Executive Summary

1. Page i, second to last paragraph:
   "The electric restoration efforts for the storm lasted approximately two weeks, beginning with the loss of power to the first customers late on December 11, 2008, and ending when the final customer was restored on December 24, 2008."

   Unitil Comment:
   The restoration data provided by Unitil identifies the date when its absolute last customer was restored. There may be inconsistencies between companies as to what is meant by full restoration.

2. Page i, last paragraph:
   "an ice storm of this magnitude should occur on average once every 10 years based on research done by the Army Corps of Engineers Cold Regions Research Engineering Laboratory. Past storms, such as the 1998 ice storm, were more severe than the 2008 ice storm in terms of ice accretion, but occurred farther north in less populated areas"

   Unitil Comment:
   Please refer to Attachment 2 for Unitil's comment on this point.

Page ii, last bullet:
"This assessment revealed that the most significant cause of storm damage to the electric system was ice laden limbs and trees falling onto power lines."

Unitil Comment:
This statement is in conflict with the NEI recommendation, discussed in more detail below, to design distribution lines more conservatively than the NESC requires. Unitil agrees that the majority of damage was caused by ice laden limbs and trees, and believes that the NESC design conditions are appropriate for the design of distribution lines.

Chapter I - Introduction

1. Page I-8, 1st paragraph:
   "Unitil's two operating centers in New Hampshire – Concord and Hampton…"

   Unitil Comment:
   Unitil's New Hampshire electric operating centers are in Concord, NH and Kensington, NH.

2. Page I-8, 1st paragraph:

"As a result of the December 2008 ice storm, the Emergency Operations Center for all of Unitil's electric service is currently in the redesign phase and will be located in Hampton, New Hampshire by fall 2009."

Unitil Comment:

This should be reworded to state that *"…the System Emergency Operation Center for all of Unitil's electric service territory is located in Hampton, New Hampshire."* Unitil has designed and completed construction of its System EOC. This was a major recommendation of Unitil's self assessment report.

Chapter II – Storm Restoration Performance

1. Page II-4, 1st paragraph:
   "A tree crew consists of two or three people and one truck, and is responsible for the removal and disposal of downed trees."

   Unitil Comment:

   During the ice storm, no tree crews working for Unitil disposed of any downed trees. The primary responsibility for these crews was to remove trees from the electric infrastructure, as well as move debris out of the traveled way in order to allow bucket trucks, digger/auger trucks, and other personnel access to rebuild the infrastructure. Tree disposal was not the responsibility of these crews.

2. Page II-6, Table II-2:
   "Table II-2 – The total number of customers without power and the number of field crews working each day".

   Unitil Comment:

   Field crews shown in the table do not match those provided in response to NH PUC Staff 1-22 for December 22 and December 23. As a result, the Graph II-2 and II-3 do not mirror this table. In addition, it is unclear if NEI used this information or the information provided in NH PUC Staff 1-22 to draw conclusions.

3. Page II-9, 4th paragraph:
   "Unitil had on average 440 customers restored per crew, showing its lack of available manpower. However, it had a relatively high restoration rate of 57 customers restored per crew-day."

   Unitil Comment:

   These two sentences are in conflict and do not take into consideration the severity of the damage being repaired. NEI makes the statement that Unitil had insufficient manpower, but follows that up with a statement indicating that Unitil had a high restoration rate. This data supports the fact that Unitil crews were efficient in restoring larger quantities of customers at a quicker rate.

4. Page II-9, last paragraph:
   "If the other utilities had supplied sufficient crews to equal those of National Grid, then an average of approximately 1,270 crews per day would have been supplied statewide…. It is reasonable to assume that if all the utilities could have supplied resources at the same rate and quantity as National Grid, all power would have been restored to the state approximately 4 days sooner than actually occurred."

   Unitil Comment:
   To put this into perspective, the average number of line crews across the state for the 14 day period was 846 crews. This is a difference of 424 crews (50%). Unitil had on average 55 crews. An increase of 50% on this number would have been an additional 27 crews (or 82 crews total). Unitil was able to obtain 74 crews by the 6th day and 82 crews the last two days of the storm event.

5. Page II-15, Chronology Day 1 5:00pm:
   "The chronology at 5:00 PM on Day 1 indicates Unitil had 0 diggers available."

   Unitil Comment:
   The NEI assessment of Unitil's equipment availability is incorrect and confuses availability with utilization. Unitil had four diggers available to be deployed based on the priority of work; not every job required a digger and Unitil utilized its equipment as needed.

6. Page II-29, 2nd Bullet under #1:
   "Damage assessment personnel should be pre-positioned to various locations in order to be able to provide timely indication of storm damage."

   Unitil Comment:
   The pre-positioning of damage assessment personnel would be dangerous, particularly in events such as ice storms. Falling debris and hazardous driving conditions would place damage assessors into harms way. In addition, prematurely deploying these resources in a massive effort such as the ice storm of 2008 would have been useless, as impassable roads would have made damage assessment nearly impossible.

