Executive Summary

This report contains an assessment of the actions of the major electric and telecommunications utilities in New Hampshire resulting from the December 2008 ice storm. The utilities assessed included:

- New Hampshire Electric Cooperative (NHEC) - Electric
- Granite State Electric Company in New Hampshire d/b/a National Grid - Electric
- Public Service Company of New Hampshire (PSNH) - Electric
- Unitil Energy Systems, Inc - Electric
- FairPoint Communications - Telecommunications
- TDS Companies - Telecommunications

This assessment may be divided into the following categories:

- A detailed chronology and critique of the December 2008 Ice Storm
- The emergency response and preparedness of each utility
- Aspects of planning, design, and protection by the utilities as related to the results of the ice storm
- Aspects of operations, maintenance, and vegetation management as related to the results of the ice storm
- Post ice storm actions and processes
- Telecommunications
- Best utility practices
- Summary of recommendations, priorities and cost estimates

The December 2008 ice storm resulted in over $150 million of reported damages to property in the state. Close to 60% of this damage was experienced on the systems of the four electric and two telecommunications utilities studied in this report. Nearly 1/2 of all the damage reported in the state occurred on PSNH's system alone. 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 on December 24, 2008. The telecommunication restoration efforts lasted longer, finally ending on approximately January 3, 2009.

While the December 2008 ice storm created the greatest amount of property damage and longest duration of power and telecommunication outages in the recent history of New Hampshire, 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. It is quite probable that people who witnessed the December 2008 ice storm will still be living to see another storm of equal or greater severity.

To prevent similar damage from occurring, the State of New Hampshire will need to be better prepared.

This report concentrates on the electric utilities with some attention given to the telecommunications utilities. The areas of assessment covered in this report involve a number of technical aspects. Each chapter will provide a set of findings, conclusions, and recommendations. Key findings in the report include the following:

- All of the utilities underestimated the severity of the storm and the extent of damage it would cause. There were a number of lessons learned from the storm that could be used to improve the response to future storms.
- Communications between the utilities, the state EOC, public officials, and customers were often ineffective and uncoordinated. Lessons learned from this storm should be used to implement improved communication efforts with all in the future. It was also determined that better communications between the power and telecommunication companies could have reduced the outage duration for both groups.
- If a storm of similar or greater magnitude were to occur again, the damage to facilities and outage durations would in all likelihood be the same or very similar to those experienced during the December 2008 ice storm. However, if the recommendations of this report are implemented, less damage will occur, utility response will be faster, and the time needed to restore power will be reduced.
- The December 2008 ice storm was a multistate event. This meant that the utilities in multiple states competed for the manpower available to help in the restoration. This lack of manpower increased the duration of restoration. Applying the lessons learned from the December 2008 ice storm could mitigate this factor during a future multistate disaster.
- The possibility of converting the entire overhead transmission and distribution system in New Hampshire to an underground system was investigated. The results of the investigation revealed that the implementation of such a conversion could take as long as 50 years and the costs would be exorbitant. However, limited overhead to underground conversion on a case by case basis may be considered when costs are reasonable and reliability can be improved.
- 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. To minimize impacts of future storms, a more aggressive tree trimming and vegetation removal program needs to be implemented by the utilities and backed by local and state government.
- Electric and telecommunication companies have joint use pole agreements which allow them to share the ownership and maintenance of poles. There is a growing concern that the telecommunication companies may not be providing adequate pole inspection and

vegetation management, and the electric utilities may be required to bear a greater burden of the maintenance costs.

- Based upon team member's experiences throughout the utility industry, a set of best practices was developed. These practices should be reviewed by each utility, used as a self assessment tool, and when practical, implemented to improve performance.

The report includes a total of 38 recommendations. Chapter IX summarizes these recommendations, and ranks them according to priority and cost.