APPENDIX C
INDEPENDENT ENGINEERING STUDY

McClellanville 115 kV Transmission Line

Independent Engineering Study

For

Central Electric Power Cooperative, Inc.

Columbia, SC

February 2017

Performed By:

McGavran Engineering, P. C.
801 Baxter Street, Suite 410
Charlotte, North Carolina 28202

WORK PERFORMED AND SEALED BY:

SEAL:

SIGNATURE:

Edward G. McGavran, III, P.E.
(South Carolina, P.E.)

McGavran Engineering, P. C.
801 Baxter Street, Suite 410
Charlotte, North Carolina 28202
Main: 704-347-4906
Fax: 704-347-4908

TABLE OF CONTENTS

I. INTRODUCTION.

This Independent Engineering Study ("Study") is prepared for Central Electric Power Cooperative, Inc. ("Central") of Columbia, South Carolina relating to its proposed 115 kV transmission line project to serve the McClellanville - Awendaw area ("Service Area"). Central is the transmission provider for Berkeley Electric Cooperative Inc. ("BEC"), which provides retail distribution service to this area. BEC owns all substation facilities, and Central owns all transmission facilities that serve those substations. As such, this project is a collaborative effort by both organizations to explore avenues to better serve co-op members in the Service Area. The Study is intended to evaluate and supplement the extensive work already done by the co-ops in assessing the merit of several identified project alternatives (each, a "Proposed Plan" and collectively, the "Proposed Plans") based on need, impact, and cost, as well as to offer additional insight and information that may be relevant to assessing each of the Proposed Plans.

BEC proposed upgrades to the infrastructure in the Service Area in the late 1990s to better serve members in the remoter areas of its footprint. The Service Area is now served and has been served via a 20-plus-mile distribution feeder from South Carolina Electric and Gas ("SCE&G") in Mt. Pleasant, SC, which is the sole feeder source for both SCE&G and BEC customers/members in the area. Reliability within the Service Area has always been problematic for this reason, and the magnitude of the problems is increasing as demand grows.

This Study evaluates the following criteria in reviewing the Proposed Plans:

- **Project Need**
- **Routes and impacts**
- **Alternatives**
- **Cost**

Project need will be examined and reviewed to determine if that need is legitimate and if Proposed Plan or alternative proposal can adequately fulfill that need. Need is based on reliability and capacity chiefly, but other metrics may well enter the discussion.

Line routes and their impact on surrounding areas will be examined in depth. As considerable work has been done to evaluate alternative routes and their impacts, the Study does not propose new alternative routes or specify an actual route for any Proposed Plan.

The Study will instead focus primarily on the existing Proposed Plans and assess whether they (1) meet the accepted industry criteria for investigation, and (2) have been vetted to an appropriate degree.

Project alternatives will be an evaluation of two alternatives proposed to either delay or eliminate the need for the transmission line to serve the proposed substation. These alternatives would include, but not be limited to, energy storage and onsite generation to alleviate both capacity and reliability issues that drive the project need.

Economic factors for all the Proposed Plans and alternatives will be examined as well. The Study is not geared to identify the lowest cost alternative but rather to present conclusions as to the best alternative considering all relevant factors.

II. METHODOLOGY.

The following describes the methods used by the Engineer in preparing the Study. The Engineer has reviewed all prior work done by the co-ops in establishing necessity for the project, evaluating routes, and some degree of project alternatives such as energy storage and onsite generation. The Engineer has reviewed all of this, and in addition has made a site visit to the project area. As such, the review will be the professional opinion of the Engineer in looking at all the work done, as well as add in information previously not known regarding certain components of the project such as additional information regarding reliability, cost, and impact that may be deterministic in the evaluation.

This Study considers environmental impacts but is not intended as an environmental study. The considerable environmental study work done speaks competently and clearly to those impacts. The studies were used as a means of assessing these impacts for the purpose of this report along with the field investigation.

As follows, the methods included the following:

All documents regarding the project were reviewed, and examined for professional competence, and proper focus on the areas of study they were intended. Those documents would be:

- McClellanville Power Supply Alternative Evaluation
- Macro Corridor Study Report
- McClellanville 115 kV Transmission Line Proposal – Summary Report/ Environmental Decision
- McClellanville 115 kV Transmission Project – Draft Environmental Impact Statement
- Environmental Review Process - McClellanville Transmission Line Proposal
- McClellanville 115 kV Transmission Project – Newsletter, Volume 1, No. 1
- McClellanville 115 kV Transmission Project – Newsletter, Volume 1, No. 2
- Federal Register

- McClellanville 115 kV Transmission Line Project –Environmental Impact Statement - Addendum to Scoping Report
- Appendix A – Notice of Intent
- Appendix E – Agency and Public Scoping Meeting Sign – In Sheets
- McClellanville 115 kV Transmission Project – Environmental Impact Statement – Scoping Summary Report
- McClellanville Scoping Meeting – Slides
- DRAFT EIS

As the project is proposed to solve a service issue on the BEC system, the following additional documentation was reviewed concerning system performance as related to reliability and capacity:

- BEC system growth trends.
- BEC system reliability trends including individual circuit performance and history.
- BEC distribution planning regarding the McClellanville – Awendaw area.

Engineer reviewed a significant amount of very detailed mapping related to the Service Area and Proposed Plans. Central also provided detailed cost estimates for all the transmission line alternatives. It should be reiterated that the Study evaluates the overall economic impact of each Proposed Plan and presented alternatives, but that lowest overall cost was not the determining factor in Engineer's analysis.

Engineer conducted a two-day field investigation in November 2016 that included the following tasks:

- Engaging in discussions with both Central and BEC staff regarding previously conducted system planning and operational aspects that include but are not be limited to capacity issues, reliability metrics, and environmental impacts.

- Visiting the proposed substation site to get to know firsthand the community that would be served and understand the impact and practicality of all the alternatives on that community. This was a very important aspect of the entire independent analysis because the visit afforded the Engineer an opportunity to better assess the real-world effects of each of the Proposed Plans on the community.

- Conducting a field investigation of all the transmission line routes as studied in the Macro Corridor Study ("MCS") and the Draft Environmental Impact Study ("DRAFT EIS"). This was done to verify the findings in those studies and to see if there is some additional detail or information that could be added to supplement those works and bring light to the reasoning behind the ultimate choices made. Again, the Study examined merits of the respective routes for each Proposed Plan in preparing its conclusions.

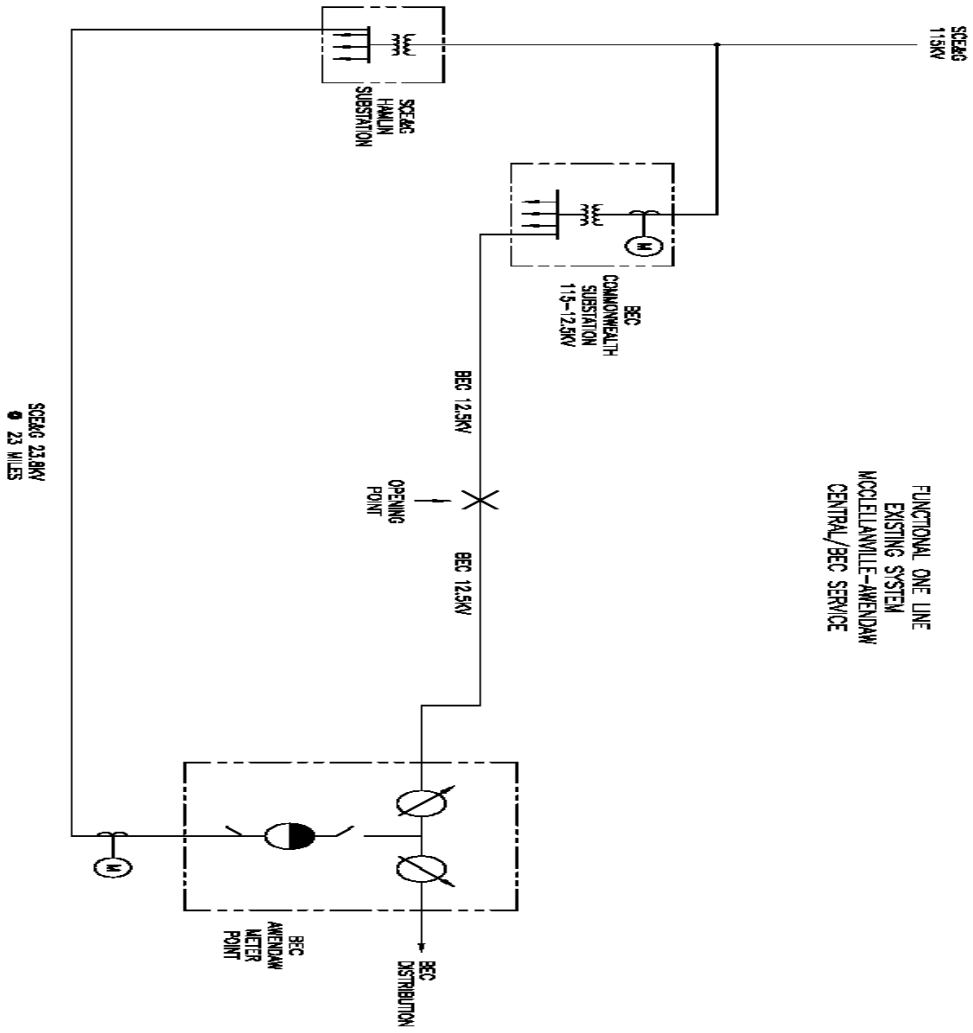
III. PROJECT NEED.

Project need has been well established through the past decade and longer based on two prime metrics, system reliability and system capacity. It is the case that in the electric utility industry these two-broad metrics decide the need for all infrastructure projects and their associated expenditures. It is also the case that this infrastructure is built based on growth trends that are observable and verifiable. It is never the case that electrical infrastructure is built to encourage and promote economic activity and growth. It is built to meet the needs of the community that result from prolonged and sustained growth and economic activity.

A. Existing System Description.

Presently the system in the McClellanville area is configured as it is represented in Figure 1 below.

Figure 1 – Existing System Functional One Line Diagram



The above diagram shows that presently the Service Area is served via a 20X mile (13.8 or 24.9 kV) distribution line owned and operated by SCE&G. That line is a long three phase distribution line, that sources at the SCE&G Hamlin substation. That substation is served from the SCE&G 115 kV system in, and around the Mount Pleasant, SC - Charleston, SC metro area. The distribution line serves the BEC Awendaw delivery that is shown in Figure 1.

Figure 2 – Awendaw Point of Delivery

The Awendaw delivery presently serves approximately 1,500 BEC members in and around the McClellanville – Awendaw area. The BEC members are located generally outside the corporate area of McClellanville. The same distribution line does serve the SCE&G customers in the area, as well as the BEC members through the Awendaw Metering Point.

The SCE&G line is built on wood poles and follows the route of U.S. Highway 17 ("US 17") north to McClellanville. As such, it parallels the Intracoastal Waterway just inland from coastal barrier islands and the Atlantic Ocean, which makes it susceptible to reliability issues arising from storm damage and environmental damage from high salt content. Other sections of the existing line parallel across US 17 as well as many roadways, thus exposing the line to traffic accidents. The long line exposure is through forested properties, increasing the likelihood of service interruption. All of these factors render this source inherently unreliable.

It is also the case that, even if a transmission resource were built to replace this distribution line, BEC would still be dependent on a SCE&G resource that is, in turn, dependent on reliability in the

Mount Pleasant area, as opposed to reliability throughout the BEC and Central - Santee Cooper area. As the system is configured now, all power flows from Mount Pleasant to McClellanville, from SCE&G's source. The SCE&G 115 kV transmission system is not configured to supply redundant service to the SCE&G substation at Hamlin which is the SCE&G source for BEC.

The most reliable mode of operation would be to have access to multiple sources, so that if one is out the other one can serve the load. One source would be considered a primary or nominal resource, the other one a secondary or contingency resource. The resources do not have to be both transmission type resources. One should be a transmission resource, in that it would be the primary resource that operates as the nominal resource. The only reason to have two transmission resources would be for the benefit of the overall transmission system, as opposed to being focused on the preservation of distribution service.

As for the existing reliability metrics for BEC, the co-op has done a superb job of keeping records of its reliability, including significant source outage information. In Appendix 1, the coop source outage information for each substation/metering point is shown from November 2011 – November 2016. That data shows that 28% of all source outages system wide occur at the Awendaw delivery, and that over that period there were 40 separate outages that inflicted 525,825 total member minutes; that complete service was lost to the delivery. In looking over the information that detail the cause of the loss of service, it is a myriad of reasons that include, but are not limited to, complete line outages on the source line, outages that took out part of the line between the source, and the delivery which takes out the delivery point. These incidents and outages are related directly to long line length and location of the line.

In summation, the co-ops' use of system reliability as a justification for the contemplated project is completely in keeping with any and all industry standards and requirements to provide improved electric service to the Service Area. System growth and system capacity are as important a set of metrics as reliability can be and are is generally easier to quantify than reliability.

B. System Growth.

BEC has grown substantially the past decade. This mirrors growth in the greater Charleston, SC metro area. The McClellanville area is now growing as a result of the growth in Mount Pleasant and Charleston. That growth is driven by the ease of travel into the metro area via US 17, which is a four-lane highway, proximity to the coastal areas, and existing infrastructure that can support the growth for both residents and businesses that are in the area. That growth extends all the way to the Santee River area north of McClellanville but is concentrated south of McClellanville along US 17. There is very little growth west of US 17 because of the lack of facilities, such as water and sewer infrastructure. So, very little if any growth will occur in the area west and north of US 17 simply because, there is no existing infrastructure to support it and it would be very expensive

to build it. The need for power is highly concentrated in the US 17 – coastal area corridor. That was also clear on the field investigation as well in November 2016.

BEC system growth trends are reflected in Table 1 below.

Table 1 – System Growth – Active meters and Memberships

Year	Active Meters	Active Members
9/30/2016	92,669	78,050
2015	90,395	75,826
2014	88,111	72,134
2013	85,307	71,451
2012	83,572	70,066
2011	82,322	68,619
2010	81,284	67,581
2009	75,156	66,257
2008	77,659	65,046
2007	76,526	63,818
2006	74,146	61,736
2005	73,044	60,059
2004	70,484	58,051
2003	67,593	56,479
2002	66,343	55,962
2001	64,891	54,384
2000	63,293	53,491

As the above table shows, BEC increased from approximately 53,000 members in 2000 to over 78,000 in 2016. Active meters, a more reliable metric of system growth, went from approximately 63,000 to over 92,000 during that period, an increase of almost 50%.

The Awendaw metering point tends to peak in the winter, driven by growth and weather conditions. The peak demand in 1994 was 3,453 KW. In 2000, that same demand was 4,505 KW. The largest peak demand maximum was 6,300 KW in 2014. The 2015 demand was 6,178 KW and the 2016 peak was 5,579 KW. Demand growth is projected at about 2% annually.

As the growth trends indicate, system demand has been increasing in the McClellanville service area for BEC. The Winter Weather Operating Agreement in Appendix 3 indicates that BEC load has grown to the point that BEC must switch load from an SCE&G feed to an alternate BEC resource in real time to avoid overload of the SCE&G facilities.

The key element of the Winter Weather Operating Agreement is found on Page 1. This agreement states that Santee Cooper (in physical reality BEC) is allowed a max of 120 amps at the McClellanville delivery. When temperatures are forecasted to fall below 23 degrees F north of the

Mount Pleasant and McClellanville areas, or if for any reason anticipated electrical demand is expected to exceed 120 amps per phase, BEC will be dispatched to switch load off the Awendaw meter point and over to the BEC Commonwealth substation via the circuit that ties with the Awendaw meter point.

Physical real-time switching is a very difficult and inefficient mode of operation when used in this manner to avoid an overload condition on the long distribution feeder from Hamlin.

The SCE&G 23.9 kV source to BEC starts at the termination of a 23-mile distribution line. Thus, the Service Area is subject to poor reliability and limited capacity from a source that nominally serves the Awendaw metering point. As such, the current SCE&G source is insufficient to reliably serve the Service Area.

C. Conclusions and Recommendations.

The Engineer reaches the following conclusions about project need/necessity as follows:

1. The reliability indices and associated data compiled and tracked by BEC prove that the project is well justified in terms of need for improved system reliability. The Awendaw metering point, which is fed from a 23-mile-long 23.9 kV feeder from the SCE&G Hamlin substation, is a long, exposed line inadequate for serving the Service Area.

2. As presently configured, all power flows from the SCE&G source in Mount Pleasant to McClellanville and beyond. Any minimally adequate transmission alternative should therefore bring power in from another source to insure equivalent reliability to the Service Area. The existing system as shown above in Figure 1 shows that there is no N-1 capability available. N-1 is defined as having reasonable service capability available in the event one source is lost. The only possible way to do that is to have another power resource as opposed to staying dependent on the reliability of one source.

   The N-1 contingency in this case would be to have one source from SCE&G supplemented by a second resource from Central. That would best be served by having a strong Central source at the proposed McClellanville substation, and using the distribution system from Commonwealth as a contingency resource. That would fit the N-1 criteria for the BEC members in that service area.

3. Limits on current capacity further illustrate the need for the project. This is most evidenced by the Winter Operating Agreement between BEC and SCE&G governing the capacity management of the existing resource, a 23.9 kV L-L circuit from Hamlin. This resource cannot deliver more than 120 amps to Awendaw. The operating agreement stipulates that under certain conditions as mentioned above, at least some portion the load at Awendaw must be switched to the BEC Commonwealth substation to assure that the maximum load

threshold is not exceeded. This mode of operation is neither reliable nor efficient. As such, the project is justified by bringing in a resource with greater capacity that avoids having to do real-time switching to maintain system integrity.

4. System growth is increasing in the entire service area, and in particular the area in and around Mount Pleasant and Charleston, SC, further underscoring the need for the project in the Service Area. BEC has seen its number of active services increase by almost 50% since 2000. Load on Awendaw, which will be served via the proposed McClellanville substation, was at 3,453 KW in 1994 and has peaked at 6,300 KW (2.7% Annual Load Growth over 30 years) in 2014. Growth is being driven by access to the area, via US 17 and the coastal area east southeast of the highway. There is an established infrastructure in that area, such as adequate water and sewer facilities, roads, and communications facilities, indicating that the area will likely be the source of further growth in the foreseeable future.

5. BEC and all electric utilities respond to growth trends as opposed to attempting to drive those trends. Development north and west of the US 17 corridor will not be encouraged by any project of this nature. There is not any existing infrastructure as mentioned here that is present to drive growth outside of the US 17 corridor. It would take a huge infrastructure development that would be a cost prohibitive to undertake compared to any electric expansion to serve existing load that is growing in a defined area.

6. The support studies and documentation indicate some of the capacity issues highlighted here. Others like the operational limitations mentioned in the Winter Weather Operating Agreement are recent developments not mentioned previously. Appendix 4 has the most recent planning documentation that addresses need by Central. At the time, the original plan for McClellanville was made in 2002. Projected load on the proposed substation was 9,065 KW which would include all the existing Awendaw metering point load and transferring some from Commonwealth to alleviate capacity and distribution line exposure issues on the long circuit from Commonwealth.

   The foregoing illustrates that the long-term system reliability and capacity benefits are not limited just to the existing Awendaw service area, further illustrating project necessity.

The growth rates are consistent with the system demand and consumer growth trends on both a system wide and localized basis.

IV. TRANSMISSION LINE ROUTE ANALYSIS AND IMPACTS.

Central has proposed to mitigate the reliability and capacity issues in the Service Area by constructing a single-circuit 115 kV transmission line to feed the site of the proposed

McClellanville substation. This would be a radial line and would source either SCE&G in the Mount Pleasant area or a line provided by Central from the Santee Cooper transmission system.

Based on the available options for transmission service to McClellanville, the best interests of BEC are served by having the line source a Santee Cooper resource due to N-1 contingencies.

Reliability and capacity factors must be balanced with other factors such as environmental impact and cost, which frequently have an inverse correlation. That is, minimization of environmental impacts can affect the cost of a project dramatically.

A. <u>Transmission Line Routes Studied</u>:

The Proposed Plans provide the following five routing/sourcing alternatives for getting the 115 kV source over to the proposed McClellanville site:

- Source the 115 kV Central/Santee Cooper line at Belle Isle substation north of the Santee River and come south down the US 17 corridor to the proposed McClellanville site.

- Source the Santee Cooper 230 – 115 kV substation at Charity which serves the North Charleston area. Construct the 115 kV line from there by taking a route northeast from Charity to the proposed McClellanville site.

- Source the Santee Cooper 115 kV source at Jamestown and construct a 115 kV line from Jamestown southeast from the delivery to the proposed McClellanville site.

- Source the Santee Cooper 230 kV line that connects Winyah and Charity 230 kV points and install a 230 -115 kV substation at Honey Hill. Then construct a 115 kV line from Honey Hill to the proposed McClellanville substation.

- Source the SCE&G 115 kV source at or around the BEC Commonwealth substation, and construct a 115 kV line north up the US highway 17 corridor to the proposed McClellanville site.

The Proposed Plans have been evaluated to some degree in the MCS and the DRAFT EIS. The Study summarizes those findings and present the Engineer's conclusions regarding same.

The Study's examination of "impacts" will not be limited just to environmental impact but will also address system impact. As such, all impacts are analyzed in light of how they fit the need basis of the entire project. If project necessity is not met via reliability and/or capacity, it is noted as such and may be eliminated accordingly.

A synopsis of each Proposed Plan is given below and is based on the evaluations in the studies and the field investigation by the Engineer in November of 2016.

B. Proposed Plans For Individual Routes and Sources.

1. Proposed Plan 1: Belle Isle Substation 115 kV Source:

The Belle Isle substation is a substation on the Santee Electric co-op system and is served via a 115 kV line from the Santee Cooper source at Winyah. Winyah is a strong 230 -115 kV source and serves Belle Isle on a radial feed from Winyah. To construct a 115 kV line from Belle Isle to McClellanville, it would include a lengthy crossing of the Santee River and then following the US 17 corridor south to the proposed McClellanville substation.

The Santee River Delta ("Delta") crossing involves constructing an overhead or underground transmission line across a two-mile expanse of diverse salt marsh ecosystem.

As illustrated by the MCS and DRAFT EIS, the environmental impact on this crossing will largely be to birds by causing collisions with the conductors across the Delta. The impact of a cleared right of way would be marginal because the crossing would be located along the pre-existing route of the bridge on US 17.

Using a directional bore, under the delta to get the transmission line across the marsh has been examined. Since the impact of the bore would be to put the line underground it would eliminate the bird collision issue. However, it would challenge other aspects of the project involving need.

The Risk Corridor scores range from a low of 6.2 to a high of 18.2. Part of the reason the scores are low is that the national forest areas are not heavily impacted. However, the Santee River crossing is a significant barrier that can cause reliability problems as will be discussed below.

To reiterate, factors establishing "need" include improving reliability and alleviating capacity concerns in the Service Area. Using any route as defined in the MCS from Belle Isle would address need as follows:

Capacity: Capacity issues are readily addressed by this alternative and any other 115 kV alternatives, primarily because the co-op unloads existing source distribution line would be unloaded from SCE&G and transferred to the co-ops' proposed McClellanville substation. The co-ops could then eliminate the Awendaw metering point from service and its corresponding system capacity concerns.

Reliability: There are several ways to quantify the effects of a capital project on system reliability. As discussed in Section III above, the threshold industry standard for acceptable reliability is the

N-1 criteria as defined by NERC is preserving service in the event a source is lost. In this case, the criteria are applied by Central serving as the transmission source. In the event that the source is out of service, it is possible to maintain service by switching distribution load over to Commonwealth for the time that service is down. That source would be from SCE&G, which is independent of the Central source at Belle Isle. This comes as close to completely satisfying the N-1 criteria as can reasonably be expected in this part of the BEC Service Area.

While the N-1 criteria is satisfied in absolute terms by adding a source not already in operation and having a backup from a completely different source, there are still issues with this alternative as follows:

First, the 115 kV from Bell Isle is a long radial line that goes all the way back to Winyah. That adds approximately 3.1 miles to the distance from Belle Isle to McClellanville. That distance to McClellanville is approximately 16.0 miles if Central utilizes the US 17 corridor. This means that total line exposure is approximately 19.1 miles to the source at Winyah.

Second, this Proposed Plan has some inherent risk from crossing a large river delta over 2.0 miles either underground or overhead. It is also the case that this Proposed Plan is located near the coastal areas, and is subject to consequential damage from storms that can happen regularly and would be difficult to repair in the delta area either overhead or underground.

The underground part of the project is only about 2.0 miles and would be only approximately 10% of the entire line exposure if the option to use a directional bore were utilized. Although this would eliminate some portion of the danger from storm damage, it would not do so for the entire project length. So, the use of a directional bore would only have a marginally positive effect on protecting the line from storm damage and would also introduce the difficulties inherent in repairing damage to the underground lines. These difficulties could extent outage times and/or require a shift in source to the Commonwealth contingent resource.

If an overhead line went down in the Delta overhead, it would be hard to access and would be a difficult process (though not as difficult and time consuming as an underground line) to getting the line back in service. So, while it does utilize a different source and a strong source from Santee Cooper, this Proposed Plan does present long term problems that would have to be dealt with from a reliability perspective over the life of the project. As such, although this Project plan does meet some of the criteria for reliability as related to need, it poses other major issues such as complexity to construct and operate as well as long line exposure.

2. <u>Proposed Plan 2: Source 230 - 115 kV at Charity Substation</u>:

The Charity 230 -115 kV substation is a major Santee Cooper substation just outside North Charleston, SC. It serves a large steel mill that has a very high reliability requirement, and is served

by the major 230 kV line from the Santee Cooper Winyah steam plant. This 230 kV source is part of the Santee Cooper 230 kV network which is a redundant system that ties major power generation and delivers bulk power throughout the state of South Carolina.

There are two routes that have been investigated from Charity. We will concentrate on the route designated in the MCS as Charity Route 1 that goes north out of Charity, and then ties in with the US 17 corridor and follows that corridor all the way to McClellanville. The alternative route from Charity goes south and adds quite a bit of unnecessary distance. Charity Route 1 is approximately 28.9 miles in total length and Charity Route 2 is approximately 34.8 miles in total length.

Environmental Impact: Both routes cross a considerable amount of marsh and wet areas along the Wando River area as is reflected in the MCS until it reaches the US 17 corridor. The MCS and DRAFT EIS both mention a considerable amount of red cockaded woodpecker habitat along the route and as the MCS shows over 49% of the entire route is in the National Forest with 14.3 square miles of the total 28.6 miles of the entire project area in the forest. The risk corridor score in the MCS is 26.0 which is the third highest of all the routes studied in the MCS.

Following the route of US 17 does not necessarily lower actual impacts as we see from the MCS and DRAFT EIS. Typically, because a transportation corridor has an established use corridor it is compatible with a transmission line and lowers overall impact. In this case, the route must go through a large area between Charity and the US 17 corridor to get to the corridor. The overall distance of the entire length of the route, being longer than most routes increases environmental impacts.

The project would all be constructed overhead as shown in the DRAFT EIS using single-pole structures, and a 75-foot-wide right of way. There are no obstacles that would require underground construction. The difficulty with this route and much of the impact from are related to accessing the project area. Due to the remoteness of the corridor in this Project Plan and lack of existing forest roads, access to the corridor for line construction and maintenance would be a major and ongoing task, especially in and around the Charity – US 17 part of the route. Both proposed paths present these difficulties.

The capacity and reliability factors for the are discussed below:

Capacity: Capacity issued are resolved by the installation of the 115 kV transmission line, which would be the source for the McClellanville substation. Upon its establishment, the Awendaw meter point and associated SCE&G distribution source would be abandoned by BEC, resolving the capacity problem permanently.

Reliability: There are several ways to quantify the effects of a capital project on system reliability. As discussed in Section III above, the threshold industry standard for acceptable reliability is the

N-1 criteria as defined by NERC is preserving service in the event a source is lost. In this case, the criteria are applied by having Central serving as the transmission source. In the event that the source is out of service, it is possible to maintain service by switching distribution load over to Commonwealth for the time that service is down. That source would be from SCE&G which is totally independent of the Central source at Charity. This comes as close to completely satisfying the N-1 criteria as can reasonably be expected in this part of the Service Area.

It is also the case that the Charity substation is a very strong source as it is part of the backbone Santee Cooper 230 kV system, which makes it the most reliable source in the entire MCS and DRAFT EIS study area. The downside of any route from this source is that they are the longest in terms of actual linear distance, and in areas that can be problematic in terms of reliability as follows:

- First, distance is a factor in reliability. At 28.9 and 34.8 miles, respectively the two routes from Charity are the longest routes available, and therefore the most line exposure which can and will cause outages from time to time.

- Second, both routes are along US 17, and near the coastal area for some distance which exposes them to nominal storm issues in the area that arise often. That is one reason the 230 kV line from Winyah to Charity takes a more upland route and avoids the coastal area along US 17. Line accessibility is a challenge on these routes as well, and in the event of a major outage could result in long-duration outages that would cripple service in the Service Area.

Although the routes from Charity do source an extremely reliable resource, they do pose challenges for long-term system reliability, a core justification for this project, due to length and location.

3. Proposed Plan 3: Source the Santee Cooper 115 kV Source at Jamestown Substation:

This Proposed Plan would involve tapping the existing 115 kV transmission line at the BEC Jamestown substation, which is served from the existing Santee Cooper 115 kV transmission system. The 115 kV transmission that is proposed as the source at Jamestown is a loop-fed transmission line from Winyah that terminates in Moncks Corner and is part of the 115 kV Santee Cooper transmission network. As such, this is a very reliable transmission resource and has more than sufficient capacity available to serve the McClellanville area. Distance is approximately 20.9 miles from the source at Jamestown to the proposed McClellanville substation.

Impacts:

The MCS shows that this Proposed Plan's route stays within the BEC service territory and is located in a very rural part of the service area. Approximately 49.9% of the route is in the national forest. It is also the case that a large part of the route follows the route of SC Highway 45 ("SC 45"), which serves to limit impacts that would typically be associated with routing away from established road corridors. It is also the case that the forest service roads in the area provide both access and right of way corridors that would minimize any impacts from the project.

The impact would revolve around red-cockaded woodpecker clusters and associated foraging habitat and some wetlands. In terms of the woodpecker issue, these clusters have been and can be readily identified and any impacts, all of which would be minor, can be appropriately mitigated. Impacts during the construction would be negligible because construction activities would (1) be limited to daylight hours, while birds are generally not in the cluster and (2) not occur within at least one to two hours of dawn and dusk. Additionally, use of mechanized equipment in a cluster is not permitted during the breeding season. Once completed, the project would not be an impediment to woodpecker clusters within the right -of-way because the 75 foot right – of – way "opening", even adjacent to Forest Service roads which would add 20 fee to the opening, would not exceed 200 feet. Foraging stands are not considered fragment as long as they are not separated by more than 200 feet.

49.9% of this Proposed Plan is located in the national forest as mentioned above. 63.4% of the route is in forested land that would include public and private land taken together. The total percentage of the route traversing wetlands is 64.6%. As this project is composed of single pole structures, there is minimal impact on wetlands and forest areas, especially after construction operations are concluded. Since access roads are already in place, this reduces overall impact throughout the project area on wetlands and forested areas.

The Proposed Plan's route does cross a wilderness linkage management area near Honey Hill. At this point, the route parallels SC 45, which already impacts this part of the wilderness area, and sets the use of it as a transportation link. As such, placing a transmission line overhead along this corridor would minimally affect the wilderness area except during construction. Clearing for the project would be limited to approximately 37.5 feet, except for some danger trees from time to time. One of the big advantages of this Proposed Plan is its high degree of easy access both for construction and ongoing O&M due to the route's proximity to roads. Its risk corridor score is rated at 19.0, which is the midrange of all risk corridor scores of all the Proposed Plans.

4. Proposed Plan 4: Santee Cooper 230 kV Source at Honey Hill:

Source the Santee Cooper 230 kV transmission line at Honey Hill and build a 115 kV transmission line from Honey Hill to McClellanville. This would follow the same route as set forth in Proposed Plan 3.

Implementing Proposed Plan 4 would be complex for the following reasons:

- The project would require a significant amount of land (6-10 acres) to be cleared, and graded at Honey Hill to provide room for a 230 - 115 kV substation. This would have impacts on the surrounding environment as well as create a complex electrical system that would require significant maintenance and technology to monitor and control the system.