7. Page II-33 – table II-7:
   "Unitil Storm Restoration Performance Evaluation Matrix"

   Unitil Comment:
   Table 1) Effective Process for Resource Deployment
   Items 2-4 – now part of Unitil's ERP

Table 2) Collection Mechanisms for Maintaining Customer Outages
Items 1&2 – will be completed with OMS
Item 3&4 – now part of Unitil's ERP

8. Page II-41 and II-42:
NEI comments that Unitil could have benefited the most from acquiring more crews and also that our restoration efforts weren't complete until 12/23.

Unitil Comment:
The report suggests that Unitil did not perform as well as the other utilities based upon data in a table that included erroneous information (see #4 above). If focus was placed on percentage of customers restored (for example 98-99%), then Unitil was essentially complete by 12/20 when only a handful of customers were still without power, and better than most of the other utilities. (Note Unitil's comment above with respect to restoring the final customer.) The conclusion that Unitil underperformed relative to the other utilities is not supported by NEI's analysis. The table shown below simply presents the data from a different perspective and leads to a different conclusion:

	% Restored				
Date	PSNH	UNITIL	National Grid	NHEC	Total
11-Dec	n/a	n/a	n/a	n/a	
12-Dec	0.0%	0.0%	0.0%	0.0%	0.0%
13-Dec	1.0%	28.6%	50.4%	45.9%	11.2%
14-Dec	37.2%	56.1%	75.2%	71.8%	44.9%
15-Dec	52.9%	71.6%	88.8%	75.1%	59.0%
16-Dec	66.1%	76.7%	88.3%	81.3%	70.0%
17-Dec	75.7%	86.9%	98.0%	92.8%	79.9%
18-Dec	84.8%	91.6%	99.2%	97.1%	87.6%
19-Dec	89.4%	96.7%	100.0%	98.4%	91.6%
20-Dec	91.9%	99.1%	100.0%	98.4%	93.7%
21-Dec	94.3%	99.9%	100.0%	100.0%	95.8%
22-Dec	94.6%	100.0%	100.0%	100.0%	96.0%
23-Dec	98.3%	100.0%	100.0%	100.0%	98.7%
24-Dec	99.4%	100.0%	100.0%	100.0%	99.6%

9. Page II-42, last paragraph:
"Unitil had fewer crews dispatched per outage than any of the other utilities until Day 6, Tuesday, December 16, when it finally procured enough crews to equal PSNH and NHEC. Of the four utilities Unitil could have benefited the most from additional crews."

Unitil Comment:

Unitil disagrees with this statement. Unitil had the second highest number of customers restored for each crew-day worked (reference table II-4). This demonstrates the fact that Unitil crews were restoring customers at a high rate per crew (i.e. more effectively).

10. Page II-43, 1st paragraph:

"Figure II-11 clearly shows the difficulty that Unitil had in quickly acquiring enough crews. The field crews curve flattens out on December 16 showing they stopped acquiring additional crews…."

Unitil Comment:

It is misleading to say Unitil stopped acquiring crews. Though Unitil was unable to acquire additional crews, the Company never stopped its attempts to acquire them.

11. Page II-47, 1st paragraph:

"To be consistent with what is typically done nationally, and what is done in New Hampshire…we suggest that crews in the future concentrate on repairing the medium voltage distribution system and let customers privately take care of their low voltage system from the transformer to the house."

Unitil Comment:

First, this is not typical for New Hampshire. Second, if customers were responsible for repairing their secondary drop from the transformer to the house, it would only serve to extend restoration efforts and would significantly prolong most minor and major storm events. Unitil disagrees with this statement.

12. Page II-48, 2nd paragraph:

"The restoration strategy at Unitil during the December 2008 ice storm was to attempt to restore customers at the same time."

Unitil Comment:

Reference Attachment 1 - Unitil Restoration Prioritization

In addition there are several different statements across pages II-49 and II-50 which relate to the same discussion.

13. Page II-48, last paragraph:

"Conclusion: At Unitil, the restoration strategy during the ice storm was inappropriate. The restoration strategy at Unitil[75] during the December 2008 ice storm was to attempt to get all customers restored at the same time."

Unitil Comment:

Reference Attachment 1 - Unitil Restoration Prioritization

In addition there are several different statements across pages II-49 and II-50 which relate to the same discussion.

14. Page II-58, first bullet after Recommendation 2:

"The electric utilities should adopt a policy requiring that estimated times of restoration following storms be prepared and disseminated to customers within 24 hours of the event."

Unitil Comment:

This is an unrealistic expectation following the occurrence of severe storms such as the 2008 Ice Storm. Detailed damage assessment cannot be completed until several days after the event concludes as damage continues to occur, and travel conditions and road obstacles prevent damage assessment from being completed. It is impractical to believe that detailed damage assessment can be completed prior to 36-48 hours after the conclusion of a severe storm related event. Following the December ice storm, it took some towns up to 2-3 days to open roads to allow vehicles to pass. Trees and limbs were still falling and travel was treacherous in many places. Damage assessment could not have been completed within the first 24 hours.

15. Page II-72, first bullet after Recommendation 3:

"The electric utilities should continue to maintain their existing mutual aid agreements with <u>NEMGA</u> and NEPPA for use in future storm restoration efforts."

