)	CASE NO. IPC-E-16-28

IDAHO POWER COMPANY

DIRECT TESTIMONY

OF

RYAN N. ADELMAN

Q. Please state your name and business address.

A. My name is Ryan Adelman. My business address is 1221 West Idaho Street, Boise, Idaho 83702.

Q. By whom are you employed and in what capacity?

A. I am employed by Idaho Power Company ("Idaho Power" or "Company") as the Customer Operations Project Manager in the Customer Operations Engineering and Construction Department.

Q. Please describe your educational background.

A. I graduated in 1996 from the University of Idaho, Moscow, Idaho, receiving a Bachelor of Science Degree in Civil Engineering. I am a registered professional engineer in the state of Idaho. I am currently pursuing a Masters of Business Administration through Boise State University's Executive MBA program.

Q. Please describe your work experience with Idaho Power.

A. From 2004 to 2008, I was employed by Idaho Power as an engineer in Power Production's Civil Engineering Group. In 2008, I became an Engineering Leader responsible for the Langley Gulch power plant project. In 2013, I transitioned to the Civil Engineering Leader in Power Production. In 2015, I accepted my current position as Manager of the Projects Department where I manage Idaho Power's Project Management and Cost and Controls group.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony is to describe the details of the various options for redundant electrical service into the Wood River Valley/North Valley area as provided to me by Company witness David Angell and as described in his testimony. I will also discuss the costs, benefits, and detriments of each of the viable options and conclude by identifying the lowest-cost, base case redundant service option, Overhead Distribution, as well as the economically equivalent redundant service option, Underground Transmission-Transition Point 1, for which the Company is requesting a Certificate of Public Convenience and Necessity ("CPCN").

I. BACKGROUND

Q. Please state again the construction configurations considered by the Company to provide redundant electric service to the North Valley.

A. Idaho Power investigated a number of construction configurations and numerous routes for providing a redundant source of energy to the North Valley, including some non-traditional construction configurations described in Mr. Angell's testimony. The Company's analysis concluded that the non-traditional construction configuration technologies (i.e., microgrid) for providing

a redundant electric energy solution are just not cost-effective today, would only provide electric backup for a relatively short period of time, and would still not eliminate the need for the redundant transmission system.

Mr. Angell described four redundant electric service construction configurations which all begin with the same Common Route configuration of a 138 kilovolt ("kV") overhead transmission line constructed from the Wood River Transmission Station, east to Buttercup Road, then north along the bike path and Highway 75 to approximately the area near Owl Rock Road. The four construction configurations Mr. Angell described were identified as: (1) Overhead Transmission, (2) Underground Transmission, (3) Overhead Distribution, and (4) Underground Distribution.

Q. Which of these construction configurations did Mr. Angell provide to you for additional analysis and review?

A. Mr. Angell concluded that neither the Dollar Mountain nor the Downtown District route options for an Overhead Transmission construction configuration provided a viable solution for redundant electric service to the North Valley. Mr. Angell describes the Company's rationale for eliminating this construction configuration in greater detail in his testimony.

The three remaining construction configurations Mr. Angell provided for further analysis and review are identified as:

1. Underground Transmission.

The Underground Transmission construction configuration would include the Common Route along Highway 75 to one of three possible overhead-to-underground transition points between Owl Rock Road and Elkhorn Road, at which point the transmission line would be constructed underground and proceed along the highway and in road rights-of-way to the Ketchum substation. Please see Angell Exhibit No. 5.

2. Overhead Distribution.

The Overhead Distribution construction configuration would include the Common Route to a new substation site on the west side of Highway 75 south of Owl Rock Road. This construction configuration would include a new substation with 2 x 44.8 MVA 138/12.5 kV transformers, two 4-bay metalclad sections, five feeder getaways, a control building, 10 foot decorative walls, and sound barriers around the transformers. Five overhead distribution circuits would connect with the existing Ketchum and Elkhorn substation distribution circuits. Eight sets of padmount switchgear and optical fiber from the new substation for Supervisory Control and Data Acquisition

(SCADA) control will be installed to effectuate the load transfers during outages of any transmission line or substation. Please see Angell Exhibit No. 6.

