Composite Conductor Field Trial Summary Report: Western Area Power Administration—Phoenix

Installation Date	January 2004
Field trial Location	Phoenix, Arizona, USA

Line Characteristics

Utility:	Western Area Power Administration (WAPA Desert Southwest)
Point of Contact at Utility	Ross Clark, Transmission Manager
Installation Date:	January 2004
Conductor Installed	ACCR 1272 kcmil *(726 mm^2)*
Length of line:	1,800 feet (548 meters)
Conductor diameter	1.382 inch, *(35.1 mm)*
Voltage	230 kV
Ruling span length	900 feet, (274 meters)
Structure Type	Steel Poles
***Data output**, (Time stamped every 10 minutes)*	(1) Mechanical load cell (2) MVA reading (3) Ambient temperature, (4) Net radiation sensor (5) Wind anemometer and direction

Hardware

Suspension Hardware	Preformed Line Product, THERMOLIGN™ Suspensions TLS-0116-SE
Termination Hardware (1)	Alcoa Brand ACCR Compression Dead Ends and Splice B0119-A (Dead End), B9095-C (Splice)
Termination Hardware (2)	PLP THERMOLIGN™ Dead Ends and Splice TLDE-1272-N; TLSP-1272
Insulator type	Ceramic
Dampers	Alcoa Brand Stockbridge Dampers –1707-11
*Terminal*s	Alcoa Brand Compression Terminal Connectors – B9102-C

Results and Measurements

- Document installation procedure
- Performance of large diameter ACCR conductors
- Response to high ambient heat
- Response to high mechanical loads
- Monitor room temperature creep versus model

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Photo Album *(3M copyright, 2004)*

Overall view of the 230KV line

Installation of Alcoa compression dead end

Installation of PLP THERMOLIGN™ Suspensions

Installation of PLP THERMOLIGN™ Dead End

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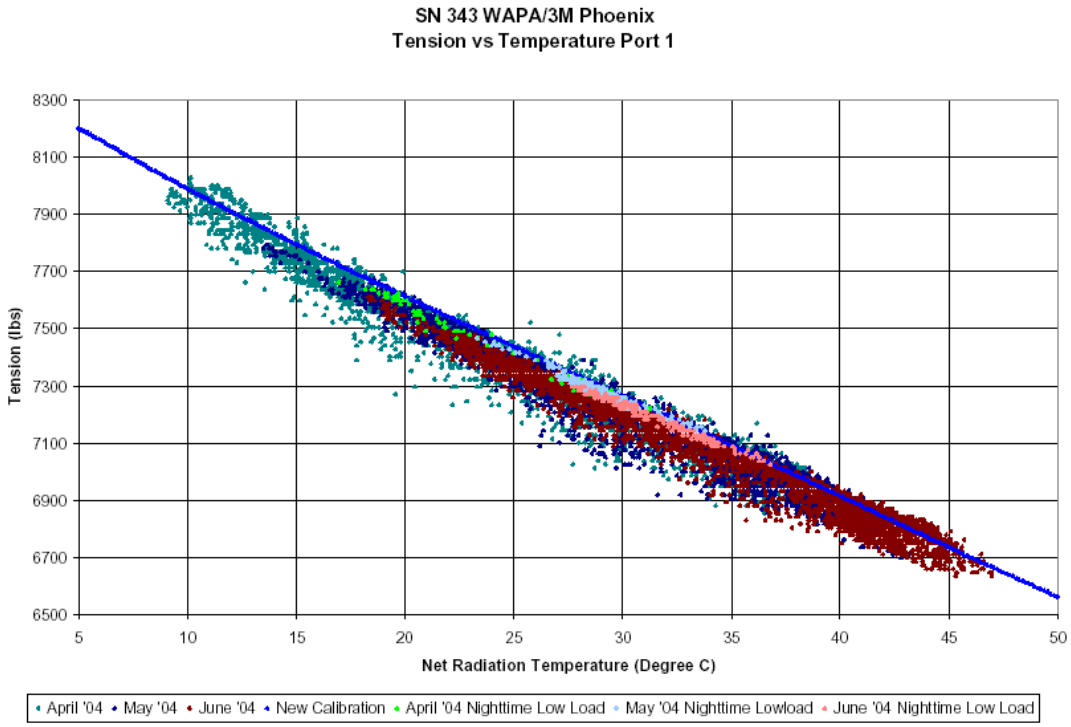
Installation process

The installation was similar to the one in Fargo.

