



## Pre-Submittal Meeting:

# License Amendment Request for Removal of Severe Line Outage Detection (SLOD) at Millstone Power Station

# Background

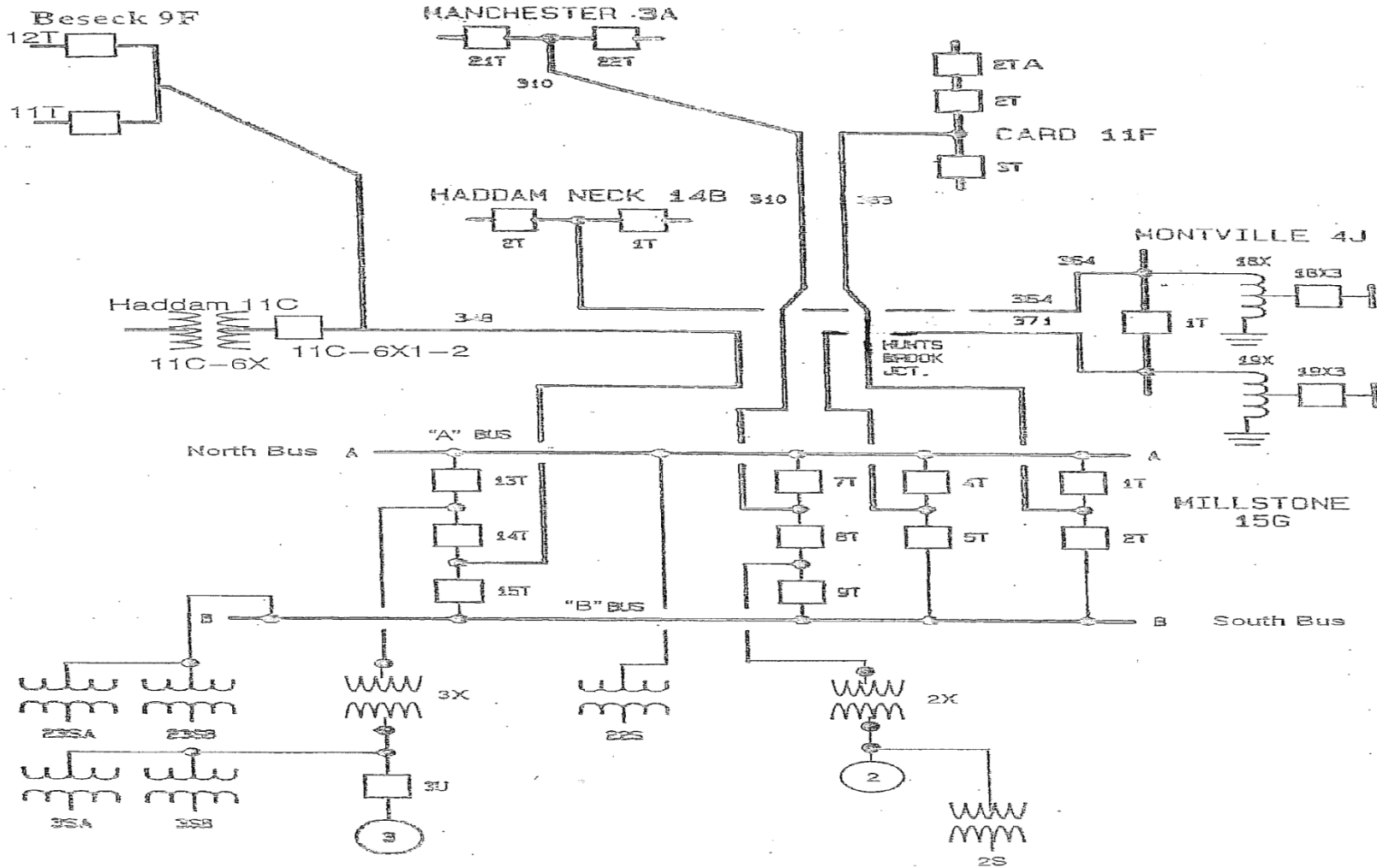
- SLOD in original MP2 and MP3 License Basis (FSAR) as required to be operational to meet GDC-17.
- Eversource replaced double circuit towers (DCTs) with single circuit towers (SCTs) (2012)
- SLOD disabled (December 2012) without prior NRC approval.
- Number of options were evaluated and a License Amendment Request (LAR) was selected.

# Site Description

- Three Unit Site:
  - Unit 1: Decommissioned.
  - Unit 2: Combustion Engineering Design.
  - Unit 3: Westinghouse Design.
- Common switchyard.
- Four 345 kV transmission lines.