- The substation itself would require a large 230 -115 kV transformer and it may be that two transformers would be needed to switch over to in case one of the units failed.

- The interconnection between the main transmission line, and the substation would add significantly to the protection, and control system of the existing line which is very secure, and has to be operated at a very high level of reliability, as it is an important backbone line for the entire Santee Cooper 230 kV network. This would likely result in the application of a three ring 230 kV breaker scheme, to assure line operation in the event of a fault on the 230 -115 kV substation.

- NERC standard operating procedures would highly discourage this alternative due to the negative impacts to the 230 kV bulk transmission system.

Impacts:

The primary environmental impacts from this Proposed Plan would result from placement of considerable facilities in wetland areas, including a major 230 – 115 kV substation. Approximately 89.9% of the entire project land area lies in wetland acreage per the MCS. Placing a major substation in such an area additionally would require changing the character and nature of the area and the major permitting and remediation attendant to such changes.

The transmission line itself in this Proposed Plan would again follow the minimal-impact route of SC 45 to McClellanville. The Proposed Plan's risk corridor score is 18.3, one of the lower such scores, due to the relatively short line length of 10.0 miles. However, the impact from the required new substation would be a major impact factor that offsets some of the impacts mitigated by a shorter line route.

Project Necessity:

Capacity: The project as proposed easily fulfills any, and all capacity needs at McClellanville on a permanent basis.

Reliability: Reliability from this source would be the best and most reliable source that could be tapped. This 230 kV line is the most reliable source in the entire study area due to the nature of

the 230 kV network requirements. Additionally, the 115 kV line to McClellanville would have less exposure only being 10.0 miles long, which is the shortest route in any of the Proposed Plans.

The alternative also satisfies the N-1 criteria, as it sources a major Santee Cooper resource and can rely on the SCE&G resources at Commonwealth to be a temporary backup in the event the primary resource was out of service. It is also the case that the 115 kV line and substation are easily accessed, facilitating efficient maintenance. However, the reliability of the bulk transmission system could be severely compromised, which overrides local reliability issues.

5. Proposed Plan 5: Construct a 115 kV Transmission Line From Commonwealth Substation to McClellanville:

This route is not covered in the DRAFT EIS or the MCS because it does not satisfy the system reliability factor for project necessity. It was mentioned in the 2011 scoping report as a route that should be considered because it generally did not affect natural areas at least around its point of origin at the BEC Commonwealth Substation.

This Proposed Plan would source the SCE&G 115 kV source that feeds the BEC Commonwealth substation. This line is a 115 kV extension from the SCE&G Hamlin substation, and sources the 115 kV SCE&G transmission system. As such, this line (which is owned by Central) is a radial feed from the SCE&G 115 kV delivery point at the Hamlin SCE&G substation. It is also the case that the Hamlin substation is the present source for the 23.9 kV distribution line. This feeds Awendaw metering point which would be replaced by the McClellanville substation and transmission line project.

The environmental and other impacts discussed in this report on this route result from placing this project in populated rights of way that are present in and around Commonwealth substation. Found just outside the city of Mt. Pleasant, SC, there is significant urbanized population in the area. The area contains many residences, often of significant monetary value, numerous shopping and other commercial centers, as well as health care and educational facilities that are not optimal for placement of transmission lines. Thus, this Proposed Plan would be very complicated to implement. Total line length from Commonwealth to Awendaw as modeled is 24.0 miles. The added line length back to Hamlin which is the source is 3.11 miles. This makes total line exposure of 27.11 miles, the second longest line exposure of any of the Proposed Plans.

Impacts:

This Proposed Plan poses similar impact to the Charity Route Proposed Plans because they follow generally the same route to McClellanville. Impacts would be similar to those routes.

There is no risk corridor score associated with this route, as the MCS and the DRAFT EIS have only studied the routes from the Charity source. It can be determined from mapping that, even though the project corridor is located along US 17, there will be areas impacted by the Proposed Plan. Parts of the Proposed Plan's corridor must be routed to avoid existing infrastructure.

The impact on existing infrastructure is likely much more pronounced than anything that would be seen on natural resources because, especially in the case of the first part of the route from Commonwealth, the project area is largely urbanized as it is in the proximity of the town of Mt. Pleasant, SC a rapidly growing bedroom community in Charleston County, SC with a population exceeding 75,000. This area is home to a significant business community and port infrastructure on the Wando River.

This Proposed Plan's transmission line route would be difficult to determine and even more difficult to acquire proper rights of way for. This route would not only pose cost and time problems, but it would also create operational problems relating to accessing and executing O&M. Such issues would also involve consideration of traffic control coordination of other city operations that could affect electric operations in real time.

Additionally, rudimentary ongoing issues such as tree trimming, construction and maintenance would impact the movement and actions of a fairly large population in real time when facilities are in proximity to homes and other areas such as schools and health care centers. Transmission line infrastructure is generally located in areas conducive to such ongoing operations and generally away from high-population-density areas to avoid such issues.

Project Necessity:

Capacity: The capacity issues at Awendaw are solved by this proposed project permanently.

Reliability: There following are reliability factors related to this Proposed Plan:

First, utilizing a 115 kV source and building a 115 kV transmission line to McClellanville would be a more reliable option than the existing 23.9 kV circuit from Hamlin.

Second, the route for this Proposed Plan poses significant reliability problems. Following the US 17 corridor from Commonwealth to McClellanville is a route that essentially parallels the coastal areas around Bull's Bay and into some wetland areas between Bull's Bay and McClellanville. The entire route of the line all the way back to Commonwealth is exposed to this harsh environment and nominal storm issues on a regular basis (as opposed to just major storms on an occasional basis).

Third, this Proposed Plan would employ a long radial transmission line of approximately 24 miles in length from Commonwealth. Additionally, the 115 kV line from Hamlin to Commonwealth is another 3 miles, which means that the entire line length from the SCE&G source will be approximately 27 miles. With the exception of the proposed Charity routes, this would represent the longest route in the entire project area. Having this long length through an area that is so inherently difficult to operate renders this Proposed Plan very difficult to justify.
Generally, a transmission feed into an area like this through such an environment requires a dual feed from another source, eventually requiring construction of another transmission line from one of the other sources to derive the full reliability benefits available from the other Proposed Plans.

Another concern here that impairs the viability of this Proposed Plan is that the same source that serves the area now is the SCE&G resource at Hamlin substation. This alternative continues the Service Area's dependency on the SCE&G 115 kV source at Hamlin. In the event of a service outage, there would be no backup from Commonwealth available to carry load at McClellanville. The N-1 capabilities available from all other Proposed Plans involving Santee Cooper are not available in this Proposed Plan.

This alternative continues to rely on the SCE&G 115 kV transmission system in and around Mt. Pleasant and Charleston, SC as a single-point resource with no backup capability either on the transmission or distribution sides. As such, this alternative does not meet the project need criteria as required by BEC and Central and was accordingly omitted from both the MCS and the DRAFT EIS. The Engineer concludes that further consideration of this Project Plan is not merited for this reason.

V. PROJECT ALTERNATIVES.

The project, as it has been analyzed in this report up to this point, has been based on the assumption that constructing a transmission line and substation is the best and most practical way to solve the reliability and capacity problems in the Service Area. However, other project alternatives have been examined due to the challenges discussed above in providing transmission service to the Service Area. This section evaluates the following two such proposed alternatives:

- Onsite generation that would supplement existing resources both at time of peak and in the case outages occurred that took the existing SCE&G distribution resource out of service.

- Energy storage technology that would store energy in the case of a capacity problem or a source outage as mentioned above.

A. Onsite Generation.

Onsite generation in the Awendaw – McClellanville area could take two forms and have various functions. First, the nature of that generation could be either full base load support and operation, or merely confined to peaking and emergency times. A base load solution would mean running the generation system as the primary resource at all times. The Study analyzes such generation implementing a natural gas generation system or a diesel generation system. In theory, such a solution could eliminate the immediate need for a transmission line.

1. Base Load Generation:

Natural gas would provide the most feasible base load solution based on capital and fuel costs. Several factors support this conclusion, with the projected low cost of natural gas over diesel fuel being the most substantial. Capital costs would be similar regardless of whether a natural gas or diesel solution were implemented. Implementing either system would require overcoming the significant challenge of efficiently providing an efficient continuous fuel supply.

Provision of a continuous diesel fuel source in the Service Area would require construction of a large onsite storage tank and a significant containment area to guard against spills in a coastal area. A spill would have very detrimental impacts on that environment, so a large part of the footprint for such a facility would be dedicated to this secondary containment. Because there is no pipeline in the service area dedicated to getting diesel fuel deployed in the service area, the only way to get fuel to the resource would be have it trucked in, which would be very expensive and potentially unreliable. Thus, the diesel resource alternative is rejected.

A natural gas generation solution requires a pipeline to be constructed to the proposed McClellanville substation, the designs for which would have to be adapted to host a generation system. The only nearly natural gas pipeline runs parallel to the 230 kV line from Winyah to Charity, and the tap point on that pipeline would be 10 miles from the proposed substation. Such a pipeline would follow the route of the proposed Honey Hill to McClellanville transmission line.

A project of that magnitude would be very expensive and have much more impact on wetlands and forest areas than a transmission line would. For this reason, the natural gas alternative is not feasible.

In sum, neither base load generation solution merits further consideration.

2. Peak Load Generation:

The McClellanville Power Supply Alternatives Evaluation (MCPAE) completed in 2002 examines both the transmission and generation alternatives. It also evaluates diesel generation primarily as a peaking resource. The use of diesel generation becomes much more standard in this case, and is discussed in the MCPAE, as an alternative to the transmission line project.

To make this project work, it would take a considerable upgrade at Awendaw or, as discussed previously, utilization of the proposed substation site at McClellanville. Also, considerable upgrades to the distribution system would be necessary to utilize the system to its fullest both at peak time and during emergency times. The historical peak demand would require the generation to exceed that level which is over 6 MW to serve the load at Awendaw during an outage on the SCE&G resource for that metering point. The 2002 analysis proposed a 5 MW generation resource. In 2002, the Awendaw metering point had not reached the 5 MW level so, to meet levels now seen on the metering point it would have to exceed the 5 MW level based on the latest data available. Since generation cannot be pushed beyond its base level it must also be sized for power factor beyond a base MW rating. In this case, the Engineer would expect that sizing a generation resource today would be somewhere between 7.5 – 10 MW.

The estimated cost for such a project in 2002 was $12,100,000. Given that the co-op would need more capacity than the 2002 study proposed, we would expect that cost figure to increase possibly up to $20,000,000 to provide this capacity as a diesel peak demand generation resource. That would exceed cost estimates of most of the transmission line proposals under consideration in this report. There would also be considerable regulatory and environmental concerns that would include a significant degree of secondary containment in the event of fuel spills.

Additionally, diesel engines also require a high degree of maintenance to remain operational, requiring regular "exercising," frequent lubrication and regular visual inspection. As such, a diesel system would require installation of a significant SCADA and communications link, adding to both the cost and complexity of this alternative, rendering this alternative less reliable than the Proposed Plans that involve construction of transmission infrastructure.

B. Energy Storage Alternatives.

The alternative to a generation system as described above is an energy storage system that would, in effect, act as a support system for the existing distribution resource from Hamlin. There are several possible solutions postulated in the Renewable Audit Report of November 2016 ("RAR").

The Study analyzes the following three possible alternatives:

- Deploy grid-level battery storage at the McClellanville site.
- Deploy behind-the-meter technology ("BTM") at individual member's premise.
- Deploy a mix of grid-level battery and BTM as above.

1. Grid-Level Storage at the Proposed McClellanville Substation Site:

In this scenario, BEC would install a single bank of 4 MW /4 MWh batteries, along with inverter and switching capabilities to activate the system and would be available either in times of capacity

requirements or during some system outages. Infrastructure upgrades to the distribution system would be necessary to accommodate the solution.

There are negative consequences to this solution. First, such a system would require advanced switching logic, necessitating a very detailed study of how the distribution system operates. This further complicates this solution. Second, this alternative would cover only 78% of all outages, a calculation apparently based on power and energy requirements on the system. That is a very straight-line calculation that has no real backup to it, and cannot be relied on as a practical calculation or predictor of operational capability. Finally, restoration time is limited to the capacity of the storage and then power is lost again until distribution service is restored.

2. <u>Behind-the-Meter Storage</u>:

Another storage alternative is a BTM storage solution. In this scenario, a transfer switch, inverter, and 4 kW/ 7 kWh battery, and critical load panel is installed and would likely need conditioned space to be operable and reliable. This alternative poses numerous complications that make it a very impractical.

First, the retail member is required to pay for battery losses, which are modeled at 15%. This modeling is an ideal number and is questionable. Also, requiring a member to accept such a complicated device may well require a significant adjustment in the BEC's membership rules and practices. BTM storage is a very complicated load management solution that is typically implemented on a voluntary basis; in this scenario, it would require involuntary imposition on members to provide any reasonable prospect for successful implementation.

Second, it is doubtful that every member on the system in the Service Area, (or any other part of it) is capable of having such a complicated device placed on their premises. Along with multiple parts, including battery and switching panel, the requirement for conditioned air at each site is almost an impossible expectation to satisfy.

Third, back feeding stored power onto the distribution system during switching or outages could pose a very dangerous situation for BEC or contract employees working on the distribution lines. Electrocutions could result when the system is down if the switching does not work properly at the premises of each and every member affected by an outage or maintenance operation. This aspect alone should disqualify this proposed solution.

Finally, at best, this solution provides backup for only 68% of all outages which again, and this figure may be optimistic given the theoretical nature of the calculation with no underlying support.

3. <u>Hybrid Central and Behind the Meter Storage</u>:

This solution combines the concerns of grid-level and BTM storage, requiring even more complex control strategies than the first two alternatives. Such strategies are unknown in addition to being unproven.

A hybrid solution involves placing a battery solution at each member's premises, identical to the solution above, and a 7.4 MW/8.0 MWH on the distribution system at an undetermined location. It would also require a critical load assessment and a load shedding strategy as well as to be fully functional.

C. Conclusions Regarding Stored Energy Solutions.

Conventional methods of onsite generation, using diesel or natural gas as a generation fuel are difficult to implement due to the location of the project and the cost to install such a facility. The only practical transport system for fuel is to truck it in to the site and to keep a large onsite fuel storage system operational, Such solutions would require more physical space and create more compliance issues such as major spill prevention and fire safety requirements.

The energy storage alternatives provided in the RAR require significant system upgrades and are unproven technologies today. Also, they do not factor in growth, which has been occurring for some time in this part of the service area. BTM storage would additionally involve a major overhaul of BEC member rules and regulations and forced compliance, both difficult prospects.

The reliability of energy storage solutions is questionable as well. The RAR storage solutions rely on technology that is just now being deployed on a utility scale, with unproven results when compared to a mature transmission solution. The calculations regarding outages covered in the RAR appear to be related to a straight-line calculation regarding storage capacity versus the peak demand of the service area as seen on a historical basis. This means that, as growth occurs, the ability to cover these outages will diminish.

Ultimately, neither the conventional onsite generation nor the energy storage provides solutions that are viable at this time based on existing technology.

VI. OVERALL CONCLUSIONS AND RECOMMENDATIONS.

This portion of the report deals with the final conclusions and recommendations concerning the alternatives investigated, and recommends from the Engineer's independent perspective the Proposed Plan that provides the best alternative for implementation. In addition to Engineer's analysis of the work previously done by the co-ops and its own field examinations, the recommendations are also based on Engineer's experience in looking at similar projects with similar goals, and metrics that drive and define the necessity, practicality, operational, environmental, cultural and economic impacts of such projects.

A. Base Conclusions.

1. All possible alternatives to solve the project need/necessity have been studied, and all those studies are competently and thoroughly done and present a true and complete picture of what it will take to solve the service issue problems as presented. The studies appropriately consider distribution system upgrades, transmission and substation capital investment, and onsite generation. Those studies and analyses are very thorough and present an honest, real picture of what each alternative would entail, in terms of fulfilling project need, impact, and cost.

2. Of all the alternatives studied, only Proposed Plans that entail building the proposed McClellanville substation and 115 kV transmission line from a reliable source resolve the project necessity issues totally and permanently. A distribution solution would only provide a temporary fix and would require a transmission solution at some point. As documented, the onsite generation solutions have major fuel and environmental issues rendering them impractical and costly. The energy storage solutions rely on technologies that are very immature and require significant adverse social impact on the BEC membership to be implemented, all without completely filling the need basis for the project.

B. Transmission Line Project Comparisons.

The Study analyzes the Proposed Plans involving construction of transmission lines/substation on the following criteria:

- Ability to fulfill the project necessity, as presented in various studies and summarized in this report.
- Project impacts which include but are not limited to environmental and cultural impacts as well.
- Economics and the long-term cost to construct and operate the facility.

C. Project Necessity.

The project necessity has been defined as two major issues that must be solved, for the alternative to meet the project necessity criteria. They are as follows:

The Study evaluates each Proposed Plan in terms of how well it improves what at present is a very poor source of reliability for the Service Area. Presently, the Service Area has one distribution source and that is a very long and exposed single-source distribution line from SCE&G's Hamlin substation. To insure quality of service, an ideal Proposed Plan should meet the above-discussed N-1 criterion by providing multi-source service to the Service Area so that full service may be

quickly restored in the event of a service outage from the primary source. In this scenario, the Service Area needs both a more reliable primary source and a newly implemented secondary source.

This gets us to an N-1 criterion, which means that full service can either be maintained or rapidly restored with one source out of service. That means that any source from Santee Cooper fits that need criteria. A source from SCE&G's 115 kV source in Mt. Pleasant does not meet this criterion. This would eliminate the Hamlin 115 kV alternative, as it does not meet the defined need.

Other Proposed Plans demonstrate varying ability to fill this need but all do meet the basic criteria as set forth above. As the project descriptions discuss, distance, access, and placement of each project affect potential reliability. Building a line across the Santee River from Belle Isle and/or along the US 17 corridor exposes the line to hazardous operating environments that pose significant risk for frequent outages, from nominal events such as smaller storms and exposure to coastal environments that hamper reliable operations more generally. Also, distance is a criterion that can pose a problem, as longer distances mean more line exposure.

Crossing the Santee River imposes operational constraints. Also, using the US 17 corridor hampers the Belle Isle routes as the best reliability alternatives. The distance and access issues, as noted above in the discussion of the Charity routes eliminates them from consideration as the best alternative based on the reliability criterion as stated.

Here, because of its upland location and relative ease of access, the Jamestown route offers the best solution for the reliability criterion. The Jamestown source is part of the Santee Cooper 115 kV network, an extremely reliable source. The line location is such that it is not exposed to coastal issues except at or near the termination point at McClellanville. The distance is less than most of the routes, and it is easily accessible generally either by main paved roads such as SC 45 or local and forest service roads, which can be used to get to the line for both O&M and emergency restoration.

The Honey Hill site offers the best reliability from both source, route and distance perspectives. However, the NERC issues previously discussed make this Proposed Plan a very difficult proposition as a practical matter.

There are now urgent capacity concerns regarding the Awendaw metering point and documented reliability issues that result from a 23.9 kV source that is more than 23 miles away. All Proposed Plans employing 115 kV N-1 alternatives and the installation of the McClellanville substation will eliminate those concerns permanently.

D. Environmental Impacts.

Environmental impacts are analyzed in both the DRAFT EIS and the MCS. The risk corridor scores in the MCS are good indicators of the degree of environmental impact each route poses. The entire range of values in the MCS for the routes studied range from a low of 6.2 for the Belle Isle alternate with a directional bore under the Santee River to a high of 36.8 for the route from Charity to Honey Hill to McClellanville. These are total scores. On a per-mile basis, the scores range from 0.9 to 1.8. A midrange value of approximately 1.4 per mile is acceptable.

As we have noted in the discussions, the routes of the Belle Isle and Charity routes are difficult to access and would require construction and maintenance of significant road entrances and rights of way to be viable. The Jamestown route to McClellanville follows the route of existing highways, county roads, and forest service access roads, which limits impacts as existing road corridors establish use generally.

The Honey Hill Proposed Plan, tapping the 230 kV line and building the transmission line down to McClellanville, has the highest per-mile risk corridor score because it requires a large tract of cleared land to accommodate the 230 – 115 kV required substation.

The Jamestown route does run adjacent to the linkage area. However, the route is also adjacent to a bridge on SC 45 which is established as a transport medium compatible with construction of the transmission line, so there would be no major impact from the transmission line either during construction or long-term operation. The Jamestown Proposed Plan would only require an additional 37.5 feet or less of cleared right of way. The Jamestown route at approximately 20.9 miles, is midrange and its per-mile risk corridor score at 1.2 is in the low range indicating, at most, a moderate impact.

E. Economic and Long Range System Impact.

As with any major capital project there is an economic aspect that must be considered. Those considerations include the actual cost of the project in today's dollars and the long-term benefit of the project that is realized by that cost. This Study considers both actual dollars spent as well as long-term benefits that would decide that outcome.

Appendix 5 presents the cost estimates for the various alternatives. As shown, the costs are affected by a number of factors that include linear distance, type of special construction, such as directional bores under the river system, and additional costs for a 230 - 115 kV step down station. The cost ranges from a high $25,979,254 for one of the Honey Hill routes to a low of $12,469,807 for the Jamestown-to-McClellanville Proposed Plan.

Based on long-term system analysis done over the past decade or more, and reviewing the project in the field, the Jamestown alternative provides the best long-term and initial-cost Proposed Plan. If this Proposed Plan were implemented, no additional transmission construction would be required to serve the Service Area, and it will be the easiest to construct and maintain.

F. Final Recommendation.

For the following reasons, the Jamestown-to McClellanville Proposed Plan is the best alternative considering all of the metrics considered by the Engineer:

- The Jamestown to McClellanville route meets the project necessity requirements as we have seen for both reliability and for capacity reasons.

- The Jamestown to McClellanville route offers moderate and light impacts as seen from its corridor risk scores, distance, and access. The impacts are lessened by the fact that it generally will follow existing road corridors and will avoid large land use issues as posed by new substations sites.

- The Jamestown to McClellanville route is the best long term investment for Central and BEC. It permanently solves any and all capacity and reliability problems in the area. In this case, it does for the least cost of all the alternatives studied. As such, it presents the best one system plan that is a criterion for any RUS project and in fact any transmission and substation investment plan.

The Engineer ranks the Proposed Plans based on the above criteria as follows (Proposed Plans or alternatives that are not ranked do not satisfy need criteria):

1. Jamestown route

2. Belle Isle routes

3. Charity routes

4. Honey Hill route

Appendix 1

BEC Outage Trends
2011 -2016

"Priority" Members During Storm Situatior

AW CKT 1

Communications Tower (8757 Old Georgetown Rd McClellanville, SC)
St James Elementary School (8900 Hwy 17 North McClellanville, SC)
Awendaw Fire Dept. Station 3 (Across from 8900 Hwy 17 North McClellanville, SC)
Mt. Pleasant Water Works Water Station (8900 Hwy 17 North McClellanville, SC)
TDS Telephone control box (Lofton Rd near 8900 Hwy 17 North McClellanville, SC)
Awendaw Fire Dept. Station 4 & Charleston County Operations Center (10009 Hwy 17 North McClellanville, SC)
Mt. Pleasant Water Works Water Station (10009 Hwy 17 North McClellanville, SC)
Gas Station & Convenience Store (10105 Hwy 17 North McClellanville, SC)
Dollar General (10141 Hwy 17 North McClellanville, SC)
Communications Building (10750 Hwy 17 North McClellanville, SC)
South Santee-Germantown Fire Dept. (911 South Santee Rd)
Mt. Pleasant Water Works Water Station (911 South Santee Rd)
Several Communication (Cell Towers) (Seven Mile Rd)

CW CKT 8

Berkeley Electric Co-op Awendaw Office (7200 Hwy 17 North Awendaw, SC)
Cell Tower (7951 Hwy 17 North Awendaw, SC)
TDS Telephone control box (Corner of Seewee Rd & Hwy 17 North)
Charleston County Public Works (4836 Seewee Rd Awendaw, SC)
WTAT-TV Tower (5404 Seewee Rd Awendaw, SC)
Awendaw Fire Dept. Station 2 (6384 Maxville Rd Awendaw, SC)
Communications Tower behind this same location
Awendaw Town Hall and Water Tower (6971 Doar Rd Awendaw, SC)

CW CKT 7

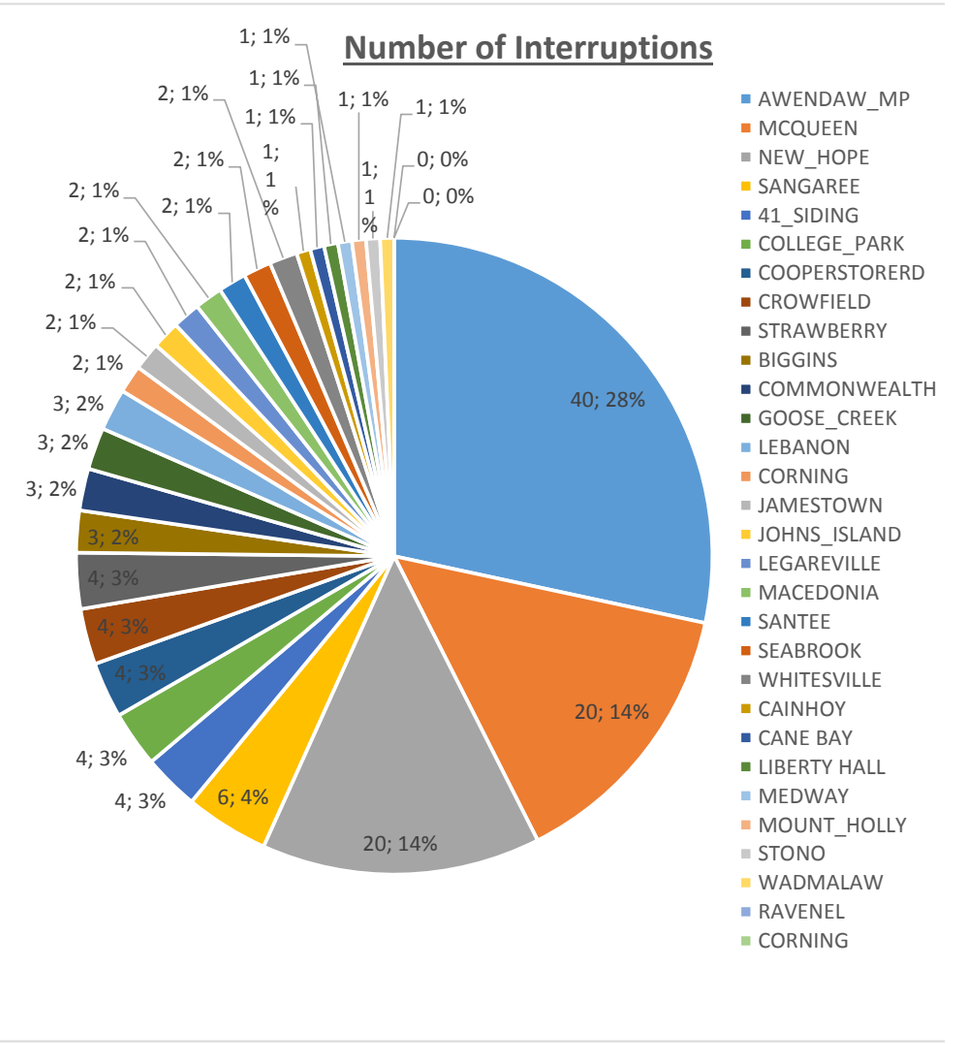
Pump Station on Gadsenville Rd & Beehive Rd
Awendaw Fire Dept. Station 1 (4286 Hwy 17 North Awendaw, SC)
Cell tower behind this same location
Tractor Supply (4765 Hwy 17 North Awendaw, SC)
Dollar General (4775 Hwy 17 North Awendaw, SC)
Cell Tower (4816 Hwy 17 North Awendaw, SC)
Seewee Outpost (4853 Hwy 17 North Awendaw, SC)
Pump Station on Paradise Island (two)
US Post Office (6201 Hwy 17 North Awendaw, SC)

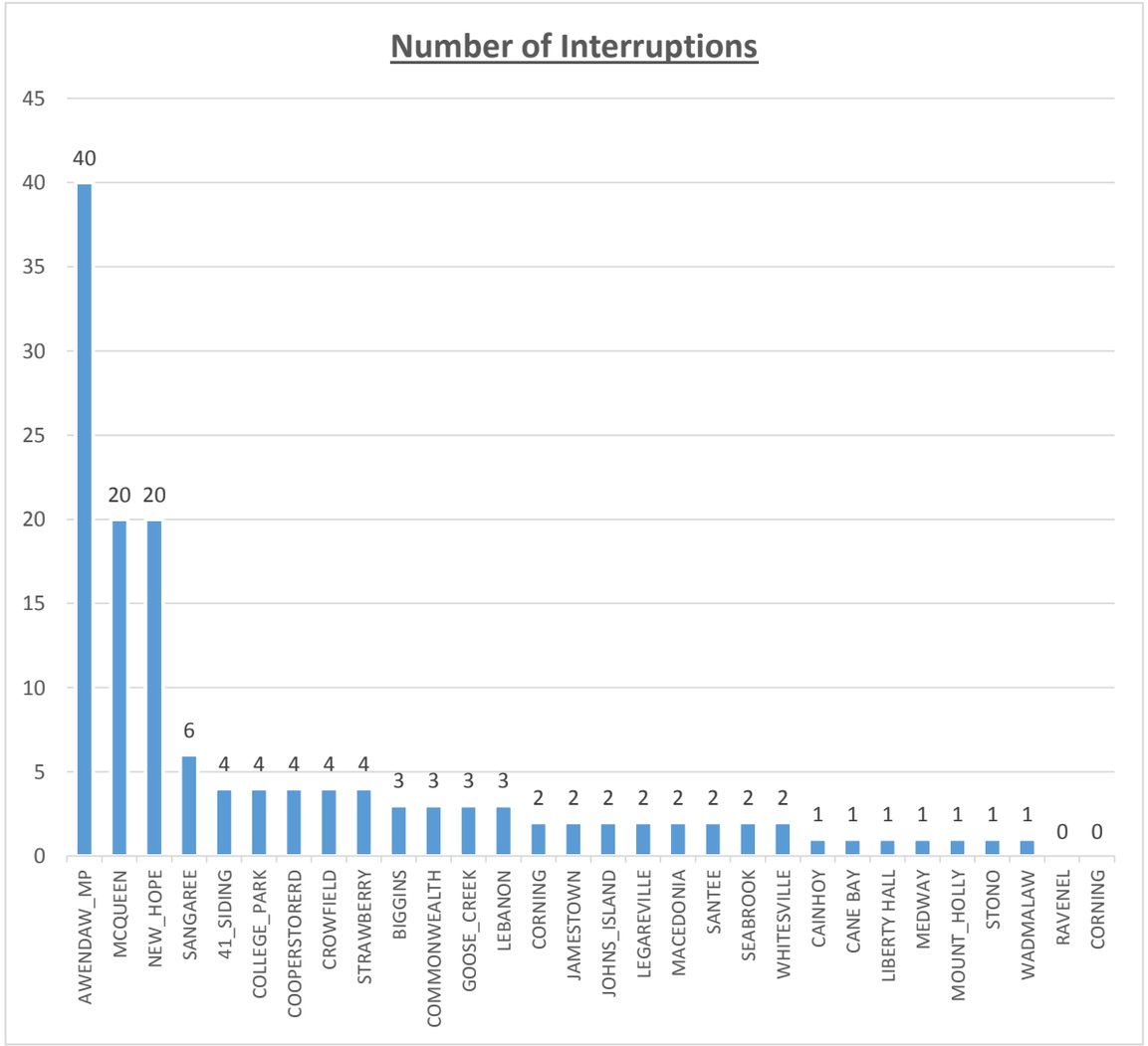
ıS

Note
Will be in McClellanville Sub Service Territory
Will be in McClellanville Sub Service Territory
Will be in McClellanville Sub Service Territory
Will be in McClellanville Sub Service Territory
Will be in McClellanville Sub Service Territory
Will be in McClellanville Sub Service Territory
Will be in McClellanville Sub Service Territory
Will be in McClellanville Sub Service Territory
Will be in McClellanville Sub Service Territory
Will be in McClellanville Sub Service Territory
Will be in McClellanville Sub Service Territory
Will be in McClellanville Sub Service Territory
Will be in McClellanville Sub Service Territory
Will be in McClellanville Sub Service Territory
Will be in McClellanville Sub Service Territory