Response to Hot Weather

The conductor stretches over one suspension towers in between the two dead-ends in a desert area with temperature soaring over 110°F *(43°C)* in the full sun. Measurement and calculation tracks the effect of changing temperatures on the conductor sag. The load data shows the variation in conductor tension from 50°F to 113°F *(10°C to 45°C).* Scatter is due to conditions such as wind and thermal loading of conductor.



April -June 2004, Load –temperature data on the 230kV ACCR line in Fargo, ND.

Overall, the tension follows the prediction from Sag-Tension models based on the conductor properties.

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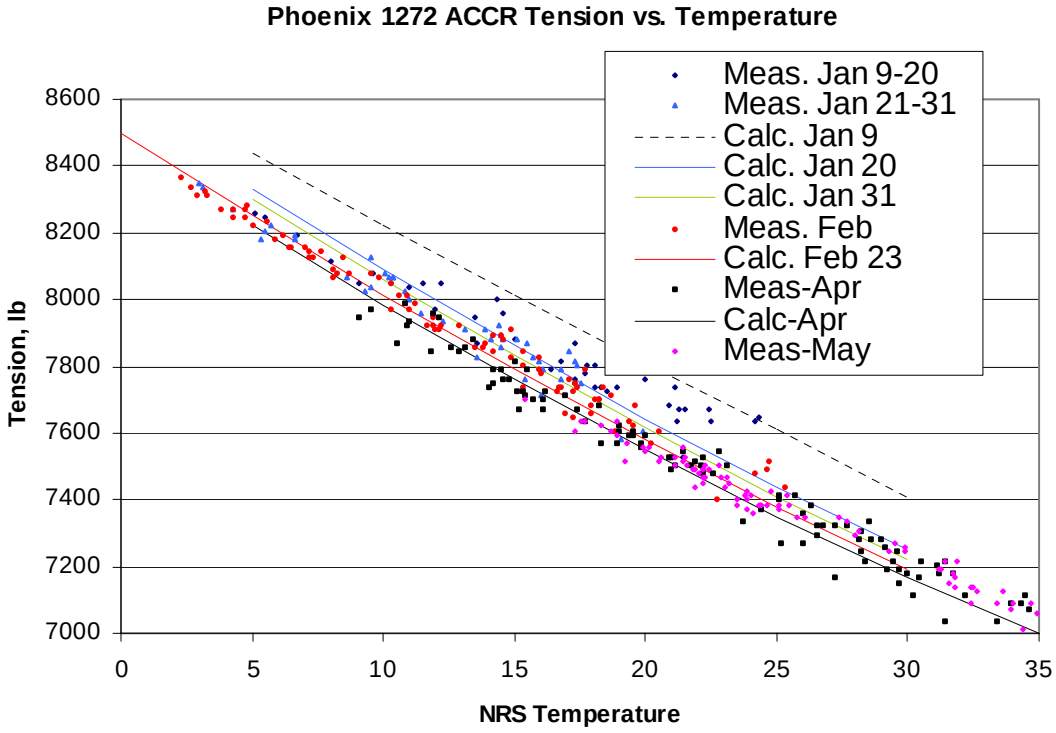
Measured and predicted sag

The sag was predicted with the Strain Summation Method to account for the full loading history from January to February 2004. The data for the spring 2004 will be reported in September 2004.



The Strain Summation Method of Sag-Tension Calculation was used to model the sags and tensions, taking into account creep as a function of time. A conductor data file was created based on stress strain tests performed by NEETRAC. The Strain Summation Method accounts for creep and wind loads on a daily basis because the method can examine any number of conductor states in sequence. This differs from the Graphic Method, which considers only two states: initial and final.

The predicted data matches the calculated data within a precision of 0.5% percent on tension when accounting the conductor stress-strain, thermal elongation, temperature, current and creep history.

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Response to special weather events

The conductor and accessories have been subjected to full sun temperature in excess of 113^{o}F, (45^{o}C) and winds in excess of 55 mph (88 km/h) in 2004. The conductor and accessories are behaving as expected under such conditions.

1272 ACCR Specification

			METRIC
Designation		1272-T13	
Stranding		54/19	*54/19*
	kcmil	1,272	*726 mm^2*
Diameter	in	1.38	*35.1 mm*
Total Area	in^2	1.126	*726 mm^2*
Weight	lbs/linear ft	1.392	*2.071 kg/m*
Breaking Strength	lbs	43,677	*194 kN*
Modulus	msi	10	*73 GPa*
Thermal Elongation	ppm/^{0}C	17	*17 10^{-6}/^{o}C*

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