Unlike the Underground Transmission construction configuration, this option (and the next) only provides 60 megawatts ("MW") of additional service capacity on five distribution circuits. Additional circuits will need to be constructed if the area peak load increases.

3. Underground Distribution.

The Underground Distribution construction configuration would also include the Common Route to a new substation site on the west side of Highway 75 south of Owl Rock Road. From this point on, the option is substantially the same as the Overhead Distribution construction configuration with the 12.5 kV distribution circuits installed underground, rather than overhead, requiring boring, asphalt, and landscape work.

II. COSTS, BENEFITS, AND DETRIMENTS

Q. What are the estimated construction costs for each of the three viable redundant service line construction configurations?

A. I have provided Exhibit No. 7, which shows the cost estimates for each of the three redundant service construction configurations. The estimates are based on conceptual design level estimates and all three service

line options include a 30 percent contingency. Variances could occur as a result of actual right-of-way costs and underground bore costs.

The construction cost estimates for the Underground Transmission construction configuration range from $29.5 to $36.2 million. The cost estimate ranges depend on the location of the point of transition from overhead-to-underground construction. For the Overhead Distribution construction configuration, the construction cost estimates range from $29.1 to $31.1 million and for the Underground Distribution construction configuration, they range from $43.4 to $45.9 million. Both distribution line options include basic feeder switching automation.

Q. What are the benefits and detriments of each of the three redundant electric service options?

A. The primary benefit of the Underground Transmission construction configuration is that the line would provide a second, fully redundant transmission line to the Ketchum substation and reduce sustained outages. If this option were constructed, the North Valley customers would not experience a sustained outage for loss of either transmission line (the existing transmission line or the newly constructed transmission line). Other benefits include that the line would support a build-out demand in the North Valley area of 120 MW. The current peak for the

North Valley is approximately 60 MW. The underground portion of the transmission line would avoid the City of Ketchum's Prohibition of Use and greatly reduce the adverse visual impacts that are opposed by many in the North Valley. The line would provide the ability to de-energize any section of either transmission line for maintenance, inspection, repair, or reconstruction, without customer interruption.

Q. Are there any potential detriments or downsides to this option?

A. Yes. Idaho Power does not have historical experience in constructing and operating underground transmission. The Company currently does not have any underground transmission line anywhere on its system, but underground transmission is not new technology and is used by other utilities in other parts of the country.

Q. What are the benefits of the Overhead Distribution construction configuration?

A. The benefits of the Overhead Distribution construction configuration are that the combination of the line, substation, and distribution circuits would provide 60 MW of redundant capacity to the existing customers served from the Ketchum and Elkhorn substations, with similar reliability benefits as the Underground Transmission construction configuration. New distribution

circuits would provide backup service for maintenance activities on portions of the existing distribution circuits. Idaho Power has extensive experience operating and maintaining overhead distribution lines and substations.

Q. Are there any possible detriments to this option?

A. Yes. If there was an interruption in the service caused by the existing transmission line, customers would experience short sustained outages until the distribution circuits are switched to the alternate service circuits. This could occur if the current 138 kV transmission line experienced a "line event," which is an extended outage for line conductor, insulator, or structure failures caused by, among other things, vandalism, inclement weather, wood decay, woodpecker damage, avalanche, fire, and micro-burst wind events. The Overhead Distribution construction configuration would not result in a reduction of the number of sustained outages. The substation and five overhead feeders would cause additional visual impacts which may not be supported by the customers in the North Valley area and may not be allowed by city ordinances in Ketchum and Sun Valley. This configuration provides only 60 MW of backup service for the existing customers. Over time, additional facilities would be

required to maintain backup service as demand in the North Valley area grows.

Q. And finally, what are the benefits and detriments of the Underground Distribution construction configuration?

A. From a reliability and capacity perspective, the Underground Distribution construction configuration would provide substantially similar benefits as the Overhead Distribution construction configuration. However, unlike the Overhead Distribution construction configuration, this option would greatly reduce the visual impacts of overhead distribution circuits and avoid the city ordinance issues in Ketchum and Sun Valley.