Unitil Comment:

NEMAG misspelled.

16. Page II-72, first bullet after Recommendation 3

"The average number of calls answered per CSR was 94, more than twice the normal average, which indicates CSR staffing should have been higher.

Unitil Comment:

Please refer to Unitil comment to #18 below.

17. Page II-78, Conclusion:

" Staffing levels at the customer call centers for Unitil, NHEC and PSNH were inadequate to manage all CSR offered calls during the December 2008 ice storm. NHEC, in addition, did not have enough phone lines available to manage the call volume during the storm."

Unitil Comment:

Please refer to Unitil comment to #18 below.

18. Page II-81, 1st paragraph:

Unitil's Customer Service Call Center is located in Concord, NH and is the central call center operation for all of the Unitil companies. At the time of the 2008 ice storm, the company had 72 lines on three 24-channel circuits. Four lines were reserved for system connectivity, leaving 68 available for incoming calls. As depicted in Table II-11, normal customer call volume at the call center requires approximately 15 customer service representatives (CSRs) to be available simultaneously during the peak period of the day. This would correspond to a normal daily call volume of approximately 1,000 calls received by the interactive voice response (IVR) system and approximately 650 answered by CSRs or 43.3 calls per representative. During the ice storm, 41 CSRs were available simultaneously to answer customer calls during the peak period of the outage which corresponded to 24,880 calls received by the IVR and 3,855 answered by the CSRs. The average number of calls answered per CSR was 94, more than twice the normal average, which indicates CSR staffing should have been higher.

Table II-11 – Volume of calls Unitil received and staffing CSR staffing levels following the storm.[167]

	Staffing	*Calls Answered by CSRs*	*Calls Answered Per CSR*
Normal	*15*	*650*	*43.3*
December 2008 Ice Storm	*41*	*3,855*	*94*

Unitil Comment:

Normal customer call volume at the call center is roughly 650 calls per day, which requires 10 customer service representatives to be available simultaneously during the peak period of the day. This was incorrectly stated above as 15. This staffing requirement is determined using an hourly call arrival rate of 11.5% and an average handle time (call time + after call wrap up time) of 5:21. This would correspond to a normal daily call volume of approximately 1,100 calls received by the interactive voice response (IVR) system and approximately 650 answered by CSR's or 65 calls per representative.

During the ice storm, 40 CSR's were available simultaneously to answer customer calls during the peak period of the outage on December 18th. This peak CSR requirement did not correspond, however, to the peak number of IVR calls experienced on December 12th where 24,880 calls were received by the IVR and 3,855 were answered by the CSR's. One important distinction between the two days (December 12th and December 18th) was the difference in the average call handle time. The average call handle time for December 12th was 3:32 compared to 6:20 for December 18th. This variable was not mentioned in the report and

plays a significant role in determining CSR staffing to accommodate peak calling periods. Using the actual hourly call arrival rate for December 12th, the total number of agents required would have been 26 for this day which would have equated to 148 calls per CSR. The Company did not reach the peak staffing of 40 CSR's until December 18th. According to the same staffing variables (arrival rates and handle times), the peak CSR staffing requirement during the entire storm occurred on December 18th due to the number of callers requesting to speak to a CSR and the high call handle time of 6:20. The peak number of CSR's required on December 18th was 53 compared to the actual peak staffing of 40 for that day. The overall point is correct that additional CSR's were required, but the information used to make the point is inaccurate. In summary, the data presented in the "Calls per CSR" column depicted in Table II-11 does not accurately portray the staffing requirements of the call center. As stated earlier, arrival rates and handle times are necessary to determine appropriate staffing requirements.

The following actions have been taken by Unitil's Customer Service Center since the December Storm.

All Unitil employees have been assigned with secondary jobs for future emergency outage related situations. A total of (58) Unitil employees have been trained as CSR's and an additional (16) employees are trained to provide Customer Service support functions. The training included internal outage procedures, interpersonal skills (i.e. listening, questioning skills) and technical system related training. This training will be conducted on a quarterly basis to ensure the staff remains familiar with the process.

The IVR outage reporting selections have been shortened and streamlined to enable customers to report their outage and/or obtain any outage updates more quickly and efficiently.

The number of inbound telephone lines, available to customers reporting their outage, was increased by (46) bringing the total to (114) lines. An additional (24) lines were also installed but reserved for gas emergency purposes.

The Siemens Network Operating Center (NOC) is now providing Unitil with a 24-hour monitoring service that proactively determines if the entire network and telephone lines are operating as intended.

Unitil contracted with the IVR vendor Milsoft to provide an outage reporting overflow function that is activated when all of the inbound telephone lines are maximized. Although this service prevents customers from receiving a busy signal once all the (114) lines are busy, the Company is evaluating other overflow alternatives that will replicate all of IVR functions including the option to speak to a Customer Service Representative.

Chapter III – Emergency Planning and Preparedness

1. Page III-10, Table III-2:
   "Unitil emergency planning and response evaluation matrix"

   Unitil Comment:
   Every one of the evaluative criteria in this Table is now directly provided for in Unitil's updated ERP.