SOURCE OUTAGE SUMMARY 1/1/2011 - 11/7/2016

Source	Number of Interru	Total Member Minute	Total Duration
AWENDAW_MP	40	529,825	740
MCQUEEN	20	587,719	188
NEW_HOPE	20	361,112	187
SANGAREE	6	280,119	67
41_SIDING	4	566,899	214
COLLEGE_PARK	4	249,192	44
COOPERSTORERD	4	0	0
CROWFIELD	4	0	0
STRAWBERRY	4	0	0
BIGGINS	3	0	0
COMMONWEALT	3	28,399	27
GOOSE_CREEK	3	496	62
LEBANON	3	0	0
CORNING	2	37	37
JAMESTOWN	2	0	0
JOHNS_ISLAND	2	0	0
LEGAREVILLE	2	0	0
MACEDONIA	2	0	0
SANTEE	2	120,453	57
SEABROOK	2	0	0
WHITESVILLE	2	0	14
CAINHOY	1	308,709	363
CANE BAY	1	93,115	35
LIBERTY HALL	1	0	0
MEDWAY	1	0	0
MOUNT_HOLLY	1	0	0
STONO	1	0	0
WADMALAW	1	258,112	218
RAVENEL	0	0	0
CORNING	0	0	0
TOTAL	**141**	**3,384,187**	**2,253**




Number of Interruptions
45
40
35
30
25
20
15
10
5
0
40
20 20
6
4 4 4 4 4
3 3 3 3
2 2 2 2 2 2 2 2
1 1 1 1 1 1 1
0 0
AWENDAW_MP
MCQUEEN
NEW_HOPE
SANGAREE
41_SIDING
COLLEGE_PARK
COOPERSTORERD
CROWFIELD
STRAWBERRY
BIGGINS
COMMONWEALTH
GOOSE_CREEK
LEBANON
CORNING
JAMESTOWN
JOHNS_ISLAND
LEGAREVILLE
MACEDONIA
SANTEE
SEABROOK
WHITESVILLE
CAINHOY
CANE BAY
LIBERTY HALL
MEDWAY
MOUNT_HOLLY
STONO
WADMALAW
RAVENEL
CORNING

SOURCE OUTAGE SUMMARY 1/1/2012 - 11/7/2016

Row Labels	Number of Interruptions	Total Member Minutes	Total Duration
41_SIDING	4	566,899	214
AWENDAW_MP	40	529,825	740
BIGGINS	3	0	0
CAINHOY	1	308,709	363
CANE BAY	1	93,115	35
COLLEGE_PARK	4	249,192	44
COMMONWEALTH	3	28,399	27
COOPERSTORERD	4	0	0
CORNING	2	37	37
CROWFIELD	4	0	0
GOOSE_CREEK	3	496	62
JAMESTOWN	2	0	0
JOHNS_ISLAND	2	0	0
LEBANON	3	0	0
LEGAREVILLE	2	0	0
LIBERTY HALL	1	0	0
MACEDONIA	2	0	0
MCQUEEN	20	587,719	188
MEDWAY	1	0	0
MOUNT_HOLLY	1	0	0
NEW_HOPE	20	361,112	187
SANGAREE	6	280,119	67
SANTEE	2	120,453	57
SEABROOK	2	0	0
STONO	1	0	0
STRAWBERRY	4	0	0
WADMALAW	1	258,112	218
WHITESVILLE	2	0	14
Grand Total	**141**	**3,384,187**	**2,253**

Sources NOT Listed Above (no source outages)

RAVENEL	0	0	0
CORNING	0	0	0

SDate	EDate	OutageName	OutageRecID	Substation
2011-01-01 00:00:00	2016-11-09 23:59:59	41-SIDING SUB (SOURCE)	2013-07-02-0116	41_SIDING
2011-01-01 00:00:00	2016-11-09 23:59:59	41-Siding: Source O/C	2013-07-15-0765	41_SIDING
2011-01-01 00:00:00	2016-11-09 23:59:59	SANTEE COOPER 230KV LOCKOUT	2013-11-22-0973	41_SIDING
2011-01-01 00:00:00	2016-11-09 23:59:59	41-SIDING (SOURCE)	2016-03-16-1167	41_SIDING
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2011-01-06-0263	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OUTAGE)	2011-03-03-0098	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2011-07-07-0749	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OUTAGE)	2011-05-11-0713	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2011-07-14-1509	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2011-09-11-0739	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OUTAGE)	2011-09-20-1328	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2011-10-18-1393	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OUTAGE)	2011-10-19-1552	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AMWENDAW MP (SOURCE OUTAGE)	2011-11-17-1300	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2011-11-17-1303	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2011-11-29-1935	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2012-01-05-0346	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2012-01-05-0349	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OUTAGE)	2012-01-23-1363	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2012-02-12-0517	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2012-02-27-1316	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2012-04-13-0620	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2012-05-04-0142	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2012-09-01-0006	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OUTAGE)	2012-09-25-1016	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2013-04-19-0756	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OUTAGE)	2013-05-06-0255	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2013-06-03-0151	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OUTAGE)	2013-06-05-0286	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2013-06-26-2237	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OPERATION	2013-07-24-1138	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OUTAGE)	2013-08-14-0556	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE O/C)	2013-08-25-1057	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWMP (Sourceside) O/C	2013-12-03-0066	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWMP (Sourceside) O/C	2013-12-03-0067	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWMP (SOURCE OUTAGE)	2013-12-18-0589	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP	2014-07-24-2135	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE OUTAGE)	2014-09-19-2148	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE)	2015-05-08-0804	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE)	2015-05-15-1120	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE)	2015-05-16-1193	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE)	2015-05-17-1216	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AW-MP (SOURCE)	2015-07-03-0278	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	AWENDAW MP (SOURCE)	2016-09-20-1998	AWENDAW_MP
2011-01-01 00:00:00	2016-11-09 23:59:59	BIGGINS SUB (SOURCE OPERATION)	2013-08-30-1248	BIGGINS
2011-01-01 00:00:00	2016-11-09 23:59:59	SANTEE COOPER 230V LOCKOUT	2013-11-22-0969	BIGGINS
2011-01-01 00:00:00	2016-11-09 23:59:59	BIGGINS SUB(SOURCE BLINK)	2015-03-12-0415	BIGGINS
2011-01-01 00:00:00	2016-11-09 23:59:59	CAINHOY (PRI SWITCH)	2013-04-30-1541	CAINHOY
2011-01-01 00:00:00	2016-11-09 23:59:59	CANE BAY SUB (SOURCE)	2016-09-16-1755	CANE BAY
2011-01-01 00:00:00	2016-11-09 23:59:59	2011-04-23-1841	2011-04-23-1841	COLLEGE_PARK
2011-01-01 00:00:00	2016-11-09 23:59:59	COLLEGE PARK CKT 9 O/C	2011-04-23-1831	COLLEGE_PARK
2011-01-01 00:00:00	2016-11-09 23:59:59	COLLEGE PARK SUB (SOURCE O/C)	2011-09-03-0133	COLLEGE_PARK
2011-01-01 00:00:00	2016-11-09 23:59:59	COLLEGE PARK TRANSMISSION LINE	2013-03-10-0486	COLLEGE_PARK
2011-01-01 00:00:00	2016-11-09 23:59:59	COMMONWEALTH CKT 8 OPERATION	2011-09-11-0742	COMMONWEALTH
2011-01-01 00:00:00	2016-11-09 23:59:59	Commonwealth Ckt 1:Lockout/Maint	2012-10-18-0796	COMMONWEALTH
2011-01-01 00:00:00	2016-11-09 23:59:59	Commonwealth Ckt 2:Lockout/Maint	2012-10-18-0788	COMMONWEALTH
2011-01-01 00:00:00	2016-11-09 23:59:59	COOPER STORE SUB (SOURCE O/C)	2013-09-03-0102	COOPERSTORERD
2011-01-01 00:00:00	2016-11-09 23:59:59	COOPERSTORE (SOURCE BLINK)	2014-08-13-0553	COOPERSTORERD
2011-01-01 00:00:00	2016-11-09 23:59:59	COOPER STORE SUB (SOURCE BLIN	2015-03-12-0416	COOPERSTORERD
2011-01-01 00:00:00	2016-11-09 23:59:59	COOPERSTORE SUB (SOURCE)	2016-08-25-3661	COOPERSTORERD
2011-01-01 00:00:00	2016-11-09 23:59:59	CORNING TRANSMISISON	2013-03-11-0548	CORNING
2011-01-01 00:00:00	2016-11-09 23:59:59	SANTEE COOPER 230KV LOCKOUT	2013-11-22-0974	CORNING
2011-01-01 00:00:00	2016-11-09 23:59:59	CROWFIELD SUB (SOURCE O/C)	2011-07-14-1488	CROWFIELD
2011-01-01 00:00:00	2016-11-09 23:59:59	SANTEE COOPER 230KV LOCKOUT	2013-11-22-0975	CROWFIELD
2011-01-01 00:00:00	2016-11-09 23:59:59	CROWFIELD SUB (SOURCE BLINK)	2015-03-12-0435	CROWFIELD

2011-01-01 00:00:00	2016-11-09 23:59:59	CROWFIELD SUB (SOURCE BLINK)	2016-07-14-0967	CROWFIELD
2011-01-01 00:00:00	2016-11-09 23:59:59	GOOSE CREEK SUB (SOURCE O/C)	2011-07-14-1493	GOOSE_CREEK
2011-01-01 00:00:00	2016-11-09 23:59:59	412 TRUMAN DRIVE	2015-03-13-0475	GOOSE_CREEK
2011-01-01 00:00:00	2016-11-09 23:59:59	GOOSE CREEK (SOURCE BLINK)	2016-07-14-0968	GOOSE_CREEK
2011-01-01 00:00:00	2016-11-09 23:59:59	JAMESTOWN SUB (SOURCE BLINK)	2015-04-07-0193	JAMESTOWN
2011-01-01 00:00:00	2016-11-09 23:59:59	JAMESTOWN MP (SOURCE BLINK)	2015-07-13-0865	JAMESTOWN
2011-01-01 00:00:00	2016-11-09 23:59:59	SANTEE COOPER 230KV LOCKOUT	2013-11-22-0972	JOHNS_ISLAND
2011-01-01 00:00:00	2016-11-09 23:59:59	JOHNS ISLAND SUB (SOURCE BLINK)	2015-04-20-0843	JOHNS_ISLAND
2011-01-01 00:00:00	2016-11-09 23:59:59	LEBANON SUB (SOURCE O/C)	2013-09-03-0100	LEBANON
2011-01-01 00:00:00	2016-11-09 23:59:59	LEBANON SUB (SOURCE BLINK)	2014-08-13-0551	LEBANON
2011-01-01 00:00:00	2016-11-09 23:59:59	LEBANON SUB (SOURCE)	2016-08-25-3662	LEBANON
2011-01-01 00:00:00	2016-11-09 23:59:59	LEGAREVILLE SUB (SOURCE BLINK)	2015-04-20-0840	LEGAREVILLE
2011-01-01 00:00:00	2016-11-09 23:59:59	LEGAREVILLE (SOURCE BLINK)	2016-07-14-0969	LEGAREVILLE
2011-01-01 00:00:00	2016-11-09 23:59:59	LIBERTY HALL SUB (SOURCE BLINK)	2015-03-12-0424	LIBERTY HALL
2011-01-01 00:00:00	2016-11-09 23:59:59	MACEDONIA SUB (SOURCE BLINK)	2015-03-12-0413	MACEDONIA
2011-01-01 00:00:00	2016-11-09 23:59:59	MACEDONIA SUB (SOURCE BLINK)	2015-07-13-0866	MACEDONIA
2011-01-01 00:00:00	2016-11-09 23:59:59	MCQUEEN SUB (SOURCE O/C)	2011-08-16-2297	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MQUEEN SUB	2012-08-17-0986	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MQUEEN SUB (TRANS.OUTAGE)	2012-10-02-0090	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	McQueen Sub: Source O/C	2012-11-07-0329	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	McQueen Sub: Source Outage	2013-03-11-0602	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MQUEEN SUB (TRANS BLINK)	2014-07-17-1797	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MCQUEEN SUB (SOURCE BLINK)	2014-09-03-0088	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MCQUEEN (SOURCE BLINK)	2014-09-15-1068	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MQUEEN SUB (SOURCE)	2014-10-17-0702	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MCQUEEN SUB (SOURCE)	2014-12-22-2124	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MCQUEEN SUB (SOURCE)	2016-07-14-0971	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MCQUEEN SUB (SOURCE)	2016-03-03-0268	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MCQUEEN SUB (SOURCE)	2016-03-03-0326	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MCQUEEN SUB (SOURCE)	2016-03-03-0387	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MCQUEEN SUB (SOURCE)	2016-03-03-0406	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MCQUEEN SUB (SOURCE)	2016-03-03-0431	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MCQUEEN SUB (SOURCE)	2016-08-25-3660	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MCQUEEN SUB (SOURCE)	2016-09-21-2047	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MCQUEEN SUB (SOURCE)	2016-09-19-1903	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MCQUEEN SUB (SOURCE)	2016-09-19-1937	MCQUEEN
2011-01-01 00:00:00	2016-11-09 23:59:59	MEDWAY SUB (SOURCE BLINK)	2015-03-12-0421	MEDWAY
2011-01-01 00:00:00	2016-11-09 23:59:59	MOUNT HOLLY SUB (SOURCE BLINK)	2015-04-14-0563	MOUNT_HOLLY
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE SUB (SOURCE O/C)	2011-08-16-2296	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE SUB	2012-08-17-0994	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE SUB.(TRANS.OUTAGE)	2012-10-03-0199	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	New Hope Sub: Source O/C	2012-11-07-0328	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	New Hope Sub: Source Outage	2013-03-11-0601	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE SUB (TRANS BLINK)	2014-07-17-1796	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE (SOURCE BLINK)	2014-09-03-0086	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE (SOURCE BLINK)	2014-09-15-1066	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE SUB (SOURCE)	2014-10-17-0703	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE SUB (SOURCE)	2014-12-19-1957	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE SUB SOURCE	2015-09-04-0326	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE SUB (SOURCE)	2016-03-03-0286	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE SUB (SOURCE)	2016-03-03-0334	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE SUB (SOURCE)	2016-03-04-0489	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE SUB (SOURCE)	2016-03-03-0409	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE SUB (SOURCE)	2016-03-03-0436	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE SUB (SOURCE)	2016-08-25-3654	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE SUB (SOURCE)	2016-08-25-3658	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE SUB (SOURCE)	2016-09-19-1905	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	NEW HOPE (SOURCE)	2016-09-19-1925	NEW_HOPE
2011-01-01 00:00:00	2016-11-09 23:59:59	SANGAREE SUB (SOURCE O/C)	2011-08-16-2293	SANGAREE
2011-01-01 00:00:00	2016-11-09 23:59:59	SANGAREE SUB	2012-08-17-0988	SANGAREE
2011-01-01 00:00:00	2016-11-09 23:59:59	SANGAREE SUB (TRANS. OUTAGE)	2012-10-02-0181	SANGAREE
2011-01-01 00:00:00	2016-11-09 23:59:59	Sangaree Sub: Source operation	2012-11-07-0325	SANGAREE
2011-01-01 00:00:00	2016-11-09 23:59:59	Sangaree Sub: Source Outage	2013-03-11-0600	SANGAREE
2011-01-01 00:00:00	2016-11-09 23:59:59	SANGAREE SUB (SOURCE)	2016-09-28-2435	SANGAREE
2011-01-01 00:00:00	2016-11-09 23:59:59	SANTEE SUB (SOURCE)	2015-09-28-2415	SANTEE
2011-01-01 00:00:00	2016-11-09 23:59:59	SANTEE SUB (SOURCE)	2016-09-26-2264	SANTEE

2011-01-01 00:00:00	2016-11-09 23:59:59	SEABROOK SUB (SOURCE BLINK)	2015-04-20-0841	SEABROOK
2011-01-01 00:00:00	2016-11-09 23:59:59	SEABROOK SUB (SOURCE SUB)	2016-07-14-0970	SEABROOK
2011-01-01 00:00:00	2016-11-09 23:59:59	STONO SUB (SOURCE BLINK)	2015-04-20-0842	STONO
2011-01-01 00:00:00	2016-11-09 23:59:59	STRAWBERRY SUB (SOURCE O/C)	2013-09-04-0130	STRAWBERRY
2011-01-01 00:00:00	2016-11-09 23:59:59	SANTEE COOPER 230KV LOCKOUT	2013-11-22-0970	STRAWBERRY
2011-01-01 00:00:00	2016-11-09 23:59:59	STRAWBERRY SUB (SOURCE BLINK)	2015-03-12-0419	STRAWBERRY
2011-01-01 00:00:00	2016-11-09 23:59:59	STRAWBERRY SUB (SOURCE BLINK)	2016-08-18-1215	STRAWBERRY
2011-01-01 00:00:00	2016-11-09 23:59:59	WADMALAW SUBSTATION	2012-05-17-0927	WADMALAW
2011-01-01 00:00:00	2016-11-09 23:59:59	WHITESVILLE SUB (SOURCE BLINK)	2015-03-12-0420	WHITESVILLE
2011-01-01 00:00:00	2016-11-09 23:59:59	WHITESVILLE SUB (SOURCE)	2015-07-20-2651	WHITESVILLE

Feeder	OutageStartTime	OutageEndTime
	6.20.2013 2:55 PM	6.20.2013 5:08 PM
	7.13.2013 3:33 PM	7.13.2013 3:33 PM
	11.11.2013 3:16 PM	11.11.2013 3:16 PM
	3.13.2016 4:54 PM	3.13.2016 6:16 PM
	1.5.2011 4:46 PM	1.5.2011 4:46 PM
	3.3.2011 11:58 AM	3.3.2011 12:00 PM
	3.5.2011 4:41 PM	3.5.2011 4:41 PM
	5.11.2011 4:21 AM	5.11.2011 5:16 AM
	7.13.2011 9:44 PM	7.13.2011 9:44 PM
	9.11.2011 5:00 PM	9.11.2011 5:00 PM
AW-01	9.19.2011 4:54 PM	9.19.2011 4:57 PM
	10.18.2011 10:11 AM	10.18.2011 10:11 AM
	10.19.2011 6:32 PM	10.19.2011 9:48 PM
	11.17.2011 1:34 PM	11.17.2011 1:35 PM
	11.17.2011 2:40 PM	11.17.2011 2:40 PM
	11.29.2011 8:34 AM	11.29.2011 8:34 AM
	12.29.2011 3:56 PM	12.29.2011 3:56 PM
	12.30.2011 10:10 AM	12.30.2011 10:10 AM
AW-01	1.23.2012 7:48 PM	1.23.2012 11:12 PM
	2.11.2012 9:29 PM	2.11.2012 9:29 PM
	2.27.2012 1:26 PM	2.27.2012 1:26 PM
AW-01	4.13.2012 8:50 AM	4.13.2012 8:50 AM
	5.4.2012 7:44 AM	5.4.2012 7:44 AM
	9.1.2012 6:02 AM	9.1.2012 6:02 AM
AW-01	9.25.2012 9:02 AM	9.25.2012 9:10 AM
	4.19.2013 5:58 AM	4.19.2013 5:58 AM
AW-01	5.3.2013 6:58 PM	5.3.2013 7:04 PM
	6.3.2013 1:40 PM	6.3.2013 1:40 PM
	6.5.2013 4:06 AM	6.5.2013 4:19 AM
	6.26.2013 3:07 PM	6.26.2013 3:07 PM
	7.24.2013 9:51 AM	7.24.2013 9:51 AM
AW-01	8.14.2013 12:30 PM	8.14.2013 2:41 PM
	8.25.2013 9:08 AM	8.25.2013 9:08 AM
	12.2.2013 9:02 AM	12.2.2013 9:02 AM
	12.2.2013 9:02 AM	12.2.2013 9:02 AM
	12.18.2013 7:57 AM	12.18.2013 8:00 AM
AW-01	7.24.2014 3:52 PM	7.24.2014 4:37 PM
AW-01	9.19.2014 3:15 PM	9.19.2014 3:40 PM
	5.7.2015 3:10 PM	5.7.2015 3:19 PM
AW-01	5.15.2015 5:00 PM	5.15.2015 5:08 PM
AW-01	5.16.2015 4:11 PM	5.16.2015 4:20 PM
AW-01	5.17.2015 3:34 PM	5.17.2015 3:42 PM
	7.3.2015 3:12 PM	7.3.2015 3:25 PM
	9.20.2016 8:21 PM	9.20.2016 8:25 PM
	8.29.2013 9:53 PM	8.29.2013 9:53 PM
	11.11.2013 3:16 PM	11.11.2013 3:16 PM
	3.5.2015 12:35 PM	3.5.2015 12:35 PM
	4.21.2013 10:47 AM	4.21.2013 4:50 PM
	9.16.2016 6:54 AM	9.16.2016 7:30 AM
CP-09	4.23.2011 2:07 PM	4.23.2011 2:09 PM
CP-09	4.23.2011 2:07 PM	4.23.2011 2:09 PM
	9.3.2011 8:55 AM	9.3.2011 8:57 AM
	3.10.2013 5:19 PM	3.10.2013 5:56 PM
CW-08	9.11.2011 5:00 PM	9.11.2011 5:00 PM
CW-01	10.18.2012 6:16 AM	10.18.2012 6:33 AM
CW-02	10.18.2012 6:21 AM	10.18.2012 6:31 AM
	9.2.2013 7:05 PM	9.2.2013 7:05 PM
	8.12.2014 4:36 PM	8.12.2014 4:36 PM
	3.5.2015 12:35 PM	3.5.2015 12:35 PM
	8.20.2016 7:24 PM	8.20.2016 7:24 PM
	3.10.2013 5:19 PM	3.10.2013 5:56 PM
	11.11.2013 3:16 PM	11.11.2013 3:16 PM
	7.13.2011 4:49 PM	7.13.2011 4:49 PM
	11.11.2013 3:16 PM	11.11.2013 3:16 PM
	3.5.2015 12:35 PM	3.5.2015 12:35 PM

	7.7.2016 10:51 AM	7.7.2016 10:51 AM
	7.13.2011 4:49 PM	7.13.2011 4:49 PM
GC-03	3.13.2015 11:45 PM	3.14.2015 12:47 AM
	7.7.2016 10:51 AM	7.7.2016 10:51 AM
	3.5.2015 12:35 PM	3.5.2015 12:35 PM
	7.11.2015 9:45 PM	7.11.2015 9:45 PM
	11.11.2013 3:16 PM	11.11.2013 3:16 PM
	4.19.2015 6:09 PM	4.19.2015 6:09 PM
	9.2.2013 7:05 PM	9.2.2013 7:05 PM
	8.12.2014 4:36 PM	8.12.2014 4:36 PM
	8.20.2016 7:24 PM	8.20.2016 7:24 PM
	4.19.2015 6:09 PM	4.19.2015 6:09 PM
	8.21.2015 4:35 PM	8.21.2015 4:35 PM
	3.5.2015 12:35 PM	3.5.2015 12:35 PM
	3.5.2015 12:35 PM	3.5.2015 12:35 PM
	7.11.2015 9:45 PM	7.11.2015 9:45 PM
	8.12.2011 11:46 AM	8.12.2011 11:46 AM
	8.17.2012 5:00 PM	8.17.2012 5:25 PM
	10.2.2012 8:43 PM	10.2.2012 8:53 PM
	11.1.2012 2:39 AM	11.1.2012 2:39 AM
	3.11.2013 11:55 AM	3.11.2013 11:56 AM
	7.15.2014 6:28 PM	7.15.2014 6:28 PM
	9.2.2014 4:36 PM	9.2.2014 4:36 PM
	9.12.2014 7:19 PM	9.12.2014 7:19 PM
	10.16.2014 4:15 PM	10.16.2014 4:21 PM
	12.18.2014 5:08 PM	12.18.2014 5:15 PM
	9.4.2015 11:26 PM	9.5.2015 12:19 AM
	3.3.2016 6:25 PM	3.3.2016 7:16 PM
	3.3.2016 7:40 PM	3.3.2016 7:42 PM
	3.3.2016 7:49 PM	3.3.2016 7:51 PM
	3.3.2016 9:30 PM	3.3.2016 9:47 PM
	3.3.2016 11:27 PM	3.3.2016 11:29 PM
	8.18.2016 6:57 PM	8.18.2016 6:57 PM
	8.24.2016 4:03 PM	8.24.2016 4:03 PM
	9.19.2016 4:39 PM	9.19.2016 4:44 PM
	9.19.2016 5:05 PM	9.19.2016 5:12 PM
	3.5.2015 12:35 PM	3.5.2015 12:35 PM
	4.14.2015 9:10 AM	4.14.2015 9:10 AM
	8.12.2011 11:46 AM	8.12.2011 11:46 AM
	8.17.2012 5:00 PM	8.17.2012 5:25 PM
	10.2.2012 8:43 PM	10.2.2012 8:53 PM
	11.1.2012 2:39 AM	11.1.2012 2:39 AM
	3.11.2013 11:55 AM	3.11.2013 11:56 AM
	7.15.2014 6:28 PM	7.15.2014 6:28 PM
	9.2.2014 4:36 PM	9.2.2014 4:36 PM
	9.12.2014 7:19 PM	9.12.2014 7:19 PM
	10.16.2014 4:15 PM	10.16.2014 4:21 PM
	12.18.2014 5:08 PM	12.18.2014 5:15 PM
	9.4.2015 11:26 PM	9.5.2015 12:19 AM
	3.3.2016 6:25 PM	3.3.2016 7:16 PM
	3.3.2016 7:40 PM	3.3.2016 7:42 PM
	3.3.2016 7:49 PM	3.3.2016 7:51 PM
	3.3.2016 9:30 PM	3.3.2016 9:47 PM
	3.3.2016 11:27 PM	3.3.2016 11:29 PM
	8.18.2016 6:57 PM	8.18.2016 6:57 PM
	8.24.2016 4:03 PM	8.24.2016 4:03 PM
	9.19.2016 4:39 PM	9.19.2016 4:44 PM
	9.19.2016 5:05 PM	9.19.2016 5:12 PM
	8.12.2011 11:46 AM	8.12.2011 11:46 AM
	8.17.2012 5:00 PM	8.17.2012 5:25 PM
	10.2.2012 8:43 PM	10.2.2012 8:53 PM
	11.1.2012 2:39 AM	11.1.2012 2:39 AM
	3.11.2013 11:55 AM	3.11.2013 11:56 AM
	9.16.2016 6:48 AM	9.16.2016 7:17 AM
	9.24.2015 2:54 PM	9.24.2015 2:54 PM
	9.26.2016 11:45 AM	9.26.2016 12:43 PM

	4.19.2015 6:09 PM	4.19.2015 6:09 PM
	8.21.2015 4:35 PM	8.21.2015 4:35 PM
	4.19.2015 6:09 PM	4.19.2015 6:09 PM
	8.29.2013 9:53 PM	8.29.2013 9:53 PM
	11.11.2013 3:16 PM	11.11.2013 3:16 PM
	3.5.2015 12:35 PM	3.5.2015 12:35 PM
	8.10.2016 2:54 PM	8.10.2016 2:54 PM
	5.17.2012 3:28 AM	5.17.2012 7:06 AM
	3.5.2015 12:35 PM	3.5.2015 12:35 PM
	7.20.2015 12:19 PM	7.20.2015 12:33 PM

Cause	TroubledElement
051 Santee Cooper	41_SIDING
051 Santee Cooper	41_SIDING
051 Santee Cooper	SW1535988441-B
051 Santee Cooper	41_SIDING
052 SCE&G	SW618929878-A
052 SCE&G	SW618929878-A
052 SCE&G	SW618929878-A
052 SCE&G	SW618929878-A
052 SCE&G	SW618929878-A
052 SCE&G	SW618929878-A
052 SCE&G	OC1531708827
052 SCE&G	SW618929878-A
052 SCE&G	SW618929878-A
052 SCE&G	SW618929878-A
052 SCE&G	SW618929878-A
052 SCE&G	SW618929878-A
052 SCE&G	SW618929878-A
052 SCE&G	SW618929878-A
052 SCE&G	OC1531708827
052 SCE&G	SW618929878
052 SCE&G	SW618929878
052 SCE&G	OC1531708827
052 SCE&G	AWENDAW_MP
052 SCE&G	SW618929878
052 SCE&G	OC1531708827
052 SCE&G	AWENDAW_MP
052 SCE&G	OC1531708827
052 SCE&G	AWENDAW_MP
052 SCE&G	AWENDAW_MP
052 SCE&G	AWENDAW_MP
052 SCE&G	AWENDAW_MP
052 SCE&G	OC1531708827
052 SCE&G	AWENDAW_MP
052 SCE&G	AWENDAW_MP
052 SCE&G	AWENDAW_MP
052 SCE&G	AWENDAW_MP
052 SCE&G	OC1531708827
052 SCE&G	OC1531708827
052 SCE&G	AWENDAW_MP
052 SCE&G	OC1531708827
052 SCE&G	OC1531708827
052 SCE&G	OC1531708827
052 SCE&G	AWENDAW_MP
052 SCE&G	OH1460503743
051 Santee Cooper	SW662338177-B
051 Santee Cooper	OH-42610481
054 Santee Cooper Operation	BIGGINS
053 BEC	CAINHOY
051 Santee Cooper	XFMR210035
051 Santee Cooper	OC1865049885
051 Santee Cooper	OC1865049885
051 Santee Cooper	COLLEGE_PARK
051 Santee Cooper	COLLEGE_PARK
052 SCE&G	OC275325955
052 SCE&G	OC344976902
052 SCE&G	OC215251518
051 Santee Cooper	COOPERSTORERD
051 Santee Cooper	COOPERSTORERD
054 Santee Cooper Operation	COOPERSTORERD
051 Santee Cooper	COOPERSTORERD
051 Santee Cooper	CORNING
051 Santee Cooper	CORNING
051 Santee Cooper	CROWFIELD
051 Santee Cooper	OH1376581575
054 Santee Cooper Operation	CROWFIELD

051 Santee Cooper	CROWFIELD
051 Santee Cooper	GOOSE_CREEK
052 SCE&G	TR-1865317810
051 Santee Cooper	GOOSE_CREEK
054 Santee Cooper Operation	JAMESTOWN
051 Santee Cooper	JAMESTOWN
051 Santee Cooper	SW-1794710131-B
051 Santee Cooper	JOHNS_ISLAND
051 Santee Cooper	LEBANON
051 Santee Cooper	LEBANON
051 Santee Cooper	LEBANON
051 Santee Cooper	LEGAREVILLE
051 Santee Cooper	LEGAREVILLE
054 Santee Cooper Operation	SW186213-B
054 Santee Cooper Operation	MACEDONIA
051 Santee Cooper	MACEDONIA
051 Santee Cooper	MCQUEEN
051 Santee Cooper	MCQUEEN
051 Santee Cooper	MCQUEEN
051 Santee Cooper	MCQUEEN
051 Santee Cooper	MCQUEEN
051 Santee Cooper	MCQUEEN
051 Santee Cooper	MCQUEEN
051 Santee Cooper	MCQUEEN
051 Santee Cooper	MCQUEEN
051 Santee Cooper	MCQUEEN
051 Santee Cooper	MCQUEEN
051 Santee Cooper	OH1368234708
051 Santee Cooper	OH1368234708
051 Santee Cooper	OH1368234708
051 Santee Cooper	OH1368234708
051 Santee Cooper	OH1368234708
051 Santee Cooper	MCQUEEN
051 Santee Cooper	MCQUEEN
051 Santee Cooper	OH1368234708
051 Santee Cooper	OH1368234708
054 Santee Cooper Operation	MEDWAY
051 Santee Cooper	MOUNT_HOLLY
051 Santee Cooper	NEW_HOPE
051 Santee Cooper	NEW_HOPE
051 Santee Cooper	NEW_HOPE
051 Santee Cooper	NEW_HOPE
051 Santee Cooper	NEW_HOPE
051 Santee Cooper	NEW_HOPE
051 Santee Cooper	NEW_HOPE
051 Santee Cooper	NEW_HOPE
051 Santee Cooper	NEW_HOPE
051 Santee Cooper	NEW_HOPE
051 Santee Cooper	OH-1142665965
051 Santee Cooper	OH-1142665965
051 Santee Cooper	OH-1142665965
051 Santee Cooper	OH-1142665965
051 Santee Cooper	OH-1142665965
051 Santee Cooper	OH-1142665965
051 Santee Cooper	NEW_HOPE
051 Santee Cooper	NEW_HOPE
051 Santee Cooper	OH960514415
051 Santee Cooper	OH-1142665965
051 Santee Cooper	SANGAREE
051 Santee Cooper	SANGAREE
051 Santee Cooper	SANGAREE
051 Santee Cooper	SANGAREE
051 Santee Cooper	SANGAREE
051 Santee Cooper	SANGAREE
051 Santee Cooper	SANTEE
051 Santee Cooper	SANTEE

