UNITED STATES

DEPARTMENT OF AGRICULTURE

RURAL DEVELOPMENT

RURAL UTILITIES SERVICE

SUMMARY OF

ITEMS OF ENGINEERING INTEREST

AUGUST 2004

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NRECA T&D ENGINEERING COMMITTEE

ADMINISTRATIVE and OTHER

ABBREVIATIONS

ACCC	Aluminum Conductor Composite Core
ACSR	Aluminum Conductor Steel Reinforced
AEP	American Electric Power
AIEE	American Institute of Electrical Engineers
ANOPR	Advanced Notice of Proposed Rulemaking
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
CRN	Cooperative Research Network
CWP	Construction Work Plan
DEM	Division of Emergency Management
DG	Distributed Generation
DOE	Department of Energy
EES	Engineering and Environmental Staff
ESD	Electric Staff Division
EIS	Environmental Impact Statement
EMF	Electric and Magnetic Fields
E&O	Engineering and Operations
EOP	Emergency Operation Plan
EPA	Environmental Protection Agency
ER	Environmental Report
ETV	Environmental Technologies Verification
FERC	Federal Energy Regulatory Commission
FEMA	Federal Emergency Management Agency
FM	Factory Mutual
GFR	General Field Representative
GSU	Generator Step-Up
IARC	International Agency for Research on Cancer
ICBO	International Conference of Building Officials
ICC	Insulated Conductors Committee
ICC	International Code Council
IEEE	Institute of Electrical and Electronics Engineers
IWO	Inventory of Work Orders
KPSC	Kentucky Public Service Commission
kV	Kilovolt
kVA	Kilovolt-Ampere
LRP	Long Range Plan
MW	Megawatts (1,000,000 watts)
NEC	National Electrical Code
NEETRAC	National Electric Energy Testing Research and Applications Center
NESC	National Electrical Safety Code

ABBREVIATIONS *(continued)*

NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NOPR	Notice of Proposed Rulemaking
NRECA	National Rural Electric Cooperative Association
OSHA	Occupational Safety and Health Act
PCB	Polychlorinated Biphenyls
PE	Professional Engineer
PSD	Power Supply Division
REA	Rural Electrification Administration
REPC	Rural Electric Power Conference
ROD	Record of Decision
RUS	Rural Utilities Service
RUS List of Materials	RUS Informational Publication 202-1, "List of Materials Acceptable for Use on Systems of RUS Electrification Borrowers"
SC	Supply Chain
SPCC	Spill Prevention, Control, and Countermeasure
T&D	Transmission & Distribution
T&DEC	Transmission & Distribution Engineering Committee
UL	Underwriters Laboratories
URD	Underground Residential Distribution
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VM	Vegetation Management
WRC	Western Red Cedar

ENGINEERING

Help Develop the 2007 Edition of the National Electrical Safety Code

In the 2003 Summary of Items of Engineering Interest, we included an item on this same subject. We discussed the importance of the National Electrical Safety Code (NESC) and the Institute of Electrical and Electronics Engineers (IEEE) Secretariat that is charged with writing the NESC. Please refer to last year's edition for the specifics on these details. You will find last year's edition on the RUS Web at:

http://www.usda.gov/rus/electric/engineering/2003/en-in-03.pdf

We are repeating an item on the NESC this year because preparation of the 2007 Edition of the NESC is in progress and there is still opportunity for RUS borrowers and others to participate and help make the NESC a better document. Repeated below is last year's table which details the major events schedule of the code changing process being observed to revise the 2002 edition and create the 2007 NESC. We suggest that you pay particular attention to the September 1, 2004, date in the table and consider obtaining a copy of the Preprint 2007 Proposals document and then sending your comments to the NESC by the May 1, 2005, deadline. Your compelling comments could be the difference and result in a more useful 2007 NESC.

September & October, 2003	NESC Subcommittees meet to consider all the change proposals submitted by the public
September 1, 2004	The Secretariat publishes the "Preprint 2007 Proposals." This publication includes the Subcommittees' resolutions of the public comments and the amendments that Subcommittees produce as a result of the comments; these are the amendments the subcommittees propose for incorporation into the 2007 NESC. This is the time period when rural electric engineers and others involved with all aspects of the utility business covered in the NESC can provide immeasurable assistance in the process. You can review the Preprint 2007 Proposals and the subcommittees' resolutions of the public comments and where there are egregious provisions being proposed, you can provide comments of warning, offer remedy suggestions, etc., and otherwise help to improve the provisions for everyone's benefit.

May 1, 2005	Deadline for the public and interested parties to submit comments concerning the subcommittees' proposed amendments published in the September 1, 2004, Preprint
October 2 through 20, 2005	NESC Subcommittees meet to consider the public comments regarding the subcommittees' proposals published in the September 1, 2004, Preprint.
January 15, 2006	The Proposed revision of the NESC that is prepared after considering the public comments is submitted to the NESC Main Committee for Ballot and to ANSI for concurrent public review.
May 15, 2006	The NESC Main Committee approved revision of the NESC is sent to the American National Standards Institute (ANSI) for consideration as an ANSI standard.
August 1, 2006	2007 Edition of the NESC is published.

For further information on the NESC please contact the following:

Main Committee: George Bagnall.....202-720-1900
Subcommittee 2, Grounding Methods: Harvey Bowles.....202-720-0980
Subcommittee 4, Overhead Lines-Clearances: Jim Bohlk.....202-720-1967
Subcommittee 5, Overhead Lines-Strength and Loading: Don Heald.....202-720-9102
Subcommittee 7, Underground Lines: Trung Hiu.....202-720-1877

An Update to Two Possible Changes to Sections 26 and 27 of the 2002 NESC
(Revisited from the 2003 Items of Engineering Interest)

Various working groups within National Electrical Safety Code (NESC) Subcommittee 5, Strengths and Loadings, are continuing their efforts in developing changes to the 2002 edition of the code for 2007. This subcommittee is responsible for sections 24, 25, 26 and 27 of the NESC.

This update will discuss two change proposals and the possible impact they will have on design. The two change proposals concern acceptance of ANSI O5.1, 2002 edition, and the elimination of Exception 1 to Rule 261A.2.a.

ANSI O5.1, Wood Poles – Specification and Dimensions:

The 2002 edition of the NESC references ANSI O5.1-1992 as the standard to use to obtain the designated fiber stress of a wood pole. In that edition of the standard, an equation for decreasing fiber stress with height is in the appendix and as such, is not a part of the standard. The 2002 ANSI O5.1 moved this information from the appendix to the body of the standard. The NESC voted to accept the change proposal which updates the reference to this standard from the

1992 edition to the 2002 edition. By doing so, the 2007 edition of the NESC will require the design of wood pole lines (distribution and transmission) to use the equation for decreasing fiber stress with height.

Calculating moments at the groundline for wood poles, Exception 1 to Rule 261A.2.a:

The committee also voted to remove 'EXCEPTION 1' to Rule 261A.2.a. This rule states "When installed, naturally grown wood poles acting as single-based structures or unbraced multiple-pole structures, shall meet the requirements of Rule 261A2a without exceeding the permitted stress level at the ground line for unguyed poles or at the points of attachment for guyed poles."

Summarizing the impact:

RUS, with the cooperation of Great River Energy and Tri-State Generation & Transmission Association, investigated the possible impact these two proposed NESC changes may have on transmission line design. The existing and proposed mechanical design manuals for overhead transmission lines include a sample calculation for a single pole using the TSS-1 pole top assembly. Great River Energy and Tri-State performed PLS CADD calculations to check and verify the example in the design manual. The calculations were expanded to cover several different situations, including calculating spans at the maximum stress point (as opposed to the groundline) and assuming a decreasing fiber stress with height.

The initial computer calculations were made to verify the example and the calculations of the secondary moments in which manual methods are used. In determining p-delta moments, the code permits calculating the deflection without the overload factors being applied. Because the computer program is not able to do this, the computer calculations were performed without load factors and without strength factors applied. The calculations shown in the design manual were also redone without applying load factors and strength factors to have an equal basis for comparison.

The example in the design manual is for a 60 foot Class 1 Western Red Cedar (WRC) pole. The conductor is 266.8 kcmil, 26/7 ACSR (partridge) with a 3/8" high strength steel overhead ground wire. Heavy Loading District loads are assumed.

The results of these calculations and the expanded calculations (for 80 foot poles) follow:

	Spans in feet based on no overload factors, no strength factors*			
	60 foot WRC poles		80 foot WRC poles	
	Manual calculations	Computer calculations	Manual calculations	Computer calculations
Spans based on groundline moments	1670	1570	1500	1329
Spans based on the maximum stress point		1424		1116
Spans based on the maximum stress point and decreasing fiber stress with height		1202		898

* The permitted spans will be 25 to 30 percent of the above spans

The above summary demonstrates several things. First, to calculate spans based on the maximum stress point in the pole above ground and to manually calculate spans based on the maximum stress point in the pole assuming a decreasing fiber stress with height is difficult to do. Second, the spans based on groundline moments correlates fairly well between the manual calculations and the computer calculations (6-12 percent difference). Third, determining spans based on the maximum stress point and decreasing fiber stress with height appears to significantly reduce calculated spans (by 25 percent or more). Fourth, when considering p-delta moments, the safety factor for the permitted span actually is a blended number between the effective transverse and vertical load factors. Also, it should be noted that computer calculations included the weight of the pole, whereas the manual calculations did not.

For other information concerning change proposals to the NESC, see the web site:

http://standards.ieee.org/nesc/index.html.

If you would like more information or have any questions, please contact Donald Heald, Structural Engineer, Transmission Branch, at 202-720-9102, or at Don.Heald@usda.gov.

Vegetable Oil Based Dielectric Coolants

RUS borrowers may not know it, but many of their constituents may be ***growing*** their next transformer dielectric coolant. That is because of the increasing interest and demand for vegetable oil based insulating fluids.

Vegetable oils are chemically referred to as natural esters. Synthetic ester based dielectric coolants have been used in the US since the mid-eighties, primarily as a substitute for PCB based dielectric oils due to having fire points (ignition temperatures) at or above 300^{o} C. However,

pure natural esters have neither the inherent stability of synthetic esters nor their very low pour point temperatures. Fortunately, a method of use has been developed to overcome these limitations.

Natural esters have several advantages over conventional mineral oil based insulating oils. Obviously one that is of current interest to many borrowers is the USDA program promoting the increase usage of bio-based materials. Natural esters based dielectric coolants are included in the current draft of the proposed guidelines for products to be designated as "bio-based". Natural esters dielectric coolants can replace conventional transformer oil, which is derived from non-renewable petroleum. Other advantages can be categorized in one of three important attributes of a dielectric fluid: environmental impact, fire safety, and performance.

Environmental: Natural esters based dielectric fluids have much improved environmental profiles compared to the products they replace, particularly those with performance enhancing additives that are essentially food grade. Sensitive acute aquatic toxicity tests have shown one natural ester dielectric coolant to be non-toxic. The same insulating fluid matched the biodegradation rate of sodium citrate, a substance considered by the US EPA as having the ultimate biodegradation rate. Most transformers used by RUS borrowers contain naphthenic petroleum based insulating oils. These transformer oils are obviously non-renewable, and relatively very slow to completely biodegrade. According to the California EPA, they potentially contain an International Agency for Research on Cancer (IARC) known human carcinogen.

Fire Safety: Natural esters can also replace less-flammable dielectric fluids that have very high ignition resistance. Such fluids are used where additional fire safety is required either by codes or good engineering practices. Unlike natural and synthetic esters, other ignition resistant fluids typically have one or more less-desirable environmental features.

Natural esters can have exceptional resistance to ignition, possessing flash points as high as 330º C and fire points as high as 360º C, compared to conventional mineral oil with flash and fire points of approximately 145º C and 155º C, respectively. This allows natural esters to be listed as "less-flammable" dielectric fluids per the National Electrical Code (NEC). Both Underwriters Laboratories (UL) and Factory Mutual (FM) list such fluids. In fact, Factory Mutual's Transformer Loss Prevention guide allows clearances as little as 5 feet for such natural esters up to 10,000 gallons. This compares with minimum clearances for mineral oil as much as 50 feet for just 5,000 gallons.

The aging of the substation infrastructure in the United States is causing increasing concerns for risk management. One report by a major insurance group predicts substation transformer failures to rise by 500% within ten years as many existing units were installed in the electric growth heyday of the 50's and 60's. Such units are well beyond their expected operational life. A small, but significant percentage of transformer failures occur in an "eventful mode", resulting in tank ruptures and/or oil fires. NESC, NEC, OSHA, and insurance standards entities, such as Factory Mutual Global, recognize the inherent safety of high flash and fire point dielectric coolants. Typically, a natural ester fluid can eliminate the need for substation fire barriers and deluge systems.

Performance: As impressive as the relative environmental and fire safety of natural esters compared to mineral oils are, even more interesting is their impact on improving the life and performance of transformers. Accelerated aging testing has shown that insulating paper aging rate is slowed down to 1/5 to 1/8 when immersed in a natural ester fluid relative to being immersed in conventional mineral oil. Insulation life is considered a major factor in the expected life of a transformer, as explained in great detail in the IEEE/ANSI C57.91 loading guide. Such properties will have a major impact on improving the ability to load transformers, design transformers with higher allowable average winding temperatures rise, or extending the life expectancy of the insulation system.

Other improvements compared to mineral oil in performance include: a much lower gassing tendency, low to no sludging (Doble Engineering sludge-free life test resulted in no detectable sludge), and significantly lower coking tendency on copper contacts. Natural ester based dielectric fluids also automatically remove and help keep moisture out of the insulating paper, resulting in better dielectric performance of the insulation system.

