NEI SGAM Gas Void Acceptance Criteria Discussion

Operability Technical Considerations

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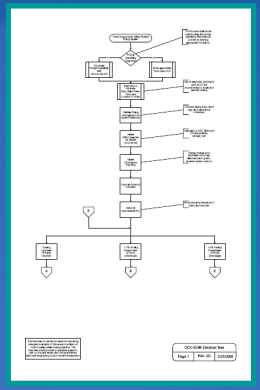
BWROG ECCS Gas Intrusion Committee

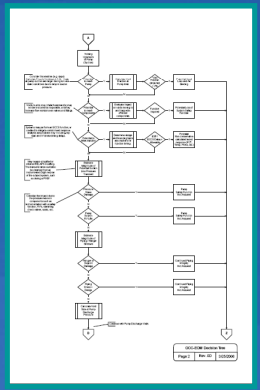
Purpose of Presentation

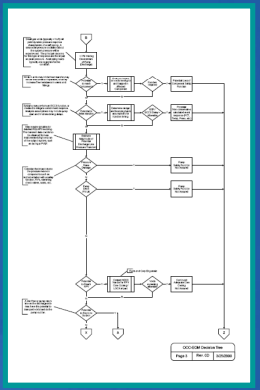
- Provide some Gas/Void Technical Considerations used by Exelon
  - Supports Station Decision Making Process Upon Discovery
  - Provides a Framework for OPERABILITY Evaluation Process

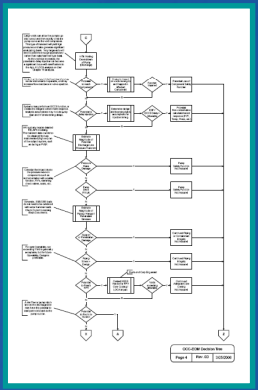
Approach

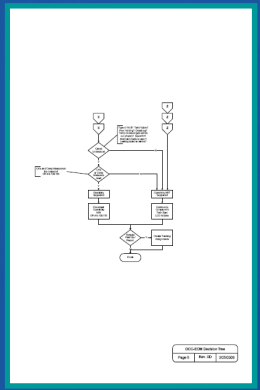
- A Decision Flowchart was developed for the OCC-EOM



