Grayson Rural Electric Cooperative Corporation

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February 22, 2007

Ms. Beth O'Donnell, Executive Director
Public Service Commission of Kentucky
211 Sower Boulevard
P. O. box 615
Frankfort, KY 40602

RE: Administrative Case No. 2006-00494
An Investigation of the Reliability Measures of Kentucky's Jurisdictional Electric Distribution Utilities and Certain Reliability Maintenance Practices

Dear Ms. O'Donnell:

Please find enclosed the original and six (6) copies of the information requested in Administrative Case No. 2006-00494, An Investigation of the Reliability Measures of Kentucky's Jurisdictional Electric Distribution Utilities and Certain Reliability Maintenance Practices for Grayson Rural Electric Cooperative Corporation, Second Data Request of Commission To Jurisdictional Electric Distribution Utilities

Carol Hall Fraley, President & CEO will be our witness for all items.

Should you need additional information concerning this filing, please contact me, Carol Hall Fraley, President & CEO at 606-474-5136.

Sincerely,

GRAYSON RURAL ELECTRIC
COOPERATIVE CORPORATION

Carol Hall Fraley

Carol Hall Fraley
President & CEO

CHF/bcg

Enclosures

Grayson Rural
Electric

A Touchstone Energy™ Cooperative

The power of human connections

Administrative
Case No. 2006-00494

Second Data Request
Of Commission Staff to Jurisdictional
Electric Distribution Utilities

Grayson Rural Electric
Cooperative Corporation
109 Bagby Park
Grayson, KY 41143

1. Describe in detail how the company utilizes all of the reliability measures it monitors.

Not applicable

2. Has the company determined an appropriate operating range for performance threshold based on these measures? If yes, identify.

Not applicable

3. Describe in detail how the company develops formal plans to address its worst performing circuits. If the company does not develop such plans, indicate so in the response.

Through outage reports, end-of-line voltage monitoring, maintenance personnel and customer information, Grayson Rural Electric makes it determinations as to the 'worst performing circuits'. In most cases, formal plans to make upgrades to these circuits are placed in the next RUS Construction Work Plan (CWP). In the event we determine the circuit cannot be placed on hold until the next CWP the circuit modifications will be analyzed immediately.

Studies of the worst performing circuits and the possible modifications are run through our Milsoft Circuit Analysis software called Windmil. Windmil utilizes present circuit loading parameters from our automated meter reading software (Hunt Technologies Command Center). Information from our Power Requirement Study prepared by East Kentucky Power predicts the loading for these circuits. We then analyze the possible alternatives to determine the most cost effective means of correction or possible alternatives. Analysis includes outage data and any input from field personnel that would alter the results. If the project is expected to exceed $100,000, we then file an addendum with RUS for approval before proceeding with the corrections.

4. Why are momentary outages excluded?

Grayson Rural Electric does not include momentary outage in its analysis of worst performing circuits because of the lack of monitoring equipment for such events.

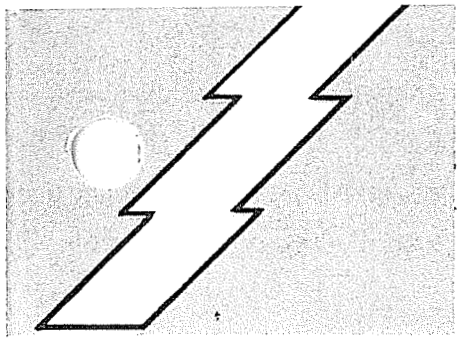
5. Why are major event days or major storms excluded?

Grayson RECC does not include the major event days or major storm in its analysis of worst performing circuits because these events are not regular occurrences and don't contribute to the determination of a worst performing circuit. Grayson Rural Electric focuses on areas that have chronic problems rather than events that only occur on occasion.

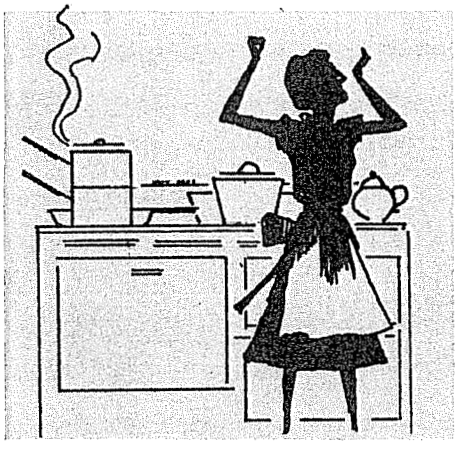
6. Provide a hard copy citing the Rural Utility Service ("RUS") reliability monitoring or reporting requirements or, in the alternative, provide an accessible internet site.

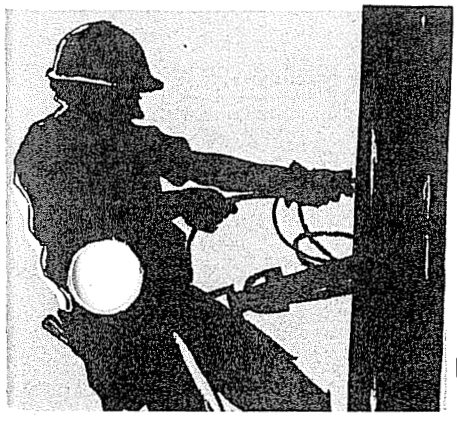
RUS Bulletin 161-1 "Interruption Reporting and Service Continuity Standards for Electric Distribution Systems" is attached.