2. Page III-13, 4th paragraph:
   "…its new Emergency Planning Manager… His responsibilities will include developing a new Emergency Plan and organization for Unitil"

   Unitil Comment:
   Mr. Francazio's title is Director of Business Continuity and Emergency Planning. A new Emergency Plan and organization has been developed.

3. Page III-18, last bullet:
   "Each utility should make use of the Cold Regions Research and Engineering Laboratory (CRREL) to determine exact storm precipitation and wind values. This information should be used to develop construction requirements that are more suitable for conditions found in New Hampshire than the general methods contained in the National Electrical Safety Code (NESC)."

   Unitil Comment:
   As stated in the report on page V-4,

   > *"…the December 2008 ice storm did not directly damage the transmission and distribution systems. Instead it damaged the woodlands of New Hampshire, causing tree limbs and whole trees to fall, which in turn damaged the power system by breaking poles, cross arms, hardware, and conductors. Poles and conductors are quite resilient to simple ice loading as is evident in Figure V-2 where it may be seen that wires, poles, and a transformer are all carrying heavy ice loads, yet are all completely intact. If a limb or a tree were to break off due to the ice and fall on the wires or against a pole, the additional stress raises the risk that that poles or wires could fail."*

   Also as stated on page V-17,

   > *"There was considerable damage to the distribution infrastructure as a result of the December 2008 ice storm. However, the damage was*

primarily the result of the impact of tree limbs and whole trees falling onto power lines."

Also stated on page VII-8

"A major cause of the December 2008 loss of power to customers was ice laden tree limbs and whole trees falling onto power lines."

The damage to the distribution system was due to ice laden trees and limbs falling onto the distribution lines. There is an inconsistency between this statement and the recommendation that utilities should not use NESC to design the distribution systems. Unitil disagrees that any standards besides NESC should be used for designing distribution lines.

4. Page III-18, 2nd paragraph:
   "*Unitil had no dedicated facility for an EOC, but is in the process of establishing one for the future."*

   Unitil Comment:
   Unitil had dedicated regional EOC facilities at its Concord, NH and Kensington, NH operating companies that were in use during the storm event. Unitil did not have a formal *System* EOC in use during the storm. A System EOC has since been designed and its construction completed.

5. Page III-24, Recommendation 11, first bullet:
   "Each electric utility should use the December 2008 ice storm as a model and determine the number of damage assessors that would be required to perform a detailed damage assessment within 24 hours.

   Unitil Comment:
   This is an unrealistic expectation. Detailed damage assessment cannot be completed until several days after the event concludes as damage may continue to occur, and travel condition and road obstacles may prevent damage assessment from being completed. It is impractical to expect that detailed damage assessment be completed prior to 36-48 hours after the conclusion of any storm related event. In the December ice storm, it took the towns in some cases 2-3 days to even open roads to allow vehicles to pass. Trees continued to fall and limbs were still breaking, and travel was treacherous in places. Damage assessment could not have been completed within the first 24 hours even with additional damage assessors.

6. Page III-25, 2nd paragraph:
   "*None of the utilities provided global estimated restoration times. Each waited until it completed detailed damage assessment before providing estimated*

restoration times. In some cases, those assessments were not completed until several days after the storm concluded."

Unitil Comment:
See Unitil Comment 5, above.

7. Page III-25, 3rd paragraph:
"Use of rotor and fixed wing aircraft is a partial solution to this problem. The utilities should contract with charter services for aircraft and pilots to provide reconnaissance flights as soon after storms as is safe."

Unitil Comment:
Use of helicopter or airplane patrols on transmission rights-of –way with wide tree clearance is both beneficial and standard practice for Unitil. However, on the distribution system it may not provide the results that NEI is expecting. The use of helicopters works well for right-of-way patrols where the individuals patrolling have an unobstructed view of the structures and wires. Helicopter patrols will provide benefit on the distribution system in areas where the roadways and distribution lines are not partially or completely obscured by tree cover. Generally this is sub-transmission and open right of ways. The use of helicopter patrols on distribution will only provide a subjective view of the damage and should not be relied upon for a true assessment of damage.

8. Page III-25, Recommendation 12, 2nd bullet:
"Each electric utility should make a global estimate of the amount of time required to restore service and publish this estimate within 24 hours after the end of a storm."

Unitil Comment:
See Unitil Comment 5, above.

Chapter IV – System Planning, Design, Construction and Protection

1. Page IV-4, 4th paragraph:
"The 34.5 kV circuit on the left consists of single wood poles, three current-carrying conductors attached to cross arms, and a grounded neutral wire attached to the pole below the cross arm. The neutral conductor is significant in that single-phase as 19.9 kV distribution loads may be attached to that circuit. The 34.5 kV circuit on the right has three current carrying conductors, but has no grounded neutral wire and thus cannot be used for single-phase, 19.9 kV distribution loads."

Unitil Comment:

This is an inaccurate statement. It is a common practice for sub-transmission lines sharing the same right-of-way to share a common neutral conductor. The neutral is tied into the substations that these lines serve. The two lines in question are effectively grounded. If single phase loads are connected to these lines, the same neutral would be used for both lines.

