CUMBERLAND VALLEY ELECTRIC

A Touchstone Energy Cooperative

KENTUCKY 57 BELL
GRAY, KENTUCKY

CONSTRUCTION WORK PLAN
January 1, 2007 ~ December 31, 2010

KY PSC CASE 2006-00545

November 2006

by:

Phillip Bare, PE
Gary Grubbs, PE
Patterson & Dewar Engineers, Inc.
P.O. Box 2808, Norcross, Georgia 30091-2808
850 Center Way, Norcross, Georgia 30071-4844
Phone: 770-453-1410 FAX: 770-453-1411
www.pd-engineers.com

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC

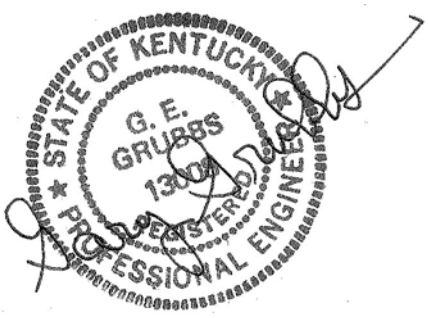
KENTUCKY 57
GRAY, KENTUCKY

CONSTRUCTION WORK PLAN (CWP)
January 1, 2007 – December 31, 2010

ENGINEERING CERTIFICATION

Upon completion of the construction proposed herein, the above indicated electric distribution system can provide adequate and dependable service to approximately 25,191 customers with residential using a monthly average of 1,234 kilowatt-hours per consumer. The peak demand is estimated to be approximately 123,796 kW in the summer of 2010 and 160,896 kW in the winter of 2010-2011.

I certify that this 2007-2010 Construction Work Plan was prepared by me or under my direct supervision, and that I am a duly registered professional engineer under the laws of the State of Kentucky.



Patterson & Dewar Engineers, Inc.

Gary Grubbs
Kentucky P.E. No. 13008

Cumberland Valley Electric
A Touchstone Energy Cooperative

NOVEMBER 2006

ENVIRONMENTAL REPORT

KY 57

2007-2010 Construction Work Plan

The projects in this work plan consist of code 300 line conversions and conductor replacements only.

Ted Hampton
Manager

Ted Hampton • President & CEO

P.O. Box 440 • Gray, KY 40734
Phone: (606) 528-2677 • (606) 546-9295 • 1-800-513-2677 • FAX: (606) 528-8458

November 9, 2006

2007-2010 Construction Workplan (CWP)

Ted Hampton, Manager
Cumberland Valley Electric Cooperative

I have completed my review of the cooperative's 2007-2010 CWP, which was prepared by Phillip Bare, Patterson & Dewar, and find it to be generally satisfactory for loan contract purposes. Approval to proceed with the proposed distribution system construction is contingent upon RUS's review and approval of an Environmental Report (reference 7 CFR 1794).

Headquarters, SCADA, and load management projects will be reviewed/approved by the Northern Regional Division office, as necessary. This action will be taken after their receipt of the CWP and other supporting documents (i.e., appropriate feasibility and engineering studies).

You should make a special effort to inform all of the cooperative's employees and contractors, involved in the construction of utility plant of any commitments made in the Environmental Report covering the construction of the facilities recommended in the CWP.

Changes (line improvements, tie lines, extensions, substations, etc.) in the CWP will require RUS approval. The environmental acceptability of any such changes shall also be established in accordance with 7 CFR 1794. The procedure for satisfying these environmental requirements shall be the same as that used in connection with this CWP approval.

It is your responsibility to determine whether or not loan funds and/or general funds are available for the proposed construction. If general funds are used, the requirements as outlined in 7 CFR 1717 need to be followed.

The construction shall be accomplished in accordance with RUS requirements. Specific reference should be made to 7 CFR 1726, Electric System Construction Policies and Procedures.

Mike Norman
RUS Field Representative

CUMBERLAND VALLEY ELECTRIC

P.O. Box 440
Gray, Kentucky 40734

P.O. Box C
Cumberland, Kentucky, 40823

November 2, 2006

RESOLUTION – WORK PLAN

Whereas, a Construction Work Plan for 2007-1010 in the amount of $13,635,571 was prepared by Patterson & Dewar Engineers, Inc., and presented to the board of directors.

Now therefore be it resolved, that Cumberland Valley Electric's Board of Directors adopt the 2007-1010 Construction Work Plan as a course of action, to be followed, or until amended with the approval of the Rural Utilities Service.

I, Lansford Lay, Secretary-Treasurer of Cumberland Valley Electric, Inc., do hereby certify that the above is a true and correct excerpt from the minutes of the meeting of the Board of Directors of Cumberland Valley Electric, held on November 9, 2006, at which meeting a quorum was present.

LANSFORD LAY, SECRETARY-TREASURER

November 9, 2006

2007-2010 Construction Workplan (CWP)

Ted Hampton, Manager
Cumberland Valley Electric Cooperative

I have completed my review of the cooperative's 2007-2010 CWP, which was prepared by Phillip Bare, Patterson & Dewar, and find it to be generally satisfactory for loan contract purposes. Approval to proceed with the proposed distribution system construction is contingent upon RUS's review and approval of an Environmental Report (reference 7 CFR 1794).

Headquarters, SCADA, and load management projects will be reviewed/approved by the Northern Regional Division office, as necessary. This action will be taken after their receipt of the CWP and other supporting documents (i.e., appropriate feasibility and engineering studies).

You should make a special effort to inform all of the cooperative's employees and contractors, involved in the construction of utility plant of any commitments made in the Environmental Report covering the construction of the facilities recommended in the CWP.

Changes (line improvements, tie lines, extensions, substations, etc.) in the CWP will require RUS approval. The environmental acceptability of any such changes shall also be established in accordance with 7 CFR 1794. The procedure for satisfying these environmental requirements shall be the same as that used in connection with this CWP approval.

It is your responsibility to determine whether or not loan funds and/or general funds are available for the proposed construction. If general funds are used, the requirements as outlined in 7 CFR 1717 need to be followed.

The construction shall be accomplished in accordance with RUS requirements. Specific reference should be made to 7 CFR 1726, Electric System Construction Policies and Procedures.

Mike Norman
RUS Field Representative

Anticipated Annual Additional Cost of Operation After Completion of all CWP Projects:

Estimated Depreciation:

Account No.	*Balance 11/30/2006*	*Monthly Rate X 12*	*Depreciation*	*per cent of total*	*Estimated Capitalization*	*Estimated Depreciation*
36200	$681,902.55	3.10%	$21,111.70	0.97%	$131,651	$4,076
36400	$19,982,360.65	4.00%	$798,495.13	36.52%	$4,979,350	$198,975
36500	$18,138,387.62	2.80%	$507,149.32	23.19%	$3,162,541	$88,425
36700	$2,197,309.99	4.00%	$87,804.51	4.02%	$547,542	$21,880
36800	$9,579,037.45	3.10%	$296,567.00	13.56%	$1,849,367	$57,256
36900	$6,084,186.52	3.60%	$219,030.71	10.02%	$1,365,857	$49,171
37000	$3,868,654.77	3.40%	$131,379.52	6.01%	$819,272	$27,822
37100	$3,130,139.44	4.00%	$125,080.37	5.72%	$779,991	$31,168
37300	$0.00		$0.00	0.00%	$0	$0
39000	$0.00		$0.00	0.00%	$0	$0
	$63,661,978.99		$2,186,618.26	100.00%	$13,635,571	**$478,773**

Estimated Property Taxes:

2005 Taxes	*Property @ 12/31/05*	*Average Rate*	*Work Plan Amount*	*Estimated Taxes*
$430,923	$42,688,621	1.01%	$13,635,571	**$137,645**

Estimated Interest Expense:

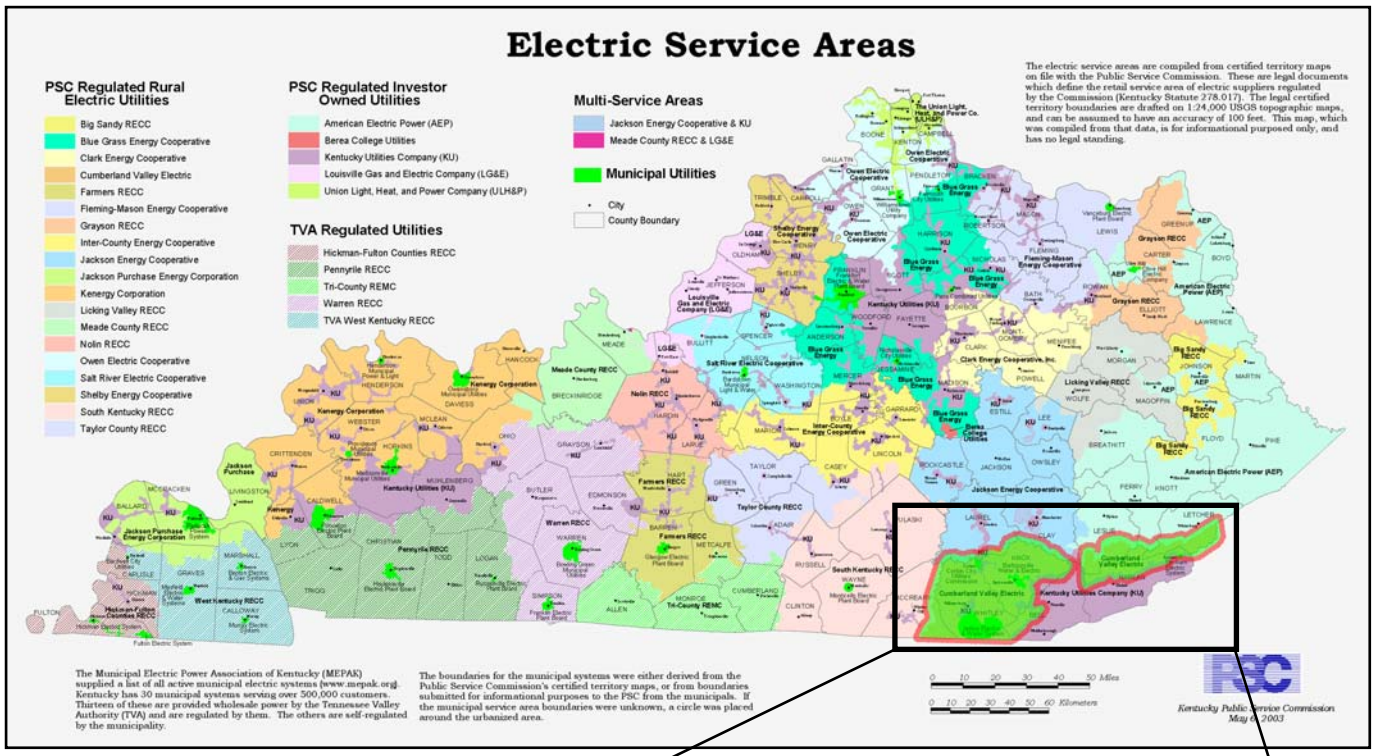
Plant	*Estimated Interest Rate*	*Estimated Interest Expense*
$13,635,571	5.00%	**$681,779**

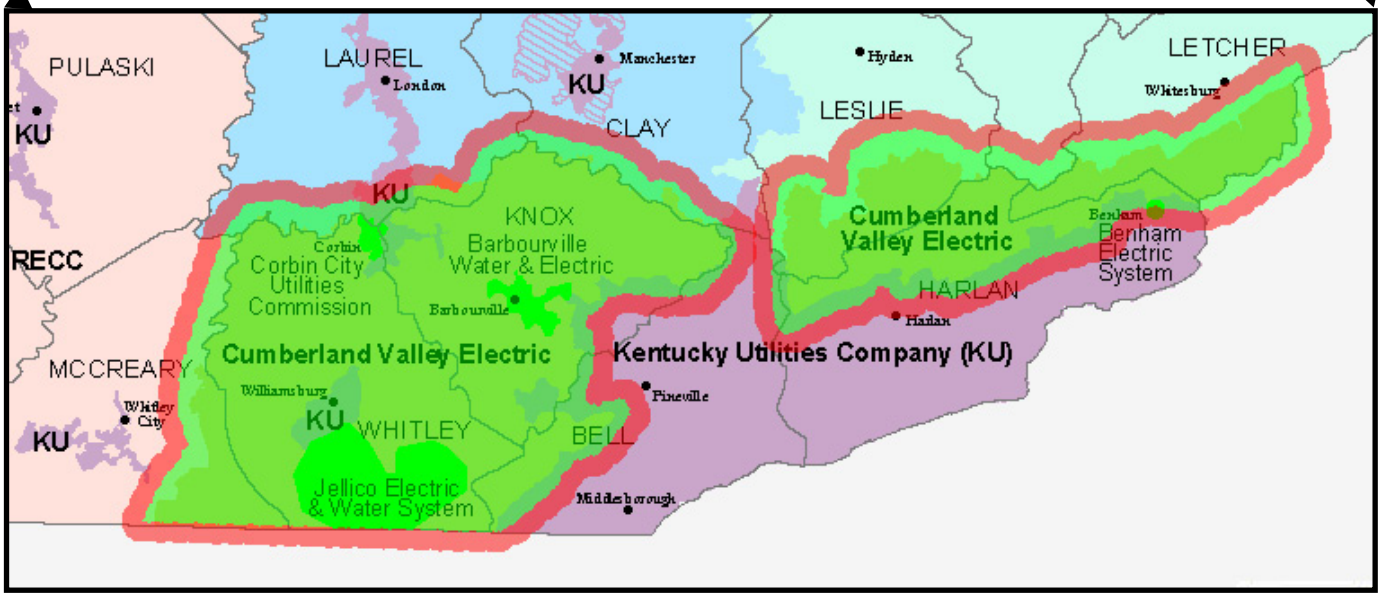
Estimated Operation and Maintenance Expense:

Plant	*Estimated O&M %*	*Estimated O&M Expense*
$13,635,571	4.72%	**$643,599**

Estimated cost of operation after the proposed facilities are completed: **$1,941,796**

Kentucky Map With Cumberland Valley Electric Service Area Noted





PAGE FORWARD PAGE BACK

TABLE OF CONTENTS

PAGE

TEXT

TABLE OF CONTENTS
(Continued)

EXHIBITS **TAB**

THE EXHIBITS MAY BE ACCESSED VIA THE "BOOKMARK" PANE ON THE LEFT

TABLE OF CONTENTS
(Continued)

APPENDICES

THE APPENDICIES MAY BE ACCESSED VIA THE "BOOKMARK" PANE ON THE LEFT

MAPS

ALL MAPS ARE CONTAINED IN THE ACCOMPANYING FILE NAMED: CVE_maps_mmddyy.pdf

CUMBERLAND VALLEY ELECTRIC
Kentucky 57 Bell
Gray, Kentucky
2007-2010 CONSTRUCTION WORK PLAN (CWP)
(January 1, 2007– December 31, 2010)

I. EXECUTIVE SUMMARY

A. Purpose, Results and General Basis of Study

This report documents the winter 2010 engineering analysis of, and summarizes the proposed capital requirements for, Cumberland Valley Electric (CVE's) electric distribution system for the four-year period of 2007 through 2010.

The proposed construction program included herein may be financed by the Rural Utilities Service (RUS) - formerly the Rural Electrification Administration, (REA). This report provides engineering support in the form of descriptions, costs and justification of required new facilities as required for a RUS loan application.

Upon completion of the construction proposed herein the CVE system can provide adequate and dependable service to approximately 23,664 residential consumers, using an average of 1,234 kWh per consumer per month, and approximately 1527 small commercial and industrial customers, averaging approximately 10,773 kWh per month each.

The 2010 projected number of consumers and total peak system load were taken directly from CVE's approved 2006 Load Forecast, (LF). The most probable peak kW demand, plus the addition of the new growth loads discussed later, was used for the loading conditions for the next four years.

A review of CVE's 2006 Long-Range Plan (LRP) finds the load projections and recommendations to be adequate for this four-year planning period. All construction proposed herein is consistent with the LREP.

An Operations and Maintenance Survey (Review Rating Summary - RUS Form 300, dated March 30, 2004, is used to determine other system improvement needs in the area of joint pole use.

Load projections indicate that additional substation capacity is required in the Emmanuel and Hinkle Substation’s service areas. A detailed discussion of capacity needs is addressed later in this report.

An analysis of the thermal loading, voltages, physical conditions and reliability has been performed on all the substations, distribution lines, and major equipment for the peak winter 2010 system. The analysis utilizes Milsoft Integrated Solution's (MIS's) "*WindMil*" software and is presented in Appendices 1-3. Appendices 2 and 3 include the analyses for the projected peak 2010 system before and after system improvements, respectively. The primary analyses are used as the basis for system capital needs over the next four years. The recommendations given herein are based on CVE's System Design and Operational Criteria.

Summarized within this CWP are the capital requirements for the four year construction work plan period. The estimated total capital required is $13,635,571. A detailed discussion of the system improvements is presented in Section III of this report.

B. Service Area, Distribution System and Power Supply

Cumberland Valley Electric (CVE's) corporate office is located in Gray, Kentucky. CVE provides electric service to the southeastern portion of Kentucky. The service area generally encompasses the rural areas and small towns in the area. Displayed at the beginning of this report is a general location map of the service area. CVE provides electric service to some or all of the rural homes, farms, small commercial and industrial consumers in Bell, Harlan, Knox Laurel, Leslie, Letcher, McCreary and Whitley Counties in Kentucky, as well as Claybourne County Tennessee.

CVE provides service to portions of unincorporated areas as well as portions of the incorporated towns of Corbin, Cumberland, Barbourville and Williamsburg. Corbin and Barbourville are primarily served by their municipal utility. Lexington, located 80 miles north of the system, is the closest sizable city with a population greater than 100,000. The Cities of Corbin and Williamsburg both have populations in excess of 5,000. The system receives significant growth near the cities of Corbin and Williamsburg and near Interstate 75 which connects Lexington to Knoxville.

The terrain varies from rolling hills with grazing lands along small streams and tributaries to rugged mountainous forest in the eastern portion of the service area. The chief sources of income are from light manufacturing, general farming, post secondary education and coal mining. Steady growth is being experienced around the small cities and towns with modest growth in the remaining mountainous rural areas.

Highway and road construction is limited within the CVE service area at this time.

The following data summarizes CVE's December 31, 2005 Financial and Statistical Report (RUS Form 7):

Number of Consumers =	(Average for year = 23,029)
KWH Purchased =	524,823,764
KWH Sold =	499,445,622
Maximum KW Demand =	133,773 KW for January 2005
Total Utility Plant =	$65,495,374 ($2,844 per consumer)
Number Miles Transmission Line =	0
Number Miles Distribution Line =	2,529
Consumers per Distribution Mile =	9.1
Annual Load Factor =	44.8%
KWH Losses =	4.76%

Service is provided to CVE members through fifteen East Kentucky Power Cooperative (EKPC) delivery points.

EKPC is CVE's sole power supplier and is headquartered in Winchester, Kentucky. CVE takes delivery at either 13kV or 25 kV at all of its substations. EKPC currently owns all the substations.

C. System Organization and Operation.

CVE's headquarters, as mentioned earlier, are located in Gray, Kentucky - in the central part of the electric system. All engineering and management decisions come through this office. A District office is maintained in Cumberland. The system is operated and maintained under the leadership of the manager of engineering and the manager of operations. Staking technicians and linemen complement the system operations.

CVE utilizes contractor construction crews when needed. System improvements are accomplished by in-house personel as well as contractors. In-house crews perform maintenance, install services, line extensions, pole replacements and accomplish a portion of the system improvements.

A systematic pole inspection is in place. It is estimated that 100 bad poles will be changed out each year of this CWP. If additional bad poles are located they will be changed as quickly as possible to ensure public safety is maintained and to improve system reliability.

The current line right-of-way (ROW) maintenance program includes cutting, trimming and mowing. The current ROW program has improved reliability, decreased line losses, decreased overtime costs, and increased public safety.

All line equipment maintenance is accomplished by contract services. This includes equipment such as line reclosers, line voltage regulators and transformers.

CVE's service territory is firmly established by Kentucky statutes. Consumers located within CVE’s territorial boundaries are set to be served by CVE.

At the present time CVE's retail rates are lower than the rates of the neighboring cooperatives.

D. Status of Previous Work Plan Projects.

The work plan summarizes the current status of previous Construction Work Plan (CWP) site specific projects. The status of any given project is indicated as follows: COM - Completed; DEL - Deleted; IP - In Progress; NP - No Progress; or CPC - Complete pending closeout.

100 percent of the former CWP projects were completed.

E. Summary of Construction Program and Costs.

The CWP presents the costs of the recommended construction program over the next four years. The annual costs are itemized as follows:

2007- $3,731,118
2008 - $3,193,503
2009 - $3,384,622
2010 - $3,326,329
Total - $13,635,571

The annual totals for distribution plant additions and replacements during the four previous years are as follows:

2002 - $3,316,188
2003 - $2,997,623
2004 - $3,393,233
2005 - $3,562,282 (four year average = $3,317,332)

Capital expenditures projections for this CWP are greater than past expenditures due to an increase in the number of system improvements as well as an escalation in material prices.

A further breakdown of the construction program costs are summarized as follows:

		2007	2008	2009	2010
New Construction	=	$2,029,828	$2,074,504	$2,120,255	$2,167,844
System Improvements	=	$1,701,290	$1,118,999	$1,264,367	$1,158,484
Totals		$3,731,118	$3,193,503	$3,384,622	$3,326,329

Each item recommended was reviewed with engineering and management staff prior to inclusion in this CWP.

F. Substation Loading and Changes.

CVE's system is normally a winter peaking system. Summer peaks are approximately eighty-two percent of the winter peak. The 133,775 kW peak of the winter 2005 is the highest winter level ever experienced by CVE, while the highest summer peak of 105,922 kW occurred in 2005. The 133,775 kW winter peak of 2005 was used for the existing conditions.

The projected substation loading conditions for the next four years as reviewed in this CWP are for the winter peaks.

The substation review reveals that for the winter 2005 system loading conditions, an average of 99 percent power factor at peak was maintained and that all but one substation was loaded below the limit of 90 percent of capacity set by the System Design and Operational Criteria (SDOC). Emmanuel substation is loaded to 91 percent of winter capacity. A review of the summer 2005 system loading conditions reveal an average of 95 percent power factor at peak was maintained and all but one substation is loaded below the limits set by the SDOC. Emmanuel

substation is loaded to 92 percent of summer capacity. The transformer capacity is defined by EKPC for both winter and summer conditions.

EKPC is responsible for maintaining the firm transformation capacity. EKPC has spare transformers to provide the firm capacity needed if and when one of the existing transformer units should fail. EKPC also owns mobile substations for this purpose.

The projected winter 2010 peak loading conditions, including the new growth loads, indicate that additional capacity is needed. The SDOC sets the design limit for projected future substation loading at 95 percent of transformer capacity. One substation was identified as exceeding this standard. Emmanuel is projected to be loaded to 103 percent of capacity during normal winter loading conditions and 101 percent of capacity during normal summer loading conditions.

The above loading conditions are without the addition of the new Alex Creek, Frackes, Girdler and Liberty Church Substations. The Liberty Church and Girdler Substations are proposed to be 69 kV to 13.2/7.62 kV, 11.2 MVA substations with in service dates of September 2007. The Alex Creek Substation is proposed to be a 69kV to 24.9/13.2 kV, 5 MVA substation with a completion date of November 2007. Frackes Substation is proposed to be a 161 kV to 24.9/14.4 kV, 12/16/20 MVA substation with a completion date of March 2010.

