



Pre-Application Meeting for Proposed Licensing Action to Revise the Fire Protection Program at the South Texas Project, Units 1 and 2

March 5, 2013



Agenda

- Introductions
- Proposed Licensing Action
- Basis for Proposed Licensing Action (Technical)
- Basis for Proposed Licensing Action (Analytical)
- Safety/Security Interface
- Preliminary No Significant Hazards Consideration Determination
- Environmental Considerations
- Conclusion
- Questions



INTRODUCTIONS



Purpose

To reach a common understanding on the regulatory criteria and standards to be applied in the NRC's review of the proposed change to the South Texas Project (STP), Units 1 and 2 Fire Protection Program (FPP) Licensing Basis regarding the Alternative Shutdown Capability.

Submittal Type

- License Amendment Request
 - Result in amendment to the STP Fire Hazards Analysis Report.



Proposed Licensing Action

- To credit one automatic operation and the performance of operator actions in the control room, in addition to a single action currently credited in STP FPP Licensing Basis, in the event a fire requires evacuation of the control room.
- To regain compliance with the STP Licensing Basis for ensuring that the requirements of Section III.L of 10 CFR 50, Appendix R are met.
- STP is required by their licensing basis to meet the requirements of 10 CFR 50, Appendix R, Section III.L, *Alternative and dedicated shutdown capability*.



Proposed Operator Actions

1. Initiate main steam isolation
2. Close the pressurizer power-operated relief valve (PORV) block valves
3. Secure all reactor coolant pumps
4. Close feedwater isolation valves
5. Secure the startup feedwater pump
6. Isolate reactor coolant system letdown
7. Secure the centrifugal charging pumps

Credited Feature

Credit the automatic trip of the main turbine upon initiation of a manual reactor trip.



Impacted Regulatory Requirements

Governing regulation is 10 CFR 50.48 (a) and (e)

- (a) Each operating nuclear power plant must have a fire protection plan that satisfies Criterion 3 of Appendix A of this part.

- (e) Nuclear power plants licensed to operate after January 1, 1979, shall...satisfy Criterion 3 of Appendix A to this part in accordance with the provisions of their licenses.”



Impacted Regulatory Requirements (continued)

Criterion 3 – *Fire protection.*

Structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions. Noncombustible and heat resistant materials shall be used wherever practical throughout the unit, particularly in locations such as the containment and control room. Fire detection and fighting systems of appropriate capacity and capability shall be provided and designed to minimize the adverse effects of fires on structures, systems, and components important to safety. Firefighting systems shall be designed to assure that their rupture or inadvertent operation does not significantly impair the safety capability of these structures, systems, and components.



Impacted Regulatory Requirements (continued)

Appendix R, Section III.L.1 Requirement

Alternative or dedicated shutdown capability provided for a specific fire area shall be able to (a) achieve and maintain subcritical reactivity conditions in the reactor; (b) maintain reactor coolant inventory; (c) achieve and maintain hot standby conditions for a PWR (hot shutdown 3 for a BWR); (d) achieve cold shutdown conditions within 72 hours; and (e) maintain cold shutdown conditions thereafter. During the postfire shutdown, the reactor coolant system process variables shall be maintained within those predicted for a loss of normal a.c. power, and the fission product boundary integrity shall not be affected; i.e., there shall be no fuel clad damage, rupture of any primary coolant boundary, or rupture of the containment boundary.



Impacted Regulatory Requirements (continued)

Appendix R, Section III.L.2 Requirement

The performance goals for the shutdown functions shall be:

- a. The reactivity control function shall be capable of achieving and maintaining cold shutdown reactivity conditions.
- b. The reactor coolant makeup function shall be capable of maintaining the reactor coolant level above the top of the core for BWRs and be within the level indication in the pressurizer for PWRs.
- c. The reactor heat removal function shall be capable of achieving and maintaining decay heat removal.
- d. The process monitoring function shall be capable of providing direct readings of the process variables necessary to perform and control the above functions.
- e. The supporting functions shall be capable of providing the process cooling, lubrication, etc., necessary to permit the operation of the equipment used for safe shutdown functions.



Impact on Operating License (OL)

Condition 2.E for STP Units 1 and 2 OL

- STPNOC is required to implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report and the Fire Hazards Analysis Report through the amendments cited in the OL
- If changes to the FPP are considered to adversely affect the ability to achieve and maintain safe shutdown in the event of a fire, prior NRC approval is required of the change.
 - Although 10CFR50.48 does not define “adverse”, STPNOC considers the proposed action meets the threshold for an amendment because of the reliance on the number of operator actions required to meet Section III.L of Appendix R.



Planned Submittal Date/Requested Approval Date

- Plan to submit on March 28, 2013
- Expedited review requested
 - Required to restore compliance with the STP Licensing Basis.
 - Issue of over 7 years old.
 - Amendment is the corrective action path STPNOC is pursuing to resolve a Notice of Violation for untimely corrective action.



Technical Basis for Proposed Operator Actions



Technical Basis for Proposed Licensing Action

Proposed operator actions are actions performed by a single operator in the control room prior to evacuation

- Operator is designated to perform the actions and has no Fire Brigade duties.
- Control panel switches to perform the actions are readily accessible and familiar to the operator.
- Actions have been trained on and demonstrated to be feasible and reliable.
- Operator will be pre-alerted because actions are not initiated until a fire occurs and the decision is made to trip the reactor.



Technical Basis for Proposed Licensing Action (Continued)

Automatic turbine trip upon initiation of a reactor trip.

- Part of the plant design since initial operation.
- Robust separation scheme between redundant reactor protection system circuitry.
- Strong reliability record, tested by a Technical Specification surveillance.



Technical Basis for Proposed Licensing Action (Continued)

Design features

- Relay room physically separated from main control room.
- Robust safety train circuit separation.
- Once control is transferred to the alternate shutdown stations, fire-induced circuit failures in the control room will not negate the proposed operator actions.



Analytical Basis for Proposed Operator Actions



Analytical Basis for Proposed Licensing Action

- When assuming plant is at nominal full power conditions, analysis demonstrates that the proposed operator actions satisfy Appendix R, Section III.L requirements for a fire-induced spurious actuation.
- When including instrument uncertainties from nominal conditions, analysis demonstrates safety margin is maintained and the plant can achieve safe shutdown.
- When crediting no proposed operator actions, analysis demonstrates safety margin is maintained and plant can achieve safe shutdown conditions (defense in depth).



Analytical Basis for Proposed Licensing Action (Continued)

Assuming nominal full power conditions

Key Appendix R Section III.L parameters include:

- Process variables are maintained within those predicted for a loss of normal AC power.*
- No fuel damage or rupture of primary or containment boundaries.
- Reactor coolant makeup function capable of maintaining reactor coolant level within the level indication of the pressurizer.