Conclusion: Based on IEEE accelerated life tests, field trials since 1996, and thousands of units successfully installed in the field since 1999, biobased natural ester based dielectric coolants using essentially food grade additives can be successfully incorporated into transformer insulation systems. This applies to both new and retrofilling existing mineral oil filled transformers, distribution and power class. Currently the largest unit to have been retrofilled is a 200 MVA at 161 kV generator step-up (GSU) transformer. Due to the growing demand, ASTM has published a standard for natural ester dielectric coolants and IEEE is developing a standard for their application in electrical equipment. The US EPA, through its Environmental Technologies Verification (ETV) program, has confirmed the environmental and performance claims Envirotemp® FR3™ Insulating Dielectric Fluid for use as a vegetable oil-based insulating dielectric fluid in electrical apparatus requiring a liquid dielectric fluid. Envirotemp® FR3™ is manufactured by Cooper Power Systems of Waukesha, Wisconsin. EPA's ETV has also verified that Biotemp® Insulating Dielectric fluid for use as a vegetable oil-based insulating dielectric fluid for use in 3-phase transformers up to 20 MVA. Biotemp® is manufactured by ABB Inc., of South Boston, Virginia. UL and FM have listed both companies' fluid based on the additional fire safety. It is now shown to be a competitive alternative to all existing transformers types based on total life-cycle cost and with mineral oil and fire resistant types (in fire sensitive locations) on both a first cost and life-cycle cost basis.

RUS would like to thank C. Patrick McShane, Product Line Manager, Cooper Power Systems for preparing this article. If you would like more information or have any questions, please contact Mr. McShane at 262-524-4591 or at pmcshane@cooperpower.com, or Jim Bohlk, Electrical Engineer, Distribution Branch, at 202-720-1967 or at Jim.Bohlk@usda.gov.

Separation of Outdoor Oil-Insulated Transformers from Buildings and Other Equipment

Transformers generally contain the largest quantity of a combustible substance that is located in a substation. Therefore, special attention should be given to their location in relation to control

buildings, other transformers, and other combustible substance filled equipment. Most fires related to oil-insulated transformers occur as a result of a breakdown of insulation caused by overloads, switching or lightning surges, low oil level, moisture in the oil, combustible gas accumulation within the transformer tank, or failure of the insulating bushing. Potentially, such a fire could cause a considerable amount of burning oil to be expelled over a large area and an intense fire could follow. Therefore, the location of transformers in a substation should be of concern to the designer and engineer. Every possible attempt should be made to locate oil-filled equipment away from substation buildings, other equipment, possible fire hazards present in adjacent properties, and similar hazards.

Determination of the physical separation design is based on type and quantity of oil in the transformer, size of a postulated oil spill (surface area and depth), type of construction of adjacent structures, power rating of the transformer, fire suppression systems provided, and type of electrical relaying protection provided.

Subclause 4.4.1 of IEEE Standard 979, "IEEE Guide for Substation Fire Protection," states:

> "Transformers containing 2000 gal (7571 L) or more of insulating oil should be at least 20 ft (6.1 m) from any building. If these large oil-filled transformers are located between 20 and 50 ft (6.1-15.2 m) of a building, the exposed walls of the building should constitute, or be protected by, at least a 2-hour fire-rated barrier. The barrier should extend in the vertical and horizontal directions such that any point of the transformer is a minimum of 50-ft (15.2 m) from any point on the wall not protected by the barrier. Should it be necessary to encroach on the above minimums, the installation of a transformer fire protection system should be considered. Some jurisdictions require combination of barrier and fire protection systems."

Subclause 4.4.2 of IEEE Standard 979 states:

> "Transformers containing less than 2000 gal (7571 L) of insulating oil should be separated from buildings by the minimum distances shown in the following table:

Transformer Rating	**Recommended Minimum Distance From Building**
75 kVA or less	10 ft (3.0 m)
76-333 kVA	20 ft (6.1 m)
More than 333 kVA	30 ft (9.1 m)

"

Where a transformer is installed next to a building with less than the minimum distance, the building should have fire-resistive wall construction. Guidance can be found in NFPA 255-1990, "Standard Method of Test of Surface Burning Characteristics of Building Materials."

Subclause 4.4.3 of IEEE Standard 979 states:

> "Large oil-filled transformers should be separated by at least 30 ft (9.1 m) of clear space and/or a minimum 1 hour fire-rated barrier."

For further recommendations regarding substation fire protection, including "Typical Oil Quantities in Equipment," refer to the IEEE Standard 979, "IEEE Guide for Substation Fire Protection," and NFPA 850-1992, "Recommended Practice for Fire Protection for Electric Generating Plants," especially where this NFPA code has been adopted by authority having jurisdiction. If any local code or ordinance is more restrictive than a recommendation listed in the NFPA code or the IEEE Standard, then the local code or ordinance should be followed.

If you like more information or have any question about this article, please call Mike Eskandary, Electrical Engineer, Transmission Branch, at 202-720-9098 or at Mike.Eskandary@usda.gov.

Pump Up the Juice with this New Conductor

This new kid on the block called ACCC (Aluminum Conductor Composite Core) is creating some storms. This is a second invention next to duct tape. *ACCC can fix it all* and it may have some merit.

The electric grid is the most critical infrastructure to every rural, regional and national economy. Most urban transmission lines are seriously overloaded and outdated. Transmission capacity must be increased in many states.

The development of ACCC represents the first major change in overhead conductors since the ACSR (Aluminum Conductor Steel Reinforced) was introduced two decades ago. ACCC conductor can provide transmission capacities up to three times greater than existing conductors. ACCC can replace existing conductor, without tower modifications or additions. This would extend the life of existing towers, which are typically a large capital asset of any transmission system. This method will also allow installation cost of approximately 6 times less than traditional cable installation. The ACCC is lightweight, strong, with low electrical resistance, and handles corrosive environments well.

ACCC has the following advantages over other conductor like ACSR cables:

- Has more aluminum content therefore, reduces the line losses by up to 28%
- Has higher operating temperature without significant line sag
- Has no ferromagnetic core, therefore, less electromagnetic field (EMF)
- Has double juicing power when compare to ACSR
- Has less environmental degradation
- Has high strength and lightweight
- Has excellent fatigue resistance

- Has standard sizes and lengths (round or compact construction)

This new conductor can help solve transmission bottlenecks problems in an urban area. It also can help with transmission problems in the rural areas. The ACCC conductor can be utilized in mountainous area, national parks, and river or lake crossing applications.

ACCC cables make new transmission lines more efficient by reducing electrical line losses. This will improve utilities return on investment.

For more information on ACCC, please refer to the following websites:

Oak Ridge National Laboratory at www.ornl.org

National Transmission Grid Study at www.doe.gov

Prairie Business Magazine at www.prairiebizmag.com

If you would like more information or have any questions, please contact Theodore V. Pejman, Electrical Engineer, Transmission Branch, at 202-720-0999 or at Ted.Pejman@usda.gov.

OPERATIONS AND MAINTENANCE

Assessment of the 2003 Southeast Ice Storm and its Impact on Consumers and Utilities in Kentucky

Following the February 2003 ice storm, the Kentucky Public Service Commission ("KPSC") Staff reviewed storm responses and recovery efforts of the Kentucky regulated utilities that were most severely affected. This review assessed all aspects of utility response, from disaster planning and preparedness through the final stages of restoring service to customers. The utilities responded to requests for information from Commission staff concerning their forecasting, response planning, damage assessment, mobilization, repair activity, and customer service before and during the ice storm, as well as their general operation and maintenance practices and overall emergency preparedness. Staff reviewed the data and, where necessary, reviewed supplementary documentation requested during the review process. This assessment relies upon and draws from the provided documentation, utility inspections, site visits, and interviews with utility personnel, and upon the knowledge and experience of the KPSC staff. The report contains the results of this review. It includes lessons learned, changes made by the utilities as a result of the ice storm, "best practices" methods, and additional recommendations made by the KPSC staff. Following is the Table of Contents:

The Assessment, minus the appendices, can be viewed at:

http://psc.ky.gov/agencies/psc/hot_list/ice_storm/ice_idx.htm

The complete Assessment, including appendices, an E-Book version and slide show can be obtained by contacting Gary E. Grubbs of the Kentucky Public Service Commission by e-mail at GaryE.Grubbs@KY.GOV

RUS would like to thank Gary E. Grubbs, P.E., Team Leader, Kentucky Public Service Commission Staff, for preparing this article. If you would like more information or have any questions, please contact Mr. Grubbs at 502-564-3940 or at GaryE.Grubbs@KY.GOV, or George Bagnall, Director, Electric Staff Division, at 202-720-1900 or at George.Bagnall@usda.gov.

Pole Splitting Problem

This past year RUS received an E-mail from a borrower advising of a system-wide pole splitting problem that was especially occurring on poles that support A3 distribution pole top assemblies. We thought that it might be of interest and benefit to all borrowers and others to briefly discuss the problem and the recommendations RUS provided.

We were not surprised to hear that poles were splitting because of the increasing mechanical loads that poles are supporting today. However, we were surprised at the extent and number of poles this particular borrower reported. Other RUS borrowers have reported that they have experienced the same type of problems, but most reported problems were not as widespread.

We advised the borrower that it is because of pole splitting reports and other mechanical strength and loading reasons that RUS' 24.9/14.4 kV construction provisions require the installation of a 3-inch, square, curved washer on all guy assemblies and on all primary and neutral deadend and suspension angle subassemblies that are attached directly to the pole. This requirement is included in the December, 1998, edition of RUS Bulletin 1728F-803, "Specifications and Drawings for 24.9/14.4 kV Line Construction." The 3-inch washer is considered to be the

minimum size washer to use. Borrowers may install larger washers at their own discretion. We plan to include this same washer provision in RUS Bulletin 1728F-804, "Specifications and Drawings for 12.47/7.2 kV Line Construction." This bulletin is currently under development and should be published later this year.

The installation of an anti-split bolt subassembly appears to be another solution to the pole splitting problem. An anti-split bolt subassembly consists of a bolt, 2 washers and a locknut. Usually the washers are 2 ½-inch square, but 3-inch square, curved washers may also be used. Other borrowers have reported to us that they have successfully solved their pole splitting problems by installing anti-split bolts. RUS believes that the installation of anti-split bolts may not be needed if the specified larger washers required by the RUS specification are installed at the primary, neutral and guy subassembly positions.

We told the borrower with the pole splitting concern that we heartily recommend that it immediately begin to start using, on a system-wide basis, the specification to install 3-inch, square, curved washers on all guy attachments and primary and neutral deadend and suspension angle subassemblies that are attached directly to the pole. Furthermore, in consideration of the problems this borrower experienced, we recommended that the borrower also install, at its discretion, 4-inch square, curved washers (instead of the 3-inch washers) on subassemblies that support large conductors or impress loads on the pole of more than 3,000 pounds. Finally, we recommend that the borrower install anti-split bolt assemblies on new or existing poles that it deemed necessary or beneficial.

We advised the borrower that, since the measures recommended are included in RUS standards, that, as is the case for all borrowers, there was no additional RUS approval required for any of the recommended construction modifications.

If you would like more information or have any questions, please contact James Bohlk, Electrical Engineer, Distribution Branch, at 720-1967 or at Jim.Bohlk@usda.gov.

Pole Fire Problems

The Electric Staff Division, along with RUS General Field Representative (GFR) Cliff Burris, has been investigating pole fires that a number of RUS borrowers in Texas have experienced on their 15 kV and 25 kV distribution lines. The fires occurred in regions along the coast as well as in the interior. RUS personnel visited the areas and inspected a number of poles with line crews. We thought that it would be beneficial to provide a status update in this year's Summary of Items of Engineering Interest for general educational purposes and for the purpose of soliciting ideas that lead to solution of the problem.

The borrower along the coast indicated that the fires occur generally after a long period without rain followed by fog or heavy dew. The problem is frequent in nature and can occur within weeks of changing out the pole top assembly from a previous fire. The problem occurs on both single pin and double pin installations and appears to be associated with electrical tracking from the center pin insulator along the metallic insulator pin to the lower bolt attaching the insulator pin to the pole. At this pole/metal interface, it appears the tracking and associated corona

eventually causes a fire to occur that eventually burns the pole top. The utility's normal corrective action is to lower the center phase to the cross arm where possible and implement an insulator washing program. No occurrences of fires beginning on the outside phases were reported. Several structures were viewed, both single phase and three phases. Indications of electrical tracking were seen on insulators and burn marks were seen along the surface of insulator pins, the lower insulator pin bolt and the wood near this bolt.

The coastal borrower also has a single-phase line that runs to a fishing camp along the water's edge. On this line, the borrower is testing various types of pin assemblies in an attempt to identify methods of resolving the problem. The borrower has RUS standard single pin assemblies, assemblies with fiberglass arms with the phase on one end and the neutral on the other, and various "armless" assemblies. It was noted that a single phase assembly with the neutral on the arm (RUS drawing A9-1) utilizing a fiberglass arm showed signs of electrical tracking on the under side of the arm from the phase toward the through-bolt connecting the arm to the pole at the gain. The armless assembly also showed signs of tracking. The borrower agreed to test standard construction using fiberglass pins and line post insulators to see if either of these methods would provide additional benefits. A pin assembly with obvious indications of tracking was removed from one of the borrower's three phase lines that had experienced a pole fire. This assembly was obtained for further investigation. The final type of assembly viewed involved the use of an experimental cross arm made of composite materials. Each of these types of assembly had experienced electrical tracking. One of the assemblies had a hole completely burned through the composite material of the cross arm. It was also noted that these composite crossarms were drooping badly.

