

Sdp \ Exercise1 \
Exercise#1tables.wpd

SDP PHASE 1 SCREENING WORKSHEET FOR INITIATING EVENTS, MITIGATION SYSTEMS, AND BARRIERS CORNERSTONES

Reference/Title (LER #, Inspection Report #, etc):

Performance Deficiency (concise statement clearly stating deficient licensee performance):
Failure to follow vendor recommendations for setting seal oil backup differential pressure regulator.

Factual Description of Condition (statement of facts known about the condition that resulted from the performance deficiency, without hypothetical failures included):
Incorrect setting of backup differential pressure regulator resulted in a reactor/turbine trip.

System(s)/Train(s) Degraded by Condition: Turbine/generator.

Licensing Basis Function of System(s)/Train(s): Generate electrical power.

Other Safety Function of System(s)/Train(s): None.

Maintenance Rule Category (check one):

risk-significant non risk-significant

Time condition existed or is assumed to have existed: < 3 days.

C13

CORNERSTONES AND FUNCTIONS DEGRADED AS A RESULT OF DEFICIENCY

(✓) Check the appropriate boxes

INITIATING EVENTS CORNERSTONE	MITIGATION SYSTEMS CORNERSTONE	BARRIERS CORNERSTONE
<p><input type="checkbox"/> Primary System LOCA initiator contributor - (e.g., RCS leakage from pressurizer heater sleeves, RPV piping penetrations, CRDM nozzles, PORVs, SRVs, ISLOCA issues, etc.)</p> <p><input checked="" type="checkbox"/> Transient initiator contributor (e.g., reactor/turbine trip, loss of offsite power, loss of service water, main steam/feedwater piping degradations, etc.)</p> <p><input type="checkbox"/> Fire initiator contributor (e.g., transient loadings and combustibles, hotwork)</p> <p><input type="checkbox"/> Internal/external flooding initiator contributor</p>	<p><input type="checkbox"/> Core Decay Heat Removal Degraded</p> <p><input type="checkbox"/> Short Term Heat Removal Degraded</p> <p style="margin-left: 20px;"><input type="checkbox"/> Primary (e.g., Safety Inj, [main feedwater, HPCI, and RCIC - BWR only])</p> <p style="margin-left: 40px;">___ High Pressure</p> <p style="margin-left: 40px;">___ Low Pressure</p> <p style="margin-left: 20px;"><input type="checkbox"/> Secondary - PWR only (e.g. AFW, main feedwater, ADVs)</p> <p><input type="checkbox"/> Long Term Heat Removal Degraded (e.g., ECCS sump recirculation, suppression pool)</p> <p><input type="checkbox"/> Reactivity Control Degraded</p> <p><input type="checkbox"/> Seismic/Fire/Flood/Severe Weather Protection Degraded</p>	<p><input type="checkbox"/> RCS Boundary as a mitigator following plant upset (e.g., pressurized thermal shock). Note: all other RCS boundary issues, such as leaks, will be considered under the Initiating Events Cornerstone.</p> <p><input type="checkbox"/> Containment Barrier Degraded</p> <p><input type="checkbox"/> Reactor Containment Degraded</p> <p style="margin-left: 20px;">___ Actual Breach or Bypass</p> <p style="margin-left: 20px;">___ Heat Removal, Hydrogen or Pressure Control Degraded</p> <p><input type="checkbox"/> Control Room, Aux Bldg/Reactor Bldg, or Spent Fuel Bldg Barrier Degraded</p> <p><input type="checkbox"/> Fuel Cladding Barrier Degraded</p>

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Check the appropriate boxes ✓

IF the finding is assumed to degrade:

1. fire protection defense-in-depth strategies involving: detection, suppression (equipment for both manual and automatic), barriers, fire prevention and administrative controls, and post fire safe shutdown systems, **THEN STOP. Go to IMC 0609, Appendix F.** Issues related to performance of the fire brigade are not included in Appendix F and require NRC management review.
2. steam generator tube integrity, **THEN STOP. Go to IMC 0609, Appendix J.**
3. the safety of an operating reactor, **THEN IDENTIFY** the degraded cornerstone(s):