The detriments are similar to that noted for overhead distribution. It should be noted, however, this option is the most expensive of all three options, without providing any significant additional benefits other than the reduction in adverse visual impacts and the avoidance of city ordinance issues.

III. CONSTRUCTION CONFIGURATION ANALYSIS

Q. Based upon the cost estimates and relative benefits and detriments of the three construction configurations, was the Company able to eliminate any construction configuration from further analysis?

A. Yes. In reviewing the three proposed construction configurations for providing redundant electrical service to the North Valley, the Company compared the cost estimates of each option with its respective benefits and detriments. The Company concluded that the Underground Distribution construction configuration should be eliminated from further consideration. The Underground Distribution construction configuration would provide substantially similar benefits as the Overhead Distribution construction configuration, but at a substantially higher cost to construct. While there would be fewer obstacles to construction by avoiding city ordinance issues regarding overhead construction, the significant increase in construction costs could not be justified.

Q. What additional review did the Company perform for the two remaining service construction configurations?

A. At this point in the analysis, the construction cost estimates for the Overhead Distribution construction configuration, ranging from $29.1 to $31.1 million, provide the lowest-cost solution to providing redundant electrical service to the North Valley. In addition, the Overhead Distribution construction configuration is consistent with the Company's traditional or standard practice of providing redundant electric

service to an area. However, while the Overhead Distribution construction configuration provides an electrical solution that would enable the Company to reduce the duration of sustained outages and continue providing reliable electric service to the North Valley, the similarity in costs between the Overhead Distribution and Underground Transmission construction configurations necessitated further review between the two. For the additional analysis, the Company used the midpoint of the range in cost estimates for the Overhead Distribution construction configuration ($30 million) as an economic base for the Company's standard practice solution. Using the $30 million economic base, the Company continued analysis on the range of cost estimates for the Underground Transmission construction configuration.

Q. What impact does the location of the underground transition structure have on the total overall cost estimate for the Underground Transmission construction configuration?

A. Because the cost of underground transmission is very expensive, the impact to the overall cost of providing redundant service to the North Valley under the Underground Transmission construction configuration is impacted greatly by the location of the transition point from overhead to underground transmission. The cost to

construct an underground transmission line can range between five to 10 times the costs of overhead construction. Therefore, the total project cost estimate for the Underground Transmission construction configuration can be reduced by continuing the initial overhead portion of the Common Route transmission line, the portion from the Wood River substation in Hailey to the area near Owl Rock Road, as far north as possible before transitioning the line to underground.

Q. What options to various overhead-to-underground transition points were evaluated?

A. Three separate options with varying overhead-to-underground transition points ("TP") were analyzed further. The potential locations for transition points along Highway 75 are identified as: TP1, near the intersection of Elkhorn Road and Highway 75; TP2, near the intersection of Hospital Drive and Highway 75; and TP3, near the intersection of Owl Rock Road and Highway 75.

Q. What are the total estimated costs for the Underground Transmission construction configuration that are associated with each of these transition points?

A. The overall Underground Transmission project costs are as follows:

Underground Transmission-TP1:	$30.0 million
Underground Transmission-TP2:	$32.7 million
Underground Transmission-TP3:	$35.7 million

The estimates are based on conceptual design level estimates. Variances could occur as a result of actual right-of-way costs, underground bore costs, or other unknown construction-related costs.

Q. How do these cost estimates compare to the economic base case option of $30 million for the Overhead Distribution construction configuration?

A. The cost estimates for options TP2 and TP3 are greater than the cost estimate of the economic base construction configuration. However, the cost estimate for TP1 of $30 million is the same as the cost estimate for the Overhead Distribution construction configuration.

Q. Does the Company consider the Overhead Distribution base case construction configuration equivalent to Underground Transmission-TP1 construction configuration?