2. Page IV-6, last sentence:
   "Unlike the transmission and sub-transmission lines shown in Figure IV-1, Figure IV-2, and Figure IV-3, the ROW under this line has not been well cleared."

   Unitil Comment:
   NEI is confusing the use of the term right-of-way (ROW) for distribution and sub-transmission applications. In this example, the distribution line is located on the side of the road. Distribution lines, for the most part, are located within the road right-of-way, but the utility does not have unrestricted trimming rights. The utility is required to work with the town and the abutting landowners to obtain trimming rights. In a subtransmission ROW, the utility generally has the right to trim its ROW without further permissions.

3. Page IV-7, 2nd paragraph:
   "Unlike the transmission and sub-transmission lines shown in Figure IV-1, Figure IV-2, and Figure IV-3, the ROW under this line has not been well cleared."

   Unitil Comment:
   Unitil does not own or operate any 12.47kV distribution. Unitil uses 13.8kV in its 15kV class applications.

4. Page IV-8, Figure IV-6 caption:
   "Figure IV-6 – 34.5kV to 12.47kV Unitil electric distribution substation located in East Kingston, New Hampshire. (Photo by NEI-Unitil System)"

   Unitil Comment:
   Unitil does not own or operate any 12.47kV distribution. Unitil uses 13.8kV in its 15kV class applications.

5. Page IV-32, 1st paragraph:
   "The Iron Works Road Substation transformer failure was most likely the combined result of the relatively unusual transformer winding connection, grounded-wye/delta/grounded-wye, in conjunction with an upstream single phasing condition.

Unitil Comment:

Unitil employs a transformer protection philosophy that is consistent with the following industry standards.

C37.41 IEEE Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories.
C37.91 IEEE Guide for Relay Applications to Power Transformers.
C37.91 Appendix Application of the Transformer Through-Fault Current Duration Guide to the Protection of Power Transformers.
C57.12.00 IEEE Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
C57.109 IEEE Guide for Transformer Through-Fault-Current Duration.

6. Page IV-33, 4th bullet:

"Unitil should investigate and modify if necessary the transformer protection at the Store Street Substation."

Unitil Comment:

Storrs Street is misspelled.

7. Page IV-35, 3rd paragraph:

"By replacing electro-mechanical relays with micro-processor based relays system reliability and security can be improved… The electric utilities should replace all their electro-mechanical relays with microprocessor based relays within five years.

Unitil Comment:

Unitil disagrees with this statement. Unitil experienced no electro-mechanical relay failures and had no electro-mechanical relay misoperations during the December 2008 Ice Storm. In fact, over the recent past, Unitil has experienced more failures of microprocessor based relays than electromechanical relays. Unitil's electromechanical relays have the ability for instantaneous operation and fuse saving. In order to replace an electromechanical relay with a microprocessor based relay, major panel and wiring modifications are required. This recommendation results in a high project cost with very little apparent benefit.

8. Page IV-36, 2nd Conclusion:

"The maximum radial ice seen in New Hampshire in the December 2008 ice storm was found to be 1/2 inch. An equivalent storm with this ice thickness can be expected to occur once every ten years."

Unitil Comment:

Please refer to Attachment 2, Ice Loading, for Unitil's comment on this point.

9. Page IV-37, last paragraph:

"As noted, the maximum equivalent radial ice seen in New Hampshire was 1/2 inch, which is equal to NESC heavy loading ice requirements for design in New Hampshire. According to the CRREL report, wind was not a significant factor during this storm… the system should have been able to sustain the amount of ice and wind which was seen without sustaining significant damage.

Unitil Comment:

Reference Attachment 2 – Ice Loading

As stated in the report on page V-4,

"…the December 2008 ice storm did not directly damage the transmission and distribution systems. Instead it damaged the woodlands of New Hampshire, causing tree limbs and whole trees to fall, which in turn damaged the power system by breaking poles, cross arms, hardware, and conductors. Poles and conductors are quite resilient to simple ice loading as is evident in Figure V-2 where it may be seen that wires, poles, and a transformer are all carrying heavy ice loads, yet are all completely intact. If a limb or a tree were to break off due to the ice and fall on the wires or against a pole, the additional stress raises the risk that that poles or wires could fail."

Also as stated on page V-17,

"There was considerable damage to the distribution infrastructure as a result of the December 2008 ice storm. However, the damage was primarily the result of the impact of tree limbs and whole trees falling onto power lines."

Also stated on page VII-8

"A major cause of the December 2008 loss of power to customers was ice laden tree limbs and whole trees falling onto power lines."

The damage to the distribution system was due to ice laden trees and limbs falling onto the distribution lines. There is an apparent inconsistency between this statement and the recommendation that utilities should not use NESC to design the distribution systems. Unitil disagrees that any standards besides NESC should be used for designing distribution lines.

