

NEI Tornado Missile Risk Evaluator (TMRE)

Public Meeting Between the NEI TMRE Task Force and the NRC Staff

June 29, 2016



Agenda

- Update of NEI TMRE Action Plan
- Probabilistic Risk Assessment (PRA) Topics
- Refinements to the Missile Impact Parameter (MIP)
- Reportability of Nonconforming Conditions
- Extension of Enforcement Discretion-Group A Plants

Update on NEI TMRE Action Plan

Bruce Montgomery, NEI



TMRE Action Plan

- Develop basis for a conservative, bounding MIP using NP-768 data.
 - Based on NRC suggestions from the May 11 meeting.
- Continue to pursue the availability, viability of using a TORMIS model to develop comparisons to TMRE results.
- Begin developing NEI guidance
- Identify TMRE pilot plant(s) and develop LAR(s)

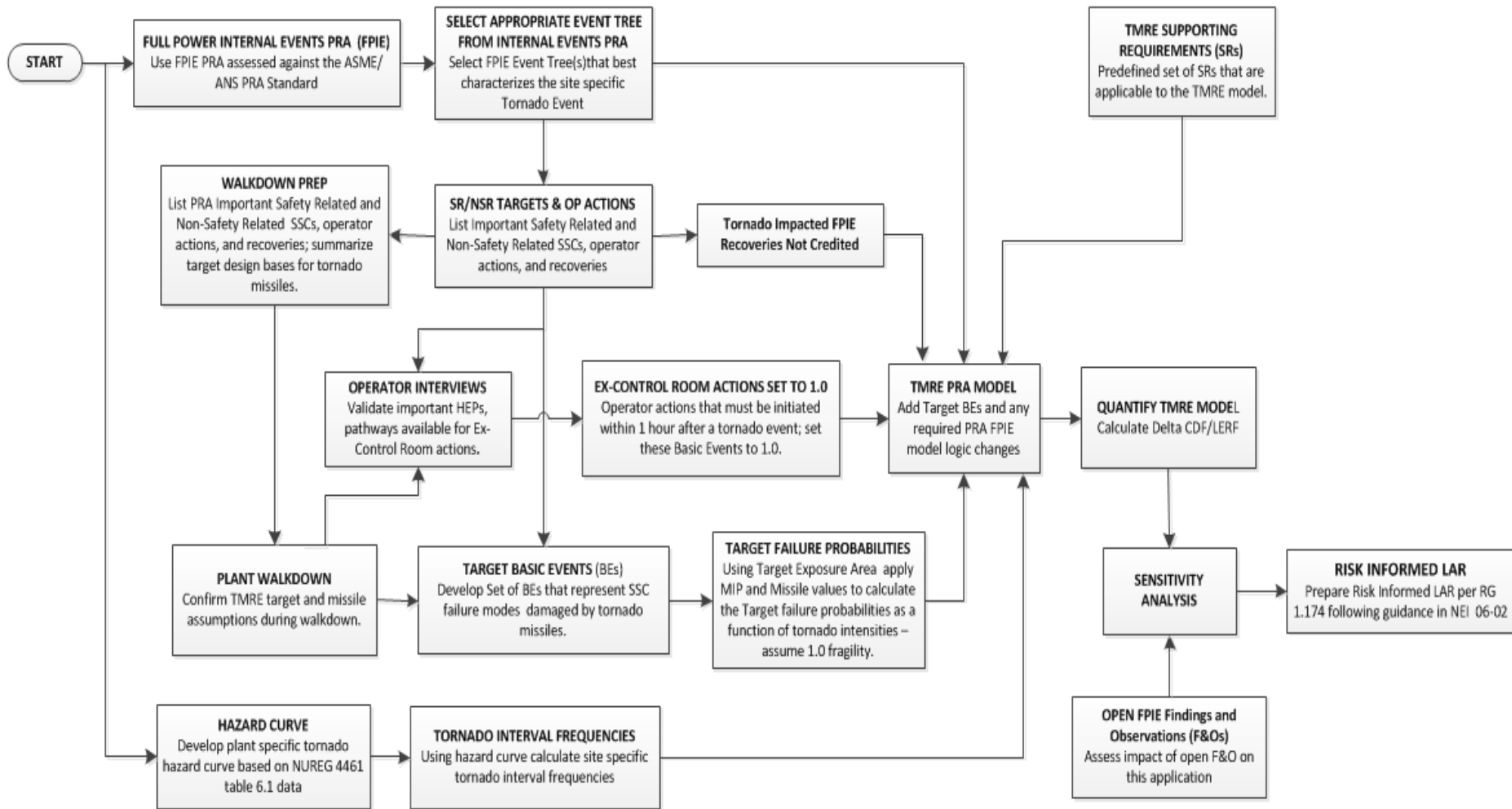
Probabilistic Assessment Topics

Leo Shanley, Jensen Hughes

TMRE PRA Model

- Method and modifications to RG 1.200 internal events PRA model discussed in detail at May 11, 2016 public meeting.
- Details will be provided to licensees in NEI guidance document.

