

Attachment A

Internet Research Samples

SCE is not unfamiliar with ACCR conductors. Go to below web site to see Comment Set B-9 (Starting page B-103) for discussion of proposals to use ACCR conductors for the Desert Southwest Transmission Project (Palo Verde to Devers).

http://www.cpuc.ca.gov/environment/info/aspen/dpv2/feir/cmts/cmt_sets_B07-B10.pdf

Planning and Operational Issues Arising From the Widespread Use of HTLS Conductors

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Abstract

High-temperature low-sag (HTLS) conductors, which can double the ampacity of conventional conductors, are becoming a mature option to uprate thermally limited transmission lines. This paper addresses several issues related to the widespread use of HTLS conductors in existing power systems. The first part of the paper analyzes the influence of higher line resistances on power transfer capability as well as the accuracy of conventional network models, based on constant conductor temperatures. The second part deals with the problem planners are facing when considering existing network reinforcement options versus the new alternative offered by HTLS conductors, intended to replace Alloy Aluminum Conductor Steel Reinforced (ACSR) equipment in situ. This leads to a security-constrained optimization problem involving binary decision variables. The 57-bus system is used throughout the paper to illustrate the main ideas.

Silicon Valley Power Chooses 3M's ACCR to Boost Transmission Without Need to Expand Towers or Right of Way

[NEMA](#) > [Press Room](#) > [Industry News](#) > Silicon Valley Power Chooses 3M's ACCR to Boost Transmission Without Need to Expand Towers or Right of Way

12 Aug 2008

Silicon Valley Power, the 112-year-old electric utility established by the City of Santa Clara, California, will install the [3M](#) Aluminum Conductor Composite Reinforced (3M ACCR) on an existing line to boost capacity without having to enlarge the towers or the right of way. Silicon Valley Power will re-conductor a 60kV line that principally links its Scott Receiving Station with the Northwestern Substation, through a narrow right of way in an urban neighborhood.

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Reconductoring with 3M ACCR allows the line to be upgraded with minimal disturbances to the neighborhood. The utility serves just over 51,000 residential, commercial and industrial customers in a 19-square-mile area with a population exceeding 115,000. Its service area covers a significant portion of the Silicon Valley technology community.


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Alabama Power to Install 3M High-Capacity ACCR Conductor to Upgrade Key Transmission Line

[NEMA](#) > [Press Room](#) > [Industry News](#) > Alabama Power to Install 3M High-Capacity ACCR Conductor to Upgrade Key Transmission Line

05 Mar 2008

Alabama Power Company, which supplies electricity to more than 1.4 million residential and commercial customers, will install [3M](#)'s high-capacity aluminum conductor composite reinforced (ACCR) transmission conductor to upgrade a key line at its Miller Steam Plant, according to Tim Koenig, head of 3M's High Capacity Conductor Program.

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According to Koenig, 3M ACCR can carry more than twice the current of conventional steel-core conductors of the same diameter, generally with no new tower construction or rebuilding because of its relatively light weight, low sag and high strength.

"Utilities around the globe are recognizing that the 3M ACCR is a proven solution to electric transmission constraints that is both cost-effective and applicable to a very broad range of climate conditions and terrain," he said. "Most importantly, it offers a means of quickly making more power available in response to growing demand without the financial and environmental risks associated with enlarging towers or expanding rights of way."

"The characteristics of the 3M conductor provided the ideal solution for the particular challenges faced with the line reconductor at the Miller Steam Plant," said Howard Samms, a senior engineer at Alabama Power. "The 3M conductor allowed us to obtain the required capacity, while utilizing the existing structures and maintaining or improving the existing clearances to ground and other obstacles. As a result, significant savings were achieved in both time and cost by eliminating the need for the design, supply and construction of new towers."


3M ACCR was developed with the support of the U.S. Department of Energy and with early contributions by the Defense Advanced Research Projects Agency. It has the durability and longevity of traditional steel core conductors, even when operated continuously at high temperatures. Also, since it is based on aluminum, it is not adversely affected by environmental conditions, such as moisture or UV exposure, and has the corrosion resistance typically associated with aluminum-based conductors.

Shanghai Electric Installs 3M ACCR to Boost Capacity on Key Line

[NEMA](#) > [Press Room](#) > [Industry News](#) > Shanghai Electric Installs 3M ACCR to Boost Capacity on Key Line

07 Nov 2007

Shanghai Electric Power Company Ltd. has become the first utility outside the United States to install [3M](#) aluminum conductor composite reinforced (ACCR) light-weight, high-capacity transmission conductors. 3M's ACCR can carry more than twice the current of conventional steel-core conductors of the same diameter on existing towers, without requiring new construction or rebuilding.

