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UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Utilities Service

**BULLETIN 1724D-106**

**RD-GD-2010-63**

**SUBJECT: Considerations For Replacing Storm-Damaged Conductors**

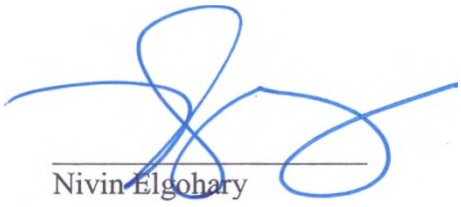
**TO:** RUS Electric Borrowers

**EFFECTIVE DATE:** Date of Approval

**OFFICE OF PRIMARY INTEREST:** Distribution Branch, Electric Staff Division

**AVAILABILITY:** This is a revision of an existing guide bulletin and is available on the Rural Utilities Service website at http://www.usda.gov/rus/electric/bulletins.htm.

**PURPOSE:** Immediately after a major storm like a hurricane, electric utility personnel are very busy and focused on restoring electric service. Often during this period of service restoration and commotion, electric utility engineers or others have to make an immediate decision on whether to simply re-install downed or damaged conductors or to replace them with new conductors. This bulletin provides guidelines that will assist Rural Utilities Service (RUS) borrowers to expediently make this decision.



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_____8/3/10_____
Date

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## ABBREVIATIONS

| | |
|---|---|
| ACSR | Aluminum Conductor Steel Reinforced |
| CWP | Construction Work Plan |
| LRP | Long Range Plan |
| FEMA | Federal Emergency Management Agency |
| RUS | Rural Utilities service |

## DEFINITIONS

For the purposes of this bulletin, the following definitions are used:

Storm (or major storm) - The most recent major natural catastrophic event such as a hurricane, tornado, flood, forest fire or an ice storm.

Line Section - All of the spans between guyed, dead-end, poles or structures. (In this bulletin it is assumed that new conductors will be installed and sagged in the entire line section because that is the standard method of installing new conductors.)

Conductor-Span - One span of one primary phase or a neutral conductor.

(e.g., 5 spans with 3 phases and a neutral equal 20 Conductor-Spans.) [5 x (3 + 1) = 20]

Downed conductor – A conductor that is lying on or near the ground as the result of a storm. (A downed conductor has usually either been torn away from its pole-top attachments, or it is still attached to the top of a pole that has been broken off.)

Damaged conductor – A conductor that:

Is entirely broken or contains broken strands;

Has been permanently stretched, annealed, or deformed such that cannot be re-installed within predictable sag values or reasonable tension limits;

Is severely pitted, burned, or similarly harmed in other ways;

Has areas of rusted steel or corroded (white powder) aluminum strands; or

Contains one or more splices (with automatic splices or compression type connectors) other than those installed when the conductor was initially installed.

Re-install conductors – A repair if necessary and restore all of the downed or damaged conductors in a line section to their original position before the storm.

Replace conductors - Remove the downed or damaged conductors (even if they have been previously re-installed) and install new conductors of the same size or larger.

## FORMS

Questionnaire Form: "Reasons to Replace Stormed-Damaged Conductors"

## 1 PURPOSE

a This bulletin presents guidelines for borrowers to use during emergency system restorations when borrowers need to decide without delay whether to re-install or to replace storm-damaged conductors. This bulletin is not to be used for making undamaged conductor replacement decisions normally made in a construction work plan (CWP) or a long-range plan (LRP) that employ additional studies and a much more rigorous analysis.

b The brief questionnaire at the end of this bulletin can be used to determine, document and validate replacing storm-damaged conductors with new conductors. If one or more of the 6 criteria in the questionnaire are met, then the conductor replacement is justified. A knowledgeable utility engineer in the field can complete the questionnaire when conductor replacement decisions need to be made promptly, without the benefit of an engineering study, during restoration activities after a major storm event.

c If borrowers are seeking grant funds from FEMA, RUS recommends that borrowers reference and comply with the FEMA Disaster Assistance Fact Sheet DAP9580.6.

