Received: April 9, 2013 Date of Response: April 12, 2013

Request No. Staff 1-1 Witness: Richard L. Francazio

Request:

How did the Company arrive at the new annual MSCR recovery amount of $800,000? Please provide all relevant calculations to support your analysis.

Response:

As shown on Attachment 1, The Company undertook an MSCR Reserve Fund Balance Analysis to determine: ***If the MSCR Reserve Fund Balance were targeted to be the average amount of the Company's annual storm cost spending, at what annual level of MSCR recovery would the fund balance achieve a surplus position equal to one year's average storm costs – and when would it achieve that position?***

Results:

1. The targeted MSCR Reserve Fund Balance equal to the average annual spend for storm costs would be achieved in 6 years, at December 31, 2018, at an annual MSCR Recovery amount of $800,000 begun on May 1, 2013. [as shown in column (l) on Lines 14 and 15 of Attachment 1]

2. At the current annual MSCR Recovery amount of $400,000; the Company's MSCR Reserve Fund Balance would remain in a continuing and increasing deficit position and never achieve the targeted reserve amount. [as shown on Line 7 in columns (d) through (i) of Attachment 1]

Recommendation: The Company recommends the annual MSCR Recovery amount be increased to $800,000 beginning on May 1, 2013, subject to annual review and reconciliation to actual costs and charges incurred.

Attachment 1

MSCR RESERVE FUND BALANCE ANALYSIS
Target Fund Balance to Annual Spend
as of March 2013

column:		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
Line		2007	2008	2009	2010	2011	2012	2013 YTD	Average Annual Spend 2007-2013	2014	2015	2016	2017	2018
1	**Opening MSCR Reserve Fund Balance:**				$ -	$ (313,210)	$ (435,764)	$ (719,840)		$ (1,380,710)	$ (1,670,485)	$ (1,923,471)	$ (2,086,587)	$ (2,257,842)
2	Cost of storms - Actual and (Projected)	$ (579,000)	$ (678,000)	$ (640,000)	$ (513,210)	$ (522,554)	$ (657,579)	$ (1,000,000)	$ (655,763)	$ (655,763)	$ (655,763)	$ (655,763)	$ (655,763)	$ (655,763)
3	Influence of fully cycle trimming				$ -	$ -	$ -	$ -		$ 50,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000
4	Influence of storm resiliency program				$ -	$ -	$ -	$ -		$ -	$ -	$ 100,000	$ 100,000	$ 100,000
5	Carrying Charges (net of D.I.T.) = 4.99%						$ (26,497)	$ (60,870)		$ (84,011)	$ (97,223)	$ (107,353)	$ (115,492)	$ (124,038)
6	MSCR Annual Recovery at **$400K**				$ 200,000	$ 400,000	$ 400,000	$ 400,000		$ 400,000	$ 400,000	$ 400,000	$ 400,000	$ 400,000
7	**MSCR Reserve Fund Balance:**				$ (313,210)	$ (435,764)	$ (719,840)	$ (1,380,710)		$ (1,670,485)	$ (1,923,471)	$ (2,086,587)	$ (2,257,842)	$ (2,437,643)
8	**Opening MSCR Reserve Fund Balance:**				$ -	$ (313,210)	$ (435,764)	$ (719,840)		$ (1,114,044)	$ (990,512)	$ (809,568)	$ (517,100)	$ (135,689)
9	Cost of storms - Actual and (Projected)	$ (579,000)	$ (678,000)	$ (640,000)	$ (513,210)	$ (522,554)	$ (657,579)	$ (1,000,000)	$ (655,763)	$ (655,763)	$ (655,763)	$ (655,763)	$ (655,763)	$ (655,763)
10	Influence of fully cycle trimming				$ -	$ -	$ -	$ -		$ 50,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000
11	Influence of storm resiliency program				$ -	$ -	$ -	$ -		$ -	$ -	$ 100,000	$ 100,000	$ 100,000
12	Carrying Charges (net of D.I.T.) = 4.99%						$ (26,497)	$ (60,870)		$ (70,705)	$ (63,293)	$ (51,769)	$ 37,175	$ 18,142
13	MSCR Annual Recovery at **$800K**				$ 200,000	$ 400,000	$ 400,000	666,666		$ 800,000	$ 800,000	$ 800,000	$ 800,000	$ 800,000
14	**MSCR Reserve Fund Balance:**				$ (313,210)	$ (435,764)	$ (719,840)	$ (1,114,044)		$ (990,512)	$ (809,568)	$ (517,100)	$ (135,689)	$ 226,690
15	**MSCR Reserve Fund Balance TARGET:**									$ 676,468	$ 619,056	$ 507,532	$ 418,589	$ 437,621

Unitil Energy Systems, Inc.
Docket No. DE 13-065
Technical Session Data Requests – Set 1

Received: April 9, 2013
Request No. Staff 1-2

Date of Response: April 12, 2013
Witness: Kevin Sprague

Request Staff 1-2:

Please provide a corrected version of Schedule 1, Page 3 of the filing. The total change in Non-REP Net Plant does not tie to the amount shown on Schedule 2.

Response:

Please refer to Staff 1-2 Attachment 1 for a corrected version of Schedule 1, Page 3. The total for Plant Account 303-02 was not carried over to the last column, Adjusted Net Book Value. The total Adjusted Net Book Value on Schedule 1, Page 3 now ties to the change in Non-REP Net Plant In Service shown on Schedule 2.