REA BULLETIN 161-1
MARCH 1972



INTERRUPTION REPORTING and SERVICE CONTINUITY STANDARDS for ELECTRIC DISTRIBUTION SYSTEMS





U.S. DEPARTMENT OF AGRICULTURE • RURAL ELECTRIFICATION ADMINISTRATION

FOREWORD

This revised bulletin contains a suggested form for reporting service interruptions, standard names and codes for the causes of interruptions, and standard formats for summarizing experience. These standards were developed from the experience of managers, engineers and operating people on rural electric systems. We urge you to take full advantage of this experience of others in the electric utility industry. Wherever data are collected, results are better and costs are less if people are willing to plan carefully and agree on the kind of information needed and the ways it will be used.

Your attention is invited particularly to the ways of using summaries and reports discussed in this bulletin, including monthly reports to your power supplier about supplier-caused interruptions to service.

We thank those who provided the ideas and comments that are included and hope this information will be helpful to others.

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UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Electrification Administration

March 31, 1972
Supersedes 2/1/56

REA BULLETIN 161-1

SUBJECT: Interruption Reporting and Service Continuity Standards for Electric Distribution Systems

I. Purpose and Scope:

This bulletin provides suggestions on recording and reporting service interruptions (outages) and on the use of interruption records in the operation and maintenance of electric distribution systems. The bulletin does not include discussion of system engineering and design as related to service reliability. The influences of electric system planning, design and sectionalizing are discussed in REA Bulletin 60-7, Service Reliability.

II. General:

A. Purposes of Interruption (Outage) Records. The quality of electric service depends greatly on freedom from significant service interruptions; therefore, knowledge is required about the number and extent of interruptions, their causes, and the steps being taken to improve the continuity of service.

Well-planned procedures for interruption reporting and analysis will improve efficiency in handling trouble calls and responding to them so that the work can be done promptly and with a minimum of wasted motion.

The main purposes of interruption reporting and followup are:

1. To help make certain when a trouble call is received, that all of the information needed for responding to the trouble call will be available.

2. To identify multiple reports from the same line outage in order to expedite work and minimize confusion in storm and disaster situations.

3. To provide a record of causes and extent of interruptions, for determining adequacy of maintenance and for planning system improvements to increase service reliability.

4. To aid in informing consumers and in responding to consumer complaints.

5. To provide information required by power suppliers, public service commissions and REA.

B. Descriptions of Units and Terms:

1. The terms interruption and outage are interchangeable for much of this discussion. Present usage favors interruption when referring to loss of service to consumers, and outage when referring to components of a system. The following definitions are proposed by the IEEE Power System Engineering Committee:

> "Interruption. An interruption is a loss of service to one or more consumers or other facilities and is the result of one or more component outages."
>
> "Outage. An outage describes the state of a component when it is not available to perform its intended function due to some event directly associated with that component. An outage may or may not cause an interruption of service to consumers depending on system configuration."[1]

2. For discussing the quality of service, or service reliability, other terms are needed to define the extent of interruptions:

   a. Annual service interruption hours per consumer is the interruption index specified by REA to indicate the average length of time each year that a consumer on the system is without service. The unit for measuring this interruption is the consumer-hour, i.e., the product of the number of affected consumers multiplied by duration of the interruption in hours. The annual service interruption hours per consumer is calculated by adding consumer-hours for all interruptions during the year and dividing the sum by the average number of consumers receiving service during that period. The index may be maintained separately for parts of the system such as substations or service districts, or by causes, but the index for the entire system should always be calculated.

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1. References are listed at the end of the bulletin.

b. Service interruption hours per consumer, "year-to-date" has been found to be helpful in compiling a monthly or quarterly report for comparing with like months of previous years.

c. The number of interruptions experienced during a month, quarter, or year helps to indicate the amount of crew time required for service or maintenance because of outages from particular causes. Some systems maintain records for the cost of restoring service.

III. Interruption Reporting:

A. Reporting Forms. A suggested interruption reporting form is provided in Figure 1. This form may be used as shown, printed on both sides of a card if desired, or adapted as necessary to fit local conditions or individual reporting procedures. The front side of the form may be printed on both sides of a narrow card rather than on the 5-inch by 8-inch card, if desired. The form is designed for entering information in a logical sequence as follows:

1. For the person receiving the call.

2. For the dispatcher or superintendent.

3. For completion, followup, evaluation and review.

Looking at the front of the suggested form, the person receiving the trouble call fills in the top portion but omits the report number. The information in and to the right of the box, through "Location of Cause, if Known," helps in making certain that all of the needed information is obtained at the time of the call. The time of the call is entered following the date, and the "Time Power Went Off," is also taken for use later in calculating duration of the interruption.

The superintendent, operations manager, or dispatcher may enter "Recloser or Tap Location" in the event of a feeder outage. This information will assist in determining number of consumers out of service. At the same time, if more reports are coming in, he can decide which of them are due to the same line outage. This is particularly important during storms when many reports are being received.

The action taken, the time (or times) of restoring service and the material or equipment responsible for the interruption are usually taken from work reports and/or voice reports to the dispatcher.

Figure 1. Interruption Report. This design is for a 5-inch by 8-inch card. It may be divided horizontally for printing on both sides of a narrower card if desired.