* The STP analysis of a loss of normal AC power shows a safety injection signal may occur.



Analytical Basis for Proposed Licensing Action (Continued)

Assuming instrument uncertainties in the plant initial conditions

- Preliminary results indicate pressurizer water level goes off-scale low for a brief period of time as a result of a fire-induced spurious actuation.
- Significant voiding of the reactor coolant system does not occur and the plant satisfies the other Appendix R, Section III.L requirements.
- Plant can achieve safe shutdown conditions.



Analytical Basis for Proposed Licensing Action (Continued)

When crediting no proposed operator actions

The limiting case is a stuck open pressurizer PORV with the following assumptions:

- Pressurizer PORV spuriously opens at the initiation of reactor trip. Automatic turbine trip occurs with 3.5 seconds.
- None of the proposed operator actions are successful.
- Operator secures the pressurizer PORV valve in 10 minutes at the alternate control station, terminating the event.



Analytical Basis for Proposed Licensing Action (Continued)

Limiting case assumptions continued:

- Safety injection (SI) does not actuate.
- Except for SI, automatic controls in the control room are assumed to function because of control/relay room and safety train separation scheme provides reasonable assurance that at least one safety train should not be damaged by fire.
- Operators restore charging and letdown within two hours of event initiation.



Analytical Basis for Proposed Licensing Action (Continued)

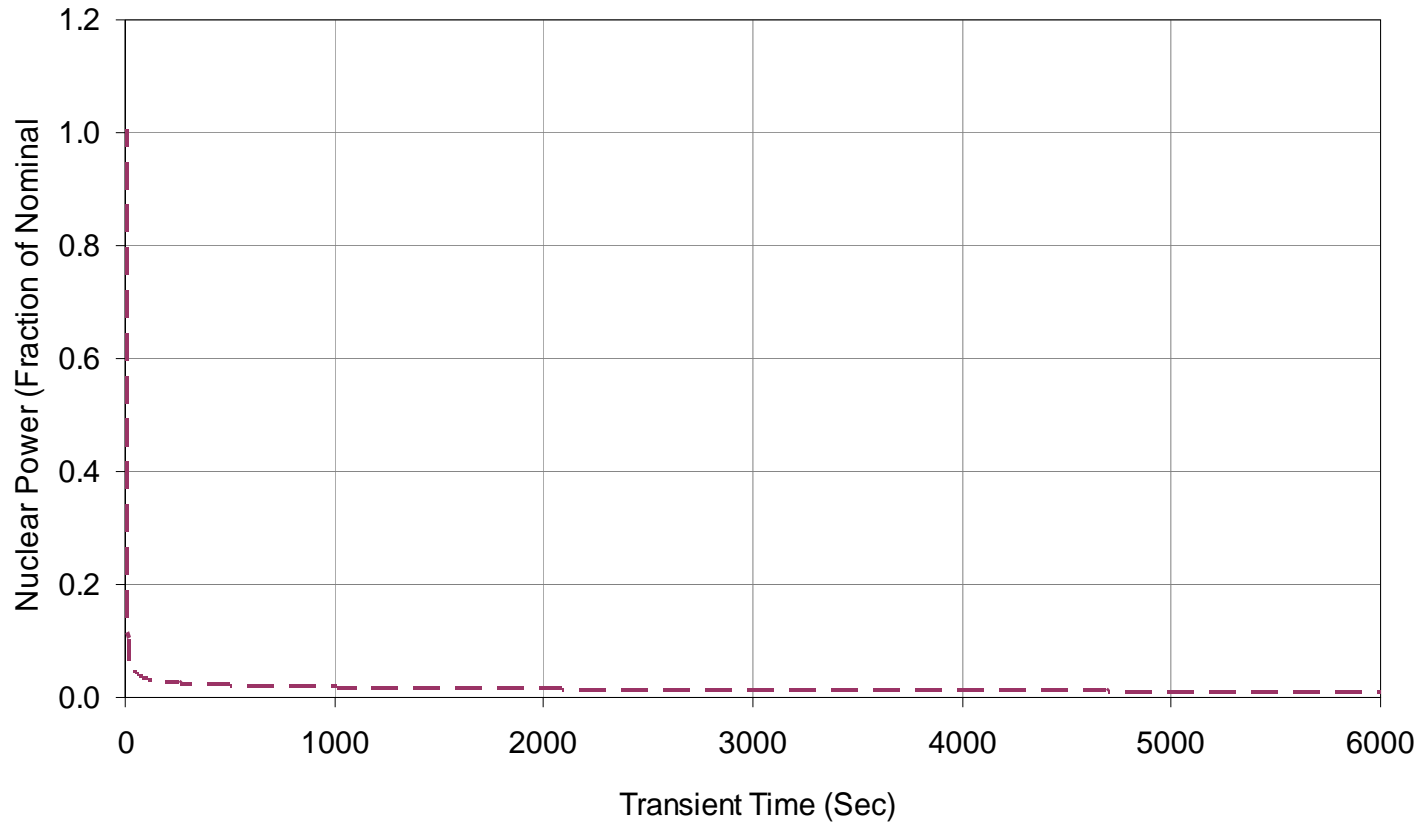
Limiting case analysis results:

- Pressurizer level restored to $>20\%$ and $<100\%$.
- Steam generator level restored to 22% and 100% .
- The loss of subcooling margin does not impact the ability of the plant to establish and maintain natural circulation.
- The core remains sub-critical and covered ensuring fuel integrity.