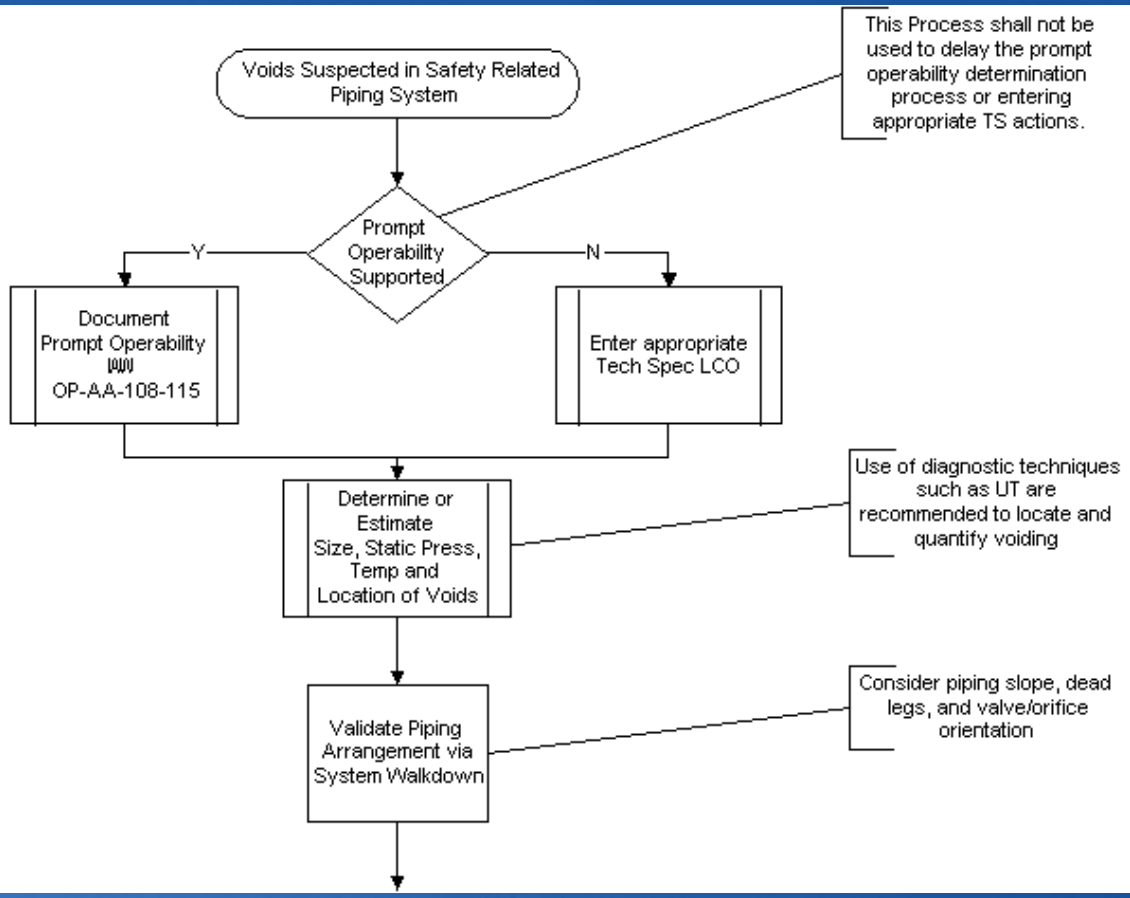


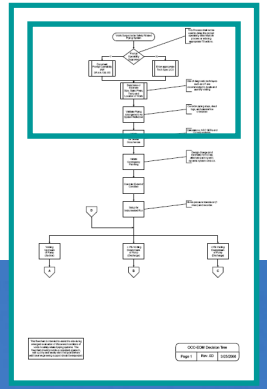






OCC-EOM Flowchart - Prologue





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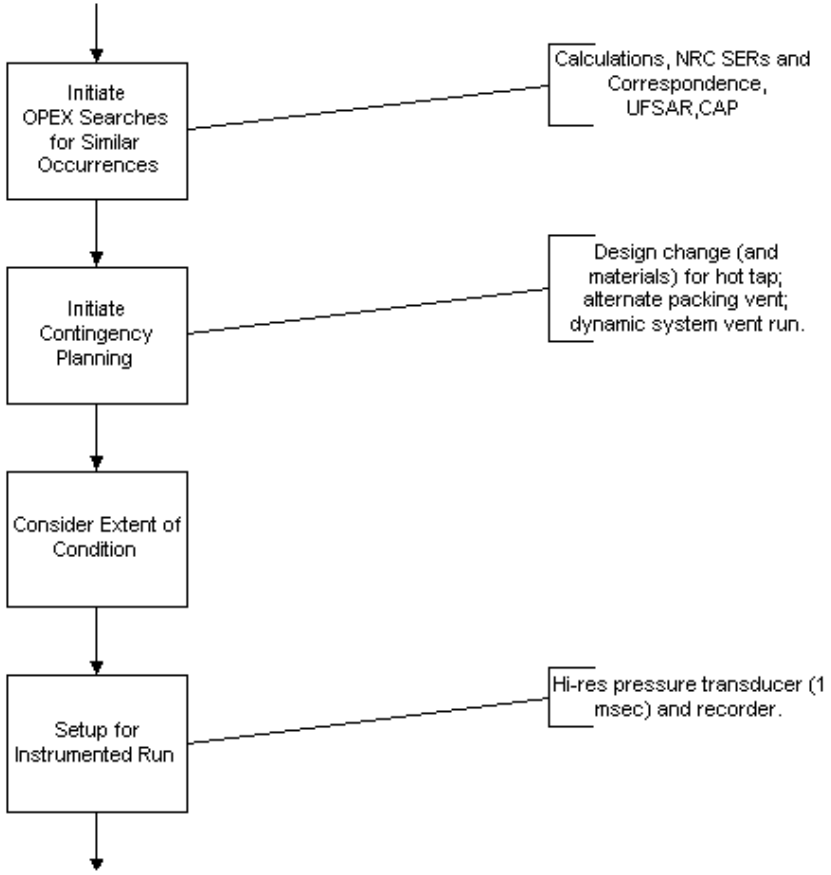
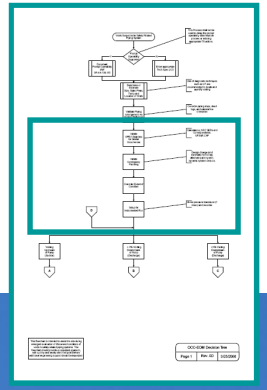
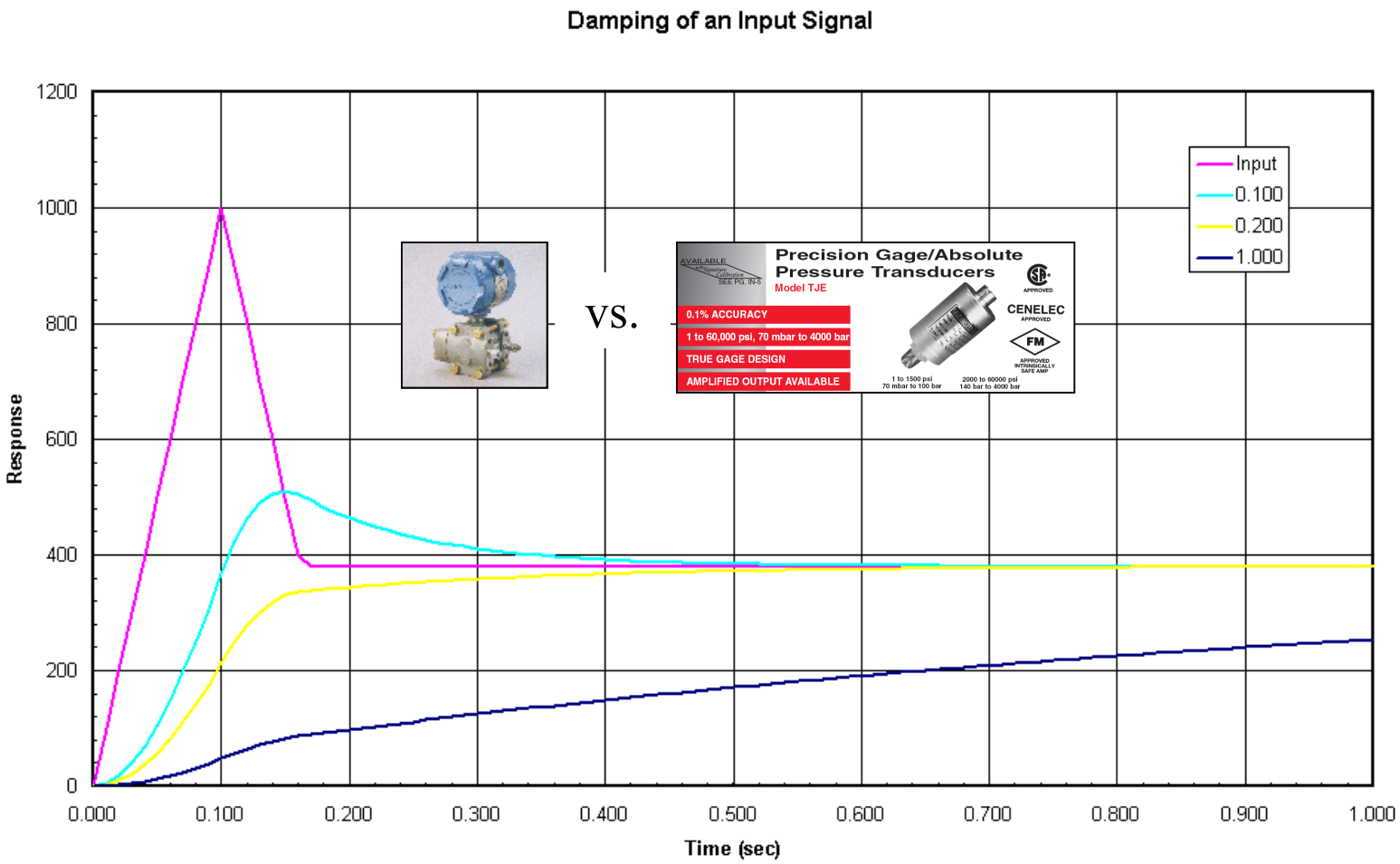




