UNITIL ENERGY SYSTEMS, INC.

DIRECT TESTIMONY OF

SARA M. SANKOWICH

New Hampshire Public Utilities Commission

Docket No. 16-384

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I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Sara M. Sankowich. My business address is 6 Liberty Lane West, Hampton, New Hampshire 03842.

Q. What is your position and what are your responsibilities?

A. I am the System Arborist of Unitil Service Corp. Unitil Service provides centralized utility management services to Unitil Corporation's utility operating subsidiaries Unitil Energy Systems, Inc. ("Unitil Energy" or the "Company") and Fitchburg Gas and Electric Light Company. My primary responsibility is the planning and management of the electric operations vegetation management program for both subsidiaries.

Q. Please describe your business and educational background.

A. I have over 15 years of professional experience in the utility industry with an extensive background utility vegetation management. I joined Unitil Service Corp. in 2011 as the System Arborist. Prior to joining Unitil Corporation, I was employed for six years at National Grid where I advanced through positions in utility vegetation management. The last position I held with National Grid prior to joining Unitil was that of Manager, Vegetation Management Strategy. Prior to National Grid I held a utility arborist position with Orange & Rockland Utilities, and a position with Northern Indiana Public Service Company as a consultant through Environmental Consultants Inc. I hold a Bachelor of Science degree in Forestry Resource Management from the State University of New York, College of Environmental Science and Forestry.

Q. Do you have any certifications that qualify you to speak to issues related to vegetation management?

A. Yes. I am a Certified Arborist through the International Society of Arboriculture.

Q. Have you previously testified before the New Hampshire Public Utilities Commission ("Commission")?

A. Yes, I have appeared previously before the Commission in multiple reconciliation hearings. I have also supplied expert testimony in other state regulatory proceedings relating to vegetation management.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to describe the Company's vegetation management program ("VMP") and the storm resiliency program ("SRP").

Q. Please summarize your testimony.

A. The Company has a comprehensive vegetation management program intended to prevent trees from interfering with electric lines during normal weather conditions and minor storm events. The program's components cost-effectively address the different areas of risk and provide benefits to customers, support favorable reliability, and provide a measure of public safety. The Company is also proposing the continuation of its storm resiliency program, which is the component of the VMP that has been specifically designed to reduce tree exposure along electric overhead lines in order to reduce the overall cost of storm preparation and response, and improve system performance during major storm events.

Q. How have you organized your testimony?

A. My testimony will first discuss the current status of the vegetation management program, including the program's components of cycle pruning, hazard tree mitigation, mid-cycle review, forestry reliability assessment, and sub-transmission maintenance.

My testimony will then discuss the storm resiliency program, including a summary of work completed under the program, the recent results of the program, as well as its costs and benefits.

II. VEGETATION MANAGEMENT PROGRAM, POLICY, AND STRATEGY

Q. Does the Company have a comprehensive vegetation management program to prevent trees from interfering with electric lines?

A. Yes. Unitil Energy's VMP consists of four main components: cycle pruning; hazard tree mitigation; mid-cycle review; and forestry reliability assessment. Each component of the program is designed to minimize the potential for tree and vegetation contact with the overhead utility lines and the incidence and resulting damage of tree and limb failures from above and alongside the conductors.

Vegetation maintenance pruning and clearing done on a cyclical schedule by circuit is called "cycle pruning." The Company's base cycle length is five years.

A hazard tree is a danger tree (any tree or tree part which, on failure, is capable of interfering with the safe, reliable transmission of electricity) that has both a target and a noticeable defect that increases the likelihood of failure. The hazard tree mitigation component program involves the consolidation of hazard tree removal activities into a formalized program.

The mid-cycle review program component targets circuits for inspection and pruning based on time since last circuit pruning and forecasted next circuit pruning. The aim of this program is to proactively address the fastest growing tree species that will grow into the conductors prior to the next cyclic pruning.

The forestry reliability assessment program component targets circuits for inspection, pruning, and hazard tree removal based on recent historic reliability performance. This allows reactive flexibility to address immediate reliability issues not otherwise addressed by the scheduled maintenance programs, without compromising their integrity.