Unitil Energy Systems
Non-REP Plant Calculation

(Thousand of Dollars)

Change Between Periods						
Plant Account	Account Description	Total Plant	Accumulated Reserve	Net Book Value	Less: REP Projects	Adjusted Net Book Value
105-00	Plant Held for Future Use	-	-	-		-
301-00	Organization-E	-	-	-		-
303-00	Intangible Software-5 Yea-E	186	156	29		29
303-01	Intangible Software-3 Yea-E	10	4	6		6
303-02	Intangible Software-10 Yea-E	2,226	37	2,189		2,189
343-00	PRIME MOVERS-E	-	4	(4)		(4)
360-01	ROW - Distribution-E	-	-	-		-
360-02	ROW - Distribution-E	16	-	16		16
361-00	Distribution Structures-E	-	4	(4)		(4)
362-00	Distribution Station Equi-E	(943)	318	(1,261)	220	(1,480)
364-00	Distribution Poles, Tower-E	3,468	1,197	2,271	945	1,327
365-00	Distribution Overhead Con-E	4,515	1,212	3,303	805	2,498
366-00	Distribution Underground -E	36	34	2	0	2
367-00	Distribution Underground -E	476	397	79	1	78
368-00	Distribution Line Transfo-E	2,822	625	2,198		2,198
368-01	Transformer Installations-E	1,653	398	1,255		1,255
369-00	Distribution Services-E	964	935	29	8	21
370-00	Distribution Meters-E	386	445	(59)		(59)
370-01	Meter Installation-E	210	187	23		23
371-00	Installations on Customer-E	199	(54)	253	6	247
373-00	Street Lights & Signal Sy-E	32	163	(132)	1	(133)
373-01	Street Lights & Signal Sy-E	-	-	-		-
389-00	General & Misc. Land-E	-	-	-		-
390-00	Structures-E	10	56	(46)		(46)
391-01	Office Furniture & Fixtur-E	(4)	57	(61)		(61)
391-03	Computer Equipment-E	-	-	-		-
392-00	Transportation Equipment-E	(60)	17	(77)		(77)
393-00	Stores Equipment-E	-	3	(3)		(3)
394-00	Tools, Shop and garage Eq-E	52	50	1		1
395-00	Laboratory Equipment-E	62	21	40		40
397-00	Communication Equipment-E	(1)	222	(222)		(222)
398-00	Miscellaneous Equipment-E	-	6	(6)		(6)
399-00	Other Intangible Plant-E	-	0	(0)		(0)
	Additional Wind Storm Costs	-	-	-		-
	Total	$16,314	$6,494	$9,821	$1,986	$7,835

Unitil Energy Systems, Inc.
Docket No. DE 13-065
Technical Session Data Requests – Set 1

Received: April 9, 2013
Request No. Staff 1-3

Date of Response: April 12, 2013
Witness: Raymond Letourneau and Sara Sankowich

Request Staff 1-3:

Please provide additional analysis of the Storm Resiliency Pilot Program.

Response:

Please see Staff 1-3 Attachment 1.

Storm Resiliency Pilot Program 2012

Cost Benefit Analysis

Prepared By:

Sara Sankowich & Raymond Letourneau
Unitil Service Corp.

April 11, 2013

1. Storm Pilot Overview

In 2012, Unitil embarked on a pilot study to test the effectiveness of performing targeted vegetation management to reduce effects of storm events on the electric system. This pilot was initiated after the Unitil Service territory in New Hampshire was met with 2 large events in 2011, Hurricane Irene and the October Snowstorm and had sustained other frequent major storm events over the past 4 years.

The 2011 October Snowstorm caused widespread damage and prolonged outages and was ranked as the 3rd largest event in the state's history.[1] The NH PUC Regulated Utilities' Preparation and Response Report indicated customers expressed frustration with costs incurred with the outages.

> *"Customers also expressed frustration with the personal costs incurred as a result of multi-day outages. For residential customers, those costs are driven in part by the purchase of fuel for generators; lodging and meals for those who cannot remain in their homes; lost wages for those who work from home; and spoiled food with the loss of refrigeration. Business customers experienced revenue losses, as well. Without electricity, many customers in New Hampshire lack water, as well as heat."*[2]

In after storm meetings with towns and annual emergency preparedness meetings, Unitil also saw that customers expressed a desire for something to be done. Customer's increased reliance on technology coupled with the economic cost of service interruption and safety aspect contributes to the changing expectation of uninterrupted service. Certain towns even expressed support for more tree work to be done.

Unitil began to explore the options available to "harden" or make the system more resilient to storms. After the review of different options available, such as undergrounding electric lines, and reviewing their rough cost estimates, Unitil recognized that there was an opportunity to consider the effects of implementing a vegetation centered storm hardening program.

In order to study the effects of the program and whether the program provided valuable benefits to customers, Unitil proposed to study the cost to implement, the reliability effects, and the public acceptance, against the cost of storm preparation, the cost of storm restoration and response, and the cost of storm to customers - both residential and business.

This report outlines the storm pilot program development, implementation, results and future recommendations.