## 2 RESTORATION OF ELECTRIC SERVICE

a Immediately after a storm, electric utilities expediently strive to make the distribution supply system safe for the general public, and restore electric service to all consumers in an orderly, prioritized manner (starting from the substation). For example, the restoration of service to hospitals and re-energizing main feeders are deemed high priority. Whenever possible, line workers make good, permanent repairs to the storm-damaged distribution system. However during emergency conditions, line workers routinely make temporary repairs (including non-standard construction) until the time and resources are available to return and make permanent repairs to restore the distribution supply system to its condition before the storm.

b For the purposes of this bulletin, it is assumed that all distribution line materials other than conductors (such as poles, crossarms, insulators and transformers) that have been damaged during a storm have been or will be permanently replaced on a “like-with-like” basis. The purpose of such repairs and material replacements is to restore the distribution infrastructure to pre-storm.

## 3 RUS ACCOUNTING REQUIREMENTS

Borrowers’ activities related to materials retirements, new material replacements, and construction and other activities pertaining to storm damage restoration involve accounting procedures that are beyond the scope of this bulletin. However, because of the detailed nature of these accounting provisions, RUS recommends that borrowers refer to RUS Bulletin 1767B-1, “Uniform System of Accounts - Electric Program.” Borrowers should specifically review Accounting Method and Procedure #136, “Storm Damage,” in

RUS Bulletin 1767B-1. Copies of RUS Bulletin 1767B-1 are available on the RUS website at: http://www.usda.gov/rus/regs/bulls/1767b-1.pdf

## 4 BENEFITS OF REPLACING STORM-DAMAGED CONDUCTORS

Replacing downed or damaged conductors immediately or soon after a storm will eliminate the duplicate labor and cost of a documented and planned near future replacement of the conductors based on a previous study of voltage, loading, or physical condition needs. Also replacing downed and damaged conductors immediately or soon after a storm will eliminate the duplicate labor and cost of re-installing the downed and damaged conductors yet another time (or ultimately replacing them) should the old conductors fail again when subjected to another storm before they are replaced.

## 5 REASONS TO REPLACE DAMAGED CONDUCTORS WITH LARGER CONDUCTORS

If the decision has been made to replace downed or damaged conductors, larger conductors should be installed if:

a Larger conductors are called for and documented in a current CWP or LRP;

b The existing conductors are made of steel, Amerductor, Copperweld or hard-drawn copper;

c The conductors are smaller than #2 ACSR; or

d There are known (and preferably documented) undesirable primary voltage drops or primary conductor overload problems that can be attributed to the conductors in the line section in question.

## QUESTIONNAIRE FORM: "Reasons to Replace Stormed-Damaged Conductors

Company: _____ Address: _____

Engineer: _____ Date: _____

Date and type of storm [name] _____

Circuit, lead / line & section location: _____No. of Spans: _____

Existing Conductor [phases, size & type: approx. age]: _____

Number of Conductor-Spans[1] in the line section; Total Number =_____ Damaged =_____

Description of damage: _____

Number of poles in line section: Total Number = _____ Number Damaged = _____

Proposed Conductor [phases, size & type]: _____

Comments: _____

_____

_____

| Reasons for Replacing Conductors in the above Line Section | YES | NO |
|---|---|---|
| #1. 25%or more of the conductor spans are damaged. Damage is defined as broken conductors, broken strands, the existence of new (disaster-related) splices, and/or if the conductor is severely pitted, burned, kinked, or damaged. | | |
| #2. 30% or more of the line spans are visibly out of sag or do not meet clearances (for example, the conductor does not meet clearance requirements for conductor-to-conductor or conductor-to-ground). | | |
| #3. 40% or more of the poles were replaced or need to be replaced or plumbed (straightened) due to the disaster. | | |
| #4. 40% or more of the supporting structures have a disaster-related damaged component (for example, x-arms, braces, pins, ties, insulators, guys/anchors, or poles). | | |
| #5. The sum of the percentages of the above criteria is 65% or more. | | |
| #6. Other additional compelling information provided by a licensed professional engineer. | | |

[1] A Conductor-Span means one span of one primary phase or neutral conductor.
Example: 5 spans with 3 phases and neutral equals 20 Conductor-Spans. [ 5 x (3 + 1) = 20 ]