051 Santee Cooper	SEABROOK
051 Santee Cooper	SEABROOK
051 Santee Cooper	STONO
051 Santee Cooper	SW1428772315-B
051 Santee Cooper	SW1428772315-B
054 Santee Cooper Operation	STRAWBERRY
051 Santee Cooper	STRAWBERRY
051 Santee Cooper	SW-808879795
054 Santee Cooper Operation	SW42671492-B
051 Santee Cooper	WHITESVILLE

EquipMat	equip
030 Conductors and devices	30
070 Transmision Breaker	70
070 Transmision Breaker	70
020 Towers, poles, and fixtures	20
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
130 Source side fuse or Device	130
020 Towers, poles, and fixtures	20
020 Towers, poles, and fixtures	20
070 Transmision Breaker	70
190 Circuit Lockout	190
070 Transmision Breaker	70
070 Transmision Breaker	70
199 Distribution substation, other (Explain)	199
070 Transmision Breaker	70
199 Distribution substation, other (Explain)	199
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
099 Generation or transmission, other	99
130 Source side fuse or Device	130
040 Transmission substations	40
190 Circuit Lockout	190
191 Circuit Operation	191
010 Generation	10
199 Distribution substation, other (Explain)	199
070 Transmision Breaker	70
190 Circuit Lockout	190
190 Circuit Lockout	190
070 Transmision Breaker	70
099 Generation or transmission, other	99
099 Generation or transmission, other	99
070 Transmision Breaker	70
020 Towers, poles, and fixtures	20
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
099 Generation or transmission, other	99

070 Transmision Breaker	70
070 Transmision Breaker	70
999 No Equipment failure	999
070 Transmision Breaker	70
099 Generation or transmission, other	99
070 Transmision Breaker	70
070 Transmision Breaker	70
099 Generation or transmission, other	99
070 Transmision Breaker	70
099 Generation or transmission, other	99
070 Transmision Breaker	70
099 Generation or transmission, other	99
070 Transmision Breaker	70
099 Generation or transmission, other	99
070 Transmision Breaker	70
099 Generation or transmission, other	99
099 Generation or transmission, other	99
070 Transmision Breaker	70
099 Generation or transmission, other	99
040 Transmission substations	40
199 Distribution substation, other (Explain)	199
070 Transmision Breaker	70
070 Transmision Breaker	70
099 Generation or transmission, other	99
099 Generation or transmission, other	99
199 Distribution substation, other (Explain)	199
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
040 Transmission substations	40
040 Transmission substations	40
040 Transmission substations	40
040 Transmission substations	40
040 Transmission substations	40
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
099 Generation or transmission, other	99
070 Transmision Breaker	70
099 Generation or transmission, other	99
040 Transmission substations	40
040 Transmission substations	40
070 Transmision Breaker	70
070 Transmision Breaker	70
099 Generation or transmission, other	99
099 Generation or transmission, other	99
199 Distribution substation, other (Explain)	199
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
040 Transmission substations	40
040 Transmission substations	40
040 Transmission substations	40
040 Transmission substations	40
040 Transmission substations	40
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
099 Generation or transmission, other	99
040 Transmission substations	40
040 Transmission substations	40
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70
070 Transmision Breaker	70

099 Generation or transmission, other	99
070 Transmision Breaker	70
099 Generation or transmission, other	99
070 Transmision Breaker	70
070 Transmision Breaker	70
099 Generation or transmission, other	99
099 Generation or transmission, other	99
050 Insulator	50
099 Generation or transmission, other	99
020 Towers, poles, and fixtures	20

Weather	Crew	Customers
100 Clear, calm	421-GEORGE SWEATMAN	2783
020 Lightning, Thunderstorm		2784
100 Clear, calm		2738
020 Lightning, Thunderstorm	816-Jeremy Harrell	2728
010 Rain		848
030 Wind	420-Joe Harvey	842
100 Clear, calm		850
020 Lightning, Thunderstorm	511-Kenny Holloway	849
020 Lightning, Thunderstorm		847
100 Clear, calm		838
100 Clear, calm	511-Kenny Holloway	835
015 Cloudy		834
100 Clear, calm		834
015 Cloudy		841
015 Cloudy		841
015 Cloudy		841
100 Clear, calm		841
100 Clear, calm		841
015 Cloudy	507-Terrance Branton	846
030 Wind		847
015 Cloudy		845
100 Clear, calm		845
015 Cloudy		847
100 Clear, calm		869
100 Clear, calm		869
015 Cloudy		886
030 Wind	506-Rico Harrell	885
020 Lightning, Thunderstorm		882
020 Lightning, Thunderstorm		884
020 Lightning, Thunderstorm		889
015 Cloudy		883
020 Lightning, Thunderstorm		885
100 Clear, calm		888
100 Clear, calm		896
100 Clear, calm		896
100 Clear, calm		896
100 Clear, calm	507-Terrance Branton	874
010 Rain	507-Terrance Branton	877
010 Rain		869
100 Clear, calm	507-Terrance Branton	865
100 Clear, calm	507-Terrance Branton	866
100 Clear, calm	507-Terrance Branton	866
020 Lightning, Thunderstorm		869
015 Cloudy		858
020 Lightning, Thunderstorm		2851
100 Clear, calm		2873
010 Rain		2851
030 Wind	451-Bryce Jones	1455
100 Clear, calm		2692
100 Clear, calm		670
100 Clear, calm		670
100 Clear, calm		6038
100 Clear, calm	605 - Ryan Ford	6318
100 Clear, calm		774
015 Cloudy	421-GEORGE SWEATMAN	987
015 Cloudy	421-GEORGE SWEATMAN	1162
020 Lightning, Thunderstorm		1637
020 Lightning, Thunderstorm		1645
010 Rain		1662
020 Lightning, Thunderstorm		1666
100 Clear, calm	605 - Ryan Ford	1
100 Clear, calm		1
020 Lightning, Thunderstorm		7014
100 Clear, calm		6323
010 Rain		6316

100 Clear, calm		6364
020 Lightning, Thunderstorm		6527
100 Clear, calm	605 - Ryan Ford	8
100 Clear, calm		6859
010 Rain		1148
020 Lightning, Thunderstorm		1142
100 Clear, calm		2793
020 Lightning, Thunderstorm		2861
020 Lightning, Thunderstorm		1719
020 Lightning, Thunderstorm		1693
020 Lightning, Thunderstorm		1715
020 Lightning, Thunderstorm		3825
020 Lightning, Thunderstorm		3898
010 Rain		1571
010 Rain		1584
020 Lightning, Thunderstorm		1673
015 Cloudy		2341
020 Lightning, Thunderstorm	613-Mike Mallard	2699
010 Rain		2697
100 Clear, calm		2693
015 Cloudy		2715
020 Lightning, Thunderstorm		2886
020 Lightning, Thunderstorm		2900
020 Lightning, Thunderstorm		2902
015 Cloudy		2908
100 Clear, calm		2957
015 Cloudy		3293
010 Rain		3224
010 Rain		3238
010 Rain		3238
010 Rain		3239
010 Rain		3241
020 Lightning, Thunderstorm		3289
100 Clear, calm		3299
015 Cloudy		3292
100 Clear, calm		3292
010 Rain		16
010 Rain		9435
015 Cloudy		1781
020 Lightning, Thunderstorm	613-Mike Mallard	1811
010 Rain		1809
100 Clear, calm		1808
015 Cloudy		1807
020 Lightning, Thunderstorm		1873
020 Lightning, Thunderstorm		1886
020 Lightning, Thunderstorm		1888
015 Cloudy		1885
100 Clear, calm		1898
015 Cloudy		1962
010 Rain		1987
010 Rain		1990
010 Rain		1990
010 Rain		1990
010 Rain		1990
020 Lightning, Thunderstorm		2024
100 Clear, calm		2024
015 Cloudy		2019
100 Clear, calm		2019
015 Cloudy		3926
020 Lightning, Thunderstorm		4143
010 Rain		4130
100 Clear, calm		4096
015 Cloudy		4106
100 Clear, calm		4522
100 Clear, calm		2106
015 Cloudy		2112

020 Lightning, Thunderstorm		4785
020 Lightning, Thunderstorm		4881
020 Lightning, Thunderstorm		3286
020 Lightning, Thunderstorm		2947
100 Clear, calm		3091
010 Rain		3201
100 Clear, calm		3498
020 Lightning, Thunderstorm	700-Scott Bennett	1184
010 Rain		3324
100 Clear, calm		0

InterruptionD	CustomerMin	CustomerHours
132	343203	5720.05
0	0	0
0	0	0
82	223696	3728.266666
0	0	0
2	1684	28.066666
0	0	0
55	46695	778.25
0	0	0
0	0	0
3	2505	41.75
0	0	0
196	163464	2724.4
0	841	14.016666
0	0	0
0	0	0
0	0	0
0	0	0
204	171738	2862.3
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
8	6952	115.866666
0	0	0
6	5310	88.5
0	0	0
13	11492	191.533333
0	0	0
0	0	0
131	12390	206.5
1	888	14.8
0	0	0
0	0	0
2	2688	44.8
45	39330	655.5
24	21358	355.966666
9	7821	130.35
8	6920	115.333333
8	6928	115.466666
8	6928	115.466666
13	11297	188.283333
4	2596	43.266666
0	0	0
0	0	0
0	0	0
363	308709	5145.15
35	93115	1551.916666
3	2010	33.5
2	1340	22.333333
2	12076	201.266666
37	233766	3896.1
0	0	0
17	16779	279.65
10	11620	193.666666
0	0	0
0	0	0
0	0	0
0	0	0
37	37	0.616666
0	0	0
0	0	0
0	0	0
0	0	0

0	0	0
0	0	0
62	496	8.266666
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
25	67475	1124.583333
11	29667	494.45
0	0	0
1	2715	45.25
0	0	0
0	0	0
0	0	0
6	17448	290.8
7	20699	344.983333
53	174529	2908.816666
51	164424	2740.4
2	6476	107.933333
2	6476	107.933333
16	51824	863.733333
2	6482	108.033333
0	0	0
0	0	0
5	16460	274.333333
7	23044	384.066666
0	0	0
0	0	0
0	0	0
25	45275	754.583333
11	18090	301.5
0	0	0
1	1807	30.116666
0	0	0
0	0	0
0	0	0
6	11310	188.5
7	13286	221.433333
53	103986	1733.1
50	99350	1655.833333
3	5970	99.5
2	3980	66.333333
16	31840	530.666666
1	1990	33.166666
0	0	0
0	0	0
5	10095	168.25
7	14133	235.55
0	0	0
25	103575	1726.25
11	41300	688.333333
0	0	0
1	4106	68.433333
30	131138	2185.633333
0	0	0
57	120453	2007.55

0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
218	258112	4301.866666
0	0	0
14		0

Notes
---------- 6/20/2013 14:58:00 421-GEORGE SWEATMAN assigned to outage.
Jefferies to St Stephen Hydro operated during a strong storm.
11/22/2013 06:43:51 This was a 230kV outage – Line between Jefferies and Cross – tree caused. BEC did not see an outage or direct operation.
A SMALL STORM CAME THROUGH THE AREA. SANTEE COOPER FOUND A BROKE TRANSMISSION POLE ON THE BONNEAU SIDE OF M
---------- 1/6/2011 14:58:44 TARGETS ON A PHASE TO GROUND CAUSE UNKNOWN 1350 OPERATED PER BILL TURNER
---------- 3/3/2011 11:58:57 420-Joe Harvey assigned to outage. ---------- 3/3/2011 12:21:30 CLosed Awendaw Moab at 12:00:35 to restore pov
---------- 5/11/2011 04:29:11 511-Kenny Holloway assigned to outage. SCE&G has restored power to their line feeding our Awendaw Mp. Their c
---------- 7/14/2011 12:11:31 SCE&G breaker operated.
---------- 9/19/2011 17:56:20 511-Kenny Holloway assigned to outage. ---------- SCE@G breaker# 920912 malfunctioned.
---------- 10/18/2011 11:04:53 Breaker# 1350 operated per: Wenday @ SCE&G Charleston Dispatch.
---------- 10/19/2011 19:20:21 SWAPED 18:32:47
---------- 11/17/2011 14:43:29 SCE&G took an operation on their downline.
---------- 11/17/2011 14:45:31 SCE&G operation tree on line
---------- 11/29/2011 10:06:51 90912 operated / cause unknown Per: Wendy @ SCE&G
Load was on CW-08 while SCE&G had a HLT and no BEC consumer affected. AW MP Source outage 15:56:11 - 16:42:25
---------- 1/23/2012 19:49:00 507-Terrance Branton assigned to outage. ---------- 1/23/2012 23:11:26 SCE&G RECLOSERS
---------- 2/27/2012 13:41:05 Breaker# 1350 operated per: Wendy @ SCE&G Charleston Dispatch.
---------- 5/4/2012 09:11:52 SCE&G Breaker #1350 operated per: Charleston Dispatch
---------- 9/1/2012 08:18:12 SCE&G HAS A DOWN LINE RECLOSER OUT
SCE&G took a dip on their 90912, cause unknown. Per:Wendy @ SCE&G Charleston Dispatch
EVERYTHING WAS BACK TO NORMAL AT 22:21 ---------- 5/6/2013 8:01:44 AM 506-Rico Harrell assigned to outage. Crew was assigned
6/3/2013 16:09:41 2 Operations per Wendy @ SCE&G Dispatch
Closed MOAB 4:19:32 SCE&G back hot at 9:11:33, Bad insulator near Beehive & Gadsenville Rd.
6/26/2013 15:20:15 1350 operated due to T-storm per: James SCE&G Dispatch
7/24/2013 13:37:38 SCE&G breaker# 1350 operated per: James @ Charleston Dispatch
CAUSE UNKNOWN PER LEVI AT SCE&G. CLOSE IN MOAB AT 12:44 AM TERRACE BRANTON OPEN THE BLADES BACK TO NORMAL AT 2
Breaker failure. Bill Turner stated they found high resistance in the auxiliary contacts for that breaker. long operation.
12/3/2013 2:28:57 AM A truck hit and brought down primary on a tap off Doar Road per Bill Turner ""Truck ran over an anchor and cut a down guy
12/3/2013 2:31:19 AM A truck hit and brought down primary on a tap off Doar Road per Bill Turner ""Truck ran over an anchor and cut a down guy
SCE&G FOUND A SQUIRREL BEHIND CHARLESTON NATIONAL AT 1200 OLD COURSE LN
---------- 7/24/2014 16:09:12 507-Terrance Branton assigned to outage. 7/24/2014 4:36:53 PM SCE&G DROPPED US
---------- 9/19/2014 15:18:42 507-Terrance Branton assigned to outage. 9/19/2014 17:14:34 SCE&G HAS WIRE TORE DOWN AT SEE WEE B
5/8/2015 13:07:41 SCE&G FOUND A TREE ON THEIR 90912 FEEDER TO AWMP 5/8/2015 13:09:38 SCE&G GOT THE 90912 BACK HOT AT 16
5/15/2015 7:48:45 PM SCE&G FOUND NOTHING BUT SAID IT MIGHT HAVE BEEN TREE LIMBS BRUSHING AGAINST THE LINE ----------
SCE&G HAD THERE CREWS RIDE THE LINES THEY SAID THEY FOUND TREE LIMBS BRUSHING AGAINST LINES THEY HAVE THE TREE
SCE@G FOUND TREE ON LINE AT GARDEN HILL RD. LOAD WAS SWAPPED NOW BACK TO NORMAL ---------- 5/17/2015 4:09:02 PM
SCE&G FOUND A LIMB ON THERE 90912. SYSTEM CONTROL SWAP BACK OVER THE NEXT MORNING. SCE
STRONG STORMS SANTEE COOPER JEFFRIES TO MEDWAY OPERATED. ALSO FOUND GROUNDS MISSING AROUND AREA OF LIGHTN
This was a 230kV outage – Line between Jefferies and Cross – tree caused. BEC did not see an outage or direct operation. We saw possible low
3/12/2015 15:12:06 “Low voltage at multiple subs in Moncks Corner and Goose Creek due to an adjacent transmission feeder fault. A broken pole
---------- 4/30/2013 8:21:02 AM 451-Bryce Jones assigned to outage. FOUND BODY IN SUBSTATION
SANTEE COOPER WAS WORKING ON THEIR BREAKER AND KNOCKED OUT
---------- SANTEE COOPER TRANSMISSION LINE BLINKED BROKEN POLE
Buzzard
Santee Cooper had a broken pole on fire that feeds transmission line to College Park to Corning
---------- 10/18/2012 06:16:20 421-GEORGE SWEATMAN assigned to outage. ---------- 10/18/2012 06:53:52 SCE&G switch burnt-up while we
---------- 10/18/2012 06:21:40 421-GEORGE SWEATMAN assigned to outage. ---------- 10/18/2012 06:58:30 SCE&G switch burnt-up while we
9/3/2013 3:25:34 PM STRONG STORM SANTEE COOPER JEFFRIES TO HARLEYVILLE OPERATED
8/13/2014 08:17:05 TRANSMISSION BLINK
3/12/2015 15:13:50 “Low voltage at multiple subs in Moncks Corner and Goose Creek due to an adjacent transmission feeder fault. A broken pole
---------- 3/11/2013 8:38:57 AM 605 - Ryan Ford assigned to outage. 3/11/2013 8:40:05 AM SANTEE COOPER HAD BROKEN POLE FROM WC
11/22/2013 06:45:22 This was a 230kV outage – Line between Jefferies and Cross – tree caused. BEC did not see an outage or direct operation.
---------- 7/14/2011 10:14:46 Carnes 115 to North Charleston operated, possibly lightning.
11/22/2013 06:47:35 This was a 230kV outage – Line between Jefferies and Cross – tree caused. BEC did not see an outage or direct operation.
3/12/2015 20:29:01 “Low voltage at multiple subs in Moncks Corner and Goose Creek due to an adjacent transmission feeder fault. A broken pole

07/14/2016 09:48:36 Truck came into contact with Cooperative line underneath South Carolina Public Authority line. this caused the cooperative li
---------- 7/14/2011 10:18:37 Carnes 115 to North Charleston operated, possibly lightning.
SCe&G transmission lines makeing noise...moisture etc on the lines...Nothing to worry about per Ryan Ford ---------- 3/13/2015 23:51:44 605 - R
07/14/2016 09:50:24 TRUCK CAME INTO CONTACT WITH COOPERATIVE LINE UNDERNEATH SOUTH CAROLINA PUBLIC AUTHORITY LINE
4/7/2015 08:22:00 "Low voltage at multiple subs in Moncks Corner and Goose Creek due to an adjacent transmission feeder fault. A broken pole,
STRONG THUNDERSTORM IN THE AREA
11/22/2013 06:41:04 This was a 230kV outage – Line between Jefferies and Cross – tree caused. BEC did not see an outage or direct operation.
4/20/2015 15:40:52 LIGHTNING STRIKE ON THE JOHNS ISLAND 115kv TRANSMISSION
STRONG STORMS IN AREA SANTEE COOPER JEFFRIES TO HARLEYVILLE OPERATED
8/13/2014 08:15:03 TRANSMISSION BLINK
4/20/2015 15:31:47 TRANSMISSION BLINK DUE TO LIGHTNING STRIKE ON THE JOHNS ISLAND 115kv LINE
3/12/2015 15:34:13 "Low voltage at multiple subs in Moncks Corner and Goose Creek due to an adjacent transmission feeder fault. A broken pole
3/12/2015 15:08:38 "Low voltage at multiple subs in Moncks Corner and Goose Creek due to an adjacent transmission feeder fault. A broken pole
STRONG THUNDERSTORM IN THE AREA
Carnes 115 to St George operated. Cause unknkown per: Santee Cooper
---------- 8/17/2012 5:23:11 PM 613-Mike Mallard assigned to outage. Tree on line line St. George to Carnes Feeder.
---------- 10/2/2012 9:23:54 PM SANTEE COOPER DROPPED TRANSMISSION DUE TO FIRE AT EDISTO SUB. FOUND NEXT DAY ATTEMP
Beaver cut tree on transmission line on Sangaree tap.
Partial lockout on Carnes to St George 115 line.
7/17/2014 12:04:57 SEVERE THUNDERSTORM
10/17/2014 09:40:48 TREE FELL ON TRANSMISSION LINE BETWEEN DORCHESTER AND ST GEORGE
EDISTO ELECTRIC INSTALLING NEW TRANSFORMER IN SUBSTATIONTHAT WAS NOT GROUNDED RESULTED IN SANTEE COOPER TR
TREE ON LINE BREAKER FAILURE
B PHASE TRANSFORMER BUSHING AT HARLEYS BRIDGE AT THE TIME TRANSMISSION OUTAGE THE 115KV TRANSMISSION LOOP WA
B PHASE TRANSFORMER BUSHING AT HARLEYS BRIDGE AT THE TIME TRANSMISSION OUTAGE THE 115KV TRANSMISSION LOOP WA
B PHASE TRANSFORMER BUSHING AT HARLEYS BRIDGE AT THE TIME TRANSMISSION OUTAGE THE 115KV TRANSMISSION LOOP WA
B PHASE TRANSFORMER BUSHING ON HARLEYS BRIDGE AT THE TIME O THE TRANSMISSION OUTAGE THE 115KV TRANSMISSION LO
B PHASE TRANSFORMER BUSHING AT HARLEYS BRIDGE AT THE TIME TRANSMISSION OUTAGE THE 115KV TRANSMISSION LOOP WA
08/25/2016 15:37:32 Tree found on line 2 spans down from TEFIS 137470
Chris Wagner with Santee Cooper called and said they had this line on a hot line work permit (one shot) when the line went out. Looks like the out
LOGGER DROPPED TREE ON THE LINE 09/19/2016 17:19:15
3/12/2015 15:25:57 "Low voltage at multiple subs in Moncks Corner and Goose Creek due to an adjacent transmission feeder fault. A broken pole
4/14/2015 13:34:22 SANTEE COOPER TOOK AN OPERATION ON THE N. CHARLESTON 115 KV LINE
Carnes 115 to St George operated. Cause unknkown per: Santee Cooper
---------- 8/17/2012 5:29:44 PM 613-Mike Mallard assigned to outage. Tree on line line St. George to Carnes Feeder.
---------- 10/3/2012 10:04:22 FIRE AT EDISTO SUB. (SANTEE COOPER) FOUND OUT NEXT DAY ATTEMPTED THEFT AT SUB.
Beaver cut tree on transmission line on Sangaree tap.
Partial lockout on Carnes to St Geaorge 115 line.
7/17/2014 12:03:09 SEVERE THUNDERSTORM
10/17/2014 09:43:00 TREE FELL ON TRASSMISSION LINE BETWEEN DORCHESTER AND ST GEORGE
EDISTO ELECTRIC INSTALLING NEW TRANSFORMER IN SUBSTATIONTHAT WAS NOT GROUNDED RESULTED IN SANTEE COOPER TR
TREE ON LINE BREAKER FAILURE 09/05/2015 00:39:39 SANTEE COOPER DROPPED U
B PHASE TRANSFORMER BUSHING AT HARLEYS BRIDGE AT THE TIME TRANSMISSION OUTAGE THE 115KV TRANSMISSION LOOP WA
B PHASE TRANSFORMER BUSHING AT HARLEYS BRIDGE AT THE TIME TRANSMISSION OUTAGE THE 115KV TRANSMISSION LOOP WA
B PHASE TRANSFORMER BUSHING AT HARLEYS BRIDGE AT THE TIME TRANSMISSION OUTAGE THE 115KV TRANSMISSION LOOP WA
B PHASE TRANSFORMER BUSHING ON HARLEYS BRIDGE AT THE TIME O THE TRANSMISSION OUTAGE THE 115KV TRANSMISSION LO
B PHASE TRANSFORMER BUSHING AT HARLEYS BRIDGE AT THE TIME TRANSMISSION OUTAGE THE 115KV TRANSMISSION LOOP WA
08/25/2016 15:31:14 tree found on line 2 spans down from TEFIS 137470
Chris Wagner with Santee Cooper called and said they had this line on a hot line work permit (one shot) when the line went out. Looks like the out
09/19/2016 17:18:46 LOGGER DROPPED TREE ON LINE
---------- 8/16/2011 11:07:21 Carnes 115 to St George operated. Cause unknkown per: Santee Cooper
Tree on line line St. George to Carnes Feeder.
---------- 10/2/2012 9:26:49 PM SANTEE COOPER DROPPED TRANSMISSION DUE TO FIRE AT EDISTO SUB. SOMEONE TRIED TO STEAL
Beaver cut tree on transmission line on Sangaree tap.
Partial lockout on Carnes to St Geaorge 115 line.
09/28/2016 16:31:26 SANTEE COOPER WAS DOING MAINTANENCE WORK AND KNOCKED OUT THEIR BREAKER.
09/28/2015 14:13:27 SANTEE COOPER OPERATION. CAUSE IS UNDER INVESTIGATION. (SC OCCURENCE CODE 8418) SEPTEMBER 29,
09/26/2016 13:07:21 SANTEE COOPER HAD A LOCKOUT ON THEIR JEFFERIES TO PINELAND BREAKER

4/20/2015 15:35:56 LIGHTNING STRIKE ON THE JOHNS ISLAND 115kv TRANSMISSION
4/20/2015 15:39:34 LIGHTNING STRIKE ON THE JOHNS ISLAND 115kv TRANSMISSION
STRONG STORMS SANTEE COOPER JEFFRIES TO MEDWAY OPERATED. ALSO FOUND GROUNDS MISSING AROUND AREA OF LIGHTN
11/22/2013 06:31:28 This was a 230kV outage – Line between Jefferies and Cross – tree caused. BEC did not see an outage or direct operation.
3/12/2015 15:24:33 “Low voltage at multiple subs in Moncks Corner and Goose Creek due to an adjacent transmission feeder fault. A broken pole
08/18/2016 11:09:00 SANTEE COOPER TREE TRIMMERS CUT GUY WIRE AND OPERATED THE TRANSMISSION **CHADH** ALSO BIGGIN
---------- 5/17/2012 04:20:10 700-Scott Bennett assigned to outage.
3/12/2015 15:28:34 “Low voltage at multiple subs in Moncks Corner and Goose Creek due to an adjacent transmission feeder fault. A broken pole
SANTEE COOPER HAD A BROKE POLE ON THE JEFFERIES TO CARNES CROSSROADS TRANSMISSION 07/20/2

FaultedPole#	outagerecid_1
Phase ABC Verified Open on 41_SIDING	2013-07-02-0116
Phase ABC Verified Open on 41_SIDING	2013-07-15-0765
Phase ABC Verified Open on SW1535988441-B	2013-11-22-0973
Phase ABC Verified Open on 41_SIDING	2016-03-16-1167
Phase ABC Verified Open on SW618929878-A	2011-01-06-0263
Phase ABC Verified Open on SW618929878-A	2011-03-03-0098
Phase ABC Verified Open on SW618929878-A	2011-07-07-0749
Phase ABC Verified Open on SW618929878-A	2011-05-11-0713
Phase ABC Verified Open on SW618929878-A	2011-07-14-1509
Phase ABC Verified Open on SW618929878-A	2011-09-11-0739
Phase ABC Verified Open on OC1531708827	2011-09-20-1328
Phase ABC Verified Open on SW618929878-A	2011-10-18-1393
Phase ABC Verified Open on SW618929878-A	2011-10-19-1552
Phase ABC Verified Open on SW618929878-A	2011-11-17-1300
Phase ABC Verified Open on SW618929878-A	2011-11-17-1303
Phase ABC Verified Open on SW618929878-A	2011-11-29-1935
Phase ABC Verified Open on SW618929878-A	2012-01-05-0346
Phase ABC Verified Open on SW618929878-A	2012-01-05-0349
Phase ABC Verified Open on OC1531708827	2012-01-23-1363
Phase ABC Verified Open on SW618929878	2012-02-12-0517
Phase ABC Verified Open on SW618929878	2012-02-27-1316
Phase ABC Verified Open on OC1531708827	2012-04-13-0620
Phase ABC Verified Open on AWENDAW_MP	2012-05-04-0142
Phase ABC Verified Open on SW618929878	2012-09-01-0006
Phase ABC Verified Open on OC1531708827	2012-09-25-1016
Phase ABC Verified Open on AWENDAW_MP	2013-04-19-0756
Phase ABC Verified Open on OC1531708827	2013-05-06-0255
Phase ABC Verified Open on AWENDAW_MP	2013-06-03-0151
Phase ABC Verified Open on AWENDAW_MP	2013-06-05-0286
Phase ABC Verified Open on AWENDAW_MP	2013-06-26-2237
Phase ABC Verified Open on AWENDAW_MP	2013-07-24-1138
	2013-08-14-0556
Phase ABC Verified Open on AWENDAW_MP	2013-08-25-1057
Phase ABC Verified Open on AWENDAW_MP	2013-12-03-0066
Phase ABC Verified Open on AWENDAW_MP	2013-12-03-0067
Phase ABC Verified Open on AWENDAW_MP	2013-12-18-0589
Phase ABC Verified Open on OC1531708827	2014-07-24-2135
Phase ABC Verified Open on OC1531708827	2014-09-19-2148
Phase ABC Verified Open on AWENDAW_MP	2015-05-08-0804
Phase ABC Verified Open on OC1531708827	2015-05-15-1120
Phase ABC Verified Open on OC1531708827	2015-05-16-1193
Phase ABC Verified Open on OC1531708827	2015-05-17-1216
Phase ABC Verified Open on AWENDAW_MP	2015-07-03-0278
Phase ABC Verified Open on OH1460503743	2016-09-20-1998
Phase ABC Verified Open on SW662338177-B	2013-08-30-1248
Phase ABC Verified Open on OH-42610481	2013-11-22-0969
Phase ABC Verified Open on BIGGINS	2015-03-12-0415
Phase ABC Verified Open on CAINHOY	2013-04-30-1541
Phase ABC Verified Open on XFMR210035	2016-09-16-1755
Phase ABC Verified Open on OC1865049885	2011-04-23-1841
Phase ABC Verified Open on OC1865049885	2011-04-23-1831
Phase ABC Verified Open on COLLEGE_PARK	2011-09-03-0133
Phase ABC Verified Open on COLLEGE_PARK	2013-03-10-0486
Phase ABC Verified Open on OC275325955	2011-09-11-0742
Phase ABC Verified Open on OC344976902	2012-10-18-0796
Phase ABC Verified Open on OC215251518	2012-10-18-0788
Phase ABC Verified Open on COOPERSTORERD	2013-09-03-0102
Phase ABC Verified Open on COOPERSTORERD	2014-08-13-0553
Phase ABC Verified Open on COOPERSTORERD	2015-03-12-0416
Phase ABC Verified Open on COOPERSTORERD	2016-08-25-3661
Phase ABC Verified Open on CORNING	2013-03-11-0548
Phase ABC Verified Open on CORNING	2013-11-22-0974
Phase ABC Verified Open on CROWFIELD	2011-07-14-1488
Phase ABC Verified Open on OH1376581575	2013-11-22-0975
Phase ABC Verified Open on CROWFIELD	2015-03-12-0435

