



Changes to the Voluntary Industry Initiative (Revision 3)

Steve Geier (NEI), Frances Pimentel (NEI), Greg Krueger (NEI), Richard Anoba (JH), Matt Johnson (JH)

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Incorporation of Risk Informed Evaluation Method into OPC VII

Purpose - To demonstrate operator manual actions will be sufficient to mitigate the impact of an open phase condition.

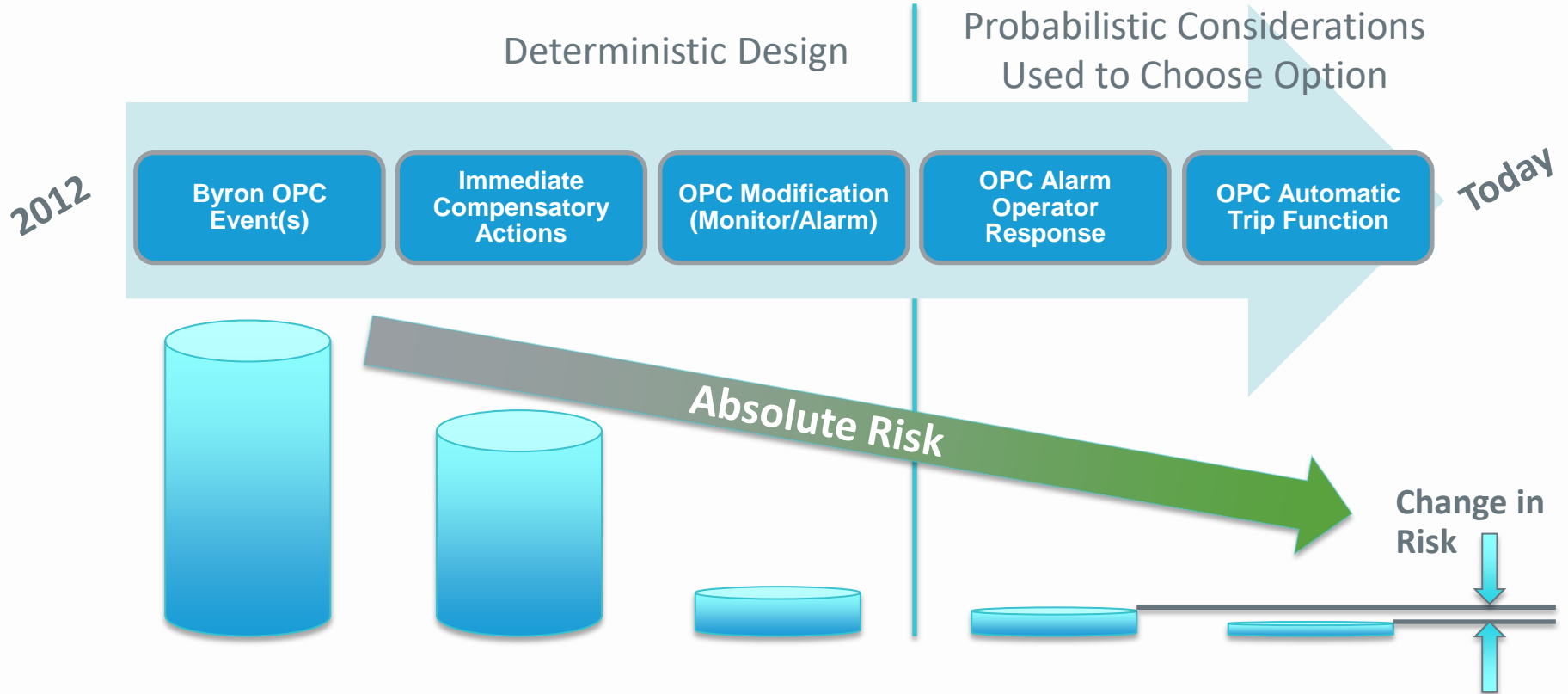
Background

- The automatic isolation design requirement in previous revisions of the OPC VII is a direct result of applying a non risk informed approach to loss of function with an OPC
- Through the implementation of detection circuits, the risk associated with an OPC event is significantly reduced such that the use of risk evaluation techniques as an alternative to enabling the automatic isolation of OPCs can be applied

Deterministic Requirements and Application of Risk Insights

- The VII was originally developed to outline a set of deterministic requirements that provide the foundation for development of a design to address an OPC
 - The deterministic goal and requirements were developed to guide the design of the OPIS and serve as the basis for regulatory evaluation to assess adequacy of implementation and safety performance assuming occurrence of an OPC
- Risk analysis (PRA or other quantitative/qualitative risk insight process) provides an assessment tool to evaluate the change in risk based on a broad spectrum of events and the probability of such events