The overall goals of these integrated components of the VMP are to meet the Commission's expectations and increase customer satisfaction through improved reliability performance. In addition to these overall goals, cycle pruning and mid-cycle review also aim to provide a measure of public safety by minimizing the potential for direct contact by the public with energized conductors by climbing trees, and indirect contact though vegetation in contact with energized equipment, as well as minimizing the potential for electrically caused fire in trees and brush.

Q. Does the Company have a vegetation management component to respond to unscheduled necessities such as customer calls and emergency needs?

A. Yes. Unitil Energy's VMP has a non-discretionary or "Core Work" component. This critical component of the VMP allows for the ability to respond to emergencies, customer requests, new construction needs, and other non-discretionary and unscheduled work. A dedicated number of specialized crews are required on site on a year-round basis to address the Company's Core Work needs.

Q. Does the Company have full control over the amount of Core Work completed each year?

A. No. The amount of Core Work completed each year is highly variable as it is comprised of fluctuating components such as customer and emergency needs. More

frequent severe weather events can change the quantity of Core Work activities dramatically as restoration and damage needs increase, but also as customers become aware of the consequences of tree and wire conflict and, as a result, request tree work. For this reason, work amount expectations can be easily exceeded due to frequent minor weather events or residual impact of large weather events.

Q. Does the Company have a vegetation management component to maintain the rights-of-way that connect substations together?

A. Yes. The Company has a sub-transmission maintenance component that applies the principles and practices of integrated vegetation management (IVM) to maintain the rights-of-way. This includes identifying compatible and incompatible vegetation, considering action thresholds, evaluating control methods and selecting and implementing controls to achieve a specific objective. The plants to be controlled are primarily tall growing trees that can grow into or fall onto electric lines. Right-of-way maintenance includes: cyclical floor maintenance such as mowing, hand cutting, and herbicide application; side line pruning; and hazard tree removal.

III. VEGETATION MANAGEMENT PROGRAM COSTS

Q. What are the drivers of the VMP's cost?

A. The VMP's costs are driven primarily by the cost to implement cycle pruning, the largest program work category. The second largest program cost is hazard tree mitigation, and the third largest program cost is sub-transmission right-of-way maintenance. A large uncontrollable, but necessary, cost relates to required police protection and flaggers for traffic safety. The Company has limited ability to control these generally increasing costs.

Q. Are there any shared vegetation management costs for jointly-owned poles?

A. Yes. The companies which jointly own poles share vegetation maintenance and storm costs pursuant to the respective Joint Ownership Agreement ("JOA") and the Intercompany Operating Procedures' ("IOP") Joint Trimming process. These procedures are followed to share applicable costs between the joint pole owner companies.

Q. Has the Company reduced its request for recovery of its vegetation management costs by the amounts charged to joint owners under each applicable IOP for tree trimming costs incurred during the test year?

A. No. The Company's request to recover vegetation management costs is not reduced for these amounts because payment by the joint owners is not guaranteed nor always timely, and the integrity of the VMP should not be dependent upon the occurance of these payments.

Q. **How is the Company proposing to treat the contributions received from joint pole owners towards trimming expenses?**

A. As discussed in the direct testimony of Unitil Energy witness David Chong, the Company is proposing to continue the current reconciliation process through the External Delivery Charge mechanism ("EDC"). Any payment received from a joint pole owner will be credited to customers through that reconciliation.. As part of that process, the Company will continue to provide its VMP plan for the upcoming project year to Staff and the OCA for review. The Company will make itself available to meet with Staff and the OCA in technical sessions to discuss the plan, obtain comments, and answer any questions regarding the plan to be implemented for that fiscal year. After that review, the Company will take all reasonable steps deemed appropriate to carry out and implement the plan, taking into account the comments received.

Q. What are the benefits to the Company and its customers of continuing the VMP at its current scope?

A. The benefits of continuing the current scope of the VMP are the achievement of greater reliability, customer satisfaction, safety, and maintanence efficiency.

Reliability

There is a risk to reliability improvement and continued favorable reliability performance trends if the there is a reduction or lapse in ongoing implementation of the VMP. The risk of tree related interruptions from grow-in conditions are significantly low when all circuits are kept on their appropriate pruning schedule. Each year approximately 20 percent of the system is being maintained while growth is occurring on the other 80 percent. The risk to reliability increases if the full cycle maintenance scope is not implemented.