The lines of the second borrower visited were located inland considerably away from the coast. These are predominately 7.2 kV but there are some areas where 14.4 kV is used. The first area viewed involved a 7.2 kV service line that had previously had a severe problem with pole fires strictly on poles sporting double ridge pins with 15 kV class insulators installed. The borrower has since replaced the 15 kV insulators with 25 kV insulators on these structures. This has appeared to eliminate the pole fire problem. The distribution line was along a road constructed of caliche from which vehicular traffic causes considerable dust and other contaminates to infiltrate the pole and pole top hardware thought to contribute to the electrical tracking and pole fire problem. Caliche is a general term for any secondary calcium carbonate (limestone-$CaCO_3$) that forms in sediments or in voids and crevices within bedrock just below the surface in semiarid regions.

It is worth noting that in this area one structure, also along the road, did not experience the pole fire problem when 15 kV class insulators were used while a nearby structure did. The only difference between the two structures was the one that had experienced a pole fire had a guy installed while the other did not. No problems have been noted since the borrower replaced the 15 kV insulators with 25 kV insulators.

The second borrower also has a 25 kV line that was experiencing pole fire problems. The borrower converted all problem structures by replacing the center phase 25 kV insulators with 35 kV insulators. This appears to have resolved the problem as well.

Structures viewed during the RUS staff visit to the second borrower that had previously had pole fire problems have anchor assemblies attached to the poles and most were not in areas of heavy contamination. The borrower's staff noted that structures in the problem area where the main line fed a tap line did not experience pole fire problems. The structures serving the tap lines are supported by anchor assemblies but they have single ridge pin insulator pins not double ridge pin insulators.

The second borrower agreed to install some test structures using standard 25 kV insulators with fiberglass ridge pins. The borrower also agreed to test some structures by installing guy strain insulators. It was noted that on the lines observed that most poles fires appeared to begin at the bottom bolt of the dual ridge pin assembly or at the through bolt of the crossarms at the gain.

The third borrower visited is inland but near some large bodies of fresh water. This borrower experienced pole fires on structures using dual ridge pin installations. The borrower indicated that the problem is most prevalent after a long period of dry weather followed by heavy mist or fog. Mitigation action taken has been to move the center phase from the pole top to the cross arm and to covert to single ridge pins.

Several structures viewed during the RUS staff visit exhibited fire damage and carbonizing of wood fibers on the exterior of the pole. Tracking was noticed from the bottom of the ridge pin to the center bolt of the cross arm and to the guy attachment. In most areas, the line was parallel to or near a caliche-covered road. Most of the structures viewed during the RUS visit had dual ridge pin insulators and showed signs of electrical tracking on the insulators, insulator pins and nearby wood of the pole. There was also a very noticeable buildup of contaminants under the insulator skirts.

It appears that the presence of a guy and other grounded equipment above the neutral plays some part in the problem but is not the sole contributing factor as evidenced by the fact that a number of single ridge pin structures with guys above the neutral did not show signs of problems. Parallel ridge pins appear to contribute to the problem in all areas. In coastal areas, fires occurred on structures with single and double ridge pins. Contamination of dirt, caliche, and salt appears to also contribute to the problem but there is not a clearly defined consistency present in all cases.

After returning to Washington, RUS located an article written by Paul M. Ross, Superintendent of the High Voltage Laboratory of Ohio Brass. The article entitled, "Burning of Wood Structures by Leakage Currents," was written in 1947 and presented at the Winter Technical Meeting of the American Institute of Electrical Engineers (AIEE), the predecessor to the Institute of Electrical and Electronics Engineers (IEEE). This article provides interesting material on the causes for "pocket burning" and a number of solutions using shunting devices (metallic pole bands) which by-pass leakage currents around high resistance dry wood zones on the pole and prevent pocket burns from occurring.

With respect to the recent Texas borrowers' pole fire problems, all poles examined were treated with creosote, which at first was not thought to be attributable to the problem. However, a 1951 article RUS located in its reference room changed the thinking on the creosote issue. The article is entitled, "Pole Fires Due to Insulator Contamination." The three authors of the article are

W. H. Whickham, H. A. Adler, and M. S. Oldacre. All we know about the authors are that they are, respectively, Member of the American Institute of Electrical Engineers (AIEE), Associate AIEE, and Fellow AIEE. The article provided some intriguing results from laboratory studies where researchers successfully simulated actual field experienced pole fires that occurred on creosoted structures carrying dual 33 kV, three-phase, circuits. The laboratory studies concluded that pole fires can not be attributed to any single factor but a number of concurrent conditions with insulator contamination as a prerequisite followed by atmospheric conditions of fog or heavy mist. Burning was more apt to occur on creosoted poles with fires occurring at the pole gain where the cross arm attaches to the pole. This study suggested that applying a slightly electrically conductive caulking compound between the cross arm and the pole would eliminate any arcing in the wood electrically stressed area of the gain.

RUS continues to work with the borrowers affected by this problem and will provide follow-up status on this effort. Meanwhile, if anyone reading this item has any pole fire experiences, comments, suggestions, experience with a caulking or other successful remedial measures for preventing pole fire, RUS would certainly appreciate hearing from you.

If you would like more information have any questions, please contact John Pavek, Chief of the Distribution Branch at 202-720-5082 or at John.Pavek@usda.gov.

ENVIRONMENTAL

Environmental Review of Minor Projects

Minor projects are defined as projects costing less than $100,000 that are not included in an RUS approved borrower's Construction Work Plan (see 7 CFR 1721.1(b)). These projects still require environmental approval before funds can be advanced. The borrower must check the applicable environmental statement on the RUS Form 219-Inventory of Work Orders (IWO). A project description must be provided and the borrower must do one of the following to satisfy RUS' environmental requirements:

- If applicable, check the statement that the project is a categorical exclusion of a type described in 7 CFR 1794.21(b) which normally does not require the preparation of an Environmental Report (ER); or

- If applicable, state that the project is a categorical exclusion of a type that normally requires the preparation of an ER and the ER is attached to the IWO. **Note that projects that would normally be classified as a project code 200 will require an ER. Also conversion projects (project code 300) will require an ER if the project is to be relocated on a new right-of-way.**

The following common problems will cause processing delays and may cause an IWO for minor projects to be returned for additional information or may cause the project to be disallowed:

- The cost of construction in column 4 on the RUS Form 219 cannot be greater than $100,000. Please note that even though the cost in column 9 is less than $100,000, the project will be disallowed because the cost in column 4 is greater than $100,000.

- The project description is inadequate or so vague that the reviewer cannot identify the project or determine its proper classification. An inadequate description is a major cause of delays in processing the RUS Form 219.

- The manager does not sign the environmental certification.

- The appropriate environmental certification is not checked. The classification of the project should be checked with categorical exclusion projects without an ER (7 CFR 1794.21(b)) or categorical exclusion projects with an ER (7 CFR 1794.22(a)). If the project is classified as not requiring an ER, no further review will be necessary and environmental certification #1 should be checked.

- If the environmental certification #2 is checked, an ER should be attached to the RUS Form 219.

- It should also be noted that minor projects should be listed on a separate RUS Form 219.

If you would like more information or have any questions, please contact Dennis Rankin, Environmental Protection Specialist, Engineering and Environmental Staff, at 202-720-1953, or at Dennis.Rankin@usda.gov.

USDA-RUS

INVENTORY OF WORK ORDERS

No funds involved may be requisitioned unless a completed application Form 219 has been received (7 U.S.C. 901 et seq.)

FORM APPROVED OMB No. 0572-0015

1. INVENTORY NO. | **2. MONTH ENDING**

3. SYSTEM DESIGNATION

4. NAME OF BORROWER

Instructions - Prepare 2 copies of this form. Forw ard 1 copy to the Rural Utilities Service, USDA-RD, Washington DC 20250. Copy 2 is for your records. For detailed instructions see RUS Bulletin 1767B-2

740-C CODE		WORK ORDER		Budget Item No.	GROSS FUNDS REQUIRED	DEDUCTIONS			
					Cost Of Construction:	Cost Of Removal: Improvememts or Replacements	SALVAGE RELATING TO Improvements or Replacements	SALVAGE RELATING TO Retirements Without Replacement	Contributions in Aid of Construction and Previous Advances	LOAN FUNDS SUBJECT TO ADVANCE BY RUS
Code No.	Year	Construc-tion	Retire-ment							
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Subtotal					0.00	0.00	0.00	0.00	0.00	0.00

Cost of construction cannot be greater than $100,000.

The project description should be adequate so the reviewer can identify what the project is and what is its environmental clasification. Se 7 CFR 1794.21(b) or .22(a).

Work OrderNo. | **Description of Construction**

Appropriate environmental certification should be checked.

If Environmental Certification #2 is checked, An envirobmental report should be attached.

Manager must sign environmental certification.

SUMMARY BY BUDGET ITEMS

Item No.	740-C Code	Amount
1		$0.00
Total		$0.00

ENVIRONMENTAL CERTIFICATION - *FOR MINOR PROJECT 219 ONLY*

1 ☐ We certify that construction reported on the above listed work orders (except certification "2" below), is a categorical exclusion of a type described in 7 CFR 1794.31 (b) which normally does not require preparation of a Borrower's Environmental Report.

2 ☐ We certify that construction reported on work orders _____ above, is a categorical exclusion of a type that normally requires a Borrower's Environmental Report which is attached.

DATE | SIGNATURE *(Manager)*

BORROWER CERTIFICATION - We certify that the costs of construction shown are the actual costs and are reflected in the general accounting records. We further certify that funds represented by advances requested have been expended in accordance with the purposes of the loan, the provisions of the loan contract and mortgage, and RUS bulletins and the Code of Federal Regulations relative to the advance of funds for work order purposes. We recognize that statements contained herein concern a matter within the jurisdiction of an agency of the United States and the making of a false, fictitious or fraudulent statement may render the maker subject to prosecution under Title 18, United States Code Section 1001.

DATE | SIGNATURE *(Manager)*

DATE | SIGNATURE *(Board Approval)*

ENGINEERING CERTIFICATION - I hereby certify that sufficient inspection has been made of the construction reported by this inventory to give me reasonable assurance that the construction complies with applicable specifications and standards and meets appropriate code requirements as to strength and safety. This certification is in accordance with acceptable engineering practice.

INSPECTION PERFORMED BY | FIRM

LICENSE NUMBER | SIGNATURE OF LICENSED ENGINEER

RUS Form **219** (*Rev. 10-02*) V 16, 10/21/02

Environmental Report Preparation

Projects listed in the Rural Utilities Service's (RUS) Environmental Policies and Procedures, Code of Federal Regulations (CFR) Sections (§§) 1794.22(a) and 1794.23(c) require the submittal of an Environmental Report (ER) for RUS review. Projects listed in §1794.21(b) may require the development of an ER to provide for extraordinary circumstances. For construction projects requiring the preparation of an environmental report, applicants should follow guidance in RUS Bulletin 1794A-600, "Guide for Preparing the Environmental Report for Categorically Excluded Projects." The Guide Bulletin, along with the Environmental Regulation, is available on the RUS electric web site at:

Bulletin: **http://www.usda.gov/rus/electric/bulletins.htm**

Regulation: **http://www.usda.gov/rus/electric/regs.htm**

The following is a summary of guidelines for environmental report preparation and common problems/solutions found in the review of environmental reports. Following these guidelines should help borrowers avoid delays in obtaining RUS environmental approval.

GENERAL ENVIRONMENTAL REPORT PREPARATION GUIDELINES

1. Project Description

This section should contain a brief description of the facilities proposed in the construction work plan. Specific project codes 200, 300 (if relocated), 400, 800 and 900 will require the preparation of an environmental report. The method of construction should also be described briefly. The amount of area to be cleared for a project should be described.

Common Problems/Solutions

Problem: Projects in the ER are not specifically identified and/or don't correspond with the projects identified in the CWP and on the 740c.
Solution: Identify the projects in the ER and ensure that all projects are included in the CWP and 740c, if appropriate. Carry over projects from previous CWP's should be identified as previously approved projects. Descriptions and accompanying discussions should be clear and complete enough so that a person with little previous knowledge of the proposed project can make an independent environmental review.

Problem: Location relevant to road right-of-way is not always included.
Solution: Define whether the projects are located within or immediately adjacent to the road right-of-way or some distance from the edge of the right-of-way.

2. Project Alternatives

The no action alternative discussion should include the potential impacts of not providing service or improving facilities and should be tied to the need for the project. Alternative transmission routes and substation sites may need to be identified especially where condemnation may be necessary to obtain the required easements.

Common Problems/Solutions

Problem: Alternative transmission line routes/substation sites not identified on a map or evaluated especially for a project that is controversial or causes adverse impacts.
Solution: Ensure that the projects/alternatives are located on the U.S. Geological Survey (USGS) map and evaluated.

3. Existing Environment Description

Information should be presented that will enable RUS to make a determination of potential impacts of the projects. The approximate locations of the proposed projects and alternatives should be shown on USGS maps. Photocopies of the maps are acceptable. The specific location of any substation site should be identified and described. It should be noted that USGS maps are not always included in environmental submissions.

Common Problems/Solutions

Problem: USGS maps with the projects identified are not included in the ER.
Solution: Include the appropriate map(s) in the document. USGS maps contain information that is useful in evaluating impacts.