- Initiating Event
- Mitigation Systems
- RCS Barrier (PTS issues only)
- Fuel Barrier
- Containment Barriers

IF TWO OR MORE of the above cornerstones are degraded → **THEN STOP. Go to Phase 2.**

IF ONLY ONE of the above cornerstones is degraded, **THEN CONTINUE** in the appropriate column on page 4 of 5 of this worksheet.

NOTE: When assessing the significance of a finding affecting multiple cornerstones, the finding should be assigned to the cornerstone that best reflects the dominant risk of the finding.

Initiating Events Cornerstone	Mitigation Systems Cornerstone	RCS Barrier/ Fuel Barrier Cornerstones	Containment Barriers Cornerstone
<p><u>LOCA Initiators</u></p> <p>1. Assuming worst case degradation, would the finding result in exceeding the Tech Spec limit for identified RCS leakage or could the finding have likely affected other mitigation systems resulting in a total loss of their safety function.</p> <p><input type="checkbox"/> If YES → Stop. Go to Phase 2.</p> <p><input type="checkbox"/> If NO, screen as Green.</p> <p><u>Transient Initiators</u></p> <p>1. Does the finding contribute to <u>both</u> the likelihood of a reactor trip AND the likelihood that mitigation equipment or functions will not be available?</p> <p><input type="checkbox"/> If YES → Stop. Go to Phase 2.</p> <p><input checked="" type="checkbox"/> If NO, screen as Green.</p> <p><u>External Event Initiators</u></p> <p>1. Does the finding increase the likelihood of a fire or internal/external flood?</p> <p><input type="checkbox"/> If YES → Use the IPEEE or other existing plant-specific analyses to identify core damage scenarios of concern and factors that increase the frequency. Provide this input for Phase 3 analysis.</p> <p><input type="checkbox"/> If NO, screen as Green.</p>	<p>1. Is the finding a design or qualification deficiency confirmed <u>not</u> to result in loss of operability per Part 9900, Technical Guidance, "Operability Determination Process for Operability and Functional Assessment"?</p> <p><input type="checkbox"/> If YES, screen as Green.</p> <p><input type="checkbox"/> If NO, continue.</p> <p>2. Does the finding represent a loss of safety function?</p> <p><input type="checkbox"/> If YES → Stop. Go to Phase 2</p> <p><input type="checkbox"/> If NO, continue.</p> <p>3. Does the finding represent actual loss of safety function of a single Train, for > its Tech Spec Allowed Outage Time?</p> <p><input type="checkbox"/> If YES → Stop. Go to Phase 2.</p> <p><input type="checkbox"/> If NO, continue.</p> <p>4. Does the finding represent an actual loss of safety function of one or more non-Tech Spec Trains of equipment designated as risk-significant per 10CFR50.65, for >24 hrs?</p> <p><input type="checkbox"/> If YES → Stop. Go to Phase 2.</p> <p><input type="checkbox"/> If NO, continue.</p> <p>5. Does the finding screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event, using the criteria on page 5 of this Worksheet?</p> <p><input type="checkbox"/> If YES → Use the IPEEE or other existing plant-specific analyses to identify core damage scenarios of concern and provide this input for Phase 3 analysis.</p> <p><input type="checkbox"/> If NO, screen as Green.</p>	<p>1. <u>RCS Barrier</u> (e.g., pressurized thermal shock issues)</p> <p>Stop. Go to Phase 3.</p> <p>2. <u>Fuel Barrier</u></p> <p>Screen as Green.</p>	<p>1. Does the finding <u>only</u> represent a degradation of the radiological barrier function provided for the control room, or auxiliary building, or spent fuel pool, or SBT system (BWR)?</p> <p><input type="checkbox"/> If YES → screen as Green.</p> <p><input type="checkbox"/> If NO, continue.</p> <p>2. Does the finding represent a degradation of the barrier function of the control room against smoke or a toxic atmosphere?</p> <p><input type="checkbox"/> If YES → Stop. Go to Phase 3.</p> <p><input type="checkbox"/> If NO, continue.</p> <p>3. Does the finding represent an actual open pathway in the physical integrity of reactor containment, or involve an actual reduction in defense-in-depth for the atmospheric pressure control or hydrogen control functions of the reactor containment?</p> <p><input type="checkbox"/> If YES → Stop. Go to Appendix H of IMC 0609.</p> <p><input type="checkbox"/> If NO, screen as Green.</p>