INTERRUPTION REPORT

DATE | TIME | RECEIVED BY | REPORT NO.

ACCOUNT NO. | REPORTED BY | PHONE NO. | TIME POWER WENT OFF

☐ SERVICE OFF ENTIRELY
☐ NEIGHBORS ALSO OFF
☐ SERVICE DROP DOWN
☐ LIGHTS DIM
☐ CHECKED FUSES

ADDRESS

CAUSE, IF KNOWN

LOCATION OF CAUSE, IF KNOWN

RECLOSER OR TAP LOCATION | ASSIGNED TO | TIME | TRUCK NO.

ACTION TAKEN

RESTORED SERVICE TO | TIME | REMARKS

RESTORED SERVICE TO | TIME

RESTORED SERVICE TO | TIME

MATERIAL OR EQUIPMENT; CAUSE OF INTERRUPTION | CODES

REVIEWED BY

Dispatcher | Superintendent | Engineer

Figure 1. (Continued) These checklists are for printing on back of 5-inch by 8-inch card if desired.

Plant Codes *(Material or Equipment) (Check One)*

☐ 00 Power Supplier

Substation *(owned)*

- ☐ 10 Transformer
- ☐ 11 Regulatr. or brkr.
- ☐ 12 Sw. or lgtn. arr.
- ☐ 13 Source fuse
- ☐ 19 Other

Distribution

- ☐ 20 Pole
- ☐ 21 Crossarm or brace
- ☐ 22 Anchor or guy
- ☐ 29 Other fixture

Overhead Line *(Distn.)*

- ☐ 30 Conductor
- ☐ 31 Connector, clamp
- ☐ 32 Splice, deadend
- ☐ 33 Jumper
- ☐ 34 Insulator
- ☐ 35 Ligtng. arrestr.
- ☐ 36 Fuse or cutout
- ☐ 37 OCR or sectzr.
- ☐ 39 Other device

Underground

- ☐ 40 Primary cable
- ☐ 41 Splice, fitting
- ☐ 42 Switch
- ☐ 43 Lgt. arr. for URD
- ☐ 44 Sec. cable or fittings
- ☐ 49 Other

Line Transformer

- ☐ 50 Bad, replaced
- ☐ 51 Fuse or breaker
- ☐ 52 Lightng. arrester

Secondary, Service

- ☐ 60 Wire
- ☐ 61 Meter or loop
- ☐ 62 Security or street light
- ☐ 69 Other

☐ 99 Unknown

Generation or Transmission, if owned:

- ☐ 01 Generation
- ☐ 02 Towers, poles, fixtures
- ☐ 03 Conductors and devices
- ☐ 04 Transmission substation
- ☐ 09 Other

Cause *(Check One)*

☐ 00 Power Supplier

Scheduled

- ☐ 10 Construction
- ☐ 11 Maintenance
- ☐ 19 Other

☐ 20 Major Storm

Equipmt. or Inst.

- ☐ 30 Matl. or equip. fault
- ☐ 31 Install. fault
- ☐ 32 Sag, clearance
- ☐ 39 Other

Age or deterioration

- ☐ 40 Decay
- ☐ 41 Woodpeckers
- ☐ 42 Corrosion
- ☐ 43 Contamination *(leakage)*
- ☐ 44 Moisture
- ☐ 45 Elec. overload
- ☐ 49 Other

Weather

- ☐ 50 Lightning
- ☐ 51 Wind, not trees
- ☐ 52 Ice, not trees
- ☐ 53 Trees and ice
- ☐ 54 Trees, other
- ☐ 59 Other

Birds, Animals

- ☐ 60 Small, cause short circuit
- ☐ 61 Large, forced pole or anchor
- ☐ 69 Other, not woodpeckers

Public

- ☐ 70 Vehicles
- ☐ 71 Aircraft
- ☐ 72 Accidents, other
- ☐ 73 Vandalism
- ☐ 74 Fire
- ☐ 79 Other

☐ 99 Unknown

To calculate the interruption time in consumer-hours, the elapsed time in hours between "Time Power Went Off" and "Service Restored" is multiplied by the number of consumers affected. If service was restored in several steps, the calculations should be made separately and then added together. For example, if a recloser is tripped due to a broken (by gunfire) bushing on a distribution transformer (internally fused), we might have:

Restored service to main line at 3:42 P.M.

Restored service to Joe Black at 6:20 P.M.

If the "Time Power Went Off" was 3:00 P.M., and the line serves 31 consumers including Joe Black, the consumer-hour calculation is:

$$30 \text{ consumers} \times \frac{42}{60} \text{ hour} = 21.00 \text{ consumer-hours}$$

1 consumer x 3 hrs. 20 min. = 3.33 consumer-hours

Total for interruption = 24.33 consumer-hours

Codes shown may be printed on the reverse side of the form if desired. The report number is usually assigned after duplicate reports have been eliminated; it is used for locating, where the reports are filed chronologically, and for chronological listings of interruptions if desired.

Whenever an outage occurs on a feeder, it will be necessary to enter the number of affected consumers on the report form. This will require a record of the number of consumers beyond each sectionalizing point. Provision must be made to keep this information up to date.

B. Filing for Future Reference. The completed reports may be filed in simple chronological order, if the number is small. However, a file according to substation, feeder and sectionalizing point should be considered for systems of average or larger size. It may also be desirable to file individual consumer interruptions by account number, separately from line outages.