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[1] NH PUC "The October Snowstorm – New Hampshire's Regulated Utilities' Preparation and Response" November 20,2012, Appendix E p55

[2] NH PUC "The October Snowstorm – New Hampshire's Regulated Utilities' Preparation and Response" November 20,2012, Section VI p38

2. 2012 Storm Pilot Development

To develop the storm pilot program, Unitil targeted specific circuits (shown in Table 1) in communities in the Seacoast area that expressed desire for storm hardening and additional tree work. Each circuit was chosen for its recent historic reliability performance, number of customers served, field conditions, and location.

The design was for critical 3-phase sections of the circuit, from the substation out to the first protection device, to have tree exposure reduced by removing all overhanging vegetation or pruning "ground to sky". Intensive hazard tree review and removal was to be conducted on these critical sections. In cases where the customer count was over 500 customers at the first protection device, overhang and hazard tree removal was to be continued to the second protection device. From that point, hazard tree inspection and removal was to be conducted out to the third protection device or along remaining three phase lines.

Table 1

Circuit	Scheduled Miles
E13W2	4.65
E58X1	5.42
E21W2	4.66
Total	**14.73**

Unitil also met with towns and communities in the development stage to gain insight into their critical infrastructure needs for the town. The locations of police and fire departments, schools, emergency shelters and other critical business centers were taken into account along with the critical electric infrastructure.

Cost estimates for this pilot program were calculated using a weighted cost per mile estimate for pruning and tree removal including customer outreach and education materials, work planning, notification, and monitoring, plus an addition of traffic control costs.

3. 2012 Storm Pilot Implementation

Implementation began with an outreach program, where towns were notified of the intent, scope of work, and tentative schedule. An informational brochure was developed for customers and plans were put up on the company web site.

Unitil hired a consultant certified arborist work planner trained in risk tree assessment and hazard identification. The consultant was trained in the project scope and risk tree assessment level desired and work planning began on the three identified circuits. The work planner also conducted extensive customer outreach and education related to the program and sought tree owner consent for pruning and removal.

After all work-planning was completed, the pilot program was to put out to bid to Unitil's qualified line-clearance vendors. An extensive request for proposal document and pre-bid

meeting was prepared to ensure full understanding and lowest market price for specified work. A number of bid questions was also included and evaluated to ensure selected vendor exhibited Unitil's shared values and desired a partnership to invest in the communities where this tree work was being conducted.

Tree pruning and removal work began by the selected vendor in the beginning of October and continued through the end of December. The use of specialized equipment such as cranes, log loaders, staged wood removal sites and mowers was implemented to reduce the surrounding vegetation impact and overall appearance to the community.

4. Storm Pilot Results and Analysis

a. Work Delivery

When work was completed, 14.7 miles of critical three phase line had all overhanging vegetation removed (pruned "ground-to-sky") and 1,685 hazard trees were removed along this critical line portion as well as 9.9 additional miles of three phase. (see Table 2)

Table 2

2012 Storm Pilot Work Details			
Circuit	Scheduled Miles	Completed Miles	# of Removals
E13W2	4.65	4.65	614
E58X1	5.42	5.42	408
E21W2	4.66	4.66	663
Total	**14.73**	**14.73**	**1685**

b. Customer Response

Overall, there was excellent support from the towns and customers involved. There was limited opposition before work began and very little complaints or concerns as work progressed and completed.

In fact, Unitil received lots of praise for the program, especially after Hurricane Sandy and other minor storms in the end of 2012 and beginning of 2013. (See **Section C**, below for more on studying the impact during Hurricane Sandy) Some of the customer responses from Twitter include:

@tgnh: Thanks @Unitil for the intense tree removal in my town recently. I'm sure it's why we did not lose power!

@hiltonizer: @Unitil No outage for me here in Newton today, Asplundh has been here everyday for a month+ and doing a good job. Tell your arborist thanks!

@scateo: Hats off to @Unitil, their extensive tree maintenance campaign paid off in little if any disruption of serve this year in my area.

@scateo: Fantastic job of limbing past summer is paying off in lack of outages! Your actions really paid off.

@mackgraddiesdad: So far so good! The trimming really does help! Keep cutting those trees back off the lines ... love staying connected in storm!

@richguarino: Congratulations, taking down those trees in Newton paid off. Not one outage yesterday...

Some of the web submittals and emails received include:

Submitted on Monday, February 18, 2013
Address of service request: *54 Walker Road*
City: *Atkinson*
State of residence: *New Hampshire*
Subject: *Great Work!*
Message: *There doesn't seem to be a way to contact you to give you compliments! I just want to say your electrical support/maintenance has improved incredibly. The winds through the blizzard and this past weekend's storm would have knocked out our power for sure 4-5 years ago. Your preventive work has paid off and we are in such better shape as a result. Thank you so much!! We all notice and are buzzing about it. I was just worried you never hear the good stuff!*

Submitted on Thursday, November 29, 2012
Address of service request: *19 Forest St.*
City: *Plaistow*
State of residence: *New Hampshire*
Subject: *Recent Storm*
Message: *My husband and I very often travel from Plaistow to Exeter to our doctors and hospital. There seemed to be a lot of tree work bring done. Just to let you know we feel all the tree work has paid off as Unitil came through the storm practically unscathed. Congratulations.*