Several growth loads were included in the model. A new Civic Center is projected to add 1,000 kW of load to circuit 87-01(Bacon Creek). A school expansion is projected to add 500 kW of load to circuit 45-04(South Corbin). A commercial expansion of an existing facility is projected to add 300 kW to circuit 26-01(Cumberland Falls). A new light commercial facility is projected to add 300 kW to circuit 26-03(Cumberland Falls). A new school facility is projected to add 1200 kW to circuit 53-03(Hinkle). A second new school facility is projected to add 1,200 kW to circuit 85-04(Carpenter).

II. BASIS OF STUDY AND PROPOSED CONSTRUCTION

A. System Design and Operational Criteria (SDOC).

Exhibit L presents CVE's System Design and Operational Criteria. On March 1, 2006 the area RUS General Field Representative (GFR) reviewed CVE's criteria. The proposed construction as outlined herein is necessary for meeting the minimum standards set forth in the system's criteria.

The criteria presented herein is used as a guideline only. System conditions may result in a breach of a specific criterion. Such occurrences are considered only temporary and not for the long term operations.

B. Historical Line and Equipment Costs.

Exhibit B presents the historical and projected unit cost averages for new services and system improvements. The cost calculations utilize data encompassing a 24 month period ending March 31, 2006.

Costs presented are based on CVE's historical cost, input from CVE's engineering staff as well as the experience of Patterson & Dewar Engineers.

C. Analysis of Current System Studies.

1. 2006 Long Range Plan (LRP).

In November of 2006 a LRP was completed by Patterson & Dewar Engineers. RUS approval is pending.

Several conclusions have resulted from the study and they are summarized as follows:

- In addition to the three substations previously justified, one additional substation, Frakes, will be added during this CWP.
- Jellico Substation is to be converted to 25 kV in 2012.
- Two additional 69 to 13.2/7.62 kV 11.2 MVA substations, Gray (2012) and Clio (2012), and an upgrade to 15 MVA at South Corbin (2014) will be required in the 2011-2014 CWP.

2. 2003 Operations and Maintenance Survey (REA Form 300)

Recently, CVE personnel, along with RUS, conducted a review of CVE's facilities and records. This review was used as a basis for completing the RUS Form 300, Review Rating Summary. The report is included herein as Exhibit M. The survey was completed by CVE's staff and reviewed by the RUS Kentucky GFR on March 30, 2004.

The survey resulted in the following conclusions and/or recommendations:

- Increase inspection of CATV compliance with pole attachment agreement. CVE will take the necessary steps to insure CATV compliance.

- Telephone poles left standing near electric poles. CVE will follow through with other pole owners after pole upgrades.

These areas are being addressed by the CVE's management and staff.

3. Sectionalizing Review.

A sectionalizing review of the entire system has been accomplished by the engineering staff of CVE and Patterson and Dewar. The review is inclusive of the four additional substations to be completed within this CWP. These substations along with line upgrades will require extensive changes to the existing sectionalizing. Future sectionalizing needs are given in Exhibit J.

4. 2006 Load Forecast.

A new 2006 Load Forecast was approved by CVE's Board in April 2006. The forecast was prepared by East Kentucky Power Cooperative in cooperation with CVE. The forecast utilized historical modeling techniques reflecting moderate growth patterns for future system conditions through 2026.

The 2006 Load Forecast projections for average annual consumers and peak kilowatts are as follows:

	Consumers	Non-Coincident KW
2007	24,051	146,600
2008	24,428	150,300
2009	24,809	153,500
2010	25,196	156,400

The system is projected to have an annual load factor of 46 percent and losses of approximately 4.8 percent. Exhibit A summarizes the Load Forecast projections used in this CWP including special growth loads which have developed after the load forecast was complete.

D. Historical and Projected System Data.

1. Annual Consumer, Load and Losses Data.

Exhibit A tabulates the annual system data for consumers, their monthly average usage as well as their annual monthly peak, the system peak demands, annual losses, and annual load factor. The exhibit provides both data and graphs for the actual conditions for 1994 through 2005 and for the projected years of 2006 through 2011. The actual system non- coincident peak kW is listed for winter conditions.

The distribution system experienced a growth in winter peak demand from 105,325 kW in 1994 to 133,773 kW in 2005. This represents a 2.2 percent per year growth rate for the eleven year period. CVE's system is expected to grow at a rate of 3.7 percent per year, inclusive of the growth loads, to approximately 160,896 kW.

From 1994 to 2005 the system experienced an annual 3.05 percent growth in consumers. The 2006 LF projects aa annual growth rate of 1.65 percent. This growth rate is projected to continue through 2010.

The annual system load factor has varied from 42.7% to 56.6% over the last eleven years. The future load factor is expected to level off at approximately 46.2%.

The annual system losses over the eleven year period from 1994 – 2005 varied from a low of 2.73 percent to a high of 7.88 percent. The losses are projected for the long range to be approximately 4.8 percent.

The 2005 total sales for CVE were 499,834,022 kWh. With 2,529 miles of distribution line, the 1000 kWh's billed per mile per year ratio calculates to be 197.5. According to RUS Bulletin 45-4, the guidelines average loss percentage for this ratio is approximately 8.5 percent. CVE's 2005 line losses were only 4.76 percent. Therefore, in considering billed 1000 kWh's per mile, the 4.76 percent loss level is excellent in comparison to the RUS guideline average.

2. Substation Load Data.

Exhibit O, page 1 of 3 summarizes the system peak loading conditions for both the winter and summer of 2005. Exhibit O, pages 2 and 3 of 3 summarizes the projected system peak loading conditions for the winter 2010 without and with improvements respectively.

Adequate and reasonable power factor levels are being maintained by CVE at each delivery point. The exception is the Arkland Substation which is a dedicated industrial substation serving one coal mine. All but one of the existing delivery points fall below CVE's System Design and Operational Criteria (SDOC), which allows existing substation loading to be at the 90% level. The Emmanuel Substation is loaded to 92% of summer and 91% of winter capacity. The 1998 Long Range Engineering Plan identified the need for a substation north of Emmanuel. A 2005 Power Supply Study justified the construction of the Girdler Substation, which is to be placed in service in 2007.

A review of the projected winter 2010 loading without improvements, Exhibit O page 2, reveals no substations, other than Emmanuel exceed the limit in the SDOC. The additional substations, Alex Creek and Liberty Church, were justified on distribution capacity and wheeling issues. The forth substation, Frackes, will be justified on distribution capacity and reliability issues.

Future loading conditions and specific recommendations concerning substations are presented in Section IIID of this text.

3. Circuit Loading and Voltage Conditions.

The January 2005 consumer power usage data is used to calculate the peak system conditions and serves as the basis for the recommendations included herein. The non-coincident demand was 133,773 kW.

Appendix 1 presents the primary analysis for the winter (January) 2005 system. The primary analysis provides the following system parameters.

1. Circuit loading by substation and by line section.
2. Unregulated voltage drops on 120-volt base (by section and accumulated total).
3. Annual primary losses by section in dollars per year.
4. Number of consumers served through each section, circuit and substation.
5. Circuit primary conductor size and miles from sub.

6. Fault current levels by fault types; maximum three-phase, maximum phase-to-phase-ground, maximum phase-to-ground and minimum phase-to-ground.

The voltage drop datum for winter 2005, winter 2010 without improvements and winter 2010 with improvements is shown by color coding in Exhibit U on Map 1, 2 and 3 respectively. Recommended system improvements are also included on the maps.

The January 2005 data was used to project the peak 2010 system condition before any improvements. This primary analysis is given herein as Appendix 2. Appendix 3 contains an analysis of the system after all improvements recommended in this CWP are completed.

Through the use of line voltage regulators and capacitors, adequate system voltages are being maintained for current system conditions in most areas of the system. In anticipation of future system loading conditions, some line voltage regulator and capacitor changes and system improvements will be necessary to maintain adequate voltage.

Three of the most critical circuit loading conditions are in the areas of the proposed Girdler, Alex Creek and Liberty Church Substation.. With the Girdler and Liberty Church areas experiencing high growth, recommendations are included to relieve the overloaded conditions. These efforts include major line upratings as well as installing substations and capacitors..

4. Load Current Measurements.

The Milsoft Integrated Solutions *WindMil* program is very detailed and complex. Incorrect and erroneous calculations may result from the many assumptions and averages of the program's algorithm. In order to substantiate the computer model results, it is good to compare the calculated conditions in the model with actual ammeter and voltmeter readings taken in the field. Such was accomplished as much as was available. A comparison of the MIS system model feeder currents was made with the CVE's substation output peak feeder readings. For the most part, the quantities are within 10% of each other. Generally speaking, the computer model reasonably compares with the measured quantities in the field.

CVE is encouraged to take special steps to secure more reliable and accurate system voltage and current levels during peak times. Such could be accomplished using new regulator and recloser controls.

According to System Design and Operational Criteria, Exhibit L, efforts are to be made by system operating personnel to maintain feeder phase balance within 20 percent of the average. According to field data reviewed, CVE's engineering and operating departments are doing a reasonable job maintaining feeder phase balance.

5. Voltage Measurements.

CVE operating staff utilize individual recording voltmeters to survey the system circuit voltage conditions. CVE's engineering and operating department is encouraged to continue to purchase microprocessor based voltage regulator controls. Voltage profiles could be developed to reflect the true circuit conditions. These profiles could then be used to substantiate computer models of the system, which are used to determine the system improvements required over the next four years. This new resource is increasingly being used in the industry. It is further recommended that CVE add electronic min/max or recording voltmeters at key system locations to facilitate additional confirmation of the calculated voltage conditions. The locations need to be

at key circuit branch points and points extremely far from substations with the greatest voltage drops.

6. System Outages and Reliability.

CVE has maintained daily outage reports. Exhibit S presents the summary of the consumer outage hours for the five previous years.

The five year consumer outage average is 1.666 hours per consumer per year, which is below RUS's maximum guideline average of 5 hours. The system improvements recommended in this Construction Work Plan will improve service reliability.

Power supplier outages are estimated for the five year period to average 0.222 hours per consumer per year. This is below the one hour per year level generally recognized in the rural electric cooperative industry for power suppliers. Supplier outages can be minimized by close communication between CVE and EKPC operating departments. CVE is encouraged to continue its aggressive ROW program so that the consumer outage rate will be lowered further.

III. REQUIRED CONSTRUCTION ITEMS

A. Service to New Consumers

During the 24 month period ending March 31, 2006, CVE averaged adding 754 new services annually to their system. The average number of underground services was 166 and the average number of overhead services was 588 per year. The average line construction costs for each new consumer was $1,813 for each underground service and $1,363 for each overhead service. Over the next four years 166 new underground and 590 new overhead services are projected to be installed each year. The average cost of each underground service is projected to be $1,947 and the average cost of each overhead service is projected to be $1,469. The total cost of new services is projected to average $1,190,101 each year.

Exhibit B summarizes the historical datum used in projecting the required capital for the new services. Transformers, meters and security light quantities and costs are also given in this exhibit. Exhibit D summarizes the costs on an annual basis. Approximately 35 percent of the capital required for this work plan is estimated to be for new consumer services.

B. Service Changes to Existing Customers.

For the next 48 months it is estimated that CVE will increase the service wire capacity to 396 consumers or 99 per year. The average cost for each service upgrade is projected to be $900. Using these averages yields a projected capital requirement of approximately $356,400 for the four year CWP period.

C. Distribution Lines ~ Additions and Changes.

C1. General Summary

The recommended CWP line changes and improvements are generally for the following reasons:

Excessive Voltage Drops
Excessive Load Currents (or Overloaded Lines)
Poor Service Reliability

Increasing primary line voltage, conductor size, number of phases, reducing distances of feed, and installing voltage regulators and capacitors are the methods of correction for excessive voltage drops. Excessive load current is an undesirable situation normally corrected by the same methods used for excessive voltage drops; however, the improvement is recommended in most cases to assure proper coordination of line reclosers or sectionalizing devices as well as to protect the system and personnel from high impedance ground fault conditions.

Right-of-way clearing often results in improved service reliability. However, if specific line components are causing outages, then priority is given to rebuilding the line to replace aged equipment. Rebuilding a line may include conductor, pole, or crossarm replacement, replacing defective insulators, etc. Also the construction of tie lines may improve service reliability. Tie lines shorten the circuit feed distance thereby reducing line exposure and they also provide loop feed capability. The loop feed capability is very beneficial during outages and line maintenance.

Exhibit N identifies the economical line design load levels generally used in this CWP. The results are tabulated in the table below. Evaluations were accomplished based on lines operating at 13.2kV and 24.9kV. The loads shown below represent the projected long range and long term levels anticipated for the circuit to be upgraded.

Conductor	KW for Rural Lines @ 7.62/13.2KV
3 ø 1/0 ACSR	≤2050
3 ø 336 ACSR	2050-6287
3 ø 477 ACSR	6287-9770
3 ø 566 ACSR	≥ 9770

Conductor	KW for Rural Lines @ 14.4/24.9KV
3 ø 1/0 ACSR	≤3874
3 ø 336 ACSR	3874-11880
3 ø 477 ACSR	11880-18462
3 ø 566 ACSR	18462≥

Oftentimes other criteria besides loading are used to determine the conductor size selected; criteria such as main ties between substations, feeders to industrial parks, etc.

Reviewing the winter 2005 primary analysis of Appendix 1, and considering the load growth estimates of the peak 2010 conditions, the system improvements are summarized as follows. The four year CWP distribution line construction estimate is $5,243,140. This estimate includes $2,770,544 for line conversion and changes (Code 300 projects). Exhibit F itemizes the line construction included in this CWP.

Each recommendation of the CWP has been reviewed by CVE's staff and the RUS-GFR prior to inclusion in this report. The construction project numbers utilize a five digit number with a dash. Please note the following explanation for the construction project reference numbers:

XYY-ZZ	= Construction Item Number
X	= RUS Reference Prefix (2 for new & tie lines; 3 for line conversions)
YY	= CVE Substation Number
ZZ	= Consecutive Number Under Each Substation

C2. Project Justification

Exhibit F not only tabulates the proposed distribution line construction but also provides a reason why the construction is necessary. Number codes are included as follows:

Construction Justification Codes

1. Overloaded single-phase line	7. New load development
2. Overloaded multi-phase line	8. Area voltage conversion
3. Excessive voltage drop	9. Eliminate 2-way feed to open delta bank
4. Balance phase loading	10. Establish main tie between subs/circuits
5. Improve service reliability	11. Highway relocation
6. New feeders (new/existing sub/MP)	12. Economic conductor loading

The computer model output in the appendices provides further information if needed, (e.g., voltage drop improvements, elimination of overloaded conductor, etc.). Please contact Phillip Bare of Patterson & Dewar Engineers for further discussion and assistance in identifying project justification and system improvements.

Recommended line open changes are shown in Exhibit P and are result of system improvements. Recommendations should be implemented as soon as possible after the sytem improvement to realize lower losses and improved system voltage..

D. Substation and Meter Point Additions and Changes.

System Design and Operational Criteria (SDOC), Exhibit L, establishes that a substation's projected loading condition is not to exceed 95 percent of its capacity. A review of the substation winter 2010 loading conditions without improvements in Exhibit O, page 2 of 3 reveals only Emmanuel Substation will exceed the SDOC level or require additional capacity. The 1998 Long-Range Engineering Plan concluded that the most economical method to solve this problem is to install a new 69 kV to 13.2kV, 11.2 MVA substation in the Girdler area since the existing Emmanuel Substation has limited expansion capability. A 2005 Power Supply Study justified the Girdler Substation and it is expected to be in service in 2007.

Excessive voltage drops and conductor loading does exist in other areas of the system. Most notably the Alex Creek and Liberty Church areas. Separate 2005 Power Supply Studies justified a 5.6 MVA 69/24.9 kV substation for Alex Creek and a 11.2 MVA 69/13.2 kV for Liberty Church. The 2006 LREP indicates a need for a 12.0 MVA 161/24.9 kV substation to be located near Frackes, Kentucky. The distribution circuit currently serving the area is 26 miles in length and is projected to be loaded at approximately 10 MVA by 2010. Power is currently wheeled through Kentucky Utilities to the Carpenter Substation which serves the Frakes circuit. The proposed Frakes Substation would require wheeling power through the Tennessee Valley Authority. The disparity in current wheeling charges prohibits the building of the Frackes Substation. However, the difference in wheeling charges is expected to narrow due to recent actions by the Kentucky Public Service Commission. Once the new wheeling rates are known a Power Supply Study will be submitted for Frackes.

Exhibit G itemizes the substation improvements recommended in this CWP. No capital requirements are included for CVE as EKPC is the sole owner of all substation facilities.

E. Capacitor Equipment ~ Additions and Changes.

Exhibit I presents the capacitor recommendations and associated costs. The total cost of the capacitor recommendations is approximately $126,000. The improvements are estimated to be equally divided over each of the four years of this CWP averaging $31,500 per year. The recommendations are shown on Map 2. The recommended size and proposed placement of each capacitor is outlined in Exhibit I, pages 1-4.

The capacitor recommendations conform to the design criteria of Exhibit L which specifies that no less than 95 percent lagging power factor at peak loading will be maintained.

All capacitor recommendations are based on the computer output of the *WindMil* software of Milsoft Integrated Solutions, Inc. All capacitor placement changes are recommended to produce minimum line losses and eliminate harmonic resonance conditions,

F. Sectionalizing Equipment ~ Additions and Changes

This CWP report presents a summary of changes in sectionalizing equipment in Exhibit J. Specific recommendations are accomplished under separate cover. The four year CWP sectionalizing cost is estimated at $912,000. The cost for the changes is estimated at $228,000 per year.

G. Line Regulators ~ Additions and Changes.

Exhibit H and the maps CWP CORBIN ASI AND CWP CUMBERAND ASI present the line voltage regulator changes. The cost of the regulator changes is categorized by RUS reference Code 604. Only $54,000 in purchases is estimated for this CWP period. See Exhibit H for a summary of the devices to be removed and added.

It is important to note that the recommendations included herein are assuming the capacitor changes have been made per those recommendations included in Exhibit I.

H. Replacements ~ Poles and Conductors.

CVE has a specific plan and objective for replacing bad poles on their system. The following discussion summarizes that plan and the basis for such.

CVE has approximately 43,000 poles on the system. RUS recommends an annual inspection of 10 percent of the system's total poles. When bad poles are identified they are replaced as soon as possible. CVE replaced approximately 98 bad poles per year in 2004 and 2005. Approximately 100 poles will be replaced annually (or 400 poles for the four year CWP period). Some $522,953 is included in this CWP for pole change outs.

IV. CONCLUSION

The recommendations set forth in this construction work plan will allow Cumberland Valley Electric Cooperative to serve the projected winter 2010 peak conditions per CVE's current system design and operational criteria. The construction recommendations are in accordance with RUS prescribed guidelines and other economic criteria established by CVE's Long Range Plan. Any questions or comments regarding this report should be directed to Phillip Bare of Patterson & Dewar Engineers.

TABLE OF CONTENTS

.

THE EXHIBITS MAY BE ACCESSED VIA THE "BOOKMARK" PANE ON THE LEFT

EXHIBIT A

CVE System Statistical Data

Pages: 4

PAGE FORWARD PAGE BACK

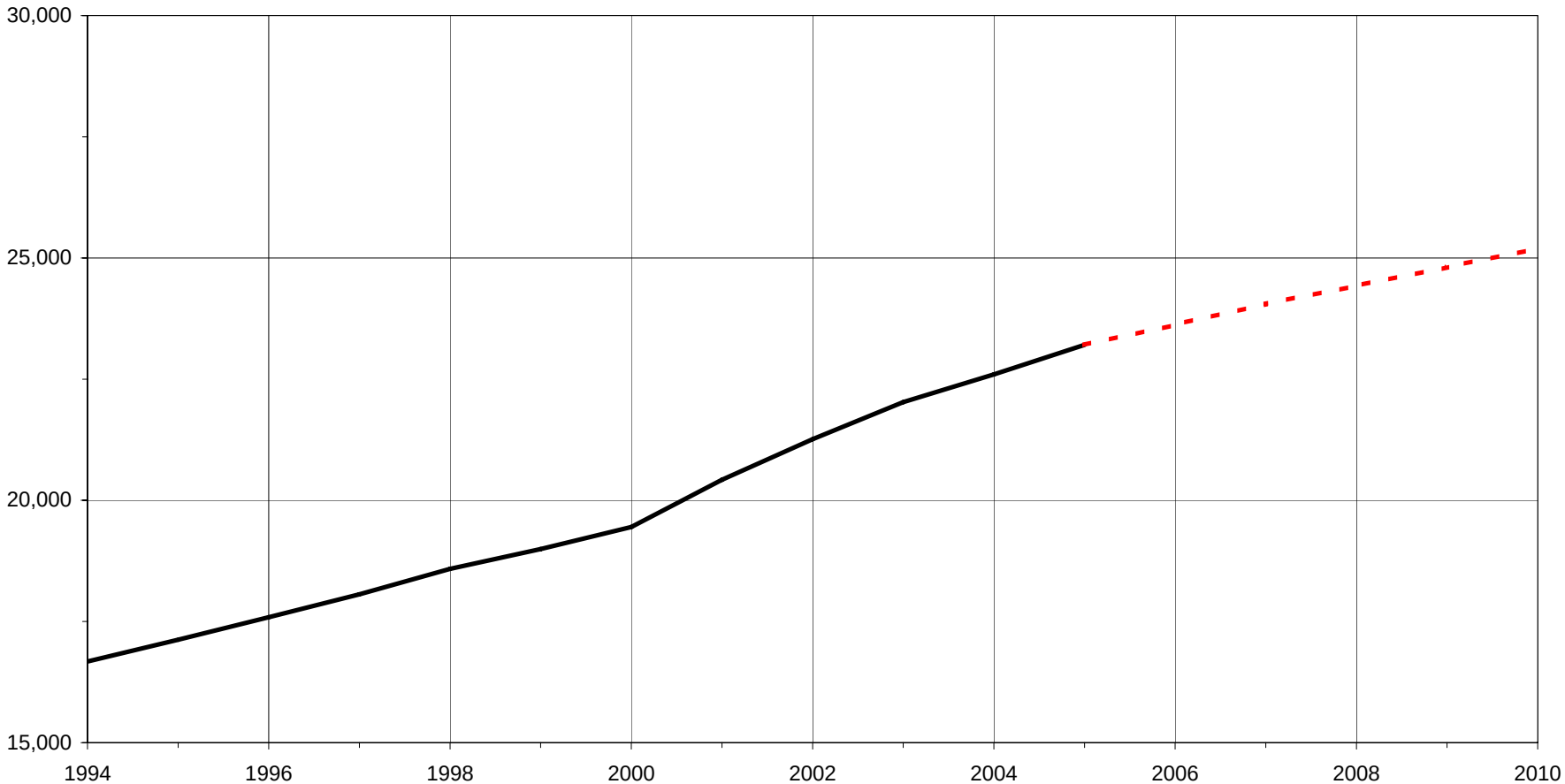
CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