The filing arrangement should be carefully selected in light of detailed uses that may be made of the interruption information. Even though the number of reports per year or quarter may be large, many kinds of special evaluations can be made very effectively from the original reports. The burden of detail in summaries and in the data routinely processed may thus be reduced.

C. Interruption Log. A log such as shown in Figure 2 provides an orderly method of entering interruption information as calls are received, if a log is desired. However, some electric superintendents and managers have said they do not use an interruption (or outage) log because the reporting form is all that is needed. Others have radio logs which are adequate for this purpose.

Two cautions against use of the interruption log are:

1. It may represent unnecessary duplication of details that should be on the interruption report instead.

2. It may be taking the place of an interruption or outage summary, yet be poorly designed for that purpose, so that the interruption information is not being used to best advantage.

IV. Causes of the Interruptions: Categories and Codes -

A. Reports to REA. Borrowers are asked to report on REA Forms 7a[2] and 300[3] the average annual interruption hours per consumer due to causes in each of four major categories:

Power supplier

Major storm

Scheduled

All other

"Scheduled," for this purpose, refers to interruptions resulting when a distribution transformer, line or owned substation is deliberately taken out of service at a selected time for maintenance or other reasons. The interruptions resulting from either scheduled or unscheduled outages on lines or substations owned by the power supplier are charged to "power supplier."

"Major storm" represents service interruptions from conditions which cause many concurrent outages because of snow, ice or wind loads that exceed design assumptions for the lines.

Most service interruptions are for reasons in the category, "All other." These are the ones resulting from emergency conditions due to equipment breakdown, malfunction, or human error.

Figure 2. Interruption Log

_____ Month _____ Year

Report No.	Date	Time	Received By	Reported		Truck No.	Cause	Location Of Cause
				By	Phone No.			

B. Standard Codes for Interruption Analysis. The detailed categories for service interruptions, Tables 1 and 2 of this bulletin, have been carefully selected so that the important ones may be clearly seen when the interruption data are summarized. Numerical codes are assigned. These are recommended for use as standard codes for data processing.

To avoid excessive detail, the number of individual reasons (codes) has been kept to a minimum. In addition, they are arranged in groups -- nine for "Equipment or Material Responsible for Interruption" and nine for "Cause of Interruption." The two codes for equipment or material and cause are designed so that together they will provide the needed information about reasons for the interruption.

The importance of keeping detail to a minimum can hardly be overemphasized. When comparisons are to be made, such as between substation areas or feeders, sometimes on a quarterly or month-by-month basis, how much detail do you really want? When additional detail is needed for a special study, it is generally best to go back to the original reports for more information.

Additional detail codes or even group codes may be assigned to allow for circumstances that are particularly important in a geographic area or in a particular electric system. Users are urged to keep such codes to the absolute minimum.

C. Special Studies. Interruption reports may be a valuable source of information about performance of transformers or other equipment, or about soil or terrain conditions that have important effects on maintenance costs or quality of service. Such details may be summarized from the original reports as needed. However, it is generally a mistake to design any general plan of interruption analysis to encompass such detail. The resulting procedures and reports become cumbersome and costly and too often fail to accomplish the primary purposes of interruption analysis.

V. Interruption Experience: Summaries and Reports

A. For Operation and Maintenance. Tables 3, 4 and 5 show suggested ways to summarize interruption experience for purposes of electric system operation and maintenance.

1. Table 3 shows comparisons of experience in individual substation areas, in terms of the number of interruptions (service calls) and summations of consumer-hours (the number of consumers multiplied by hours) representing the time that consumers were without electric

Table 1. Equipment or Material Responsible for Interruption

Code	Description	Items in Acct. No.
00	Power Supplier	
	Generation or Transmission (If Owned)	
01	Generation	
02	Towers, poles and fixtures	354, 355
03	Conductors and devices	356-358
04	Transmission substations	353
09	Generation or transmission, other	
	Distribution Substation (Owned)	362
10	Transformer	
11	Voltage regulator or breaker	
12	Lightning arrester or switch	
13	Source side fuse	
19	Other	
	Poles and Fixtures, Distribution	364
20	Pole	
21	Crossarm or crossarm brace	
22	Anchor or guy	
29	Other	
	Overhead Line Conductors and Devices, Distribution	365
30	Line conductor	
31	Connector or clamp	
32	Splice or deadend	
33	Jumper	
34	Insulator	
35	Lightning arrester, line	
36	Fuse cutout (damaged, malfunction or maintenance)	
37	OCR or sectionalizer (damage malfunction or maintenance)	
39	Overhead distribution line, other	
	Underground Conductor or Devices, Distribution	366, 367
40	Primary cable	
41	Splice or fitting	
42	Switch	
43	Lightning arrester for URD	
44	Secondary cable or fittings	
49	Underground, other	
	Line Transformer	368
50	Transformer bad, replaced	
51	Transformer fuse or breaker, refused or reset	
52	Transformer lightning arrester	
	Secondaries and Services	369, 370
60	Secondary or service conductor	
61	Meter or meter loop	
62	Security light or street light	
69	Other	
	Unknown	
99	Open OCR, sectionalizer or fuse, source of difficulty not known	