Phase ABC Verified Open on CROWFIELD	2016-07-14-0967
Phase ABC Verified Open on GOOSE_CREEK	2011-07-14-1493
Phase C Verified Open on TR-1865317810	2015-03-13-0475
Phase ABC Verified Open on GOOSE_CREEK	2016-07-14-0968
Phase ABC Verified Open on JAMESTOWN	2015-04-07-0193
Phase ABC Verified Open on JAMESTOWN	2015-07-13-0865
Phase ABC Verified Open on SW-1794710131-B	2013-11-22-0972
Phase ABC Verified Open on JOHNS_ISLAND	2015-04-20-0843
Phase ABC Verified Open on LEBANON	2013-09-03-0100
Phase ABC Verified Open on LEBANON	2014-08-13-0551
Phase ABC Verified Open on LEBANON	2016-08-25-3662
Phase ABC Verified Open on LEGAREVILLE	2015-04-20-0840
Phase ABC Verified Open on LEGAREVILLE	2016-07-14-0969
Phase ABC Verified Open on SW186213-B	2015-03-12-0424
Phase ABC Verified Open on MACEDONIA	2015-03-12-0413
Phase ABC Verified Open on MACEDONIA	2015-07-13-0866
Phase ABC Verified Open on MCQUEEN	2011-08-16-2297
Phase ABC Verified Open on MCQUEEN	2012-08-17-0986
Phase ABC Verified Open on MCQUEEN	2012-10-02-0090
Phase ABC Verified Open on MCQUEEN	2012-11-07-0329
Phase ABC Verified Open on MCQUEEN	2013-03-11-0602
Phase ABC Verified Open on MCQUEEN	2014-07-17-1797
Phase ABC Verified Open on MCQUEEN	2014-09-03-0088
Phase ABC Verified Open on MCQUEEN	2014-09-15-1068
Phase ABC Verified Open on MCQUEEN	2014-10-17-0702
Phase ABC Verified Open on MCQUEEN	2014-12-22-2124
Phase ABC Verified Open on MCQUEEN	2016-07-14-0971
Phase ABC Verified Open on OH1368234708	2016-03-03-0268
Phase ABC Verified Open on OH1368234708	2016-03-03-0326
Phase ABC Verified Open on OH1368234708	2016-03-03-0387
Phase ABC Verified Open on OH1368234708	2016-03-03-0406
Phase ABC Verified Open on OH1368234708	2016-03-03-0431
Phase ABC Verified Open on MCQUEEN	2016-08-25-3660
Phase ABC Verified Open on MCQUEEN	2016-09-21-2047
Phase ABC Verified Open on OH1368234708	2016-09-19-1903
Phase ABC Verified Open on OH1368234708	2016-09-19-1937
Phase ABC Verified Open on MEDWAY	2015-03-12-0421
Phase ABC Verified Open on MOUNT_HOLLY	2015-04-14-0563
Phase ABC Verified Open on NEW_HOPE	2011-08-16-2296
Phase ABC Verified Open on NEW_HOPE	2012-08-17-0994
Phase ABC Verified Open on NEW_HOPE	2012-10-03-0199
Phase ABC Verified Open on NEW_HOPE	2012-11-07-0328
Phase ABC Verified Open on NEW_HOPE	2013-03-11-0601
Phase ABC Verified Open on NEW_HOPE	2014-07-17-1796
Phase ABC Verified Open on NEW_HOPE	2014-09-03-0086
Phase ABC Verified Open on NEW_HOPE	2014-09-15-1066
Phase ABC Verified Open on NEW_HOPE	2014-10-17-0703
Phase ABC Verified Open on NEW_HOPE	2014-12-19-1957
Phase ABC Verified Open on OH-1142665965	2015-09-04-0326
Phase ABC Verified Open on OH-1142665965	2016-03-03-0286
Phase ABC Verified Open on OH-1142665965	2016-03-03-0334
Phase ABC Verified Open on OH-1142665965	2016-03-04-0489
Phase ABC Verified Open on OH-1142665965	2016-03-03-0409
Phase ABC Verified Open on OH-1142665965	2016-03-03-0436
Phase ABC Verified Open on NEW_HOPE	2016-08-25-3654
Phase ABC Verified Open on NEW_HOPE	2016-08-25-3658
Phase ABC Verified Open on OH960514415	2016-09-19-1905
Phase ABC Verified Open on OH-1142665965	2016-09-19-1925
Phase ABC Verified Open on SANGAREE	2011-08-16-2293
Phase ABC Verified Open on SANGAREE	2012-08-17-0988
Phase ABC Verified Open on SANGAREE	2012-10-02-0181
Phase ABC Verified Open on SANGAREE	2012-11-07-0325
Phase ABC Verified Open on SANGAREE	2013-03-11-0600
Phase ABC Verified Open on SANGAREE	2016-09-28-2435
Phase ABC Verified Open on SANTEE	2015-09-28-2415
Phase ABC Verified Open on SANTEE	2016-09-26-2264

Phase ABC Verified Open on SEABROOK	2015-04-20-0841
Phase ABC Verified Open on SEABROOK	2016-07-14-0970
Phase ABC Verified Open on STONO	2015-04-20-0842
Phase ABC Verified Open on SW1428772315-B	2013-09-04-0130
Phase ABC Verified Open on SW1428772315-B	2013-11-22-0970
Phase ABC Verified Open on STRAWBERRY	2015-03-12-0419
Phase ABC Verified Open on STRAWBERRY	2016-08-18-1215
Phase ABC Verified Open on SW-808879795	2012-05-17-0927
Phase ABC Verified Open on SW42671492-B	2015-03-12-0420
Phase ABC Verified Open on WHITESVILLE	2015-07-20-2651

OutageName	Substation	OutageStartTime	OutageEndTime	Customers
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	1.5.2011 4:46 PM	1.5.2011 4:46 PM	848
AWENDAW MP (SOURCE OUTAGE)	AWENDAW_MP	3.3.2011 11:58 AM	3.3.2011 12:00 PM	842
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	3.5.2011 4:41 PM	3.5.2011 4:41 PM	850
AWENDAW MP (SOURCE OUTAGE)	AWENDAW_MP	5.11.2011 4:21 AM	5.11.2011 5:16 AM	849
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	7.13.2011 9:44 PM	7.13.2011 9:44 PM	847
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	9.11.2011 5:00 PM	9.11.2011 5:00 PM	838
AWENDAW MP (SOURCE OUTAGE)	AWENDAW_MP	9.19.2011 4:54 PM	9.19.2011 4:57 PM	835
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	10.18.2011 10:11 AM	10.18.2011 10:11 AM	834
AWENDAW MP (SOURCE OUTAGE)	AWENDAW_MP	10.19.2011 6:32 PM	10.19.2011 9:48 PM	834
AMWENDAW MP (SOURCE OUTAGE)	AWENDAW_MP	11.17.2011 1:34 PM	11.17.2011 1:35 PM	841
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	11.17.2011 2:40 PM	11.17.2011 2:40 PM	841
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	11.29.2011 8:34 AM	11.29.2011 8:34 AM	841
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	12.29.2011 3:56 PM	12.29.2011 3:56 PM	841
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	12.30.2011 10:10 AM	12.30.2011 10:10 AM	841
AWENDAW MP (SOURCE OUTAGE)	AWENDAW_MP	1.23.2012 7:48 PM	1.23.2012 11:12 PM	846
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	2.11.2012 9:29 PM	2.11.2012 9:29 PM	847
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	2.27.2012 1:26 PM	2.27.2012 1:26 PM	845
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	4.13.2012 8:50 AM	4.13.2012 8:50 AM	845
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	5.4.2012 7:44 AM	5.4.2012 7:44 AM	847
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	9.1.2012 6:02 AM	9.1.2012 6:02 AM	869
AWENDAW MP (SOURCE OUTAGE)	AWENDAW_MP	9.25.2012 9:02 AM	9.25.2012 9:10 AM	869
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	4.19.2013 5:58 AM	4.19.2013 5:58 AM	886
AWENDAW MP (SOURCE OUTAGE)	AWENDAW_MP	5.3.2013 6:58 PM	5.3.2013 7:04 PM	885
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	6.3.2013 1:40 PM	6.3.2013 1:40 PM	882
AWENDAW MP (SOURCE OUTAGE)	AWENDAW_MP	6.5.2013 4:06 AM	6.5.2013 4:19 AM	884
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	6.26.2013 3:07 PM	6.26.2013 3:07 PM	889
AWENDAW MP (SOURCE OPERATION)	AWENDAW_MP	7.24.2013 9:51 AM	7.24.2013 9:51 AM	883
AWENDAW MP (SOURCE OUTAGE)	AWENDAW_MP	8.14.2013 12:30 PM	8.14.2013 2:41 PM	885
AWENDAW MP (SOURCE O/C)	AWENDAW_MP	8.25.2013 9:08 AM	8.25.2013 9:08 AM	888
AWMP (Sourceside) O/C	AWENDAW_MP	12.2.2013 9:02 AM	12.2.2013 9:02 AM	896
AWMP (Sourceside) O/C	AWENDAW_MP	12.2.2013 9:02 AM	12.2.2013 9:02 AM	896
AWMP (SOURCE OUTAGE)	AWENDAW_MP	12.18.2013 7:57 AM	12.18.2013 8:00 AM	896
AWENDAW MP	AWENDAW_MP	7.24.2014 3:52 PM	7.24.2014 4:37 PM	874
AWENDAW MP (SOURCE OUTAGE)	AWENDAW_MP	9.19.2014 3:15 PM	9.19.2014 3:40 PM	877
AWENDAW MP (SOURCE)	AWENDAW_MP	5.7.2015 3:10 PM	5.7.2015 3:19 PM	869
AWENDAW MP (SOURCE)	AWENDAW_MP	5.15.2015 5:00 PM	5.15.2015 5:08 PM	865
AWENDAW MP (SOURCE)	AWENDAW_MP	5.16.2015 4:11 PM	5.16.2015 4:20 PM	866
AWENDAW MP (SOURCE)	AWENDAW_MP	5.17.2015 3:34 PM	5.17.2015 3:42 PM	866
AW-MP (SOURCE)	AWENDAW_MP	7.3.2015 3:12 PM	7.3.2015 3:25 PM	869
AWENDAW MP (SOURCE)	AWENDAW_MP	9.20.2016 8:21 PM	9.20.2016 8:25 PM	858

InterruptionI	CustomerMi	CustomerHours
0	0	0
2	1684	28.066666
0	0	0
55	46695	778.25
0	0	0
0	0	0
3	2505	41.75
0	0	0
196	163464	2724.4
0	841	14.016666
0	0	0
0	0	0
0	0	0
0	0	0
204	171738	2862.3
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
8	6952	115.866666
0	0	0
6	5310	88.5
0	0	0
13	11492	191.533333
0	0	0
0	0	0
131	12390	206.5
1	888	14.8
0	0	0
0	0	0
2	2688	44.8
45	39330	655.5
24	21358	355.966666
9	7821	130.35
8	6920	115.333333
8	6928	115.466666
8	6928	115.466666
13	11297	188.283333
4	2596	43.266666

740

Notes
---------- 1/6/2011 14:58:44 TARGETS ON A PHASE TO GROUND CAUSE UNKNOWN 1350 OPERATED PER BILL TURNER
---------- 3/3/2011 11:58:57 420-Joe Harvey assigned to outage. ---------- 3/3/2011 12:21:30 CLosed Awendaw Moab at 12:00:35 to restore
---------- 5/11/2011 04:29:11 511-Kenny Holloway assigned to outage. SCE&G has restored power to their line feeding our Awendaw Mp. Th
---------- 7/14/2011 12:11:31 SCE&G breaker operated.
---------- 9/19/2011 17:56:20 511-Kenny Holloway assigned to outage. ---------- SCE@G breaker# 920912 malfunctioned.
---------- 10/18/2011 11:04:53 Breaker# 1350 operated per: Wenday @ SCE&G Charleston Dispatch.
---------- 10/19/2011 19:20:21 SWAPED 18:32:47
---------- 11/17/2011 14:43:29 SCE&G took an operation on their downline.
---------- 11/17/2011 14:45:31 SCE&G operation tree on line
---------- 11/29/2011 10:06:51 90912 operated / cause unknown Per: Wendy @ SCE&G
Load was on CW-08 while SCE&G had a HLT and no BEC consumer affected. AW MP Source outage 15:56:11 - 16:42:25
---------- 1/23/2012 19:49:00 507-Terrance Branton assigned to outage. ---------- 1/23/2012 23:11:26 SCE&G RECLOSERS
---------- 2/27/2012 13:41:05 Breaker# 1350 operated per: Wendy @ SCE&G Charleston Dispatch.
---------- 5/4/2012 09:11:52 SCE&G Breaker #1350 operated per: Charleston Dispatch
---------- 9/1/2012 08:18:12 SCE&G HAS A DOWN LINE RECLOSER OUT
SCE&G took a dip on their 90912, cause unknown. Per:Wendy @ SCE&G Charleston Dispatch
EVERYTHING WAS BACK TO NORMAL AT 22:21 ---------- 5/6/2013 8:01:44 AM 506-Rico Harrell assigned to outage. Crew was assigned a
6/3/2013 16:09:41 2 Operations per Wendy @ SCE&G Dispatch
Closed MOAB 4:19:32 SCE&G back hot at 9:11:33, Bad insulator near Beehive & Gadsenville Rd.
6/26/2013 15:20:15 1350 operated due to T-storm per: James SCE&G Dispatch
7/24/2013 13:37:38 SCE&G breaker# 1350 operated per: James @ Charleston Dispatch
CAUSE UNKNOWN PER LEVI AT SCE&G. CLOSE IN MOAB AT 12:44 AM TERRACE BRANTON OPEN THE BLADES BACK TO NORMAL AT 2:44:54 PM
Breaker failure. Bill Turner stated they found high resistance in the auxiliary contacts for that breaker. long operation.
12/3/2013 2:28:57 AM A truck hit and brought down primary on a tap off Doar Road per Bill Turner ""Truck ran over an anchor and cut a dow
12/3/2013 2:31:19 AM A truck hit and brought down primary on a tap off Doar Road per Bill Turner ""Truck ran over an anchor and cut a dow
SCE&G FOUND A SQUIRREL BEHIND CHARLESTON NATIONAL AT 1200 OLD COURSE LN
---------- 7/24/2014 16:09:12 507-Terrance Branton assigned to outage. 7/24/2014 4:36:53 PM SCE&G DROPPED US
---------- 9/19/2014 15:18:42 507-Terrance Branton assigned to outage. 9/19/2014 17:14:34 SCE&G HAS WIRE TORE DOWN AT SEE WEE BL
5/8/2015 13:07:41 SCE&G FOUND A TREE ON THEIR 90912 FEEDER TO AWMP 5/8/2015 13:09:38 SCE&G GOT THE 90912 BACK HOT AT 16:52
5/15/2015 7:48:45 PM SCE&G FOUND NOTHING BUT SAID IT MIGHT HAVE BEEN TREE LIMBS BRUSHING AGAINST THE LINE ---------- 5/1
SCE&G HAD THERE CREWS RIDE THE LINES THEY SAID THEY FOUND TREE LIMBS BRUSHING AGAINST LINES THEY HAVE THE TREE CREW CUT
SCE@G FOUND TREE ON LINE AT GARDEN HILL RD. LOAD WAS SWAPPED NOW BACK TO NORMAL ---------- 5/17/2015 4:09:02 PM 507-
SCE&G FOUND A LIMB ON THERE 90912. SYSTEM CONTROL SWAP BACK OVER THE NEXT MORNING. SCE

FaultedPole#	outagerecid_1
Phase ABC Verified Open on SW618929878-A	2011-01-06-0263
Phase ABC Verified Open on SW618929878-A	2011-03-03-0098
Phase ABC Verified Open on SW618929878-A	2011-07-07-0749
Phase ABC Verified Open on SW618929878-A	2011-05-11-0713
Phase ABC Verified Open on SW618929878-A	2011-07-14-1509
Phase ABC Verified Open on SW618929878-A	2011-09-11-0739
Phase ABC Verified Open on OC1531708827	2011-09-20-1328
Phase ABC Verified Open on SW618929878-A	2011-10-18-1393
Phase ABC Verified Open on SW618929878-A	2011-10-19-1552
Phase ABC Verified Open on SW618929878-A	2011-11-17-1300
Phase ABC Verified Open on SW618929878-A	2011-11-17-1303
Phase ABC Verified Open on SW618929878-A	2011-11-29-1935
Phase ABC Verified Open on SW618929878-A	2012-01-05-0346
Phase ABC Verified Open on SW618929878-A	2012-01-05-0349
Phase ABC Verified Open on OC1531708827	2012-01-23-1363
Phase ABC Verified Open on SW618929878	2012-02-12-0517
Phase ABC Verified Open on SW618929878	2012-02-27-1316
Phase ABC Verified Open on OC1531708827	2012-04-13-0620
Phase ABC Verified Open on AWENDAW_MP	2012-05-04-0142
Phase ABC Verified Open on SW618929878	2012-09-01-0006
Phase ABC Verified Open on OC1531708827	2012-09-25-1016
Phase ABC Verified Open on AWENDAW_MP	2013-04-19-0756
Phase ABC Verified Open on OC1531708827	2013-05-06-0255
Phase ABC Verified Open on AWENDAW_MP	2013-06-03-0151
Phase ABC Verified Open on AWENDAW_MP	2013-06-05-0286
Phase ABC Verified Open on AWENDAW_MP	2013-06-26-2237
Phase ABC Verified Open on AWENDAW_MP	2013-07-24-1138
	2013-08-14-0556
Phase ABC Verified Open on AWENDAW_MP	2013-08-25-1057
Phase ABC Verified Open on AWENDAW_MP	2013-12-03-0066
Phase ABC Verified Open on AWENDAW_MP	2013-12-03-0067
Phase ABC Verified Open on AWENDAW_MP	2013-12-18-0589
Phase ABC Verified Open on OC1531708827	2014-07-24-2135
Phase ABC Verified Open on OC1531708827	2014-09-19-2148
Phase ABC Verified Open on AWENDAW_MP	2015-05-08-0804
Phase ABC Verified Open on OC1531708827	2015-05-15-1120
Phase ABC Verified Open on OC1531708827	2015-05-16-1193
Phase ABC Verified Open on OC1531708827	2015-05-17-1216
Phase ABC Verified Open on AWENDAW_MP	2015-07-03-0278
Phase ABC Verified Open on OH1460503743	2016-09-20-1998

Appendix 2

BEC System Growth Trends

BERKELEY ELECTRIC COOPERATIVE - LOAD PROJECTIONS

SUB/KVA	PEAK PERIOD	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Max. W/S	Proj. 2007	% over 2002
41-Siding	WINTER	9802	9764	11485	11465	11977	14505	13506	13756	13125	18060		21400	
Sub. #9	SUMMER	7564	8779	9152	9682	10127	10920	10193	9119	10952	4935		4.33%	10.27%
			1.112	1.255	1.184	1.183	1.328	1.325	1.508	1.198		1.508		
Awendaw MP	WINTER	3453	3406	4056	3930	4220	4826	4555	5156	4879	5352		6300	
Sub. #24	SUMMER	2507	2904	2805	2912	3161	3317	3175	3199	3402	473		4.16%	5.25%
			1.173	1.446	1.350	1.335	1.455	1.435	1.612	1.434		1.612		
Biggins	WINTER	10016	9730	10952	9833	9918	11609	13099	13015	13731	17041		20000	
Sub. #1	SUMMER	7391	8560	8313	8164	8872	9503	10745	10661	11638	3310		4.08%	7.81%
			1.137	1.317	1.204	1.118	1.222	1.219	1.221	1.180		1.317		
Cainhoy	WINTER	---	---	---	---	---	---	---	9998	7540	9048		11000	
Sub. #12	SUMMER	---	---	---	---	---	---	5227	5175	5707	1508		5.01%	7.85%
									1.932	1.321		1.932		
College Park #1 (1-5)	WINTER	12916	12576	14248	13073	14888	18672	18790	21584	19879	24554		29000	
Sub. #4	SUMMER	7950	8782	9147	10558	11994	15551	13967	15054	15996	4675		4.25%	7.85%
			1.432	1.558	1.238	1.241	1.201	1.345	1.434	1.243		1.558		
College Park #2 (7-8,11-12)	WINTER	14568	13898	15057	13083	13890	14797	13162	15858	14490	17659		20700	
Sub. #4	SUMMER	9396	10066	9772	9994	10326	10990	10299	10365	10548	3169		4.05%	7.39%
			1.381	1.541	1.309	1.345	1.346	1.278	1.530	1.374		1.541		
College Park #1 & #2	WINTER	27484	26474	29305	26156	28778	33469	31952	37442	34369	42213		49700	
Sub. #4	SUMMER	17346	18848	18919	20552	22320	26541	24266	25419	26544	7844		4.17%	7.66%
			1.405	1.549	1.273	1.289	1.261	1.317	1.473	1.295		1.549		
Corning #1 (1)	WINTER	---	---	---	---	---	1019	980	1467	1058	1402		1650	
Sub. #60	SUMMER	---	---	---	---	---	2298	1695	1415	1525	344		4.16%	1.59%
							0.443	0.578	1.037	0.694		1.037		
Corning #2 (2)	WINTER	---	---	---	---	---	1344	1739	2266	2084	2090		2350	
Sub. #60	SUMMER	---	---	---	---	---	2410	1954	2071	2174	6		2.97%	1.57%
							0.558	0.890	1.094	0.959		1.094		
Corning #1 & #2	WINTER	---	---	---	---	---	2363	2719	3733	3142	3492		4000	
Sub. #60	SUMMER	---	---	---	---	---	4708	3649	3486	3699	350		3.45%	1.58%
							0.502	0.745	1.071	0.849		1.071		
Crowfield #1 (1-6)	WINTER	~~24793~~	19519	21765	19258	21998	22287	~~11661~~	21071	22013	25003		28300	
Sub. #14	SUMMER	15482	16931	17438	16551	17334	20296	15912	17920	19800	2990		3.15%	5.15%
			1.1529	1.248	1.164	1.269	1.098	0.733	1.176	1.1118		1.269		
Crowfield #2 (7-11)	WINTER	18427	17800	19201	17094	18612	20407	19844	22284	17512	24572		27000	
Sub. #14	SUMMER	15126	16016	16042	16069	16763	14941	15714	15830	15073	7060		2.38%	9.04%
			1.111	1.197	1.064	1.110	1.366	1.263	1.408	1.162		1.408		
Crowfield #1 & #2	WINTER	43220	37319	40966	36352	40610	42694	31505	43355	39525	49575		55300	
Sub. #14	SUMMER	30608	32947	33480	32620	34097	35237	31626	33750	34873	10050		2.77%	6.95%
			1.133	1.224	1.114	1.191	1.212	0.996	1.285	1.133		1.285		
Goose Creek #1 (1-6)	WINTER	14580	11826	13050	11756	12346	14363	16171	15927	14867	19096		21700	
Sub. #3	SUMMER	11334	12107	11603	12299	12646	16299	15255	15194	15847	4229		3.25%	6.49%
			0.977	1.125	0.956	0.976	0.881	1.060	1.048	0.938		1.125		
Goose Creek #2 (7-10)	WINTER	8833	8294	9069	8730	8482	9114	9309	10236	10497	11090		12800	
Sub. #3	SUMMER	8054	8530	8433	8536	9175	9763	9319	9280	9319	593		3.65%	4.05%
			0.972	1.075	1.023	0.924	0.934	0.999	1.103	1.126		1.126		
Goose Creek #1 & #2	WINTER	23413	20120	22119	20486	20828	23477	25480	26163	25364	30186		34500	
Sub. #3	SUMMER	19388	20637	20036	20835	21821	26062	24574	24474	25166	4822		3.40%	6.35%
			0.975	1.104	0.983	0.954	0.901	1.037	1.069	1.008		1.104		
Hamlin (#1 & #2)	WINTER	14364	15155	18386	16377	17958	20510	19157	22219	20448	24826		29000	
Sub. #21	SUMMER	10320	11832	11953	13379	13915	15907	15902	15019	16666	4378		3.96%	7.24%
			1.281	1.538	1.224	1.291	1.289	1.205	1.479	1.227		1.538		
Huger MP	WINTER	7160	6334	7376	7209	7808	10049	9407	---	---	---		0	
Sub. #11 (Retired)	SUMMER	5006	5848	6005	6269	6804	7754	---	---	---	---		---	---
			1.083	1.228	1.150	1.148	1.296					1.296		
Jamestown MP	WINTER	5581	5365	6046	5601	6050	7169	6934	7586	7409	8731		10400	
Sub. #10	SUMMER	4400	4836	5063	5080	5292	5681	5512	5409	5888	1322		4.47%	7.02%
			1.109	1.194	1.103	1.143	1.262	1.258	1.402	1.258		1.402		
Jedburg	WINTER	9750	9800	10550	10117	11428	13272	13542	13926	10362	13204		15300	
Sub. #6	SUMMER	8596	8675	8321	8888	10337	10432	11145	6446	8889	2842		3.75%	8.11%
			1.130	1.268	1.138	1.106	1.272	1.215	~~2.160~~	1.166		2.160		
Johns Island	WINTER	13018	9019	9655	8692	10396	10527	10705	12011	10875	12189		14700	
Sub. #32	SUMMER	6825	7244	6988	7132	7394	8278	8415	8670	10679	1314		4.79%	6.21%
			1.245	1.382	1.219	1.406	1.272	1.272	1.385	1.018		1.406		

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Chris est. Growth Rate	CWP Growth	Central (prelim) Growth Rate
2501 Biggins	10,016	9,730	10,952	9,833	9,918	11,609	13,099	12,915	13,686	17,041	14,734	16,695	15,880	16,962	18,808	18,481	18,308	18,438	16,837	14,629	19,446	20,844	16,463	2.50%	0.250%	0.82%
2502 Whitesville	19,600	19,350	20,965	19,101	22,092	17,516	17,464	22,473	20,516	22,226	19,326	22,184	19,507	16,140	19,356	19,514	20,200	21,446	19,502	16,688	22,498	22,016	21,734	1.40%	1.500%	1.70%
2503 Goose Creek #1	14,580	11,826	13,050	11,756	12,346	14,363	16,171	15,863	14,809	19,096	16,328	15,614	13,527	14,136	24,472	16,919	17,615	17,325	16,034	13,310	17,977	17,789	15,803	2.00%	2.350%	1.71%
2503 Goose Creek #2	8,833	8,294	9,069	8,730	8,482	9,114	9,309	10,161	10,446	11,090	9,648	13,261	11,578	11,795	14,321	14,655	16,341	16,705	15,396	11,693	15,178	14,916	13,408	2.20%	2.350%	1.71%
2504 College Park #1	12,916	12,576	14,248	13,073	14,888	18,672	18,790	21,423	19,738	24,554	21,954	27,204	20,030	20,803	24,358	23,199	25,453	23,442	20,972	17,574	22,818	22,395	19,284	1.50%	1.500%	1.36%
2504 College Park #2	14,568	13,898	15,057	13,083	13,890	14,797	13,162	15,798	14,437	17,659	15,194	19,368	16,784	19,016	20,976	20,772	21,817	21,570	20,438	17,263	22,427	22,079	20,248	2.00%	1.500%	1.36%
2505 Mount Holly	27,069	22,987	25,712	8,675	13,833	10,476	19,218	13,077	13,414	16,622	15,731	18,443	16,869	18,430	20,561	19,977	20,049	21,668	20,907	17,067	22,502	22,732	28,831	3.50%	4.890%	1.98%
2505 Mount Holly (5-8)				15,258	16,392	17,006	20,530	18,235	17,016	20,451	17,057	19,497	16,978	17,552	18,986	24,121	23,031	20,744	21,228	18,834	24,085	26,108	13,787	3.50%	4.890%	1.98%
2507 Lebanon	6,816	6,969	7,439	7,501	7,727	9,047	8,896	11,444	9,681	11,462	12,321	13,141	12,045	12,248	11,513	9,911	8,644	10,454	9,898	8,305	10,209	9,926	9,484	1.00%	0.340%	2.55%
2508 Santee	7,849	7,259	8,301	7,985	8,402	9,627	8,988	10,303	9,655	12,694	10,905	11,167	10,123	11,467	11,468	9,902	12,194	10,438	9,961	8,367	11,004	11,047	9,381	1.20%	0.250%	2.47%
2509 Fourty-One Sidin	9,802	9,764	11,485	11,465	11,977	14,505	13,506	13,647	13,025	18,060	14,883	17,325	16,461	15,599	18,015	16,491	17,442	17,267	16,345	13,744	17,055	17,287	15,867	1.60%	0.025%	1.90%
2510 Jamestown	5,581	5,365	6,046	5,601	6,050	7,169	6,934	7,586	7,409	8,731	7,620	8,692	7,413	6,787	7,205	6,773	6,480	8,453	6,451	5,400	8,674	6,398	5,765	0.50%		2.67%
2512 Cainhoy								9,966	7,517	9,048	8,007	9,230	8,424	8,450	9,895	9,331	9,331	9,794	9,201	7,467	9,707	9,649	8,912	0.50%	0.670%	2.61%
2514 Crowfield #1	24,793	19,519	21,765	19,258	21,998	22,287	11,661	20,982	21,915	25,003	22,362	25,410	19,185	21,490	24,338	21,607	22,303	22,505	20,272	16,880	23,551	22,811	19,097	0.70%	2.350%	0.41%
2514 Crowfield #2	18,427	17,800	19,201	17,094	18,612	20,407	19,844	22,123	17,405	24,572	18,188	18,810	18,608	20,501	26,197	23,959	23,801	23,822	21,938	15,758	17,677	17,880	15,104	1.00%	2.350%	0.41%
2515 Macedonia	6,006	5,986	6,510	5,750	6,356	7,790	7,352	8,469	8,197	9,414	8,217	9,368	7,826	9,407	11,177	10,403	10,845	10,874	9,550	7,952	10,041	9,940	9,065	1.20%	1.020%	4.64%
2516 Sangaree #1	21,224	20,624	22,164	19,750	22,085	24,292	11,126	14,191	20,723	23,719	17,281	13,962	12,502	13,623	14,894	14,053	12,242	13,806	12,242	10,128	15,959	12,799	11,047	0.50%	4.890%	0.56%
2516 Sangaree #2				15,258	16,392	17,006	20,530	15,137	10,653	10,657	11,504	13,585	12,870	13,494	18,038	13,795	14,157	14,736	13,607	11,771	15,416	16,053	15,047	3.50%	4.890%	0.56%
2517 Strawberry						7,446	7,680	8,748	8,605	10,176	9,304	9,928	9,422	11,215	13,693	14,691	16,181	16,934	16,065	13,750	19,600	19,107	17,354	4.50%	1.500%	5.21%
2518 New Hope #1											4,385	21,053	20,534	23,045	25,875	20,896	11,156	11,493	10,469	9,199	10,758	11,090	10,758	3.00%	3.730%	1.07%
2518 New Hope #2															8,779	9,224	3,738	3,666	3,459	3,113	3,921	3,834	3,243	1.00%	3.730%	1.07%
2519 Liberty Hall																			7,645	7,475	10,026	9,401	8,932	3.00%	2.350%	5.49%
2520 Commonwealth																26,477	27,114	27,961	25,929	23,668	32,890	31,749	27,660	3.00%	4.400%	1.13%
2524 Awendaw	3,453	3,406	4,056	3,930	4,220	4,826	4,555	5,156	4,879	5,352	4,974	5,501	4,855	4,870	5,455	5,552	5,591	5,617	5,371	4,663	6,330	6,178	5,579	1.50%	2.410%	3.93%
2530 Stono	13,938	14,687	15,933	15,476	16,396	19,373	19,138	22,097	9,733	14,526	12,860	14,612	12,874	14,728	16,960	16,482	17,612	17,729	15,941	15,105	19,528	19,165	15,800	0.75%	2.720%	1.57%
2532 Johns Island	13,018	9,019	9,655	8,692	10,396	10,527	10,705	11,910	10,789	12,189	11,236	13,235	13,192	13,847	15,794	15,659	16,449	16,372	15,149	18,184	16,969	17,355	15,533	3.25%	2.870%	2.38%
2533 Legareville	15,274	13,442	16,222	14,480	15,352	18,914	19,018	21,371	20,555	27,453	22,844	25,434	22,635	26,241	27,961	28,873	29,901	31,219	24,854	25,530	35,769	35,247	26,991	2.75%	3.060%	1.48%
2535 Wadmalaw	4,711	4,783	5,426	5,341	5,938	6,697	6,383	7,335	6,545	8,706	7,180	8,171	7,336	8,106	8,949	8,964	9,153	9,530	8,482		11,055	10,231	8,337	1.00%	2.870%	2.61%
2537 Seabrook #1	11,481	11,117	12,874	10,687	11,208	13,616	13,278	14,256	13,271	19,016	14,438	15,845	12,861	14,278	17,306	16,973	17,538	18,654	15,480	14,206	21,745	19,974	13,077	0.75%	2.380%	1.54%
2537 Seabrook #2	11,219	10,270	11,713	10,244	9,660	10,907	10,010	12,455	10,549	14,158	11,089	11,297	10,089	11,903	12,104	12,134	12,452	13,174	10,747	11,866	12,711	12,321	10,992	0.75%	2.380%	1.54%
2540 Ravenel									9,940	10,290	9,449	10,591	9,160	9,998	10,031	10,090	10,803	11,151	10,166	8,870	10,840	11,154	9,599	1.00%	0.089%	2.43%
2541 Cane Bay																							0	5.00%		1.10%
2550 Cooper Store														7,157	9,755	9,785	9,827	9,813	9,461	7,687	10,203	10,030	8,916	1.10%	0.520%	5.27%
2580 Corning						2,363	2,719										498	381	504	512	483	532	454	0.10%		
2584 McQueen #1																	15,467	17,382	15,617	13,283	17,807	19,346	17,561	3.00%	3.730%	
2584 McQueen #2																	1,390	1,434	1,835	1,689	1,636	1,123	1,304	0.10%	3.730%	
2586 Medway 1								0	0	0	0	0	0	0	4,786	8,617	10,731	18,901	25,745	22,616	23,049	27,186	13,242			
2586 Medway 2								0	0	0	0	0	0	0	0	0	0	0	0	21,753	27,333	36,574	52,090			
2586 Medway 3								0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,424	4,017			
2586 Medway 4								0	0	0	0	0	0	0	0	0	0	0	0	0	0	79	79			
2506 Jedburg	9,750	9,800	10,550	10,117	11,428	13,272	13,542	13,788	10,282	13,204	12,011	0	0	0	0	0	0	0	0	0	0	0	0			
2521 Hamlin #1	14,364	15,155	18,386	16,377	17,958	20,510	19,157	22,219	20,448	24,826	11,736	13,454	11,592	12,024	13,013	12,749	0	0	0	0	0	0	0			
2521 Hamlin #2								0	0	0	10,454	11,856	11,035	12,192	13,363	12,662	0	0	0	0	0	0	0			
2583 Parker Hannifin								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
2593 Cane Bay Middle School								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
2523 Rifle Range Rd.								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	305,288	283,626	316,779	304,515	333,996	374,134	362,765	403,128	375,838	461,995	403,220	453,933	402,195	437,504	518,402	523,691	515,854	534,898	503,698	455,999	598,877	605,769	539,845			
		-7.64%	10.47%	-4.03%	8.83%	10.73%	-3.13%	10.01%	-7.26%	18.65%	-14.58%	11.17%	-12.86%	8.07%	15.61%	1.01%	-1.52%	3.56%	-6.19%	-10.46%	23.86%	1.14%	-12.21%			
						3.68%	4.36%	4.28%	3.80%	5.54%	1.44%	4.02%	-0.05%	2.82%	2.18%	4.60%	2.40%	4.96%	2.63%	-2.74%	2.51%	2.97%	0.18%			
											2.43%	3.75%	2.12%	3.04%	3.56%	2.86%	2.97%	2.46%	2.54%	-0.13%	3.27%	2.51%	2.55%			

Appendix 3

SCE&G - BEC
Winter Weather
Operating Agreement

McClellanville (Awendaw / Shellmore Road) Electric Delivery Point

Winter Weather Operating Agreement

South Carolina Electric & Gas Company ("SCE&G") provides to South Carolina Public Service Authority ("Santee Cooper") for Central Electric Power Cooperative, Inc. ("CEPC") and Berkeley Electric Cooperative ("BEC") a 23.9 kV point of service on Shellmore Road near Awendaw, SC. This point of service is described as "McClellanville" in the Network Integrated Transmission Service Agreement ("NITSA") between SCE&G and Santee Cooper dated September 15, 2015. CEPC and BEC may act as agents for Santee Cooper with regard to the NITSA. SCE&G also provides Santee Cooper a 115 kV point of service at SCE&G's Hamlin Substation. Santee Cooper takes service from this 115 kV line for the Commonwealth Substation owned by BEC. This point of service is described as "Hamlin/Commonwealth" in the NITSA. Santee Cooper, through the BEC distribution system, has the capability of shifting load between the Hamlin/Commonwealth and McClellanville Delivery Points.