SYSTEM STATISTICAL DATA

	Total Consumers (Annual Average)		kWh per Consumer Residential (Monthly Average)		Average Cost Per Kilowatt-Hour ($)		Annual System Losses		Annual Load Factor		System Peak Demand (KW)	
Year	Actual	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual	Projected
1994	16,675		1,131		$0.0414		5.50%		42.8%		105,325	
1995	17,125		1,154		$0.0347		7.88%		54.2%		90,620	
1996	17,587		1,236		$0.0330		5.44%		47.9%		106,838	
1997	18,062		1,178		$0.0326		6.25%		50.1%		102,314	
1998	18,586		1,231		$0.0326		3.18%		56.6%		93,459	
1999	18,995		1,257		$0.0345		2.73%		54.3%		99,413	
2000	19,450		1,294		$0.0362		4.97%		50.3%		109,988	
2001	20,423		1,234		$0.0388		4.11%		46.3%		118,332	
2002	21,260		1,273		$0.0380		4.12%		46.6%		118,680	
2003	22,026		1,225		$0.0398		4.73%		43.7%		124,564	
2004	22,598		1,191		$0.0437		4.29%		42.7%		130,799	
2005	23,209	23,209	1,279	1,279	$0.0516	$0.0516	4.76%	4.76%	44.8%	44.8%	133,773	133,773
2006		23,622		1,186		$0.0526		4.80%		45.7%		141,000
2007		24,051		1,195		$0.0537		4.80%		45.9%		150,900
2008		24,428		1,206		$0.0547		4.80%		46.1%		154,832
2009		24,809		1,221		$0.0558		4.80%		46.0%		158,164
2010		25,196		1,234		$0.0569		4.80%		46.0%		160,896

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

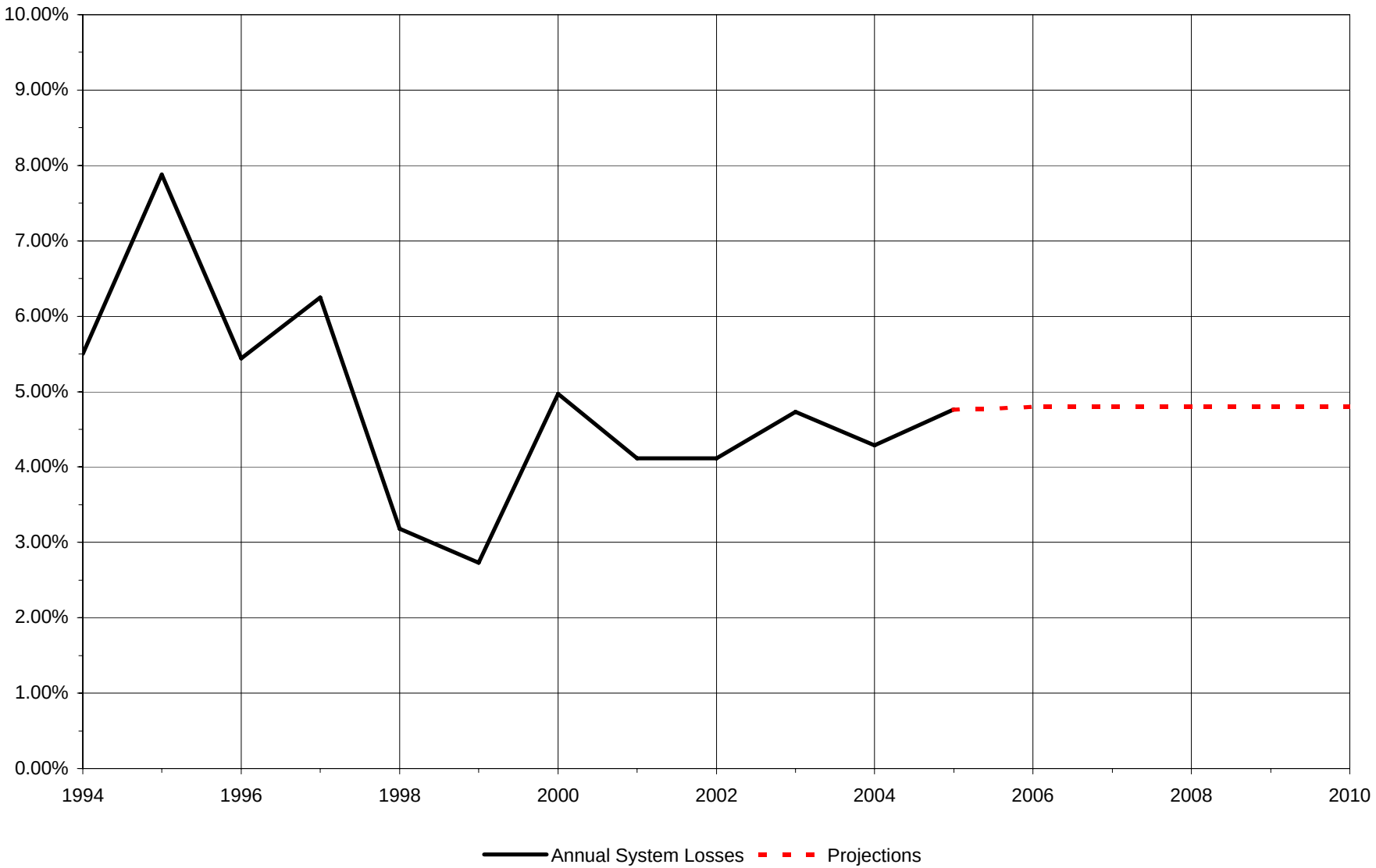
TOTAL CONSUMERS



PAGE FORWARD PAGE BACK

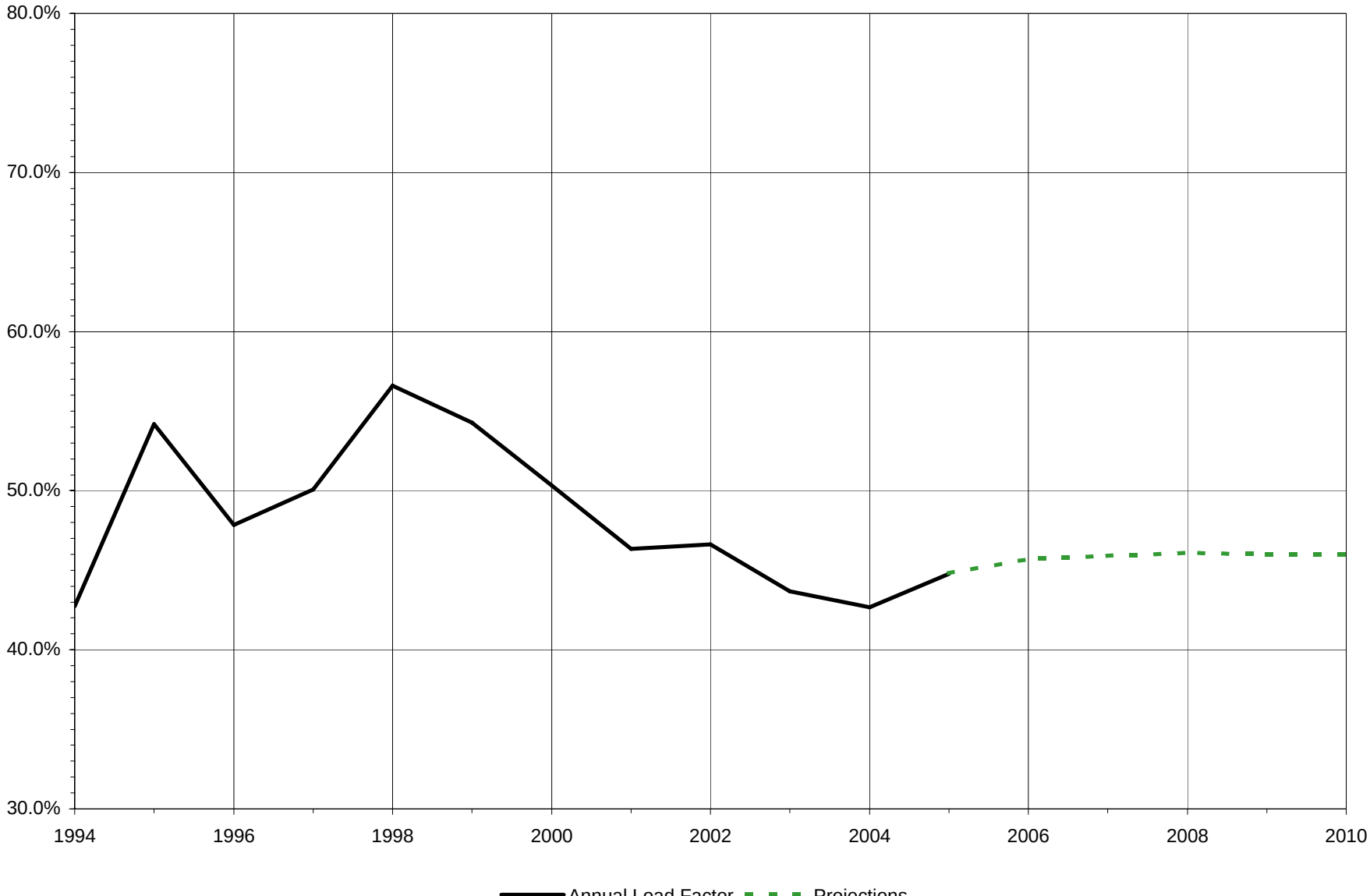
CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

ANNUAL SYSTEM KWH LOSSES (%)



CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

ANNUAL LOAD FACTOR



PAGE FORWARD PAGE BACK

EXHIBIT B

CVE Historical Data

Pages: 2

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

HISTORICAL COST DATA ENDING 03/30/06

DISTRIBUTION	12 Months 4/04 - 3/05	12 Months 4/05 - 3/06	For 48 Months 2007-2011
100 - NEW SERVICES			
102 - Overhead			
Number Services	573	604	$2,360
Total Lineal Feet	146,109	166,497	625,212
Average Feet Per Service	255	276	265
Total Cost	$801,052	$803,245	$3,467,430
Average Cost Per Service	$1,398	$1,330	$1,469
101 - Underground			
Number Services	171	161	$664
Total Lineal Feet	44,082	36,835	161,834
Average Feet Per Service	258	229	244
Total Cost	$342,475	$259,541	$1,292,974
Average Cost Per Service	$2,003	$1,612	$1,947
200 - NEW CONSTRUCTION AND TIE LINES			
See Exhibit C & F			
300 - LINE CONVERSIONS & CHANGES			
See Exhibit C & F			
600 - MISCELLANEOUS DISTRIBUTION EQUIPMENT			
601 - Transformers and Meters (overhead and underground)			
Transformers-Overhead:			
Number New	459	364	$2,110
Total Cost	$253,305	$206,581	$1,540,472
Average Cost	$552	$568	$730
Transformers-Underground:			
Number New	59	36	$200
Total Cost	$76,621	$36,093	$301,012
Average Cost	$1,299	$1,003	$1,505

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

HISTORICAL COST DATA ENDING 03/30/06 (Continued)

DISTRIBUTION (continued)	12 Months 4/04 - 3/05	12 Months 4/05 - 3/06	For 48 Months 2007-2011
601- Continued			
Meters-Underground & Overhead			
Number New Meters	57	600	$3,024
Total Cost	$9,087	$22,301	$399,168
Average Cost	$159	$37	$132
Meters-Turtle 2			
Number New Meters	1,378	1,472	$6,724
Total Cost	$76,529	$56,691	$618,608
Average Cost	$56	$39	$92
602 - Service Wires for Increased Capacity			
Number Work Orders	97	101	$396
Total Cost	$237,615	$91,495	$356,400
Average Cost	$2,450	$906	$900
603 - Line Sectionalizing Equipment			
Number Work Orders	14	15	-
Total Cost	$20,407	$22,657	See Exhibit J
Average Cost	$1,458	$1,510	-
604 - Line Regulators			
Number Work Orders			
Total Cost			
Average Cost			
605 - Line Capacitors			
Number Work Orders			
Total Cost			
Average Cost			
606 - Replacements (pole)			
Number Poles Changed Out	25	36	$400
Total Costs	$72,433	$67,782	$522,953
Cost per Pole	$2,897	$1,883	$1,307
615 - System Improvement with Retirement			
Number of Jobs			
Cost per Job			
Total Costs			
616 - System Improvement no Retirement			
Number of Jobs			
Cost per Job			
Total Costs			
700 - OTHER DISTRIBUTION			
702 - Security Lights			
Number Installed	690	676	$2,840
Total Cost	$252,084	$246,155	$1,136,112
Average Cost	$365	$364	$400

EXHIBIT C

Status of Previous CVE CWP

Pages: 1

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

STATUS OF PREVIOUS CONSTRUCTION WORK PLAN (CWP) PROJECTS

CWP Source Legend		Status Legend	
1 =	2003-2006 CWP	COM =	Completed
S =	Skipped Numbers	DEL =	Deleted
X / AM-YY =	Amendment Coding	CPC =	Complete Pending Closeout
X =	CWP Source	IP =	In Progress
YY =	Amendment#	NP =	No Progress

Const. Item No.	CWP Source	Line Section Locations	Construction Description	CWP Costs	Actual Costs	% Actual to CWP Costs	Status
Tie Lines (Code 200)							
None							
Line Conversions and Changes (Code 300)							
362	1	7137-147	Rockholds 1ø 2 ACSR - 3ø 336 ACSR	$70,400	$172,868	245.6%	COM
363	1	7534-546	Chad 3ø 1/0 ACSR - 3ø 336 ACSR	$28,000	$321,869	1149.5%	COM
364	1	637-653	Chad 3ø 4/0 ACSR - 3ø 336 ACSR	$168,000	$309,479	184.2%	COM
365	1	255-511	Hinkle 3ø 1/0 ACSR - 3ø 336 ACSR	$63,800	$37,410	58.6%	COM
366	1	592	Oven Fork 3ø 1/0 ACSR - 3ø 1/0 ACSR	$30,600	$53,809	175.8%	COM
368	2005.01	171-82	Carpenter 3ø 2 CU - 3ø 336 ACSR	$150,000	$207,192	138.1%	COM
369	2005.02	14070051	Cumberland 3ø 3/0 ACSR - 3ø DC 336	$150,000	$169,241	112.8%	COM
370	2005.03	15340083	Rockholds 3ø 1/0 CU - 3ø 336 ACSR	$105,000	$95,933	91.4%	COM
New Substations (Code 400)							
	1		Alex Creek Metering Point		By EKPC		DEL
Substation Modifications and Changes (Code 500)							
	1		Goldbug Fans		By EKPC		COM
	1		Hinkle Fans		By EKPC		NP
	1		North Corbin Fans		By EKPC		COM

EXHIBIT D

Summary of CVE Distribution Cost Estimates

Pages: 1

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

SUMMARY OF DISTRIBUTION COST ESTIMATES

		Cost Year A 2007	Cost Year B 2008	Cost Year C 2009	Cost Year C 2010	Total CWP Costs
740C REF 100 Line Construction for New Services	=	$1,138,042	$1,172,118	$1,206,950	$1,243,294	$4,760,404
740C REF 200 New Construction and Tie Lines	=	$0	$0	$0	$0	$0
740C REF 300 Line Conversions and Line Changes	=	$1,120,690	$428,716	$564,854	$656,293	$2,770,554
740C REF 400 New Substations, Switching Stations, Meter Points, etc.	=	$0	$0	$0	$0	$0
740C REF 500 Substation and Meter Point Changes	=	$0	$0	$0	$0	$0
740C REF 600 Miscellaneous Distribution Equipment						
1. Code 601 - Transformers and Meters	=	$607,786	$797,319	$813,605	$640,550	$2,859,260
2. Code 602 - Sets of Service Wires For Increased Service Capacity	=	$89,100	$89,100	$89,100	$89,100	$356,400
3. Code 603 - Sectionalizing Equipment	=	$228,000	$228,000	$228,000	$228,000	$912,000
4. Code 604 - Line Voltage Regulators	=	$56,000	$0	$0	$0	$56,000
5. Code 605 - Line Capacitors	=	$31,500	$31,500	$31,500	$31,500	$126,000
6. Code 606 - Replacements (pole)	=	$125,000	$128,750	$132,613	$136,591	$522,953
740C REF 700 Other Distribution Items						
1. Code 702 - Security Lights	=	$284,000	$284,000	$284,000	$284,000	$1,136,000
2. Code 704 - Scada	=	$51,000	$34,000	$34,000	$17,000	$136,000
Total Estimated Distribution Requirements	=	$3,731,118	$3,193,503	$3,384,622	$3,326,329	$13,635,571

EXHIBIT E

Cost Breakdown for CVE RUS 740C

Pages: 4

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

COST ESTIMATE BREAKDOWN FOR RUS 740C

1. DISTRIBUTION

a. 740C Ref. Code 100 - New Services

		Total Miles	Cost Year A 2007	Cost Year B 2008	Cost Year C 2009	Cost Year D 2010
100 -	101 - Underground ~ 166 New Consumers per Year	30.65	$309,092	$318,388	$327,850	$337,644
	102 - Overhead ~ 590 New Consumers per Year	118.41	$828,950	$853,730	$879,100	$905,650
	CODE 100 YEARLY TOTALS =		**$1,138,042**	**$1,172,118**	**$1,206,950**	**$1,243,294**
	TOTAL LOAN CODE 100 MILES =	149.06	**TOTAL LOAN CODE 100 COSTS =**			**$4,760,404**

b. 740C Ref Code 200: New Construction and Tie Lines (See Exhibit F for further details)

Ref Number	Pri Code	Miles	Existing Construction	Proposed Construction	$/Mile	Cost Year A 2007	Cost Year B 2008	Cost Year C 2009	Cost Year D 2010
None						$0	$0	$0	$0
						$0	$0	$0	$0
			CODE 100 YEARLY TOTALS =			**$0**	**$0**	**$0**	**$0**
						TOTAL LOAN CODE 200 COSTS =			**$0**

c. 740C Ref Code 300: Line Conversions and Changes (See Exhibit F for further details)

Ref Number	Pri Code	Miles	Existing Construction	Proposed Construction	$/Mile	Cost Year A 2007	Cost Year B 2008	Cost Year C 2009	Cost Year D 2010
301.01	B	23.80	1ø 7.2 Kv	1ø 14.4 Kv	$5,300	$0	$128,663	$0	$0
	B	5.30	3ø 7.2 Kv	3ø 14.4 Kv	$8,500	$0	$45,951	$0	$0
301.02	B	1.05	3ø 2 ACSR	3ø 336 ACSR	$82,000	$0	$87,822	$0	$0
305.01	A	4.98	1ø 1/0 ACSR	3ø 1/0 ACSR	$32,000	$159,360	$0	$0	$0
305.02	C	1.06	1ø 2 ACSR	3ø 336 ACSR	$59,000	$0	$0	$65,067	$0
306.01	C	2.57	3ø 4/0 ACSR	3ø 336 ACSR	$59,000	$0	$0	$157,756	$0
306.02	C	0.24	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$0	$0	$7,990	$0
306.03	D	5.29	3ø 1/0 ACSR	3ø 336 ACSR	$59,000	$0	$0	$0	$331,214
307.01	A	1.59	2ø 2 ACSR	3ø 1/0 ACSR	$32,000	$50,880	$0	$0	$0
307.02	B	1.06	3ø 4/0 ACSR	3ø 336 ACSR DC	$107,000	$0	$115,688	$0	$0
307.03	C	1.18	3ø 1/0 ACSR	3ø 336 ACSR DC	$107,000	$0	$0	$131,361	$0
307.04	A	0.91	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$29,120	$0	$0	$0
308.01	C	1.13	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$0	$0	$37,621	$0
308.02	D	2.63	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$0	$0	$0	$89,141
308.03	A	1.46	3ø 4/0 ACSR	3ø 336 ACSR	$59,000	$86,140	$0	$0	$0
309.01	D	0.68	3ø 1/0 ACSR	3ø 336 ACSR	$59,000	$0	$0	$0	$42,576
310.01	A	0.45	3ø 1/0 ACSR	3ø 336 ACSR DC	$107,000	$48,150	$0	$0	$0
310.02	A	0.56	3ø 1/0 ACSR	3ø 336 ACSR	$59,000	$33,040	$0	$0	$0
310.03	B	0.06	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$0	$1,958	$0	$0

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

COST ESTIMATE BREAKDOWN FOR RUS 740C (Continued)

c. 740C Ref Code 300: Line Conversions and Changes (See Exhibit F for further details) {Continued}

Ref Number	Pri Code	Miles	Existing Construction	Proposed Construction	$/Mile	Cost Year A 2007	Cost Year B 2008	Cost Year C 2009	Cost Year D 2010
310.04	B	1.49	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$0	$48,634	$0	$0
310.05	C	0.59	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$0	$0	$19,643	$0
310.06	D	0.51	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$0	$0	$0	$17,319
312.01	A	1.00	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$32,000	$0	$0	$0
312.02	C	1.26	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$0	$0	$41,949	$0
313.01	A	2.01	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$64,320	$0	$0	$0
313.02	D	31.30	1ø 7.2 Kv	1ø 14.4 Kv	$5,300	$0	$0	$0	$176,044
	C	11.70	3ø 7.2 Kv	3ø 14.4 Kv	$8,500	$0	$0	$103,468	$0
314.01	A	0.53	3ø 336 ACSR	3ø 336 ACSR DC	$107,000	$56,710	$0	$0	$0
314.02	A	1.80	3ø 1/0 ACSR	3ø 336 ACSR	$59,000	$106,200	$0	$0	$0
315.01	A	1.62	3ø 4/0 ACSR DC	3ø 336 ACSR DC	$107,000	$173,340	$0	$0	$0
315.02	A	0.80	3ø 1/0 ACSR	3ø 336 ACSR	$59,000	$47,200	$0	$0	$0
315.03	A	0.65	3ø 1/0 ACSR	3ø 336 ACSR	$59,000	$38,350	$0	$0	$0
318.01	A	2.12	3ø 4/0 ACSR	3ø 336 ACSR	$59,000	$125,080	$0	$0	$0
318.02	A	1.20	3ø 1/0 ACSR	3ø 336 ACSR	$59,000	$70,800	$0	$0	$0
TOTAL MILES =		114.6	**CODE 300 YEARLY TOTALS =**			**$1,120,690**	**$428,716**	**$564,854**	**$656,293**
								TOTAL LOAN CODE 300 COSTS =	**$2,770,554**

d. 740c Ref Code 400: New Substations. Switching Stations, Metering Points - (See Exhibit G for further details)

Ref Number	Pri Code	Proposed Construction			Cost Year A 2007	Cost Year B 2008	Cost Year C 2009	Cost Year D 2010
	A	Girdler	69/13 kV 11.2 MVA	By EKPC	$0	$0	$0	$0
	A	Liberty Church	69/13 kV 11.2 MVA	By EKPC	$0	$0	$0	$0
	B	Alex Creek	69/25 kV 11.2 MVA	By EKPC	$0	$0	$0	$0
	D	Frackes	69/25 kV 12.0 MVA	By EKPC	$0	$0	$0	$0
		CODE 400 YEARLY TOTALS =			**$0**	**$0**	**$0**	**$0**
							TOTAL LOAN CODE 400 COSTS =	**$0**

e. 740c Ref Code 500: Substation, Switching Stations, Metering Point Changes - (See Exhibit G for further details)