Customer Satisfaction

Failure to implement the full scope of the VMP has the potential to result in negative customer satisfaction. Customer expectation of continued reliability would not occur and reliability performance may deteriorate. The perception of proactively managing vegetation to improve reliability performance would be lost and replaced with the perception of a reactive program that is always behind the curve. Negative customer satisfaction can also result in increased customer complaints and requests for individual pruning work, which require more supervisor review and management and increased work and cost to mitigate.

Safety

Not implementing the full scope of the VMP results in risks of public injury, property damage, and liability. In the absence of necessary maintenance there is the risk of electrocution through direct contact in a climbable tree or indirect contact through the tree itself, as well as the risk of fire. The absence of sideline hazard tree mitigation, increases risk to life and property through direct contact, or potential for contact through energized conductors being brought down within public contact zones. Tree caused outages that would be addressed by maintenance work often result in the most significant damage, large amount of customers affected, long duration outages and increased risk to safety. Large trees and limbs bringing conductors down also increases the risk of loss of electric service to municipalities' critical infrastructure and emergency services.

Efficiency

There is a risk to efficiency if the full scope of the VMP is not implemented. Efficiency losses will develop if vegetation is allowed to encroach on the overhead assets, as working around conditions with vegetation growth in close proximity to conductors will slow routine maintenance and typical storm restoration, as well as deter accurate and efficient line inspections. Efficiency and reliability losses may also occur with the potential to delay fault locating when an event occurs.

Q. What factors drive the VMP's costs?

A. High tree density, high customer density per mile, overall forest health, scenic road designations, and traffic control / work protection requirements all affect program costs in the Company's service territory.

High Tree Density

High tree density found in the service territory contributes to increased costs for all program components relative to similar components in land areas with lower tree density. The overall tree pruning and maintenance needs are higher when there are more trees per mile, resulting in increased costs. Not only are there more trees to prune per mile, but there are potentially more hazard trees to remove per mile. Increased pruning requirements also increases the volume and time required for wood debris and chip disposal. Further, with a higher number of trees per mile, the increased exposure of trees to electric overhead lines results in potential for increased customer requests and damage in storm events and the associated costs.

High Customer Density

Areas with high customer density per mile also also contributes to increased costs for all program components relative to similar components in areas with lower customer densities. High customer density per mile necessitates increased customer outreach, which is typically time-consuming and costly. High customer exposure also results in higher customer awareness, and potential increased customer concern, and program restrictions when affecting their private property, increasing program costs.

Forest Health

The overall forest health of the service territory, with regard to tree and stand age, health, and maturity, as well as overall hazard tree population and mortality rate, has the potential to affect the costs for all program components. Poor forest health can be a factor of overall tree population aging, commonly found in New Hampshire where stands matured together after areas cleared for farming returned to forest. This can lead

to an increased hazard tree population relative to other areas with a mixed stand age population. Another factor for poor forest health is the effect of damaging storm events and the residual health decline that occurs after many trees cannot recover from the extensive damage. The Company has seen an increasing trend of damaging storm events, from ice damage, wind damage and heavy wet snow damage that have damaged and affected the forest health. Pest infestations, such as the highly destructive and invasive Emerald Ash Borer, as well as the Winter Moth, and the Hemlock Wooly Adelgid, all found in the Company's service territory, also have the potential to affect forest health and contribute to increased tree mortality. All of these factors affecting forest health - aging stand maturity, decline after damaging storm events, and pest infestation, lead to high hazard tree populations and increased costs to manage and maintain the risk from hazard tree and limb failure.

Importantly, the highly destructive and invasive Asian Longhorned Beetle present in the neighboring state of Massachusetts, is not currently affecting the Company's costs, but has the potential to impact costs substantially if discovered in the service territory.

Scenic Road Designations

Scenic roads and other municipality designations that impose restrictions, measures, or guidelines that must be followed for vegetation pruning and hazard tree removal contribute to increased costs for all program components. Scenic road planning, hearings, notifications, and permits add increased supervisory and administrative costs. This also requires the design, production and distribution of educational material and resources such as printed literature and web information sites. Restrictions imposed on

obtaining authority for the necessary work also impacts costs as full program benefits are not realized and "hot spotting" or other work between pruning cycles therefore must be scheduled.