Santee Cooper is authorized to take up to 120 amps per phase at the McClellanville Delivery Point. However, when temperatures in the north Mount Pleasant and McClellanville areas drop to or below 23 ^{0}F, the Santee Cooper electrical demand at the McClellanville Delivery Point would be expected to exceed the amount authorized by SCE&G.

When temperatures are forecasted to drop to or below 23 ^{0}F, or when Santee Cooper or BEC anticipate its electrical demand may exceed 120 amps per phase for any reason, Santee Cooper or BEC and SCE&G's Distribution Dispatch will discuss the anticipated situation and BEC will effect switching operations on its distribution system to reduce electric load at the McClellanville Delivery Point. Either party may initiate the call to begin the switching operations.

Once temperatures have risen above 23 ^{0}F, or electric demand at the McClellanville Delivery Point is anticipated to be below 120 amps per phase, BEC may return its distribution system to the normal electrical configuration by first notifying SCE&G's Distribution Dispatch and then effecting the necessary switching operations.

If Santee Cooper or BEC takes no action to reduce the load at the McClellanville Delivery Point as described above, SCE&G reserves the right to perform switching operations to separate the Santee Cooper McClellanville load from the SCE&G system until BEC performs the necessary switching operations on its distribution system to reduce its load below 120 amps per phase.

SCE&G and Santee Cooper or BEC will monitor loads in the north Mount Pleasant and McClellanville area and may revise the temperature criteria when Santee Cooper load exceeds 120 amps per phase as necessary to protect the integrity of SCE&G's distribution system.

Contact Information:

For day-ahead or day-of switching operations:

SCE&G Distribution Dispatch
803-217-2422
distributiondispatch@scana.com

BEC System Control
843-761-6277
systemcontrol@bec.coop

Santee Cooper (notifications only)
843-761-4030
trn@santeecooper.com

Contact Information for all other purposes:

SCE&G, Manager Transmission Support
Matt Hammond
803-217-2175
mhammond@scana.com

BEC, Manager of Engineering
& Technical Services
Jeff Coleman
843-509-2971
jeffc@bec.ccop

Santee Cooper, Manager System Control
Stony Martin
843-761-8000, x5297
srmartin@santeecooper.com

South Carolina Electric & Gas Company

Name: _____

Print: _____

Date: _____

Berkeley Electric Cooperative

Name: _____

Print: _____

Date: _____

South Carolina Public Service Authority

Name: Michael C Brown

Print: Michael C. Brown

Date: 01.04.17

Central Electric Power Cooperative, Inc.

Name: John T. Boyt

Print: John T. Boyt

Date: 1-5-17

SCPSA
LEGAL
APPROVED AS TO
LEGALITY AND
FORM
S. R. PELCHER
ARP

CENTRAL
LEGAL APPROVED
1-5-2017

Appendix 4

Central Electric 2012 CWP

M E M O R A N D U M

TO: Ron Calcaterra

FROM: Buck Springs

SUBJECT: Need to include the McClellanville delivery point transmission project (RUS 740C #849) as "Carry Forward" in the 2013-2016 Construction Work Plan.

DATE: September 1, 2012

This transmission project was submitted to RUS in the 2009-2012 CWP dated September 1, 2009. The project is scheduled for completion in December 2015 and is in the routing phase. The project is considered "In Progress" due to the allocation of time and materials. This project is being included in the 2013-2016 Construction Work Plan.

ESTIMATED PROJECT COSTS

740C	Project Name	ROW	Construction	Engineering	Overall
849	McClellanville (Buck Hall)	$1,600,000	$7,500,000	$3,320,000	$12,420,000

ENVIRONMENTAL STATUS

A Preliminary Draft Environmental Impact Study (PDEIS) for the 115 kV McClellanville Transmission Project was submitted to RUS on November 15, 2013. The Final Environmental Impact Statement (FEIS) is tentatively scheduled to be submitted to RUS in August 2014. RUS environmental approval for the McClellanville project is expected in January 2015. The Louis Berger Group, Inc. is the contractor preparing the EIS reports for Central Electric A Generic Environmental Report detailing Central Electric Power Cooperative's commitment to preserving the environment consistent with RUS guidelines is included in Section II.B. of this Construction Work Plan.

RECOMMENDATION

It is recommended that the project be put in the 2013-2016 Construction Work Plan.

McClellanville 115kV Transmission Projects

MEMORANDUM

TO: Ron Calcaterra

FROM: Michael C Smith and Buck Springs

SUBJECT: Need for Rescheduling on Transmission construction to the proposed McClellanville (formally Buck Hall) delivery point.

DATE: February 5, 2007

This transmission project was originally scheduled to go into service in January 2002. It has been delayed in response to the sensitivity of the area and because of compliance requirements with state and federal procedures.

The station is still called for by the member coop and the transmission line is now an open project. It is Centrals opinion that the transmission line to the distribution station is still justified and that the following analysis is still applicable.

RECOMMENDATION

It is recommended that service to the proposed McClellanville 115 kV delivery point be constructed as planned.

M E M O R A N D U M

TO: Ron Calcaterra

FROM: Buck Springs

SUBJECT: Transmission construction to the proposed McClellanville (formally known as Buck Hall) delivery point.

DATE: May 14, 2001

The proposed McClellanville delivery point is being designed for 115 kV operation. It will be located approximately one half mile Northeast of the existing McClellanville metering point in Berkeley Electric Cooperatives system (attachment #1). The planned in service date for this station is January 2002. The McClellanville substation is included as part of Berkeley Cooperative's Construction Work Plan submitted to RUS on February 26, 1999(attachment #2). Funds for the transmission required to serve the McClellanville substation are not included in previous loan applications. Attachment #3 provides a load flow printout of the area around the proposed delivery point under 2002 loading conditions.

The initial station loading will be 5 MW, all from the existing McClellanville metering point, which will be retired. The station will be designed with an installed transformer base capacity of 15 MVA. The load is expected to be 6.24 MW by 2010.

Options for serving this new delivery point are limited by the lack of transmission infrastructure in the area. The only three possible options, attachment #1, are via a 115 kV tap from the Bell Isle delivery point, a 115 kV tap from the Northwest around Jamestown, or from the Cainhoy delivery point from the Southwest.

Attachment #4 provides a load flow printout of McClellanville served under 2002 loading conditions from the Bell Isle delivery point. In this case, service is within the designed parameter of 95% voltage criteria, to the new delivery point. Attachment□s #5&6 demonstrate that under a 2002 loading condition and a first contingency, supplied power is still within the 90% voltage criteria, to the new delivery point.
Attachment #4A provides a load flow printout of McClellanville served under 2002 loading conditions from the Jamestown delivery point. In this case, service is within the designed parameter of 95% voltage criteria, to the new delivery point. Attachment□s #5A&6A demonstrate that under a 2002 loading condition and a first contingency, supplied power is still within the 90% voltage criteria, to the new delivery point.

Attachment #7 provides a load flow printout of McClellanville served under 2002 loading conditions from the Cainhoy delivery point. In this case, service is within the designed parameter of 95% voltage criteria, to the new delivery point. This is considered a radial service with no alternative service.

Attachment #8 is a load flow printout of the same configuration as attachment #4, but under 2010 loading conditions. This case demonstrates that service, in 2010 and under normal conditions is well within the 95% voltage criteria. Attachment□s #9&10 demonstrate that under a 2010 loading condition and a first contingency, supplied power is still within the 90% voltage criteria, to the new delivery point. The radial configuration, in 2010, results in loading on the most critical line section (795 ACSR out of the Winyah 115/230 kV generating station) of 52% of normal capacity. The normal capacity of 795 ACSR is 179 MVA at 115 kV.

Attachment #8A is a load flow printout of the same configuration as attachment #4A, but under 2010 loading conditions. This case demonstrates that service, in 2010 and under normal conditions is well within the 95% voltage criteria. Attachment□s #9A&10A demonstrate that under a 2010 loading condition and a first contingency, supplied power is still within the 90% voltage criteria, to the new delivery point. The radial configuration, in 2010, results in loading on the most critical line section (477 ACSR out of the Georgetown 115/230 kV switching station) of 26% of normal capacity. The normal capacity of 477 ACSR is 133 MVA at 115 kV.

Attachment #11 is a load flow printout of the same configuration as attachment #7, but under 2010 loading conditions. This case demonstrates that service, in 2010 and under normal conditions is well within the 95% voltage criteria. This is considered a radial service with no alternative service.

OBSERVATIONS

There is very little transmission infrastructure in the area around the proposed McClellanville delivery point.

Options for serving this new delivery point are limited by the transmission system in the area. The only three options, attachment #1, are via a 115 kV tap from the Bell Isle delivery point, a 115 kV tap from the Northwest near Jamestown, or from the Cainhoy delivery point from the Southwest. The service from Bell Isle would require 16 miles of 795 ACSR 115 kV transmission. The service from Jamestown would require 24 miles of 795 ACSR 115 kV transmission. The service from Cainhoy would require 24 miles of 795 ACSR 115 kV transmission.

All three tap points are considered strong sources with generation plants nearby providing excellent reliability.

The Belle Isle and Jamestown tap points have the advantage of being part of a looped transmission 115 kV system and both have an alternate source of service. The Belle Isle tap point has approximately eight mile less of transmission to construct over the other options.

Planned system improvements in the area will insure adequate service to the new delivery point through the forecasted year 2010.

RECOMMENDATION

It is recommended that service to the McClellanville 115 kV delivery point be provided via a tap from the Bell Isle delivery point. A 115 kV tap from Jamestown would be the next best alternative.

ATTACHMENT #2

4.19.0 McCLELLANVILLE-BEC SUBSTATION
Substation #25
(Proposed)

4.19.1 Technical Data

a. Voltage Rating: 115-14.4/24.94 kV
b. Primary Protection: Circuit Switcher
c. Power Transformers: One (1) 3Ø 15/28 MVA
d. Voltage Regulators: Nine (9) 1Ø 288 kVA
e. Number Outgoing Feeders: Circuits 1, 2 & 3
f. Feeder Protection: Three (3) Electronic Reclosers
g. OCR By-Pass: Blades
h. Maximum Fault Current, 3Ø, Secondary Side: 4340 Amps (Zero Source Impedance Assumed)

4.19.2 Design Data

Projected Substation Demand by Feeder

Feeder Number	Peak kW	Remarks
1	1849	2003 Peak = *
2	1580	
3	5636	
Total	9,065	

4.19.3 Construction Requirements

a. Substation - This new station will be required in 2006 to replace the Awendaw Metering Point. The new station will be equipped with one (1) three phase 15 MVA transformer which is to be purchased. Nine (9) 288 kVA voltage regulators are to be purchased for feeder regulation. A circuit switcher will be required for primary protection and three (3) electronic reclosers for feeder protection. A control house, along with SCADA equipment, is to be purchased for this station. See page 246 for associated costs.
b. Line Construction - Detailed on page 154.
c. Line Voltage Regulators - None required.
d. Sectionalizing Equipment - Five (5) single phase hydraulic OCR's and two (2) Air Break Switches will be required for the distribution system.
e. Capacitors - None required.

* New Station - No historical data available.

CONSTRUCTION WORK PLAN
SYSTEM IMPROVEMENTS, DISTRIBUTION LINE

McCLELLANVILLE-BEC SUBSTATION
SUB. #25

SC 25 BERKELEY

CONST. NO.	SECTION	CKT. NO.	DESCRIPTION	EXISTING CONDUCTOR PHASE	EXISTING CONDUCTOR WIRE SIZE	PROPOSED CONDUCTOR PHASE	PROPOSED CONDUCTOR WIRE SIZE	MILES	COST/MILE	EXT. COST (NEAREST $100)	YEAR	REMARKS
*225.01 (225.1)	02525, 02524, 02523, 02538	1,2,3,4	McClellanville Sub., Exit Ckt.'s		None	3	4 Circuits 750 Al. 35 kV	0.10	$1,300,900	$130,100	2006	
*325.01 (325.1)	15410-15346 02527-02537	1,2	Hwy. 17 Conversion to Toby Rd.	3	4/0 ACSR	3	Double Circuit 477 ACSR	1.26	$141,100	$177,800	2006	
*325.05 (324.5)	15668-15880	1	South Santee Rd. Conv.	2	4/0 ACSR	3	4/0 ACSR	0.39	$43,100	$16,800	2006	

NOTES

* INCLUDED IN PRIOR WORK PLAN BUT NOT CONSTRUCTED

REMARKS

DATE Aug-03

PAGE 1 of 1

FIRST 12 MONTHS MILES	FIRST 12 MONTHS COST	SECOND 12 MONTHS MILES	SECOND 12 MONTHS COST	THIRD 12 MONTHS MILES	THIRD 12 MONTHS COST	FOURTH 12 MONTHS MILES	FOURTH 12 MONTHS COST		GRAND TOTAL MILES	GRAND TOTAL COST
0.00	$0	0.00	$0	0.10	$130,100	0.00	$0	TIE LINES	0.10	$130,100
0.00	$0	0.00	$0	1.65	$194,600	0.00	$0	CONVERSION	1.65	$194,600
0.00	$0	0.00	$0	1.75	$324,700	0.00	$0	TOTAL	1.75	$324,700

ATTACHMENT #2 (cont)

ATTACHMENT #2(CONT.)

3.4.0 SUBSTATIONS - ADDITIONS AND CHANGES

3.4.1 New Substations - Category 400

CFR Code:	*420.0	Estimated Cost:	$1,662,100
Substation:	Commonwealth	Construction Period:	2007

This new station will be required in 2007 to replace the existing Hamlin MP. The new station will be equipped with one (1) three phase 24 MVA transformer which is to be purchased. Fifteen (15) 432 kVA voltage regulators are to be purchased for feeder regulation. One (1) circuit switcher will be required for primary protection and five (5) electronic reclosers for feeder protection. A control house, along with SCADA equipment, is to be purchased for this station. See page 242 for associated costs.

CFR Code:	450.0	Estimated Cost:	$1,290,300
Substation:	Cooper Store Rd.	Construction Period:	2005

This new station will be required in 2005 to reduce the service area of Lebanon, Mt. Holly and Whitesville Substations. The new station will be equipped with one (1) three phase 15 MVA transformer which is to be purchased. Twelve (12) 250 kVA voltage regulators are to be purchased for feeder regulation. A circuit switcher will be required for primary protection and four (4) electronic reclosers for feeder protection. A control house, along with SCADA equipment, is to be purchased for this station. See page 243 for associated costs.

CFR Code:	*425.0	Estimated Cost:	$1,294,100
Substation:	McClellanville-BEC	Construction Period:	2006

This new station will be required in 2006 to replace the Awendaw MP. The new station will be equipped with one (1) three phase 15 MVA transformer which is to be purchased. Nine (9) 288 kVA voltage regulators are to be purchased for feeder regulation. A circuit switcher will be required for primary protection and three (3) electronic reclosers for feeder protection. A control house, along with SCADA equipment, is to be purchased for this station. See page 246 for associated costs.

CFR Code:	*499.0	Estimated Cost:	$919,000
Substation:	Mobile Substation	Construction Period:	2004

A 30 MVA mobile will be required to provide service to all the existing stations in the event of a transformer failure. This unit will be equipped with a primary voltage of 115 kV and dual secondary voltages of 7.2/12.47 kV and 14.4/24.94 kV. See page 246 for associated cost.

CFR Code:	432.0	Estimated Cost:	$1,219,000
Substation:	New Johns Island	Construction Period:	2005

This new station will be required in 2005 to replace the old Johns Island Substation and reduce the service area of the Stono Substation. The new station will be equipped with one (1) three phase 15 MVA transformer which is to be obtained from Seabrook 1. Twelve (12) 288 kVA voltage regulators are to be purchased for feeder regulation. A circuit switcher will be required for primary protection and four (4) electronic reclosers for feeder protection. A control house, along with SCADA equipment, is to be purchased for this station. See page 247 for associated costs.

* Repeated from Previous Construction Work Plan

```
     PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E      THU, FEB 08 2007  16:14
2002 CASE1:EXISTING SYSTEM AROUND THE PROPOSED BUCK HALL                RATING
DELIVERY POINT.                                                          SET A
                    OUTPUT FOR ZONE 25 [BERKELEY    ]

BUS    719 6WINYAH     230.00 CKT     MW     MVAR     MVA  %I 1.0200PU  -43.04  X--- LOSSES ---X X---- AREA -----X X---- ZONE -----X
719
                                                    234.60KV              MW     MVAR  144 SC             25 BERKELEY
 TO    709 6CHARITY    230.00  1    177.7     54.6   185.9  23                  1.02    13.37  144 SC          122 SC-EA
 TO    712 6HEMING2    230.00  1    232.4     12.3   232.7  29                  1.31    17.45  144 SC          121 SC-NO
 TO    713 6JEFF       230.00  1     55.0      8.6    55.7   7                  0.10     1.37  144 SC          122 SC-EA
 TO    730 6CAMPFLD    230.00  1    323.7      5.2   323.8  66                  2.22    20.36  144 SC          122 SC-EA
 TO    845 3WINYAH     115.00  1     71.2      0.7    71.2  23 1.0000LK         0.00     1.49  144 SC           25 BERKELEY
 TO   1452 12WINY 2    22.000  1   -295.0    -26.4   296.2  92 1.0000LK         0.00    26.48  144 SC          122 SC-EA
 TO   1453 12WINY 3    22.000  1   -295.0    -25.4   296.1  92 1.0000LK         0.00    27.47  144 SC          122 SC-EA
 TO   1454 12WINY 4    22.000  1   -270.0    -29.8   271.6  85 1.0000LK         0.00    23.12  144 SC          122 SC-EA

BUS    767 3GTNREA     115.00 CKT     MW     MVAR     MVA  %I 1.0096PU  -46.53  X--- LOSSES ---X X---- AREA -----X X---- ZONE -----X
767
                                                    116.10KV              MW     MVAR  144 SC             25 BERKELEY
 TO LOAD-PQ                                    10.7      4.6    11.7
 TO    770 3GTWN S     115.00  1     9.2    -23.4    25.1  14                  0.01     0.05  144 SC           25 BERKELEY
 TO    859 3GTN  CT    115.00  1   -19.9     18.8    27.4  15                  0.02     0.08  144 SC           25 BERKELEY

BUS    770 3GTWN S     115.00 CKT     MW     MVAR     MVA  %I 1.0113PU  -46.59  X--- LOSSES ---X X---- AREA -----X X---- ZONE -----X
770
                                                    116.30KV              MW     MVAR  144 SC             25 BERKELEY
 TO SHUNT                                      0.0    -58.3    58.3
 TO    767 3GTNREA     115.00  1    -9.2     23.3    25.0  14                  0.01     0.05  144 SC           25 BERKELEY
 TO    778 3GTN  ST    115.00  1   121.6     38.5   127.6  95                  1.21     4.00  144 SC          122 SC-EA
 TO    785 3IPCOPMP    115.00  1    81.0     -3.5    81.1  60                  0.32     1.18  144 SC          122 SC-EA
 TO    786 3IPCOSW     115.00  1    34.0     12.4    36.2  34                  0.17     0.42  144 SC          122 SC-EA
 TO    789 3JEFF       115.00  1   -25.8      2.8    25.9  19                  0.44     1.56  144 SC          122 SC-EA
 TO    830 3SAMPIT     115.00  1   -12.9      7.4    14.9  11                  0.02     0.08  144 SC          122 SC-EA
 TO    845 3WINYAH     115.00  1  -138.5    -10.2   138.8  57                  0.66     5.82  144 SC           25 BERKELEY
 TO   1213 3VVV+       115.00  1  -136.2     -9.0   136.5  56                  0.44     3.82  144 SC          122 SC-EA
 TO   1217 3DUNBAR     115.00  1     4.5      1.4     4.7   3                  0.00     0.01  144 SC          122 SC-EA
 TO   1323 3CAMPFLD    115.00  1    81.3     -4.7    81.4  61                  0.89     3.19  144 SC          122 SC-EA

BUS    845 3WINYAH     115.00 CKT     MW     MVAR     MVA  %I 1.0200PU  -44.24  X--- LOSSES ---X X---- AREA -----X X---- ZONE -----X
845
                                                    117.30KV              MW     MVAR  144 SC             25 BERKELEY
 TO    719 6WINYAH     230.00  1   -71.2      0.7    71.2  23 1.0000UN         0.00     1.49  144 SC           25 BERKELEY
 TO    770 3GTWN S     115.00  1   139.1     15.6   140.0  57                  0.66     5.82  144 SC           25 BERKELEY
 TO   1167 3BL ISL+    115.00  1    84.5     13.4    85.6  47                  0.19     1.03  144 SC           25 BERKELEY
 TO   1213 3VVV+       115.00  1   142.5     18.3   143.7  59                  0.22     1.98  144 SC          122 SC-EA
 TO   1478 12WINY 1    22.000  1  -295.0    -48.1   298.9  93 1.0000LK         0.00    28.85  144 SC          122 SC-EA

BUS    859 3GTN  CT    115.00 CKT     MW     MVAR     MVA  %I 1.0079PU  -46.39  X--- LOSSES ---X X---- AREA -----X X---- ZONE -----X
859
                                                    115.91KV              MW     MVAR  144 SC             25 BERKELEY
 TO    767 3GTNREA     115.00  1    19.9    -18.9    27.5  15                  0.02     0.08  144 SC           25 BERKELEY
 TO   1151 0GTN  CT    34.500  1    11.9      5.1    12.9  32 0.9870RG   30.00LK   0.00     0.76  144 SC          122 SC-EA
 TO   1151 0GTN  CT    34.500  2    12.0      5.2    13.1  32 0.9870RG   30.00LK   0.00     0.77  144 SC          122 SC-EA
 TO   1174 3MRYVIL+    115.00  1   -69.6     -5.2    69.8  39                  0.11     0.62  144 SC           25 BERKELEY
 TO   1231 12GTN CT    12.470  1    14.7      7.9    16.7  55 0.9530LK   30.00LK   0.00     1.17  144 SC          122 SC-EA
 TO   1231 12GTN CT    12.470  2    11.0      5.9    12.5  41 0.9530LK   30.00LK   0.00     0.88  144 SC          122 SC-EA

BUS   1167 3BL ISL+    115.00 CKT     MW     MVAR     MVA  %I 1.0159PU  -44.90  X--- LOSSES ---X X---- AREA -----X X---- ZONE -----X
1167
                                                    116.83KV              MW     MVAR  144 SC             25 BERKELEY
 TO    845 3WINYAH     115.00  1   -84.3    -12.6    85.3  47                  0.19     1.03  144 SC           25 BERKELEY
 TO   1174 3MRYVIL+    115.00  1    77.8     10.3    78.5  43                  0.26     1.40  144 SC           25 BERKELEY
 TO   1198 3BL ISL     115.00  1     6.5      2.3     7.0   4                  0.00     0.00  144 SC           25 BERKELEY
     PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E      THU, FEB 08 2007  16:14
2002 CASE1:EXISTING SYSTEM AROUND THE PROPOSED BUCK HALL                RATING
DELIVERY POINT.                                                          SET A
                    OUTPUT FOR ZONE 25 [BERKELEY    ]

BUS   1173 3MRYVIL     115.00 CKT     MW     MVAR     MVA  %I 1.0101PU  -45.90  X--- LOSSES ---X X---- AREA -----X X---- ZONE -----X
1173
                                                    116.16KV              MW     MVAR  144 SC             25 BERKELEY
 TO   1174 3MRYVIL+    115.00  1    -7.8     -3.7     8.7   5                  0.00     0.00  144 SC           25 BERKELEY
 TO   1233 12MRYVIL    12.470  1     7.8      3.7     8.7  43 0.9526LK   30.00LK   0.00     0.42  144 SC          122 SC-EA

BUS   1174 3MRYVIL+    115.00 CKT     MW     MVAR     MVA  %I 1.0103PU  -45.89  X--- LOSSES ---X X---- AREA -----X X---- ZONE -----X
1174
                                                    116.18KV              MW     MVAR  144 SC             25 BERKELEY
 TO    859 3GTN  CT    115.00  1    69.7      5.6    69.9  39                  0.11     0.62  144 SC           25 BERKELEY
 TO   1167 3BL ISL+    115.00  1   -77.5     -9.3    78.1  43                  0.26     1.40  144 SC           25 BERKELEY
 TO   1173 3MRYVIL     115.00  1     7.8      3.7     8.7   5                  0.00     0.00  144 SC           25 BERKELEY

BUS   1198 3BL ISL     115.00 CKT     MW     MVAR     MVA  %I 1.0158PU  -44.91  X--- LOSSES ---X X---- AREA -----X X---- ZONE -----X
1198
                                                    116.82KV              MW     MVAR  144 SC             25 BERKELEY
 TO LOAD-PQ                                    6.5      2.4     7.0
 TO   1167 3BL ISL+    115.00  1    -6.5     -2.4     7.0   4                  0.00     0.00  144 SC           25 BERKELEY

BUS   1391 3CHARITY    115.00 CKT     MW     MVAR     MVA  %I 1.0153PU  -47.28  X--- LOSSES ---X X---- AREA -----X X---- ZONE -----X
1391
                                                    116.76KV              MW     MVAR  144 SC             25 BERKELEY
 TO    709 6CHARITY    230.00  1   -15.7     -7.1    17.3  11 1.0000UN         0.00     0.14  144 SC          122 SC-EA
 TO    709 6CHARITY    230.00  2   -15.8     -7.1    17.3  11 1.0000UN         0.00     0.14  144 SC          122 SC-EA
 TO   1418 3MGIND      115.00  1    22.4     10.3    24.6  14                  0.01     0.07  144 SC           25 BERKELEY
 TO   1491 3CHARI#2    115.00  1     1.5      1.6     2.2   1                  0.00     0.00  144 SC          122 SC-EA
```

```
 TO   1541 3CAINHY+     115.00  1      7.7     2.2     8.0   4                      0.00    0.00  144 SC              25 BERKELEY

BUS   1418 3MGIND       115.00 CKT     MW      MVAR    MVA   %I 1.0137PU  -47.41  X--- LOSSES ---X X---- AREA -----X X---- ZONE -----X
1418
                                                                116.58KV             MW      MVAR  144 SC              25 BERKELEY
 TO   1391 3CHARITY     115.00  1    -22.4   -10.4    24.6  14                      0.01    0.07  144 SC              25 BERKELEY
 TO   1419 13MGIND      13.800  1     11.2     5.2    12.4  41 0.9820RG             0.00    0.66  144 SC              25 BERKELEY
 TO   1419 13MGIND      13.800  2     11.2     5.2    12.3  40 0.9820RG             0.00    0.66  144 SC              25 BERKELEY

BUS   1419 13MGIND      13.800 CKT     MW      MVAR    MVA   %I 1.0103PU  -50.26  X--- LOSSES ---X X---- AREA -----X X---- ZONE -----X
1419
                                                                 13.941KV            MW      MVAR  144 SC              25 BERKELEY
 TO LOAD-PQ                                    22.4     9.0    24.1
 TO   1418 3MGIND       115.00  1    -11.2    -4.5    12.1  40 1.0000UN             0.00    0.66  144 SC              25 BERKELEY
 TO   1418 3MGIND       115.00  2    -11.2    -4.5    12.0  40 1.0000UN             0.00    0.66  144 SC              25 BERKELEY

BUS   1541 3CAINHY+     115.00 CKT     MW      MVAR    MVA   %I 1.0153PU  -47.28  X--- LOSSES ---X X---- AREA -----X X---- ZONE -----X
1541
                                                                116.76KV             MW      MVAR  144 SC              25 BERKELEY
 TO   1391 3CHARITY     115.00  1     -7.7    -2.2     8.0   4                      0.00    0.00  144 SC              25 BERKELEY
 TO   1542 3CAINHOY     115.00  1      7.7     2.2     8.0   4                      0.00    0.00  144 SC              25 BERKELEY

BUS   1542 3CAINHOY     115.00 CKT     MW      MVAR    MVA   %I 1.0153PU  -47.29  X--- LOSSES ---X X---- AREA -----X X---- ZONE -----X
1542
                                                                116.76KV             MW      MVAR  144 SC              25 BERKELEY
 TO LOAD-PQ                                     7.7     2.2     8.0
 TO   1541 3CAINHY+     115.00  1     -7.7    -2.2     8.0   4                      0.00    0.00  144 SC              25 BERKELEY
```

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E TUE, AUG 05 2003 14:52
2002 CASE5A:BUCK HALL SERVED FROM THE JAMESTOWN DELIVERY RATING
POINT. SET A