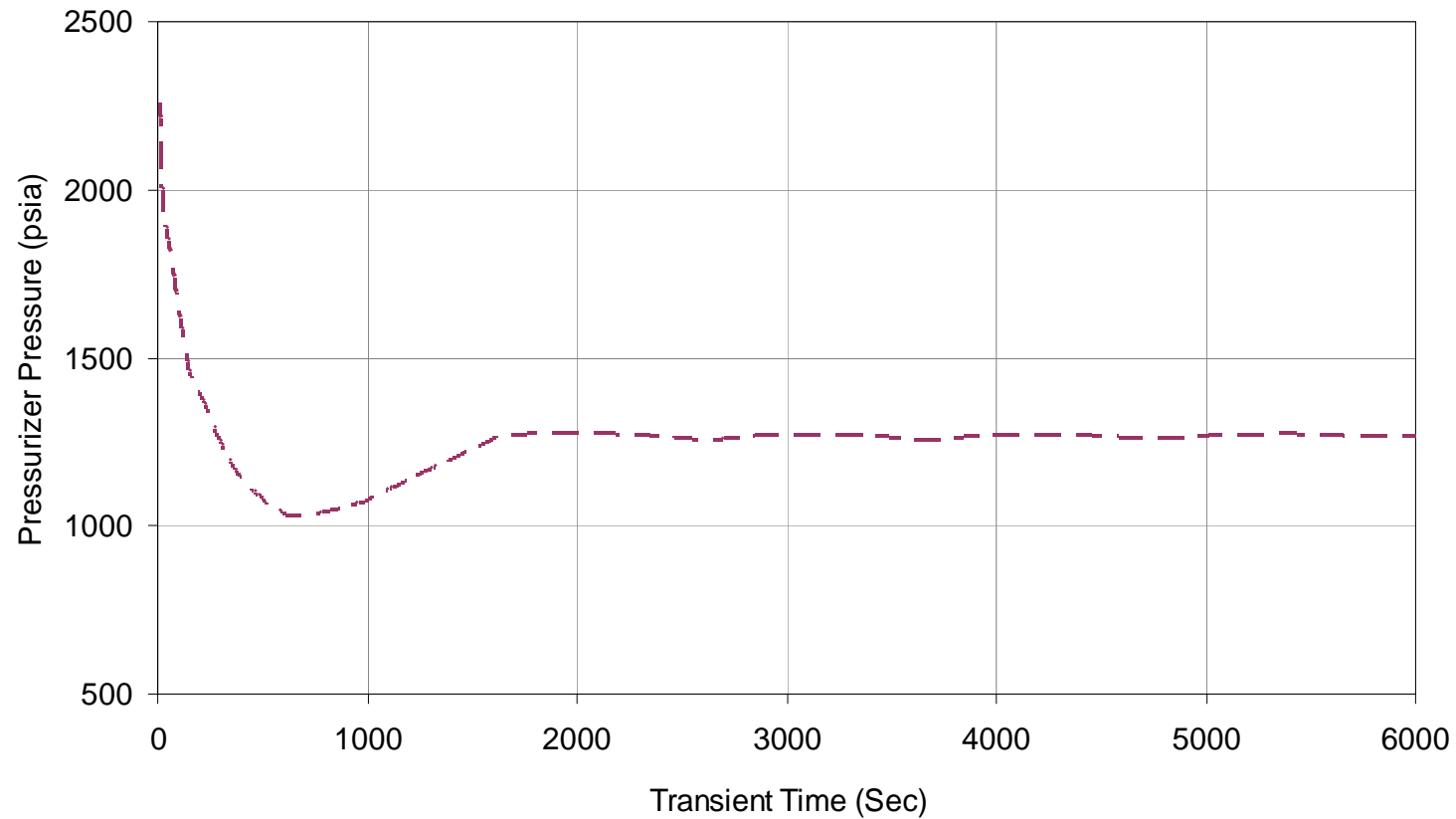
Limiting Case Analysis Results

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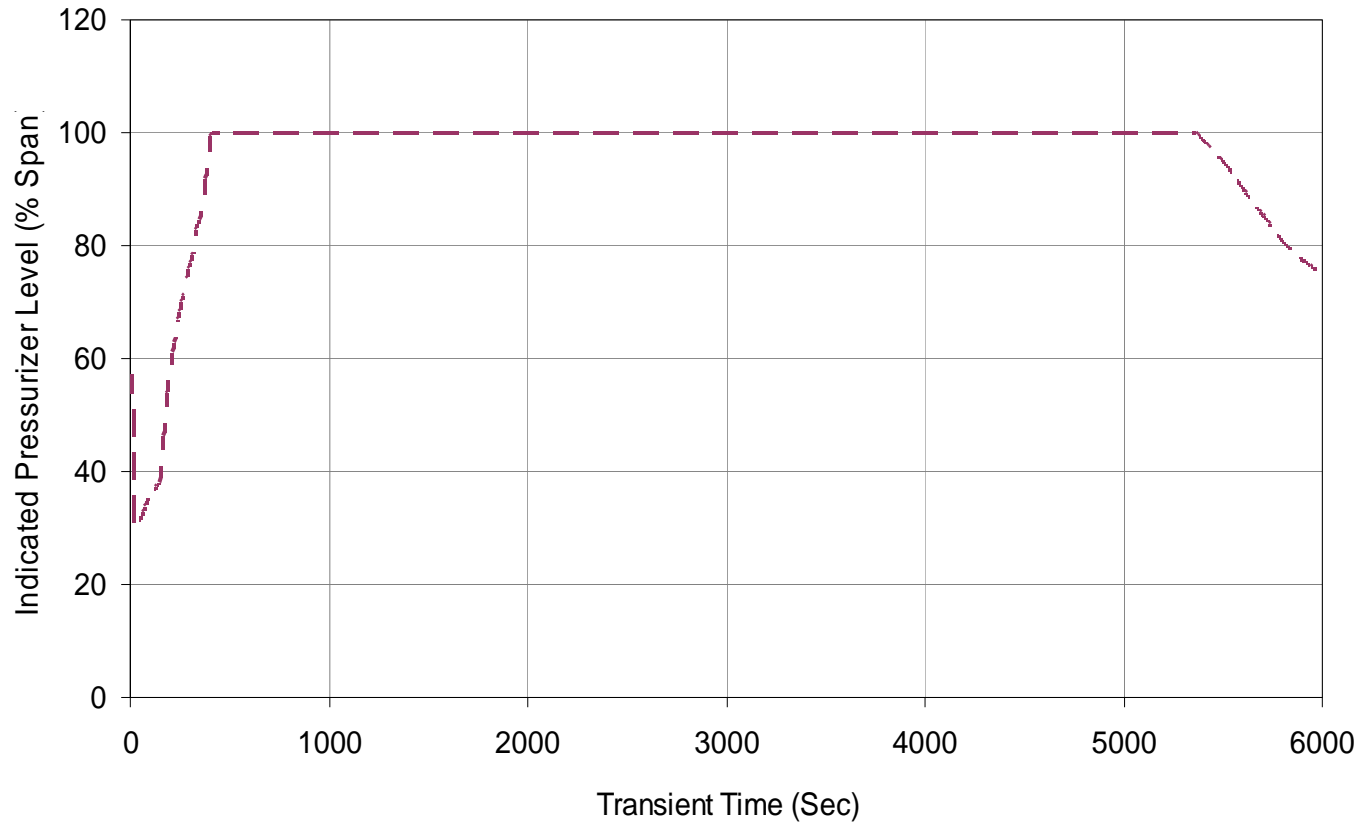
Limiting Case Analysis Results