Chapter V – Operations, Maintenance, and Vegetation Management

1. Page V-8, Table V-2:
   "Table V-2 – Unitil operations, maintenance, and vegetation management evaluation matrix."

   Unitil Comment:

   Table 1 – Isolating Problems Efficiently (Bullets 1, 4 and 5)

   Unitil disagrees with this table. Unitil's substation and distribution systems are designed based upon industry standards and good utility practice. At no time during this storm event did the frequency of the Unitil system migrate outside of industry tolerances. In addition, at no point during this event did the steady state system voltage violate ANSI C84.1 standards. Unitil's substations and distribution systems operated as designed to efficiently and automatically isolate the fault conditions. Faults on the distribution system were automatically isolated into the smallest possible sections using single phase distribution protective devise. Unitil prioritized its storm restorations and was successful at restoring the largest numbers of customers first.

2. Page V-12, Unitil section
   "Unitil has an AMR system and since the storm has chosen to add an OMS system made by ABB.[10] They had an AMR system in place during the storm, but since it was not integrated with an OMS it was of limited value during restoration. As a result, the Unitil personnel were unprepared to use their AMR for large scale outage restoration, and attempts to use the system following the storm were ad hoc, evolving as the restoration progressed.."

   Unitil Comment:
   Unitil has implemented an automated metering infrastructure (AMI) system. Everywhere in the report that NEI refers to Unitil it should be using AMI not AMR.

3. Page V-14, paragraphs 1 and 2:
   "The failure of communications following the ice storm hampered the electric utilities' restoration effort and limited the value of Unitil's AMR system."

   Unitil Comment:
   See Unitil Comment 2, above. References to Unitil's "AMR" should be "AMI."

4. Page V-20, Conclusion:
   "Conclusion: Outages caused by trees generally take longer to restore than outages due to other causes such as equipment failure, lightning, etc."

Unitil Comment:

This statement has no basis in fact and is overly general. The types of damages caused by trees may, in some instances, be easier to repair and thus be shorter in duration than equipment failures, such as the failure of a distribution transformer. There is no evidence in this report to support this conclusion nor was an analysis undertaken to support this statement.

5. Page V-24, figure V-8:

"Percentage of their distribution maintenance budget each utility spent on vegetation management."

Unitil Comment:

Using O&M budget percentage as a direct comparison between companies is flawed since each company may have variations in how O&M expenses are allocated, as well as what each company includes in its tree trimming budget (such as traffic control). A $/mile of line (3ph and 1ph) over a 3-5 year timeframe as a comparison would provide a better relative comparison.

6. Page V-28, paragraph 1:

"Not following ground to sky trimming practices has resulted in a number of instances where the National Electrical Safety Code has been violated."

Unitil Comment:

Unitil disagrees with this statement. NESC Rule 218 does not require, nor does it imply that ground to sky trimming is required in order to be compliant with this rule.

7. Page V-30, 2nd paragraph:

"For most utilities, including those in the Northeast, a four-year vegetation management cycle has been found to be ideal and a four year cycle has been mandated by the electric utility commissions of several states."

Unitil Comment:

Footnote 42. FAC-003-1 is NERC Transmission reliability standard and does not apply to distribution systems.

The Hydro One report indicates that most of the North American utilities are on a 4-6 year trimming cycle. At the time of the study, Hydro One was on a 10 year cycle. It is not apparent as to where NEI came up with a 4 year trimming cycle.

8. Page V-32, 2nd and 4th bullets:

"Each electric utility should use a four year trimming cycle unless the utility can show, by using empirical data, that another length is more cost effective."

Each electric utility should include in their plan that trimming will be done ground to sky where possible, and where this is not possible a minimum clearance of 15 feet will be maintained above each line, 8 feet on each side of the line, and 15 feet below the line."

Unitil Comment:

This recommendation is impractical to implement and may be impossible to achieve. First, as the report states, customers must provide permission for such trimming practices. Secondly, ground-to-sky trimming is approximately 10 times more expensive per section than our current trimming practices. Although ground-to-sky may have some applications, adopting this as a standard trimming program for our entire system would be extremely costly.

9. Page V-35, Recommendation #6:

"Each electric utility should be required to employ at least one system forester or arborist in their New Hampshire service territory"

Unitil Comment:

Unitil does not employ an arborist, but does have access to one from several of our trimming contractors. This arborist provides technical assistance to their crews, and is also available upon request for other matters involving trees and trimming. Because of this access, Unitil does not agree it is necessary to employ an arborist or forester.

Chapter VI – Post Ice Storm Action and Processes

1. Page V-32, Table VI-2:

Table 1) Planning for Post Storm Actions
Table 2) Gathering and Use of Storm Information Following the Storm
Table 3) Post Storm Critiques and Self Assessments

Unitil Comment:

Table 1) – Unitil does not agree with this table. Unitil did verify invoices from contractors. Unitil reworked all temporary repairs immediately following the storm. Unitil replenished all of its stock during and immediately following the storm.

Table 2) – Unitil collected photographic evidence of the damage and also developed a video of the storm. Unitil also used the information collected during the storm to develop a very detailed storm assessment that resulted in many

recommendations for improvement that Unitil is currently acting upon, most of which have been successfully implemented or completed.