High-Res Instrumented Run



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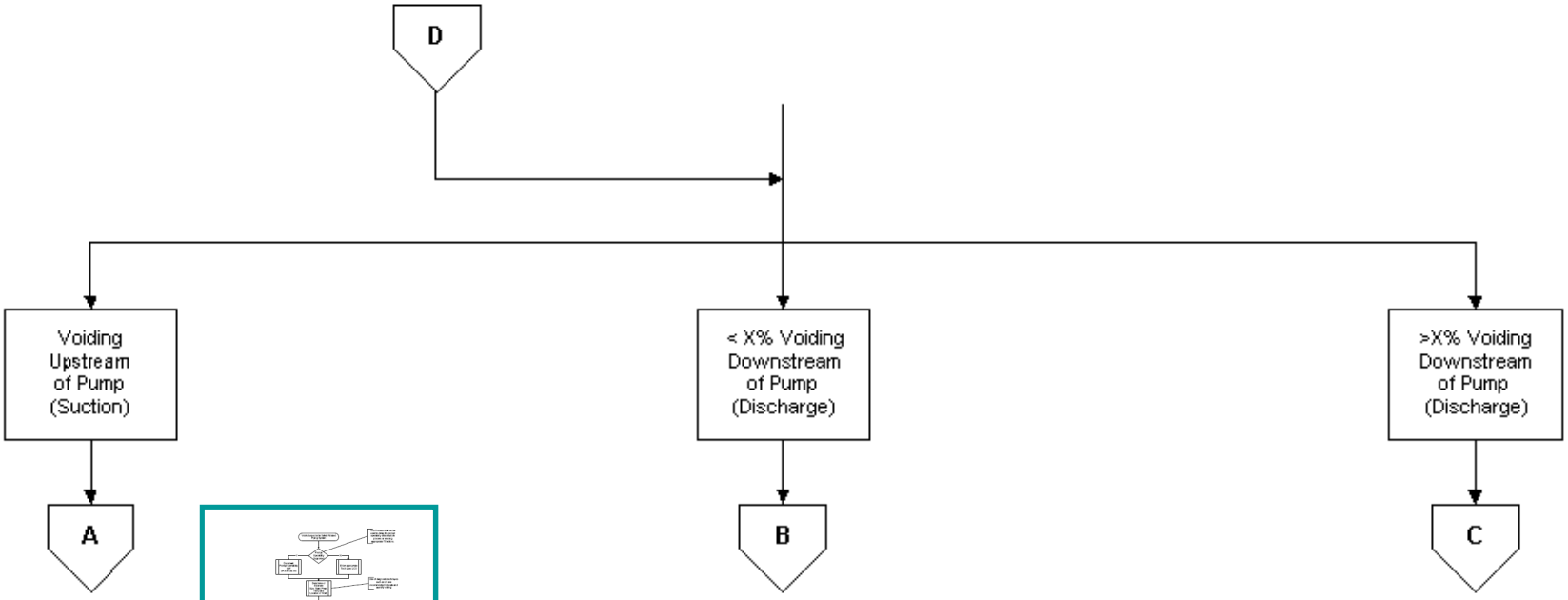
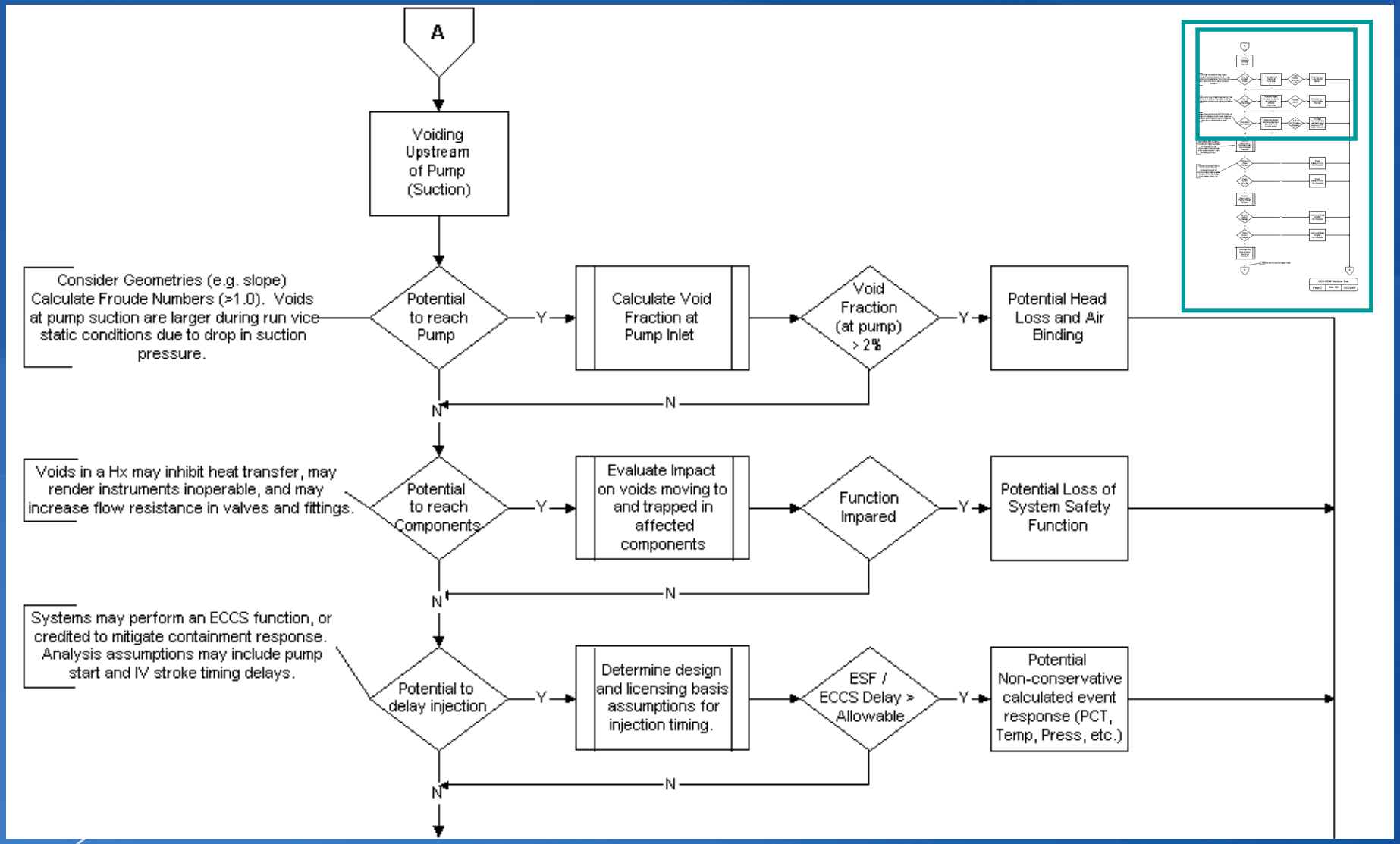