# Millstone Transmission System and Facilities



# Background

Submittal of LAR is necessary for the following:

- Restoring the current license basis in the FSAR to the standards originally considered when the plants were licensed.
- Establishing appropriate controls in the Technical Requirements Manual for periods when one offsite line is not available.



# Summary of Proposed Changes

## Final Safety Analysis Report (FSAR) Changes

- Reflect elimination of SLOD.
- Address replacing dual circuit towers (DCTs) with single circuit towers (SCTs).
- Address GDC-17 compliance (offsite sources only).



# Basis for FSAR Change

## Basis of Meeting GDC-17 Without SLOD

ISO-New England Current Stability Studies:

Offsite sources reliability is maintained losing either one additional line, a Millstone Unit, or largest other unit under the following:

(1) With either three or four lines available.

OR

(2) With two lines available and Millstone Station output < 1650 MWe Net.

# Basis for FSAR Change

## Conclusion:

LAR will conclude current plant design meets GDC-17.

- Current plant design has four transmission lines on separate SCTs (SLOD removed).
- All aspects of onsite power system connection to offsite power system remain unchanged.
- Plant design meets GDC-17 based on current ISO-New England stability studies.





# Summary of Proposed Changes

## Technical Requirements Manual (TRM) Changes

- Specify actions when only three offsite transmission lines are functional.
- Proposed TRM would allow 72 hours with one offsite line removed from service and a provision to allow up to 14 days if specific defense-in-depth measures have been taken.

# Proposed TRM Changes

## Basis for 14 Day Allowed Outage Time (AOT)

- Avoids multiple shorter line outages resulting in fewer plant and transmission equipment manipulations.
- Similar to current EDG 14 Day AOT.
- Similar to Standard Review Plan (SRP) Branch Technical Position 8-8, “Onsite (Emergency Diesel Generators) and Offsite Power Sources Allowed Outage Time Extensions,” allowing AOT up to 14 Days.



# Proposed TRM Changes

Proposed TRM is based on the following:

- Appropriate Defense-In-Depth Measures
- Traditional Engineering Analysis
- Configuration Risk Management Insights

# Proposed TRM Changes

## Defense-in-Depth Measures

Defense-in-depth measures are proposed for periods when only three transmission lines are available.

1. Once per shift, verify the remaining offsite lines to the Millstone Switchyard are FUNCTIONAL.
2. Perform an initial weather assessment for the expected line outage duration and then once per shift thereafter.
3. Verify that the emergency diesel generators (EDGs) are OPERABLE and the Millstone Unit 3 SBO diesel generator is available and at least once per 24 hours thereafter.

# Proposed TRM Changes

## Traditional Engineering Analysis

- No change to onsite power system.
- Offsite transmission lines are designed and operated to assure reliability and efficiency of the New England bulk power system.
- North American Electric Reliability Corporation (NERC) requires each nuclear plant generator operator and its associated transmission entities to establish Nuclear Plant Interface Requirements (NPIRs).

# Proposed TRM Changes

## Traditional Engineering Analysis

- The NPIR between Millstone Station, ISO-New England, and the local transmission control center (CONVEX), requires the entities to, in part:
  - Maintain voltage at the Millstone switchyard at or above 345kV and below 362kV.
  - Coordinate and plan outages of transmission lines serving as a Millstone offsite power source.