Limiting Case Analysis Results

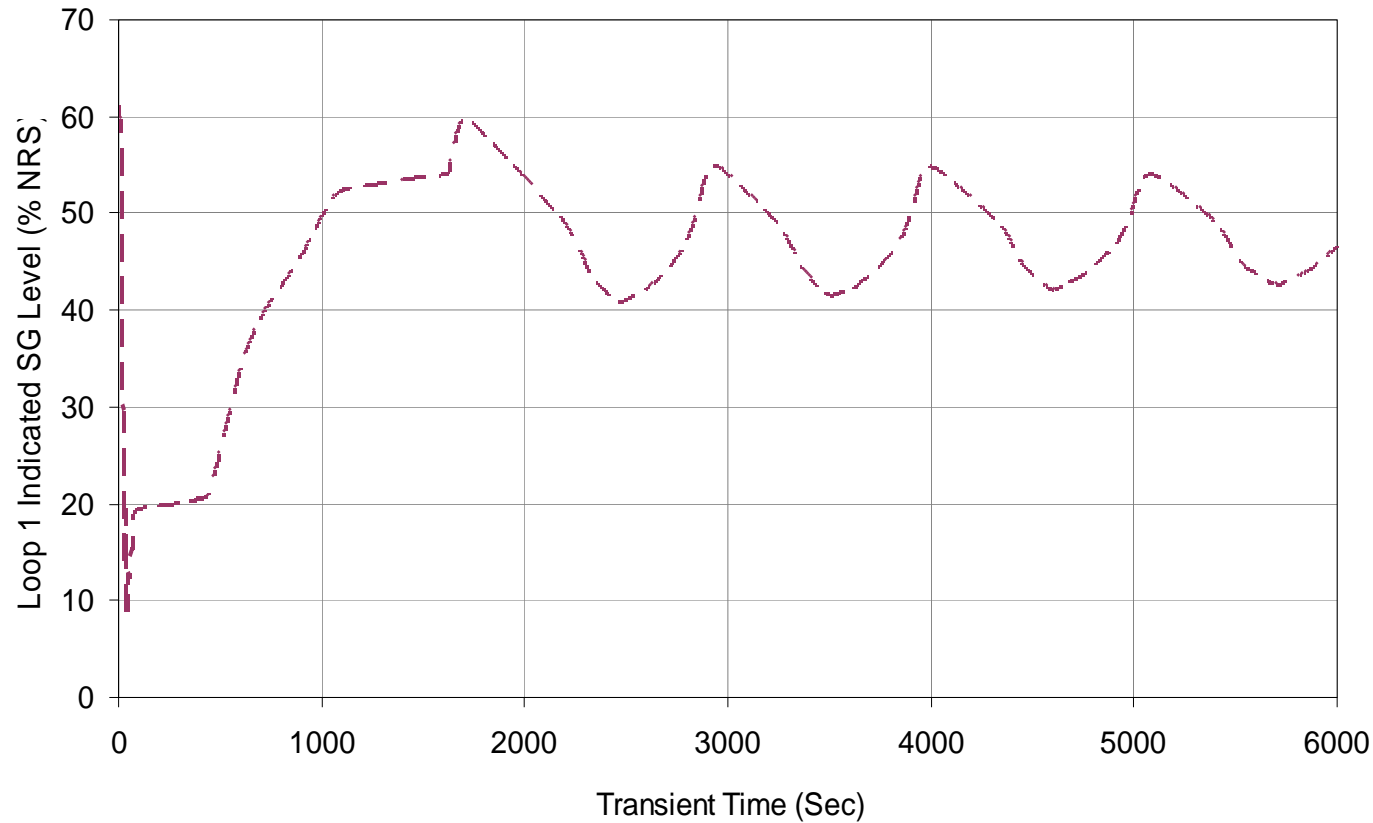
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Limiting Case Analysis Results

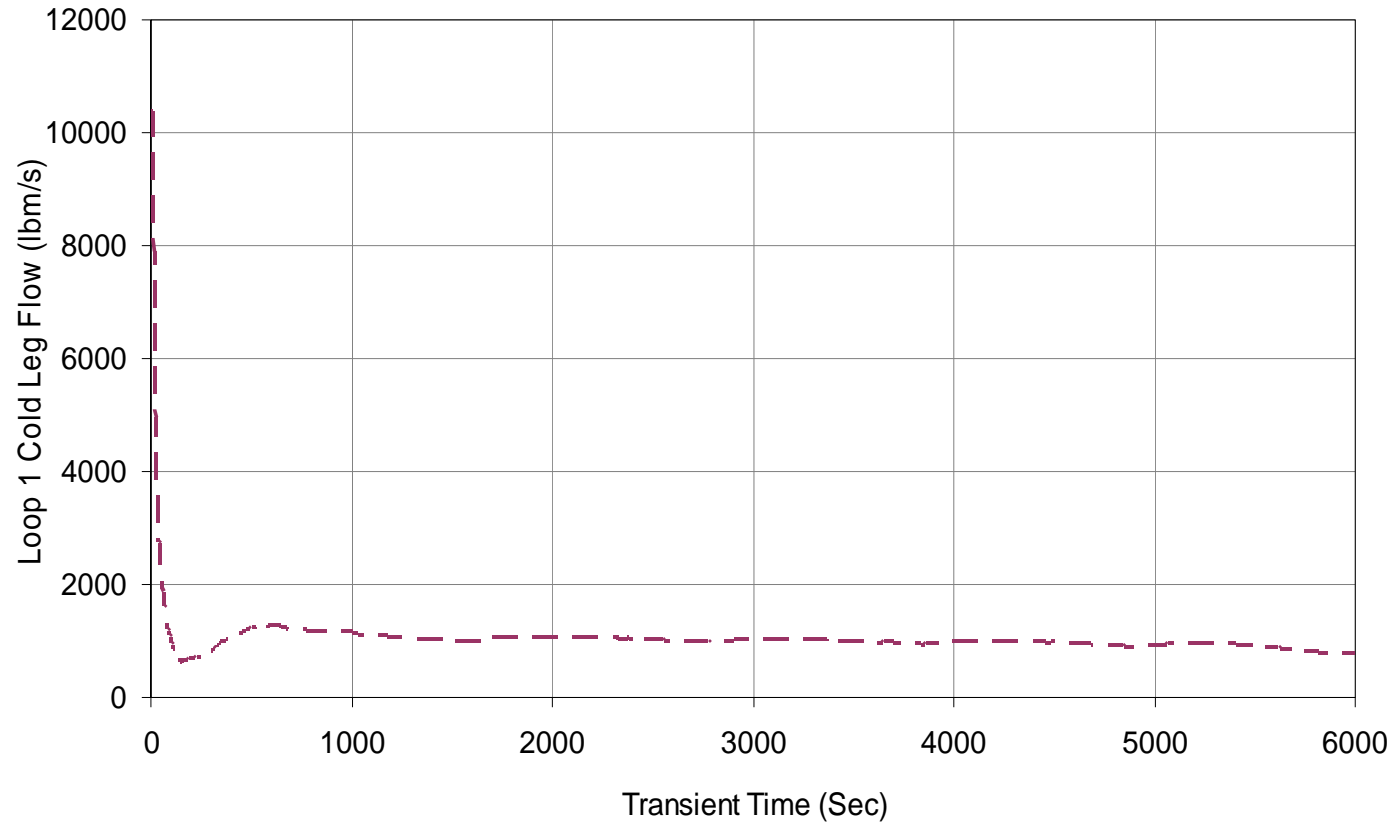
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Limiting Case Analysis Results