4. Environmental Impacts Discussion

At a minimum there should be a discussion of the non-NEPA issues. Agencies contacted should include, but are not limited to the following: National Conservation Resource Service (wetlands, important farmland, prime rangeland and forest land), State Historic Preservation Officer (cultural resources), U.S. Fish and Wildlife Service (threatened and/or endangered species, their critical habitat and wetlands), Army Corps of Engineers (floodplains and wetlands), and State Wildlife Agency (threatened and/or endangered species and wildlife concerns). These are the minimum agencies to contact.

Other areas of potential impacts include land use, vegetation, socioeconomics, and coastal barrier areas, if applicable. Note that projects crossing federally managed lands should be identified. Projects crossing lands managed by the Forest Service, Bureau of Land Management, Bureau of Indian Affairs, or the National Park Service may require additional environmental review before a Special Use Permit is issued by the agency. It should be noted that the Bureau of Land Management (BLM) will evaluate the complete project, i.e., the sections on BLM land and the section on private land. Response to Federal, State and local agency comments should be included in this section.

Common Problems/Solutions

Problem: The same standard letter is sent to all agencies contacted.
Solution: Letters to the agency should be specific as to the information required, i.e., cultural resource information should not be requested from the USFWS. Information concerning mitigation measures currently used should be included in the discussion.

Problem: Borrower correspondence to the agencies not included in the ER.
Solution: Copies of letters requesting information to agencies should be included along with the agency response. Borrowers should keep the original copies of agency correspondence.

Problem: Not all agency response letters are included in the ER.
Solution: All responses should be received and included in the ER before the ER is sent to Washington for review and approval. Some agency responses are not included in the ER because response was not received within 30 days. If an agency does not respond within 30 days, a follow-up contact should be made by telephone to ensure the letter was received and to determine if the agency had comments or not. Written documentation of follow-up telephone conversations or meetings with agencies should be included in the ER.

Problem: Agency responses are not addressed in the ER either in the appropriate impact sections of the ER or in a separate section.
Solution: After getting the appropriate information from an agency, the applicant/consultant should analyze the information. It is not enough to just contact the agency and get a response. Commitments to conduct surveys for threatened and/or endangered species or cultural resources should be addressed along with commitments to mitigate impacts to specific resources. ALL CONCLUSIONS SHOULD BE SUPPORTED. ANY ENVIRONMENTAL CONCERNS THAT ARE RAISED BY AN AGENCY OR THE PUBLIC SHOULD BE ADDRESSED AS COMPLETELY AS POSSIBLE.

Problem: Public notification has not been done if projects will impact wetlands, floodplains or cultural resources.
Solution: Contact RUS if there is a question on the need for a notice.

Problem: Certain mitigation measures may not be included in the construction of the project or the contractor may not be aware of a mitigation commitment.
Solution: Certain mitigation measures may be required in order for RUS to make a no effect determination such as not constructing during the breeding season or avoidance of certain areas due to cultural resources. These measures should be included in the construction contract so the contractor is aware of possible limitations. These actions may protect borrowers from potential liability if there is a problem during construction.

Problem: Construction initiated before all environmental approvals have been received.
Solution: All surveys should be completed and RUS approval received prior to the start of construction in order to avoid delays and possible loss of funding.

If you would like more information or have any questions, please call Dennis Rankin, Environmental Protection Specialist, Engineering and Environmental Staff, at 202-720-1953 or

at Dennis.Rankin@usda.gov, or Larry Wolfe, Senior Environmental Protection Specialist, Engineering and Environmental Staff, at 202-720-5093 or at Larry.Wolfe@usda.gov.

Headquarters & Substation Projects - Guidelines for Typical Site Descriptions

According to RUS Environmental Policies and Procedures, 7 CFR Part 1794, each project being considered for RUS financing must be sufficiently described to ensure its proper environmental classification. Based on 7 CFR 1794 Subpart C - Classifications of Proposals, one can determine the proper environmental review process (normally a categorical exclusion or an environmental assessment process) for the project. The determining factor as to which environmental review process is used is dependent on the acreage impacted by the facility. Consultation with the appropriate RUS environmental protection specialist is recommended if there is a question as to the proper review process. In all cases, a proper project description of the specific site to be disturbed is necessary in defining the scope of the project. In order to evaluate a new site for constructing buildings, warehouses, and/or substations, the following items should be addressed or be given some consideration:

1. **General Site Location.**

   - Show exact location on a United States Geological Survey (USGS) map or other similar map that details landmarks, geographical and topographical references.

   - State approximate acreage to be disturbed by the proposed construction. Identify the general ground cover currently existing at the site.

   - Describe the general topography of the site: developed or undeveloped land, rolling hills, any unique scenic aspects, proximity to streams, proximity to other areas already developed, any special zoning restrictions, distance from existing or proposed roads, any buffer zones from recreational or open space lands.

   - Identify the whether the site is located on a 100-year floodplain, known or suspected wetland areas, important farmland, any special state, tribal, locally or federally protected forest or wildlife areas.

2. **Wetlands & Endangered Species Concerns.** If construction is expected to take place in or near wetlands, discuss:

   - General type of soil (sandy, stone-filled, prime farmland, uncultivated or swampy area, etc.) or existing use of surrounding land.

   - Typical animals and birds that inhabit or nest in the surrounding area, if commonly known. Identify threatened or endangered species or critical habitat that may be located in the area.

- Identify mitigation measures that may be used to minimize impacts of construction: sediment control, disposal of debris, special mats for crossing wetland areas, landscaping or screening efforts proposed.

- Identify any known construction restrictions in the area (such as areas designated as Coastal Barriers) or special permits needed.

3. **Floodplains Considerations.** If construction is located in or near a 100-year flood plain, consider the following:

   - "Critical facilities" should not be located on a floodplain. Examples of critical facilities include generation plants, substations, emergency service facilities and areas used for storage of hazardous materials.

   - Alternative sites should be evaluated. If no alternative sites exist, there should be a discussion to justify that there is no practicable alternative to constructing in the floodplain.

   - Identify and define the area within the floodplain or impacts to the floodplain that could result from construction.

   - If site selection can not avoid a floodplain area, identify specific measures to be taken to protect structures and equipment from extended flood damage. Identify and evaluate other options available under emergency flooding conditions.

4. **Construction In/Near Residential Areas.** If construction is located near residential areas, provide:

   - An explanation of general community concerns, if any. Address concerns for noise, air quality, radio or television interference, possibly electric and magnetic fields (EMF) issues, special lighting or traffic controls.

   - It is recommended that a Class I assessment be done on the site to ensure that there are no hazardous waste problems. However, a Class I assessment does not take the place of RUS' formal environmental review.

It should also be noted that site clearing and/or construction should not begin until final RUS environmental approval is received.

If you would like more information or have any questions, please contact Dennis Rankin, Environmental Protection Specialist, Engineering and Environmental Staff at 202-720-1953 or at Dennis.Rankin@usda.gov

Environmental Review Process for Projects Requiring the Preparation of an Environmental Impact Statement

Borrowers are beginning to consider the construction of coal-fired generation to meet their future power needs. These types of projects require the preparation of an environmental impact statement, according to RUS Environmental Policies and Procedures. RUS is required to select and hire a third party contractor to write the environmental impact statement. In order to avoid delays in the review process, a borrower should consider the following steps in developing a schedule for the review of the project.

1. Borrower notifies RUS Engineering and Environmental Staff (EES) and the Power Supply Division (PSD) of intent to request Rural Utilities Service (RUS) financial assistance and submits documentation justifying the proposal.

2. The Borrower meets with PSD to discuss purpose and need/engineering requirements and with EES to discuss the RUS environmental compliance requirements associated with the proposal. The provisions of 7 CFR Part 1794 are applicable if RUS becomes the lead Federal agency for NEPA compliance. Where another Federal agency is designated lead Federal agency, its NEPA regulations will take precedence. However, RUS must ensure that the requirements of 7 CFR Part 1794 are met. The designation of a lead agency is normally negotiated among the participating Federal agencies. The determining factor is usually based on the level of involvement. Land management agencies normally receive preference over lending agencies.

The remainder of this outline assumes that RUS is the lead Federal agency. Under such circumstances, the Environmental Impact Statement (EIS) will be prepared by a third party consultant selected by RUS and funded by the Borrower in accordance with the requirements of 7 CFR Part 1789 (Use of Consultants Funded by Applicants).

3. The selection of the consultant to prepare the EIS will proceed as follows:

    - Borrower submits a funding proposal to RUS (refer to §1789.156).

    - RUS will prepare a Statement of Work. The Statement of Work must include the preparation of the Draft and Final EIS and a draft Record of Decision. Although there are advantages in utilizing the same consultant for the entire NEPA-EIS process, the Borrower or a consultant selected by the Borrower can prepare the scoping documents.

    - Under a Blanket Purchase Agreement with GOV-WORKS, RUS has selected 12 environmental consultants. Only consultants included on the General Services Administration Library Section 899-1 list of pre-qualified consultants were eligible. RUS will develop a Statement of Work and issue a Request for Proposal. The proposals will be evaluated and a consultant selected. RUS is ultimately responsible for the final selection; however, Borrower input will be accepted.

- RUS provides the Borrower with a copy of the draft Task Order identifying the consultant, the consultant's cost estimate, and contract information to enable the Borrower to develop a Funding Agreement, an Escrow Agreement, and an Indemnification Agreement.

- Borrower develops and submits to RUS executed originals of the three agreements and its Board's Resolution authorizing Borrower funding.

- Total contract cost will include GOV-WORKS 3% processing fee.

- Upon receiving written RUS approval, the Borrower will establish and fund the Escrow Account.

- RUS will then issue the Task Order for consultant services.

- Following the contract award the consultant will provide EES with an executed "No Conflict of Interest" statement.

- RUS will be solely responsible for the administration of the contract and have complete control over the scope of work, performance timetable, acceptability of deliverables and the approval of payment of invoices.

- All documents and information provided by the consultant can be released and made available to the Borrower only with the approval of RUS.

4. If necessary, RUS may execute a Cooperative Agreement with the Borrower. One provision of the agreement would reimburse RUS for project related travel over and above what is normally required for RUS staff to conduct project scoping. These costs have been traditionally paid by RUS.

5. Prior to scoping, an Alternatives Evaluation Study and one of the following is prepared and submitted to RUS:

   - Site Selection Study for generation projects, or

   - Macro-Corridor Study for transmission line projects.

   - Combination Site Selection/Macro-Corridor Study for generation projects with transmission.

6. RUS approval of the two studies is required before scoping meetings are scheduled. Note that the two studies can be submitted as a single document.

7. RUS prepares a Notice of Intent to prepare an EIS and conduct scoping meetings. The notice includes the schedule and locations of public meetings and locations where the studies are available for public review.

- RUS Federal Register Notice must be published at least 14-days prior to the first public meeting.

- The Borrower or Consultant publishes notices in local newspapers and/or other media at least 10-days prior to the first public meeting.

8. Normally, RUS also schedules a separate meeting with affected and/or interested Federal, State, and local agencies (interagency meeting) in conjunction with the public scoping meetings. Interested Federal, State and local agencies should receive the studies (refer to Item 5) at least 14-days prior to the interagency meeting.

9. RUS, with the assistance of the Borrower and consultant, conducts scoping meetings (interagency and public) and visits proposed sites or corridors. A memorandum of understanding that defines agency; consultant and borrower responsibilities may be developed where multiple agencies are participating in the EIS process.

10. RUS accepts written public comments for at least 30 days following the public scoping meetings.

11. A summary of the scoping meetings, including agency and public comments, is prepared. Copies are made available to cooperating/interested agencies and, if requested, to members of the public.

12. Preparation of the Draft EIS

    - Consultant prepares the preliminary Draft EIS.

    - Preliminary Draft EIS is submitted to the lead and cooperating agencies for a 30-day review period. Comments are returned to the Consultant.

    - Final version of the Draft EIS is completed and submitted for RUS and cooperating agencies for approval. The document will be available in both printed and CD formats.

13. RUS prepares a Notice of Availability of the Draft EIS, specifying at least a 45-day review period.

    - RUS notice is published in the Federal Register.

    - The Borrower or Consultant publishes notices of Availability in local newspapers. Other media can also be utilized to provide public notice.

    - A copy of the Draft EIS is posted on the RUS web-site.

    - Copies of the Draft EIS are distributed to the same locations as the studies identified in Item #5.

- Draft EIS is provided to the EPA Regional Office with jurisdiction plus other Federal, State, and local agencies.

- An appropriate number of copies will be made available for public review.

14. Draft EIS filed with EPA Office of Federal Activities in Washington, D.C.

    - Requirement is for 5 printed copies.

    - EPA notice of availability published by Friday of the week Draft EIS is filed.

    - Date of EPA Federal Register notice is official start of 45-day comment period.

15. EPA Regional Office provides comments and rates the Draft EIS.

16. RUS, the cooperating agencies, and the consultant review all comments and address them as appropriate. The Borrower may be requested to provide information to address certain comments.

17. RUS and the cooperating agencies determine format and content of the Final EIS.

    - RUS will issue the Final EIS as a complete document if substantial changes to the Draft EIS are required.

    - Where the Final EIS does not require substantial changes from the Draft EIS, RUS will document changes through errata sheets, insertion pages and revised sections to be incorporated into the Draft EIS. Such changes together with comments on the Draft EIS, responses to comments and other appropriate information would be circulated as the Final EIS. The Draft EIS would not be circulated again.

18. Preparation of the Final EIS

    - Consultant prepares the preliminary Final EIS.

    - Preliminary Final EIS is submitted for review by lead and cooperating agencies (30-days). Comments are returned to the Consultant.

    - Final version of the Final EIS is completed and submitted for RUS and cooperating agency approval. The document will be available in both printed and CD formats.