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Shanghai Electric, a publicly-owned utility, serves the Shanghai metropolitan area with more than 2,800 megawatts of generating capacity. It deployed 3M's ACCR to increase capacity on a key 10-mile line to meet growing peak demand. Shanghai is the largest city in the People's Republic of China, and the eighth largest metropolis in the world.

"Interest from U.S. and foreign utilities continues to gain momentum as decision-makers realize we have a proven and ready solution to common problems that limit the capacity of conventional transmission lines, often causing constraints and bottlenecks," said Tim Koenig, director of the 3M high-capacity conductor program. "The performance and reliability of this high-performance conductor have been persuasively established in several years of use through field tests and commercial applications, under harsh environmental and operating conditions."

Because 3M's ACCR is installed on existing structures and can match the sag and tension of the existing conductor with less weight, utilities can reduce the costs and risks associated with major transmission construction projects, without adding any risk to the existing system.

Xcel Energy Installs 3M's New ACCR Overhead Conductor on Minnesota Transmission Line

Jun 6, 2005 1:03 PM
Business Wire

Xcel Energy, which serves 3.3 million electricity and 1.8 million natural gas customers in 10 states, has installed and energized 3M's new aluminum conductor composite reinforced (ACCR) overhead conductor on a 10-mile line that is an integral part of the electricity grid in the Upper Midwest. It is the first commercial application of the ACCR, which more than doubles the transmission capacity of conventional conductors of the same diameter without requiring construction of new towers.

The new ACCR conductor was installed during an eight-week period on Xcel Energy's Black Dog-Blue Lake line in Minnesota, U.S., which extends from Shakopee to Burnsville. The high-capacity conductor

will support the expansion of the utility's Blue Lake plant, which will provide additional power during peak demand periods in Xcel Energy's Upper Midwest service territory.

"The ACCR provided a fast and cost-effective option for delivering additional energy from Blue Lake to our 1.5 million electricity customers in the Upper Midwest," said Doug Jaeger, transmission vice president, Xcel Energy. "Without it, we would have had to replace existing towers to accommodate larger sized conventional conductors. Use of the new conductor allowed us to boost capacity on the line, while avoiding major construction in an area with sensitive wetlands."

3M ACCR is intended as a solution to thermally constrained transmission bottlenecks that have increasingly plagued electricity grids in recent years, causing brownouts and blackouts.

ACCR is a new type of bare overhead conductor containing a multistrand core of heat-resistant aluminum matrix composite wires, which retains its strength at high temperatures and is not adversely affected by environmental conditions, such as moisture or UV exposure. Because of its lightweight and reduced thermal expansion properties, the conductor can be installed on existing towers and requires no visual changes to a line or additional rights-of-way.

The ACCR has been extensively tested in the laboratory and field-tested for more than four years, including Oak Ridge National Laboratory in Tennessee, under the auspices of the U.S. Department of Energy, and at locations operated by Xcel Energy; Western Area Power Administration (in North Dakota and Arizona) sites; the Salt River Project, also an Arizona utility; Hawaiian Electric Company; and Bonneville Power Administration at a site in Washington state. The power line has been proven under a broad range of extreme conditions, such as salt water corrosion, high winds, vibration and extreme heat and cold.

3M teamed with various companies whose expertise in certain components helped to make 3M ACCR viable. Key contributors include Wire Rope Industries, Nexans Inc., Preformed Line Products Co. and Alcoa Conductor Accessories. Organizations playing key supporting roles in laboratory and field testing of the technology include National Electric Energy Testing, Research and Applications Center (NEETRAC); Kinectrics, Oak Ridge National Laboratory (ORNL); and the U.S. Department of Energy Western Area Power Administration.

ACCR Fires Up at Platte River

Platte River Power Authority, a utility owned by and serving four major communities in north-central Colorado, has energized a key transmission line upgraded with 3M's ACCR (Aluminum Conductor Composite Reinforced) high capacity overhead conductor.

3M ACCR was energized on a three-mile line linking the Timberline and Harmony Substations in Fort Collins, primarily to help ensure adequate transmission capacity during summer peak-demand hours. Platte River also serves Estes Park, Longmont and Loveland. All four communities are situated north of Denver.

Already in service in major metropolitan areas, including Phoenix, Minneapolis-St. Paul, and Shanghai, China, 3M ACCR is also finding application in less-populated areas, where minimal

environmental disruption may be required. For example, Western Area Power Administration (WAPA) recently installed the new conductor on its Topac-Davis-Lake Mead line in rural western Arizona.

According to Mike Dahl, Platte River Power Authority's division manager of electric operations, the Timberline-Harmony line "is an important part of the grid between Denver and Cheyenne, and we chose 3M ACCR as a way to safeguard against overloading when demand is high."