A. From a cost basis, yes. However, the benefits and construction challenges are not equivalent.

Q. How are the benefits between the two cost equivalent solutions different?

A. While both the Overhead Distribution and Underground Transmission-TP1 construction configurations provide redundant service to the North Valley area, the Underground Transmission-TP1 option will provide additional stability over time as it would allow for future growth in

customer demand. As I stated above, the Underground Transmission construction configuration would provide full redundant capacity of the existing 138 kV transmission line and would support a build-out demand in the North Valley area of 120 MW. The line would provide the ability to de-energize any section of either transmission line for maintenance, inspection, repair, or reconstruction, without customer interruption.

While the Overhead Distribution construction configuration is the economic base case, the Overhead Distribution construction configuration would provide for only 60 MW of backup service. Over time, additional facilities would be required to maintain backup service as demand in the North Valley area grows. If there was an interruption in the service provided by the existing transmission line, customers would experience short sustained outages until the distribution circuits are switched to the alternate service circuits. The Overhead Distribution construction configuration would not result in a reduction of the number of sustained outages.

Q. Are there differences in the operational risks between the two cost-equivalent construction configurations?

A. Yes. From an operating perspective, given the unlikely event of a 138 kV underground cable failure, no

customers would experience a sustained outage with the Underground Transmission construction configuration, as the existing line will maintain the continuity of service until the underground cable is repaired.

For the Overhead Distribution construction configuration, the potential operational risks include customers experiencing sustained outages if the alternate source switching is not automated. Even if the switching is automated, the customers would experience sustained outages if any circuit is in an abnormal configuration prior to the line event. Lack of automation and abnormal circuit configurations have the potential to increase the System Average Interruption Frequency Index (SAIFI) and System Average Interruption Duration Index (SAIDI) reliability indices. Additionally, cold load pickup might complicate and prolong re-energizing feeders that are out if the automation is either not implemented, disabled, or malfunctions.

Q. Because Idaho Power does not currently have any experience with underground transmission facilities on its system, what does the Company propose to do if there is a cable failure?

A. As noted above, it is unlikely that the underground cable will fail. However, in the event of a

failure, Idaho Power will utilize contractors that have experience dealing with underground transmission lines.

Q. What construction concerns or challenges did the Company consider between the two cost-equivalent options?

A. While both options would require a number of permits prior to construction, the Company believes that construction of the Overhead Distribution construction configuration may be met with considerable resistance. Blaine County requires approval of a conditional use permit due to the transmission structure heights. But the substation for the Overhead Distribution construction configuration, if located on the west side of Highway 75, would also require a site alteration permit of the Mountain Overlay District from the Blaine County Planning and Zoning Commission. For the Underground Transmission construction configuration, both the City of Ketchum and the City of Sun Valley require a Right-Of-Way Encroachment and Dig Permit, approved by their respective city councils. However, there is concern that the overhead distribution circuits for the Overhead Distribution construction configuration would likely be denied by both Sun Valley and Ketchum based upon statements made by city officials and their interpretations of city code and conditional use permits in specific zoning districts. Through numerous meetings with city officials,

it has become apparent that overhead construction of any sort will be met with significant resistance.

Q. Has the Company thus far pursued any permitting activities for any of the possible routes?

A. Yes. Idaho Power has been and is currently engaged in acquiring the appropriate and required permits including the submission in 2015 for a right-of-way encroachment application to the cities of Ketchum and Sun Valley and a conditional use permit, with a revised application in 2016 to Blaine County. All requests are still pending, with a hearing set for the conditional use permit application with Blaine County on November 10, 2016.

IV. CONCLUSION

Q. Please summarize the Company's analysis for providing a redundant source for electrical service in the North Valley.

A. Across the Company's system, Idaho Power's standard practice to reduce sustained outages and improve system reliability is to construct redundant overhead transmission lines or to implement distribution circuits with tie switches, particularly in large customer areas like the North Valley. Two construction configurations evaluated meet this standard practice criterion, the Overhead Transmission and Overhead Distribution construction configurations.