19. RUS prepares for publication the Notice of Availability of the Final EIS, specifying a 30-day review period.

    - RUS notice is published in the Federal Register.

    - The Borrower or Consultant publishes notices of Availability in local newspapers. Other media can also be utilized to provide public notice.

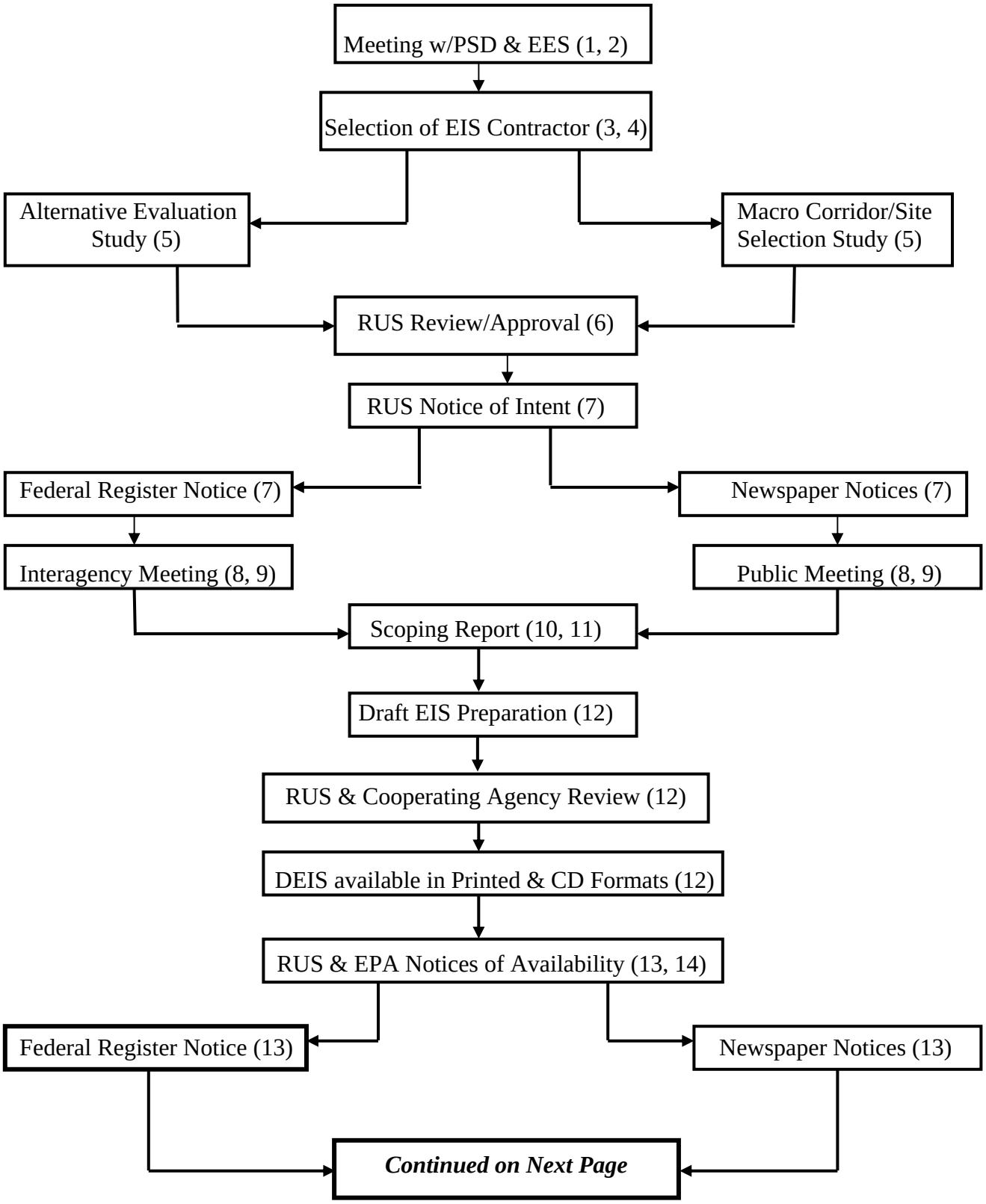
- A copy of the Final EIS is posted on the RUS web-site.
- Copies of the Final EIS are maintained for public review at the same locations as the Draft EIS.
- Final EIS is normally provided to all recipients of the Draft EIS.

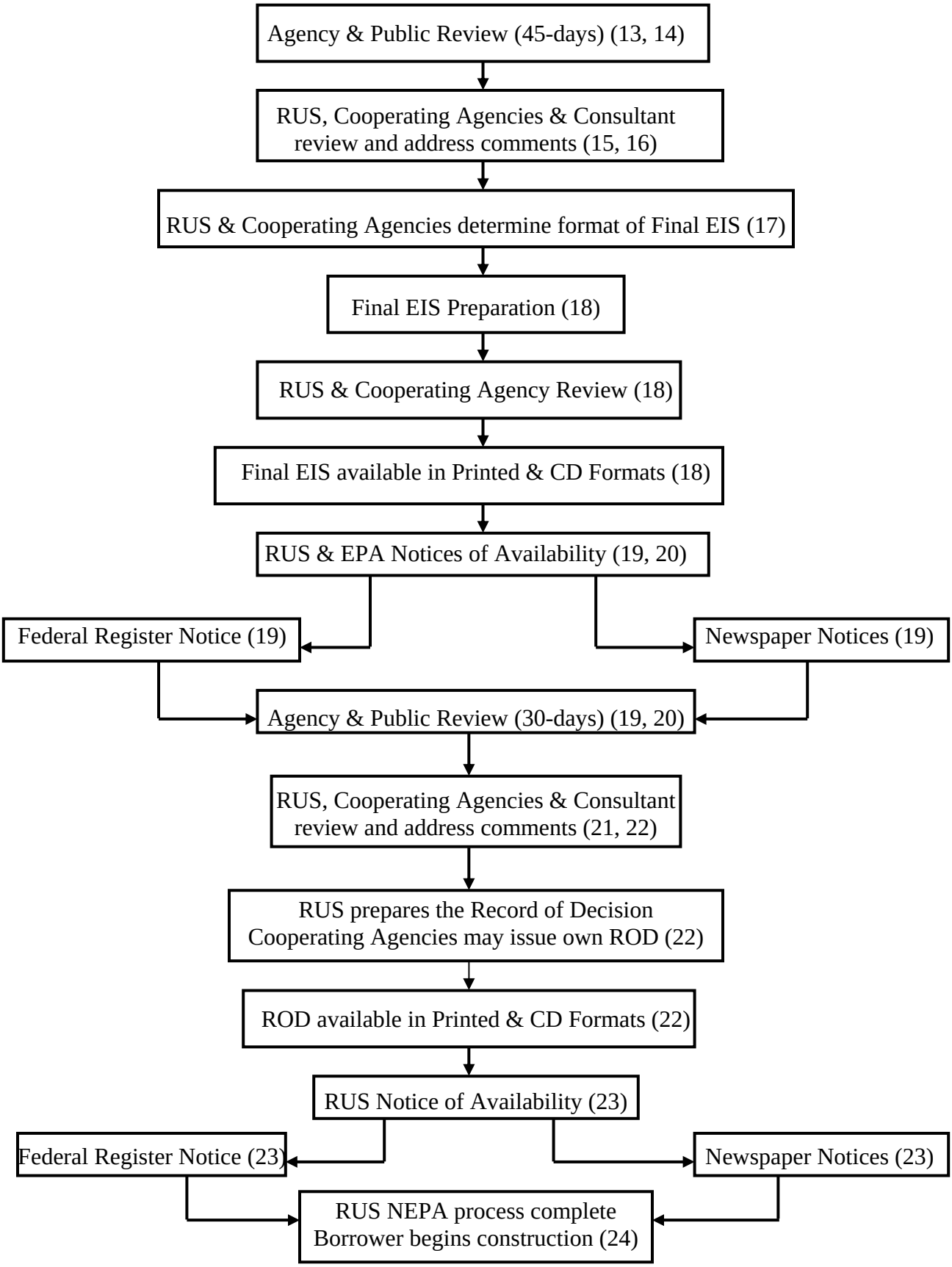
20. Final EIS filed with EPA Office of Federal Activities in Washington, D.C.
    - Requirement is for 5 printed copies.
    - EPA notice of availability published by Friday of the week Final EIS is filed.
    - Date of EPA Federal Register notice is official start of 30-day comment period.
21. EPA Regional Office provides comments and rates the DEIS.
22. The Consultant will assist RUS, as appropriate, in drafting the Record of Decision (ROD) and preparing the administrative record. The ROD will include and address, as appropriate, comments received on the Final EIS. The document will be available in both printed and CD formats. In accordance with their regulatory requirements, each cooperating agency may issue a separate ROD.
23. RUS and the borrower publish Notice of Availability of the RUS ROD.
    - RUS notice is published in the Federal Register.
    - The Borrower or Consultant publishes Notices of Availability in local newspapers. Other media can also be utilized to provide public notice.
    - A copy of the ROD is posted on the RUS web-site.
    - Copies of the ROD are maintained for public review at the same locations as the Final EIS review.
    - The ROD is provided to Federal, State, and local agencies and members of the public who have previously requested a copy.

The NEPA process for the subject project is complete, with the publication of the ROD availability notices and subsequent document distribution. RUS can then proceed with the approval of financial assistance. Borrower can start construction provided all appropriate permits and approvals have been received.

If you would like more information or have any questions, please contact Dennis Rankin, Environmental Protection Specialist, Engineering and Environmental Staff at 202-720-1953 or at: Dennis.Rankin@usda.gov or Larry Wolfe, Senior Environmental Protection Specialist, Engineering and Environmental Staff at 202-720-5093 or at Larry.Wolfe@usda.gov.

FLOW CHART FOR PROJECTS REQUIRING AN ENVIRONMENTAL IMPACT STATEMENT




Agency & Public Review (45-days) (13, 14)
RUS, Cooperating Agencies & Consultant review and address comments (15, 16)
RUS & Cooperating Agencies determine format of Final EIS (17)
Final EIS Preparation (18)
RUS & Cooperating Agency Review (18)
Final EIS available in Printed & CD Formats (18)
RUS & EPA Notices of Availability (19, 20)
Federal Register Notice (19)
Newspaper Notices (19)
Agency & Public Review (30-days) (19, 20)
RUS, Cooperating Agencies & Consultant review and address comments (21, 22)
RUS prepares the Record of Decision Cooperating Agencies may issue own ROD (22)
ROD available in Printed & CD Formats (22)
RUS Notice of Availability (23)
Federal Register Notice (23)
Newspaper Notices (23)
RUS NEPA process complete Borrower begins construction (24)

NRECA T&D ENGINEERING COMMITTEE

Transmission and Distribution Engineering Committee

In 1991, the National Rural Electric Cooperative Association (NRECA) Board of Directors established the Transmission and Distribution Engineering Committee (T&DEC) to assist RUS in the development, analysis, and updating of RUS standards, guidelines and specifications. The T&DEC also was tasked with watching the engineering and operational standards of national standards organizations to further help electric co-ops keep abreast of code changes and new designs involving the T&D engineering and supply chain management fields.

The T&DEC created seven subcommittees as follows: Materials, Overhead Distribution Lines, Substations, System Planning, Power Quality, Transmission Lines, and Underground Distribution. Membership on the Executive Committee and the various subcommittees consists of more than 80 volunteer engineers, operational and materials managers that are part of the engineering, operational, and materials professionals of electric cooperative staffs, NRECA and engineering consultants that work with electric co-ops. The Executive Committee consists of the chair of the T&DEC, chairs of the seven subcommittees, two NRECA Staff members, and the Director of RUS' Electric Staff Division.

2003 Activity: Strategic Planning – In April 2003, the T&DEC completed an important phase of a quest to have an on-going Strategic Plan. In September of 2002, the T&DEC began the exhaustive process of preparing a strategic plan for the committee and the subcommittees. The T&DEC formed a Strategic Planning Team that consisted of the committee chair, the subcommittee chairs, the RUS liaisons to each subcommittee, the two NRECA T&DEC principals, and NRECA's Executive Director of Research and Technical Services. As part of this process the committee tasked itself with crafting a Strategic Plan that would, by design, enable participants to: provide objective, outside analysis to determine the most appropriate use of all resources available; apply a proven approach to Strategic Initiative identification and Action Planning; and identify opportunities for quick wins by which the T&DEC can build momentum, and subsequently inspire the committee in formalizing direction, governance structure, and operating policies. In April, 2003, the Strategic Planning Committee met in Arlington, Virginia, and developed a strategic plan of action for the future and a list of the top priority projects that fell out of the systematic prioritization method used.

The top 20 projects that were developed are listed below:

1. Interruption Reporting Bulletin
2. IEEE 1366 - Reliability Indices
3. Operations Manual
4. E&O Community Liaisons
5. URD Research and Education
6. FERC Small Generator Interconnection
7. Joint Use Bulletin, RUS 1726A-125
8. Design Manual for High Voltage Transmission Lines, RUS 1724E-200
9. Transmission Specs and Drawings, RUS 1728F-810, 811
10. Voltage Levels Bulletin, RUS 169-4
11. Sectionalizing Bulletin, RUS 61-2
12. U-1 Specification Review
13. Application Guide for DG Interconnect
14. Long Range Planning Guide, RUS 1724D-101A
15. IEEE ICC Membership
16. IEEE 1547 Working Group Member
17. NEETRAC Advisors
18. SC Community Liaison
19. IEEE Standards Activities
20. Cable Specification Trends

The following articles discuss the activities of the subcommittees. If you would like more information or have any general questions about the T&DEC, please contact George Bagnall, Director, Electric Staff Division, at 720-1900 or at George.Bagnall@usda.gov.