Traffic Control and Work Protection

Traffic control and work zone protection is a necessary part of vegetation management work completed along roadways. Program costs are affected by the requirement to use traffic control protection, specifically with the use of police officer details on the majority of streets in the Company's service territory. Estimated costs for traffic control are based on historic annual spend per work type. This cost is tracked separately from the individual program work types since the Company has limited control over police costs and requirements which allows for an improved ability to measure actual cost of work for the individual program work types. Even though the Company has limited control over traffic control costs, it is a large factor in overall costs, and every effort is made through contract strategy, field practices, and oversight to minimize traffic control costs.

Q. Are there any other efforts or methods used to minimize the overall VMP's costs?

A. Yes. The Company has developed a vegetation management contract strategy to strive for lowest market price and minimize the program components' costs where possible. This was done by first outlining the vegetation management goals and strategies for delivering work and minimizing risk and associated cost, and then by listing the contract methods and types available for award of work to qualified line-clearance vendors. The strategy applies the risk identification, evaluation, and final strategy processes to arrive at the current contracting methods used today of multiple vendor

Lump Sum Fixed Price Bid, and Unit Price Bid award, as well as single vendor three-year contract "time and material" award.

Q. Is management and implementation oversight necessary to minimize the vegetation management program's costs?

A. Yes. Management and work implementation oversight is a critical component to keeping costs minimized and to maximizing cost savings. Effective management planning "streamlines" implementation and eliminates time loss and duplication of effort. Direct oversight of field work and field communication minimizes down time, keeps productivity high and engages workers in striving toward Company goals and targets which all work to boost efficiencies and effectiveness.

IV. STORM RESILIENCY PROGRAM

A. OVERVIEW, DEVELOPMENT AND STRATEGY

Q. Is Unitil proposing the continuation of the SRP?

A. Yes. The Company is proposing the continuation of the SRP, which is a companion or complementary program to the VMP. The SRP is different in that it is aimed at reducing tree exposure along select circuits in order to improve performance during major storm events. The goal of this program is to reduce tree-related incidents, resulting customer interruptions, and more significantly, municipality impact along critical portions of targeted lines in minor and major weather events. In turn, the Company aims to reduce the overall cost of storm preparation and response, improve restoration, and preserve municipal critical infrastructure for the purpose of enhancing public health and safety.

Q. Why is this program important?

A. In 2011, the Company experienced two large weather events that affected its service territory: Hurricane Irene; and the October Snowstorm, where over two feet of snowfall was recorded in New Hampshire. The 2011 October Snowstorm caused widespread damage and prolonged outages and was the second largest event in the Company's history. In 2012, the Company was hit by Hurricane Sandy. Prior to 2011, the Company has also sustained other frequent major storm events over the previous four years.

As a consequence of the type of damage experienced and the length and cost of restoration efforts, the Company began to explore the options available to "harden" or make critical elements of the system more resilient to storms. After a review of different options available, such as undergrounding electric lines, and reviewing rough cost estimates, the Company recognized that there was an opportunity to implement a vegetation-centered storm hardening program which would provide many of the expected benefits at a much lesser cost than alternatives.

Q. What is the scope of work related to this program?

A. The scope of work for the SRP is for critical three-phase sections of select circuits, defined as the circuitry from the substation out to a desired protection device, to undergo tree exposure reduction by: (i) removing all overhanging vegetation, or pruning "ground to sky;" and (ii) performing intensive hazard tree review and removal. In addition, under the SRP the remaining three phase circuitry beyond the designated critical portions receive hazard tree review and removal. The scope of work also takes into account critical infrastructure needs for the towns and cities affected. The locations

of police and fire departments, schools, emergency shelters and other critical business centers are considered along with the critical electric infrastructure.

Q. How does this program differ from the VMP?

A. The SRP differs from the VMP in that it targets areas that are outside of the VMP's scope. The current VMP is designed to be effective for normal conditions and weather events, described as up to 50-60 mph winds, where the failure of defective trees and limbs predominates. The storm resiliency program involves the removal of all tree exposure to the lines, affecting non-actionable and non-defective tree failure that begins to predominate above 50 mph winds. The difference between maintenance pruning and reduction of exposure can be seen by looking at: 1) the pruning specifications for the cycle pruning program versus the storm resiliency program; and 2) the intensity of hazard tree removal on the hazard tree mitigation program versus the storm resiliency program.