Each of the construction configurations includes construction of the Common Route, an overhead 138 kV transmission line from the Wood River station to a location near the intersection of Highway 75 and Owl Rock Road. As described in Mr. Angell's testimony, the Company determined that the Overhead Transmission construction configuration was not a viable option for the North Valley. This leaves the Overhead Distribution option, which as the lowest-cost viable construction configuration serves as the economic base case, at an estimated cost of $30 million, and represents the traditional and standard practice solution for providing redundant electrical service to the North Valley.

Q. Is the Overhead Distribution construction configuration the Company's recommendation for a CPCN?

A. No. As explained above, the Overhead Distribution construction configuration would be the Company's traditional and standard practice for building a redundant electrical solution, given its estimated cost and the constraints of the North Valley. Consequently, it serves as a base case by which to measure any incremental cost difference that may be required because of the local jurisdictions' preferences. However, the Company understands and recognizes that the Overhead Distribution construction configuration may not be the construction

configuration desired by many of the constituents in the North Valley, and has identified the Underground Transmission-TP1 construction configuration as an economic equivalent to the Overhead Distribution base case. The Company maintains that if the local government and communities require that the facilities be constructed underground or on a construction configuration route that increases the cost of such facilities, the incremental cost difference between the Overhead Distribution construction configuration and the underground configuration should be assessed to the cities of Ketchum and Sun Valley and to Blaine County. Company witness Michael Youngblood discusses possible funding arrangements the Company considered for recovering the incremental costs of other construction configurations in his testimony.

Q. Is the Underground Transmission construction configuration an economic equivalent to the Overhead Distribution construction configuration and, therefore, a viable option for a CPCN request?

A. Yes. The Company's analysis concludes that the Underground Transmission-TP1 option, at $30 million, would be an economic equivalent to the Company's standard practice of providing redundant electrical service. Idaho Power views this routing option as striking a balance between the Company's obligations to provide low-cost,

reliable service and the communities' interests. Consequently, the Company is seeking a CPCN for the Underground Transmission-TP1 route. The other Underground Transmission options, TP2 and TP3, result in higher estimated costs for construction. If either of these higher-cost options is chosen by the governments or communities in the North Valley, then any incremental costs above the economic base case of $30 million must be funded by the customers in the North Valley.

Q. Does this conclude your testimony?

A. Yes.

ATTESTATION OF TESTIMONY

STATE OF IDAHO)
) ss.
County of Ada)

I, Ryan N. Adelman, having been duly sworn to testify truthfully, and based upon my personal knowledge, state the following:

I am employed by Idaho Power Company as the Customer Operations Project Manager in the Customer Operations Engineering and Construction Department and am competent to be a witness in this proceeding.

I declare under penalty of perjury of the laws of the state of Idaho that the foregoing pre-filed testimony and exhibit are true and correct to the best of my information and belief.

DATED this 8th day of November 2016.

Ryan N. Adelman

SUBSCRIBED AND SWORN to before me this 8th day of November 2016.

CHRISTA S. BEARRY NOTARY PUBLIC STATE OF IDAHO

Notary Public for Idaho
Residing at: Boise, Idaho
My commission expires: 02/04/2021


NOTARY
PUBLIC

BEFORE THE

IDAHO PUBLIC UTILITIES COMMISSION

CASE NO. IPC-E-16-28

IDAHO POWER COMPANY

ADELMAN, DI
TESTIMONY

EXHIBIT NO. 7

Wood River Valley Redundant Electric Service
Estimated Cost Summary of Construction Configuration Alternatives