Submitted on Tuesday, October 23, 2012
Address of service request: *4 Crystal Hill Circle*
City: *Atkinson*
State of residence: *New Hampshire*
Subject: *Tree/Vegetation management*
Message: *If you are the ones who are responsible for the tree crews in Atkinson, clearing trees from the power lines - THANK YOU!, thank you for the increased vegetation management. Hopefully they are able to take care of some of the trees near intersection of East Road and Crystal Hill Road as well as anything they see on Crystal Hill Circle, sure would like them to take some of the*

tall pines near the lines down... but seeing some vegetation work getting done after being here 18 years is great.

c. Pilot Response Testing in Hurricane Sandy

During the course of the pilot pruning and removal work, Unitil 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 Unitil's New Hampshire service territory. At this time, one of the two storm pilot circuits, E58X1, was in the final stages of completion. Only a few customer tree removal negotiations and pruning spots remained. The E21W2 circuit pruning and removal was just beginning, however, and work had not started on the E13W2. 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 E58X1 circuit 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 to the company after the storm event, shown below, is representative of many emails, phone calls and Twitter "tweets" Unitil 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 E58X1 where a desired tree removal, still in discussion with an unsure homeowner, failed and contacted the phases. The tree was removed and those customers affected were restored quickly. Following the event, the property owner gave consent for additional tree removal.

The other two Storm Pilot circuits faced more tree related incidents and the main line of both of these circuits experience tree related troubles which led to substation lock-outs. A field review by the System Arborist directly after the storm event showed multiple tree failures along the Storm Pilot designated area. Two sideline tree failures on the E13W2 on East Rd, Plaistow and East Rd, Atkinson had been marked and approved for removal prior to the storm.

In other analysis, studying the number of tree related events on the portions of the E58X1 which had not been included in the storm pilot, compared to the number of tree related events on the main line, where the storm pilot was conducted also demonstrate

convincing results. There was one event on the main line versus 18 events on the remaining portions of the circuit. For a visual map of the incidents, see Attachment 1: *Hurricane Sandy Tree Related Outages E58X1* of the Company's February 28, 2013 Step Adjustment Filing.

d. Pilot Benefits

The Unitil Seacoast service territory was also hit with other wind and snow events over the November 2012 to January 2013 time frame. Again, in each event, the Storm Pilot circuits performed well with no major events.

From this pilot, it is apparent that the Storm Hardening Pilot work has the ability to prevent 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 costs.

There are also a number of other benefits associated with a tree exposure reducing Storm Hardening program, including:

- 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
- Minimal bill impact on a per-customer basis

The next section briefly describes each of these benefits.

Because of the design of the Storm hardening program, 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 services, and a place where residents can seek temporary warmth and shelter.

As 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, Unitil has been required to reach outside of the New England area, adding travel time and additional cost. Unfortunately, there does not appear to be a ready solution for this problem. One way, however, to manage 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. The results of the pilot suggest that the implementation of a Storm Hardening program 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.

e. Pilot Costs

All pilot program work was completed within 7% of the estimated budget, with final expenditures (excluding spring tree replanting costs) totaling $572,652. Table 3 shows the cost break down.

Table 3

2012 Storm Pilot Cost Details	
Component	**Cost**
Brochures & Work Materials	$ 4,568
Work Planning & Oversight	$ 36,958
Pruning, Removals, & Police	$531,126
Total	**$572,652**

f. Estimated Customer Costs as a Result of Interruption of Electric Service

The Company provided extensive testimony in NHPUC Docket No. DE 10-055 regarding the costs associated with the loss of electric service for customers. The following summarizes the significant points of this testimony (For complete testimony, see Direct Testimony of Thomas P. Meissner, Jr., Exhibit TPM-1, Docket DE 10-055) .

The Company believes that reliable electric service is essential to the economic well-being of the businesses and industries we serve, and to the welfare of those who live and work in our communities. Furthermore, interruptions to electric service are both expensive to repair, and expensive to the businesses and individuals who rely on electricity for commercial and household purposes. To cite one example, a 2004 study conducted by Lawrence Berkeley National Laboratory (Berkeley Lab) for the U.S. Department of Energy's Office of Electric Transmission and Distribution estimated that electric power outages and blackouts cost the nation about $80 billion annually. Of this, $57 billion (73 percent) was attributed to losses in the commercial sector and $20 billion (25 percent) in the industrial sector.[3] A subsequent study performed by Berkeley Lab in 2009 provided extensive data on the cost of customer interruptions, including estimates of the average cost of electric interruptions (in 2008 dollars) broken down by customer type, outage duration, time of day, day of week, and other variables.[4]

Utilizing the Company's customer count by class (i.e. Large CI, Small CI, and Residential), and the cost data developed in the 2009 Berkeley Lab study, as well as the Company's 10-year average SAIFI and CAIDI reliability metrics, it is possible to calculate annual costs due to electric service interruptions. For this analysis, all outages were included, including those outages that would normally be excluded from reported reliability under the PUC major storm criteria, since customers do not differentiate between interruptions that are "inclusionary" or "exclusionary" for reliability reporting purposes. The result of this calculation shows that the cost for our customers is approximately $67 million per year.

It is important to note that this is by no means an exact or highly accurate estimate. A more accurate estimate would require detailed consideration of where outages occur in relation to specific types of customers, when outages occur (time of day, day of week), the actual duration of individual outages, and other variables. However, as an order of magnitude estimate, it is instructive when considering the cost of reliability enhancement programs, such as the Storm Resiliency Program, in relation to the value provided to customers. Based on the data from the Berkeley Lab study, any reasonable set of assumptions based on Unitil Energy's historic level of reliability will result in a cost to customers of tens of millions of dollars annually due to interruptions in electric service.