Ref Number	Pri Code	Proposed Construction	Cost Year A 2007	Cost Year B 2008	Cost Year C 2009	Cost Year D 2010
None			$0	$0	$0	$0
		CODE 500 YEARLY TOTALS =	**$0**	**$0**	**$0**	**$0**
					TOTAL LOAN CODE 500 COSTS =	**$0**

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

COST ESTIMATE BREAKDOWN FOR RUS 740C (Continued)

			Cost Year A 2007	Cost Year B 2008	Cost Year C 2009	Cost Year D 2010
e. 740c Ref Code 600: Miscellaneous Distribution Equipment						
601		Transformers and Meters (Underground & Overhead)				
		Uprated Transformers - 0 units per year	$0	$0	$0	$0
		New UG - 50 per year @ $1,439	$71,950	$74,109	$76,332	$78,622
		New OH -409 per year @ $688	$281,392	$289,834	$298,529	$307,485
		25 kV Conversion -474 @ $733	$0	$178,933	$184,301	$0
	*	New Meters - 756 per year @ $133	$99,792	$99,792	$99,792	$99,792
	**	AMR Meters - 1681 per year @ $92	$154,652	$154,652	$154,652	$154,652
		CODE 601 YEARLY SUBTOTALS =	$607,786	$797,319	$813,605	$640,550
602		Service Wires for Increased Capacity (99 per year@ $900)	$89,100	$89,100	$89,100	$89,100
603		Sectionalizing Equipment	$228,000	$228,000	$228,000	$228,000
604		Line Voltage Regulators	$56,000	$0	$0	$0
605		Line Capacitors	$31,500	$31,500	$31,500	$31,500
606		Pole Replacements-	$125,000	$128,750	$132,613	$136,591
		CODE 600 YEARLY TOTALS =	**$1,137,386**	**$1,274,669**	**$1,294,818**	**$1,125,741**
					TOTAL LOAN CODE 600 COSTS =	**$4,832,614**

***** New T2 AMR Meters
****** Replace T1 with T2 AMR Meters

g. 700 - Other Distribution						
701		Security Lights ~ 710 units per year @ $400 each	$284,000	$284,000	$284,000	$284,000
702		SCADA	$51,000	$34,000	$34,000	$17,000
		CODE 700 YEARLY TOTALS =	**$335,000**	**$318,000**	**$318,000**	**$301,000**
		YEARLY DISTRIBUTION TOTALS=	**$3,731,118**	**$3,193,503**	**$3,384,622**	**$3,326,329**
					TOTAL DISTRIBUTION LOAN =	**$13,635,571**

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

BREAKDOWN OF COST ESTIMATES FOR FINANCIAL FORCAST

NEW CONSTRUCTION	Cost Year A 2007	Cost Year B 2008	Cost Year C 2009	Cost Year D 2010	TOTALS
Line Extensions	$1,138,042	$1,172,118	$1,206,950	$1,243,294	$4,760,404
Transformers and Meters	$607,786	$618,386	$629,305	$640,550	$2,496,027
Security Lights	$284,000	$284,000	$284,000	$284,000	$1,136,000
TOTAL NEW CONSTRUCTION =	**$2,029,828**	**$2,074,504**	**$2,120,255**	**$2,167,844**	**$8,392,431**
TOTAL NEW CONSTRUCTION % =					**62%**
SYSTEM IMPROVEMENTS					
New Tie Lines	$0	$0	$0	$0	$0
Conversions (Code 300)	$1,120,690	$428,716	$564,854	$656,293	$2,770,554
Transformers for Conversions	$0	$178,933	$184,301	$0	$363,233
New Substations	$0	$0	$0	$0	$0
Substation Changes	$0	$0	$0	$0	$0
Service Wires Uprated	$89,100	$89,100	$89,100	$89,100	$356,400
Sectionalizing Equipment	$228,000	$228,000	$228,000	$228,000	$912,000
Line Regulators	$56,000	$0	$0	$0	$56,000
Line Capacitors	$31,500	$31,500	$31,500	$31,500	$126,000
Pole Replacements	$125,000	$128,750	$132,613	$136,591	$522,953
SCADA	$51,000	$34,000	$34,000	$17,000	$136,000
TOTAL SYSTEM IMPROVEMENTS =	**$1,701,290**	**$1,118,999**	**$1,264,367**	**$1,158,484**	**$5,243,140**
TOTAL SYSTEM IMPROVEMENTS % =					**38%**
		Total CWP Costs =			**$13,635,571**

EXHIBIT F

CVE System Improvements

Pages: 4

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION RECOMMENDATIONS AND COST ESTIMATES

Construction Justification "Codes"
(V) - Proposed Construction Insulated for 25 KV
* Denotes carry-over from previous 2003-06 CWP

1. Overload Single-Phase Line
2. Overload Multi-phase Line
3. Excessive Voltage Drop
4. Balance Phase Loading
5. Improve Service Reliability
6. New Feeders (New Sub/MP or Existing Sub)
7. New Load Development
8. Area Voltage Conversion
9. Eliminate 2-way feed to open Delta Bank
10. Establish Loop Between Sub/Circuit
11. Highway Relocation Project
12. Economical Conductor Loading

RUS REF. NOS.	Priorty A-B-C	Line Sections	Miles	Existing Construction	Proposed Construction	$/Mile	Cost Yr A 2007	Cost Yr B 2008	Cost Yr C 2009	Cost Yr D 2010	Code
Substation 01 ~ Alex Creek	**2008**										
301.01	B	VARIOUS	23.8	1ø 7.2 Kv	1ø 14.4 Kv	$5,300	$0	$128,663	$0	$0	8
	B	VARIOUS	5.3	3ø 7.2 Kv	3ø 14.4 Kv	$8,500	$0	$45,951	$0	$0	8
301.02	B	SUB-12540025	1.1	3ø 2 ACSR	3ø 336 ACSR DC	$82,000	$0	$87,822	$0	$0	6
Substation 02 ~ Arkland											
No Construction	N/A	N/A	N/A	N/A	N/A	N/A	$0	$0	$0	$0	
Substation 03 ~ Bacon Creek											
No Construction	N/A	N/A	N/A	N/A	N/A	N/A	$0	$0	$0	$0	
Substation 04 ~ Bledsoe											
No Construction	N/A	N/A	N/A	N/A	N/A	N/A	$0	$0	$0	$0	
Substation 05 ~ Carpenter											
305.01	A	23420001-23250003	5.0	1ø1/0 ACSR	3ø 1/0 ACSR	$32,000	$159,360	$0	$0	$0	4
305.02	C	22840009-22840027	1.1	3ø 1/0 ACSR	3ø 336 ACSR	$59,000	$0	$0	$65,067	$0	2
Substation 06 ~ Chad											
306.01	C	38360034-38440007	2.6	3ø 4/0 ACSR	3ø 336 ACSR	$59,000	$0	$0	$157,756	$0	5
306.02	C	37770132-37760074	0.2	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$0	$0	$7,990	$0	4
306.03	D	38180008-38250007	5.3	3ø 1/0 ACSR	3ø 336 ACSR	$59,000	$0	$0	$0	$331,214	5

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION RECOMMENDATIONS AND COST ESTIMATES (Continued)

Construction Justification "Codes"
(V) - Proposed Construction Insulated for 25 KV
* Denotes carry-over from previous 2003-06 CWP

1. Overload Single-Phase Line
2. Overload Multi-phase Line
3. Excessive Voltage Drop
4. Balance Phase Loading
5. Improve Service Reliability
6. New Feeders (New Sub/MP or Existing Sub)
7. New Load Development
8. Area Voltage Conversion
9. Eliminate 2-way feed to open Delta Bank
10. Establish Loop Between Sub/Circuit
11. Highway Relocation Project
12. Economical Conductor Loading

RUS REF. NOS.	Priorty A-B-C	Line Sections	Miles	Existing Construction	Proposed Construction	$/Mile	Cost Yr A 2007	Cost Yr B 2008	Cost Yr C 2009	Cost Yr D 2010	Code
Substation 07 ~ Cumberland Falls											
307.01	A	14070088-14280021	1.6	2ø 2 ACSR	3ø 1/0 ACSR	$32,000	$50,880	$0	$0	$0	4
307.02	B	SUB-14160064	1.1	3ø 4/0 ACSR	3ø 336 ACSR DC	$107,000	$0	$115,688	$0	$0	2,5
307.03	C	8880109-8870243	1.2	3ø 1/0 ACSR	3ø 336 ACSR DC	$107,000	$0	$0	$131,361	$0	2,5
307.04	A	14370064-14470025	0.9	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$29,120	$0	$0	$0	4
Substation 08 ~ Emmanuel											
308.01	C	10650093-10750062	1.1	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$0	$0	$37,621	$0	4
308.02	D	10360021-10150033	2.6	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$0	$0	$0	$89,141	4
308.03	A	10680014-10590148	1.5	3ø 4/0 ACSR	3ø 336 ACSR	$59,000	$86,140	$0	$0	$0	10
Substation 09 ~ Frackes	**2010**										
309.01	D	22840028-22840060	0.7	3ø 1/0 ACSR	3ø 336 ACSR	$59,000	$0	$0	$0	$42,576	2
Substation 10 ~ Girdler	**2007**										
310.01	A	SUB -10490101	0.5	3ø 1/0 ACSR	3ø 336 ACSR DC	$107,000	$48,150	$0	$0	$0	2,6
310.02	A	SUB -10590145	0.6	3ø 1/0 ACSR	3ø 336 ACSR	$59,000	$33,040	$0	$0	$0	2,6
310.03	B	10590181-10590140	0.1	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$0	$1,958	$0	$0	4
310.04	B	10170049-4970009	1.5	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$0	$48,634	$0	$0	4
310.05	C	11430029-11430039	0.6	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$0	$0	$19,643	$0	4
310.06	D	10480036-10480047	0.5	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$0	$0	$0	$17,319	4

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION RECOMMENDATIONS AND COST ESTIMATES (Continued)

Construction Justification "Codes"
(V) - Proposed Construction Insulated for 25 KV
* Denotes carry-over from previous 2003-06 CWP

1. Overload Single-Phase Line
2. Overload Multi-phase Line
3. Excessive Voltage Drop
4. Balance Phase Loading
5. Improve Service Reliability
6. New Feeders (New Sub/MP or Existing Sub)
7. New Load Development
8. Area Voltage Conversion
9. Eliminate 2-way feed to open Delta Bank
10. Establish Loop Between Sub/Circuit
11. Highway Relocation Project
12. Economical Conductor Loading

RUS REF. NOS.	Priorty A-B-C	Line Sections	Miles	Existing Construction	Proposed Construction	$/Mile	Cost Yr A 2007	Cost Yr B 2008	Cost Yr C 2009	Cost Yr D 2010	Code
Substation 11 ~ Goldbug											
No Construction	N/A	N/A	N/A	N/A	N/A	N/A	$0	$0	$0	$0	
Substation 12 ~ Hinkle											
312.01	A	17620083-17730044	1.0	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$32,000	$0	$0	$0	4
312.02	C	11660044-11760054	1.3	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$0	$0	$41,949	$0	4
Substation 13 ~ Jellico											
313.01	A	19780017-25080009	2.0	1ø 2 ACSR	3ø 1/0 ACSR	$32,000	$64,320	$0	$0	$0	4
313.02	D	VARIOUS	31.3	1ø 7.2 kV	1ø 14.4 kV	$5,300	$0	$0	$0	$176,044	8
	C	VARIOUS	11.7	3ø 7.2 kV	3ø 14.4 kV	$8,500	$0	$0	$103,468	$0	8
Substation 14 ~ Liberty Church	**2007**										
314.01	A	SUB-9670090	0.5	3ø 336 ACSR	3ø 336 ACSR DC	$107,000	$56,710	$0	$0	$0	6
314.02	A	9770124-9870115	1.8	3ø 1/0 ACSR	3ø 336 ACSR	$59,000	$106,200	$0	$0	$0	2,6
Substation 15 ~ North Corbin											
315.01	A	9370071-9280088	1.6	3ø 4/0 ACSR DC	3ø 336 ACSR DC	$107,000	$173,340	$0	$0	$0	2,7,12
315.02	A	9290080-9290072	0.8	3ø 1/0 ACSR	3ø 336 ACSR	$59,000	$47,200	$0	$0	$0	2
315.03	A	9280161-9190142	0.7	3ø 1/0 ACSR	3ø 336 ACSR	$59,000	$38,350	$0	$0	$0	10

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION RECOMMENDATIONS AND COST ESTIMATES (Continued)

Construction Justification "Codes"
(V) - Proposed Construction Insulated for 25 KV
* Denotes carry-over from previous 2003-06 CWP

1. Overload Single-Phase Line
2. Overload Multi-phase Line
3. Excessive Voltage Drop
4. Balance Phase Loading
5. Improve Service Reliability
6. New Feeders (New Sub/MP or Existing Sub)
7. New Load Development
8. Area Voltage Conversion
9. Eliminate 2-way feed to open Delta Bank
10. Establish Loop Between Sub/Circuit
11. Highway Relocation Project
12. Economical Conductor Loading

RUS REF. NOS.	Priorty A-B-C	Line Sections	Miles	Existing Construction	Proposed Construction	$/Mile	Cost Yr A 2007	Cost Yr B 2008	Cost Yr C 2009	Cost Yr D 2010	Code
Substation 16 ~ Oven Fork											
No Construction	N/A	N/A	N/A	N/A	N/A	N/A	$0	$0	$0	$0	
Substation 17 ~ Pine Mountain											
No Construction	N/A	N/A	N/A	N/A	N/A	N/A	$0	$0	$0	$0	
Substation 18 ~ Rockhold											
318.01	A	15360042-15270043	2.1	3ø 4/0 ACSR	3ø 336 ACSR	$59,000	$125,080	$0	$0	$0	10
318.02	A	15070031-9870087	1.2	3ø 1/0 ACSR	3ø 336 ACSR	$59,000	$70,800	$0	$0	$0	10
Substation 19 ~ South Corbin											
No Construction	N/A	N/A	N/A	N/A	N/A	N/A	$0	$0	$0	$0	
					Subtotal for New Construction and Tie Lines (Code 200 Items) =		**$0**	**$0**	**$0**	**$0**	
					Subtotal for Line Conversions and Changes (Code 300 Items) =		**$1,120,690**	**$428,716**	**$564,854**	**$656,293**	
					Total Distribution Line Construction Per Year =		**$1,120,690**	**$428,716**	**$564,854**	**$656,293**	
					Total Distribution Line Construction (4 years) =					**$2,770,554**	

EXHIBIT G

CVE Sub and Meter-Point Estimates

Pages: 1

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

SUBSTATION AND METER POINT COST ESTIMATES

NEW SUBSTATIONS AND METER POINTS (Ref.Code 400)

POWER SUPPLIER CHANGES RECOMMENDED

2007 New Liberty Church 11.2/14 MVA Substation and Tap

Construct a new 69 to 13.2 kV substation as justified by Patterson & Dewar's Power Supply Study dated September 2005 in the approximate location shown The new delivery point is to unload the existing North Corbin Substation and is recommended to be in service by May 2007

2007 New Girdler 11.2/14 MVA Substation and Tap

Construct a new 69 to 13.2 kV substation as justified by Patterson & Dewar's Power Supply Study dated September 2005 in the approximate location shown The new delivery point is to unload the existing Emmanuel Substation and is recommended to be in service by May 2007

2007 New Alex Creek 5.6 MVA Substation and Tap

Construct a new 69 to 24.9 kV substation as justified by Patterson & Dewar's Power Supply Study dated September 2005 in the approximate location shown The new delivery point is to unload the existing Hinkle Substation and is recommended to be in service by November 2007

2010 New Frakes 12.0/16.0 MVA Substation and Tap

Construct a new 161 to 24.9 kV substation as recommended in the current LRSS and the forthcoming Power Supply Study. The new delivery point is to unload the existing Carpenter Substation and is recommended to be in service by March 2010

EXHIBIT H

CVE Regulators (Code 604)

Pages: 2

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

VOLTAGE REGULATOR RECOMMENDATIONS AND COST ESTIMATES

RUS CODE 604

Reasons

A = Excessive Voltage Drop	D = Unneeded
B = Overloaded	E = Switching Capacity
C = Improved Circuit Regulation	ASI = After System Improvements

Substation/Circuit	Reg. Number	Ckt	Line Section	Existing	Recommendations	Projected 2011 Peak Current	Reason(s)
Substation 1 - Alex Creek	R12-62-P51	2	12620023	3-100	Remove (ASI Alex Creek)	36a	N/A
Substation 2 - Arkland	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Substation 3 - Bacon Creek	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Substation 4 - Bledsoe	R36-36-P45	5101	36360026	N/A	N/A	8a	N/A
Substation 5 - Carpenter	R23-42-P9	8502 8502	23420009 22840032	1-100a	Remove Add 3-219a (14.4 kV)	45a (Remove ASI Frackes)	ASI 305.01
Substation 6 - Chad	R38-53-P35A	10304	38530029	3-150a	N/A	70a	N/A
Substation 7 - Cumberland Falls	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Substation 8 - Emanuel	N/A	N/A	10680114	N/A	Add 3-219a (7.62 kV)	N/A	N/A
Substation 9 - Frackes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Substation 10 - Girdler	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Substation 11 - Goldbug	N/A	6402	14880067	N/A	Add 3-219a (7.62 kV)	N/A	A
Substation 12 - Hinkle	R11-55-P23	5301 5303	11540005 17420018	3-219a	N/A Add 3-219a (7.62 kV)	24a	N/A A
Substation 13 - Jellico	N/A	4102	19790016	N/A	Add 3-100a (7.62 kV)	N/A	A
Substation 14 - Liberty Church	R09-77-P0	3	9770124	3-219a	MOVE TO LS 15190057	98a	N/A
Substation 15 - North Corbin	N/A	4803	9290059		Add 3-219a (7.62 kV)	N/A	A
Substation 16 - Ovenfork	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Substation 17 - Pine Mountain	Reg3	5002	37140031	3-100a	N/A	0a	N/A
Substation 18 - Rockhold	R15-29-P43	2202	15290037	3-219a	REMOVE	13a	N/A
Substation 19 - South Corbin	N/A	N/A	N/A	N/A	N/A	N/A	N/A

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

VOLTAGE REGULATOR RECOMMENDATIONS AND COST ESTIMATES

RUS CODE 604

COST SUMMARY

	Removed	Added	Surplus	In-Stock Spares	Required
7.62 kV Regulators					
100a	3	3	0	0	0
150a	0	0	0	0	0
219a / 300a	0	12	-	5	7
14.4 kV Regulators					
100a	1	0	1	7	0
150a	0	0	0	0	0
219a / 300a	0	3	-	4	0

100a Regulators @ $5,100/each =	$0
150a Regulators @ $6,500/each =	$0
219a Regulators @ $8,000/each =	$56,000
RUS CODE 604 (REGULATORS) =	**$56,000**

EXHIBIT I

CVE Capacitors (Code 605)

Pages: 5

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

CAPACITOR RECOMMENDATIONS AND COST ESTIMATES

RUS CODE 605

Substation	Feeder	Capacitor Number	Line Section	Existing	kV	Recommendations
1. Alex Creek	West	C12-62-P52	12620021	3-100	7.62	Remove
			11580043			Add 3-50 kVAR (14.4 kV)
2. Arkland	-	-	-	-	7.2	
3. Bacon Creek	87-01		9640201			Add 3-50 kVAR (7.62 kV)
	87-03	C09-64-P221	9640215	3-100	7.62	
4. Bledsoe	51-01	C36-57-P17	36570020	3-200	14.4	Remove
			36570020			Add 3-50 kVAR (14.4 kV)
			36700229			Add 3-100 kVAR (14.4 kV)
	51-02	C41-14-P4	41140020	3-100	14.4	Remove
			41140020			Add 3-50 kVAR (14.4 kV)
			36870015			Add 3-100 kVAR (14.4 kV)
5. Carpenter	85-01		16830019			Add 3-50 kVAR (14.4 kV)
			16640043			Add 3-50 kVAR (14.4 kV)
	85-02	C22-43-P56	22430047	3-100	14.4	Remove
			22330037			Add 3-100 kVAR (14.4 kV)
		C22-68-P64	22680026	3-100	14.4	Remove (Frackes)
		C16-75-P66	16850011	3-100	14.4	Remove
			22440008			Add 3-50 kVAR (14.4 kV)
	85-03	C22-12-P90	22120020	3-200	14.4	Remove
			22120020			Add 3-100 kVAR (14.4 kV)
		C21-16-PB76	21160039	3-100	14.4	Remove
		C21-16-PB78	21160047	3-100	14.4	Remove
			21160047			Add 3-50 kVAR (14.4 kV)
	85-04		22320010			Add 3-50 kVAR (14.4 kV)
6. Chad	103-01		38080033			Add 3-50 kVAR (14.4 kV)
	103-02		38170021			Add 3-100 kVAR (14.4 kV)
	103-04	C38-52-P100	38530041	3-200	14.4	Remove
			38530041			Add 3-100 kVAR (14.4 kV)
			37670033			Add 3-50 kVAR (14.4 kV)

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

CAPACITOR RECOMMENDATIONS AND COST ESTIMATES

RUS CODE 605

Substation	Feeder	Capacitor Number	Line Section	Existing	kV	Recommendations
7. Cumberland Falls	26-01	C08-88-P68	8880198	3-100	7.62	Remove
			8880059	3-50	7.62	Add 3-50 kVAR (7.62 kV)
			8880083	3-50	7.62	Add 3-50 kVAR (7.62 kV)
	26-04	C14-22-P5	14220013	3-100	7.62	Remove
		C14-27-P8	14270055	3-100	7.62	Remove
			14260123			Add 3-50 kVAR (7.62 kV)
			14250051			Add 3-50 kVAR (7.62 kV)
	26-03		8870177			Add 3-50 kVAR (7.62 kV)
			8760050			Add 3-50 kVAR (7.62 kV)
8. Emanuel	21-01	C10-77-P52	10770080	3-100	7.62	
			16360030			Add 3-50 kVAR (7.62 kV)
	21-02	-	-	-	-	
	21-03	-	10470063			Add 3-50 kVAR (7.62 kV)
	21-04	C10-55-P25	10550089	3-100	7.62	Remove
			10550021			Add 3-50 kVAR (7.62 kV)
			10660154			Add 3-50 kVAR (7.62 kV)
		C10-43-P27	10430097	3-100	7.62	Remove (shift to North Corbin
9. Frackes	North		22540034			Add 3-50 kVAR (7.62 kV)
	South	C22-68-P64	14460102	3-100	14.4	Remove
			14460102			Add 3-50 kVAR (7.62 kV)
			22840060			Add 3-100 kVAR (14.4 kV)
10. Girdler	South		10590145			Add 3-100 kVAR (7.62 kV)
	North 1	-	10380020			Add 3-50 kVAR (7.62 kV)
	North 2	C10-49-P110	10490122	3-100	7.62	Remove
		-	10490122			Add 3-50 kVAR (7.62 kV)
		-	11220018			Add 3-50 kVAR (7.62 kV)