Table 2. Cause of Interruption

Code	Description
00	Power Supplier
	Scheduled
10	Construction
11	Maintenance
19	Other
20	Major Storm Disaster
	Equipment or Installation
30	Material or equipment fault
31	Installation fault
32	Conductor sag or clearance not adequate
39	Faulty material or installation, other
	Age or Deterioration
40	Decay
41	Woodpeckers
42	Corrosion or abrasion
43	Contamination (leakage)
44	Moisture
45	Electrical overload
49	Age or deterioration, other
	Weather
50	Lightning
51	Wind, not trees
52	Ice, sleet, frost, not trees
53	Trees and ice
54	Trees, other
59	Weather, other
	Birds or Animals
60	Small animal or birds (short circuit)
61	Large animals (affecting pole or guy)
69	Birds or animals, other (not woodpeckers)
	Member (or Public)
70	Vehicles or machinery
71	Aircraft
72	Public accidents, other
73	Vandalism
74	Fire
79	Activities of the public, other
	Unknown
99	Cause of interruption not known

Table 3. Interruptions Due to Each Cause -- November 1971

Substation and Cause	This Month Number	This Month Consumer-Hours	Year-to-Date Number	Year-to-Date Consumer-Hours
North Fork				
Power supplier	0	0	6	670.5
Scheduled	3	1.8	6	6.9
Major storm	0	0	35	1803.6
Unscheduled, other:				
Equipment or installation	0	0	15	63.1
Age	3	15.2	18	71.4
Weather	2	10.8	9	34.7
Birds or animals	1	6.2	6	62.1
Public	3	4.8	3	6.9
Unknown	3	3.5	33	22.8
Subtotal (Unscheduled)	12	40.5	84	261.0
Substation Total	15	42.3	131	2742.0
Wideawake				
Power supplier	1	556.2	4	1710.7
Scheduled	3	7.5	8	27.6
Major storm	1	401.8	2	842.3
Unscheduled, other:				
Equipment or installation	3	29.2	4	11.5
Age	0	0	12	142.6
Weather	0	0	15	73.2
Birds or animals	1	5.2	4	21.6
Public	2	20.4	2	8.1
Unknown	3	3.6	32	43.6
Subtotal (Unscheduled)	9	58.4	69	300.6
Substation Total	14	1023.9	83	2881.2
(Other substations follow)				
Total, entire system	104	1342.6	749	19681.2

Consumers served: 5,256 (average, 11 mo.)

Average hours interrupted: 3.74 (year-to-date)

service. This information is given separately for each major cause as shown in Table 2, for each substation service area. The example shows a monthly summary form. For small electric systems with relatively few interruptions, a quarterly summary may be preferable.

2. Table 4 gives details about the material or equipment items that were responsible for interruptions, using the same items that are shown on the code list, Table 1. For each item, the consumer-hour figures may be shown separately for each major cause of interruption as shown in columns across the page. For small systems, a quarterly summary may be preferable to the monthly one shown. Other variations of this summary may be desirable, depending on circumstances:

   a. A separate summary for a month or quarter, excluding previous experience in the same year, may be preferred.

   b. The number of interruptions (as well as consumer-hours) as shown in Table 3 may be desirable, in the first column (All Causes) or in all columns.

3. Table 5 gives additional details about causes of interruptions, using the same causes as are listed in the code list of Table 2. The information is further broken down according to major equipment or material items responsible, in a format like that of Table 4.

4. While not recommended for general use, other types of reports have been used to advantage and may be desirable in some situations:

   a. A report of the largest total hours on interruption for an individual consumer or line section. This might be a tabulation with one line per line section, distributed according to cause (group codes, only), including line sections with more than 10 hours (or some other specified number) of total interruption time during the year.

   b. A report of the elapsed time between the time of interruption and the time of the trouble report. This might be tabulated, one line per "Cause" category on nine lines distributed according to equipment or material category (nine columns).