Materials Subcommittee

The mission of the subcommittee is to assist the Rural Utilities Service (RUS) in keeping the RUS List of Materials useful to RUS borrowers and manufacturers; to inform NRECA member cooperatives on matters pertaining to RUS accepted materials; to support the Supply Chain Management Advisory Board initiatives and the Institute of Supply Management-Cooperative Utilities Educational mission.

Projects include studying the feasibility of different formats for the List of Materials, such as a searchable database; educating borrowers and manufacturers about the acceptance process; and serving as a clearinghouse for NRECA members to forward information on materials to RUS. The Subcommittee also continues to work with RUS in developing new categories and sub-categories for the List of Materials.

If you would like more information or have any questions, please contact Harvey Bowles, Chair of Technical Standards Committee “A” at 202-720-0980 or at Harvey.Bowles@usda.gov.

Overhead Lines Subcommittee

The subcommittee is presently working on the following projects:

Operations Manual. This new manual (to be published by NRECA) will be a practical day-to-day "how to" manual for operations managers at electric cooperatives. The first draft of the manual is nearly complete.

RUS Bulletin 160-2, "Mechanical Design Manual for Overhead Distribution Lines" (1982) has been replaced with the following five new technical guide bulletins:

- Bulletin 1724E-150, "Unguyed Distribution Poles–Strength Requirements," was issued by RUS in July, 2003.
- Bulletin 1724E-151, "Mechanical Loading on Distribution Crossarms," was issued by RUS in November, 2002.
- Bulletin 1724E-152, "The Mechanics of Overhead Distribution Line Conductors," was issued by RUS in July, 2003.
- Bulletin 1724E-153, "Electric Distribution Guys and Anchors," was issued by RUS in April, 2001.
- Bulletin 1724E-154, "Distribution Conductor Clearances and Span Limitations," was issued by RUS in July, 2003.

RUS Bulletin 1726A-125, "Joint Use Agreement with CATV Companies." NRECA has hired a consulting firm to write a universal sample agreement for joint use with telecommunications companies. The document will be based on the most recent safety codes, federal regulations and legal rulings. The sample agreement will include such items as costs recoveries, inspection, insurance, indemnification and perhaps rate calculations and penalties. The subcommittee will review the document and make comments before it is finalized. A completion date for this project has not yet been determined.

The subcommittee is investigating: (1) the effects of magnesium chloride (MgCl – a road salt) on electric lines and line trucks (a survey has been completed); and, (2) the possible use of trunnion clamps for RUS standard distribution line construction.

If you would like more information or have any questions, please contact James Bohlk, Electrical Engineer, Distribution Branch, at 720-1967 or at Jim.Bohlk@usda.gov.

Substation Subcommittee

Mission: Work close with the RUS Liaison to maintain existing and create new RUS and NRECA standards, bulletins and guidelines pertaining to the design, construction and maintenance of Distribution and Transmission Substations.

Projects:

Revision of RUS "Design Guide for Oil Spill Prevention and Control at Substations" (1724E-302) – EPA has recently issued new rules in regards to "Oil Spill and Prevention and Response" (40 CFR Part 112). The existing RUS Bulletin was due for renewal in 1996. The subcommittee will incorporate the new rules into a revision of the bulletin with an expected completion date of September, 2004 for revision 2. It would be then submitted to RUS for publication.

Power Transformer Witness Testing Guide – This guide would advise cooperative engineers on what to look for when witnessing power transformer tests. The guide would contain the suggested tests that could be included in the purchase specification. The subcommittee should have a draft copy by May, 2004. After review by the subcommittee and willing vendors, a completed version could be submitted to NRECA for publication as early as May, 2005.

The subcommittee met during the IEEE Rural Electric Conference on May 23, 2004, in Phoenix, Arizona for Group discussion on the revision of RUS Bulletin 1724E-302, "Design Guide for Oil Spill Prevention and Control."

Attendees: Bill Kahanek, Chairman, Lower Colorado River Authority
Mike Eskandary, RUS Electric Staff Division
Bob Saint, NRECA
Jim Stine, NRECA
Paul Rupard, East Kentucky Power Co-op
Ken Malone, Middle Tennessee EMC
Tom Myers, Berkeley Electric Co-op
Kenny Adams, SGS Witter
Mike Avant, Garkane Energy
Daniel Geiger, Great River Energy
Allen Xi, Burns & McDonnell

Topics of Discussion:

SPCC regulation status update:

EPA is now proposing to extend, by 12 months, certain upcoming compliance dates for the July 2002 SPCC amendments. The new proposed compliance dates are August 17, 2005, to amend an existing SPCC Plan, and February 18, 2006, to implement the Plan. According to EPA, the extension applies only to amending existing plans not developing new ones. They have said all along that facilities like electric substations that do not already have plans may not wait until the deadlines for the 2002 rules kick in but must start to develop plans as soon as possible.

This proposed rule was published in the Federal Register on Thursday, June 17, 2004. Please check the Federal Register at:

http://a257.g.akamaitech.net/7/257/2422/06jun20041800/edocket.access.gpo.gov/2004/pdf/04-13684.pdf

For further information, please see:

http://www.epa.gov/oilspill.

Group discussion on the Revision of the RUS Bulletin 1724E-302 (Design Guide for Oil Spill Prevention and Control):

- The committee reviewed Jim Stine's comments for Chapter 1 to 5 and accepted his changes in the revised SPCC bulletin.

Discussion of Future Projects for the Subcommittee:

- Transformer Witness Testing Guide.
- Substation Design Competition.
- EPRI Inspection and Maintenance Guideline for Distribution Substations.

Discussion of next meeting for the Subcommittee:

The next substation committee meeting will be held On September 13-14, 2004 in NRECA's Arlington, Virginia, Headquarters office.

If you would like more information or have any questions about this article, please contact Mike Eskandary, Electrical Engineer, Transmission Branch, at 202-720-9098 or at Mike.Eskandary@usda.gov.

System Planning Subcommittee

The System Planning Subcommittee's activities include:

- IEEE 1547 "Standard for Interconnection Distributed Resources with Electric Power Systems" (Working Group)

  This working group (and three related working groups) is focused on developing the IEEE Distributed Generation (DG) Interconnection Standard and accompanying IEEE guides. Due to the fact that this important standard is being used as a reference for other federal and state DG Interconnection Regulations, the subcommittee continues to invest the time of the NRECA Principal in contributing to this Working Group.

- Application Guide for DG Interconnection

  The subcommittee has developed the NRECA application guide for IEEE Standard 1547. As part of this effort, the application guide will be revised to match the approved IEEE Standard.

- Distribution Transformer Efficiency Standard

  DOE is developing an ANOPR on distribution transformer efficiency standards. Subcommittee is reviewing and will comment on the ANOPR and the life cycle cost analysis used to support a proposed standard.

- Aging Analysis

  As portions of most rural distribution systems are approaching fifty years old, the maximum life expectancy for most of the equipment (poles, wire, transformers, etc.) is quickly being reached. Given the varying degrees of growth for rural distribution systems throughout the country, wholesale replacement of aging equipment is a practical impossibility. In response to this growing issue, the subcommittee is undertaking an effort to define a project and begin implementation.

- Long Range Planning Guide, RUS Bulletin 1724D-101A (revision)

  Due to the recent expiration of this RUS bulletin, the subcommittee with RUS representation is determining what, if any changes need to be made. It is anticipated that a revised or reissued guide bulletin will result from this effort.

- Sectionalizing Bulletin, RUS Bulletin 61-2 (revision)

  This bulletin was rescinded in 1992. Sectionalizing studies play an important role in the reliability of cooperative distribution systems. Also, with increasing penetration of Distributed Generation on distribution systems, new methodologies must be considered. A new RUS Bulletin will be prepared utilizing existing industry resources and that considers future industry trends.

- Distribution System Model Validation

  Due to increased concerns within the industry with regards to system model accuracy in planning studies, the subcommittee will evaluate what simplistic measurements can be taken and what devices potentially installed to verify results predicted by system planning models.

- Cooperative Research Network (CRN) Planning Guide

  The CRN Distribution Operations Task Force has requested that the subcommittee review and comment on the CRN Planning Guide. The CRN Guide will be an application guide to the RUS Construction Work Plan and the RUS Long Range Planning Guide Bulletins. This CRN guide will be made available to RUS for incorporation in RUS Bulletin revisions.

- Economic Design of Secondary

  A CRN project, never completed, focused on developing software for the economic design of overhead and underground secondary services. The software code has been made available to the subcommittee. The subcommittee will test algorithms and calculations used to ensure credibility, and make available the end product software tool to NRECA's membership as a whole.

- Strategic Planning Risk Management

  One of the members of the subcommittee has developed a strategic planning risk management package. In order to be utilized by a greater number of cooperatives, software needs to be converted from Lotus to Microsoft Excel. The subcommittee is developing a plan to promote and demonstrate the concept to engineers, accountants, and managers at distribution cooperatives.

- FERC Small Generator Interconnection

  FERC has issued an ANOPR and recently issued a NOPR for small generator interconnections (under 20 MW) that potentially will include distribution co-ops. This could have a bigger impact than IEEE 1547 because FERC can mandate rules, while the IEEE standard is only a recommendation. NRECA Energy Policy is the lead, and they have requested T&D Engineering Committee and representation at the meetings.

If you would like more information or have any questions, please contact Chris Tuttle, Senior Loan Specialist, Operations Branch, Southern Regional Division, at 202-205-3655 or at Chris.Tuttle@usda.gov.

Power Quality Subcommittee

The subcommittee is presently working on the following projects:

- RUS Bulletin 169-4, "Voltage Levels on Rural Distribution Systems"

- RUS Bulletin 161-1, "Interruption Reporting and Service Continuity Standards for Electric Distribution Systems"

The sub-committee is also developing a Power Quality Checklist to assist utilities while investigating complaints.

If you would like more information or have any questions, please contact John Pavek, Chief, Distribution Branch, at 202-720-5082 or at John.Pavek@usda.gov, or Timothy Roscoe, Electrical Engineer, Distribution Branch, at 202-720-1972 or at Timothy.Roscoe@usda.gov.

Transmission Lines Subcommittee

The Transmission Lines Subcommittee provides engineering support and technical expertise for the maintenance of existing and the creation of new RUS and NRECA standards, bulletins or guidelines to design, construct, operate, and maintain transmission lines.

The Transmission Lines Subcommittee has recently completed the "Procurement and Application Guide for Non-Ceramic Composite Insulators, Voltage Class 34.5 kV and Above." The committee is currently working on revision of the "Design Manual for High Voltage Transmission Lines." Construction specifications for steel and concrete poles have also been drafted. The project to develop standard drawings for steel and concrete pole construction and revision of the existing specification and drawings for wood construction has begun. It is anticipated that the concrete and steel construction specifications and drawings will eventually become separate bulletins.

If you would like more information or have any questions, please contact Donald Heald, Structural Engineer, Transmission Branch, at 202-720-9102 or at Don.Heald@usda.gov.

Underground Distribution Subcommittee

The NRECA Underground Subcommittee has continually assisted Bill Dorsett of Booth & Associates, Inc., in revising the NRECA Underground Distribution System Design and Installation Guide. The Subcommittee suggests splitting this comprehensive document into separate design and installation guides. References and terminologies will be updated to current acceptable standard.

This is a CRN funded project. The targeted completion date is the end of 2004.

If you would like more information or have any questions, please contact Trung Hiu, Electrical Engineer, Distribution Branch, at 202-720-1877 or at Trung.Hiu@usda.gov.

ADMINISTRATIVE and OTHER

Revision of Electric Program Standard Contract Forms

RUS has issued a final rule revising the electric program standard contract forms, which was published in the Federal Register on February 13, 2004. This final rule affects 7 CFR 1724, Electric Engineering, Architectural Services and Design Policies and Procedures, 7 CFR 1726, Electric System Construction Policies and Procedures, and 7 CFR 1755, Telecommunications Standards and Specifications for Materials, Equipment, and Construction. RUS has also published a companion document, Bulletin 1726I-602, "Attachments to Electric Program Standard Contract Forms."

RUS has updated, consolidated, and streamlined these standard forms of contracts. These changes are needed to improve the usefulness of the standard forms of contract and to make it easier for RUS borrowers and engineers to utilize these standard forms of contract. The revisions to the contract forms include:

- Eliminate unneeded forms. This includes merging Form 181 into Form 187, merging Form 180 and 792c into Form 238, merging Form 201, 203, and 764 into Form 830, and eliminating Forms 180, 181, 201, 203, 764 and 792c. We also eliminated infrequently used guidance forms (Forms 172, 173, 274, 282, and 458.)

- Make forms suitable for use as contracts "subject to" or "not subject to" RUS approval. This includes merging Form 831 into Form 830 and eliminating Form 831.

- Make construction contract forms suitable for use as "labor only" or "labor and material" contracts. This includes merging Form 792 into Form 790 and eliminating Form 792.

- Standardize tables and information pages and incorporate them as separate attachments. RUS has published the "Construction Units" pages as part of the companion bulletin. This allows the borrower to include in its bid package only those construction unit pages that are relevant to a particular project.

- Maximize consistency among forms. This includes standardizing common provisions and terminology, and adding a "Notice and Instructions to Bidders" to forms that previously did not have one. This also includes restructuring Form 198, Equipment Contract, to a "proposal" and "acceptance" format (like the other forms), and adding certain provisions, such as insurance and protection to persons and property, applicable to work performed at the project site, such as technical assistance during installation.

- Add a provision regarding assignment of the contract to RUS for security purposes.