Cycle pruning specifications are to prune vegetation away from the conductors to a height of only 15 feet above, 10 feet to the side and 10 feet below. Such clearing is adequate for normal conditions. The storm resiliency program specifications, however, are to remove all overhanging branches and limbs from above the conductors and out 10 feet to the side.

The difference in intensity between the hazard tree mitigation program and the removal of hazard trees under the storm resiliency program can be broken down into two components: 1) the actual tree populations inspected for each program; and 2) the risk accepted, or the level of defect found on inspection that actually warrants tree removal.

First, hazard tree removal under the hazard tree mitigation program component is governed by risk as described in the tree risk management protocol. Under this protocol, risk is assessed based on a specific population of trees only as defined by the location on the circuit and the corresponding customer damage category. The tree inspections performed are focused on the tree population on the same side of the street as the pole line, as the Company assumes less risk due to their proximity to the pole lines, and a limited visual assessment of the opposite side of the street from the pole line. These surveys are predominantly performed from a vehicle. In many cases only limited danger trees (when specified defects or tree health problems are observed) are inspected. In the SRP, all trees capable of interfering with the safe, reliable transmission of electricity upon failure are inspected. Tree inspections performed under the SRP are walking surveys of the tree population, including 360 degree examinations around the electric facilities, which includes tree populations on the opposite side of the street from the pole line.

Second, the level of risk accepted on the hazard tree mitigation program is higher than that of the SRP. Trees showing inspection defect(s) with a likelihood of failure of "imminent" and "probable with a modifier" are removed in customer damage categories of high and moderate. This is adequate for normal weather conditions. For the SRP, trees with a likelihood of failure of "imminent," "probable with a modifier," as well as those with a likelihood of "probable," "possible with a modifier," and "possible" are removed. Again, this level of clearing is designed for major storm events.

Q. How did the Company decide which circuits should be included in the SRP?

A. The Company reviewed all circuits individually for inclusion in the SRP. In order to be effective, certain criteria such as tree field conditions and customers served on a circuit were deemed to be significant. Criteria for the program included: 1) tree-related field condition; 2) customer count; 3) circuit total miles of three-phase; and 4) presence of scenic roads or other vegetation restrictions. Any circuits that were located primarily in low tree density areas, without critical municipality needs, were removed from the program circuit list. Any circuits with less than 500 customers served were reviewed for need as well as any circuit with less than two miles of three-phase line. Areas designated as scenic roads or with other known restrictions were also removed from the program.

Q. Was this program implemented in previous years?

A. Yes. This program was implemented as a pilot in 2012 and 2013, then transitioned to a full program for 2014 through 2016. In total, 13 circuits along 119.4 miles of line were mitigated, serving 22,000 customers and 42 life line, life safety and community resources including 11 schools, 5 community emergency shelters, and a hospital. Over 7,800 risk trees were removed.

Each year, implementation began with an outreach program, where the munipalities were notified of the intent, scope of work, and given a tentative schedule. A trained work planner identified work to be performed, conducted extensive customer outreach and education related to the program, and sought tree owner consent for pruning and removal. Over these five years, overall customer understanding and acceptance of the program was very high.

Tree pruning and removal work began in the final quarter of each year and continued through the end of the fiscal year. The use of specialized equipment such as cranes, and log loaders along with staged wood removal sites was employed to reduce the surrounding vegetation impact and overall appearance to the community.

Each year, the program wraps up with tree removal replacements offered to customers that underwent significant tree pruning or removal activity. Overall, customers were pleased with the work and the replacement trees which fit the "right tree, right place" goal for compatible trees adjacent to the overhead electric lines.

Q. Has a similar program been implemented anywhere else?

A. Yes. The Company's affiliate, Fitchburg Gas and Electric ("FG&E") has implemented a successful SRP in its Massachusetts service territory since 2014.