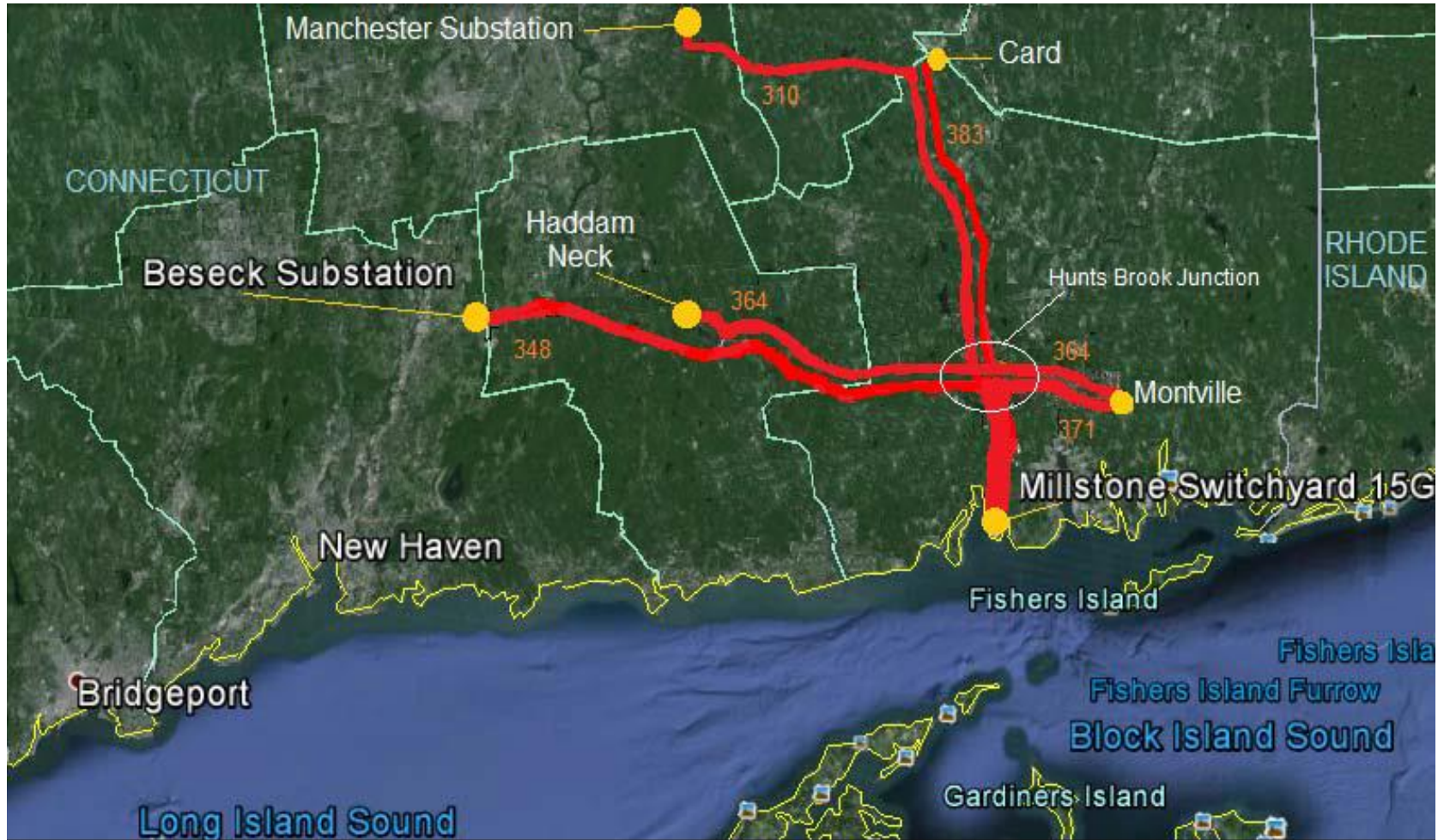
# Proposed TRM Changes

## Traditional Engineering Analysis

The following areas of concern remain after replacement of DCTs with SCTs :

- Proximity of Two Lines: At four specific Right-of-Way (ROW) locations, the spacing separation of two of the independent lines are close enough to enable certain types of limiting line-drop type single failures to impact an adjacent line.
- Line Crossovers: At three specific locations at Hunts Brook Junction (part of original design and discussed in FSARs), there exist transmission line crossovers which enable a limiting line-drop type single failure to also impact an adjacent line.
- Tower Failures: There are a number of locations where the towers are in close proximity that the failure of one tower can impact another tower.

Physical layout of these major transmission lines in the vicinity of Millstone, scaled and overlaid on a satellite photo of Southern Connecticut