- Update and clarify certain contract provisions in Forms. This includes:

    * Clarify that the contractor (not the owner or engineer) is solely responsible for the means and methods of construction and for the supervision of the contractor's employees;

    * Delete the reference to a "Supervisor" appointed by RUS;

    * Delete the reference to the loan contract and owner's access to funding;

    * Delete the option for eliminating retainage after the contract is 50 percent complete;

    * Update the "Buy American" and "Civil Rights" requirements; and,

    * Eliminating gender specific terms such as him, his, and materialmen.

RUS has also issued a clarification concerning RUS Form 790, Electric System Construction Contract – Non-Site Specific Construction. In a letter dated April 14, 2004, RUS identified several changes that could be made to the Form 790 when it is used as a "labor only" contract. A copy of this letter is included as Exhibit 1.

These documents (including the forms, bulletin, and letter) may be accessed from the RUS web site at:

http://www.usda.gov/rus/electric/forms/index.htm

If you would like more information or have any questions, please contact Fred Gatchell, Deputy Director, Electric Staff Division, at 202-720-1398 or at Fred.Gatchell@usda.gov.

Rural Broadband Access Loan and Loan Guarantee Program

Electric borrowers may be in a position to help bring broadband telecommunications services to their service area where such services are either not available or they are unreliable. The following provides details on a RUS Telecommunications Program activity that perhaps electric borrowers could use for the advantages of people in their service areas.

On May 13, 2002, the "Farm Security and Rural Investment Act of 2002" (Farm Bill) was signed into law by President Bush. Section 601 of the Farm Bill amended the Rural Electrification Act of 1936, and establishes the Rural Broadband Access Loan and Loan Guarantee Programs.

The Rural Broadband Access Loan and Loan Guarantee Program is designed to provide loans for funding the costs of construction, improvement and acquisition of facilities and equipment to provide broadband services to eligible rural communities. The goal is to ensure that rural consumers enjoy the same quality and range of telecommunications services that are available in urban and suburban communities.

Applicant Eligibility (7 CFR 1738.16)

RUS makes broadband loans and loan guarantees to legally organized entities providing, or proposing to provide, broadband services in eligible rural communities.

Eligible entities include: cooperative, nonprofit, limited dividend or mutual associations, limited liability companies, Indian tribes and tribal organizations as defined in 25 U.S.C. 450(b) and (c) and commercial organizations. Individuals or partnerships of individuals are not eligible entities.

Eligible Loan Purposes (7 CFR 1738.10 and 1738.19)

RUS makes broadband loans and loan guarantees to:

- Finance the construction, improvement, and acquisition of facilities and equipment to provide broadband service in eligible rural communities;
- Finance broadband facilities leased under the terms of a capital lease, as defined in generally accepted accounting principals; financing will be limited to 2 years of lease costs;
- Finance the acquisition by an eligible entity of another system, lines or facilities if the acquisition is necessary and incidental to furnishing or improving rural broadband service; and,
- Refinance an outstanding obligation on another telecommunications loan made under the RE ACT. The refinancing cannot exceed 40 percent of the loan amount.

Points of Contact: BROADBAND TEAM

A prospective applicant should contact one of the following Broadband Team members prior to submitting an application:

Kenneth Kuchno, Director, Broadband Division, at Kenneth.Kuchno@usda.gov

Farwa Naqvi, Engineering Branch Chief, Broadband Division, at Farwa.Naqvi@usda.gov

Wanda Lloyd, Operations Branch Chief, Broadband Division, at Wanda.Lloyd@usda.gov

All of the above can be reached at 202-690-4673.

2004 Rural Electric Power Conference

Each year the Rural Electric Power Conference (REPC) Committee of the Institute of Electrical and Electronics Engineers' (IEEE) Industry Applications Society sponsors a conference which is ideally suited to rural electric utilities. The conference is aptly named after the committee responsible for producing the conference but the name, Rural Electric Power Conference, is also well suited for the conference's intended audience. The purpose of every meeting of the conference is to provide utility engineers and operations personnel, consultants, and utility-related business people with information on the design, operations and analysis of electric distribution systems with special emphasis for utilities with rural distribution systems.

For an idea of the type of the information and sessions that can be expected during these conferences, please visit the internet address below to see the 2004 program:

http://www.ieeerepc.org/agenda.htm

The 2005 Rural Electric Power Conference, the 49th annual meeting of the conference, will be conducted on May 8, 9, and 10, 2005, at the La Mansion del Rio Hotel, San Antonio, Texas.

RUS recommends that borrowers keep an eye out for next year's program which is expected to hit the Rural Electric Committee Website at http://www.ieeerepc.org/ in October, 2004.

If you would like more information or have any questions, please contact Cameron L. Smallwood, PE, 2005 IEEE REPC Chairman, at cameron@united-cs.com, or Harvey Bowles, Senior Staff Engineer, Electric Staff Division, at 202-720-0980 or at Harvey.Bowles@usda.gov.

RUS Holds Engineering Seminar

RUS held its 2004 Electric Engineering Seminar on February 10 and 11, 2004, in New Orleans, Louisiana, in conjunction with NRECA's TechAdvantage 2004. Over 250 engineers, RUS Staff, and others attended this seminar, which explored the latest developments in the electric utility industry as they relate specifically to rural America and RUS' role. The presentations and presenters included:

RUS Update - *Blaine Stockton, Assistant Administrator - Electric, RUS*

Revision of the National Electrical Safety Code - *Bob Lash, Chief, Transmission Branch, RUS, and NESC Subcommittee Members*

Safety Accreditation - *Ken Brubaker, Manager, Safety Programs, NRECA*

Critical Infrastructure Protection: RUS Security Requirements - *John Pavek, Chief, Distribution Branch, and RUS Homeland Security Representative*

Avian Protection Working Group: The New Mexico Experience - *Dennis Rankin, Environmental Protection Specialist, Engineering and Environmental Staff, RUS*

Joint Use Contracts and Attachment Procedures - *Ty Diamond, Vice President of Engineering and Operations, Flint Energy*

RUS Technical Publications - *Fred Gatchell, Deputy Director, Electric Staff Division, RUS*

New RUS Narrow Profile Construction Assemblies - *Jim Bohlk, Electrical Engineer, Distribution Branch, and Jim Higginbotham, General Field Representative, RUS*

NRECA's Transmission & Distribution Engineering Committee - *Mike Pehosh and Bob Saint, Principals, T&D Engineering, NRECA*

Spill Prevention Control and Countermeasures Rules - Electric Utility & Electrical Equipment-Specific Issues - *James Roewer, Executive Director, Utility Solid Waste Activities Group*

Developing a Landfill Methane Generation Project - *Ralph Tyree, Program Manager, Non-Traditional Power Production Projects, East Kentucky Power Cooperative*

DOE – RUS Partnership to Expand Acceptance of Photovoltaic Systems for Rural Community Needs - *Larry Moore, Senior Member of Technical Staff, Sandia National Laboratories*

NRECA/DOE Wind Power Workshop:

Co-op Opportunities in Wind Energy - *Randy Manion, Non-Hydro Renewable Program Manager, Western Power Administration*

Building a Business Case for Wind Energy - *Chris Tuttle, Load Forecast Officer, RUS*

Co-op Wind Development in the Dakotas - *Ron Rebenitsch, Manager of Member Marketing, Basin Electric Power Cooperative*

Wind Development: Fact or Fiction - *Jim Edwards, Assistant General Manager of Operations, East River Electric Power Cooperative, Inc.*

Distributed Wind Power Interconnection - *Tom Wind, Wind Utility Consulting.*

Copies of the presentations are available in PDF format (approximately 15 MB) at:

http://www.usda.gov/rus/electric/engineering/sem2004/seminar2004.pdf

Contact the Electric Program Webmaster at RUS.Electric@usda.gov concerning availability of individual presentations.

If you would like more information or have any questions, please contact Fred Gatchell, Deputy Director, Electric Staff Division, at 202-720-1398, or at Fred.Gatchell@usda.gov.

RUS Seismic Requirements are Updated

RUS requires borrowers and grant recipients to meet applicable requirements mandated by Federal statutes and regulations to obtain RUS financing. Federal regulation 7 CFR 1792 Subpart C codifies the seismic requirements that RUS borrowers and grant recipients must meet for new building construction when using funds provided or guaranteed by RUS. This regulation was recently updated and can be found at the following website:

http://www.usda.gov/rus/electric/regs/index.htm.

In the design and construction of new federally assisted buildings, RUS borrowers and grant recipients must utilize the seismic provision of one of the following model codes or standards:

- 1997 International Conference of Building Officials (ICBO) *Uniform Building Code*
- 1995 or 1998 American Society of Civil Engineers (ASCE) 7, *Minimum Design Loads for Buildings and Other Structures*
- 2000 International Code Council (ICC) *International Building Code*

For each applicable building, borrowers and grant recipients must provide RUS a written acknowledgment from a registered architect or engineer responsible for the building design stating that seismic provisions of one of the above model codes or standards is used in the design of the building.

For projects in which plans and specifications are required to be submitted to RUS this acknowledgement is to be on the title page of the drawings included with the final plans and specifications. This acknowledgement should include the identification and date of the model code or standard that is use in the seismic design of the building. The plans and specifications are to be dated, signed and sealed by the registered architect or engineer.

For projects in which plans and specifications are not submitted, this acknowledgement is to be in the form of a statement from the architect or engineer responsible for the building design. The statement should identify the model code or standard that is used in the seismic design of the buildings and be dated and signed.

If you would like more information or have any questions, please contact Donald Heald, Structural Engineer, Transmission Branch, at 202-720-9102, or at Don.Heald@usda.gov.

RUS Technical Publications

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

<u>RULES:</u>

- 7 CFR 1726, "Revision of Electric Program Standard Contract Forms." This final rule, dated February 13, 2004, updates, consolidates, and streamlines RUS' standard forms of contracts. For more information, see the article of the same title included in this issue of the Items of Engineering Interest.

  For more information, please contact Fred Gatchell of ESD at 202-720-1398 or at Fred.Gatchell@usda.gov.

- Bulletin 1728F-804, "Specifications and Drawings for 12.47/7.2 kV Line Construction" (Incorporated by Reference.) The proposed rule covering the revision of this bulletin was

published in the Federal Register for comments on February 12, 2004. This will be an update of an existing Bulletin 50-3 with the same title.

This bulletin will update the specifications and drawings that are to be used by borrowers in the construction of 12.47/7.2 kV overhead electric distribution lines. It is one of the RUS standards that help borrowers build safe, reliable, and economical electric facilities in rural America. Listed below are some of the significant changes and additions which are being considered in connection with the update of this bulletin:

- The bulletin will be reformatted into 19 separate sections or categories. Most of the sections contain construction specifications, an index of drawings, and construction drawings of assemblies designed to perform a similar function.

- New tables will be added to define maximum line angles, permitted unbalanced conductor tensions, and soil classification data. Appendix 1 at the end of the bulletin will document the formula and data used to determine the line angles in the tables. Appendix 2, also at the end of the bulletin, will document the formula and data used to determine permitted unbalanced conductor tensions.

- All of the drawing numbers will be changed to a uniform format in which each character in the number has a functional meaning. However, most of the drawings and assemblies, brought forth from previous Bulletin 50-3, will also show the same numbers previously used in Bulletin 50-3. *Borrowers may use at their discretion either the old numbers or the new numbers for these assemblies.*

- Each drawing has been given a new, shorter, and more uniform title or name.

- "Design parameters," which define and usually limit maximum line angles or mechanical loading (tension), will be added to most of the drawings.

- Several new construction "guide" drawings will be added which will show the configuration and spacing of more than one assembly on a structure, or will show the installation details of full or partial assembly units. These drawings will not list the material used.

- Three sets of coordinated "narrow profile" assemblies and drawings will be incorporated into this bulletin.

- New conditions and specifications for the use of stirrups will be added.

RUS is presently reviewing and incorporating into the bulletin many of the comments and suggestions offered by those who responded to the proposed rule.

For more information, please contact Jim Bohlk of ESD at 202-720-1967 or at Jim.Bohlk@usda.gov.

- 7 CFR 1792, "Seismic Safety." This direct final rule, dated April 30, 2004, revises RUS' seismic safety requirements to add several building codes to the list of equivalent codes and clarify certain other requirements. For more information, see the article "RUS Seismic Requirements are Updated," included in this issue of the Items of Engineering Interest.

  For more information, please contact Don Heald of ESD at 202-720-9102 or at Don.Heald@usda.gov.

- 7 CFR 1794, "Environmental Policies And Procedures." This final rule, dated August 1, 2003, revises RUS' existing environmental regulations. Based on a greater use of small-scale and distributed generation and renewable resources, and the agency's experience and review of its existing procedures, RUS has determined that several changes are necessary for its environmental review process to operate in a more effective and efficient manner.

  For more information, please contact Larry Wolfe of the Engineering and Environmental Staff at 202-720-5093 or at Larry.Wolfe@usda.gov.

GUIDANCE DOCUMENTS:

- Bulletin 1724E-150, "Unguyed Distribution Poles – Strength Requirements," dated July 30, 2004. This guide bulletin presents equations, data, and other information needed to determine:

  * The loads applied to unguyed wood distribution poles,
  * A pole's strength requirements to sustain applied loads, and
  * Maximum horizontal spans based on pole strengths.

  This bulletin replaces one of the chapters of REA Bulletin 160-2, "Mechanical Design Manual for Overhead Distribution Lines."

  For more information, please contact Jim Bohlk of ESD at 202-720-1967 or at Jim.Bohlk@usda.gov.