OUTPUT FOR ZONE 25 [BERKELEY]

BUS	719	6WINYAH	230	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 234.60KV	-43.24	719
TO	709	6CHARITY	230	144	1	177.0	54.7	185.3	23			
TO	712	6HEMING2	230	144	1	232.0	12.3	232.3	29			
TO	713	6JEFF	230	144	1	54.7	8.6	55.4	7			
TO	730	6CAMPFLD	230	144	1	324.0	5.2	324.1	66			
TO	845	3WINYAH	115	144	1	72.3	0.8	72.3	24	1.0000LK		
TO	1452	12WINY	222.0	144	1	-295.0	-26.4	296.2	92	1.0000LK		
TO	1453	12WINY	322.0	144	1	-295.0	-25.4	296.1	92	1.0000LK		
TO	1454	12WINY	422.0	144	1	-270.0	-29.8	271.6	85	1.0000LK		
BUS	767	3GTNREA	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0096PU 116.10KV	-46.76	767
TO	LOAD-PQ					10.7	4.6	11.7				
TO	770	3GTWN S	115	144	1	9.4	-23.4	25.2	14			
TO	859	3GTN CT	115	144	1	-20.1	18.8	27.6	15			
BUS	770	3GTWN S	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0113PU 116.30KV	-46.82	770
TO	SHUNT					0.0	-58.3	58.3				
TO	767	3GTNREA	115	144	1	-9.3	23.3	25.1	14			
TO	778	3GTN ST	115	144	1	121.6	38.5	127.6	95			
TO	785	3IPCOPMP	115	144	1	80.6	-3.4	80.7	60			
TO	786	3IPCOSW	115	144	1	33.8	12.4	36.0	34			
TO	789	3JEFF	115	144	1	-25.9	2.8	26.0	19			
TO	830	3SAMPIT	115	144	1	-10.7	6.9	12.7	9			
TO	845	3WINYAH	115	144	1	-138.9	-10.1	139.3	58			
TO	1213	3VVV+	115	144	1	-136.6	-8.9	136.9	57			
TO	1217	3DUNBAR	115	144	1	4.5	1.4	4.7	3			
TO	1323	3CAMPFLD	115	144	1	80.8	-4.6	81.0	60			
BUS	787	3JAMTWN	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0111PU 116.28KV	-45.50	787
TO	801	3MACDON	115	144	1	-33.2	2.4	33.3	25			
TO	830	3SAMPIT	115	144	1	20.3	-4.6	20.8	15			
TO	1444	12JAMTWN	12.5	144	1	7.9	3.2	8.5	42	0.9526LK	30.00LK	
TO	1660	BUCKHALL	115	1	1	5.0	-1.0	5.1	3			

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E TUE, AUG 05 2003 14:52
2002 CASE5A:BUCK HALL SERVED FROM THE JAMESTOWN DELIVERY RATING
POINT. SET A

OUTPUT FOR ZONE 25 [BERKELEY]

BUS	789	3JEFF	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 117.30KV	-43.31	789	
TO	713	6JEFF	230	144	1	40.4	17.1	43.9	29	1.0000UN			
TO	713	6JEFF	230	144	2	40.6	17.2	44.1	29	1.0000UN			
TO	768	3RUSSVL+	115	144	1	47.9	12.0	49.4	36				
TO	770	3GTWN S	115	144	1	26.3	-4.2	26.7	20				
TO	794	3LEBNON	115	144	1	26.9	13.0	29.9	16				
TO	801	3MACDON	115	144	1	40.0	0.1	40.0	29				
TO	804	3MCWS	115	144	1	107.3	20.9	109.3	60				
TO	870	3GAPAC +	115	144	1	21.7	3.9	22.0	20				
TO	1163	0JEFF	34.5	144	1	15.2	3.5	15.6	38	1.0121RG	30.00LK		
TO	1253	12JEFF	12.5	144	1	1.9	0.5	2.0	25	1.0000LK	30.00LK		
TO	1368	3BIGGNS+	115	144	1	111.7	22.6	113.9	62				
TO	1466	12JEFFH1	13.8	144	1	-30.0	-8.9	31.3	90	1.0000LK			
TO	1467	12JEFFH2	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1468	12JEFFH3	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1469	12JEFFH4	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1470	12JEFFH6	13.8	144	1	-8.0	-3.3	8.7	75	1.0000LK			
TO	1471	12JEFFS1	13.8	144	1	0.0	0.0	0.0	0	1.0000LK			
TO	1472	12JEFFS2	18.0	144	1	-46.0	-5.0	46.3	82	1.0000LK			
TO	1473	12JEFFS3	18.0	144	1	-153.0	-30.6	156.0	83	1.0000LK			
TO	1474	12JEFFS4	18.0	144	1	-153.0	-30.6	156.0	83	1.0000LK			
BUS	801	3MACDON	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0161PU 116.85KV	-44.11	801	
TO	LOAD-PQ					6.4	2.5	6.9					
TO	787	3JAMTWN	115	144	1	33.4	-2.5	33.5	25				
TO	789	3JEFF	115	144	1	-39.8	0.0	39.8	29				
BUS	830	3SAMPIT	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0099PU 116.13KV	-46.58	830	
TO	LOAD-PQ					9.5	3.4	10.1					
TO	770	3GTWN S	115	144	1	10.7	-7.3	13.0	10				
TO	787	3JAMTWN	115	144	1	-20.2	3.9	20.6	15				
BUS	845	3WINYAH	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 117.30KV	-44.46	845	
TO	719	6WINYAH	230	144	1	-72.3	0.8	72.3	24	1.0000UN			
TO	770	3GTWN S	115	144	1	139.6	15.5	140.4	58				
TO	1167	3BL ISL+	115	144	1	84.7	13.4	85.8	47				
TO	1213	3VVV+	115	144	1	143.0	18.2	144.1	59				
TO	1478	12WINY	122.0	144	1	-295.0	-47.9	298.9	93	1.0000LK			
BUS	859	3GTN CT	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0079PU 115.91KV	-46.62	859	
TO	767	3GTNREA	115	144	1	20.1	-18.9	27.6	15				
TO	1151	0GTN CT	34.5	144	1	11.9	5.1	12.9	32	0.9807RG	30.00LK		
TO	1151	0GTN CT	34.5	144	2	12.0	5.2	13.1	32	0.9807RG	30.00LK		
TO	1174	3MRYVIL+	115	144	1	-69.8	-5.1	70.0	39				
TO	1231	12GTN CT	12.5	144	1	14.7	7.9	16.7	55	0.9530LK	30.00LK		
TO	1231	12GTN CT	12.5	144	2	11.0	5.9	12.5	41	0.9530LK	30.00LK		

Attachment 5A

OUTPUT FOR ZONE 25 [BERKELEY]

BUS	719	6WINYAH	230	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 234.60KV	-43.48	719
TO	709	6CHARITY	230	144	1	167.9	54.7	176.6	22			
TO	712	6HEMING2	230	144	1	229.1	12.9	229.5	28			
TO	713	6JEFF	230	144	1	43.7	9.1	44.7	5			
TO	730	6CAMPFLD	230	144	1	330.0	6.0	330.1	68			
TO	845	3WINYAH	115	144	1	89.2	1.2	89.2	29	1.0000LK		
TO	1452	12WINY	222.0	144	1	-295.0	-27.2	296.3	92	1.0000LK		
TO	1453	12WINY	322.0	144	1	-295.0	-26.2	296.2	92	1.0000LK		
TO	1454	12WINY	422.0	144	1	-270.0	-30.6	271.7	85	1.0000LK		
BUS	767	3GTNREA	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0089PU 116.03KV	-47.39	767
TO	LOAD-PQ					10.7	4.6	11.7				
TO	770	3GTWN S	115	144	1	12.4	-23.1	26.2	15			
TO	859	3GTN CT	115	144	1	-23.1	18.5	29.6	16			
BUS	770	3GTWN S	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0106PU 116.22KV	-47.46	770
TO	SHUNT					0.0	-58.2	58.2				
TO	767	3GTNREA	115	144	1	-12.4	23.0	26.1	14			
TO	778	3GTN ST	115	144	1	121.6	38.6	127.6	95			
TO	785	3IPCOPMP	115	144	1	74.4	-3.2	74.5	55			
TO	786	3IPCOSW	115	144	1	30.0	13.0	32.7	31			
TO	789	3JEFF	115	144	1	-32.4	4.8	32.8	24			
TO	830	3SAMPIT	115	144	1	29.0	6.5	29.7	22			
TO	845	3WINYAH	115	144	1	-145.8	-11.3	146.2	61			
TO	1213	3VVV+	115	144	1	-143.5	-10.1	143.8	60			
TO	1217	3DUNBAR	115	144	1	4.5	1.4	4.7	3			
TO	1323	3CAMPFLD	115	144	1	74.5	-4.4	74.6	56			
BUS	787	3JAMTWN	115	AREA 144	CKT	MW	MVAR	MVA	%I	0.9975PU 114.71KV	-48.93	787
TO	801	3MACDON	115	144	1	6.4	1.7	6.6	5			
TO	830	3SAMPIT	115	144	1	-19.3	-4.0	19.7	15			
TO	1444	12JAMTWN	12.5	144	1	7.9	3.2	8.5	43	0.9526LK	30.00LK	
TO	1660	BUCKHALL	115	1	1	5.0	-0.9	5.1	3			

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E TUE, AUG 05 2003 14:56
2002 CASE5B:SAME AS CASE5A BUT JEFFERIES TO MACEDONIA LINE RATING
SECTION OPEN. SET A

OUTPUT FOR ZONE 25 [BERKELEY]

BUS	789	3JEFF	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 117.30KV	-43.02		789
TO	713	6JEFF	230	144	1	49.3	17.2	52.2	34	1.0000UN			
TO	713	6JEFF	230	144	2	49.5	17.3	52.4	34	1.0000UN			
TO	768	3RUSSVL+	115	144	1	49.2	12.0	50.7	37				
TO	770	3GTWN S	115	144	1	33.1	-5.3	33.6	25				
TO	794	3LEBNON	115	144	1	29.0	12.7	31.7	17				
TO	804	3MCWS	115	144	1	111.8	20.6	113.7	62				
TO	870	3GAPAC +	115	144	1	25.2	2.7	25.3	23				
TO	1163	0JEFF	34.5	144	1	15.2	3.5	15.6	38	1.0121RG	30.00LK		
TO	1253	12JEFF	12.5	144	1	1.9	0.5	2.0	25	1.0000LK	30.00LK		
TO	1368	3BIGGNS+	115	144	1	115.7	22.3	117.8	65				
TO	1466	12JEFFH1	13.8	144	1	-30.0	-8.9	31.3	90	1.0000LK			
TO	1467	12JEFFH2	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1468	12JEFFH3	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1469	12JEFFH4	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1470	12JEFFH6	13.8	144	1	-8.0	-3.3	8.7	75	1.0000LK			
TO	1471	12JEFFS1	13.8	144	1	0.0	0.0	0.0	0	1.0000LK			
TO	1472	12JEFFS2	18.0	144	1	-46.0	-5.0	46.3	82	1.0000LK			
TO	1473	12JEFFS3	18.0	144	1	-153.0	-29.1	155.7	83	1.0000LK			
TO	1474	12JEFFS4	18.0	144	1	-153.0	-29.1	155.7	83	1.0000LK			
BUS	801	3MACDON	115	AREA 144	CKT	MW	MVAR	MVA	%I	0.9947PU 114.39KV	-49.18		801
TO	LOAD-PQ					6.4	2.5	6.9					
TO	787	3JAMTWN	115	144	1	-6.4	-2.5	6.9	5				
BUS	830	3SAMPIT	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0055PU 115.63KV	-48.00		830
TO	LOAD-PQ					9.5	3.4	10.1					
TO	770	3GTWN S	115	144	1	-28.9	-6.6	29.6	22				
TO	787	3JAMTWN	115	144	1	19.4	3.2	19.7	15				
BUS	845	3WINYAH	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 117.30KV	-44.98		845
TO	719	6WINYAH	230	144	1	-89.2	1.2	89.2	29	1.0000UN			
TO	770	3GTWN S	115	144	1	146.5	17.3	147.6	61				
TO	1167	3BL ISL+	115	144	1	87.8	14.0	88.9	49				
TO	1213	3VVV+	115	144	1	149.9	20.1	151.2	62				
TO	1478	12WINY	122.0	144	1	-295.0	-52.5	299.6	93	1.0000LK			
BUS	859	3GTN CT	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0074PU 115.85KV	-47.22		859
TO	767	3GTNREA	115	144	1	23.2	-18.6	29.7	16				
TO	1151	0GTN CT	34.5	144	1	11.9	5.1	12.9	32	0.9807RG	30.00LK		
TO	1151	0GTN CT	34.5	144	2	12.0	5.2	13.1	32	0.9807RG	30.00LK		
TO	1174	3MRYVIL+	115	144	1	-72.8	-5.5	73.0	40				
TO	1231	12GTN CT	12.5	144	1	14.7	7.9	16.7	55	0.9530LK	30.00LK		
TO	1231	12GTN CT	12.5	144	2	11.0	5.9	12.5	41	0.9530LK	30.00LK		

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E TUE, AUG 05 2003 15:00

2002 CASE5C:SAME AS CASE5A BUT GEORGETOWN TO SAMPIT LINE RATING

SECTION OPEN. SET A

Attachment 6A

OUTPUT FOR ZONE 25 [BERKELEY]

BUS	719	6WINYAH	230	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 234.60KV	-43.30	719
TO	709	6CHARITY	230	144	1	174.6	54.7	182.9	23			
TO	712	6HEMING2	230	144	1	231.2	12.2	231.5	28			
TO	713	6JEFF	230	144	1	51.7	8.8	52.4	6			
TO	730	6CAMPFLD	230	144	1	325.7	4.5	325.7	67			
TO	845	3WINYAH	115	144	1	76.9	0.9	76.9	25	1.0000LK		
TO	1452	12WINY	222.0	144	1	-295.0	-26.2	296.2	92	1.0000LK		
TO	1453	12WINY	322.0	144	1	-295.0	-25.2	296.1	92	1.0000LK		
TO	1454	12WINY	422.0	144	1	-270.0	-29.6	271.6	85	1.0000LK		
BUS	767	3GTNREA	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0100PU 116.15KV	-46.93	767
TO	LOAD-PQ					10.7	4.6	11.7				
TO	770	3GTWN S	115	144	1	10.1	-24.3	26.3	15			
TO	859	3GTN CT	115	144	1	-20.9	19.7	28.7	16			
BUS	770	3GTWN S	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0118PU 116.36KV	-46.99	770
TO	SHUNT					0.0	-58.4	58.4				
TO	767	3GTNREA	115	144	1	-10.1	24.2	26.2	14			
TO	778	3GTN ST	115	144	1	121.6	38.5	127.6	95			
TO	785	3IPCOPMP	115	144	1	79.0	-2.9	79.0	59			
TO	786	3IPCOSW	115	144	1	32.8	12.8	35.2	33			
TO	789	3JEFF	115	144	1	-27.6	3.6	27.9	21			
TO	845	3WINYAH	115	144	1	-140.8	-8.2	141.1	58			
TO	1213	3VVV+	115	144	1	-138.5	-7.0	138.7	57			
TO	1217	3DUNBAR	115	144	1	4.5	1.3	4.7	3			
TO	1323	3CAMPFLD	115	144	1	79.2	-4.1	79.3	59			
BUS	787	3JAMTWN	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0071PU 115.81KV	-44.64	787
TO	801	3MACDON	115	144	1	-22.4	-4.7	22.9	17			
TO	830	3SAMPIT	115	144	1	9.5	2.4	9.8	7			
TO	1444	12JAMTWN	12.5	144	1	7.9	3.2	8.5	42	0.9526LK	30.00LK	
TO	1660	BUCKHALL	115	1	1	5.0	-1.0	5.1	3			

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E TUE, AUG 05 2003 15:00
2002 CASE5C:SAME AS CASE5A BUT GEORGETOWN TO SAMPIT LINE RATING
SECTION OPEN. SET A

OUTPUT FOR ZONE 25 [BERKELEY]

BUS	789	3JEFF	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 117.30KV	-43.22	789	
TO	713	6JEFF	230	144	1	42.9	17.1	46.2	30	1.0000UN			
TO	713	6JEFF	230	144	2	43.0	17.2	46.4	30	1.0000UN			
TO	768	3RUSSVL+	115	144	1	48.3	12.0	49.8	37				
TO	770	3GTWN S	115	144	1	28.1	-4.8	28.6	21				
TO	794	3LEBNON	115	144	1	27.5	12.9	30.4	17				
TO	801	3MACDON	115	144	1	29.0	6.5	29.7	22				
TO	804	3MCWS	115	144	1	108.6	20.8	110.5	61				
TO	870	3GAPAC +	115	144	1	22.6	3.6	22.9	21				
TO	1163	0JEFF	34.5	144	1	15.2	3.5	15.6	38	1.0121RG	30.00LK		
TO	1253	12JEFF	12.5	144	1	1.9	0.5	2.0	25	1.0000LK	30.00LK		
TO	1368	3BIGGNS+	115	144	1	112.8	22.5	115.0	63				
TO	1466	12JEFFH1	13.8	144	1	-30.0	-8.9	31.3	90	1.0000LK			
TO	1467	12JEFFH2	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1468	12JEFFH3	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1469	12JEFFH4	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1470	12JEFFH6	13.8	144	1	-8.0	-3.3	8.7	75	1.0000LK			
TO	1471	12JEFFS1	13.8	144	1	0.0	0.0	0.0	0	1.0000LK			
TO	1472	12JEFFS2	18.0	144	1	-46.0	-5.0	46.3	82	1.0000LK			
TO	1473	12JEFFS3	18.0	144	1	-153.0	-33.2	156.6	83	1.0000LK			
TO	1474	12JEFFS4	18.0	144	1	-153.0	-33.2	156.6	83	1.0000LK			
BUS	801	3MACDON	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0148PU 116.70KV	-43.77	801	
TO	LOAD-PQ					6.4	2.5	6.9					
TO	787	3JAMTWN	115	144	1	22.5	4.1	22.9	17				
TO	789	3JEFF	115	144	1	-28.9	-6.6	29.7	22				
BUS	830	3SAMPIT	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0021PU 115.24KV	-45.08	830	
TO	LOAD-PQ					9.5	3.4	10.1					
TO	787	3JAMTWN	115	144	1	-9.5	-3.4	10.1	8				
BUS	845	3WINYAH	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 117.30KV	-44.59	845	
TO	719	6WINYAH	230	144	1	-76.9	0.9	76.9	25	1.0000UN			
TO	770	3GTWN S	115	144	1	141.5	13.7	142.2	58				
TO	1167	3BL ISL+	115	144	1	85.5	12.5	86.4	47				
TO	1213	3VVV+	115	144	1	144.9	16.5	145.8	60				
TO	1478	12WINY	122.0	144	1	-295.0	-43.6	298.2	93	1.0000LK			
BUS	859	3GTN CT	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0083PU 115.95KV	-46.77	859	
TO	767	3GTNREA	115	144	1	20.9	-19.8	28.8	16				
TO	1151	0GTN CT	34.5	144	1	11.9	5.1	12.9	32	0.9807RG	30.00LK		
TO	1151	0GTN CT	34.5	144	2	12.0	5.2	13.1	32	0.9807RG	30.00LK		
TO	1174	3MRYVIL+	115	144	1	-70.5	-4.2	70.7	39				
TO	1231	12GTN CT	12.5	144	1	14.7	7.9	16.7	55	0.9530LK	30.00LK		
TO	1231	12GTN CT	12.5	144	2	11.0	5.9	12.5	41	0.9530LK	30.00LK		

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E TUE, AUG 05 2003 15:00
2002 CASE5C:SAME AS CASE5A BUT GEORGETOWN TO SAMPIT LINE RATING
SECTION OPEN. SET A

OUTPUT FOR ZONE 25 [BERKELEY]

BUS	1167	3BL ISL+	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0160PU 116.84KV	-45.26	1167
TO	845	3WINYAH	115	144	1	-85.3	-11.7	86.1	47			
TO	1174	3MRYVIL+	115	144	1	78.7	9.4	79.3	44			
TO	1198	3BL ISL	115	144	1	6.5	2.3	7.0	4			
BUS	1173	3MRYVIL	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0104PU 116.20KV	-46.28	1173
TO	1174	3MRYVIL+	115	144	1	-7.8	-3.7	8.7	5			
TO	1233	12MRYVIL	12.5	144	1	7.8	3.7	8.7	43	0.9526LK	30.00LK	
BUS	1174	3MRYVIL+	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0105PU 116.21KV	-46.27	1174
TO	859	3GTN CT	115	144	1	70.7	4.6	70.8	39			
TO	1167	3BL ISL+	115	144	1	-78.5	-8.4	78.9	44			
TO	1173	3MRYVIL	115	144	1	7.8	3.7	8.7	5			
BUS	1198	3BL ISL	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0159PU 116.83KV	-45.27	1198
TO	LOAD-PQ					6.5	2.4	7.0				
TO	1167	3BL ISL+	115	144	1	-6.5	-2.4	7.0	4			
BUS	1391	3CHARITY	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0154PU 116.77KV	-47.47	1391
TO	709	6CHARITY	230	144	1	-15.7	-7.0	17.2	11	0.9748UN		
TO	709	6CHARITY	230	144	2	-15.8	-7.0	17.3	11	0.9748UN		
TO	1418	3MGIND	115	144	1	22.4	10.3	24.6	14			
TO	1491	3CHARI#2	115	144	1	1.5	1.5	2.2	1			
TO	1541	3CAINHY+	115	144	1	7.7	2.2	8.0	4			
BUS	1418	3MGIND	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0138PU 116.59KV	-47.60	1418
TO	1391	3CHARITY	115	144	1	-22.4	-10.4	24.6	14			
TO	1419	13MGIND	13.8	144	1	11.2	5.2	12.4	41	0.9820RG		
TO	1419	13MGIND	13.8	144	2	11.2	5.2	12.3	40	0.9820RG		
BUS	1419	13MGIND	13.8	AREA 144	CKT	MW	MVAR	MVA	%I	1.0103PU 13.942KV	-50.45	1419
TO	LOAD-PQ					22.4	9.0	24.1				
TO	1418	3MGIND	115	144	1	-11.2	-4.5	12.1	40	0.9820UN		
TO	1418	3MGIND	115	144	2	-11.2	-4.5	12.0	40	0.9820UN		
BUS	1541	3CAINHY+	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0154PU 116.77KV	-47.47	1541
TO	1391	3CHARITY	115	144	1	-7.7	-2.2	8.0	4			
TO	1542	3CAINHOY	115	144	1	7.7	2.2	8.0	4			
BUS	1542	3CAINHOY	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0153PU 116.77KV	-47.48	1542
TO	LOAD-PQ					7.7	2.2	8.0				
TO	1541	3CAINHY+	115	144	1	-7.7	-2.2	8.0	4			

Attachment 6A

```
     PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E      TUE, AUG 05 2003  15:00
2002 CASE5C:SAME AS CASE5A BUT GEORGETOWN TO SAMPIT LINE                RATING
SECTION OPEN.                                                            SET A
                         OUTPUT FOR ZONE 25 [BERKELEY]

BUS  1660 BUCKHALL 115 AREA CKT     MW      MVAR      MVA  %I 1.0058PU -45.02 1660
                           1                                    115.67KV
 TO LOAD-PQ                          5.0       1.0      5.1
 TO   787 3JAMTWN  115 144  1      -5.0      -1.0      5.1   3
```

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E TUE, AUG 05 2003 15:08
2010 CASE9A:BUCK HALL SERVED FROM THE JAMESTOWN DELIVERY RATING
POINT. SET A

OUTPUT FOR ZONE 25 [BERKELEY]

BUS	709	6CHARITY	230	AREA 144	CKT	MW	MVAR	MVA	%I	0.9800PU 225.40KV	-26.06	709
TO	703	6AMOCO	230	144	1	73.6	19.9	76.2	16			
TO	713	6JEFF	230	144	1	-266.3	-21.3	267.2	57			
TO	719	6WINYAH	230	144	1	-111.6	-96.7	147.7	19			
TO	1391	3CHARITY	115	144	1	16.6	7.4	18.2	12	0.9621RG		
TO	1391	3CHARITY	115	144	2	16.7	7.4	18.3	12	0.9621RG		
TO	1423	6NUCOR	230	144	1	282.8	64.8	290.1	62			
TO	12011	6WILLIAM	230	1	1	-11.7	18.3	21.8	3			
BUS	719	6WINYAH	230	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 234.60KV	-23.71	719
TO	709	6CHARITY	230	144	1	112.2	89.7	143.7	18			
TO	712	6HEMING2	230	144	1	263.4	77.9	274.6	34			
TO	713	6JEFF	230	144	1	-96.1	51.7	109.1	13			
TO	730	6CAMPFLD	230	144	1	425.9	-8.1	426.0	87			
TO	845	3WINYAH	115	144	1	134.6	2.7	134.6	44	1.0000LK		
TO	1452	12WINY	222.0	144	1	-285.0	-71.0	293.7	91	1.0000LK		
TO	1453	12WINY	322.0	144	1	-285.0	-70.0	293.5	91	1.0000LK		
TO	1454	12WINY	422.0	144	1	-270.0	-72.5	279.6	87	1.0000LK		
BUS	767	3GTNREA	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0107PU 116.23KV	-28.68	767
TO	LOAD-PQ					12.0	5.1	13.1				
TO	770	3GTWN S	115	144	1	16.1	-29.9	34.0	19			
TO	859	3GTN CT	115	144	1	-28.2	24.8	37.5	21			
BUS	770	3GTWN S	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0129PU 116.48KV	-28.78	770
TO	SHUNT					0.0	-117.0	117.0				
TO	767	3GTNREA	115	144	1	-16.1	29.9	33.9	19			
TO	778	3GTN ST	115	144	1	121.6	38.5	127.6	95			
TO	785	3IPCOPMP	115	144	1	112.9	-3.5	113.0	84			
TO	786	3IPCOSW	115	144	1	30.0	19.0	35.5	33			
TO	789	3JEFF	115	144	1	-52.4	13.7	54.1	40			
TO	830	3SAMPIT	115	144	1	-34.6	18.2	39.1	29			
TO	845	3WINYAH	115	144	1	-163.5	-1.1	163.5	68			
TO	1213	3VVV+	115	144	1	-160.9	0.2	160.9	66			
TO	1217	3DUNBAR	115	144	1	49.2	7.0	49.6	27			
TO	1323	3CAMPFLD	115	144	1	113.7	-4.9	113.8	84			
BUS	787	3JAMTWN	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0089PU 116.03KV	-25.52	787
TO	801	3MACDON	115	144	1	-61.4	10.2	62.3	46			
TO	830	3SAMPIT	115	144	1	45.9	-13.4	47.9	36			
TO	1444	12JAMTWN	12.5	144	1	9.2	3.9	10.0	50	0.9526LK	30.00LK	
TO	1660	BUCKHALL	115	1	1	6.2	-0.7	6.3	3			

Attachment 8A

OUTPUT FOR ZONE 25 [BERKELEY]

BUS	789	3JEFF	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 117.30KV	-21.43	789	
TO	713	6JEFF	230	144	1	-5.2	41.0	41.3	27	1.0000UN			
TO	713	6JEFF	230	144	2	-5.2	41.2	41.5	27	1.0000UN			
TO	768	3RUSSVL+	115	144	1	68.1	17.9	70.5	52				
TO	770	3GTWN S	115	144	1	54.2	-9.9	55.1	41				
TO	794	3LEBNON	115	144	1	51.9	14.2	53.8	29				
TO	801	3MACDON	115	144	1	70.5	-4.0	70.6	52				
TO	804	3MCWS	115	144	1	108.8	23.8	111.4	61				
TO	870	3GAPAC +	115	144	1	48.0	0.4	48.0	44				
TO	1163	0JEFF	34.5	144	1	17.6	4.0	18.1	44	1.0121RG	30.00LK		
TO	1253	12JEFF	12.5	144	1	2.2	0.6	2.2	27	1.0000LK	30.00LK		
TO	1368	3BIGGNS+	115	144	1	115.1	25.7	117.9	65				
TO	1466	12JEFFH1	13.8	144	1	-30.0	-8.9	31.3	90	1.0000LK			
TO	1467	12JEFFH2	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1468	12JEFFH3	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1469	12JEFFH4	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1470	12JEFFH6	13.8	144	1	-8.0	-3.3	8.7	75	1.0000LK			
TO	1471	12JEFFS1	13.8	144	1	-46.0	-5.0	46.3	82	1.0000LK			
TO	1472	12JEFFS2	18.0	144	1	-46.0	-5.0	46.3	82	1.0000LK			
TO	1473	12JEFFS3	18.0	144	1	-153.0	-52.1	161.6	86	1.0000LK			
TO	1474	12JEFFS4	18.0	144	1	-153.0	-52.1	161.6	86	1.0000LK			
BUS	801	3MACDON	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0147PU 116.69KV	-22.86	801	
TO	LOAD-PQ					7.8	3.1	8.4					
TO	787	3JAMTWN	115	144	1	62.2	-8.3	62.8	47				
TO	789	3JEFF	115	144	1	-70.0	5.2	70.2	52				
BUS	830	3SAMPIT	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0099PU 116.14KV	-28.00	830	
TO	LOAD-PQ					10.6	3.9	11.3					
TO	770	3GTWN S	115	144	1	34.7	-18.2	39.2	29				
TO	787	3JAMTWN	115	144	1	-45.4	14.3	47.6	35				
BUS	845	3WINYAH	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 117.30KV	-25.98	845	
TO	719	6WINYAH	230	144	1	-134.6	2.7	134.6	44	1.0000UN			
TO	770	3GTWN S	115	144	1	164.4	8.7	164.6	68				
TO	1167	3BL ISL+	115	144	1	97.0	10.7	97.6	53				
TO	1213	3VVV+	115	144	1	168.2	11.8	168.6	69				
TO	1478	12WINY	122.0	144	1	-295.0	-33.9	296.9	92	1.0000LK			
BUS	859	3GTN CT	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0086PU 115.99KV	-28.48	859	
TO	767	3GTNREA	115	144	1	28.2	-24.8	37.6	21				
TO	1151	0GTN CT	34.5	144	1	11.9	5.1	12.9	32	0.9870RG	30.00LK		
TO	1151	0GTN CT	34.5	144	2	12.0	5.2	13.1	32	0.9870RG	30.00LK		
TO	1174	3MRYVIL+	115	144	1	-80.4	-0.8	80.4	45				
TO	1231	12GTN CT	12.5	144	1	16.2	8.8	18.4	61	0.9530LK	30.00LK		
TO	1231	12GTN CT	12.5	144	2	12.1	6.6	13.8	46	0.9530LK	30.00LK		

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E TUE, AUG 05 2003 15:08
2010 CASE9A:BUCK HALL SERVED FROM THE JAMESTOWN DELIVERY RATING
POINT. SET A

OUTPUT FOR ZONE 25 [BERKELEY]

