

## Recent RUS Publications

Fred Gatchell, Deputy Director, Electric Staff Division, RUS

### RUS Technical Publications

RUS has issued a number of technical publications recently. These publications include:

#### **RULES:**

- **7 CFR 1710, Subpart E, “Load Forecasts and Market Analysis.”** This proposed rule, published July 7, 1999, will change the existing load forecasting regulations. The proposed changes are intended to reduce the overall administrative burden of reporting load forecasts to RUS. The proposed changes will also allow RUS to accept less detailed analysis for smaller borrowers. Public comments have been reviewed and addressed, and the final rule should be published shortly. For more details, see the paper entitled “Load Forecasting in a Competitive Environment,” or call Georg Shultz of the Electric Staff Division (ESD) at (202) 720-1920.
- **7 CFR 1721, “Post-Loan Policies and Procedures for Insured Electric Loans.”** This direct final rule, published December 28, 1999, changes the existing regulations concerning advance of funds. Specifically, we have changed the rules as follows:
  - \* The threshold limit for a “minor project” has been increased from \$25,000 to \$100,000, and
  - \* The limitation of RUS funding to 130% of the project cost estimate without prior RUS approval has been eliminated.

A minor project can be funded from an RUS loan even though it was not included in the approved loan, Construction Work Plan (CWP), or CWP amendment. By increasing the threshold limit for a minor project to \$100,000, borrowers will have more flexibility to use their RUS loan funds for priority projects that were not anticipated at the time of the loan or CWP. A minor project must be consistent with the purposes permitted by the loan contract, and total advances cannot exceed the total loan amount.

RUS implemented the “130% rule” in 1985 to improve control over use of RUS loan funds. In recent years, the majority of cases of noncompliance with this rule relate to distribution line extensions and miscellaneous equipment needed to serve new consumers. Since borrowers have little or no control over how many new customers will need to be connected and have no choice but to connect them, RUS approval to exceed 130% of the original estimate for this type of work is superfluous. For other major projects, borrowers have been providing good cost estimates unless the project has been changed significantly, in which case borrowers generally submit a CWP amendment for RUS approval. Since total advances still cannot exceed the total loan amount, we have determined that the

130% rule is no longer needed and that the associated administrative burden on the borrowers can be eliminated.

Since no adverse comments were received, this direct final rule became effective on February 11, 2000. For more information about this action, please call Charles Philpott of the Northern Regional Division at (202) 720-1432.

- **Bulletin 1728F-806, “Specifications & Drawings for Underground Electric Distribution”** (incorporated by reference). The proposed rule covering the revision of this bulletin was published on April 8, 1998. This is an update of an existing bulletin, which was known as Bulletin 50-6.

This bulletin provides the specifications and drawings that are used in the construction of underground distribution facilities. It is one of the RUS standards that help borrowers build safe, reliable, and economical electric facilities in rural America.

We have made a number of changes to this bulletin, including the addition of two new drawings (UC-1 and UC-2) which provide alternative construction arrangements for the interface between overhead and underground facilities. We have also deleted 23 drawings and the URD Inspection Form, which are obsolete and no longer needed.

We have also incorporated a number of design changes in the drawings, including some that were recommended by the Underground Subcommittee of the NRECA T & D Committee and some suggestions that we received through the public comment process. We have also revised some of the clearances to conform to the latest code requirements.

We have updated the references to the referenced codes, specifications and standards to reflect the latest editions of these documents. Changes to a number of drawings showing caution, warning, and danger signs were needed to reflect the latest codes and standards concerning signs. Finally, we have revised or redrawn a number of drawings for greater clarity and ease of use.

Public comments have been reviewed and addressed, and publication of the final rule is expected shortly. For more information about this action, please call Trung Hiu of ESD at (202) 720-1877.