OCC-EOM Flowchart – Suction Side



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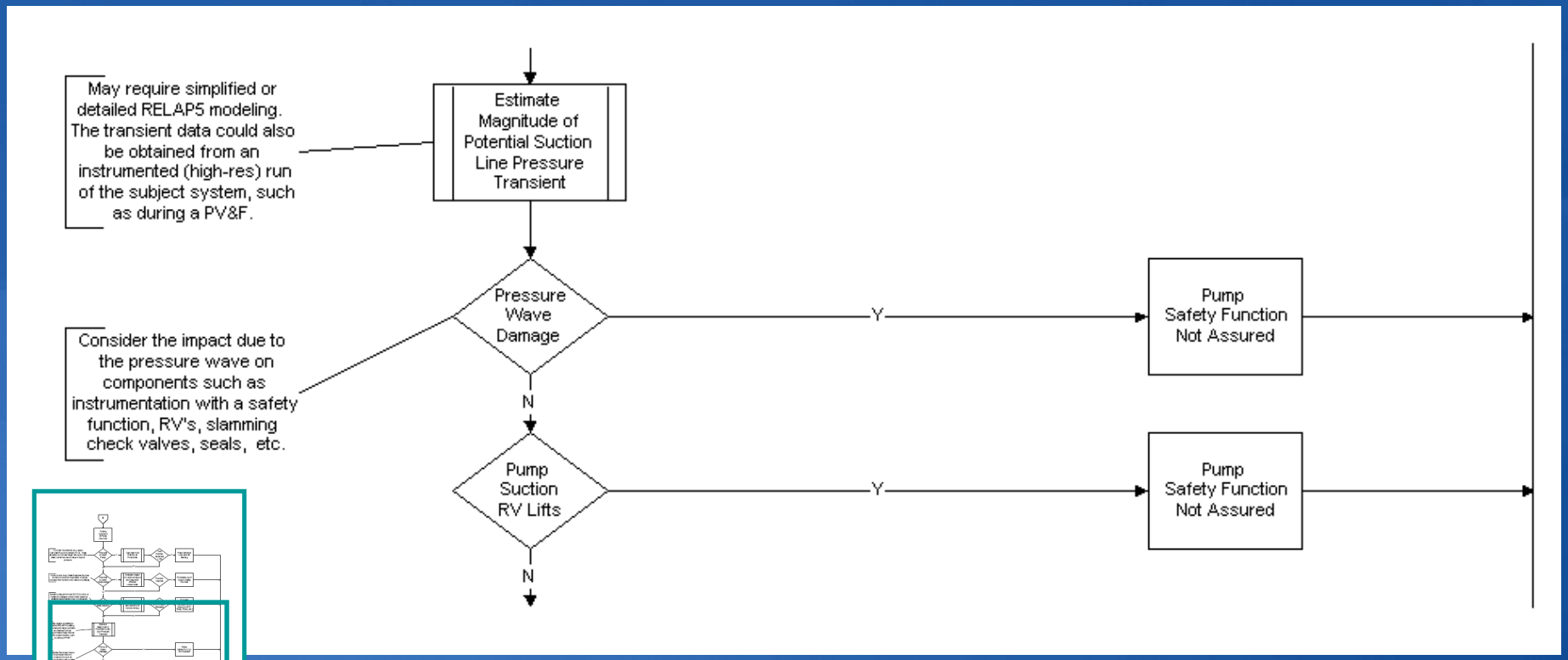