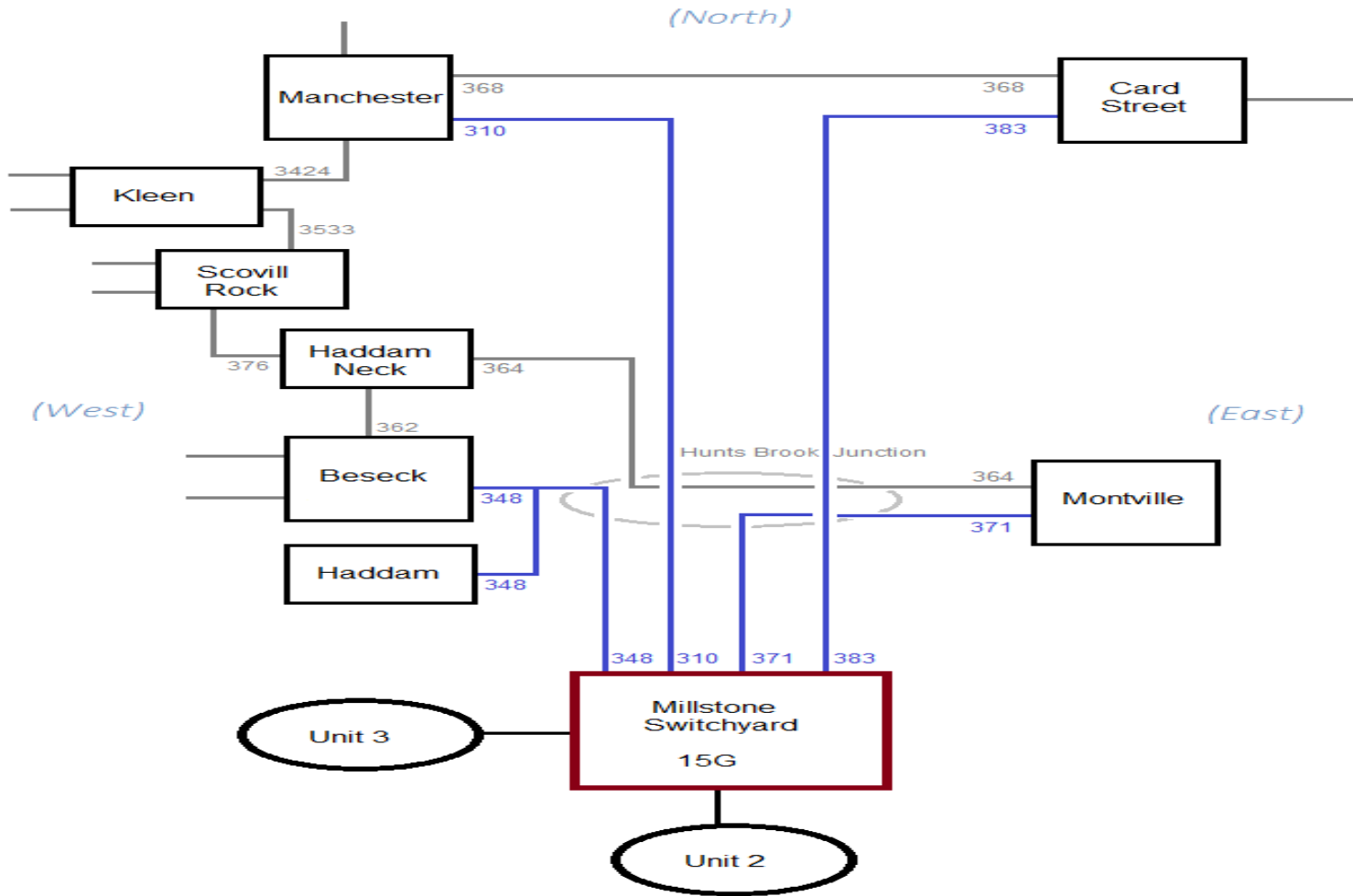


## First set of towers leaving the switchyard





# Simplified Diagram of Connecticut's 345 kV commercial electrical power system in the vicinity of Millstone





## Ground-Level View of Hunts Brook Junction (From South Looking North)



## Proposed TRM Changes

- NERC reliability standards considers failure of a single circuit tower or line affecting another tower or line (regardless of proximity) as an extreme contingency for reliability.
- ISO-New England normal contingency stability/transient studies do not include double line-to-ground faults or line-to-line faults if only SCTs are involved.

# Proposed TRM Changes

## Traditional Engineering Analysis

The proposed LAR takes a more conservative approach to areas of concern that could cause the loss of two 345kV lines due to a single event.

- Less than four 345kV transmission lines treated as a degradation of reliability.
- For defense-in-depth purposes, TRM requirements would be implemented whenever station output exceeds 1650 MWe net and only three transmission lines are available.

# Proposed TRM Changes

## Traditional Engineering Analysis

Defenses against Common Cause Failures (CCF) are maintained and the potential for introduction of new CCFs mechanisms are assessed.

- The removal of one 345kV line minimally increases the potential for a loss of offsite power event but this is not a new CCF.
- Proposed defense-in-depth measures reduce the likelihood of a single failure causing the loss of two additional 345kV lines while one line is out of service.

# Proposed TRM Changes

## Traditional Engineering Analysis

Independence of physical barriers is not degraded.

- The physical barriers between the offsite power system to the onsite power system via two connections remain unchanged when one offsite line is removed from service.

Defenses against human errors are maintained.

- Fewer plant and transmission equipment manipulations.



# Proposed TRM Changes

## Proposed Configuration Risk Program

- Planned transmission line outages are coordinated between ISO-New England and Millstone.
- Transmission Operating Guides will contain Millstone TRM limit.
- During planned transmission line outages, Millstone Station will not remove an emergency diesel generator for an extended maintenance interval.
- Core damage risk associated with performing switchyard work (including transmission line outages and physical work) will be managed under 10CFR50.65(a)(4).



# Final Summary

The LAR will document the following:

- Restoring the current license basis to standards originally considered when the plants were licensed.
- Establishing appropriate defense-in-depth measures in the TRM.
- Managing configuration risk.



*Questions??*