Table 3) – Unitil performed a post storm assessment immediately following the storm. Unitil interviewed every employee directly involved and hired a consultant to review comments, interview key personnel, critically evaluate our performance, and make recommendations. Unitil's assessment was commensurate with the size of the event and it is unclear how this process could be improved. This evaluation resulted in 28 recommendation that Unitil immediately began to implement. Unitil has also changed its ERP to include a formal post storm assessment. Reference the comments made on page VI-10 – *"Unitil performed an extensive post storm critique which was documented and published. The Unitil review contains 28 specific recommendations covering all aspects of the Unitil storm restoration organization and processes."*

2. Page VI-12, last paragraph:
   "Although Unitil did do a post storm review and productively implemented suggestions coming from that review, it does not include the requirement for conducting a post storm review in its Emergency Operations Plan."

Unitil Comment:

Unitil's post storm assessment was extremely thorough. Unitil's new ERP includes the requirement for post storm reviews. This was implemented prior to the NEI report.

Chapter VII – Best Practices for Electric Utilities

1. Page VII-3, Recommendation #3:
   "At the first indication of a storm, a utility should preposition its restoration workforce, which should include damage assessors and crews. The initial damage assessments should begin as soon as possible after a storm has passed and should be used to develop initial restoration time estimates."

Unitil Comment:

The experience Unitil had in the 2008 ice storm would indicate that pre-positioning of crews would have been a dangerous decision. In addition, due to travel difficulties, it would have been impossible to complete any damage assessment until several days after the storm had concluded.

2. Page VII-3, Recommendation #4:
   "A utility should never underestimate the potential damage of a forecasted storm. A utility should anticipate "worst case" scenario and be prepared."

Unitil Comment:

Unitil agrees it should not underestimate the potential damage; however it is neither practical nor possible to anticipate the "worst-case" scenario for every event and then act upon it. As an example, Unitil was monitoring the progress of several hurricane events over this summer. If Unitil had reacted and planned for "worse case," we would have mobilized hundreds of crews, logistics personnel, staging area resources, and other storm personnel. This would have been costly and impractical, and given that the storms did not materialize, would have been premature. Unitil believes in planning commensurate for the risk at hand, and while the worst case scenario may be part of that planning, prudence and practicality also factor into decision making, particularly when mobilizing a significant amount of forces.

3. Page VII-4, last paragraph:

"In order to provide a robust and reliable system, all lines should be designed to resist the conditions that may be expected to return every 50 years. All structures, regardless of their height, should be designed to meet 50 year return values for wind, and ice with concurrent wind, as defined by the American Society of Civil Engineers (ASCE) standards and the latest edition of the NESC. The NESC, which is the code being followed by all the electric utilities, only requires this criteria for structures above 60 feet, allowing less rigorous criteria (district loading) to be used for structures below 60 feet. Since all structures, no matter their height, could see the 50 year return values of ice and wind, best practice would dictate that the same design methods should be used for structures of any height."

Unitil Comment:

Reference Attachment 2 – Ice Loading

As stated in the report on page V-4,

"…the December 2008 ice storm did not directly damage the transmission and distribution systems. Instead it damaged the woodlands of New Hampshire, causing tree limbs and whole trees to fall, which in turn damaged the power system by breaking poles, cross arms, hardware, and conductors. Poles and conductors are quite resilient to simple ice loading as is evident in Figure V-2 where it may be seen that wires, poles, and a transformer are all carrying heavy ice loads, yet are all completely intact. If a limb or a tree were to break off due to the ice and fall on the wires or against a pole, the additional stress raises the risk that that poles or wires could fail."

Also as stated on page V-17,

"There was considerable damage to the distribution infrastructure as a result of the December 2008 ice storm. However, the damage was

primarily the result of the impact of tree limbs and whole trees falling onto power lines."

Also stated on page VII-8

"A major cause of the December 2008 loss of power to customers was ice laden tree limbs and whole trees falling onto power lines."

The damage to the distribution system was due to ice laden trees and limbs falling onto the distribution lines. There is an apparent inconsistency between this statement and the recommendation that utilities should not use NESC to design the distribution systems. Unitil disagrees that any standards besides NESC should be used for designing distribution lines.

4. Page VII-5, last paragraph:

"At times, a switch is placed in the center of the feeder which is normally kept open, isolating the substations from each other, and allowing each substation to feed half of the feeder. When necessary this switch can be closed, and one of the reclosers connecting the feeder to a substation can be opened, making it possible to supply the entire feeder from either of the substations."

Unitil Comment:

This statement requires duplicate capacity on each of the substations and on each of the distribution circuits. Overbuilding the distribution system like this will result in twice the capacity that most of the time will not be used. Unitil was able to utilize some of its circuit ties during the December ice storm. However, circuit ties only increase reliability when the damage from the storm event does not affect the main lines of the distribution circuits. The cost of designing and constructing a system with excess capacity may greatly outweigh the improved reliability.