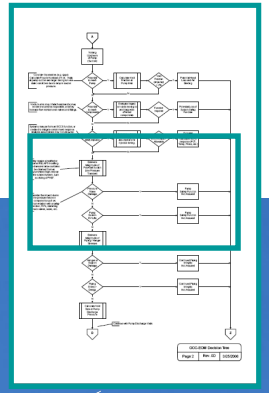

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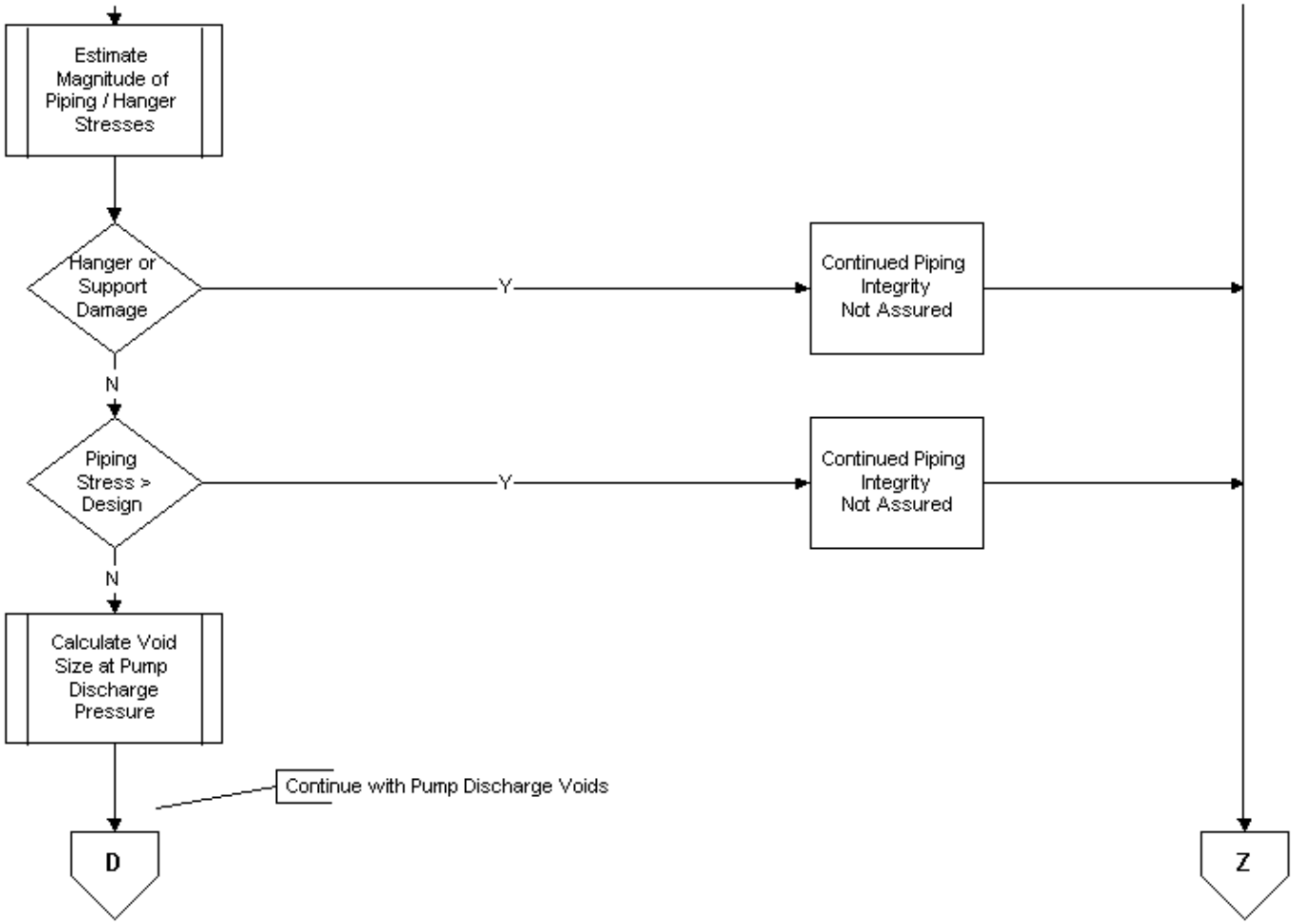
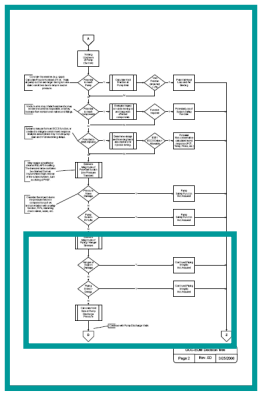
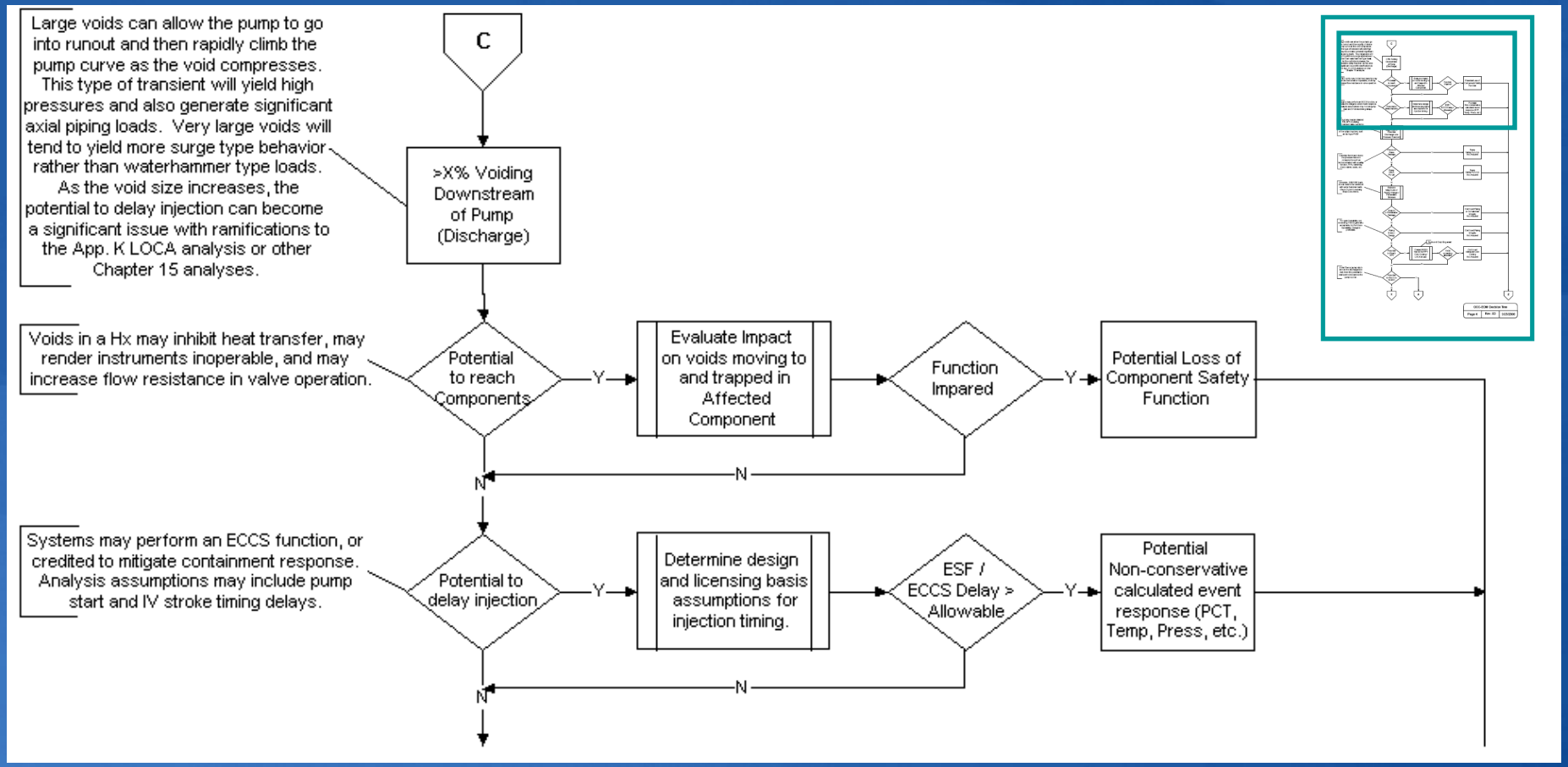