Table 4. Interruptions Due to Material Items -- Year through December 1971

	Equipment or Material	All	Cause of Interruption: Power Supplier 00	Scheduled 10-19	Major Storm 20	Equi. or Installation 30-39	Age 40-49	Weather 50-59	Birds & Animals 60-69	Member or Public 70-79	Unknown 99
						(Consumer Hours)					
00	Power Supplier	1580.0	1580.0								
	Generation & Transmission (Owned)										
01	Generation										
02	Tower or pole	780.9		66.1	294.3	92.4	58.0	108.6		133.7	27.8
03	Conductor	797.3		93.6	262.6	68.2	8.5	163.7	56.8	115.4	28.5
04	Substation	744.4		28.2	257.0	69.0	76.5	194.2	38.4	56.1	25.0
09	Other	479.0		8.4	280.1	51.5	16.3	78.3	3.4	23.9	17.1
	Subtotal	2801.6		196.3	1094.0	281.1	159.3	544.8	98.6	329.1	98.4
	Distribution Substation (Owned)										
10	Transformer	1147.1		328.0	184.2	181.6		163.5		171.3	118.5
11	Regulator or Breaker	503.9		211.8		58.4	18.9	91.1	48.9	22.6	52.2
12	Switch or Arrester	82.9		19.2	9.4	8.0	21.4	7.2		9.1	8.6
13	Source Fuse	132.7		67.6		37.1				14.2	13.8
19	Other	275.9		147.9		27.2	28.1			44.2	28.5
	Subtotal	2142.5		774.5	193.6	312.3	68.4	261.8	48.9	261.4	221.6
	Poles & Fixtures (Distribution)										
20	Pole	2969.8		374.2	1232.6	309.4	191.0	518.7	77.9	93.0	173.0
21	Crossarm or Brace	1086.7		196.8	513.3	77.9	63.3	172.1			63.3
22	Anchor or Guy	1016.9		109.4	222.5	189.0	56.1	228.2	77.5	75.0	59.2
29	Other	344.4		67.9	94.5	42.1	13.3	29.6	26.7	50.5	19.8
	Subtotal	5417.8		748.3	2062.9	618.4	323.7	948.6	182.1	218.5	315.3
	Overhead Conductor & Devices (Distribution)										
30	Line Conductor	2459.4		305.1	1048.7	122.2	13.8	421.3		437.6	110.7
31	Clamp, Conductor	455.4		124.0	173.6	28.7		97.5	11.0		20.6
32	Splice, Deadend	469.1		62.8	217.8	47.8	7.2	88.6		23.8	21.1
33	Jumper	290.7		54.7	83.5	22.5		63.3	16.2	37.4	13.1
34	Insulator	981.9		216.5	236.7	83.7	13.6	85.4	23.7	278.0	44.3
35	Lightning Arrester	633.8		68.9	257.1	42.1		102.6	27.2	107.4	28.5
36	Fuse Cutout	943.1		127.7	415.9	126.8		157.8	33.5	38.9	42.5
37	OCR, Sectionalizer	481.0		68.3				113.7	74.6	202.8	21.6
39	Other	726.9		67.6	229.1	10.0	16.9	59.8	3.5	307.7	32.3
	Subtotal	7441.3		1095.6	2662.4	483.8	51.5	1190.0	189.7	1433.6	334.7
	Underground, Conductor or Devices										
40	Primary Cable	402.8		39.7		72.8		38.1	26.6	116.8	108.8
41	Splice or Fitting	99.8		7.1		13.4		23.3			56.0
42	Switch	53.1		11.4		9.6					32.1
43	Lightning Arrester	175.9		13.2		20.8		80.5	9.3	32.3	19.8
44	Secondary Cable or Fittings	188.5		9.7		53.6		55.0	13.3	30.6	26.3
49	Other	129.7		7.1		21.4		14.4			86.8
	Subtotal	1049.8		88.2		191.6		211.3	49.2	179.7	329.8
	Line Transformer										
50	Transformer Bad	1169.4		73.8	15.9	136.2	210.6	139.8	133.3	84.5	375.3
51	Transformer Fuse or Breaker	251.6		12.9	23.8			116.5	28.2	9.3	60.9
52	Transformer Lightning Arrester	552.3		5.6	119.0	27.2	25.9	208.9	26.6	21.9	117.2
	Subtotal	1973.3		92.3	158.7	163.4	236.5	465.2	188.1	115.7	553.4
	Secondaries and Services										
60	Secondary or Service Conductor	806.9		41.9	109.8	53.2	34.4	206.1	19.8	77.2	264.5
61	Meter or Meter Loop	403.5		37.8	14.5	26.4	23.5	79.7	37.6	37.8	146.2
62	Security or Street Light	338.9		19.9	17.7	45.7	42.6	72.9	41.5	58.3	40.3
69	Other	154.3			19.2	13.4	11.8	41.7		15.6	52.6
	Subtotal	1703.6		99.6	161.2	138.7	112.3	400.4	98.9	188.9	503.6
	Total	24109.9	1580.0	3094.8	6332.8	2189.3	951.7	4022.1	855.5	2726.9	2356.8