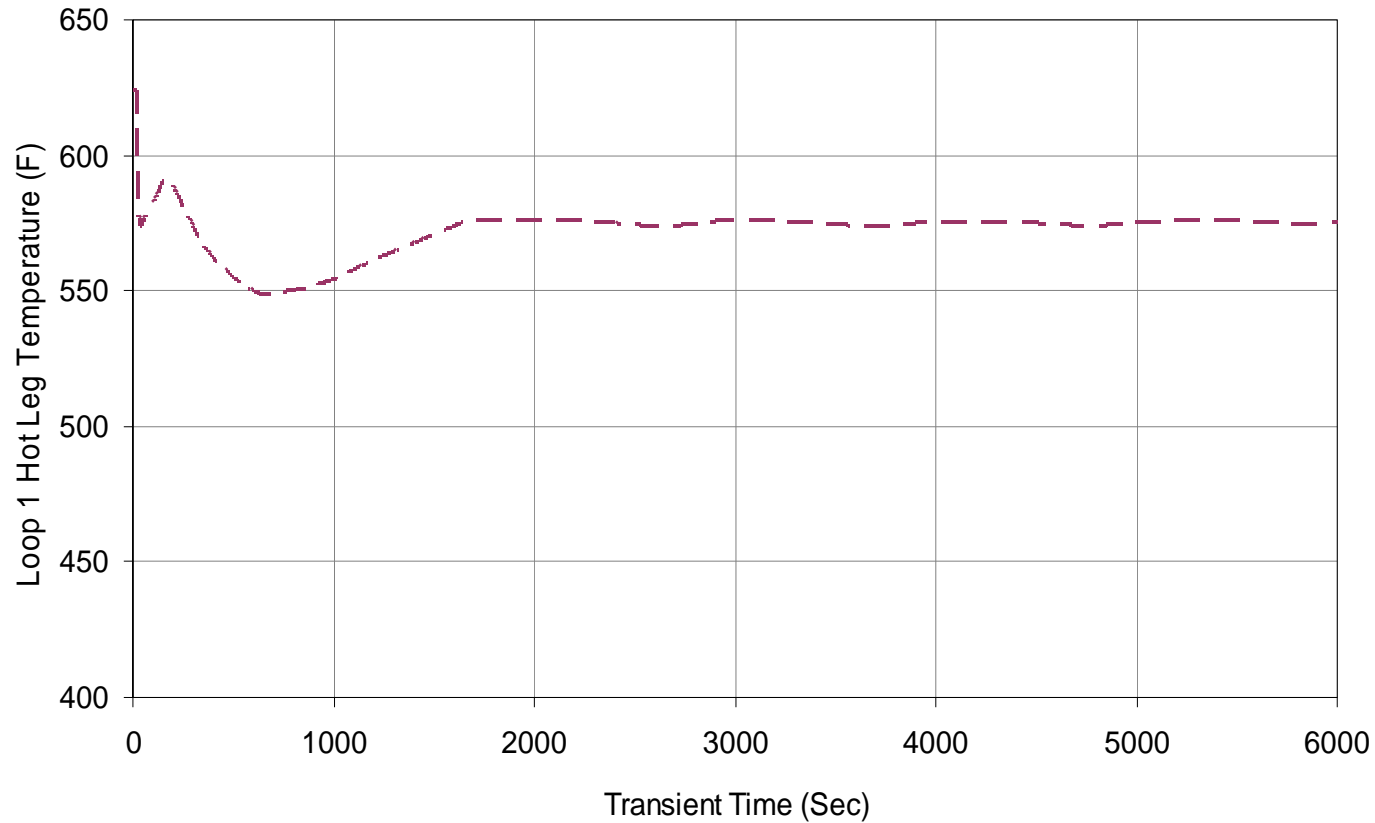
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Limiting Case Analysis Results

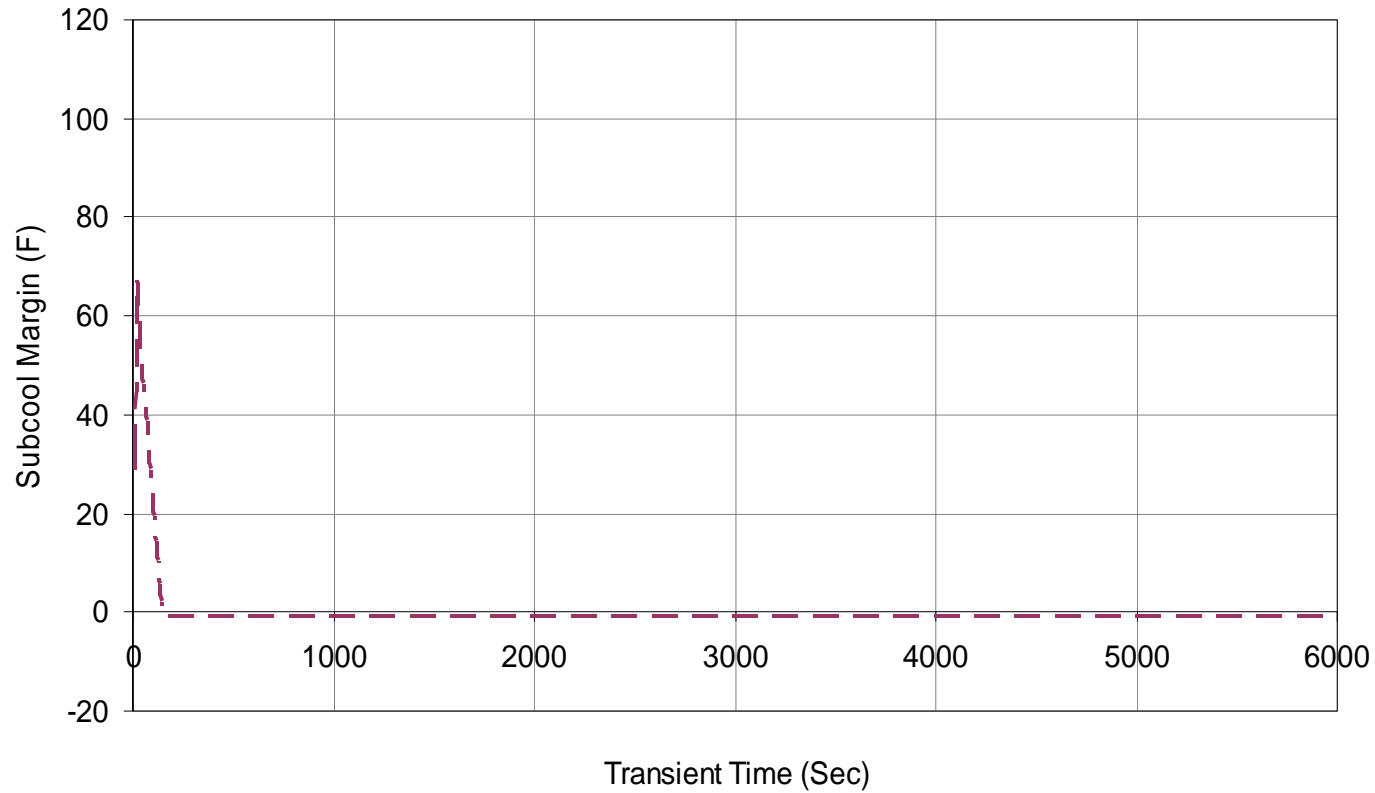
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Limiting Case Analysis Results