B. WORK PERFORMED, COSTS, AND BENEFITS

Q. What were the costs of the SRP for the test year?

A. As indicated in the testimony of Mr. Chong, the costs for the 2015 storm resiliency program were $1,019,289[1]. As explained in the Company's annual reconciliation filing DE 16-276 these costs were below the $1,423,000 budget estimate:

> The reason for the underspending was due to the lesser number of identified hazard trees on the C8X3 circuit. In previous years, the average number of removals per mile was approximately 82 trees per mile, ranging from 115 trees per mile down to 60 trees per mile. With the C8X3 only having 684 removals identified over 26.8 miles, the number of removals identified was low at 25.5 trees per mile. This anomaly, perhaps due to the circuit location along Route 4, was noticed during the work planning phase. The Company added an additional 3.3 mile circuit, C6X3, midway through the project to harden additional miles and provide maximum benefit for the cost since budget was still available. Even with the reduced time frame and additional work planning needs, the Company and was able to complete this additional circuit. (DE 16-276, "UES Reliability

[1] Mr. Chong's testimony explains all VMP expenses embedded in the 2015 test year.

Enhancement Plan and Vegetation Management Plan Annual Report 2015," at page 13.)

All program work in 2015 was completed, and an additional circuit was added, to maximize the amount of miles able to be mitigated under the program for that year. This situation is another example of why the Company supports continuting the current reconciliation process where program savings can be passed back to the customers. Due to the varying nature of storm resiliency work and traffic control, the Company expects costs may continue to experience minor variances, with final annual costs being slightly above or below the estimated budget. The Company believes that the annual program funding level of $1,423,000 remains an appropriate and reasonable estimate of the Company's targeted spending for its SRP.

Q. What are the expected costs of the SRP?

A. The Company expects the costs of the SRP to be $7,115,000 for five additional years to complete the approximately 160 miles of qualifying overhead, three-phase lines identified for the project.

Q. Are there additional factors that can affect cost?

A. Yes. There are some variable factors that can affect cost. The actual hazard tree population and number of removals necessary along the program area will vary, which would affect cost to implement the work. Customer and municipal acceptance of desired work can affect the number of trees pruned and/or removed. Other ongoing work on neighboring utilities' systems could affect the level of third party resources available to complete the work and the bidding vendor pool, thus affecting cost.

Q. How will these variable factors be minimized?

A. These variable factors will be minimized through extensive planning as well as field and management oversight. Hazard trees to be removed will be prioritized according to risk. The Company will engage in extensive interaction and advance notice to towns and the use of a specialized trained company representative for customer education and consent, and to promote the acceptance of the work. Advance planning and notice to a large vendor pool and timing of project and bid release will be used to minimize cost changes associated with competing work.

Q. Have any measurable benefits been realized since the implementation of the SRP work in 2012?

A. During the course of the initial pilot pruning and removal work in 2012, the Company was faced with a unique situation to test the work's response to a storm event. On October 29, 2012 Hurricane or "Super Storm" Sandy came up the east coast and affected the Company's New Hampshire service territory. At this time, one of the three storm pilot circuits was in the final stages of completion. Only a few customer tree removal negotiations and pruning spots remained. On the second circuit, pruning and removal was just beginning, and work had not started on the third circuit. This left the unique opportunity to study the effects on the worked and unworked circuits during one event. As rain and wind from Hurricane Sandy pelted the Seacoast area, the first circuit that had work completed held up remarkably well. The main line of the circuit experienced no events and many of the customers fed off this circuit did not experience a single interruption. A customer communication after the storm event, shown below, is representative of many emails, phone calls and Twitter "tweets" UES received and the customer experience during this storm event:

Just wanted to let you know how wonderful it was not to lose power during the hurricane. I believe it was directly attributable to all the tree cutting and trimming Unitil did especially in the Pollard Road and Westville Road area. My husband and I had our home built here thirty seven years ago....this is the first big storm that I can remember that power remained on!! I know there is no assurance this will be the norm but I think you all are striving hard to make it that way. Thanks so much!! -Plaistow, NH

There was one tree-related event in the storm pilot area along the first circuit where a desired tree removal, still in discussion with an unsure homeowner, failed and contacted the phases. However, the tree was removed during the storm and those customers affected were restored quickly. The customers on this circuit experienced many of the benefits expected from the SRP.

The other two Storm Pilot circuits that had not had tree removal started faced more tree-related incidents and the main line of both of these circuits experienced tree-related troubles which led to substation lock-outs, longer outages for a larger number of customers in the area, and increased time and manpower to restore. I performed a field review directly after the storm event which demonstrated multiple tree failures along the Storm Pilot designated area. Two sideline tree failures on the mainline of the second circuit had been marked and approved for removal prior to the storm, but had not yet been removed. Had these removals been done prior to the storm event, associated reliability loss, damage, and cost would likely have been prevented.