- **7 CFR Part 1792, Subpart C, “Seismic Safety of Federally Assisted New Building Construction.”** RUS is revising its existing regulations concerning seismic safety. The proposed revision would update and simplify the seismic safety requirements for new building construction using RUS or Rural Telephone Bank (RTB) loan, grant, or guaranteed funds or funds provided through lien accommodations or subordinations approved by RUS or RTB.

The Earthquake Hazards Reduction Act of 1977 and its associated Executive Order require that federally assisted new building construction meet certain seismic safety standards. These requirements are intended to reduce risk of loss of life and property damage caused by earthquakes. The Interagency Committee on Seismic Safety in

Construction and the National Earthquake Hazards Reduction Program (NEHRP) have been created to coordinate these efforts. 7 CFR Part 1792, Subpart C, which was originally issued in 1993, implements these requirements for RUS.

The proposed revision changes the list of acceptable model codes and standards that new buildings need to conform to in order to meet seismic provisions. In order for a model building code to be acceptable, the code must contain requirements equivalent to the 1994 NEHRP Recommended Provisions. The 1997 ICBO Uniform Building Code (UBC) and ASCE 7-95, Minimum Design Loads for Buildings and Other Structures, have been found to be acceptable for seismic safety purposes.

The proposed revision also eliminates the post-construction seismic certification and simplifies the requirements concerning the acknowledgement that the seismic safety provisions of the applicable model code are incorporated in the design of the building.

For more information about this action, please call Don Heald at (202) 720-9102.

## GUIDANCE DOCUMENTS:

- **Bulletin 1724D-112, “The Application of Shunt Capacitors to the Rural Electric System.”** This bulletin examines the application of shunt capacitors on rural distribution systems and serves as a general guide for capacitor applications to RUS borrowers and others. The System Planning Subcommittee of NRECA’s T&D Committee has been instrumental in the development of this bulletin. This is an update of an existing bulletin, which was known as Bulletin 169-1. Publication of this bulletin is expected shortly.

As a rural power distribution system load grows, the system power factor usually declines. This gradual load growth and decrease in power factor increases system energy losses, lowers voltages at consumers' premises, degrades the performance of energy utilization equipment, and drives up the cost per unit of energy delivered. For optimum performance and avoidance of these undesirable conditions, especially in today’s competitive electric industry, prudent utility providers need to make every effort to maintain power factor as close to 1.0 as economically practical. Chapter 1 recognizes the importance of power factor correction and discusses these conditions warranting power factor correction in detail.

Chapter 2 provides a discussion of how capacitors work, including a power factor definition and description of power triangle relationships. Power factor effects on the power triangle relationships are explained. Load factor effects on power factor and capacitor sizing are introduced. The chapter ends with further discussion of voltage improvement through the use of capacitors.

Issues of particular concern in capacitor use are the topic of Chapter 3. These issues include overcurrent and overvoltage protection, and harmonic disturbances. Capacitor performance standards and capacitor failure/disposal are discussed. Four solutions for problems involving harmonics are offered for consideration.

Chapter 4 covers the sizing, siting, and use of capacitors on rural electric systems. These topics include many areas of interest to the distribution planning engineer. Within the context of these topic headings, subjects such as light and peak loading, three phase banks, automatic capacitor switching, fusing, and safety precautions are discussed. The current RUS standard three-phase capacitor drawing is also included.

The final two chapters consider power supply effects of capacitor use (Chapter 5) and capacitor use with induction motors (Chapter 6). Power supply considerations include effects on substations and transmission lines. The discussion of capacitor use and induction motors covers such topics as switched capacitor banks, secondary capacitors, and series primary capacitors.

For further information about this bulletin, please call Chris Tuttle at (202) 205-3655.

- **Bulletin 1724E-104, “Reduced Size Neutral Conductors for Overhead Rural Distribution Lines,”** dated 9/23/99. This bulletin covers the principal considerations applicable to reduced size neutral conductors and outlines a procedure for their selection and installation. This is an update of an existing bulletin, which was known as Bulletin 61-4.