TMRE PROCESS



TMRE PRA Model Supporting Requirements

- Affected PRA standard Supporting Requirements presented at May 11, 2016 public meeting
- Discussion regarding conservatism in base model affecting Δ CDF calculations

Base PRA Model Conservatism

1. Assumption of LOOP for all tornadoes
 - Recent HW PRAs have shown that conditional LOOP probability ~ 1.0 at F2 and above
2. Non-recovery of offsite power
 - Typical assumption in HW PRAs; not much data
3. Failing ex-control room operator actions
 - Don't expect this has significant impact
4. Structural failure of NSR buildings
 - Need to investigate impact/sensitivity

Refinements to the Missile Impact Parameter (MIP)

Leo Shanley, Jensen Hughes

Steve Hess, EPRI

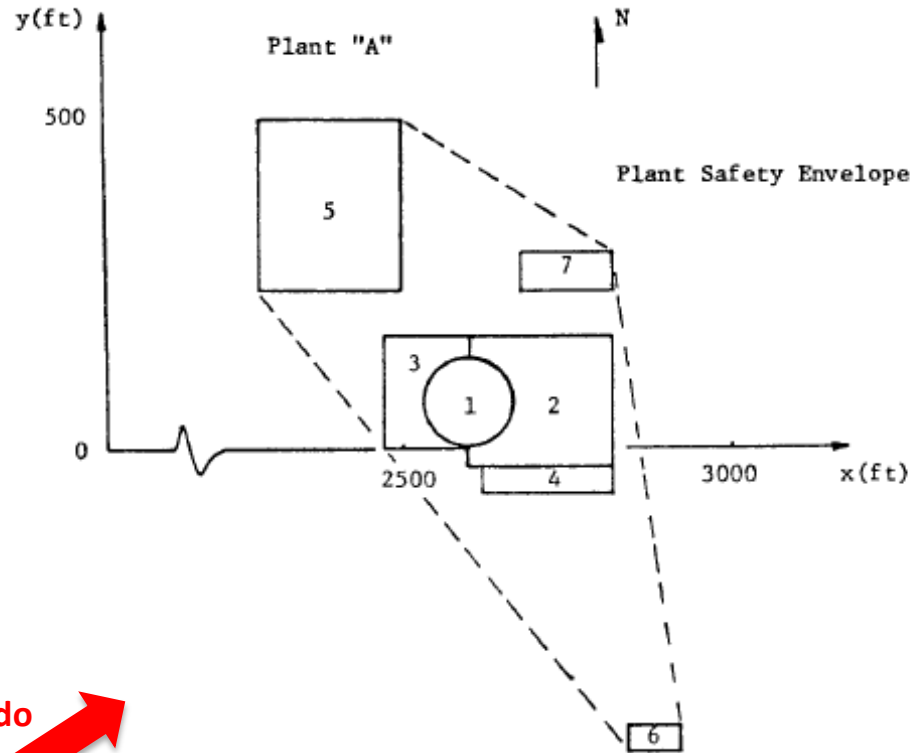
Missile Impact Parameter Derivation

- MIP derived from average missile strike probability of NP-768 targets
- Several considerations that may affect MIP
 - Missile distribution – uniform vs. zonal
 - Counting missiles outside ‘close’ range
 - Missile hit probabilities changing with elevation
 - Large vs. small targets

Variations in MIP

- Consider calculating MIP using high exposure target from NP-768
 - Target 6 in Plant A suggested after March 23 meeting
 - In general, Target 4 (EDG Building) results in highest overall MIPs
- Mean MIP from Plant A Target 4 would be more bounding than the MIP value proposed in the March 23 tabletop

MIP - Plant A Layout (EPRI NP-768)