[3] Understanding the Cost of Power Interruptions to U.S. Electricity Consumers, Kristina Hamachi LaCommare and Joseph H. Eto, September 2004.
[4] Estimated Value of Service Reliability for Electric Utility Customers in the United States, Michael J. Sullivan, Ph.D., et al, June 2009.

g. Avoided Company Costs

As described in the Company's February 28, 2013 Step Adjustment Filing, Unitil proposed to implement a 10-year Storm Resiliency Program aimed at reducing tree related outages along approximately 33 miles per year of critical circuitry. It is anticipated that this program will reduce tree related outages for both minor and major weather events. This in turn will reduce the economic impact of interruptions for our customers as described in the previous section, and also reduce overall Company costs of storm preparation, crew costs, and logistics. In addition, this program will ultimately reduce restoration duration.

In order to develop the avoided costs to the Company, we reviewed the data from the Company's two most recent significant storm events; "Snowtober" in October of 2011, and Super Storm Sandy in October of 2012. Selected statistics are shown in Table 4 below.

Table 4

Event Name	Number of Troubles	Total Cost of Event	Average Cost per Trouble
"Snowtober"	362	$2,073,586	$5,728
Super Storm Sandy	428	$2,269,530	$5,303
Totals	**790**	**$4,343,116**	**Avg. $5,498**

Immediately following Super Storm Sandy, the Unitil's System Arborist performed an assessment of the circuit miles involved in the Storm Resiliency Pilot. The results of this field survey showed that the critical main-line circuit miles that had been trimmed per the Storm Resiliency specifications showed no tree related damage, while the critical main-line circuit miles that had not yet been trimmed experienced two tree related troubles. The non-trimmed circuit encompassed 4.6 pole miles of circuitry. Presumably, if this non-trimmed circuitry was completed prior to Super Storm Sandy, the company would have avoided the repair cost of the two trouble locations.

In order to develop a high level avoided cost estimate for the Storm Resiliency Program, it requires an extrapolation of the filed survey data above over the 33 miles of Storm Resiliency program. Performing this calculation results in avoiding approximately 14 tree related outages per storm event (33 miles divided by 4.6 miles; multiply this result by 2 tree troubles) along the circuit miles where the program was implemented. Using the average cost per trouble developed in Table 1, we arrive at an avoided cost of approximately $76,972 per storm event of avoided company costs ($5,498 times 14

avoided tree troubles). This figure would accumulate every year as we complete an additional 33 miles of Storm Resiliency trimming.

As with the estimate for the Customer Costs, this estimate is by no means exact, and can vary significantly based on the assumptions and other factors. A more accurate estimate would require significantly more data points, additional field surveys, and an analysis of costs over a greater number of storm events. However it does provide a measure of magnitude in relation to the cost of the Storm Resiliency program.

As was stated earlier, The Storm Resiliency Program will also provide cost benefits for day-in and day-out troubles. In order to develop a high level avoided cost estimate for these troubles, it requires an extrapolation of avoided tree related troubles per mile across the mitigated circuits. By looking at the annual tree related interruptions for New Hampshire with exclusions taken, and the total number of overhead line miles in New Hampshire, a tree related interruption per mile figure can be calculated. In 2012, Unitil sustained 446 interruptions directly attributable to trees. With 1,169 miles of overhead line, the tree related interruptions per mile is 0.38. (446 interruptions divided by 1,169 miles) This tree related interruption per mile figure multiplied by the 33 miles of line being mitigated annually provides the annual avoided tree related interruptions. This calculation (0.38 interruptions per mile multiplied by 33 miles) results in 13 avoided interruptions, assuming the Storm Resiliency Program eliminates all tree related outages. Assuming the average cost per trouble is 50% of the cost of trouble in a major event ($5,498 divided by 2 equals $2,749) we arrive at an avoided cost of $35,737 per year of avoided company costs ($2,749 times 13 avoided tree interruptions). This figure would accumulate every year as we complete an additional 33 miles of Storm Resiliency trimming.

h. Comparison of Costs to Avoided Costs

When comparing the costs of performing the Storm Resiliency work annually against the high level avoided costs, the comparison shows a reduction in the annual program costs of $112,709, bringing the net annual cost of the program to $1,310,291. Comparing this to the annual cost of $67,000,000 incurred to customers as a result of interruptions of electric service shows that although the costs of implementing the program outweigh the direct company avoided costs, the overall investment would result in a reduction to significantly high customer costs annually. See Table 5 below.

Table 5

Comparison of Costs to Avoided Costs			
Annual Component	**Cost**	**Avoided Cost**	**Cost to Customers** (without the additional work)
Storm Resiliency Program	$1,423,000		
Major Storm Events*		- $ 76,972	
Normal Operation Events		- $ 35,737	
Public Direct Costs of Interruption Events			$67,000,000
Totals	**$1,423,000**	**- $ 112,709**	**$67,000,000**

* Assumes 1 major event annually

While the direct avoided costs are moderate and the avoided costs to customers are high, the indirect or avoided costs to customer have the potential to be even greater. In fact, a moderate 2% savings in the Company's SAIFI and CAIDI annual reliability metrics would translate into customer savings of $1.34 million (2% of the $67 million shown in Table 5); an almost breakeven proposition for our customers.