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

CAPACITOR RECOMMENDATIONS AND COST ESTIMATES

RUS CODE 605

Substation	Feeder	Capacitor Number	Line Section	Existing	kV	Recommendations
11. Goldbug	64-01	C14-48-P17	14480042	3-100	7.62	Remove
			14690135			Add 3-100 kVAR (7.62 kV)
			14470054			Add 3-50 kVAR (7.62 kV)
	64-02	C14-78-P5	14780039	3-100	7.62	
		C14-87-P22	14870031	3-100	7.62	Remove
			14870031			Add 3-50 kVAR (7.62 kV)
	64-03	C15-72-P183	15720138	3-100	7.62	
12. Hinkle	53-01	C11-63-P1	11620023	3-150	7.62	Remove
			11620088			Add 3-50 kVAR (7.62 kV)
	53-02		11620056			Add 3-50 kVAR (7.62 kV)
	53-03	C16-38-P41	20850195	3-100	7.62	Remove
			17020008			Add 3-100 kVAR (7.62 kV)
			17420017			Add 3-50 kVAR (7.62 kV)
	53-04		10890060			Add 3-50 kVAR (7.62 kV)
13. Jellico	41-02	C19-79-P31	19790016	3-100	7.62	
14. Liberty Church	North	C09-57-P118	9570107	3-100	7.62	
	South 1	C09-58-P72	9580073	3-100	7.62	Remove
			9670066			Add 3-50 kVAR (7.62 kV)
	South 2		9770114			Add 3-50 kVAR (7.62 kV)
			15190045			Add 3-50 kVAR (7.62 kV)
15. North Corbin	48-01	C09-36-P22	9360055	3-100	7.62	Remove
			9360067			Add 3-50 kVAR (7.62 kV)
	48-02	-	9280176	-	-	Add 3-50 kVAR (7.62 kV)
	48-03	C09-19-P59	9190070	3-100	7.62	Remove
			9190070			Add 3-50 kVAR (7.62 kV)
			9280183			Add 3-100 kVAR (7.62 kV)
		C10-43-P27	10430097	3-100	7.62	Remove (was Emanuel)
			10320086			Add 3-50 kVAR (7.62 kV)
			10420121			Add 3-50 kVAR (7.62 kV)

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

CAPACITOR RECOMMENDATIONS AND COST ESTIMATES

RUS CODE 605

Substation	Feeder	Capacitor Number	Line Section	Existing	kV	Recommendations
16. Ovenfork	641-01	C34-86-P49	34870128	3-100	14.4	Remove
			34870128			Add 3-50 kVAR (14.4 kV)
			34780042			Add 3-100 kVAR (14.4 kV)
	641-02	C35-53-P140	35530089	3-100	14.4	
			35530029			Add 3-200 kVAR (14.4 kV)
17. Pine Mountain	50-01	-	-	-		
	50-02	C37-59-P4	37580002	3-400	14.4	
	50-03	C37-57-P75	37570063	3-400	14.4	
18. Rockholds	22-01		15240015			Add 3-50 kVAR (7.62 kV)
	22-02	C15-36-P32	15360049	3-100	7.62	
		C15-29-P37	15290031	3-100	7.62	Remove
			15270046			Add 3-50 kVAR (7.62 kV)
	22-03	C15-63-P33	15630045	3-100	7.62	Remove
			15430007			Add 3-50 kVAR (7.62 kV)
19. South Corbin	45-01	C08-79-P124	8790172	3-100	7.62	Remove
			8690238			Add 3-50 kVAR (7.62 kV)
	45-02		8590021			Add 3-50 kVAR (7.62 kV)
			9720256			Add 3-100 kVAR (7.62 kV)
	45-04	C09-43-P196	9430019	3-100	7.62	Remove
			9430019			Add 3-50 kVAR (7.62 kV)
			9620233			Add 3-100 kVAR (7.62 kV)
	45-05	C09-62-P40	9620275	3-100	7.62	Remove
		C09-63-P128	9630171	3-100	7.62	Remove
			9630171			Add 3-50 kVAR (7.62 kV)

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

CAPACITOR RECOMMENDATIONS AND COST ESTIMATES (Continued)

RUS CODE 605

SUMMARY AND COST ESTIMATES

Summary of 7.62 kV Capacitors	Totals
3-50 kVAR Banks Installed	35
3-50 kVAR Banks Removed	1
3-50 kVAR Banks Required	34
3-100 kVAR Banks Installed	6
3-100 kVAR Banks Removed	17
3-100 kVAR Banks Required	0
3-150 kVAR Banks Installed	0
3-150 kVAR Banks Removed	1
3-150 kVAR Banks Required	0

Summary of 14.4 kV Capacitors	
3-50 kVAR Banks Installed	13
3-50 kVAR Banks Removed	0
3-50 kVAR Banks Required	13
3-100 kVAR Banks Installed	8
3-100 kVAR Banks Removed	7
3-100 kVAR Banks Required	1
3-200 kVAR Banks Installed	1
3-200 kVAR Banks Removed	3
3-200 kVAR Banks Required	0

Cost Estimate

52	Banks installed @ $2,000 per bank	=	$104,000
11	Banks resized @ $1,000 per bank	=	$22,000
	Total Per Year (4 years)	=	$31,500

Note : Capacitors are provided by EKPC.
$2,000 per bank is included to cover the cost of cutouts, arresters, crossarms, and the labor to install

RUS CODE 605 TOTAL (CAPACITORS) = $126,000

EXHIBIT J

CVE Sectionalizing (Code 603)

Pages: 1

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

SECTIONALIZING RECOMMENDATIONS AND COST ESTIMATES (Continued)

RUS CODE 603

Sectionalizing Summary and Cost Estimates

Device	Added	Removed	Surplus from Sectionalizing	Present Spares	Inventory Status	Purchases & Coil Change-Outs	Final Inventory
25H	3	10	7	6	13		13
35H	15	34	19	15	34		34
50H	18	45	27	5	32		32
35-4H	5		-5	0	-5	Purchase 9	4
50-4H	20	7	-13	5	-8	Purchase 16	8
70-4H	30	9	-21	4	-17	Purchase 25	8
25L	1		-1	0	-1	Purchase 5	4
35L	16	17	1	6	7	Purchase 1	8
50L	46	21	-25	8	-17	8 from 100-L & Purchase 17	8
70L	35	28	-7	4	-3	11 from 100-L	8
100L	0	27	27	0	27		8
25GH	2	3	1		1	Purchase 4	3
35GH	6	4	-2		-2	Purchase 5	3
50GH	17	1	-16		-16	Purchase 19	3
70GH	30		-30		-30	Purchase 33	3
E15	1		-1	0	-1	2 from E50	1
E25	12	21	9	11	20		20
E35	17	19	2	15	17		17
E50	7	43	36	12	48		26
E70	19	31	12	15	27		23
E100	42	21	-21	5	-16	20 from E50 & 4 from E70	8
4E50	1		-1		-1	Purchase 2	1
4E70	1		-1		-1	Purchase 2	1
4E100	6		-6		-6	Purchase 8	2
RVE	14	6	-8	4	-4	Purchase 6	2
VWVE	11	2	-9	0	-9	Purchase 11	2

COST ESTIMATES OF SECTIONALIZING EQUIPMENT NEEDED

19	Type "L" Coil Change-Outs each at	$600	=	$11,400
30	Type "E" Coil Change-Outs each at	$600	=	$18,000
23	Type "L" Reclosers each at	$2,900	=	$66,700
50	Type "4H" Reclosers each at	$2,600	=	$130,000
12	Type "4E" Reclosers each at	$3,500	=	$42,000
61	Type "GH" Sectionalizers each at	$600	=	$36,600
17	Type "VWVE" Line Reclosers each at	$18,400	=	$312,800
	Subtotal for Reclosers and Sectionalizers		=	$617,500
	Subtotal for System -Wide Tap Fusing		=	$294,500
	RUS CODE 603 TOTAL (SECTIONALIZING)		**=**	**$912,000**

EXHIBIT K

CVE Transmission Map

NOTE: This Map was moved to the Map Appendices due to size constraints.

EXHIBIT L

CVE System Design and Operations Criteria (SDOC)

Pages: 9

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

SYSTEM DESIGN AND OPERATION CRITERIA

Each of the criteria items listed below was reviewed and concurred by the RUS General Field Representative (GFR) for Cumberland Valley Electric, Inc. on March 1, 2006.

Construction proposed in this construction work plan (CWP) is required to meet the following minimum standards of adequacy for voltages, thermal loading, safety and reliability on the system. Note that references to future conditions implies the current CWP projections.

It is further understood that the criteria given herein is considered to be a guideline and not a mandate. Oftentimes system conditions will occur which may result in a breach of a specific criteria. Such a condition is considered to be only temporary and is not intended for long range operations.

I. SYSTEM DESIGN CRITERIA

A. Substations:

1. Cumberland Valley Electric, Inc.'s power supplier, East Kentucky Power Cooperative (EKPC), has the primary responsibility for providing the substation transformer capacity including regulation. It is EKPC's responsibility to provide CVE the requested delivery voltage to CVE's low side switching structure for power distribution.

   EKPC's current policy for substation loading is under evaluation and revision. Until that policy is approved the following loading conditions are to be used for system planning.

   The following substation equipment is not to be loaded by more than the percentage shown below of **full** nameplate values:

Power Transformer	~ 90% @ existing loading conditions
	~ 95% @ projected future loading conditions
Voltage Regulators	~ 95% of the 10% buck or boost rating @ projected future loading conditions
	~ 90% of the 5% buck or boost rating @ projected future loading conditions
Breakers/Reclosers	~ continuous rating = 95% @ projected future loading conditions
	~ interrupting rating = 95% @ projected future system conditions
Busses and Switches	~ 95% @ projected future loading conditions

SYSTEM DESIGN AND OPERATION CRITERIA (Continued)

A. Substations: (Continued)

2. All new substations and/or delivery points will be justified per the current Long Range System Study as well as power supply studies following the format required by the power supplier.
3. Feeder current balance will be maintained at plus or minus 20% of the average per phase loading at peak conditions.
4. Substation feeder protection will be accomplished per the following criteria base on power transformer capacity:
   a. Phase pickup levels will be such to protect feeder conductors as well as to be approximately 1.5 - 2.0 times full load continuous current levels.
   b. Ground pickup will be set to respond to the minimum downline calculated fault current level based on a 40 ohm high impedance primary fault.
   c. Reclosing will be limited to three times with reclosing intervals of instantaneous, 5 seconds, and then 15 seconds. The reset time is to be set from 10 to 20 seconds.
5. New substation designs and construction from the high side transmission tap point to the low side regulated bus will be accomplished and paid for by CVE's power supplier, East Kentucky Power Cooperative, Inc. (EKPC). The low side switching structure will be designed and constructed by EKPC. The new low side structure will include the following:
   a. The low-side switching structure shall generally accommodate bus metering and regulation. The structure shall also have a transfer bus.
   b. Three-phase feeder reclosers will be used in lieu of feeder breakers when the available bus fault current is below 8,000 amperes or the load current is less than 500 amperes. Three-phase breakers will be used in all other duty conditions that exceed the above indicated levels.
   c. Feeder protection will utilize static or electronic means in lieu of electro-mechanical relaying.
   d. Phasing shall generally be A-B-C, left to right with one's back to the substation (this is equivalent to EKPC's phasing of 1-2-3, respectively, with 3-2-1 counterclockwise rotation).

B. Distribution Lines:

1. All new distribution lines are to be designed and built according to RUS standard construction specifications and guidelines for the medium NESC loading district.
2. All new primary construction is to be overhead except where underground is required to comply with governmental or environmental regulations, local restrictions or favorable economics.
3. New lines and line conversions are to be built according to the standard primary voltage levels as recommended in the current Long Range System Study.

SYSTEM DESIGN AND OPERATION CRITERIA (Continued)

B. Distribution Lines: (Continued)

4. New primary conductor sizes are to be determined on a case by case basis using the Economic Conductor Analysis computer program. A minimum of 1/0 ACSR is to be used on main lines, and a minimum of 2 ACSR is to be used on tap lines.
5. Primary conductors are not to be loaded for long periods of time, over 50% of their thermal rating for summer loading, and 65% for winter. Operating capacity is defined as the manufacturer's conductor ratings at the conductor's maximum operating temperature of 75° C (or 167° F), with a 25° C or (77° F) ambient temperature and a 2 mph wind. Major tie lines between substations can be loaded to 100% of operating capacity.
6. The maximum voltage drop from the substation on primary distribution lines is normally not to exceed 8 volts unregulated, 16 volts with one bank of line voltage regulators, and 24 volts with two banks of line voltage regulators. Ordinarily, lines will be limited to one bank of line regulators.
7. Single-phase taps will be multi-phased if conditions are present that meet all of the following criteria:
   a. Serve more than 60 consumers @ 13 kV, or 100 consumers @ 25 kV.
   b. Have a projected future system load over 250 kW @ 13 kV or 500 kW @ 25 kV (35 amps).
   c. The tap serves an area that is growing and or meets the three-phase extension policy guidelines.
8. Primary lines are to be rebuilt if they are found to be unsafe or in violation (when constructed) of the National Electrical Safety Code (NESC) or other applicable code clearances.
9. Poles and crossarms are to be replaced as soon as practicable if found to be physically deteriorated by inspection.
10. Conductors are to be replaced if the ACSR is found to have a rusted steel core and have contributed to four or more outages in a given year. Similarly, if copper conductor has become brittle and dangerous, and have caused at least four outages in a given year. The line will be replaced on the following criteria:
    a. At least three outages in a given year excluding right-of-way and storm related causes.
    b. More than three splices found in a given line section.
    c. More than ten (10) outage hours per year, excluding outages caused by major storms or the power supplier.

SYSTEM DESIGN AND OPERATION CRITERIA (Continued)

C. Distribution Lines Equipment:

1. Distribution class MOV arresters and related pole grounds are to be installed a minimum of every 1,500 feet of line.
2. Line voltage regulator projected future loading will be limited to 95% of nameplate rating at 10% buck or boost or 150% at 5% buck or boost.
3. Capacitor banks will be installed on distribution lines as required to maintain no less than 95% lagging power factor at peak loading conditions. Capacitors will be located so as to maximize the kW loss reduction and to limit the voltage rise on the circuit extremities.
4. Line sectionalizing devices (e.g. circuit reclosers - CR, sectionalizers, fuses, etc.) are to be applied per the following guidelines:
   a. No sectionalizing device will be located such that its rated nameplate maximum fault interrupting capacity is exceeded.
   b. Vacuum interrupting devices will be evaluated on all newly purchased units in lieu of oil interrupting.
   c. The sectionalizing system shall be designed such that any 40 ohm primary fault will be detected, interrupted and isolated.
   d. Sectionalizing devices are to be loaded to no more than 85% of continuous nameplate ratings for devices less than 50 amps and no more than 95% for devices equal to or greater than 50 amps.
   e. CR to CR coordination is to be based on a minimum required 3 cycle separation between delayed curves at the maximum fault on the downline device with a minimum of 12 cycles separation between delayed curves desired.
   f. Line reclosers shall operate on the time current characteristics curves equivalent to the Cooper Power Systems' response curves of two (2) operations on curve "A" and two (2) operations on curve "B" before lockout.
   g. Line reclosers are to be maintained systematically based on the number of operations since last maintenance. The number of years between maintenance is to be based on data compiled from actual maintenance records and is determined for each type of recloser.

D. Service Reliability:

1. Outage datum will be accumulated and evaluated in accordance with the latest RUS Bulletin 161-1.
2. Outages will be evaluated and classified as to cause by substation. The outages will then be evaluated for any reduction efforts that may be possible.
3. System wide consumer outages are to be limited to less than 3.5 consumer outage hours average per year.

SYSTEM DESIGN AND OPERATION CRITERIA (Continued)

D. Service Reliability: (Continued)

4. Efforts, where practical, shall be made to provide alternative feeds to critical loads and substation feeders.
5. Every effort is encouraged to maintain a power supplier outage average per year of 1.0 hour per consumer. For averages above 1.0 hours they will be reviewed and evaluated with TCRECC's power supplier EKPC.

E. Voltage Conditions:

1. Voltage levels will be maintained in accordance with the latest RUS Bulletin 169-4 and the latest edition of the American National Standards Institute (ANSI) Standard C84.1. The ANSI Standard defines "Range A" and "Range B" voltage limits as follows:

Range A - Service Voltage

Electric supply systems shall be so designed and operated that most service voltages are within the limits specified for this range. The occurrence of service voltages outside these limits is to be infrequent.

Range A - Utilization Voltage

User systems shall be so designed and operated such that, with service voltages within Range A limits, most utilization voltages are within the limits specified for this range. Utilization equipment shall be so designed and rated to give fully satisfactory performance throughout this range.

Range B - Service and Utilization Voltages

This range includes voltages above and below Range A limits that necessarily result from practical design and operating conditions on supply and/or user systems. Although such conditions are a part of practical operations, they shall be limited in extent, frequency and duration. When they occur, corrective measures shall be undertaken within a reasonable time to improve voltages to meet Range A requirements.

Insofar as practicable, utilization equipment shall be designed to give acceptable performances in the extremes of this range of utilization voltage, although not necessarily as good performance as in Range A.

Table 1. Voltage Ranges ANSI Standard C84.1 (120 volt base)

Range	Minimum			Maximum
	Utilization Voltage*		Service Voltage	Utilization & Service Voltage
	Non-lighting loads	Loads including lighting		
A	108	110	114	126
B	104	106	110	127

SYSTEM DESIGN AND OPERATION CRITERIA (Continued)

*Note: Caution should be exercised in using minimum utilization voltage as in some cases they may not be satisfactory for the equipment served. For example, where existing 220-volt motors are used on 208-volt circuits, the minimum utilization voltage permitted would not be adequate for the operation or motors.

2. Basic RUS Recommended Design Criteria:

   a. Rural electric distributions systems should be designed and operated to meet the voltage level requirements of "Range A" in ANSI C84.1-1970. Users' utilization electrical equipment of all types will generally be designed to give satisfactory performance in this range.

   b. It is recognized that maintaining voltage levels within "Range A" on all parts of the system at all times cannot be assured. Due to the economics of operation, there may be some system voltages that fall in extremes of "Range B" and even beyond. This may occasionally occur as the feeder reaches its design loading limit at annual or semi-annual peak loads.

   c. When voltages frequently extend into "Range B", they should be corrected to conform to "Range A" requirements within a reasonable time. If voltages on any part of the system fall outside the limits of "Range B", corrective actions should be taken immediately to bring these voltages within "Range B" requirements within a reasonable time.

      Some types of utilization equipment will not perform satisfactorily or efficiently at the extremes of "Range B" voltages. Outside "Range B" voltage limits, many types of utilization equipment may fail to operate and may be seriously damaged or suffer shortened operating life. Voltages above these limits of Range B may be especially damaging to the users' equipment.

Table 2. Voltage Drops for Rural Electric Distribution System Design (120 volt base)

	Maximum Volts Drop	**Percent Volts Drop**
Substation regulated bus (output) to last distribution transformer (primary)	8	6.67 %
Distribution transformer (primary) to service delivery connection to consumers' wiring (meter or entrance switch)	4	3.33 %
Utility service delivery point (meter or entrance switch) to consumers' utilization terminal (outlet):		
Loads including Lights	4	3.33 %
Non-lighting Loads	6	5.00 %

SYSTEM DESIGN AND OPERATION CRITERIA (Continued)

3. Basic RUS Recommended Operating Conditions

Voltage level and limit values are based on the following:

a. The outgoing substation voltage is regulated by a suitable voltage regulator as defined in Section A, Substations, of this exhibit.

b. The regulator voltage band width setting does not exceed two volts on a 120-volt base.

c. Voltage values used are at the center of the voltage regulator band width.

d. All voltage regulators, whether at the substation or out on the line, have properly set and functioning line drop compensation (LDC).

e. Only sustained voltages apply to these levels and limits. The flicker and variations caused by motor starting, equipment switching, variation of voltage within the voltage regulator band width, and similar short duration variations are not considered.

f. Refer to RUS Bulletin 169-27, *Voltage Regulator Application on Rural Distribution Systems*, for detailed guidelines on voltage regulator installation and appropriate settings for voltage level, bandwidth, time delay, range of regulation, and line drop compensation (LDC).

Table 3. Voltage Level Limits and Spread for Rural Electric Distribution Systems. (Measured at center of regulator bandwidth - 120 volt base)

	Voltage Levels (V)		**Spread**
	Min	Max	(Volts)
Substation Regulated Bus with Regulator Line Drop Compensator in Use	122	126	4
Distribution Transformer Primary Terminals:			
Adjacent to substation bus	122	126	4
At end of line (8-Volt drop)	118	122	4
Service Connection (Meter Socket):			
At transformer nearest substation bus	118	126	8
At end of line (8-Volt drop on primary)	114	122	8
Point of Consumer Utilization:			
At transformer nearest to substation bus (Lighting load)	112	126	14
(Non-lighting loads)	108	126	18
At 8-volt drop on primary (Lighting load)	110	122	12
(Non-lighting load)	108	122	14

4. Voltage input to Distribution Substations

   The voltage input to distribution substations should be kept within limits as follows:

   a. Substation voltages are kept within the design limits of the substation transformers and other equipment.

   b. The substation voltage regulator can maintain the voltages on its output bus within the limits given in the Table 3.

F. Annual System Losses:

Annual system losses will be monitored and evaluated annually per the guidelines established by the latest RUS Bulletin 45-4.

1. Efforts will be made to limit the annual distribution system losses to 8.5% or less.
2. When there is a more than 1.0 - 1.5% change in losses from one year to the next, efforts are to be made to evaluate the cause. Such efforts should include the following to assure that there is not a metering error with the power supplier or a large power consumer resulting incorrect charges and/or revenue:
   - Check all substations that have had a change in metering equipment over the last 12 - 24 months.
   - Check all new substations that were constructed over the last 12 - 24 months and verify correctness of metering.
   - Check all new or recently revised large power load metering over the last 12 - 24 months and verify correctness.
3. Line drop compensation (LDC) will be utilized on all substation regulators to improve line voltage swings and reduce overhead transformer no-load losses during off-peak conditions. Line regulators are also to utilize LDC when controls can be satisfactorily applied and monitored.

G. Annual Load Factor:

1. The annual load factor for the system will be monitored on a twelve month basis and efforts will be made to maintain a level of 50% or higher. Efforts to maintain such could be as follows:
   - Develop retail rates to encourage consumers to use and rely on electric power for their needs.
   - Regularly evaluate the economics of a system wide positive load control program for consumer air conditioning and water heater loads. Implementation of a load management program would not occur until after approval has been received from RUS and CVE's wholesale power supplier, EKPC.
   - service using another source of energy during peak loading conditions.

SYSTEM DESIGN AND OPERATION CRITERIA (Continued)

G. Annual Load Factor: (Continued)

2. Purchase the following distribution equipment based on an evaluated losses to reduce system losses and to contribute to a higher annual load factor:

   - Consumer overhead transformers
   - Consumer underground transformers
   - Voltage regulators

EXHIBIT M

CVE RUS Form 300 (O & M Survey)

Pages: 2

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

RUS FORM 300 ~ O & M SURVEY

reducing this burden to Department of Agriculture, Clearance Officer, OC, OMB Control # 0572-0025, AG Box 7630, Washington, DC 20250
You are not required to respond to this collection of information unless this form displays the currently valid OMB control number.