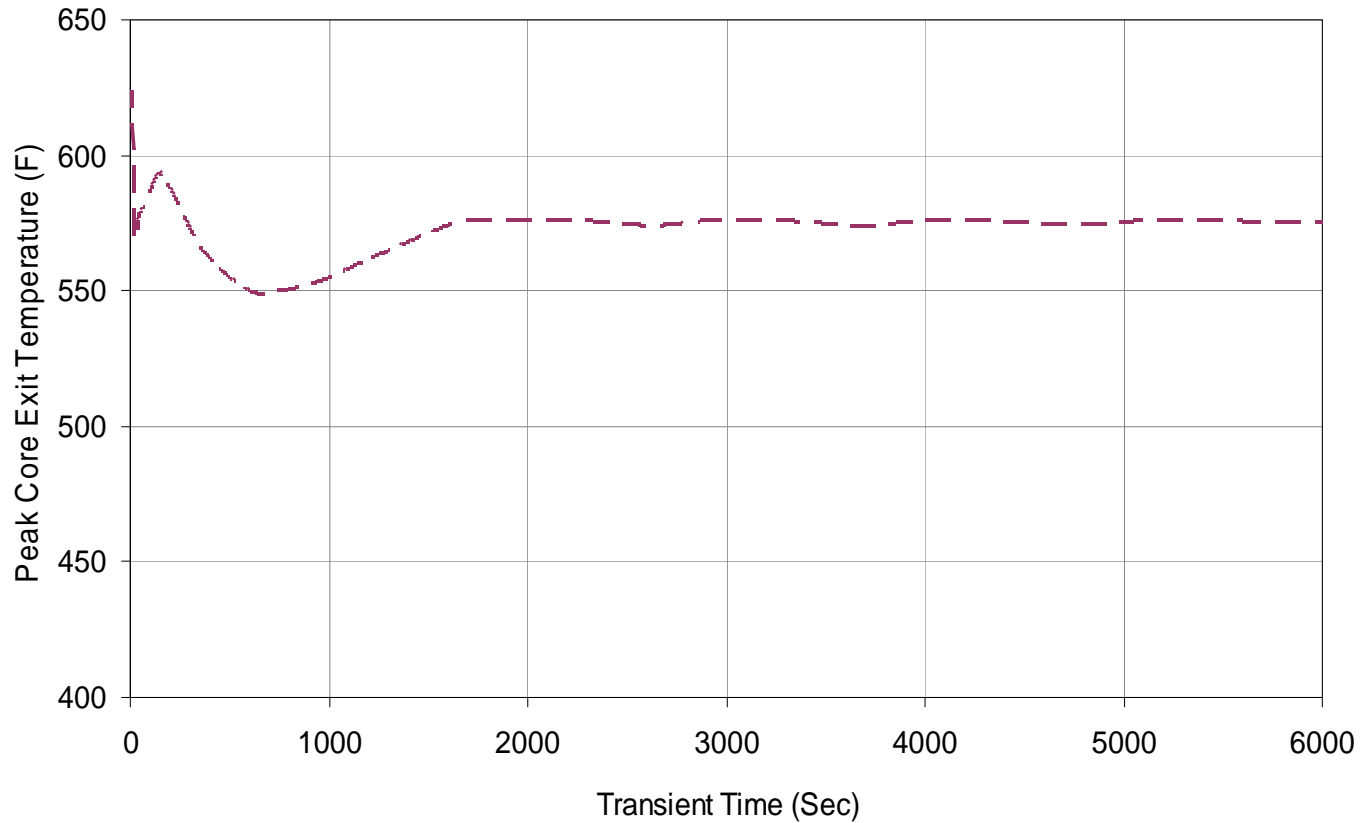
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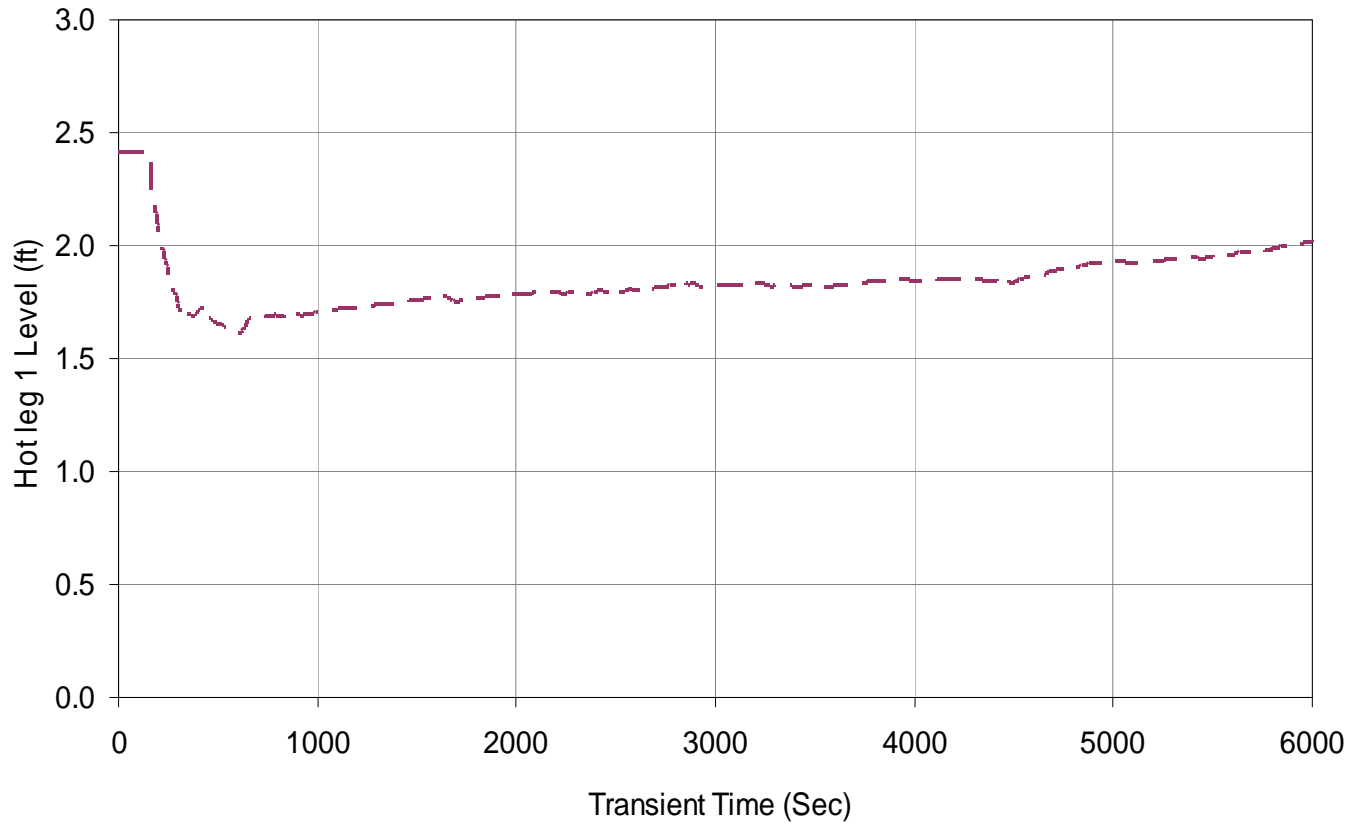
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Limiting Case Analysis Results