In 2014 the Company was again able to test the SRP. On Wednesday November 27 through Thursday November 28, 2014 the Company's Capital region in New Hampshire experienced a heavy wet snow event that was forecasted as an EII 3 event with snow totals over 10 inches. During this event, the electric system experienced significant damage. However, there were limited tree related damage events on the portions that underwent storm resiliency work in 2013. To document and analyze the performance of these circuits, the Company employed a vendor to record vehicle mounted high definition video during restoration portions of the storm, after snowfall was completed. The video captures analysis and performance of the circuits and can be viewed in a Company's short film titled "SRP Video 2014,".

Q. Other than the benefits described above, are there any reliability improvements attributed to the SRP?

A. The Company has seen an overall reliability improvement related to tree-related outages over the past five years, as shown in Schedule SMS-1. While the Company would like to attribute this in large part to the SRP, it is difficult to distinguish this result from a number of other factors such as the vegetation management program, capital improvements, emergency response plan, and favorable weather conditions.

Q. What are the expected benefits of implementing the SRP?

A. The expected benefits of the SRP are, at the core level, improved reliability, improved customer service and satisfaction, reduced safety risks, and avoided costs during storm events. These benefits should be seen by the expected prevention of tree-related failures and subsequent electric incidents. This reduction in incidents reduces damage

to the electric infrastructure and the need for crews to respond, in turn reducing overall storm restoration costs.

There are also more specific benefits, which drive the core benefits, expected from implementing the SRP. These include:

- Preserving municipal critical infrastructure
- Minimizing the dependence on mutual aid and off system resources
- Minimizing the total number of resources required to restore service
- Shortening the duration of major events
- Minimizing the overall cost of restoration
- Reducing economic loss to municipals, businesses, and customers
- Most cost-effective solution vs. other alternatives

Because of the design of the SRP, much of a municipality's critical infrastructure is included in the targeted circuitry. These areas are also most often the business centers for the municipality, and therefore include gas stations, restaurants and hotels. Preserving power during multiple-day events to both municipal infrastructure and business districts ensures functioning emergency service, and a place where residents can seek temporary warmth and shelter.

In addition, many states and regulatory jurisdictions have established standards for restoring power during major events, the competition for securing outside line resources has increased significantly and, as a result, resources have become both scarce and very expensive. Often, in order to secure an adequate amount of resources for a particular event, the Company has been required to reach outside of the New England area, adding travel time and additional cost. One way, however, to mitigate these

escalating costs is to prevent the damage from occurring in the first place. Less damage translates into a reduced need for outside crews, which, in turn, lowers overall costs and shortens the duration of an event.

As electric utilities review various options to improve overall storm performance, the undergrounding of utility infrastructure is often mentioned, but quickly dismissed due to significant cost and impracticality. Implementation of an SRP may achieve similar performance to that of undergrounding at a fraction of the cost.

Municipalities and businesses have described the significant economic impact of losing power for multiple days. These natural disasters are very disruptive, result in a loss of business income and tax revenue, personal income loss, and increased costs to municipalities due to the requirements of providing emergency services, debris removal, and requiring overtime work for multiple departments. Any actions that help to minimize this disruption will provide some measure of economic relief.

Finally, customers have expressed concern with losing power for multiple days. Although it is impossible to prevent storm damage across the entire system, preserving power and minimizing damage for each municipality along its main business corridor as well as protecting its emergency critical infrastructure appears to offer significant promise as a means to assure safety and provide some measure of security during and after these extreme weather events.

Q. Has the Company drawn conclusions about the benefit of a storm resiliency program?

A. Yes. After reviewing the results of the storm hardening initiatives implemented in New Hampshire and Massachusetts, the Company concluded that the reliability effects, the

avoided interruptions and costs, the positive public acceptance, and the benefits to customers are significant benefits that more than offset the cost to implement. As demonstrated by the results of the pilot program during Hurricane Sandy, subsequent storm events, and then validated by the video capture during restoration, we feel this program brings savings to customers through future avoided storm costs, and many additional and important public health and safety benefits. For this reason, the Company is proposing the continuation of the vegetation management SRP.

Q. Does this conclude your testimony?

A. Yes, it does.