Underground Distribution				Overhead Distribution			
New Substation		$ 5,515,000		New Substation		$ 5,515,000	
Distribution Line Switches		$ 20,000		Distribution Line Switches		$ 20,000	
Underground distribution		$ 13,165,217		Overhead distribution		$ 4,073,913	
Other Feeder Work		$ 518,100		Other Feeder Work		$ 518,100	
Communications		$ 280,000		Communications		$ 280,000	
Automation		$ 800,000		Automation		$ 800,000	
Surveying		$ 100,000		Surveying		$ 100,000	
IPC Management/Inspection		$ 150,000		IPC Management/Inspection		$ 150,000	
Subtotal 1		**$ 20,548,317**		**Subtotal 1**		**$ 11,457,013**	
Contingency	30%	$ 6,164,495		Contingency	30%	$ 3,437,104	
Overheads	15%	$ 3,082,248		Overheads	15%	$ 1,718,552	
Subtotal 2		**$ 29,795,060**		**Subtotal 2**		**$ 16,612,669**	
AFUDC	8%	$ 2,383,605		AFUDC	8%	$ 1,329,014	
Subtotal 3		**$ 32,178,665**		**Subtotal 3**		**$ 17,941,683**	
Right-of-way		$ 1,000,000	$ 2,000,000	Right-of-way		$ 1,000,000	$ 2,000,000
Substation Site Construction		$ -	$ 1,000,000	Substation Site Construction		$ -	$ 1,000,000
Underground Bore		$ -	$ 500,000				
Total		**$ 33,178,665**	**$ 35,678,665**			**$ 18,941,683**	**$ 20,941,683**
Common Route		**$ 10,204,650**				**$ 10,204,650**	
Grand Total		**$ 43,383,315**	**$ 45,883,315**	**Grand Total**		**$ 29,146,333**	**$ 31,146,333**
Cost Estimate Ranges ($ millions)		**$ 43.4**	**$ 45.9**	**Cost Estimate Ranges ($ millions)**		**$ 29.1**	**$ 31.1**

Exhibit No. 7
Case No. IPC-E-16-28
R. Adelman, IPC
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Wood River Valley Redundant Electric Service
Estimated Cost Summary of Construction Configuration Alternatives

Underground Transmission											
		Transition Point 1			Transition Point 2			Transition Point 3			
Overhead 138 kV (w/Engineering)		$ 589,000			$ 134,000			$ -			
Underground 138 kV (w/Engineering)		$ 8,097,000			$ 10,673,000			$ 12,397,000			
Distribution Underbuild		$ 98,000			$ 28,000			$ -			
Communications		$ 1,133,000			$ 1,083,000			$ 1,033,000			
138 kV Line Switches		$ 621,000			$ 621,000			$ 621,000			
138 kV Line Terminals		$ 834,000			$ 834,000			$ 834,000			
Surveying		$ 100,000			$ 100,000			$ 100,000			
IPC Management/Inspection		$ 250,000			$ 250,000			$ 250,000			
Subtotal 1		**$ 11,722,000**			**$ 13,723,000**			**$ 15,235,000**			
Contingency	30%	$ 3,516,600			$ 4,116,900			$ 4,570,500			
Overheads	15%	$ 1,758,300			$ 2,058,450			$ 2,285,250			
ITD Bridge Project Work (w/OH)		$ 345,000			$ 345,000			$ 345,000			
Subtotal 2		**$ 17,341,900**			**$ 20,243,350**			**$ 22,435,750**			
AFUDC	8%	$ 1,387,352			$ 1,619,468			$ 1,794,860			
Subtotal 3		**$ 18,729,252**			**$ 21,862,818**			**$ 24,230,610**			
Right-of-way		$ 600,000	$	1,200,000	$ 350,000	$	700,000	$ 750,000	$	1,250,000	
Underground Bore			$	200,000		$	200,000		$	500,000	
Total		**$ 19,329,252**	**$**	**20,129,252**	**$ 22,212,818**	**$**	**22,762,818**	**$ 24,980,610**	**$**	**25,980,610**	
Common Route		**$ 10,204,650**			**$ 10,204,650**			**$ 10,204,650**			
Grand Total		**$ 29,533,902**	**$**	**30,333,902**	**$ 32,417,468**	**$**	**32,967,468**	**$ 35,185,260**	**$**	**36,185,260**	
Cost Estimate Ranges ($ millions)		**$ 29.5**	**$**	**30.3**	**$ 32.4**	**$**	**33.0**	**$ 35.2**	**$**	**36.2**	