5. Page VII-5, 2nd paragraph:

"The use of microprocessor based technology in system protection has reduced many long term failures into short interruptions. Older electro-mechanical relays are analogous to the vacuum tube radios prior to 1960 and should be replaced with devices using modern day technology"

The report goes on to state that,

"This will allow the feeder protection to trip the feeder off before a downstream fuse can open. Since the fault is temporary, when the feeder breaker recloses all customers would see their power return without a fuse having opened. This saves a lineman from having to be dispatched to replace the fuse for a temporary fault that could have been cleared without opening the fuse. This type of logic is easy to implement with microprocessor based relays and nearly impossible with electromechanical relays."

Unitil Comment:

Unitil disagrees with this statement. Unitil experienced no electromechanical relay failures and had no electromechanical relay misoperations during the December ice storm. In fact, over the recent past, Unitil has experienced more failures of microprocessor based relays than electromechanical relays. Unitil's electromechanical relays have the ability for instantaneous operation and fuse saving. In order to replace an electromechanical relay with a microprocessor based relay, major panel and wiring modifications are required. This recommendation results in a high project cost with very little apparent benefit.

6. Page VII-8, Recommendation #15:

"A utility should utilize a four-year vegetation management cycle for clearing trees around power lines."

Unitil Comment:

The report calls for NH utilities to take a very aggressive approach to vegetation management (Chapter 7, page 8, Recommendation #15), while at the same time it identifies that the New Hampshire state laws are too restrictive to allow utilities to provide proper vegetation management (Chapter 5, page 33). .

7. Page VII-10, Recommendation #17:

A utility should both determine the global estimated restoration times and publish that information within 24 hours.

Unitil Comment:

As discussed at several points above, this is an unrealistic expectation.

8. Page VII-13, Table VII-2:

"Table VII-2 Unitil Best Practices Evaluation Matrix"

Unitil Comment:

Table 1) Emergency Planning and Preparedness

Item 1: We now base our ERP on ICS

Item 2: We have a dedicated emergency operation organization and facility.

Table 2) System Planning, Design, Construction and Protection

Item 9: Automatic high-speed source transfer schemes can be used at the distribution circuit level. However, high-speed source transfer schemes are more commonly used on sub-transmission or transmission systems.

Item 10: Unitil disagrees that electromechanical relays should be replaced with microprocessor based relays. The cost of this does not justify the replacement.

Table 3) Operation, Maintenance and Vegetation Management

Item 13: Unitil does not agree that a distribution system should be inspected every two years. The industry standard for distribution inspection is 10 years. Again, the cause of the damage was ice laden trees, not the age or condition of the facilities.

Table 4) Post Storm Actions and Processes

Item 18: Unitil does have a restoration strategy that targets the restoration of power to the greatest number of customers in the shortest amount of time. Reference Attachment 1.

Chapter IX – Recommendations, Priorities and Cost Estimates

NOTE: Unitil is providing a separate document that details comments on all of the recommendations. In addition to those, Unitil is providing these comments.

1. Page IX-2, Equation IX-1:

   "Using this assumption and the determination that the current electrical infrastructure is not designed for a fifty year storm, 50% of the damage would be tree related and 50% would occur to the power system infrastructure."

   Unitil Comment:

   Unitil does not agree with this statement. The December 2008 ice storm resulted in much more damage on the distribution system than the January 1998 ice storm. In fact, from an outage standpoint, the January 1998 storm is not one of the worst 10 outage events for Unitil. The 1-in-10 assumption drives the annual cost estimate. If the December 2008 ice storm was a 1-in-20 year event, the annual cost reduces almost in half to $5.8M.

   NEI does not provide any evidence that 50% of the damage would be tree related and 50% would be damage directly to the electric infrastructure. During the December 2008 ice storm, a very high percentage of the damage was tree related. It is reasonable to assume that more ice would lead to even more tree related damage.

2. Page IX-4, Priorities:

   "Priorities
   The following are the definitions of the priority levels assigned to each recommendation:

High: Implementation would result in significant improvements that will strengthen the power system, improve restoration times, and improve communications. These recommendations should be implemented as soon as possible.

Medium: Implementation would result in meaningful improvements that will strengthen the power system, improve restoration times, and improve communications. Implementation should begin within 12 months.

Low: Implementation would result in improvements that will strengthen the power system, improve restoration times, and improve communications. Benefits are modest or difficult to measure. Implementation should begin within than next 24 months."

Unitil Comment:

Unitil does not agree with the priority definitions. These priorities indicate that implementation "should" be done within a certain timeframe. Unitil would recommend the priority definitions to be modified to describe how long it may take to implement recommendations that were deemed to provide a definite benefit.

3. Page IX-8, Recommendation #4:

"Each electric utility should establish a more comprehensive vegetation management plan." The cost to implement this recommendation is estimated at "Medium."

Unitil Comment:

Within the body of the report, comprehensive would include ground to sky trimming where possible (see Chapter 5, page 32). The table in this section indicates the cost of such a program to be "Medium," defined as between $100,000 and $2.5 million. Unitil would disagree and as stated previously, ground to sky trimming is approximately 10 times more expensive than our current standards. Unitil would classify these costs as "High," and in excess of $8 million annually, based upon current vegetation management control expenditures.