Predominant Tornado
Direction

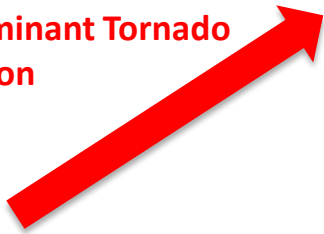


Figure 3-1. Plan View of Safety Related Structures

NP-768 Plant A Target MIP Calculations

	<i>Target 1</i>	<i>Target 2</i>	<i>Target 3</i>	<i>Target 4</i>	<i>Target 5</i>	<i>Target 6</i>	<i>Target 7</i>	3/23 Proposed MIP
<i>F'2</i>	2.6E-12	1.7E-11	7.4E-11	2.9E-10	5.8E-11	2.7E-10	5.6E-11	2.4E-10
<i>F'3</i>	1.5E-11	1.8E-10	1.7E-10	8.9E-10	3.7E-11	1.8E-09	2.9E-10	5.1E-10
<i>F'4</i>	1.8E-11	1.4E-10	2.9E-10	1.0E-09	1.1E-09	2.9E-10	6.1E-10	1.0E-9
<i>F'5</i>	1.6E-11	1.1E-09	1.2E-09	1.8E-09	7.3E-10	1.3E-09	1.4E-09	1.9E-9
<i>F'6</i>	5.4E-11	9.9E-10	1.9E-09	3.0E-09	1.6E-09	1.4E-09	2.7E-09	3.8E-9

Missiles

- Reviewing recent High Wind PRAs and deterministic analyses for missile populations
- Developing generic-use missile populations:
 - Capable of damaging robust targets
 - Only capable of damaging more susceptible (more fragile) targets

Reporting Tornado Missile Protection (TMP) Nonconforming Conditions

Jack Grobe
Exelon

TMP Reporting Considerations

- June 10, 2015 EGM 15-002 provides enforcement discretion for NRC- or licensee-identified TMP noncompliance on one or multiple systems for three or five years
- During the enforcement discretion period the equipment is considered operable provided compensatory measures are maintained and the nonconforming condition is entered into the corrective action program
- The February 2016 ISG-DSS-2016-01 provides guidance on implementing EGM 15-002 and indicates that the resident inspector be notified of application of EGM 15-002



10CFR50.72 – Immediate Notification Requirements

- 10CFR50.72(b) specifies one-hour, four-hour and eight-hour reporting requirements for “non-emergency events”
- Immediate notification requirements focus on “seriously” degraded safety barriers and “significantly” degraded plant safety
- In granting TMP enforcement discretion for three to five years, NRC recognized that TMP nonconforming conditions do not represent significant events requiring immediate notification and action by the NRC staff
- Reporting under 10CFR50.72 would be inconsistent with the importance of the nonconforming condition



10 CFR 50.73 - Licensee Event Report Requirements

- Natural phenomena
 - 10CFR50.73(a)(2)(iii) Any natural phenomenon or other external condition that posed an actual threat to the safety of the nuclear power plant or significantly hampered site personnel in the performance of duties necessary for the safe operation of the nuclear power plant.
- TMP nonconforming condition identification does not pose an actual threat under this reporting criterion.
- NRC awareness of TMP nonconforming conditions assured through notification of the Resident Inspector.
- EGM requires inspector(s) to document the exercise of enforcement discretion for nonconforming conditions in an inspection report.



Extension of Enforcement Discretion- “Group A” Plants

Bruce Montgomery, NEI

Extension of Enforcement Discretion-Group A Plants

- NRC LIC-504 Bounding Assessment, dated April 2014, considered:
 - Set Initiating Event Frequency (IEF) for winds >75mph, as starting point where damaging missiles created
 - Used a 0.1 factor for target width (against a 200ft assumption in NUREG/CR-4461)
 - Evaluated the higher risk contributors (exposed EDG and SRW components)

Extension of Enforcement Discretion-Group A Plants

- NRC LIC-504 Bounding Assessment (Cont.)
 - Utilized SPAR models to assess CDF for sample plants
 - Evaluated bounding CDF Values of:
 - $<2.5E-5$ Western US
 - $<1E-4$ Eastern US
 - $<4E-4$ Central US
 - Conservatism recognized in missile generation, actual target vulnerability and failure likelihood, PRA modelling assumptions, assumption of nonrecovery, etc.

Extension of Enforcement Discretion-Group A Plants

- Industry proposal for extension of enforcement discretion to 5-years for Group-A (Central US) plants:
 - Site specific, written request to NRC.
 - Identify and characterize known exposed SSCs.
 - Identify site-specific IEF for tornado strength of concern from NUREG/CR-4461.
 - Demonstrate that the actual site value for CDF is well-below the values presented in the LIC-504 assessment.
 - Affirm compensatory actions in place and ability of FLEX to mitigate effects of damage to exposed SSCs.

Questions