UNITED STATES DEPARTMENT OF AGRICULTURE RURAL UTILITIES SERVICE **REVIEW RATING SUMMARY**	BORROWER DESIGNATION KY 57 BELL DATE PREPARED 3/30/2004

Ratings on form are: 0: Unsatisfactory -- No Records 2: Acceptable, but Should be Improved -- See Attached Recommendations
NA: Not Applicable 1: Corrective Action Needed 3: Satisfactory -- No Additional Action Required at this Time

PART I. TRANSMISSION and DISTRIBUTION FACILITIES

1. Substations (Transmission and Distribution)		(Rating)
a. Safety, Clearance, Code Compliance		N/A
b. Physical Conditions: Structure, Major Equipment, Appearance		N/A
c. Inspection Records Each Substation		N/A
d. Oil Spill Prevention		N/A
2. Transmission Lines		
a. Right-of-Way: Clearing, Erosion, Appearance, Intrusions		N/A
b. Physical Condition: Structure, Conductor, Guying		N/A
c. Inspection Program and Records		N/A
3. Distribution Lines - Overhead		
a. Inspection Program and Records		3
b. Compliance with Safety Codes:	Clearances	3
	Foreign Structures	3
	Attachments	2
c. Observed Physical Condition from Field Checking:		
	Right-of-Way	3
	Other	N/A

4. Distribution - Underground Cable	(Rating)
a. Grounding and Corrosion Control	3
b. Surface Grading, Appearance	3
c. Riser Pole: Hazards, Guying, Condition	3
5. Distribution Line Equipment: Conditions and Records	
a. Voltage Regulators	3
b. Sectionalizing Equipment	3
c. Distribution Transformers	3
d. Pad Mounted Equipment	
Safety: Locking, Dead Front, Barriers	3
Appearance: Settlement, Condition	3
Other	NA
e. Kilowatt-hour and Demand Meter	
Reading and Testing	3

PART II. OPERATIONS and MAINTENANCE

6. Line Maintenance and Work Order Procedures		(Rating)
a. Work Planning & Scheduling		3
b. Work Backlogs:	Right-of-Way Maintenance	3
	Poles	3
	Retirement of Idle Services	3
	Other	

7. Service Interruptions

a. Average Annual Hours/Consumer by Cause (Complete for each of the previous 5 years)

PREVIOUS 5 YEARS (Year)	POWER SUPPLIER a.	MAJOR STORM b.	SCHEDULED c.	ALL OTHER d.	TOTAL e.	(Rating)
1999	0.06	0.11	0.03	2.00	2.19	3
2000	0.22	0.03	0.01	1.04	1.29	3
2001	0.03	0.04	0.05	1.48	1.59	3
2002	0.42	0.06	0.03	0.73	1.24	3
2003	0.04	0.10	0.02	1.44	1.60	3

b. Emergency Restoration Plan 3

8. Power Quality	(Rating)
a. General Freedom from Complaints	3
9. Loading and Load Balance	
a. Distribution Transformer Loading	3
b. Load Control Apparatus	N/A
c. Substation and Feeder Loading	3
10. Maps and Plant Records	
a. Operating Maps: Accurate and Up-to-Date	3
b. Circuit Diagrams	3
c. Staking Sheets	3

PART III. ENGINEERING

11. System Load Conditions and Losses		(Rating)
a. Annual System Losses	4.73%	3
b. Annual Load Factor	44.0%	3
c. Power Factor at Monthly Peak	95+%	3
d. Ratios of Individual Substation Annual Peak kW to kVA		3
12. Voltage Conditions		
a. Voltage Surveys		3
b. Substation Transformer Output Voltage Spread		3

13. Load Studies and Planning	(Rating)
a. Long Range Engineering Plan	3
b. Construction Work Plan	3
c. Sectionalizing Study	3
d. Load Data for Engineering Studies	3
e. Load Forecasting Data	3

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

RUS FORM 300 ~ O & M SURVEY

PART IV. OPERATION AND MAINTENANCE BUDGETS

YEAR	For Previous 2 Years		For Present Year	For Future 3 Years		
	2002	2003	2004	2005	2006	2004
	Actual $ Thousands	Actual $ Thousands	Budget $ Thousands	Budget $ Thousands	Budget $ Thousands	Budget $ Thousands
Normal Operation	$1,057	$1,109	$1,154	$1,188	$1,224	$2,974
Normal Maintenance	$1,672	$1,797	$1,800	$1,854	$1,910	$3,152
Additional (Deferred) Maintenance						
Total	$2,729	$2,906	$2,954	$3,042	$3,134	$6,126

14. Budgeting: Adequacy of Budgets for Needed Work 3 *(Rating)*

15. Date Discussed with Board of Directors 4/13/2004 *(Date)*

EXPLANATORY NOTES

ITEM NO.	COMMENTS
3b.	Telephone poles left standing too close to electric poles need to be removed.
3b.	Cable TV attachments require constant follow-up to ensure contract compliance

		TITLE	DATE
RATED BY:			
REVIEWED BY:	Ted Hampton	MANAGER	3/30/2004
REVIEWED BY:	Mike Ross	RUS GFR	3/30/2004

RUS FORM 300 (2/98)

PAGE 2 OF 2 PAGES

EXHIBIT N

CVE Primary Conductor Life Cycle Analysis

Pages: 7

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

CONDUCTOR LIFE CYCLE ANALYSIS
(NEW CONSTRUCTION LEGEND AND INPUT VALUES)

0.00%	TOTAL	Total fixed cost. This is an optional replacement for O & M + TAX + DEP + INS.
7.27%	O & M	Operations and Maintenance Expense as a percentage of Average Net Distribution Plant calculated using RUS Bulletin 1724D-101A ***Electric System Long-Range Planning Guide*** based on *RUS Fixed Charge Calculation Guide*
0.07%	TAX	Property tax: annual Form 7, last year Part A, line 13(b) Plant the taxes were paid on: annual Form 7, 2 years ago, Part C, line 5 + line 22 Tax Rate: (Property tax / Plant) x 100, or estimated future tax rate
3.15%	DEP	Most Owners use straight-line depreciation where the depreciation rate is the reciprocal of the asset's life. Use annual rate for Coop, for classes of plant Depreciation rate on RUS Form 7 Part E Lines 5(f) and line 6(f)
0.00%	INS	Insurance as a percentage of Net Distribution Plant. Calculating the cost of insurance as a percentage of investment is difficult, and the result makes little difference, therefore, it can be ignored for most applications.
2.33%	INF	The annual inflation rate.
35	m	The loan amortization period in years.
7.6 & 14.4	KV	Line to ground voltage in kV.
99.00%	PF	Peak month power factor.
6.37%	INT	Cost of Capital (Calculated using *RUS Fixed Charge Guide*) used for Present Worth Calculation
2.14%	LGR	The annual rate of growth projected for the peak demand. (Use latest PRS)
30	ULC	Useful Life of Conductor
$0.00	$/KW	Monthly demand charge in dollars per kW per month. If $/KW is zero the following dependant inputs will also be zero:
0.00%	KWI	Demand charge inflation rate.
0.00%	CF	Coincidence factor - This factor represents the coincidence between the non coindedent peak for the line and billing demand.
0.000	RMO	The number of months the metered demand exceeds the minimum biling demand.
0.000	RAT	The annual demand ratchet expressed as a decimal.
0.000	N	The ratio of the average of the squares of the monthly kW demands for the months when the metered demand exceeds the minimum billing demand to the square of the peak month demand.
$0.0516	$/KWH	Energy charge in dollars per kWH per month.
3.00%	KWHI	Energy charge inflation rate.
43.70%	LF	Annual load factor.

Select Conductor Resistance Temperature

	25° C (77° F) for Winter Loading or
√	50° C (122° F) for Summer Loading

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

CONDUCTOR LIFE CYCLE ANALYSIS

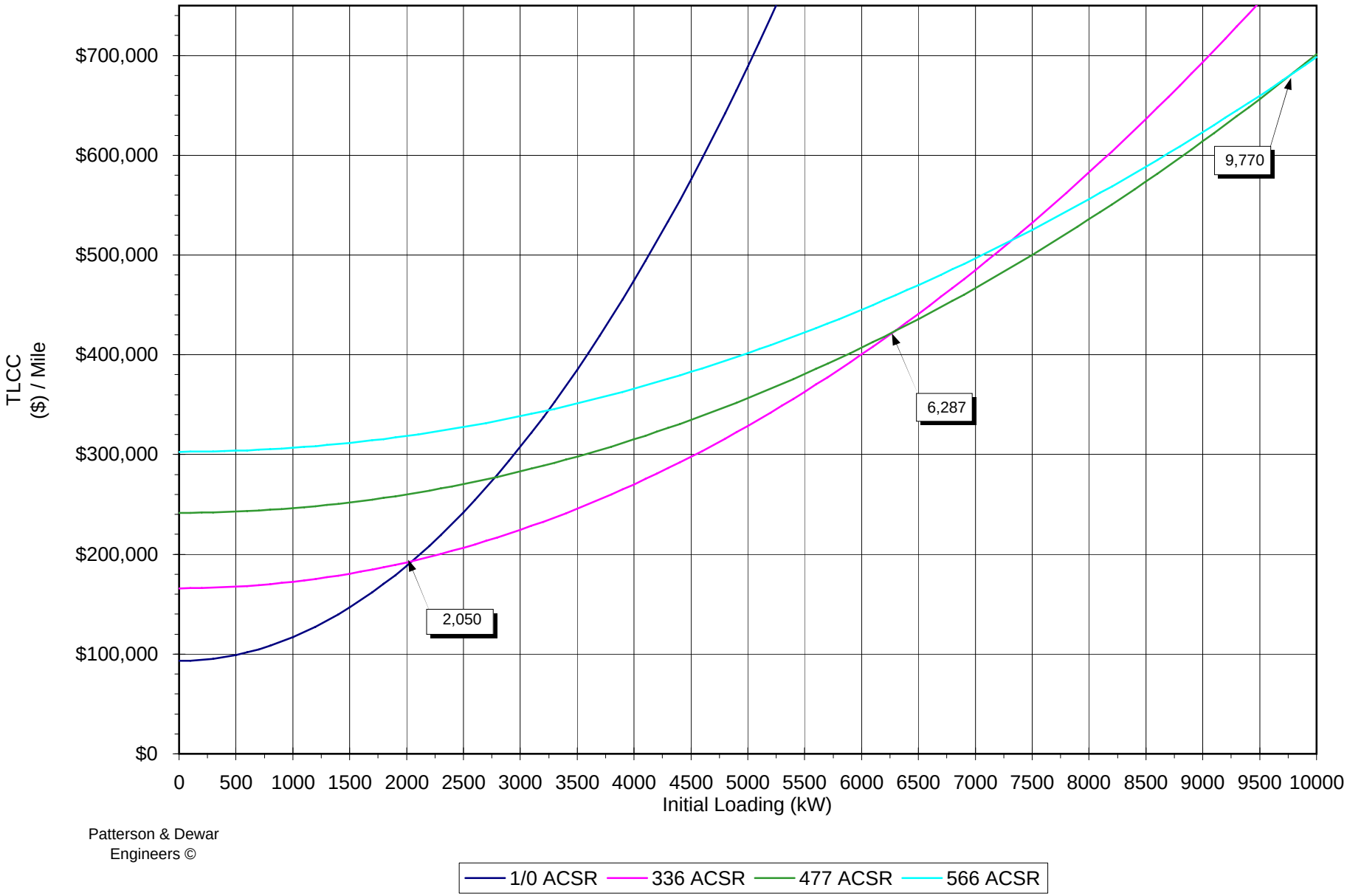
7.2 kV SUMMARY

	Initial Loading				Future Loading based on a 2.14 % LGR for 30 Years
For loads below	2,050	kW use		1/0 ACSR	3,869 KW
For loads between	2,050	kW and	6,287 kW use	336 ACSR	3,869 KW
For loads between	6,287	kW and	9,770 kW use	477 ACSR	11,866 KW
For loads above	9,770	kW use		566 ACSR	18,440 KW

Conductor	Cost Per Mile	Ohms Per Mile†	Conductor Operating Capacity* 100%	50%
1/0 ACSR	$32,000	1.120	2,603 KW	1,301 KW
336 ACSR	$57,000	0.306	5,997 KW	2,999 KW
477 ACSR	$83,000	0.216	7,582 KW	3,791 KW
566 ACSR	$104,000	0.186	8,260 KW	4,130 KW

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

Conductor Life Cycle Analysis
Total Life Cycle Cost - Three Phase 7.62 kV



Patterson & Dewar
Engineers ©

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

CONDUCTOR LIFE CYCLE ANALYSIS

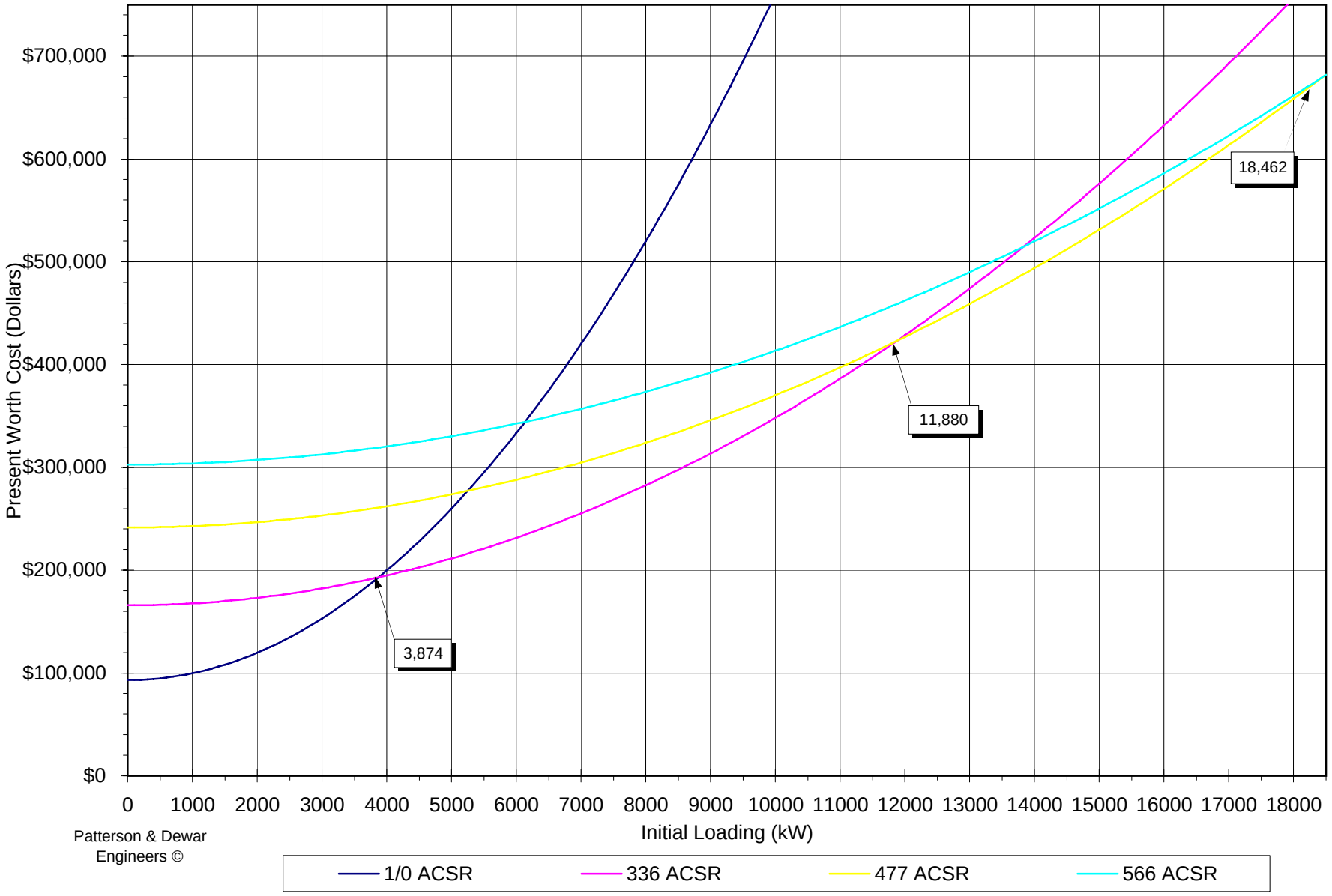
14.4 kV SUMMARY

	Initial Loading					Future Loading Based on a 2.14% LGR for 30 Years
For loads below	3,874	KW use			1/0 ACSR	7,312 KW
For loads between	3,874	KW use	11,880	KW use	336 ACSR	7,312 KW
For loads between	11,880	KW use	18,462	KW use	477 ACSR	22,423 KW
For loads above	18,462	KW use		KW use	556 ACSR	34,846 KW

	Cost Per Mile	Ohms Per Mile	Conductor Operating Capacity * 100%	50%
1/0 ACSR	$32,000	1.120	9,837 KW	4,918 KW
336 ACSR	$57,000	0.306	22,667 KW	11,334 KW
477 ACSR	$83,000	0.216	28,655 KW	14,327 KW
556 ACSR	$104,000	0.186	31,221 KW	15,610 KW

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

Conductor Life Cycle Analysis
Total Life Cycle Cost - Three Phase 14.4 kV



Patterson & Dewar Engineers ©

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

CONDUCTOR LIFE CYCLE ANALYSIS (7.2 kV)

(NEW CONSTRUCTION LEGEND AND INPUT VALUES)

0.00%	TOTAL	Total fixed cost. This is an optional replacement for O & M + TAX + DEP + INS.
7.27%	O & M	Operations and Maintenance Expense as a percentage of Average Net Distribution Plant calculated using RUS Bulletin 1724D-101A ***Electric System Long-Range Planning Guide*** based on *RUS Fixed Charge Calculation Guide*
0.07%	TAX	Property tax: annual Form 7, last year Part A, line 13(b) Plant the taxes were paid on: annual Form 7, 2 years ago, Part C, line 5 + line 22 Tax Rate: (Property tax / Plant) x 100, or estimated future tax rate
3.15%	DEP	Most Owners use straight-line depreciation where the depreciation rate is the reciprocal of the asset's life. Use annual rate for Coop, for classes of plant Depreciation rate on RUS Form 7 Part E Lines 5(f) and line 6(f)
0.00%	INS	Insurance as a percentage of Net Distribution Plant. Calculating the cost of insurance as a percentage of investment is difficult, and the result makes little difference, therefore, it can be ignored for most applications.
2.33%	INF	The annual inflation rate.
35	m	The loan amortization period in years.
7.62	KV	Line to ground voltage in kV.
99.00%	PF	Peak month power factor.
6.37%	INT	Cost of Debt (Calculated using *RUS Fixed Charge Guide*)
2.14%	LGR	The annual rate of growth projected for the peak demand. (Use latest PRS)
30	ULC	Useful Life of Conductor
$0.00	$/KW	Monthly demand charge in dollars per kW per month. If $/KW is zero the following dependant inputs will also be zero:
0.00%	KWI	Demand charge inflation rate.
0.00%	CF	Coincidence factor - This factor represents the coincidence between the non coindedent peak for the line and billing demand.
0.00%	RMO	The number of months the metered demand exceeds the minimum biling demand.
0.00%	RAT	The annual demand ratchet expressed as a decimal.
0.00%	N	The ratio of the average of the squares of the monthly kW demands for the months when the metered demand exceeds the minimum billing demand to the square of the peak month demand.
$0.0516	$/KWH	Energy charge in dollars per kWH per month.
3.00%	KWHI	Energy charge inflation rate.
43.70%	LF	Annual load factor.

Select Conductor Resistance Temperature

0	25° C (77° F) for Winter Loading or
√	50° C (122° F) for Summer Loading

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

CONDUCTOR LIFE CYCLE ANALYSIS (14.4 kV)
(NEW CONSTRUCTION LEGEND AND INPUT VALUES)

0.00%	TOTAL	Total fixed cost. This is an optional replacement for O & M + TAX + DEP + INS.
7.27%	O & M	Operations and Maintenance Expense as a percentage of Average Net Distribution Plant calculated using RUS Bulletin 1724D-101A ***Electric System Long-Range Planning Guide*** based on *RUS Fixed Charge Calculation Guide*
0.07%	TAX	Property tax: annual Form 7, last year Part A, line 13(b) Plant the taxes were paid on: annual Form 7, 2 years ago, Part C, line 5 + line 22 Tax Rate: (Property tax / Plant) x 100, or estimated future tax rate
3.15%	DEP	Most Owners use straight-line depreciation where the depreciation rate is the reciprocal of the asset's life. Use annual rate for Coop, for classes of plant Depreciation rate on RUS Form 7 Part E Lines 5(f) and line 6(f)
0.00%	INS	Insurance as a percentage of Net Distribution Plant. Calculating the cost of insurance as a percentage of investment is difficult, and the result makes little difference, therefore, it can be ignored for most applications.
2.33%	INF	The annual inflation rate.
35	m	The loan amortization period in years.
14.4	KV	Line to ground voltage in kV.
99.00%	PF	Peak month power factor.
6.37%	INT	Cost of Debt (Calculated using *RUS Fixed Charge Guide*)
2.14%	LGR	The annual rate of growth projected for the peak demand. (Use latest PRS)
30	ULC	Useful Life of Conductor
$0.00	$/KW	Monthly demand charge in dollars per kW per month. If $/KW is zero the following dependant inputs will also be zero:
0.00%	KWI	Demand charge inflation rate.
0.00%	CF	Coincidence factor - This factor represents the coincidence between the non coindedent peak for the line and billing demand.
0.000	RMO	The number of months the metered demand exceeds the minimum biling demand.
0.000	RAT	The annual demand ratchet expressed as a decimal.
0.000	N	The ratio of the average of the squares of the monthly kW demands for the months when the metered demand exceeds the minimum billing demand to the square of the peak month demand.
$0.0516	$/KWH	Energy charge in dollars per kWH per month.
3.00%	KWHI	Energy charge inflation rate.
43.70%	LF	Annual load factor.