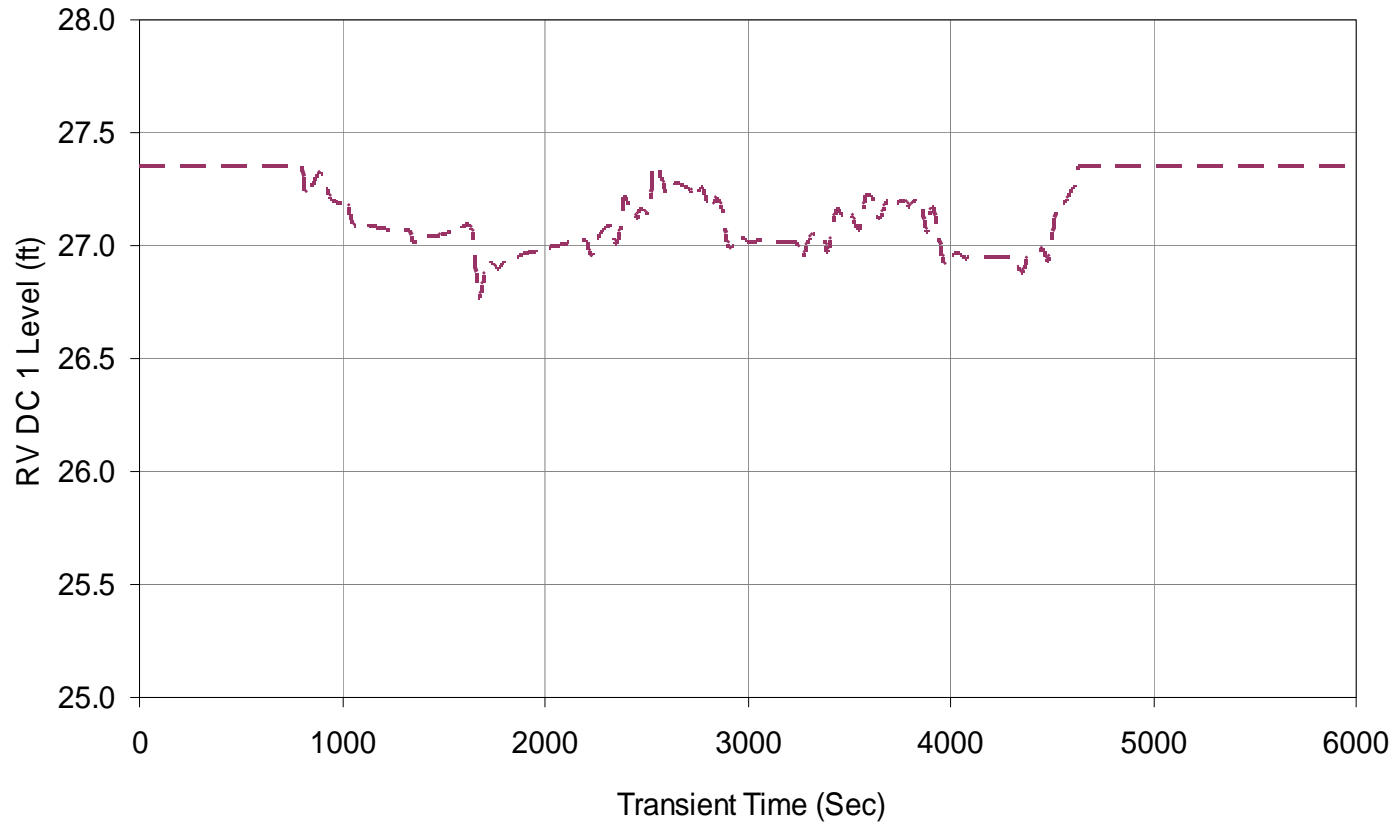
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Limiting Case Analysis Results

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Analytical Basis for Proposed Licensing Action (Continued)