Certain other benefits to our municipals would also accrue, such as hardening societally critical portions of circuits that serve areas of the community that provide necessary basic services (see conclusion), including municipal critical loads such as police and fire stations, emergency shelters, gas stations, and restaurants and hotels. Other benefits such as overall customer satisfaction or the value of customer gratification in providing a pro-active response to their concerns are difficult to measure, but provide as much or even greater value to the program.

5. Storm Resiliency Program Recommendation

After reviewing the results of the Storm Hardening Pilot program, Unitil found that the reliability effects, the avoided interruptions and costs, the positive public acceptance, and the benefits to customers more than offsets the cost to implement. Unitil is cautious to seek additional funding as we value our relationship with customers and recognize the current economic conditions, however we feel this program brings extreme value and is the best method to reduce storm costs and damages vs. alternatives. As demonstrated in the previous section, we feel this program brings savings to customers through future avoided storm costs.

For this reason, Unitil is proposing to add a Vegetation Management Storm Resiliency program component as part of the overall Vegetation Management Program. This program will build on the pilot program to expand the scope across our Seacoast and Capital regions by mitigating a manageable storm resiliency work plan annually until the system has been completed. The following section explains the development of the proposed program in detail.

6. Development of the Storm Resiliency Program and 2013 Plan

a. Application to System and Circuit Selection

When designing the Storm Resiliency Program, the full list of circuits was reviewed for applicability to the storm resiliency program. Criteria for the program included exclusion based on 1) tree related field condition, 2) customer count and 3) circuit total miles of 3-phase. Any circuits that were located primarily in low tree density areas were removed from the list. Any circuits with less than 500 customers served were reviewed for need as well as any circuit with 3-phase miles less than 2 miles.

Of the 110 circuits containing overhead lines in New Hampshire, 54 were chosen to be included in the storm resiliency program, including the three already mitigated in 2012. The sum of the 3-phase overhead line, which will be mitigated under this program, along the remaining 51 circuits is 331 miles.

The scope of the storm resiliency work will mirror the pilot program's specifications where critical sections of the circuit, from the substation out to the first protection device, will have tree exposure reduced by removing all overhanging vegetation or pruning "ground to sky." Intensive hazard tree review and removal will also be conducted on these critical sections. In cases where the customer count is either over 500 customers or over 1/3 the total customers served at the first protection device (if less than 500), overhang and hazard tree removal will continue to the second protection device. From that point, hazard tree inspection and removal will be conducted out to the third protection device or along remaining three phase lines.

b. Annual Mitigation Goal

In order to determine the annual goal mileage for mitigation, a number of important factors were taken into consideration. First, the number of miles worked needs to be manageable from the Unitil Forestry perspective. There needs to be adequate time to perform work planning, allow for competitive bidding, complete the work and review in the field within the year time frame.

Second, the number of miles needs to be manageable from a line-clearance tree vendor perspective. The line-clearance tree vendor needs adequate equipment and resources to deliver the large quantity of work, both pruning and removals, in the year time frame. This balance of quantity of work and time frame greatly influences the bid price to do work and must be managed appropriately.

For this reason, Unitil felt that working and managing approximately double the work quantity from 2012, approximately 15 miles, would be appropriate. The annual mitigation goal could be set from 25 to 35 miles annually and be feasible.

c. Time Frame Extrapolation

Using the annual goal mileage range, a total program time frame was extrapolated. With 331 miles remaining to be mitigated, and an annual workplan of approximately 33.1 miles, the entire system could be completed in a 10 year time frame.

d. Estimated Costs

Future costs of the storm resiliency program were estimated using the actual 2012 cost per mile of $39,222 plus estimated cost increases for future work based lessons learned from the pilot.

Upon looking at the range in submitted bid prices for the 2012 pilot project, it was apparent that the successful vendor bid prices reflected the fact that they operated out of a location within one of the towns where the storm pilot was being performed. In the absence of this advantage and the addition of travel costs and fuel related to working in other locations across Unitil territory, it was estimated that the cost per mile would be increased to approximately $43,000 a mile.

For 33.1 miles to be mitigated annually at $43,000 a mile, the total annual costs come to approximately $1,423,000 a year.

e. Annual Circuit Selection Process

Of the 51 circuits proposed to undergo storm resiliency program mitigation, an annual selection process has been developed to prioritize those circuits with the greatest need. From increasing importance, the following criteria are proposed to be used: field condition and tree density, past tree-related reliability performance as shown by Unitil's tree model, regional location, and time since last prune or hazard tree mitigation.

Field condition and past tree-related reliability were given the most weight as this drives the actual expected future tree failures based on actual standing hazard trees and actual past failure occurrences.

To look at past tree-related reliability, Unitil's tree model produces a reliability based ranking of every circuit experiencing tree-related outages over a historic 3 year time frame. By circuit, the model sums a customer served ranking, a tree-related events per mile rank, and a customers interrupted per event rank to produce an overall tree-related reliability ranking. The events per mile rank is designed to look at the density of events, indicating a more systemic issue may be present in the field such as pest infestation, residual damage from past storms, or other geographic based field condition. The customers interrupted per event rank is designed to look at where the tree failure condition was located along the circuit and the overall impact of the interruption to the circuit integrity. This is designed to highlight those circuits having failures along portions of circuits that serve the most customers. These individual

reliability rankings are combined together to give an overall picture of the circuit reliability and impact if mitigated.