BUS	1167	3BL ISL+	115	AREA	CKT	MW	MVAR	MVA	%I	1.0160PU -26.74 1167	
				144						116.84KV	
TO	845	3WINYAH	115	144	1	-96.8	-9.6	97.3	53		
TO	1174	3MRYVIL+	115	144	1	89.4	7.0	89.7	49		
TO	1198	3BL ISL	115	144	1	7.3	2.6	7.8	4		
BUS	1173	3MRYVIL	115	AREA	CKT	MW	MVAR	MVA	%I	1.0105PU -27.91 1173	
				144						116.21KV	
TO	1174	3MRYVIL+	115	144	1	-8.6	-4.2	9.5	5		
TO	1233	12MRYVIL	12.5	144	1	8.6	4.2	9.5	47	0.9526LK 30.00LK	
BUS	1174	3MRYVIL+	115	AREA	CKT	MW	MVAR	MVA	%I	1.0106PU -27.89 1174	
				144						116.22KV	
TO	859	3GTN CT	115	144	1	80.5	1.4	80.5	45		
TO	1167	3BL ISL+	115	144	1	-89.1	-5.6	89.3	49		
TO	1173	3MRYVIL	115	144	1	8.6	4.1	9.5	5		
BUS	1198	3BL ISL	115	AREA	CKT	MW	MVAR	MVA	%I	1.0159PU -26.75 1198	
				144						116.83KV	
TO	LOAD-PQ					7.3	2.7	7.8			
TO	1167	3BL ISL+	115	144	1	-7.3	-2.7	7.8	4		
BUS	1391	3CHARITY	115	AREA	CKT	MW	MVAR	MVA	%I	1.0152PU -26.50 1391	
				144						116.74KV	
TO	709	6CHARITY	230	144	1	-16.6	-7.3	18.1	12	0.9621UN	
TO	709	6CHARITY	230	144	2	-16.7	-7.3	18.2	12	0.9621UN	
TO	1418	3MGIND	115	144	1	22.4	10.3	24.6	14		
TO	1491	3CHARI#2	115	144	1	1.5	1.5	2.2	1		
TO	1541	3CAINHY+	115	144	1	9.4	2.7	9.8	5		
BUS	1541	3CAINHY+	115	AREA	CKT	MW	MVAR	MVA	%I	1.0152PU -26.50 1541	
				144						116.74KV	
TO	1391	3CHARITY	115	144	1	-9.4	-2.7	9.8	5		
TO	1542	3CAINHOY	115	144	1	9.4	2.7	9.8	5		
BUS	1542	3CAINHOY	115	AREA	CKT	MW	MVAR	MVA	%I	1.0151PU -26.50 1542	
				144						116.74KV	
TO	LOAD-PQ					9.4	2.8	9.8			
TO	1541	3CAINHY+	115	144	1	-9.4	-2.8	9.8	5		
BUS	1660	BUCKHALL	115	AREA	CKT	MW	MVAR	MVA	%I	1.0071PU -25.99 1660	
				1						115.81KV	
TO	LOAD-PQ					6.2	1.2	6.4			
TO	787	3JAMTWN	115	144	1	-6.2	-1.2	6.4	4		

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E TUE, AUG 05 2003 15:11
2010 CASE9B:SAME AS CASE9A BUT JEFFERIES TO MACEDONIA LINE RATING
SECTION OPEN. SET A

OUTPUT FOR ZONE 25 [BERKELEY]

BUS	709	6CHARITY	230	AREA 144	CKT	MW	MVAR	MVA	%I	0.9799PU 225.38KV	-26.11 709
TO	703	6AMOCO	230	144	1	73.6	19.9	76.2	16		
TO	713	6JEFF	230	144	1	-271.9	-20.5	272.7	58		
TO	719	6WINYAH	230	144	1	-96.6	-98.6	138.1	18		
TO	1391	3CHARITY	115	144	1	16.6	7.4	18.2	12	0.9621RG	
TO	1391	3CHARITY	115	144	2	16.7	7.4	18.3	12	0.9621RG	
TO	1423	6NUCOR	230	144	1	282.8	64.8	290.1	62		
TO	12011	6WILLIAM	230	1	1	-21.1	19.5	28.7	4		

BUS	719	6WINYAH	230	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 234.60KV	-24.10 719
TO	709	6CHARITY	230	144	1	97.2	90.5	132.8	16		
TO	712	6HEMING2	230	144	1	260.5	80.0	272.5	34		
TO	713	6JEFF	230	144	1	-114.2	53.8	126.3	16		
TO	730	6CAMPFLD	230	144	1	435.1	-6.4	435.2	89		
TO	845	3WINYAH	115	144	1	161.5	3.8	161.5	53	1.0000LK	
TO	1452	12WINY	222.0	144	1	-285.0	-73.6	294.4	92	1.0000LK	
TO	1453	12WINY	322.0	144	1	-285.0	-72.7	294.1	92	1.0000LK	
TO	1454	12WINY	422.0	144	1	-270.0	-75.2	280.3	87	1.0000LK	

BUS	767	3GTNREA	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0103PU 116.18KV	-29.69 767
TO	LOAD-PQ					12.0	5.1	13.1			
TO	770	3GTWN S	115	144	1	20.9	-30.3	36.8	20		
TO	859	3GTN CT	115	144	1	-32.9	25.1	41.4	23		

BUS	770	3GTWN S	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0124PU 116.42KV	-29.81 770
TO	SHUNT					0.0	-116.8	116.8			
TO	767	3GTNREA	115	144	1	-20.9	30.2	36.7	20		
TO	778	3GTN ST	115	144	1	121.6	38.5	127.6	95		
TO	785	3IPCOPMP	115	144	1	103.3	-2.7	103.4	77		
TO	786	3IPCOSW	115	144	1	24.4	20.5	31.9	30		
TO	789	3JEFF	115	144	1	-63.0	18.1	65.5	49		
TO	830	3SAMPIT	115	144	1	34.2	8.8	35.4	26		
TO	845	3WINYAH	115	144	1	-174.4	-0.9	174.4	72		
TO	1213	3VVV+	115	144	1	-171.7	0.3	171.7	71		
TO	1217	3DUNBAR	115	144	1	42.5	7.9	43.2	24		
TO	1323	3CAMPFLD	115	144	1	103.9	-4.0	104.0	77		

BUS	787	3JAMTWN	115	AREA 144	CKT	MW	MVAR	MVA	%I	0.9955PU 114.48KV	-31.55 787
TO	801	3MACDON	115	144	1	7.8	2.2	8.2	6		
TO	830	3SAMPIT	115	144	1	-23.3	-5.6	24.0	18		
TO	1444	12JAMTWN	12.5	144	1	9.2	4.0	10.1	51	0.9526LK	30.00LK
TO	1660	BUCKHALL	115	1	1	6.2	-0.7	6.3	4		

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E TUE, AUG 05 2003 15:11
2010 CASE9B:SAME AS CASE9A BUT JEFFERIES TO MACEDONIA LINE RATING
SECTION OPEN. SET A

OUTPUT FOR ZONE 25 [BERKELEY]

BUS	789	3JEFF	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 117.30KV	-20.91	789	
TO	713	6JEFF	230	144	1	10.3	41.0	42.2	28	1.0000UN			
TO	713	6JEFF	230	144	2	10.4	41.1	42.4	28	1.0000UN			
TO	768	3RUSSVL+	115	144	1	70.5	18.1	72.7	54				
TO	770	3GTWN S	115	144	1	65.7	-11.2	66.7	49				
TO	794	3LEBNON	115	144	1	55.7	13.9	57.5	31				
TO	804	3MCWS	115	144	1	116.8	23.3	119.1	65				
TO	870	3GAPAC +	115	144	1	54.4	-0.2	54.4	50				
TO	1163	0JEFF	34.5	144	1	17.6	4.0	18.1	44	1.0121RG	30.00LK		
TO	1253	12JEFF	12.5	144	1	2.2	0.6	2.2	27	1.0000LK	30.00LK		
TO	1368	3BIGGNS+	115	144	1	122.3	25.3	124.9	68				
TO	1466	12JEFFH1	13.8	144	1	-30.0	-8.9	31.3	90	1.0000LK			
TO	1467	12JEFFH2	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1468	12JEFFH3	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1469	12JEFFH4	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1470	12JEFFH6	13.8	144	1	-8.0	-3.3	8.7	75	1.0000LK			
TO	1471	12JEFFS1	13.8	144	1	-46.0	-5.0	46.3	82	1.0000LK			
TO	1472	12JEFFS2	18.0	144	1	-46.0	-5.0	46.3	82	1.0000LK			
TO	1473	12JEFFS3	18.0	144	1	-153.0	-52.6	161.8	86	1.0000LK			
TO	1474	12JEFFS4	18.0	144	1	-153.0	-52.6	161.8	86	1.0000LK			

BUS	801	3MACDON	115	AREA 144	CKT	MW	MVAR	MVA	%I	0.9919PU 114.07KV	-31.86	801	
TO	LOAD-PQ					7.8	3.1	8.4					
TO	787	3JAMTWN	115	144	1	-7.8	-3.1	8.4	6				

BUS	830	3SAMPIT	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0060PU 115.69KV	-30.44	830	
TO	LOAD-PQ					10.6	3.9	11.3					
TO	770	3GTWN S	115	144	1	-34.1	-8.8	35.2	26				
TO	787	3JAMTWN	115	144	1	23.5	5.0	24.0	18				

BUS	845	3WINYAH	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 117.30KV	-26.82	845	
TO	719	6WINYAH	230	144	1	-161.5	3.8	161.5	53	1.0000UN			
TO	770	3GTWN S	115	144	1	175.4	9.7	175.7	72				
TO	1167	3BL ISL+	115	144	1	101.8	10.8	102.4	56				
TO	1213	3VVV+	115	144	1	179.2	12.8	179.6	74				
TO	1478	12WINY	122.0	144	1	-295.0	-37.1	297.3	93	1.0000LK			

BUS	859	3GTN CT	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0082PU 115.94KV	-29.46	859	
TO	767	3GTNREA	115	144	1	32.9	-25.1	41.4	23				
TO	1151	0GTN CT	34.5	144	1	11.9	5.1	12.9	32	0.9870RG	30.00LK		
TO	1151	0GTN CT	34.5	144	2	12.0	5.2	13.1	32	0.9870RG	30.00LK		
TO	1174	3MRYVIL+	115	144	1	-85.1	-0.5	85.1	47				
TO	1231	12GTN CT	12.5	144	1	16.2	8.8	18.4	61	0.9530LK	30.00LK		
TO	1231	12GTN CT	12.5	144	2	12.1	6.6	13.8	46	0.9530LK	30.00LK		

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E TUE, AUG 05 2003 15:11
2010 CASE9B:SAME AS CASE9A BUT JEFFERIES TO MACEDONIA LINE RATING
SECTION OPEN. SET A

OUTPUT FOR ZONE 25 [BERKELEY]

BUS	1167	3BL ISL+	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0158PU 116.82KV	-27.63	1167
TO	845	3WINYAH	115	144	1	-101.6	-9.6	102.0	56			
TO	1174	3MRYVIL+	115	144	1	94.2	7.0	94.5	52			
TO	1198	3BL ISL	115	144	1	7.3	2.6	7.8	4			
BUS	1173	3MRYVIL	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0102PU 116.17KV	-28.85	1173
TO	1174	3MRYVIL+	115	144	1	-8.6	-4.2	9.5	5			
TO	1233	12MRYVIL12.5		144	1	8.6	4.2	9.5	47	0.9526LK	30.00LK	
BUS	1174	3MRYVIL+	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0103PU 116.19KV	-28.84	1174
TO	859	3GTN CT	115	144	1	85.3	1.2	85.3	47			
TO	1167	3BL ISL+	115	144	1	-93.9	-5.3	94.0	52			
TO	1173	3MRYVIL	115	144	1	8.6	4.1	9.5	5			
BUS	1198	3BL ISL	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0158PU 116.81KV	-27.63	1198
TO	LOAD-PQ					7.3	2.7	7.8				
TO	1167	3BL ISL+	115	144	1	-7.3	-2.7	7.8	4			
BUS	1391	3CHARITY	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0151PU 116.73KV	-26.55	1391
TO	709	6CHARITY	230	144	1	-16.6	-7.3	18.1	12	0.9621UN		
TO	709	6CHARITY	230	144	2	-16.7	-7.3	18.2	12	0.9621UN		
TO	1418	3MGIND	115	144	1	22.4	10.3	24.6	14			
TO	1491	3CHARI#2	115	144	1	1.5	1.5	2.2	1			
TO	1541	3CAINHY+	115	144	1	9.4	2.7	9.8	5			
BUS	1541	3CAINHY+	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0151PU 116.73KV	-26.55	1541
TO	1391	3CHARITY	115	144	1	-9.4	-2.7	9.8	5			
TO	1542	3CAINHOY	115	144	1	9.4	2.7	9.8	5			
BUS	1542	3CAINHOY	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0151PU 116.73KV	-26.55	1542
TO	LOAD-PQ					9.4	2.8	9.8				
TO	1541	3CAINHY+	115	144	1	-9.4	-2.8	9.8	5			
BUS	1660	BUCKHALL	115	AREA 1	CKT	MW	MVAR	MVA	%I	0.9936PU 114.26KV	-32.04	1660
TO	LOAD-PQ					6.2	1.2	6.4				
TO	787	3JAMTWN	115	144	1	-6.2	-1.2	6.4	4			

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E TUE, AUG 05 2003 15:14
2010 CASE9C:SAME AS CASE9A BUT GEORGETOWN TO SAMPIT LINE RATING
SECTION OPEN. SET A

OUTPUT FOR ZONE 25 [BERKELEY]

BUS	709	6CHARITY	230	AREA 144	CKT	MW	MVAR	MVA	%I	0.9800PU 225.39KV	-26.06	709
TO	703	6AMOCO	230	144	1	73.6	19.9	76.2	16			
TO	713	6JEFF	230	144	1	-269.2	-20.9	270.0	58			
TO	719	6WINYAH	230	144	1	-104.1	-97.6	142.7	18			
TO	1391	3CHARITY	115	144	1	16.6	7.4	18.2	12	0.9621RG		
TO	1391	3CHARITY	115	144	2	16.7	7.4	18.3	12	0.9621RG		
TO	1423	6NUCOR	230	144	1	282.8	64.8	290.1	62			
TO	12011	6WILLIAM	230	1	1	-16.3	18.9	25.0	3			

BUS	719	6WINYAH	230	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 234.60KV	-23.88	719
TO	709	6CHARITY	230	144	1	104.7	90.0	138.1	17			
TO	712	6HEMING2	230	144	1	261.9	77.9	273.2	34			
TO	713	6JEFF	230	144	1	-105.3	52.7	117.7	14			
TO	730	6CAMPFLD	230	144	1	430.5	-9.3	430.6	88			
TO	845	3WINYAH	115	144	1	148.2	3.2	148.2	48	1.0000LK		
TO	1452	12WINY	222.0	144	1	-285.0	-71.2	293.8	91	1.0000LK		
TO	1453	12WINY	322.0	144	1	-285.0	-70.3	293.5	91	1.0000LK		
TO	1454	12WINY	422.0	144	1	-270.0	-72.8	279.6	87	1.0000LK		

BUS	767	3GTNREA	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0117PU 116.34KV	-29.17	767
TO	LOAD-PQ					12.0	5.1	13.1				
TO	770	3GTWN S	115	144	1	18.4	-32.0	37.0	20			
TO	859	3GTN CT	115	144	1	-30.4	26.9	40.6	22			

BUS	770	3GTWN S	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0140PU 116.61KV	-29.28	770
TO	SHUNT					0.0	-117.2	117.2				
TO	767	3GTNREA	115	144	1	-18.4	32.0	36.9	20			
TO	778	3GTN ST	115	144	1	121.6	38.4	127.5	95			
TO	785	3IPCOPMP	115	144	1	108.2	-2.3	108.2	80			
TO	786	3IPCOSW	115	144	1	27.2	20.1	33.9	32			
TO	789	3JEFF	115	144	1	-57.7	16.5	60.1	45			
TO	845	3WINYAH	115	144	1	-169.1	3.5	169.1	70			
TO	1213	3VVV+	115	144	1	-166.4	4.7	166.5	69			
TO	1217	3DUNBAR	115	144	1	45.8	7.9	46.5	26			
TO	1323	3CAMPFLD	115	144	1	108.8	-3.7	108.9	81			

BUS	787	3JAMTWN	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0038PU 115.44KV	-22.79	787
TO	801	3MACDON	115	144	1	-26.2	-6.1	26.9	20			
TO	830	3SAMPIT	115	144	1	10.7	2.9	11.0	8			
TO	1444	12JAMTWN	12.5	144	1	9.2	4.0	10.1	50	0.9526LK	30.00LK	
TO	1660	BUCKHALL	115	1	1	6.2	-0.7	6.3	3			

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E TUE, AUG 05 2003 15:14
2010 CASE9C:SAME AS CASE9A BUT GEORGETOWN TO SAMPIT LINE RATING
SECTION OPEN. SET A

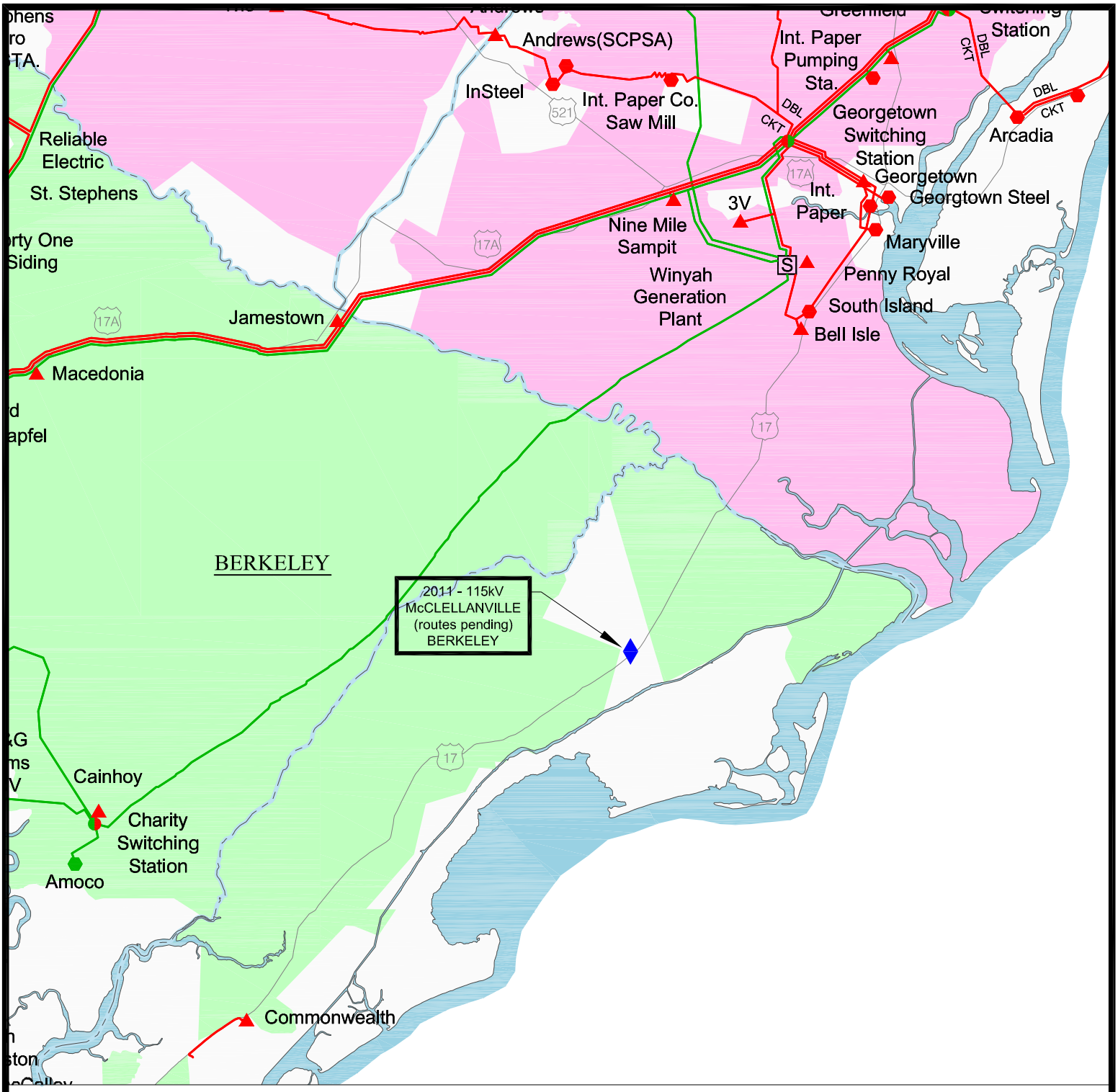
OUTPUT FOR ZONE 25 [BERKELEY]

BUS	789	3JEFF	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 117.30KV	-21.14	789	
TO	713	6JEFF	230	144	1	2.8	40.9	41.0	27	1.0000UN			
TO	713	6JEFF	230	144	2	2.8	41.1	41.2	27	1.0000UN			
TO	768	3RUSSVL+	115	144	1	69.3	18.0	71.6	53				
TO	770	3GTWN S	115	144	1	60.1	-11.2	61.1	45				
TO	794	3LEBNON	115	144	1	53.9	14.1	55.7	31				
TO	801	3MACDON	115	144	1	34.3	8.8	35.4	26				
TO	804	3MCWS	115	144	1	112.9	23.5	115.3	63				
TO	870	3GAPAC +	115	144	1	51.2	-0.2	51.2	47				
TO	1163	0JEFF	34.5	144	1	17.6	4.0	18.1	44	1.0121RG	30.00LK		
TO	1253	12JEFF	12.5	144	1	2.2	0.6	2.2	27	1.0000LK	30.00LK		
TO	1368	3BIGGNS+	115	144	1	118.9	25.4	121.5	67				
TO	1466	12JEFFH1	13.8	144	1	-30.0	-8.9	31.3	90	1.0000LK			
TO	1467	12JEFFH2	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1468	12JEFFH3	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1469	12JEFFH4	13.8	144	1	-30.0	-9.4	31.4	91	1.0000LK			
TO	1470	12JEFFH6	13.8	144	1	-8.0	-3.3	8.7	75	1.0000LK			
TO	1471	12JEFFS1	13.8	144	1	-46.0	-5.0	46.3	82	1.0000LK			
TO	1472	12JEFFS2	18.0	144	1	-46.0	-5.0	46.3	82	1.0000LK			
TO	1473	12JEFFS3	18.0	144	1	-153.0	-57.1	163.3	87	1.0000LK			
TO	1474	12JEFFS4	18.0	144	1	-153.0	-57.1	163.3	87	1.0000LK			
BUS	801	3MACDON	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0135PU 116.55KV	-21.77	801	
TO	LOAD-PQ					7.8	3.1	8.4					
TO	787	3JAMTWN	115	144	1	26.3	5.7	26.9	20				
TO	789	3JEFF	115	144	1	-34.1	-8.8	35.3	26				
BUS	830	3SAMPIT	115	AREA 144	CKT	MW	MVAR	MVA	%I	0.9982PU 114.79KV	-23.29	830	
TO	LOAD-PQ					10.6	3.9	11.3					
TO	787	3JAMTWN	115	144	1	-10.6	-3.9	11.3	9				
BUS	845	3WINYAH	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0200PU 117.30KV	-26.38	845	
TO	719	6WINYAH	230	144	1	-148.2	3.2	148.2	48	1.0000UN			
TO	770	3GTWN S	115	144	1	170.0	4.7	170.1	70				
TO	1167	3BL ISL+	115	144	1	99.3	8.8	99.7	55				
TO	1213	3VVV+	115	144	1	173.8	7.8	174.0	71				
TO	1478	12WINY	122.0	144	1	-295.0	-24.5	296.0	92	1.0000LK			
BUS	859	3GTN CT	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0094PU 116.08KV	-28.95	859	
TO	767	3GTNREA	115	144	1	30.5	-26.9	40.7	23				
TO	1151	0GTN CT	34.5	144	1	11.9	5.1	12.9	32	0.9870RG	30.00LK		
TO	1151	0GTN CT	34.5	144	2	12.0	5.2	13.1	32	0.9870RG	30.00LK		
TO	1174	3MRYVIL+	115	144	1	-82.6	1.3	82.6	46				
TO	1231	12GTN CT	12.5	144	1	16.2	8.8	18.4	61	0.9530LK	30.00LK		
TO	1231	12GTN CT	12.5	144	2	12.1	6.6	13.8	46	0.9530LK	30.00LK		

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E TUE, AUG 05 2003 15:14
2010 CASE9C:SAME AS CASE9A BUT GEORGETOWN TO SAMPIT LINE RATING
SECTION OPEN. SET A

OUTPUT FOR ZONE 25 [BERKELEY]

BUS	1167	3BL ISL+	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0162PU 116.86KV	-27.17	1167
TO	845	3WINYAH	115	144	1	-99.1	-7.6	99.4	55			
TO	1174	3MRYVIL+	115	144	1	91.7	5.0	91.9	51			
TO	1198	3BL ISL	115	144	1	7.3	2.6	7.8	4			
BUS	1173	3MRYVIL	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0111PU 116.27KV	-28.36	1173
TO	1174	3MRYVIL+	115	144	1	-8.6	-4.2	9.5	5			
TO	1233	12MRYVIL12.5		144	1	8.6	4.2	9.5	47	0.9526LK	30.00LK	
BUS	1174	3MRYVIL+	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0112PU 116.29KV	-28.35	1174
TO	859	3GTN CT	115	144	1	82.8	-0.6	82.8	46			
TO	1167	3BL ISL+	115	144	1	-91.4	-3.5	91.4	51			
TO	1173	3MRYVIL	115	144	1	8.6	4.1	9.5	5			
BUS	1198	3BL ISL	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0161PU 116.85KV	-27.17	1198
TO	LOAD-PQ					7.3	2.7	7.8				
TO	1167	3BL ISL+	115	144	1	-7.3	-2.7	7.8	4			
BUS	1391	3CHARITY	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0151PU 116.74KV	-26.50	1391
TO	709	6CHARITY	230	144	1	-16.6	-7.3	18.1	12	0.9621UN		
TO	709	6CHARITY	230	144	2	-16.7	-7.3	18.2	12	0.9621UN		
TO	1418	3MGIND	115	144	1	22.4	10.3	24.6	14			
TO	1491	3CHARI#2	115	144	1	1.5	1.5	2.2	1			
TO	1541	3CAINHY+	115	144	1	9.4	2.7	9.8	5			
BUS	1541	3CAINHY+	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0151PU 116.74KV	-26.50	1541
TO	1391	3CHARITY	115	144	1	-9.4	-2.7	9.8	5			
TO	1542	3CAINHOY	115	144	1	9.4	2.7	9.8	5			
BUS	1542	3CAINHOY	115	AREA 144	CKT	MW	MVAR	MVA	%I	1.0151PU 116.74KV	-26.50	1542
TO	LOAD-PQ					9.4	2.8	9.8				
TO	1541	3CAINHY+	115	144	1	-9.4	-2.8	9.8	5			
BUS	1660	BUCKHALL	115	AREA 1	CKT	MW	MVAR	MVA	%I	1.0020PU 115.23KV	-23.27	1660
TO	LOAD-PQ					6.2	1.2	6.4				
TO	787	3JAMTWN	115	144	1	-6.2	-1.2	6.4	4			



69 kV or Below Transmission Line
115 kV Transmission Line
230 kV Transmission Line
Transmission Line not in Operation
Proposed Transmission
Transmission Interconnection (Indicating Utility)
Central Electric Power Cooperative Substation
Central Electric Power Cooperative Switching Station
Santee Cooper Substation
Santee Cooper Switching Station
Combustion Turbine Generating Station
Hydro Generating Station
Nuclear Generating Station
Steam Generating Station

South Carolina Interstates and Highways
County Boundries
Water

CENTRAL ELECTRIC POWER COOPERATIVE, INC.
P.O. BOX 1455 / 121 GREYSTONE BLVD.
COLUMBIA, SOUTH CAROLINA 29202
(803) 779-4975

McCLELLANVILLE ATTACHMENT #1

DATE: 5/11/2009
DRAWN BY: GB

Appendix 5

Transmission Line
Cost Estimates

	Belle Isle to McClellanville #1	Belle Isle to McClellanville #2	Belle Isle to McClellanville #3	Belle Isle to McClellanville #1 (5960' Delta U/G Crossing)	Belle Isle to McClellanville #2 (3780' Delta U/G Crossing)	Belle Isle to McClellanville New SCPSA ROW (6080' Delta U/G Cossing)	Britton Neck #1 230/115 to McClellanville	Britton Neck #2 230/115 to McClellanville	Britton Neck #1 230/115 to McClellanville (6080' Delta U/G Crossing)
Line length (miles)	16.9	15.3	17	16.9	17	19.9	14	14.9	14
Engineering and Construction Cost per Mile (1)	$512,675	$522,575	$512,118	$512,675	$512,118	$498,402	$532,286	$525,383	$532,286
Base Engineering and Construction Costs	$8,664,200	$7,995,400	$8,706,000	$8,664,200	$8,706,000	$9,918,200	$7,452,000	$7,828,200	$7,452,000
Total Length in Wetlands (miles)	9.7	7.6	9.9	7.6	9.9	9.7	9.8	9.8	9.8
Additional Costs for Construction in Wetlands (2)	$203,922	$160,122	$208,580	$160,122	$208,580	$203,922	$205,963	$205,963	$205,963
Total Length on National Forest Lands	0.5	1.5	1.5	1.5	1.5	0.5	0.5	0.5	0.5
Additional Costs for Construction on National Forest Lands (3)	$13,527	$40,581	$40,203	$40,581	$40,203	$13,527	$13,527	$13,527	$13,527
Additional Cost of 230/115 switching / substation (4)	**0**	**0**	**0**	**0**	**0**	**0**	**$10,000,000**	**$10,000,000**	**$10,000,000**
Additional Cost of (1) Directional Bore Cable (Wilderness Area)									
Additional Cost of (2) Directional Bored Cable (5)	**$0**	**$8,000,000**	**$0**	**$3,780,000**	**$2,690,000**	**$3,840,000**	**$0**	**$0**	**$3,840,000**
Additional Cost of 2 Miles Overhead Crossing Santee Delta (6)	**$675,000**	**$0**	**$675,000**	**$337,500**	**$337,500**	**$337,500**	**$675,000**	**$675,000**	**$337,500**
Total estimated engineering & construction cost	**$9,556,649**	**$16,196,103**	**$9,629,783**	**$12,982,403**	**$11,982,283**	**$14,313,149**	**$18,346,490**	**$18,722,690**	**$21,848,990**
Estimated Right of Way Acquisition Costs	$1,250,000	$1,100,000	$1,250,000	$1,100,000	$1,250,000	$1,250,000	$1,200,000	$1,200,000	$1,200,000
Estimated Wetland Mitigation Costs	$682,825	$682,825	$682,825	$682,825	$682,825	$682,825	$325,185	$325,185	$325,185
TOTAL COST	**$11,489,474**	**$17,978,928**	**$11,562,608**	**$14,765,228**	**$13,915,108**	**$16,245,974**	**$19,871,675**	**$20,247,875**	**$23,374,175**

Britton Neck #2 230/115 to McClellanville (6080' Delta U/G Crossing)	Honey Hill Junc. 230/115 to McClellanville	Honey Hill Junc. 230/115 to McClellanville (2000' Wilderness U/G Crossing)	Jamestown to McClellanville	Jamestown to McClellanville (2000' Wilderness U/G Crossing)	Charity to McClellanville #1	Charity to McClellanville #2	Charity to McClellanville #3	Charity to McClellanville #4	Commonwealth - McClellanvill	SCE&G R/W Use (Commonwealth - McClellanville)
14.9	9.9	9.9	20.6	20.6	28.5	28.7	33	33.2	24.4	24.4
$525,383	$579,616	$579,616	$495,670	$495,670	$474,140	$473,749	$466,485	$466,193	$483,574	$1,265,574
$7,828,200	$5,738,200	$5,738,200	$10,210,800	$10,210,800	$13,513,000	$13,596,600	$15,394,000	$15,477,600	$11,799,200	$30,880,000
9.8	9	9	11.8	11.8	13	14.6	12.9	14.1	4.5	4.5
$205,963	$188,998	$188,998	$247,541	$247,541	$273,812	$307,546	$271,736	$297,013	$94,791	$94,791
0.5	7.7	7.7	12.8	12.8	15.2	13.9	15.8	15	5.1	5.1
$13,527	$225,974	$225,974	$347,380	$347,380	$405,200	$370,544	$421,193	$399,914	$149,670	$149,670
$10,000,000	**$10,000,000**	**$10,000,000**	0	0	0	0	0	0	0	0
		$1,550,000		**$1,550,000**						
$3,840,000	**0**	**0**	0	0	0	0	0	0	0	0
$337,500	**0**	**0**	0	0	0	0	0	0	0	0
$22,225,190	**$16,153,172**	**$17,703,172**	**$10,805,721**	**$12,355,721**	**$14,192,012**	**$14,274,690**	**$16,086,929**	**$16,174,527**	**$12,043,661**	**$31,124,461**
$1,200,000	$650,000	$650,000	$1,100,000	$1,100,000	$2,100,000	$2,200,000	$2,400,000	$2,400,000	$10,750,000	$10,750,000
$325,185	$323,875	$323,875	$564,086	$564,086	$1,100,390	$1,109,562	$1,100,390	$1,109,562	$0	$0
$23,750,375	**$17,127,047**	**$18,677,047**	**$12,469,807**	**$14,019,807**	**$17,392,402**	**$17,584,252**	**$19,587,319**	**$19,684,089**	**$22,793,661**	**$41,874,461**