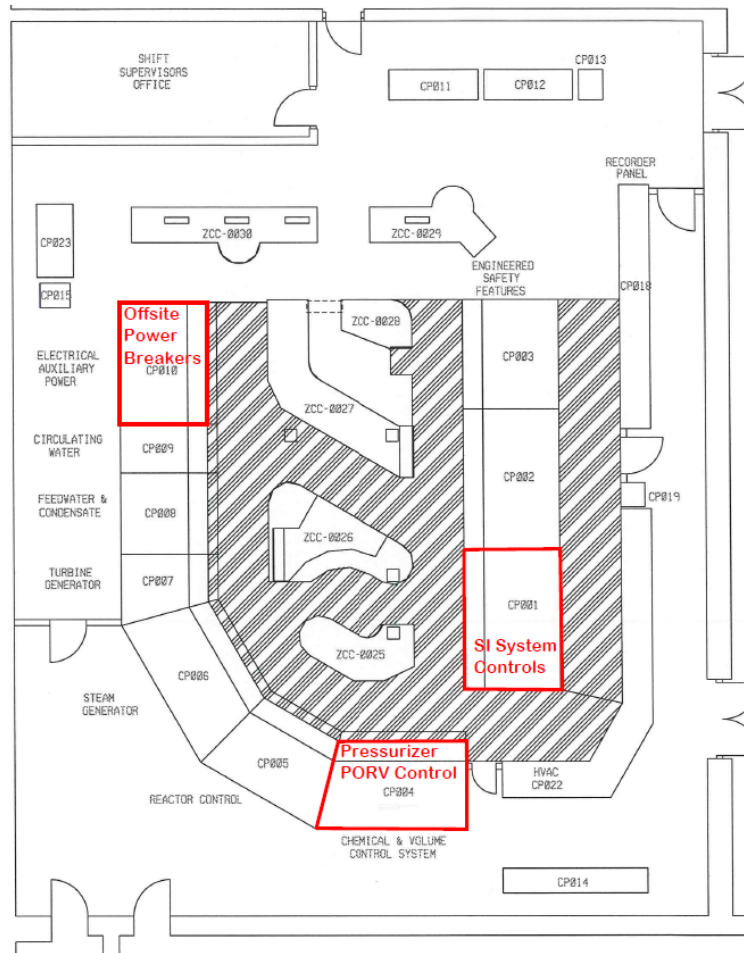
Fire Modeling of the Limiting Event

Demonstrates that a fire leading to the limiting event is not credible.

- Model used was Consolidated Model of Fire Growth and Smoke Transport (CFAST).
- Key features are barriers separating panels and distance between panels.
- Limiting panel is CP001 – Safety Injection (SI) control circuits.
 - Limiting because panel is smaller and physically isolated from other control room panels such that ambient heat flux and upper layer temperature is greater than a fire initiating in other investigated panels.
- Result is impact of fire in CP001 will only result in CP004 (PORV control circuits) and CP010 (offsite power control circuits) experiencing marginally above ambient conditions.

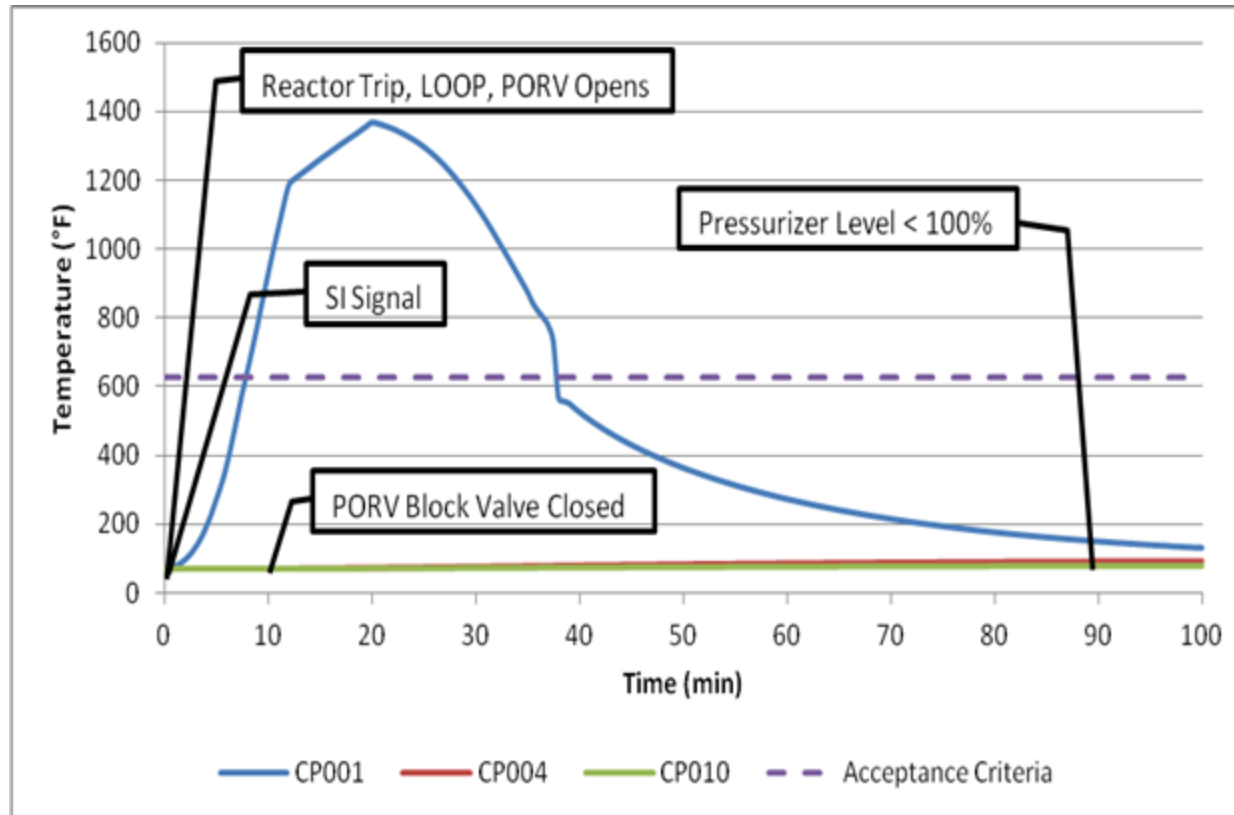


Fire Modeling of Limited Event Control Room Layout





Fire Modeling of Limited Event Results





Safety/Security Interface

- The performance of the operator actions in the control room prior to evacuation does not change security response to a fire in the control room.
- The site physical security plan is not impacted by the proposed change.



Preliminary No Significant Hazards Consideration Determination

- Proposed action will not initiate an event. The proposed actions do not increase the probability of occurrence of a fire or any other accident previously evaluated.
- Proposed action does not involve new failure mechanisms or malfunctions that can initiate a new accident.
- Margin of safety is not significantly reduced by the propose action.
 - Completion of operator actions ensure that the requirements of Appendix R, Section III.L are met and there is no impact on fission product integrity.
 - When considering instrument uncertainties, safe shutdown capability is maintained with no impact on fission product integrity.
 - In limiting case where no operator actions in the control room are successful, fission product integrity is maintained.



Environmental Considerations

The proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9).



Conclusion

- Thermal-hydraulic analysis demonstrate that the proposed operator actions meet regulatory requirements.
- Proposed operator actions will not be negated by subsequent spurious actuations.
- Automatic turbine trip is ensured by reliability and redundancy.
- Proposed operator actions have been validated to be feasible and reliable.
- Fire Protection Program objectives are met.
- Defense-in-depth limiting event analysis demonstrate that fuel integrity is not challenged.
- Fire modeling demonstrates fire leading to limiting event is not credible.



Questions?