While the use of reduced size neutral conductors can result in significant savings in distribution line construction, there are a number of important considerations that must be addressed. The considerations covered in this bulletin include:

- \* Neutral load current
- \* Fault currents, both high and low
- \* Harmonics
- \* Minimum conductivity
- \* Economics
- \* Mechanical properties
- \* Large phase conductor characteristics

The bulletin includes suggested procedures for the selection of neutral conductor size under various loading scenarios. It also provides guidance concerning line staking and conductor sagging when using reduced size neutral conductors.

Tables of the more common conductor combinations used in RUS standard construction are also included in the bulletin.

For more information about this bulletin, please call Jim Bohlk of ESD at (202) 720-1967.

- **Bulletin 1726C-115, “Checking Sag in a Conductor by the Return Wave Method,”** dated September 24, 1998. This bulletin presents a convenient and practical method for

checking sag in a conductor regardless of span length, tension, size, or type of conductor. This is an update of an existing bulletin, which was once known as Bulletin 80-4.

This bulletin is based on the fact that for a conductor suspended in air between two fixed supports, the time required for a wave to travel between those supports is dependent on the conductor sag. The bulletin includes the mathematical formula used to determine conductor sag as well as tables derived from that formula. Procedures to be used for initiating a wave and for determining the elapsed time for the wave to travel between the supports are also included.

For more information about this bulletin, please call Stephen Jones of ESD at (202) 720-1792.

- **Bulletin 1728F-800, “Assembly Unit Numbers and Standard Format,”** dated December 16, 1998. This bulletin explains and documents the RUS construction unit numbering scheme and the new numbering format used in new and revised RUS construction drawings. For more details, see the paper entitled “Overhead Distribution Line Specifications,” or call Jim Bohlk of ESD at (202) 720-1967.
- **The Summary of Items of Engineering Interest,** published in July 1999, continues the practice of furnishing annually, on an informal basis, engineering information and developments related to the rural electrification program.
- **IP 202-1, “List of Materials Acceptable for Use on Systems of RUS Electrification Borrowers,”** published in July 1999, and its quarterly supplements. This document provides a convenient listing of the materials and equipment that have been accepted by RUS.

If you need any of these publications, please contact RUS' Program Development and Regulatory Analysis staff at (202) 720-8674. Many RUS publications are also available via the Internet at:

*For Rules:* **<http://www.usda.gov/rus/electric/regs.htm>**

*For Bulletins:* **<http://www.usda.gov/rus/electric/bulletins.htm>**

**BIOGRAPHICAL SKETCH**

**FRED J. GATCHELL**

*Mr. Gatchell is the Deputy Director of the Electric Staff Division, responsible for, among other duties, coordinating the updating and issuing of many of RUS' technical publications. In his 26 years with RUS/REA, he has also been with the Power Engineering Branches of the Northwest and the Northeast Areas and with the Power Plants Branch.*

*Before joining RUS/REA, Mr. Gatchell worked at the Norfolk Naval Shipyard and at Bechtel Power Corporation. He received a B.S. in Mechanical Engineering from the University of Maryland, and is a registered professional engineer in Virginia.*

**RUS TECHNICAL  
PUBLICATIONS**

**7 CFR 1710, SUBPART E  
LOAD FORECASTS AND  
MARKET ANALYSIS**

**RUS TECHNICAL  
PUBLICATIONS**

**7 CFR 1721  
POST LOAN POLICIES  
AND PROCEDURES**

**RUS TECHNICAL  
PUBLICATIONS**

**7 CFR 1721 - POST LOAN  
POLICIES & PROCEDURES**

- ◆ **Minor Project - Up to \$100,000**
- ◆ **130% Rule - Eliminated**

**RUS TECHNICAL  
PUBLICATIONS**

**BULLETIN 1728F-806**

**UNDERGROUND  
DISTRIBUTION**

*(Incorporated by Reference)*

**RUS TECHNICAL  
PUBLICATIONS**

**BULLETIN 1728F-806  
UNDERGROUND DISTRIBUTION**

- ◆ **Updates Bulletin 50-6**
- ◆ **One of the RUS Standards**

**RUS TECHNICAL  
PUBLICATIONS**

**BULLETIN 1728F-806  
UNDERGROUND DISTRIBUTION**

- ◆ **Two new Drawings -  
Overhead to Underground**
- ◆ **Eliminated 23 Drawings**