OCC-EOM Flowchart – Discharge Side



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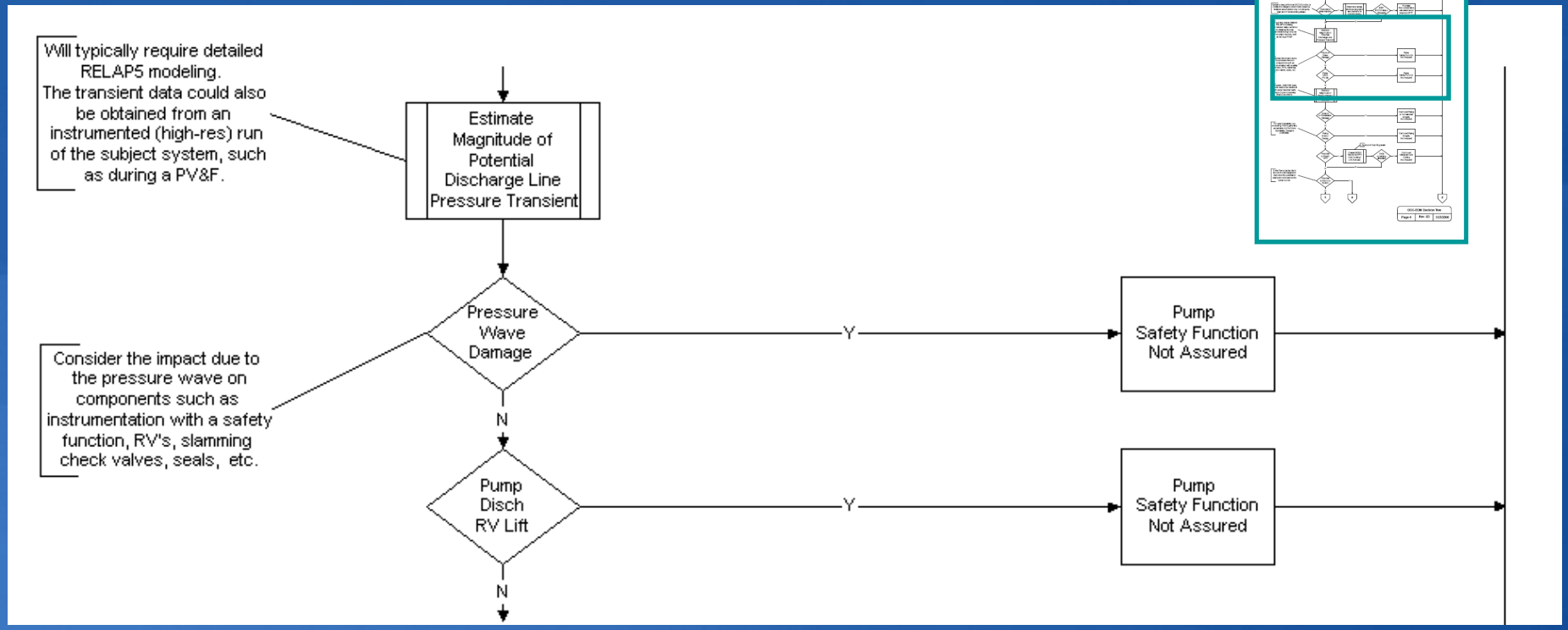

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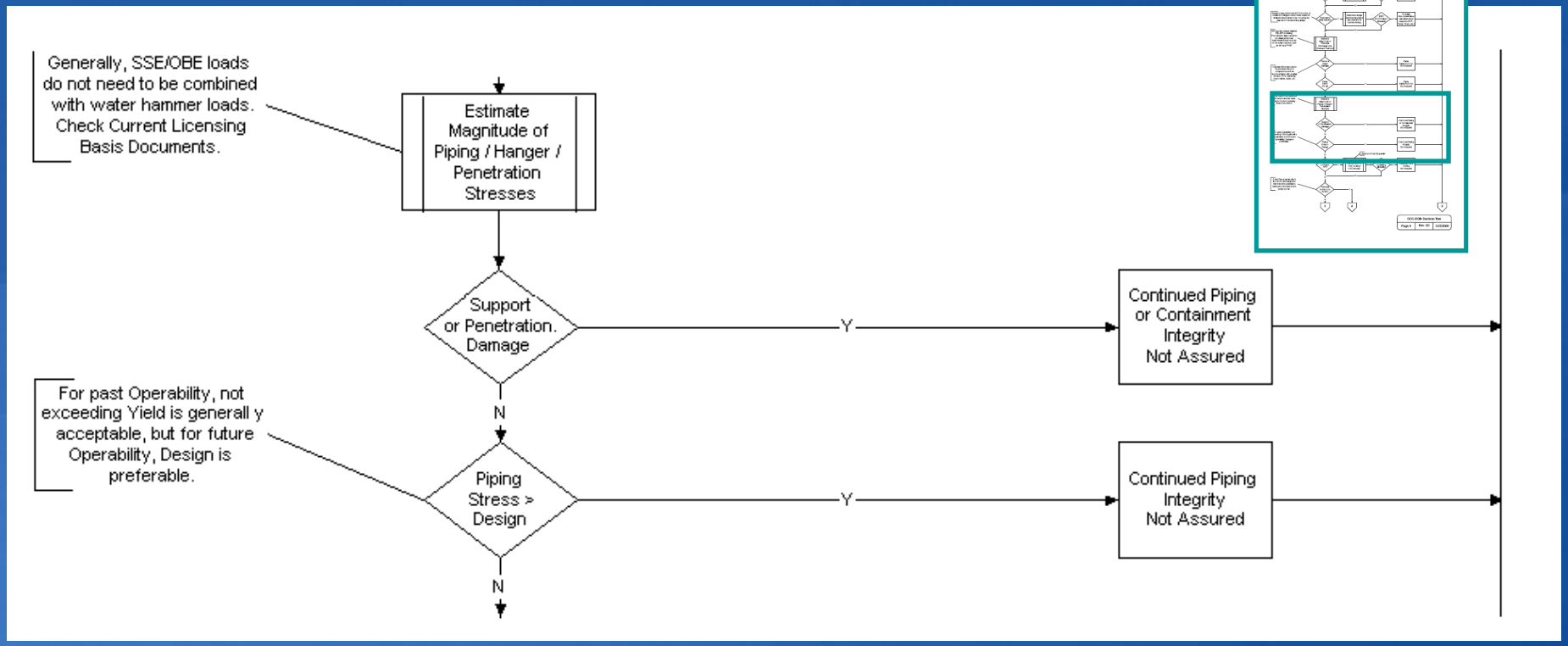