OPC VII Implementation Risk Impacts



OPC VII Implementation Options

Automatic Trip

Manual Response

Focused on design basis and deterministic response assumptions

Improbable concurrence of a DBA drives the need to prevent loss of equipment important to mitigate such an event

Deterministic Design

Probabilistic Considerations

No Automatic Trip Function

Broad spectrum of initiators and plant conditions evaluated

Accounts for potential spurious operation and recovery of Impacted equipment

Realistic timing of events and operator response considered

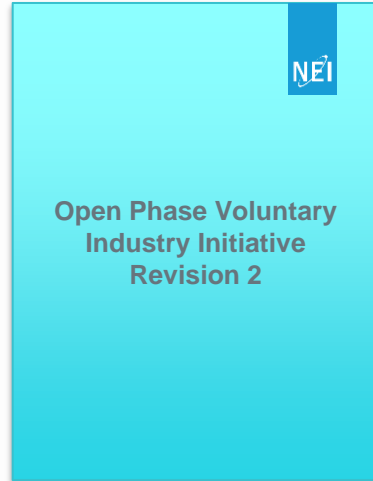
Deterministic Approach to Safety

- Deterministic requirements may contain inherently subjective judgments on what is adequate, (e.g., assumption of single worst active failure, or need to prevent failures of mitigation equipment)
- Sometimes these subjective judgments within a deterministic framework may miss important risk insights applicable to the design or implementation or overly constrain the design and operation based on negligible residual risks such as a design basis LOCA
- The current OPC VII employs a design condition based on the improbable concurrence of a DBA

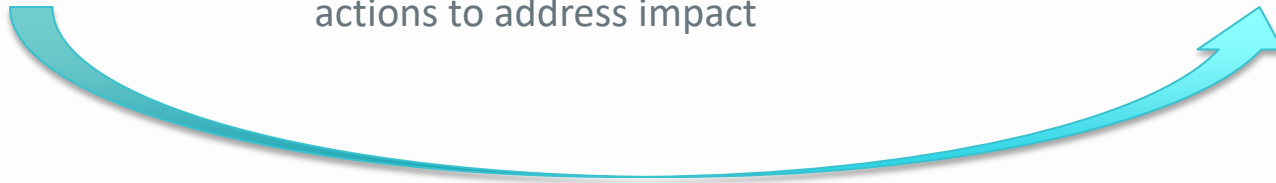
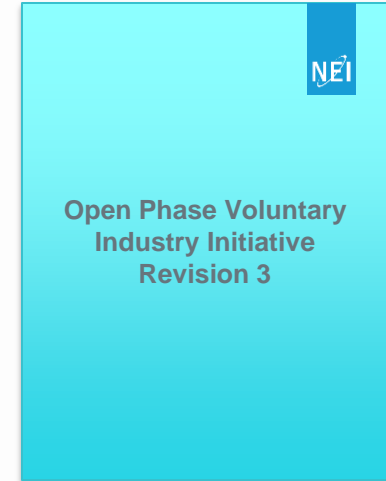
Probabilistic Approach

- Both the deterministic (a.k.a. auto trip function) and probabilistic (a.k.a. manual response) implementation paths of the OPIS can exist using the VII framework across the industry
 - The implementation solutions are not mutually exclusive
 - The manual response to an OPC relies on already conservatively designed OPC detection solutions
 - The metric used to assess reasonable assurance of adequate protection should not be based on requiring absolute certainty or risk avoidance
 - Higher probability events or plant/grid conditions should be accounted for when responding to an OPC
 - Applying absolute criteria such as prevention of the loss of function is not consistent with the application of risk insights

VII Changes



- Incorporate option to use a risk evaluation to support manual response to an OPC
- Emphasis added that the detection, alarm, and general protective action criteria used to support the design applies to both probabilistic and deterministic approaches
- Characterizes the difference in assuming impact as compared to considering a spectrum of impacts for the connected important to safety SSCs and operator actions to address impact



Risk Assessment Guidance Revisions

- Incorporated discussion of the potential for spurious operation and estimates of the likelihood of spurious operation
- Expanded discussion of potential impact to motors during an OPC
- Clarified operating experience and OPC frequency estimates
- Incorporated results for pilot plants and revised sensitivity evaluation discussion
- Provided example template to document the risk evaluation

Next Steps

- Present revised OPC Initiative to NSIAC for approval – May 17, 2019
- Issue NEI 19-02, Guidance for Assessing Open Phase Condition Implementation Using Risk Insights - May 2019
- Identify 2 plants using risk informed method for initial inspections – May 2019
- NRC issue Staff response letter acknowledging new revision of the VII - July 2019
- NRC OPC closure actions