**RUS TECHNICAL  
PUBLICATIONS**

**BULLETIN 1728F-806  
UNDERGROUND DISTRIBUTION**

- ◆ **Design Changes**
- ◆ **Update and Clarify**

**RUS TECHNICAL  
PUBLICATIONS**

**7 CFR 1792, SUBPART C**

**SEISMIC SAFETY**

**RUS TECHNICAL  
PUBLICATIONS**

**SEISMIC SAFETY**

- ◆ **Earthquake Hazards Reduction Act of 1977**
- ◆ **Interagency Committee on Seismic Safety**
- ◆ **National Earthquake Hazards Reduction  
Program**

**RUS TECHNICAL  
PUBLICATIONS**

**SEISMIC SAFETY  
MODEL CODES**

- ◆ **1997 UBC**
- ◆ **ASCE 7 - 95**

**RUS TECHNICAL  
PUBLICATIONS**

**SEISMIC SAFETY**

- ◆ **Post-Construction Certification Eliminated**
- ◆ **Design Acknowledgement Simplified**

**RUS TECHNICAL  
PUBLICATIONS**

**BULLETIN 1724D-112**

**SHUNT CAPACITORS**

**RUS TECHNICAL  
PUBLICATIONS**

**BULLETIN 1724D-112  
SHUNT CAPACITORS**

- 1. Power Factor**
- 2. Capacitors & Power Factor**
- 3. Concerns with Capacitors**

**RUS TECHNICAL  
PUBLICATIONS**

**BULLETIN 1724D-112  
SHUNT CAPACITORS**

- 4. Sizing, Siting, & Use**
- 5. Power Supply Effects**
- 6. Induction Motors**

**RUS TECHNICAL  
PUBLICATIONS**

**BULLETIN 1724E-104**

**REDUCED SIZE  
NEUTRAL CONDUCTORS**

**RUS TECHNICAL  
PUBLICATIONS**

**BULLETIN 1724E-104  
REDUCED NEUTRALS**

- ◆ **Neutral Load Current**
- ◆ **Fault Currents**
- ◆ **Harmonics**
- ◆ **Minimum Conductivity**

**RUS TECHNICAL  
PUBLICATIONS**

**BULLETIN 1724E-104  
REDUCED NEUTRALS**

- ◆ **Economics**
- ◆ **Mechanical Properties**
- ◆ **Large Phase Conductor  
Characteristics**

**RUS TECHNICAL  
PUBLICATIONS**

**BULLETIN 1726C-115**

**CONDUCTOR SAG BY THE  
RETURN WAVE METHOD**

**RUS TECHNICAL  
PUBLICATIONS**

**BULLETIN 1728F-800**

**ASSEMBLY UNIT NUMBERS  
AND STANDARD FORMAT**

**RUS TECHNICAL  
PUBLICATIONS**

**BULLETIN 1724E-216**

**GUIDE SPECIFICATION FOR  
UNGUYED STANDARD CLASS  
CONCRETE POLES**

**RUS TECHNICAL  
PUBLICATIONS**

**BULLETIN 1724E-216**

**USE FOR STANDARD  
APPLICATIONS**

**RUS TECHNICAL  
PUBLICATIONS**

**BULLETIN 1724E-216**

**FOR COMPLEX APPLICATIONS,**

**USE BULLETIN 1724E-206**