Select Conductor Resistance Temperature

0	25° C (77° F) for Winter Loading or
√	50° C (122° F) for Summer Loading

PAGE FORWARD PAGE BACK

EXHIBIT O

CVE Substation Loading Charts

Pages: 3

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

Substation Loading

Substation		Voltage	EKPC Capacity			July 2005 Peak					January 2005 Peak				
No.	Name	KV	Base (KVA)	Summer (KVA)	Winter (KVA)	(KW)	Power Factor	(KVAR)	(KVA)	% Loading	(KW)	Power Factor	(KVAR)	(KVA)	% Loading
73	Arkland	69-12.47	6,440	6,270	8,350	2,821	92.2%	1,185	3,060	49%	2,527	88.9%	1,300	2,842	34%
87	Bacon Creek	69-13.2	14,000	13,622	18,144	4,332	96.2%	1,227	4,502	33%	3,113	96.1%	895	3,239	18%
51	Bledsoe	69-24.9	11,200	11,077	15,725	5,368	94.9%	1,789	5,658	51%	6,244	99.9%	200	6,247	40%
85	Carpenter	69-24.9	22,400	22,154	31,450	13,006	96.9%	3,332	13,426	61%	17,441	99.4%	1,849	17,539	56%
103	Chad	69-13.2	14,000	13,622	18,144	5,880	92.2%	2,465	6,376	47%	9,050	98.8%	1,436	9,163	51%
26	Cumberland Falls	69-13.2	11,200	11,077	15,725	6,058	98.1%	1,187	6,173	56%	9,516	99.9%	499	9,529	61%
21	Emmanuel	69-13.2	14,000	13,622	18,144	12,018	96.1%	3,447	12,503	92%	16,381	99.3%	1,985	16,501	91%
64	Goldbug	69-13.2	14,000	13,622	18,144	9,893	95.6%	3,033	10,347	76%	11,465	98.7%	1,846	11,613	64%
53	Hinkle	69-13.2	11,200	11,077	15,725	7,586	96.7%	1,985	7,841	71%	10,213	99.6%	941	10,256	65%
41	Jellico	69-13.2	5,600	7,860	5,540	1,973	97.2%	474	2,029	26%	2,411	99.8%	158	2,416	44%
48	North Corbin	69-13.2	14,000	13,622	18,144	8,377	96.5%	2,285	8,683	64%	9,579	99.2%	1,194	9,653	53%
641	Ovenfork	69-24.9	11,200	11,077	15,725	5,144	88.4%	2,727	5,822	53%	7,030	96.2%	1,994	7,307	46%
50	Pine Mountain	69-24.9	14,000	13,622	18,144	7,119	95.5%	2,208	7,454	55%	8,283	97.6%	1,829	8,483	47%
22	Rockhold	69-13.2	11,200	11,077	15,725	7,569	96.4%	2,095	7,854	71%	9,613	99.5%	1,001	9,665	61%
45	South Corbin	69-13.2	14,000	13,622	18,144	8,778	96.0%	2,561	9,144	67%	10,909	99.7%	891	10,945	60%
	Alex Creek 07	69-24.9	5,600	7,860	5,540										
	Girdler 07	69-13.2	11,200	11,077	15,725										
	Liberty Church 07	69-13.2	11,200	11,077	15,725										
	Frakes 10	161-24.9	14,000	13,622	18,144										
					System Totals =	105,922	95.7%	32,000	110,650		133,775	99.1%	18,018	134,983	

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

Substation Loading - Projected Winter 2010/11 Peaks

Substation		Voltage	Capacity	Existing	Proposed	Winter 2010/11 Peak Without Improvements					Winter 2010/11 Peak After System Improvements				
			Base	Winter	Winter		Power			%		Power			%
No.	Name	KV	(KVA)	(KVA)	(KVA)	(KW)	Factor	(KVAR)	(KVA)	Loading	(KW)	Factor	(KVAR)	(KVA)	Loading
73	Arkland	69-12.47	6,440	8,350	8,350	3,326	88.9%	1,713	3,741	45%	3,326	88.9%	1,713	3,741	45%
87	Bacon Creek	69-13.2	14,000	18,144	18,144	4,408	95.6%	1,355	4,612	25%	4,407	96.5%	1,190	4,565	25%
51	Bledsoe	69-24.9	11,200	15,725	15,725	7,190	99.9%	375	7,200	46%	7,187	99.9%	358	7,196	46%
85	Carpenter	69-24.9	22,400	31,450	31,450	12,915	99.7%	1,040	12,957	41%	12,906	99.3%	1,525	12,996	41%
103	Chad	69-13.2	14,000	18,144	18,144	10,508	98.6%	1,756	10,654	59%	10,509	99.5%	1,081	10,564	58%
26	Cumberland Falls	69-13.2	11,200	15,725	15,725	13,311	99.7%	1,048	13,352	85%	13,321	99.7%	1,078	13,365	85%
21	Emmanuel	69-13.2	14,000	18,144	18,144	11,108	99.3%	1,278	11,181	62%	11,122	99.7%	927	11,161	62%
64	Goldbug	69-13.2	14,000	18,144	18,144	11,775	98.7%	1,895	11,927	66%	11,877	98.8%	1,886	12,026	66%
53	Hinkle	69-13.2	11,200	15,725	15,725	8,234	99.6%	758	8,269	53%	8,291	99.8%	560	8,310	53%
41	Jellico	69-13.2	5,600	5,540	5,540	2,661	99.7%	211	2,669	48%	2,723	99.7%	214	2,731	49%
48	North Corbin	69-13.2	14,000	18,144	18,144	9,674	99.4%	1,084	9,735	54%	9,806	99.7%	820	9,840	54%
641	Ovenfork	69-24.9	11,200	15,725	15,725	8,608	96.3%	2,393	8,934	57%	8,616	98.4%	1,583	8,760	56%
50	Pine Mountain	69-24.9	14,000	18,144	18,144	9,152	99.7%	679	9,177	51%	9,148	99.7%	673	9,173	51%
22	Rockhold	69-13.2	11,200	15,725	15,725	8,565	99.7%	643	8,589	55%	8,566	99.6%	771	8,601	55%
45	South Corbin	69-13.2	14,000	18,144	18,144	13,733	99.4%	1,547	13,820	76%	13,743	99.4%	1,530	13,828	76%
	Alex Creek 07	69-24.9	5,600	5,540	5,540	2,723	100.0%	65	2,724	49%	2,741	99.7%	223	2,750	50%
	Girdler 07	69-13.2	11,200	15,725	15,725	7,867	99.4%	869	7,915	50%	7,878	99.4%	841	7,923	50%
	Liberty Church 07	69-13.2	11,200	15,725	15,725	6,977	98.3%	1,303	7,098	45%	7,007	99.1%	958	7,072	45%
	Frakes 10	161-24.9	12,000	16,000	16,000	7,720	98.5%	1,361	7,839	49%	7,722	98.9%	1,142	7,806	49%
					System Totals =	160,455	99.1%	21,373	161,872		160,896	99.3%	19,073	162,023	

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

Substation Loading - Projected Winter 2010/11 Peaks

Substation		Voltage	Capacity	Existing	Proposed	Winter 2010/11 Peak Without Improvements or Subs					Winter 2010/11 Peak After System Improvements				
No.	Name	KV	Base (KVA)	Winter (KVA)	Winter (KVA)	(KW)	Power Factor	(KVAR)	(KVA)	% Loading	(KW)	Power Factor	(KVAR)	(KVA)	% Loading
73	Arkland	69-12.47	6,440	8,350	8,350	3,326	88.9%	1,713	3,741	45%	3,326	88.9%	1,713	3,741	45%
87	Bacon Creek	69-13.2	14,000	18,144	18,144	4,408	95.6%	1,355	4,612	25%	4,407	96.5%	1,190	4,565	25%
51	Bledsoe	69-24.9	11,200	15,725	15,725	7,190	99.9%	375	7,200	46%	7,187	99.9%	358	7,196	46%
85	Carpenter	69-24.9	22,400	31,450	31,450	20,594	99.1%	2,789	20,782	66%	12,906	99.3%	1,525	12,996	41%
103	Chad	69-13.2	14,000	18,144	18,144	10,508	98.6%	1,756	10,654	59%	10,509	99.5%	1,081	10,564	58%
26	Cumberland Falls	69-13.2	11,200	15,725	15,725	13,311	99.7%	1,048	13,352	85%	13,321	99.7%	1,078	13,365	85%
21	Emmanuel	69-13.2	14,000	18,144	18,144	19,112	99.1%	2,569	19,284	106%	11,122	99.7%	927	11,161	62%
64	Goldbug	69-13.2	14,000	18,144	18,144	11,775	98.7%	1,895	11,927	66%	11,877	98.8%	1,886	12,026	66%
53	Hinkle	69-13.2	11,200	15,725	15,725	13,186	99.1%	1,794	13,307	85%	8,291	99.8%	560	8,310	53%
41	Jellico	69-13.2	5,600	5,540	5,540	2,661	99.7%	211	2,669	48%	2,723	99.7%	214	2,731	49%
48	North Corbin	69-13.2	14,000	18,144	18,144	12,387	98.5%	2,188	12,579	69%	9,806	99.7%	820	9,840	54%
641	Ovenfork	69-24.9	11,200	15,725	15,725	8,608	96.3%	2,393	8,934	57%	8,616	98.4%	1,583	8,760	56%
50	Pine Mountain	69-24.9	14,000	18,144	18,144	9,152	99.7%	679	9,177	51%	9,148	99.7%	673	9,173	51%
22	Rockhold	69-13.2	11,200	15,725	15,725	10,795	99.3%	1,281	10,871	69%	8,566	99.6%	771	8,601	55%
45	South Corbin	69-13.2	14,000	18,144	18,144	13,733	99.4%	1,547	13,820	76%	13,743	99.4%	1,530	13,828	76%
	Alex Creek 07	69-24.9	5,600	5,540	5,540					0%	2,741	99.7%	223	2,750	50%
	Girdler 07	69-13.2	11,200	15,725	15,725					0%	7,878	99.4%	841	7,923	50%
	Liberty Church 07	69-13.2	11,200	15,725	15,725					0%	7,007	99.1%	958	7,072	45%
	Frakes 10	161-24.9	12,000	16,000	16,000					0%	7,722	98.9%	1,142	7,806	49%
					System Totals =	160,746	98.9%	23,593	162,468		160,896	99.3%	19,073	162,023	

PAGE FORWARD PAGE BACK

EXHIBIT P

CVE Summary of Primary Open & Close Points

Pages: 2

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

SUMMARY OF PRIMARY "OPEN" AND "CLOSED" POINTS

LEGEND
ASAP - Change open as soon as possible
ASI - Change open after system improvement
*1-See CWP Map 1 for general locations
*2-Proposed 2010 Loads

No.	Substation Area	Line Section *1		Priority	Sub Load Transfer	Transferred Load (kW) *2
		Close	Open			
1	Alex Creek	12640008/41-01	11110049	ASI Alex Creek	Yes	+2741 kW
2	Arkland	N/A	N/A	N/A	N/A	N/A
3	Bacon Creek	N/A	N/A	N/A	N/A	N/A
4	Bledsoe	N/A	N/A	N/A	N/A	N/A
5	Carpenter	22840009/Frackes	22540039	ASI Frackes	Yes	-7722 kW
6	Chad	N/A	N/A	N/A	N/A	N/A
7	Cumberland Falls	14270025	14480114	ASI Falls	Yes	+1338 kW
8	Emmanuel	10490097/Girdler 01	10490091	ASI Girdler	Yes	-2404 kW
		10490097/Girdler 02	10490091	ASI Girdler	Yes	-864 kW
		10270068	10270036	ASI Girdler	Yes	-967 kW
		10490097/Girdler 03	10680114	ASI Girdler	Yes	-1724 kW
		10430086	10430051	ASI NC/LC	Yes	-2040 kW
9	Frackes	22840009/Frackes	22540039	ASI Frackes	Yes	+1779 kW
		22840026/Frackes	22540039	ASI Frackes	Yes	+5943 kW
10	Girdler	10490097/Girdler 01	10490091	ASI Girdler	Yes	+2404 kW
		10490097/Girdler 02	10490091	ASI Girdler	Yes	+864 kW
		10270068	10270036	ASI Girdler	Yes	+967 kW
		10490097/Girdler 03	10680114	ASI Girdler	Yes	+1724 kW
		10490135	11620021	ASI Girdler	Yes	+1891 kW
11	Goldbug	14270025	14480114	ASI Falls	Yes	-1338 kW
12	Hinkle	12640008/41-01	11110049	ASI Alex Creek	Yes	-2741 kW
		10490135	11620021	ASI Girdler	Yes	-1891 kW
13	Jellico	N/A	N/A	N/A	N/A	N/A
14	Liberty Church	Lib. Ch. 01	9580099	ASI Liberty Ch.	Yes	+3405 kW
		Lib. Ch. 02	9580099	ASI Liberty Ch.	Yes	+1273 kW
		Lib. Ch. 03	9580099	ASI Liberty Ch.	Yes	+104 kW
		9770123	9870088	ASI Liberty Ch.	Yes	+1066 Kw

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

SUMMARY OF PRIMARY "OPEN" AND "CLOSED" POINTS (Continued)

LEGEND
ASAP - Change open as soon as possible
ASI - Change open after system improvement
*1-See CWP Map 1 for general locations
*2-Proposed 2010 Loads

No.	Substation Area	Line Section *1		Priority	Sub Load Transfer	Transferred Load (kW) *2
		Close	Open			
		9770123	15190074	ASI Liberty Ch.	Yes	+1183 kW
15	North Corbin	Lib. Ch. 01	9580099	ASI Liberty Ch.	Yes	-3405 kW
		Lib. Ch. 02	9580099	ASI Liberty Ch.	Yes	-1273 kW
		Lib. Ch. 03	9580099	ASI Liberty Ch.	Yes	-104 kW
		10430086	10430051	ASI NC/LC	Yes	+2040 kW
16	Ovenfork	N/A	N/A	N/A	N/A	N/A
17	Pine Mountain	N/A	N/A	N/A	N/A	N/A
18	Rockhold	9770123	9870088	ASI Liberty Ch.	Yes	-1066 Kw
		9770123	15190074	ASI Liberty Ch.	Yes	-1183 kW
19	South Corbin	N/A	N/A	N/A	N/A	N/A
		10430086	10430051	ASI NC/LC	Yes	+2040 kW
16	Ovenfork	N/A	N/A	N/A	N/A	N/A
17	Pine Mountain	N/A	N/A	N/A	N/A	N/A
18	Rockhold	9770123	9870088	ASI Liberty Ch.	Yes	-1066 Kw
		9770123	15190074	ASI Liberty Ch.	Yes	-1183 kW
19	South Corbin	N/A	N/A	N/A	N/A	N/A

EXHIBIT Q

CVE Measured Vs. Calculated Voltages

Pages: 1

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

Minimum Line Votage Comparisons
(Actual Versus Computer Model Calculated)
For January 2005 System

Sub No.	Substation Name	Circuit No.	Line Section	Actual Min. Volts	Calculated Min. Volts	Percent Difference
26	Cumberland Falls	1	8540008	119.50	120.63	0.94%
53	Hinkle	1	12540023	119.00	121.48	2.04%
64	Goldbug	2	19190025	118.50	117.32	1.01%
22	Rockholds	2	16120013	120.75	122.67	1.57%
103	Chad	4	37770094	123.50	124.7	0.96%
				Average Difference =		1.30%

NOTE: CVE plans to collect additional data for future reference

EXHIBIT R

CVE Large Power Customers

Pages: 1

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

LARGE POWER CONSUMERS

LINE SECTION	ACCT NUM	CONSUMER	KWH	KW	LF
37470003	3747001019	BITUMINOUS LAUREL	2,124,000	7,027	0.42
34980008	3498001004	NORTH FORK COAL	885,600	2,527	0.49
15820036	1582015048	WILLIAMSBURG PLASTICS	946,800	1,815	0.72
09640206	964083034	BAPTIST MED CENTER	955,200	1,723	0.77
35730033	3573043000	CMBRLND RIVER COAL	390,960	1,572	0.35
38170052	3817038000	COASTAL CO CO	466,200	1,549	0.42
22320010	2232026004	BLUE GEM ASSET CO	489,600	1,517	0.45
22460008	2246007024	F M COAL CORP	185,760	1,102	0.23
22690001	2269003010	BELL CO FORESTRY	417,600	1,079	0.54
36870018	3687049000	DTE CLOVER	382,800	1,021	0.52
14220020	1435007000	CMBRLND FALLS STATE	351,360	990	0.49
15720153	1572092002	WHITLEY CO BD OF ED	230,400	923	0.35
36870017	3687031002	CLOVER COAL CO	113,760	834	0.19
37720116	3772023021	NALLY & HAYDON	52,560	792	0.09
10550126	1054023054	JACKSON MSC	278,400	706	0.55
41040015	41040210	APPALACHIAN FUELS	170,400	693	0.34
09570091	957070032	NORTHERN CONTOURS	216,000	644	0.47
09570058	957095006	TRI CO ASSEMBLIES	103,200	504	0.28
38180062	3818036033	NALLY & HAYDON	83,400	502	0.23
22850083	2285042000	BELL CO BD OF ED	108,000	426	0.35
15820021	1582019077	C D R MANF INC	154,800	388	0.55
09570043	957097004	TRI CO ASSEMBLIES	207,600	384	0.75
09570055	957099002	ELMO GREER & SONS	1,440	354	0.01
15720206	1572210000	WHITLEY CO BD OF ED	72,720	334	0.30
22240051	2224021020	JELLICO ENTERPRISE	28,320	319	0.12
09720278	972172015	WHITLEY CO BD OF ED	72,600	311	0.32
10490120	1049062003	KNOX CO BD OF ED	63,180	307	0.29
36790191	3679083003	HARLAN CO BD OF ED	88,400	305	0.40
15140067	1514052013	WHITLEY CO BD OF ED	59,400	302	0.27
20090013	20090300	CITY OF WILLIAMSBURG	148,120	301	0.68
16270036	1627023022	KNOX CO BD OF ED	66,000	270	0.34
09640065	964121015	CORBIN NURSING HOME	87,120	256	0.47
09380088	938061006	KNOX CO BD OF ED	64,800	245	0.37
09360074	936053029	K MART	128,750	240	0.75
34830047	3483031020	LETCHER CO BD OF ED	54,600	221	0.34
09640059	964124010	THE HERITAGE	79,920	214	0.52
14690139	1469101003	US DEPT OF STATE	91,200	213	0.59
16560001	1657008000	GIRDNER MINING	54,720	207	0.37
09360073	936056015	NCS PEARSON	63,360	176	0.50
17020025	1702017000	ALVA PATTERSON	29,520	170	0.24
22850044	2285075005	HENDERSON SETTLE CO	36,720	170	0.30
09670059	967001029	CORBIN LONDON REAL EST	19,360	168	0.16
09630148	963142001	WORLEY & ASSOCIATES	29,760	105	0.39
37720113	3772044003	MT ENTERPRISE INC	750	4	0.26

EXHIBIT S

CVE Consumer Outage Hours

Pages: 1

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

Consumer Outage Hours
(Outage hours per consumer per year)

	Outage Cause				
Year	Power Supplier	Extreme Storm	Pre-Arranged	Other	Totals
2001	0.030	0.040	0.050	1.470	1.590
2002	0.420	0.060	0.030	0.740	1.250
2003	0.040	0.100	0.020	1.440	1.600
2004	0.520	0.050	0.040	1.540	2.150
2005	0.100	0.020	0.010	1.610	1.740
Five Year Average =	0.222	0.054	0.030	1.360	1.666

EXHIBIT T

CVE CWP Project Justification & Review

Pages: 32

PAGE FORWARD PAGE BACK

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW *

CFR Code and CWP Item Number: 301.01 Estimated Cost: $174,614

Description of Proposed Construction

These projects serve to reinsulate the single and three phase lines, currently in the Hinkle Substation area, which will be served from the new Alex Creek 69/25 kV Substation. There are presently 52.9 miles of single phase and 11.7 miles of three phase in the area. Currently 23.8 miles of single phase and 5.3 miles of three phase line require reinsulation to 25 kV.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Alex Creek….	Various	23.8	1ø 12.5 kV	1ø 25 kV
	Various	5.3	3ø 12.5 kV	3ø 25 kV

Reason for Proposed Construction

This construction, in conjunction with conversion to 25 kV, will negate the need to reconductor the area as well as relieve a transformation capacity issue at the Hinkle Substation. Reliability in the Alex Creek area will improve substantially.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
104	12.2	77,157	59	4.3	27,983

The losses will be reduced by $49,174 per year. Voltage drops on the circuit extremities will be reduced by 7.90 volts.

Alternate Corrective Plans Investigated

Upgrading transformation capacity at Hinkle and reconductoring the Alex Creek area with 336 ACSR did not prove to be a viable alternative. Additional transformation capacity in the northwest portion of the Hinkle service area, in the form of the new Girdler substation, along with the Alex Creek Substation proves to be more economical. Placing Alex Creek in service at 25 kV and converting the distribution system proves to be the most cost-effective alternative.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 301.02 Estimated Cost: $87,822

Description of Proposed Construction

Replace 1.05 miles of three phase # 2 ACSR conductor with three phase # 336 ACSR SC. Upgrade poles and equipment for a double circuit.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Alex Creek	Sub-12540025	1.05	3 # 2 ACSR	3 # 336 ACSR

Reason for Proposed Construction

This construction will provide an upgraded feeder from the new substation to the main three phase line in the Alex Creek Substation area. The line will be built poled for a DC, but initially will be only SC.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
59	4.9	6,927	59	4.3	5,297

The losses will be reduced by $1,630 per year. Voltage drops on the circuit extremities will be reduced by 0.60 volts.

Alternate Corrective Plans Investigated

Using the Economic Conductor Analysis 1/0 ACSR appears to be the most economical alternative. However, there is a periodic coal mine load in the service, which is not included in future system load projections, which will dictate the use of 336 ACSR conductor.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 305.01 Estimated Cost: $159,360

Description of Proposed Construction

Replace 4.98 miles of single phase # 1/0 ACSR conductor with three phase # 1/0 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Carpenter	23420001-23250003	4.98	1 # 1/0 ACSR	3 # 1/0 ACSR

Reason for Proposed Construction

The SDOC criteria for multi-phasing a single phase line is a loading projection of between 35 and 50 A. The projected loading for LS 23420001 is 35 A, within the criteria. This project will not only improve phase balancing but service reliability as well. An additional benefit is the improved phase balance results in less conductor upgrades from the source to LS 23420001.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
35	4.6	47,815	13	4.35	44,691

The losses will be reduced by $3,124 per year. Voltage drops on the circuit extremities will be reduced by 0.25 volts.

Alternate Corrective Plans Investigated

Since 1/0 ACSR is the minimum conductor for multi-phasing, and the line is radial with no ability to shift load, there are no alternatives.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 305.02 Estimated Cost: $65,067

Description of Proposed Construction

Replace 1.06 miles of three phase # 1/0 ACSR conductor with three phase # 336 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Carpenter	22840009-22840027	1.06	3 # 1/0 ACSR	3 # 336 ACSR

Reason for Proposed Construction

This project will relieve excessive voltage drop and increase transfer capacity between Carpenter and the new Frackes Substation.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
137	8.2	50,940	137	6.35	45,913

The losses will be reduced by $5,027 per year. Voltage drops on circuit extremities will be reduced by 1.85 volts.

Alternate Corrective Plans Investigated

No reasonable alternatives are available.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 306.01 Estimated Cost: $157,756

Description of Proposed Construction

Replace 2.57 miles of three phase # 4/0 ACSR conductor with three phase # 336 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Chad	38360034-38440007	2.57	3 # 4/0 ACSR	3 # 336 ACSR

Reason for Proposed Construction

The purpose of this project is to improve access to the line.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
86	4.75	13,448	85	4.5	12,497

The losses will be reduced by $951 per year. Voltage drops on the circuit extremities will be reduced by 0.25 volts.

Alternate Corrective Plans Investigated

No reasonable alternatives are available.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 306.02 Estimated Cost: $7,990

Description of Proposed Construction

Replace 0.24 miles of single phase # 2 ACSR conductor with three phase # 1/0 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Chad	37770132-37760074	0.24	1 # 2 ACSR	3 # 1/0 ACSR

Reason for Proposed Construction

The SDOC criteria for multi-phasing a single phase line is a loading projection of between 35 and 50 A. The projected loading for LS 37770132 is 40 A, well within the criteria. The project will not only improve phase balancing but service reliability as well.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
40	4.9	13,584	13	4.1	13,448

The losses will be reduced by $135 per year. Voltage drops on the circuit extremities will be reduced by 0.50 volts.