Table 5. Interruptions Due to Each Detailed Cause -- Year through December 1971

	Cause	All	Equipment or Material Responsible: Power Supplier 00	Gen. and Transm. 01-09	Substation 10-19	Pole, Fixture 20-29	Overhead Line 30-39	Underground 40-49	Line Transformer 50-52	Secondary, Service 60-69
		(Consumer Hours)								
00	Power Supplier	1580.0	1580.0							
	Scheduled									
10	Construction	1455.7		37.2	324.1	326.7	643.8	49.2	41.6	33.1
11	Maintenance	1258.6		98.4	394.0	298.4	341.5	32.3	35.6	58.4
19	Other	380.5		60.7	56.4	123.2	110.3	6.7	15.1	8.1
	Subtotal	3094.8		196.3	774.5	748.3	1095.6	88.2	92.3	99.6
20	Major Storm	6332.8		1094.0	193.6	2062.9	2662.4		158.7	161.2
	Equipment or Installation									
30	Material or Equipment Fault	956.9		86.7	165.7	328.0	166.1	96.4	57.2	56.8
31	Installation Fault	769.1		72.8	96.6	235.3	142.2	83.3	86.2	52.7
32	Conductor Sag or Clearance	214.2		42.1	21.9		113.9		11.4	24.9
39	Other	238.0		78.4	28.1	55.1	51.6	11.9	8.6	4.3
	Subtotal	2189.3		281.1	312.3	618.4	483.8	191.6	163.4	138.7
	Age or Deterioration									
40	Decay	138.9		40.4		98.5				
41	Woodpeckers	156.5		30.3		90.6			35.6	
42	Corrosion or Abrasion	167.0		20.7	12.3	35.6	20.1		41.6	36.7
43	Contamination	75.3		11.5	11.6		14.4		37.8	
44	Moisture	211.0		31.9	15.7	76.4	7.2		47.3	32.5
45	Electrical Overload	126.3		19.1	22.6		4.1		56.7	23.8
49	Other	76.7		5.4	6.2	22.6	5.7		17.5	19.3
	Subtotal	951.7		159.3	68.4	323.7	51.5		236.5	112.3
	Weather									
50	Lightning	1213.8		59.8	188.0	170.6	369.1	188.4	153.8	84.1
51	Wind, Not Trees	479.9		54.5	39.2	151.6	130.0		60.6	44.0
52	Ice, Sleet, Frost	1117.0		316.2	34.6	303.7	286.1		65.2	111.2
53	Trees and Ice	534.7		38.4		113.8	202.2		88.5	91.8
54	Trees, Other	424.2		43.5		116.7	129.7		74.4	59.9
59	Other	252.5		32.4		92.2	72.9	22.9	22.7	9.4
	Subtotal	4022.1		544.8	261.8	948.6	1190.0	211.3	465.2	400.4
	Birds or Animals									
60	Small Animals or Birds	497.0		46.5	43.3	52.7	96.8	38.6	143.7	75.4
61	Large Animals	173.9		20.6		90.8	62.5			
69	Other	184.6		31.5	5.6	38.6	30.4	10.6	44.4	23.5
	Subtotal	855.5		98.6	48.9	182.1	189.7	49.2	188.1	98.9
	Member (or Public)									
70	Vehicles or Machinery	612.9		82.1	86.3	61.3	272.6	81.7	17.4	11.5
71	Aircraft	237.4		59.2			178.2			
72	Public Accidents, Other	540.3		76.4	20.9	116.0	284.2		22.0	20.8
73	Vandalism	690.7		46.0	125.4	24.1	331.4	98.0	3.5	62.3
74	Fire	449.1		29.2	28.8	10.9	215.3		70.6	94.3
79	Other	196.5		36.2		6.2	151.9		2.2	
	Subtotal	2726.9		329.1	261.4	218.5	1433.6	179.7	115.7	188.9
99	Unknown	2356.8		98.4	221.6	315.3	334.7	329.8	553.4	503.6
	Total	24109.9	1580.0	2801.6	2142.5	5417.8	7441.3	1049.8	1973.3	1703.6

Table 6. Interruption Summary

For Month of _____
Year _____

	Power Supplier	Major Storm	Sched-uled	All Other	Total
Number of Interruptions:					
This month					
This month last year					
This year to date					
Last year to this date					
Consumer-hours Interruption:					
This month					
This month last year					
This year to date					
Last year to this date					
Average Hours per Consumer:					
This month					
This month last year					
This year to date					
Last year to this date					

Data for Computing Average Hours per Consumer:

Number of Consumers Served this Month: _____

Average Number of Consumers This Year to Date: _____

c. A report of the longest individual interruptions during the year. This could be a listing, one line per interruption distributed according to "Cause" category (nine columns), for interruptions of more than five hours or some other specified length of time.

B. For Directors and Members. Table 6, Interruption Summary, brings together the information most needed by the manager, the board of directors, and REA. This information can and should be prepared by hand from the other reports. This is easily done, and the use of data processing equipment for the report shown on Table 6 would be uneconomical. Newsletter reports to members also should not be forgotten. Emphasis might be upon interruptions influenced by activities of the public (see Table 2), on the results of delay in reporting that service is off, or on the progress being made in improving the quality of service. Newsletters or postcards may be used to notify consumers about scheduled interruptions.

C. For Power Suppliers and Regulatory Bodies. A report giving the data specified in Table 7 should be sent each month to each power supplier (and regulatory bodies as required), including all delivery points, along with indications of no interruption when applicable. If the power is delivered through the facilities of a party other than the power supplier, reports to both may be desirable. The information in Table 7 is required by REA power-type borrowers for a monthly report (Form 12g4) to REA. For other power suppliers, the information outlined in Table 7 will serve as a regular reminder of the reliability of service being provided and the need for improvement when experience so indicates.

Table 7. Interruption Report to Power Supplier

For Month of _____
Year _____

Delivery Point	Interruption Time		Date	Time	
	Hours	No. of Consumers Affected		Off	Restored

VI. Service Continuity Objectives:

Every electric system should be providing the best service available. To do this, standards or goals are needed to establish the level of service reliability considered necessary to meet consumers' needs. This is true even though there may be wide variations in the levels that are feasible for particular systems.

Electric utilities in largely urban areas tend to aim at one hour or less service interruption per year for the average urban consumer and two hours or less for the average rural consumer. However, many rural electric systems would have difficulty meeting such goals because of longer lines, severe environmental conditions, and more frequent interruptions of power supply.

The present REA criteria for rural distribution systems are shown in Table 8.[3]

Systems that are well engineered and have experienced favorable weather during the year should expect considerably less than five consumer hours per consumer during the year. Conversely, in some situations it may not be possible to achieve the figure of five consumer hours per consumer per year.

Table 8. REA Service Reliability Criteria for Rural Electric Distribution Systems

Description	Average Service Interruption Consumer-Hours per Consumer per Year
Satisfactory	5 or less
Should be explained	More than 5

The significance of a high interruption hour figure will depend on circumstances. For example, long interruptions may result from severe ice or wind loads, or excessive interruptions may be due to trees, lightning or scheduled outages showing the need for corrective measures or different work procedures. When the satisfactory level is exceeded, management should examine the causes, consider the ways available to prevent the excessive interruptions and develop time, work, and cost schedules for future corrective action.