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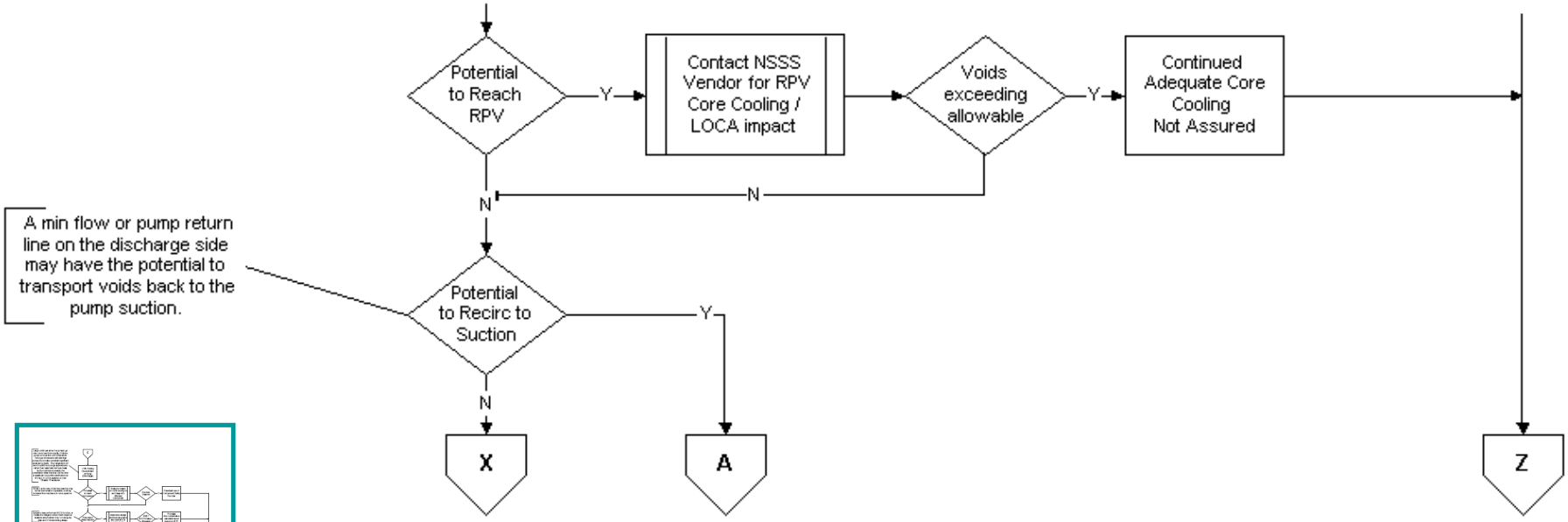
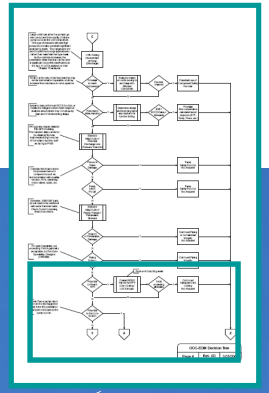
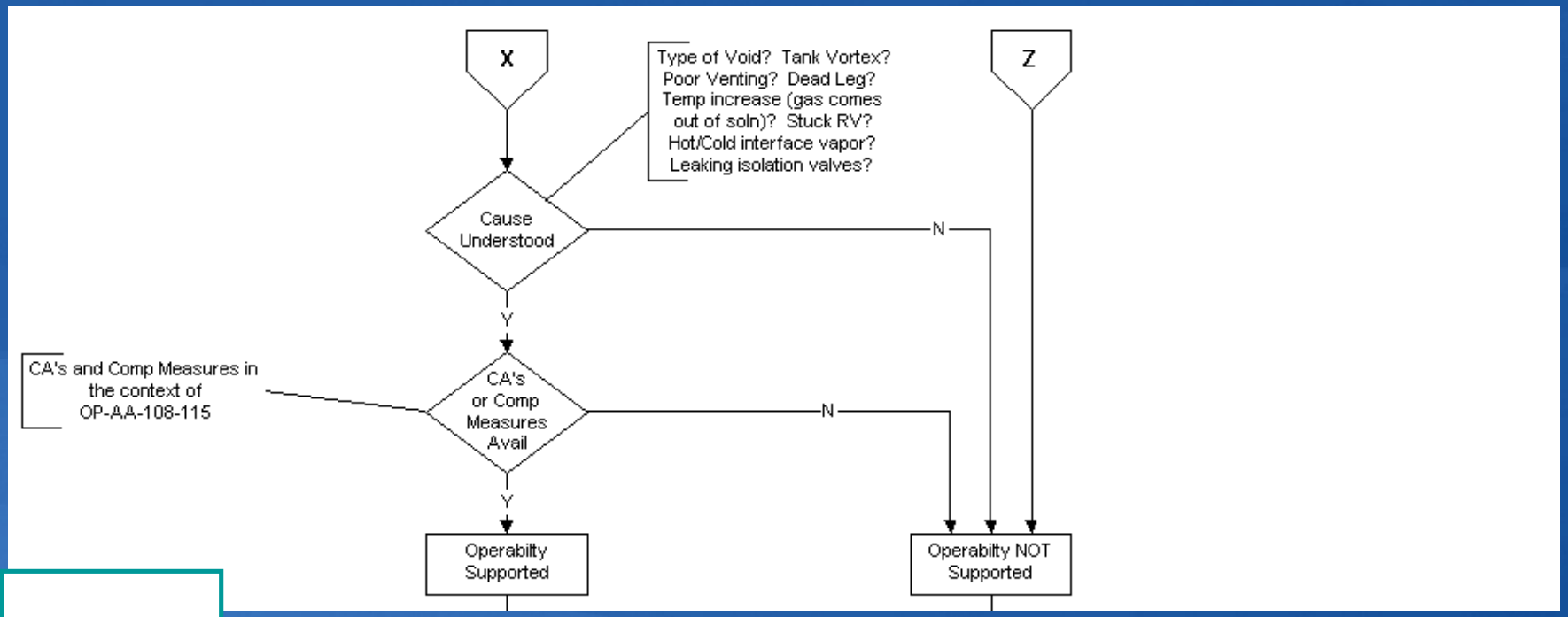
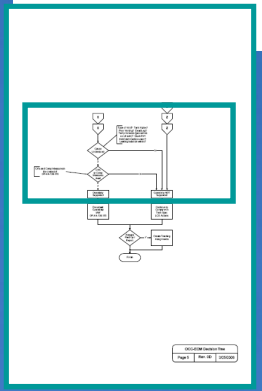