Alternate Corrective Plans Investigated

Since 1/0 ACSR is the minimum conductor for multi-phasing, and the line is radial with no ability to shift load, there are no alternatives.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 306.03 Estimated Cost: $331,214

Description of Proposed Construction

Replace 5.29 miles of three phase # 1/0 ACSR conductor with three phase # 336 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Chad	31180008-38250007	5.29	3 # 1/0 ACSR	3 # 336 ACSR

Reason for Proposed Construction

This project is to replace aged conductor which is contributing to excessive outages.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
65	2.1	4,482	66	1.5	2,445

The losses will be reduced by $2,037 per year. Voltage drops on the circuit extremities will be reduced by 0.60 volts.

Alternate Corrective Plans Investigated

No reasonable alternatives are available.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 307.01 Estimated Cost: $50,880

Description of Proposed Construction

Replace 1.59 miles of vee phase # 2 ACSR conductor with three phase # 1/0 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Cumberland Falls	14070088-14280021	1.59	2# 1/0 ACSR	3 # 1/0 ACSR

Reason for Proposed Construction

The SDOC criteria for multi-phasing a single phase line is a loading projection of between 35 and 50 A. The projected loading for LS 14070088 is 44 A, well within the criteria. The project will not only improve phase balancing but service reliability as well.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
44	5.0	23,636	33	3.8	22,685

The losses will be reduced by $951 per year. Voltage drops on the circuit extremities will be reduced by 1.2 volts.

Alternate Corrective Plans Investigated

Since 1/0 ACSR is the minimum conductor for multi-phasing, and the line is radial with no ability to shift load, there are no alternatives.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 307.02 Estimated Cost: $115,688

Description of Proposed Construction

Replace 1.06 miles of three phase # 4/0 ACSR conductor with three phase DC # 336 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Cumberland Falls	Sub-14160064	1.06	3 # 4/0 ACSR	3 DC # 336 ACSR

Reason for Proposed Construction

This project will relieve excessive voltage drop as well as improve service reliability.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
211	8.1	18,066	132 &78	7.0	13,584

The losses will be reduced by $4,482 per year. Voltage drops on the circuit extremities will be reduced by 1.1 volts.

Alternate Corrective Plans Investigated

Consideration was given to feeder regulation, which would have delayed the project until the conductor loading limit was reached in 2011. However, several factors dictate the installation of DC 336 ACSR. This is a high growth area and the recent announcement of an expansion of Cumberland Falls State Park could increase the loading of the line above the current projections. The LRSS indicates a DC # 336 ACSR for this circuit.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 307.03 Estimated Cost: $131,361

Description of Proposed Construction

Replace 1.18 miles of three phase # 1/0 ACSR conductor with three phase DC # 336 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Cumberland Falls	8880109-8870243	1.18	3 # 1/0 ACSR	3 DC # 336 ACSR

Reason for Proposed Construction

The project will relieve excessive voltage drop on the circuit extremities as well as alleviate conductor overloading. The existing 1/0 ACSR conductor is operating at 70.5 percent of capacity, which is in excess of the 65 percent winter capacity limit in the SDOC.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
162	8.4	30,564	22 & 140	6.3	22,685

The losses will be reduced by $7,879 per year. Voltage drops on the circuit extremities will be reduced by 2.1 volts.

Alternate Corrective Plans Investigated

Consideration was given to constructing a SC 336 ACSR line, poled for a double circuit. In this scenario losses increase by $1098 per year. The LRSS indicates a need for a DC # 336 ACSR and the upgrading of the South Corbin transformation capacity in 2014, along with a transfer of load from Cumberland Falls to South Corbin. Given, that after the load transfer, further shifting of the load between the circuits of the proposed DC can be performed as well as the anticipated increase in construction cost, and the costs of the additional losses, the decision to build as a DC proves to be the most viable alternative.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 307.04 Estimated Cost: $29,120

Description of Proposed Construction

Replace 0.91 miles of single phase # 2 ACSR conductor with three phase # 1/0 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Cumberland Falls	14370064-14470025	0.91	1 # 2 ACSR	3 # 1/0 ACSR

Reason for Proposed Construction

The SDOC criteria for multi-phasing a single phase line is a loading projection of between 35 and 50 A. The projected loading for LS 14370064 is 57 A, which is in excess of the upper bound of the criteria. The project will not only improve phase balancing but service reliability as well.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
57	4.1	13,040	19	3.0	12,089

The losses will be reduced by $951 per year. Voltage drops on the circuit extremities will be reduced by 1.1 volts.

Alternate Corrective Plans Investigated

Given the tap line has the ability to be loop feed from another tap, consideration was given to shifting load. The construction required under such a scenario increases by a few hundred feet and losses decrease sightly. However, the LRSS indicates the source for LS 1437004 will be the Clio substation (2012) This substation will have no wheeling charges since it will be supplied by EKPC transmission. If the load is shifted to the other tap it will remain on Cumberland Falls Substation and incur an annual wheeling charge of $1,280 under current rates. Given these facts the decision to multi-phase LS 1437004 is the most viable alternative.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 308.01 Estimated Cost: $37,621

Description of Proposed Construction

Replace 1.13 miles of single phase # 2 ACSR conductor with three phase # 1/0 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Emmanuel	10650093-10750062	1.13	1 # 2 ACSR	3 # 1/0 ACSR

Reason for Proposed Construction

The SDOC criteria for multi-phasing a single phase line is a loading projection of between 35 and 50 A. The projected loading for LS 10650093 is 45 A, well within the criteria. The project will not only improve phase balancing but service reliability as well.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
45	3.6	8,422	15	2.9	8,150

The losses will be reduced by $272 per year. Voltage drops on the circuit extremities will be reduced by 0.7 volts.

Alternate Corrective Plans Investigated

Since 1/0 ACSR is the minimum conductor for multi-phasing, and the line is radial with no ability to shift load, there are no alternatives.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 308.02 Estimated Cost: $89,141

Description of Proposed Construction

Replace 2.63 miles of single phase # 2 ACSR conductor with three phase # 1/0 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Emmanuel	10360021-10150033	2.63	1 # 2 ACSR	3 # 1/0 ACSR

Reason for Proposed Construction

The SDOC criteria for multi-phasing a single phase line is a loading projection of between 35 and 50 A. The projected loading for LS 10360021 is 71 A, in excess of the upper bound of the criteria. The project will relieve excessive voltage drop, improve phase balancing and service reliability.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
71	8.4	4,890	24	4.4	3,260

The losses will be reduced by $1,630 per year. Voltage drops on the circuit extremities will be reduced by 4.0 volts.

Alternate Corrective Plans Investigated

Since 1/0 ACSR is the minimum conductor for multi-phasing, and the line is radial with no ability to shift load, there are no alternatives.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 308.03 Estimated Cost: $86,140

Description of Proposed Construction

Replace 1.46 miles of single phase # 4/0 ACSR conductor with three phase # 336 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Emmanuel	10680014-10590148	1.46	3 # 4/0 ACSR	3 # 336 ACSR

Reason for Proposed Construction

This project serves a two-fold purpose. The first is to complete a # 336 ASCR tie between the proposed Girdler Substation and both Emmanuel and Hinkle Substation. The second is to provide voltage support to the area north of Girdler until the new substation is in service. This project together with additional regulation at LS 10680014 will allow CVE to maintain no more than eight volts drop in the area north of Girdler. The values shown in the Results of Proposed Construction are post installation of Girdler Substation.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
45	0.8	18,870	45	0.7	18,736

The losses will be reduced by $134 per year. Voltage drops on the circuit extremities will be reduced by 0.1 volts.

Alternate Corrective Plans Investigated

The only other existing route to tie all three substations with # 336 ACSR would entail 8.3 miles of reconductoring.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 309.01 Estimated Cost: $42,576

Description of Proposed Construction

Replace 0.68 miles of three phase # 1/0 ACSR conductor with three phase # 336 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Frackes	22840028-22840060	0.68	3 # 1/0 ACSR	3 # 336 ACSR

Reason for Proposed Construction

This project is to upgrade the existing three phase # 1/0 ACSR to serve as a new feeder from the Frackes Substation.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
137	5.2	8,150	137	4.5	5,162

The losses will be reduced by $2988 per year. Voltage drops on the circuit extremities will be reduced by 0.7 volts.

Alternate Corrective Plans Investigated

No reasonable alternatives are available.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 310.01 Estimated Cost: $48,150

Description of Proposed Construction

Replace 0.45 miles of three phase # 1/0 ACSR conductor with three phase DC # 336 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Girdler	Sub-10490101	0.45	3 # 1/0 ACSR	3 DC # 336 ACSR

Reason for Proposed Construction

This project is to upgrade the existing three phase # 1/0 ACSR to serve as a new feeder from the Girdler Substation.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
178	7.65	19,832	100 & 78	6.75	16,164

The losses will be reduced by $3,668 per year. Voltage drops on the circuit extremities will be reduced by 0.9 volts.

Alternate Corrective Plans Investigated

While a SC # 477 ACSR will offer lower losses initially, $1,493 per year, the voltage drop of 6.9 volts is greater. However, the LRSS indicates a DC # 336 ACSR as the most viable option.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 310.02 Estimated Cost: $33,040

Description of Proposed Construction

Replace 0.56 miles of three phase # 1/0 ACSR conductor with three phase # 336 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Girdler	Sub-10590145	0.56	3 # 1/0 ACSR	3 # 336 ACSR

Reason for Proposed Construction

This project is to upgrade the existing three phase # 1/0 ACSR to serve as a new feeder from the Girdler Substation. The existing 1/0 ACSR conductor is operating at 66.5 percent of capacity, which is in excess of the 65 percent winter capacity limit in the SDOC.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
153	3.1	5,841	153	2.5	3,260

The losses will be reduced by $2,581 per year. Voltage drops on the circuit extremities will be reduced by 0.6 volts.

Alternate Corrective Plans Investigated

The LRSS indicates # 336 ASCR as the most viable option.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 310.03 Estimated Cost: $1,958

Description of Proposed Construction

Replace 0.06 miles of single phase # 2 ACSR conductor with three phase # 1/0 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Girdler	10590181-10590140	0.06	1 # 2 ACSR	3 # 1/0 ACSR

Reason for Proposed Construction

The SDOC criteria for multi-phasing a single phase line is a loading projection of between 35 and 50 A. The projected loading for LS 10590181 is 42 A, well within the criteria. The project will not only improve phase balancing but service reliability as well.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
42	1.5	3,396	14	1.35	3,260

The losses will be reduced by $136 per year. Voltage drops on the circuit extremities will decrease by 0.15 volts.

Alternate Corrective Plans Investigated

Since 1/0 ACSR is the minimum conductor for multi-phasing, and the line is radial with no ability to shift load, there are no alternatives.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 310.04 Estimated Cost: $48,634

Description of Proposed Construction

Replace 1.49 miles of single phase # 2 ACSR conductor with three phase # 1/0 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Girdler	10170049-4970009	1.49	1 # 2 ACSR	3 # 1/0 ACSR

Reason for Proposed Construction

The SDOC criteria for multi-phasing a single phase line is a loading projection of between 35 and 50 A. The projected loading for LS 10170049 is 51 A, which is in excess of the upper bound of the criteria. The project will alleviate excessive voltage drop, improve phase balancing and reliability.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
51	8.4	6,384	17	6.4	5,433

The losses will be reduced by $951 per year. Voltage drops on the circuit extremities will decrease by 2.0 volts.

Alternate Corrective Plans Investigated

Since 1/0 ACSR is the minimum conductor for multi-phasing, and the line is radial with no ability to shift load, there are no alternatives.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 310.05 Estimated Cost: $19,643

Description of Proposed Construction

Replace 0.59 miles of single phase # 2 ACSR conductor with three phase # 1/0 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Girdler	11430029-11430039	0.59	1 # 2 ACSR	3 # 1/0 ACSR

Reason for Proposed Construction

The SDOC criteria for multi-phasing a single phase line is a loading projection of between 35 and 50 A. The projected loading for LS 11430029 is 43 A, well within the criteria. The project will not only improve phase balancing but service reliability as well.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
43	3.5	3,803	14.4	2.45	3,260

The losses will be reduced by $543 per year. Voltage drops on the circuit extremities will decrease by 1.05 volts.

Alternate Corrective Plans Investigated

Since 1/0 ACSR is the minimum conductor for multi-phasing, and the line is radial with no ability to shift load, there are no alternatives.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 310.06 Estimated Cost: $17,319

Description of Proposed Construction

Replace 0.51 miles of single phase # 2 ACSR conductor with three phase # 1/0 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Girdler	10480036-10480047	0.51	1 # 2 ACSR	3 # 1/0 ACSR

Reason for Proposed Construction

The SDOC criteria for multi-phasing a single phase line is a loading projection of between 35 and 50 A. The projected loading for LS 10480036 is 39 A, well within the criteria. The project will not only improve phase balancing but service reliability as well.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
39	1.3	6,248	13	1.2	5,841

The losses will be reduced by $407 per year. Voltage drops on the circuit extremities will decrease by 0.1 volts.

Alternate Corrective Plans Investigated

Since 1/0 ACSR is the minimum conductor for multi-phasing, and the line is radial with no ability to shift load, there are no alternatives.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 312.01 Estimated Cost: $32,000

Description of Proposed Construction

Replace 1.0 miles of single phase # 2 ACSR conductor with three phase # 1/0 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Hinkle	17620083-17730044	1.0	1 # 2 ACSR	3 # 1/0 ACSR

Reason for Proposed Construction

The SDOC criteria for multi-phasing a single phase line is a loading projection of between 35 and 50 A. The projected loading for LS 17620083 is 39 A, well within the criteria. This project will relieve excessive voltage drop, improve phase balancing and service reliability.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
39	8.5	16,844	13	4.8	16,029

The losses will be reduced by $815 per year. Voltage drops on the circuit extremities will decrease by 3.7 volts.

Alternate Corrective Plans Investigated

Since 1/0 ACSR is the minimum conductor for multi-phasing, and the line is radial with no ability to shift load, there are no alternatives.

CUMBERLAND VALLEY ELECTRIC
KY 57 BELL
GRAY, KENTUCKY

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 312.02 Estimated Cost: $41,949

Description of Proposed Construction

Replace 1.26 miles of single phase # 2 ACSR conductor with three phase # 1/0 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Hinkle	11660041-11760054	1.26	1 # 2 ACSR	3 # 1/0 ACSR

Reason for Proposed Construction

The SDOC criteria for multi-phasing a single phase line is a loading projection of between 35 and 50 A. The projected loading for LS 11660041 is 40 A, well within the criteria. This project will not only improve phase balancing but service reliability as well.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
40	6.7	3,531	13	5.6	2,852

The losses will be reduced by $679 per year. Voltage drops on the circuit extremities will decrease by 1.1 volts.

Alternate Corrective Plans Investigated

Consideration was given to 25 kV conversion and shifting this and other load to the Alex Creek 25 kV Substation. This did not prove to be a viable alternative. Since 1/0 ACSR is the minimum conductor for multi-phasing, and the line is radial with no ability to shift load, there are no alternatives.

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 313.01 Estimated Cost: $64,320

Description of Proposed Construction

Replace 2.01 miles of single phase # 2 ACSR conductor with three phase # 1/0 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Jellico	19780017-25080009	2.01	1 # 2 ACSR	3 # 1/0 ACSR

Reason for Proposed Construction

The SDOC criteria for multi-phasing a single phase line is a loading projection of between 35 and 50 A. The projected loading for LS 19780017 is 54 A, in excess of the upper bound of the criteria. This project will relieve excessive voltage drop, improve phase balancing and service reliability.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
54	14.8	18,474	18	7.6	16,029

The losses will be reduced by $2,445 per year. Voltage drops on the circuit extremities will decrease by 7.2 volts.

Alternate Corrective Plans Investigated

The LRSS indicates the conversion of the Jellico transformation to 25 kV in the first half of 2011. Consideration was given to an earlier conversion date to eliminate this particular multi-phasing project. However, given the location of the tap is near the end of the main three phase line, and the magnitude of the voltage drop, the conversion date would be 2007. The LRSS does indicate multi-phasing this tap in a later load level, even after conversion to 25 kV.

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 313.02 Estimated Cost: $279,512

Description of Proposed Construction

These projects serve to reinsulate the single and three phase lines in the Jellico Substation area, which will be served from the upgraded Jellico 69/25 kV Substation. There are presently 69.6 miles of single phase and 26.2 miles of three phase in the area. Currently 31.3 miles of single phase and 11.7 miles of three phase line require reinsulation to 25 kV.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Jellico….	Various	31.3	1ø 12.5 kV	1ø 25 kV
	Various	11.7	3ø 12.5 kV	3ø 25 kV

Reason for Proposed Construction

These projects are in conjunction with the conversion to 25 kV of the Jellico Substation.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
117	7.9	4,482	62	2.5	16,029

The losses will be reduced by $11,547 per year. Voltage drops on the circuit extremities will be reduced by 5.1 volts.

Alternate Corrective Plans Investigated

The LRSS did investigate the Jellico Substation remaining at 12.5 kV, however conversion to 25 kV proves to be the most viable alternative.

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 314.01 Estimated Cost: $56,710

Description of Proposed Construction

Replace 0.53 miles of three phase # 1/0 ACSR and # 336 ACSR conductor with three phase DC # 336 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Liberty Church	Sub-9670090	0.53	3 # 1/0 ACSR 3 # 336 ACSR	3 DC # 336 ACSR

Reason for Proposed Construction

This project is to upgrade the existing three phase # 1/0 ACSR and # 336 ACSR to serve as new feeders from the Liberty Church Substation.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
153	7.8	16,980	99 & 54	7.1	16,164

The losses will be reduced by $816 per year. Voltage drops on the circuit extremities will decrease by 0.70 volts.

Alternate Corrective Plans Investigated

The LRSS indicates a DC # 336 ACSR as the most viable alternative for this circuit.

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 314.02 Estimated Cost: $106,200

Description of Proposed Construction

Replace 1.8 miles of three phase # 1/0 ACSR conductor with three phase # 336 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Liberty Church	9770124-9870115	1.8	3 # 1/0 ACSR	3 # 336 ACSR

Reason for Proposed Construction

This project is to extend the upgrade of the existing three phase # 1/0 ACSR to serve as a feeder from the Liberty Church Substation.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
95	7.1	16,164	94	5.3	13,584

The losses will be reduced by $2,580 per year. Voltage drops on the circuit extremities will decrease by 1.80 volts.

Alternate Corrective Plans Investigated

The LRSS indicates a SC # 336 ACSR as the most viable alternative for this circuit.

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 315.01 Estimated Cost: $176,807

Description of Proposed Construction

Replace 1.62 miles of three phase DC # 4/0 ACSR conductor with three phase DC # 336 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
North Corbin	Sub-9280088	1.62	3 DC # 4/0 ACSR	3 DC # 336 ACSR

Reason for Proposed Construction

This existing conductor of Circuit 48-02 has a load projection of 272 A, even after shifting load to Circuit 48-01. This results in the conductor operating at 80 percent capacity which is well above the 65 percent winter capacity limit in the SDOC.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
71 & 274	9.4	48,902	71 & 272	8.0	39,801

The losses will be reduced by $9,101 per year. Voltage drops on the circuit extremities will decrease by 1.40 volts.

Alternate Corrective Plans Investigated

Even though load will be shifted from Circuit 48-02 when the Gray Substation (2012) is placed in service, the LRSS indicates still indicates a three phase DC # 336 ACSR for this circuit.

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 315.02 Estimated Cost: $50,089

Description of Proposed Construction

Replace 0.80 miles of three phase # 1/0 ACSR conductor with three phase # 336 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
North Corbin	9290080-9290072	0.80	3 # 1/0 ACSR	3 # 336 ACSR

Reason for Proposed Construction

The load projection for the existing 1/0 ACSR conductor is 156 A or 68 percent of capacity which is in excess of the 65 percent winter capacity limit in the SDOC.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
156	6.6	48,087	156	5.3	43,197

The losses will be reduced by $4,890 per year. Voltage drops on the circuit extremities will be reduced by 1.3 volts.

Alternate Corrective Plans Investigated

While the LRSS does not indicate a SC # 336 ACSR. This project will allow for greater load transfers between North Corbin Substation and Gray Substation (2012).

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 315.03 Estimated Cost: $ 38,350

Description of Proposed Construction

Replace 0.65 miles of three phase # 1/0 ACSR conductor with three phase # 336 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
North Corbin	9280161-9190142	0.65	3 # 1/0 ACSR	3 # 336 ACSR

Reason for Proposed Construction

The load projection for the existing 1/0 ACSR conductor is 63 A or only 42 percent of capacity, however, since the development of the model an additional 31 A of motor load has been connected on LS 9190142. If the 1/0 ACSR conductor is not upgraded there will be excessive voltage drop on the circuit extremities during normal operation of the motor as well as excessive voltage drop at the motor itself during starting.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
94	8.4	44,833	94	8.0	44,163

The losses will be reduced by $670 per year. Voltage drops on the circuit extremities will be reduced by 0.4 volts.

Alternate Corrective Plans Investigated

The LRSS does indicate a SC # 336 ACSR. No viable alternatives are available.

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 318.01 Estimated Cost: $ 125,080

Description of Proposed Construction

Replace 2.12 miles of three phase # 4/0 ACSR conductor with three phase # 336 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Rockhold	15360042-15270043	2.12	3 # 1/0 ACSR	3 # 336 ACSR

Reason for Proposed Construction

The load projection for the existing 4/0 ACSR conductor is 80 A or 36 percent of capacity. This project, together with 318.02 and 314.02 serve to complete a # 336 ACSR tie between the new Liberty Church Substation and the Rockhold Substation, which will increase load transfer capacity by 4300 kVA.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
80	6.0	22,885	80	5.7	21,948

The losses will be reduced by $937 per year. Voltage drops on the circuit extremities will be reduced by 0.3 volts.

Alternate Corrective Plans Investigated

The second existing tie between the new Liberty Church and Rockhold Substations consists of 6.6 miles of 3 # 1/0 ACSR, approximately twice the total length of 318.01 and 318.02.

DISTRIBUTION LINE CONSTRUCTION PROJECT REVIEW (Continued)

CFR Code and CWP Item Number: 318.02 Estimated Cost: $ 70,800

Description of Proposed Construction

Replace 1.2 miles of three phase # 1/0 ACSR and # 2 ACSR conductor with three phase # 336 ACSR conductor. Replace poles and equipment as required.

Substation	Line Section	Miles	Existing Phase-Wire	Proposed Phase-Wire
Rockhold	15070031-9870087	1.2	3 # 1/0 ACSR	3 # 336 ACSR

Reason for Proposed Construction

The load projection for the existing 1/0 ACSR conductor is 37 A or 17 percent of capacity. This project, together with 318.01 and 314.02 serve to complete a # 336 ACSR tie between the new Liberty Church Substation and the Rockhold Substation, will increase load transfer capacity by 4300 kVA.

Results of Proposed Construction

Future System W/O Improvements			Future System After Improvements		
Load Amps	Voltage Drop	Losses ($/year)	Load Amps	Voltage Drop	Losses ($/year)
37	5.7	21,948	37	5.5	21,814

The losses will be reduced by $134 per year. Voltage drops on the circuit extremities will be reduced by 0.2 volts.

Alternate Corrective Plans Investigated

The second existing tie between the new Liberty Church and Rockhold Substations consists of 6.6 miles of 3 # 1/0 ACSR, approximately twice the total length of 318.01 and 318.02.