James D. Thyen
Assistant Administrator - Electric

REFERENCES

1. IEEE Power System Engineering Committee Report, "Definitions of Terms for Reporting and Analyzing Outages of Electrical Transmission and Distribution Facilities and Interruptions to Customer Service" May 1971

2. REA Bulletin 108-1, Electric Distribution Borrowers' Financial and Statistical Reports

3. REA Bulletin 161-5, System Operation and Maintenance Review and Evaluation

4. REA Bulletin 108-2, Operating Report -- Power Supply Borrowers and Distribution Borrowers with Generating Facilities

Index:
RECORDS:
Interruption Reporting
REPORTS:
Interruption
SYSTEM OPERATIONS AND MAINTENANCE:
Interruption Reporting and Service Continuity

7. Provide and describe in detail any service restoration or outage response procedure utilized.

When a Grayson Rural Electric customer reports an outage, the dispatcher will record the consumers name, location, phone number and time of the outage. The dispatcher will then contact the maintenance personnel responsible for restoration in that affected area and dispatch them to the location. Once the maintenance personnel reach the site, they will report back to the dispatcher. Once the trouble is located, the maintenance personnel will once again contact the dispatcher as to the problem they will be repairing and if any assistance is needed to make the restoration. After the repair is made, the maintenance personnel will call the restoration back to the dispatcher so that the time restored, cause of the outage and the number of customer affected can be recorded.
The outage report is then forwarded to the maintenance superintendent for review. The document is then entered into a database and filed.
If the outage was after hours, the maintenance personnel will report in once again to the dispatcher when they have returned to their home or office.

8. Refer to the RUS drawing M1.30G "RIGHT-OF-WAY CLEARING GUIDE" ("ROW Guide"), a copy has been provided in Appendix A.

a. Is this type of clearance requirement appropriate for all areas of a distribution system? If not, what types of exclusions or exceptions should be made?

Grayson RECC seeks to clear a 40 foot right of way for all single and 3 phase distribution. However, there are times when the Cooperative must acquiesce to the member/owner or occasionally to non-members.

b. If the distribution utility is not already following this guide, provide an estimate of the cost and time-line to implement.

We follow RUS guidelines.

9. Refer to North American Electric Reliability Corporation ("NERC") standard FAC-003-1 "Transmission Vegetation Management Program" ("NERC Standard", a copy is attached in Appendix B.

a. Does the company prefer the type of standard described in the NERC Standard over the type of standard described in the ROW Guide? Explain why you prefer one of the other.

We prefer to continue to follow RUS guidelines, as we do in all other phases of construction.

b. Refer to section R3 of the NERC Standard and substitute "distribution" for "transmission." Is the distribution utility capable of meeting the reporting requirements described in the section? If not, why not?

We feel that RUS guidelines are sufficient to meet the needs of our member/owners in an efficient and effective manner.

c. Again referring to Section R3 as applied to distribution, how many sustained outages would be reportable for the calendar year 2006?

See attachment: SAIDI Values for Grayson RECC in Hours per Customer

10. Provide and discuss any right-of-way maintenance standard which is preferable to those identified in questions 1 and 2 above.

None

21. Why doesn't Grayson monitor or track distribution reliability?

Grayson RECC doesn't have the necessary equipment to monitor momentary outages or fluctuation of voltage throughout system.

22. Does RUS require that Grayson report any distribution reliability measures or service interruptions?

Grayson is required to submit service interruptions to RUS on an annual basis. We are not required to provide distribution reliability measures except through system inspections, maintenance and outage data.

23. Does Grayson have the capability to monitor SAIDI, SAIFI and CAIDI?

We currently do not have the technology to monitor that data.

24. How does Grayson define a sustained outage?

Any outage long enough for the customer to report.

SAIDI values for Grayson RECC in Hours per Consumer

2006

Power Supply	Scheduled	Major Event Days	Other	Total
0.00	0.41	1.52	2.45	4.38

Five-year average

Power Supply	Scheduled	Major Event Days	Other	Total
0.01	0.11	0.83	2.35	3.29

Cause	Number of Events	SAIDI in Minutes
ARRESTOR	0	0.0
BREAKER	6	2.1
BROKEN JUMPER	1	0.1
CONNECTION	32	0.4
CUTOUT	2	0.0
FUSE	158	8.6
INSULATOR	5	6.0
JUMPER	6	0.5
LIGHTNING	82	11.4
LINE	1	0.0
LINE DOWN	40	20.0
MAINTENANCE	1	0.0
METERBASE	1	0.0
NEUTRAL DOWN	6	0.4
OCR	1	0.3
OTHER	163	95.2
POLE	23	4.7
POWER SUPPLIER	0	0.0
SCHEDULED	206	24.5
STORM	78	28.0
TRANSFORMER	56	1.5
TREES	183	52.6
UNDERGROUND	1	0.0
UNKNOWN	2	1.7
VOLTAGE	1	0.0
WILDLIFE	130	3.7
WIND	1	0.0
WIRE	4	0.2

For 2006 the threshold for a day to be a Major Event Day was 10.9 minutes per consumer for the single day.

The Major Event Days in 2006 were:
9/15/06
10/26/06
12/1/06