Circuit selection by regional location also plays an important role. In order to be able to deliver the annual work, make it attractive and cost effective to partner line-clearance tree vendors, and manageable from a supervisory perspective, we limited any one year's plan to either the Seacoast or Capital regions.

f. 2013 Plan

For 2013, resiliency work on 33.1 miles of line in the Capital service area is proposed over 4 circuits in the Capital Region at a total cost of the annual proposed spending of $1,423,000 (an increase of $888,000 from the $535,000 approved for last year's pilot program). These circuits, shown in Table 6, affect the areas of Bow, Penacook, and Canterbury.

Table 6

2013 Storm Pilot Planned Work Details		
Circuit	**Overhead Miles**	**Scheduled Miles**
C13W1	33.5	6.2
C18W2	33.6	5.0
C4X1	34.3	7.7
C7W3	23.2	14.2
Total		**33.1**

7. Conclusion

Unitil embarked on a Storm Pilot Program in 2012 in response to the increasing trend of costly and devastating storm events and the public outcry for something to be done to increase response time and shorten event duration. Upon completion of the successful pilot program, Unitil was able to perform a thorough analysis of the results, let in part due to the timing of major storm event Hurricane Sandy in October of 2012. This unique situation led to the conservative high level analysis of potential cost savings of future storm resiliency program implementation. That coupled with the anticipated future savings and economic benefits to customers led to a recommendation for the continuance of storm pilot work as an annual Storm Resiliency Program.

In a recent prominent industry trade magazine from February of 2013, it was suggested that there are evolving concepts as utilities and regulators consider how best to harden the system, manage the effects of storms, all while holding costs at reasonable levels. Their first concept fits exactly in line with what Unitil proposed and piloted in 2012 and was summarized in the article as follows:

"The first concept involves circuits that would be designated for special hardening attention. Often, the aftermath of a storm with a widespread impact is particularly hard on the surrounding community because basic required services are not available for days after a storm. For example, gasoline stations have no power to pump gas, people cannot buy ice to throw into refrigerators and pharmacies cannot open. This was a complaint in Florida following the catastrophic 2005 hurricane season. Recently, this was a major concern through New Jersey and New York City in the wake of Hurricane Sandy.

Here substantial consideration is given to hardening societally critical circuits, those serving important areas of a community that provide necessary basic services. The cost of making special preparation on these circuits would be permitted to be apportioned over the entire customer base. After a particularly violent storm, homeowners as well as some offices and business might be without power, but the community as a whole would have access to needed basic goods and services."[5]

As supported by this document, Unitil feels that it is on the cusp of a growing industry need and has developed a comprehensive and balanced approach to providing increased resiliency in storm events.

[5] Hardening the System, Nicholas Abi-Samara, Lee Willis, and Marvin Moon, Transmission and Distribution World, February 2013, P33

Unitil Energy Systems, Inc.
Docket No. DE 13-065
Technical Session Data Requests – Set 1

Received: April 9, 2013
Request No. Staff 1-4

Date of Response: April 12, 2013
Witness: Kevin Sprague

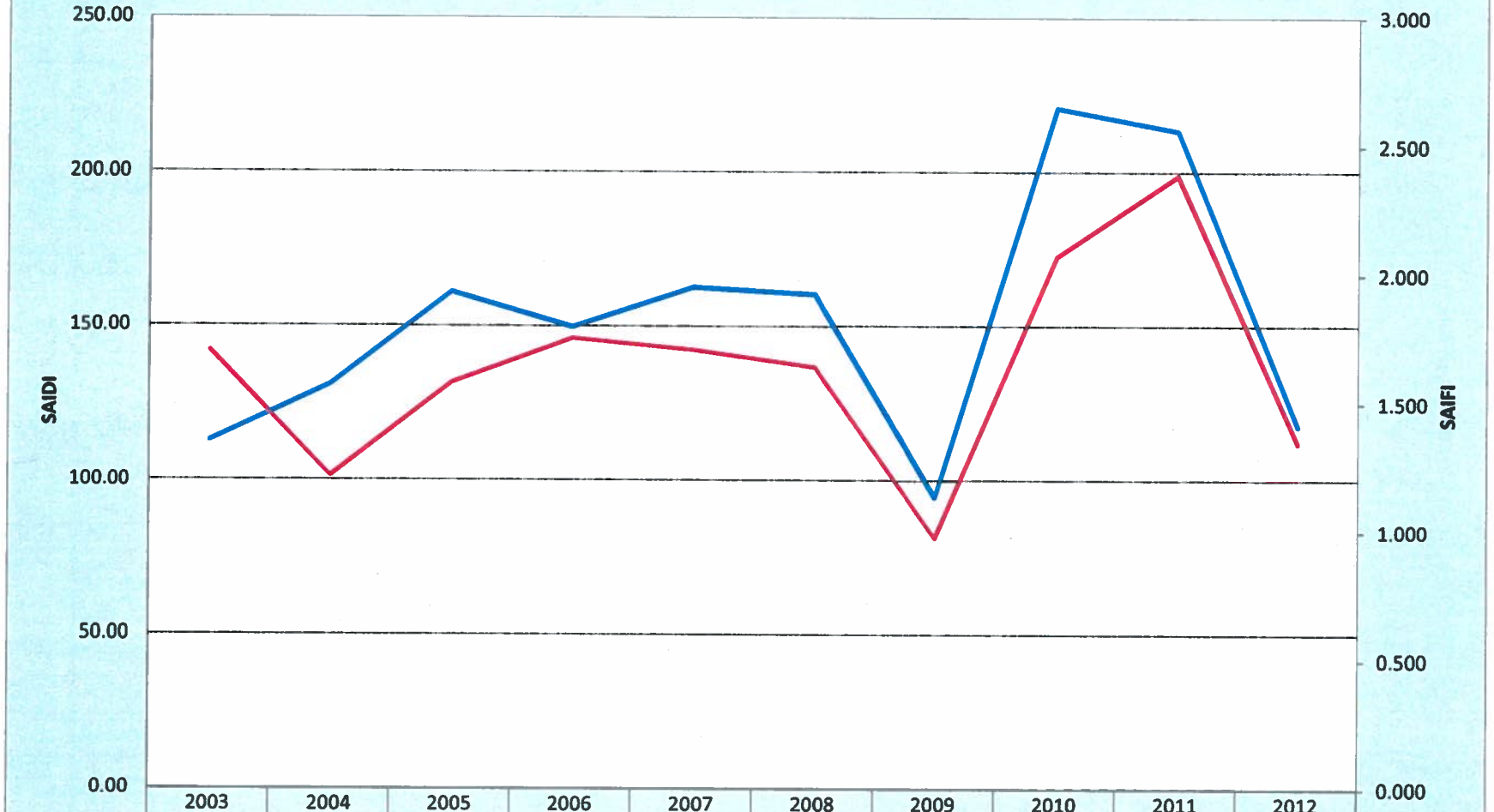
Request Staff 1-4:

Please update for 2012 the response to Staff 1-3 provided in DE 12-055.

Response:

Please see Staff 1-4 Attachment 1.

Unitil Energy Systems - Capital
SAIDI & SAIFI
2003-2012



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SAIDI	112.76	131.12	161.04	149.71	162.64	160.42	94.71	220.83	213.42	117.51
SAIFI	1.702	1.217	1.579	1.752	1.707	1.641	0.976	2.070	2.386	1.343

Unitil Energy Systems - Seacoast
SAIDI & SAIFI
2003-2012

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SAIDI	151.75	108.44	208.90	189.59	122.13	196.84	177.57	227.15	169.45	174.39
SAIFI	1.617	1.190	2.591	2.243	1.206	1.486	2.039	2.355	1.500	1.842

Unitil Energy Systems, Inc.
Docket No. DE 13-065
Technical Session Data Requests – Set 1

Received: April 9, 2013
Request No. Staff 1-5

Date of Response: April 12, 2013
Witness: Kevin Sprague

Request Staff 1-5:

Please provide a description of the major projects listed on Non-REP Plant Calculation (page 000086).

Response:

Please refer to Staff 1-5 Attachment 1, which is a breakdown of the additions by FERC account for the large variances, Accounts 303, 364 & 365. We have listed the major projects that made up the change from 2011 to 2012. There are also Blanket projects that are hundreds of small projects, under $20K, that are combined as one line.

The reason for the large increase in the Transformer Accounts 368 & 36801 is that the 2011 and 2012 Transformer projects were both closed in 2012. This was a one year anomaly and will not happen going forward.

The reason for the large decrease in the Substation Account 362 is that a large project was classified in 106 Completed Construction Not Classified in 2011 as substation work. However, only a portion of the work was actually done inside the fence, and therefore, when closed to Plant In Service account 101 it created a large credit to the 362.00 account as most of it was unitized to 364 & 365. See project C-008066 in the attached.

Projects by FERC Account

Project Auth	Project Name	303.01 Additions	364 Additions	365 Additions
C-000225	Circuit 1H6 Reconductoring along 37	-	142	116
E-002137	Circuit 23X1 Install Voltage Regula	-	-	77
E-002111	Circuit 2X2 Install Voltage Regulat	-	-	75
C-002264	Circuit 4X1 / 37 Line Automation	-	75	226
E-002132	Circuit 6W2 Rock Rimmon Road Conver	-	125	155
C-002211	Condemned Pole Replacements	-	627	99
C-001091	Hurricane Irene	-	-	51
C-008066	New 34.5 kV Line Garvins to Bow Jun	-	284	1,229
C-001045	New Circuit 7W4 from Bow Junction S	-	63	259
C-001097	Oct 29th Storm Event #111029-SYS-4-	-	72	641
C-002267	Rebuild Boscawen Sub Station Get aw	-	207	169
E-000260	Replace neutral - Correct Stray Vol	-	-	82
E-001076	Replacement of Poles, Ball Rd/Great	-	-	32
C-001078	Theatre St., Concord - Extend Circu	-	67	65
E-001078	Three Phase, Overhead Line Ext., Ex	-	-	79
C-001041	N State St, Concord-pole relocation	-	-	72
C-009086	ABB OMS Purchase	1,907	-	-
C-001037	Powerplant	320	-	-
Various	Blankets & Misc Projects	-	1,807	1,090
	Totals	**2,226**	**3,468**	**4,515**