- Bulletin 1724E-152, "The Mechanics of Overhead Distribution Line Conductors," dated July 30, 2004. This bulletin presents and explains:

  * The equations needed to calculate ruling spans and conductor sags and tensions,
  * Guidelines for preparing or selecting sag-tension tables,
  * The characteristics, behavior, and installation of distribution line conductors, and,
  * Information regarding aeolian vibration.

This bulletin replaces one of the chapters of REA Bulletin 160-2, "Mechanical Design Manual for Overhead Distribution Lines."

For more information, please contact Jim Bohlk of ESD at 202-720-1967 or at Jim.Bohlk@usda.gov.

- Bulletin 1724E-154, "Distribution Conductor Clearances and Span Limitations," dated July 30, 2004. This bulletin presents information and equations needed to determine the maximum span length that will meet the requirements of the National Electrical Safety Code (NESC) with respect to clearance between conductors at mid-span and at supporting structures

  This bulletin replaces one of the chapters of REA Bulletin 160-2, "Mechanical Design Manual for Overhead Distribution Lines."

  For more information, please contact Jim Bohlk of ESD at 202-720-1967 or at Jim.Bohlk@usda.gov.

- Bulletin 1726-601, "Electric System Construction Policies and Procedures – Interpretations," dated July 27, 2004. This supersedes Bulletin 1726-601, dated May 25, 1996, and provides clarification of certain requirements of 7 CFR 1726, Electric System Construction Policies and Procedures. This revision includes additional interpretations, mostly related to the revised contract forms.

  For more information, please contact Fred Gatchell of ESD at 202-720-1398 or at Fred.Gatchell@usda.gov.

- Bulletin 1726I-602, "Attachments to Electric Program Standard Contract Forms," dated February 19, 2004. This is a new bulletin which provides attachments that can be used with RUS electric program standard contract forms.

  For more information, please contact Fred Gatchell of ESD at 202-720-1398 or at Fred.Gatchell@usda.gov.

- IP 202-1, "List of Materials Acceptable for Use on Systems of RUS Electrification Borrowers," published in July, 2004, and its quarterly supplements. This document provides a convenient listing of the materials and equipment that will be accepted by RUS.

  For more information, please contact Harvey Bowles of ESD at 202-720-0980 or at Harvey.Bowles@usda.gov.

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

PUBLICATIONS IN PROGRESS

Timber Specifications: RUS is in the process of revising the following three bulletins that cover pressure treating of poles and crossarms, and their respective quality control:

- Bulletin 1728F-700, "RUS Specification for Wood Poles, Stubs and Anchor Logs,"
- Bulletin 1728H-701, "RUS Specification for Wood Crossarms (Solid and Laminated) Transmission Timbers and Pole Keys" (7 CFR 1728.201), and
- Bulletin 1728H-702, "RUS Specification for Quality Control and Inspection of Timber Products" (7 CFR 1728.202).

Topics currently being considered for revision include:

- Elimination of the requirement for borrowers to notify RUS of their timber product purchases during the previous year,
- Reinstatement of the acceptance and listing of inspection agencies in the RUS List of Materials,
- Requirement for a heat sterilization during kiln drying or steam conditioning of poles,
- Requirement for inspection agencies to have their company designation branded or tagged on the pole face,
- Requirement for all independent inspectors and plant quality control personnel to be trained and certified by x-ray fluorescence instrument manufacturer,
- Requirement for treating plants and inspection agencies to maintain certain levels of liability insurance and errors and omission insurance, and
- Include butt treating of cedar poles as an acceptable method of treatment for poles.

RUS is soliciting input from electric borrowers and others as to necessary changes to these bulletins. Comments or suggestions should be sent to H. Robert Lash, Chief, Transmission Branch, RUS, Stop 1569, 1400 Independence Ave SW, Washington, DC 20250-1569, E-mail: Bob.Lash@usda.gov. All comments are welcome.

RUS is also working on the following publications:

- Bulletin 1724D-114, "Voltage Regulator Application on Rural Distribution Systems." This bulletin will examine the application of voltage regulators on rural distribution systems and serve as a general guide for voltage regulator applications to RUS borrowers and others.

  For more information, please contact John Pavek of ESD at 202-720-5082 or at John.Pavek@usda.gov.

- Bulletin 1724E-200C, "Transmission Line Clearances." This bulletin explains in detail how the clearances in Bulletin 1724E-200, "Design Manual for High Voltage Transmission Lines," were derived

  For more information, please contact Norris Nicholson of ESD at 202-720-1924 or at Norris.Nicholson@usda.gov.

- Bulletin 1724E-220, "Procurement and Application Guide for Non-Ceramic Composite Insulators, Voltage Class 34.5 kV and Above." The objective of this guide bulletin is to assist users in developing specifications for procurement of non-ceramic composite insulators. Information in this bulletin will assist users not familiar with non-ceramic composite insulators and current standards in developing purchase specifications. This bulletin will provide recommended design and manufacturing criteria to ensure acceptable of non-ceramic composite insulators performance on electrical facilities operating at voltages 34.5 kV and above. This guide is consistent with present day criteria already developed for non-ceramic composite insulator standards.

  For more information, please contact Norris Nicholson of ESD at 202-720-1924 or at Norris.Nicholson@usda.gov.

If you would like more information or have any questions, please contact Fred Gatchell, Deputy Director, Electric Staff Division, at 202-720-1398 or at Fred.Gatchell@usda.gov.

EXHIBIT 1

United States Department of Agriculture
Rural Development

Rural Business–Cooperative Service • Rural Housing Service • Rural Utilities Service
Washington, DC 20250

April 14, 2004

SUBJECT: Permitted Modification of RUS Form 790

TO: All Electric Borrowers

FROM: Blaine D. Stockton
Assistant Administrator
Electric Program

In February, 2004, the Rural Utilities Service (RUS) revised its standard forms of contract for the electric program. One of these contract forms, RUS Form 790, Electric System Construction Contract – Non-Site Specific Construction, is intended to be used in several different ways. RUS has determined that when this form is used as a replacement for the former RUS Form 792, Distribution Line Extension Construction Contract (Labor Only), certain borrower added modifications may be appropriate. If Form 790 is used as a "labor only" contract, i.e., the borrower supplies all materials and equipment, and the contract is to be accounted for under RUS Bulletin 1767B-2, Work Order Procedures – Electric Program, a borrower may choose to eliminate the cost of owner furnished materials from the unit prices, and modify Form 790 as follows:

1. Notice & Instructions to Bidders, Item 2 – Delete this item.

2. Proposal, Article I, Section 3, Paragraph 2 – Delete the first three sentences of Paragraph 2 so that it reads as follows:

   Materials, if any, not required for the project, which have been furnished to the Bidder by the Owner or delivery of which has been accepted by the Bidder on behalf of the Owner, shall be returned to the Owner by the Bidder upon completion of construction of the project. The value of all materials not installed in the project nor returned to the Owner shall be deducted from the final payment to the Bidder.

3. Other provisions in the Form 790 relating to contractor furnished materials become inapplicable, since contractor furnished materials are outside the scope of a "labor only" contract. Such provisions may be deleted if desired for clarification.

If you have any questions, please contact your RUS General Field Representative or your regional engineering branch chief in Washington, DC.

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APPENDIX A

Selected Metric Conversion Factors

TO CONVERT FROM:	TO:	MULTIPLY BY:
Inch (in)	Centimeter (cm)	2.54
Foot (ft)	Meter (m)	0.3048
Mile (mi)	Kilometer (km)	1.609
Pound (lb)	Newton (N)	4.448
Gallon (gal)	Liter (L)	3.785

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APPENDIX B

RURAL UTILITIES SERVICE
ELECTRIC STAFF DIVISION

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As of August, 2004. For updated information, see: http://www.usda.gov/rus/electric/contacts/esd.htm.

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APPENDIX C

NRECA TRANSMISSION & DISTRIBUTION ENGINEERING COMMITTEE

MEMBER	ORGANIZATION	LOCATION
Committee Chair		
Max Davis	South Alabama Elec Co-op	Troy, AL
NRECA Staff Coordinators		
Steve Lindenberg	NRECA	Arlington, VA
Mike Pehosh	NRECA	Arlington, VA
Bob Saint	NRECA	Arlington, VA
Materials Subcommittee		
John Mitchell, Chair	Rappahannock EC	Fredericksburg, VA
Harvey Bowles	RUS	Washington, DC
Susan Brouse	Great River Energy	Elk River, MN
Tom Denison	Cobb EMC	Marietta, GA
Charles Emerson	Trico EC	Tucson, AZ
George Keel	RUS	Washington, DC
Peter Platz	Coast EPA	Bay St. Louis, MS
Scott Wehler	Adams Electric Co-op	Gettysburg, PA
Overhead Distribution Lines Subcommittee		
Terry Rosenthal, Chair	Laclede EC	Lebanon, MO
Jim Bohlk	RUS	Washington, DC
James Byrne	Poudre Valley REA	Fort Collins, CO
Titus (Ty) Diamond	Flint Energy	Warner Robbins, GA
Allan Glidewell	Southwest Tennessee EMC	Brownsville, TN
Tom Hoffman	Agralite Electric Co-op	Benson, MN
Greg Lindsly	Dixie EMC	Baton Rouge, LA
Shannon Messer	Clark Energy Coop	Winchester, KY
Brian Nelson	Intercounty ECA	Licking, MO
Ernest Neubauer	Pioneer Electric Co-op	Piqua, OH
Gene Smith	SGS Witter, Inc.	Lubbock, TX
Tom Suggs	Middle Tennessee EMC	Murfreesboro, TN

APPENDIX C

NRECA TRANSMISSION & DISTRIBUTION ENGINEERING COMMITTEE

MEMBER	ORGANIZATION	LOCATION
Substation Subcommittee		
Bill Kahanek, Chair	Lower Colorado River Auth.	Austin, TX
Kenny Adams	SGS Witter, Inc.	Albuquerque, NM
Mike Eskandary	RUS	Washington, DC
Daniel Geiger	Great River Energy	Elk River, MN
Ken Malone	Middle Tennessee EMC	Murfreesboro, TN
Tom Myers	Berkeley EC	Moncks Corner, SC
Paul Rupard	East Kentucky Power Co-op	Winchester, KY
Allen Xi	Burns & McDonnell	Houston, TX
System Planning Subcommittee		
Robin Blanton, Chair	Piedmont EMC	Hillsborough, NC
Mark Barbee	Kansas Electric Power Co-op	Topeka, KS
Robert Dew	Power Tech Engineering	Norcross, GA
Joe Dorough	Jackson EMC	Jefferson, GA
Ronnie Frizzell	Arkansas EC Corp.	Little Rock, AR
Dee Futz	Chugach EA	Anchorage, AK
David Garrison	Allgeier Martin & Associates	Okmulgee, OK
Wayne Henson	East Mississippi EPA	Meridian, MS
Joe Perry	Patterson & Dewar Engr.	Decatur, GA
Ryan Smoak	McCall-Thomas Engineering	Orangeburg, SC
Brian Tomlinson	Conserv Energy	Corinth, TX
Chris Tuttle	RUS	Washington, DC
Kenneth Winder	Moon Lake Electric	Roosevelt, UT
Power Quality Subcommittee		
Ed Bevers, Chair	Rural Electric Co-op., Inc.	Lindsay, OK
Chris Brewer	Blue Grass Energy Co-op	Nicholasville, KY
Robert Casey	Georgia Transmission Corp	Tucker, GA
Corbitt Clift	Cobb EMC	Marietta, GA
Peter Daly	Power System Engineering	Madison, WI
Herman Dyal	Clay Electric Cooperative	Keystone Heights, FL
Ken Kjar	Cass County Electric Co-op	Kindred, ND
Wally Lang	Minnkota Power Co-op	Grand Forks, ND

APPENDIX C

NRECA TRANSMISSION & DISTRIBUTION ENGINEERING COMMITTEE

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Chris Perry	Nolin RECC	Elizabethtown, KY
Tim Pierce	Great River Energy	Elk River, MN
Jeff Pogue	Wabash Valley Power Assoc	Indianapolis, IN
Timothy Roscoe	RUS	Washington, DC
Lewis Shaw	Brunswick EMC	Shallotte, NC
Michael Watson	Duck River EMC	Shelbyville, TN
Jim Worley	East Kentucky Power Co-op	Winchester, KY
Transmission Lines Subcommittee		
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Steve Mundorff	Tri-State G&T Association	Denver, CO
Norris Nicholson	RUS	Washington, DC
Bob Oldham	Southern MD EC (Retired)	FL
Art Smith	Burns & McDonnell	Atlanta, GA
David Turner	Lower Colorado River Auth.	Austin, TX
John Twitty	Alabama EC	Andalusia, AL

APPENDIX C

NRECA TRANSMISSION & DISTRIBUTION ENGINEERING COMMITTEE

MEMBER	ORGANIZATION	LOCATION
Underground Distribution Subcommittee		
Ace Necaise, Chair	Singing River EPA	Lucedale, MS
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Berl Davis	Palmetto EC	Hilton Head, SC
William Duke	Allgeier Martin & Associates	Okmulgee, OK
Steven Gwin	Middle Tennessee EMC	Murfreesboro, TN
Vince Heuser	Nolin RECC	Elizabethtown, KY
Trung Hiu	RUS	Washington, DC
Tim Mobley	Berkeley EC	Moncks Corner, SC
John Rodgers	Nodak EC, Inc.	Grand Forks, ND
Les Shankland	Mountain Parks Electric	Granby, CO
Blaine Strampe	Federated REA	Jackson, MN
Ed Thomas	Utility Elec. Consultants	Raleigh, NC