OCC-EOM Flowchart – Epilogue





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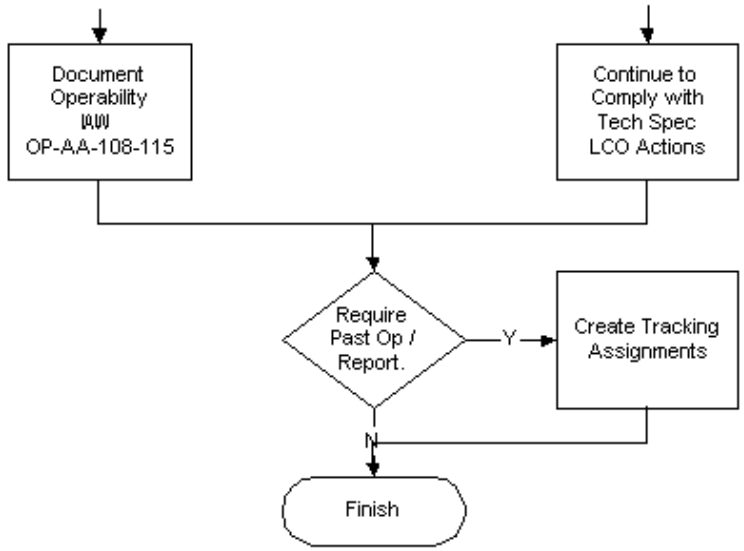

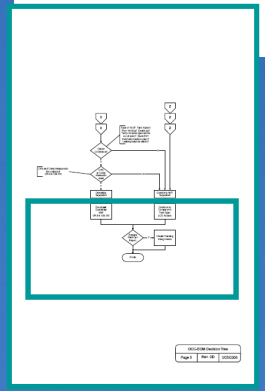

Summary - The 14 Gates

- The elements necessary to evaluate a void in a system, or those necessary to develop an *a priori* set of acceptance criteria. The acceptance criteria are expected to be different from system to system. However, these multiple system criteria could be approached more generically for a given plant or given system across multiple plants, while sacrificing the detail for added conservatism in the result.

Summary - The 14 Gates

- Suction Side Considerations
  - Volume of void under dynamic conditions vice static (suction pressure, temp)
  - Potential to become trapped in system vice transport through piping
  - Potential to impact components by trapping voids (valves, orifices, instruments, Hx's)
  - Potential to create suction side transient
    - Pressure wave damage to components (Check Valves, instruments)
    - Relief Valve lifts
    - Suction pressure system trip
    - Hanger/support/piping damage
  - Potential to delay and/or reduce injection

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Summary - The 14 Gates

- Pump Considerations
  - Pump performance degradation (e.g., head, flow, and NPSHR)
  - Pump operability (e.g., air binding, vibration levels, and mechanical damage)

Summary - The 14 Gates

- Discharge Considerations
  - Volume of void under dynamic conditions (discharge pressure, temp)
  - Potential to become trapped in system vice transport through piping
  - Potential to impact components by trapping voids (valves, orifices, instruments, Hx's)
  - Potential to create discharge side transient
    - Pressure wave damage to components (Check Valvess, instruments)
    - Relief Valve lifts
    - Suction pressure system trip
    - Hanger/support/piping damage
    - Containment penetration damage

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Summary - The 14 Gates

- Safety Analysis Considerations
  - Potential to impact LOCA PCT
    - Potential to delay ECCS Injection
    - Potential to reduce ECCS Injection
    - Potential to impact Core Refill/Reflood rates
    - Potential to impact Core Heat Transfer coefficients
  - Potential to impact RHR/DHR cooling, RCIC/AFW and/or Containment Spray
    - Potential of delay
    - Potential to reduce flow rate
    - Potential to impact containment temperatures & pressure
    - Potential to impact non-LOCA conditions that require makeup to the RCS

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Summary - The 14 Gates

- In addition to evaluating the specific occurrence of voiding, OPERABILITY requires that the source of the voiding is reasonably well understood, and that sufficient compensatory measures and corrective actions are identified to ensure continued OPERABILITY until the non-conforming condition can be eliminated.