SDP PHASE 1 SCREENING WORKSHEET FOR IE, MS, and B CORNERSTONES

Seismic, Flooding, and Severe Weather Screening Criteria

1. Does the finding involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding, or severe weather initiating event (e.g., seismic snubbers, flooding barriers, tornado doors)?
 - If YES** → continue to question 2
 - If NO** → skip to question 3

2. If the equipment or safety function is assumed to be completely failed or unavailable, are ANY of the following three statements TRUE? The loss of this equipment or function by itself, during the external initiating event it was intended to mitigate
 - a) would cause a plant trip or any of the Initiating Events used by Phase 2 for the plant in question;
 - b) would degrade **two or more** Trains of a multi-train safety system or function;
 - c) would degrade one or more Trains of a system that supports a safety system or function.
 - If YES** → the finding is potentially risk significant due to external initiating event core damage sequences - return to page 4 of this Worksheet
 - If NO**, screen as Green

3. Does the finding involve the total loss of any safety function, identified by the licensee through a PRA, IPEEE, or similar analysis, that contributes to external event initiated core damage accident sequences (i.e., initiated by a seismic, flooding, or severe weather event)?
 - If YES** → the finding is potentially risk significant due to external initiating event core damage sequences - return to page 4 of this Worksheet
 - If NO**, screen as Green

Result of Phase 1 screening process:

- Screen as Green** **Go to Phase 2** **Go to Phase 3**

Important Assumptions:

Type of Remaining Mitigation Capability	Remaining Mitigation Capability Credit $X = -\log_{10}(\text{failure prob})$
<p>Recovery of Failed Train</p> <p>Operator action to recover failed equipment that is capable of being recovered after an initiating event occurs. Action may take place either in the control room or outside the control room and is assumed to have a failure probability of approximately 0.1 when credited as "Remaining Mitigation Capability." Credit should be given only if the following criteria are satisfied: (1) sufficient time is available; (2) environmental conditions allow access, where needed; (3) procedures describing the appropriate operator actions exist; (4) training is conducted on the existing procedures under similar conditions; and (5) any equipment needed to perform these actions is available and ready for use.</p>	1
<p>1 Automatic Steam-Driven (ASD) Train</p> <p>A collection of associated equipment that includes a single turbine-driven component to provide 100% of a specified safety function. The probability of such a train being unavailable due to failure, test, or maintenance is assumed to be approximately 0.1 when credited as "Remaining Mitigation Capability."</p>	1
<p>1 Train</p> <p>A collection of associated equipment (e.g., pumps, valves, breakers, etc.) that together can provide 100% of a specified safety function. The probability of this equipment being unavailable due to failure, test, or maintenance is approximately 1E-2 when credited as "Remaining Mitigation Capability."</p>	2
<p>1 Multi-Train System</p> <p>A system comprised of two or more trains (as defined above) that are considered susceptible to common cause failure modes. The probability of this equipment being unavailable due to failure, test, or maintenance is approximately 1E-3 when credited as "Remaining Mitigation Capability," regardless of how many trains comprise the system.</p>	3
<p>2 Diverse Trains</p> <p>A system comprised of two trains (as defined above) that are not considered to be susceptible to common cause failure modes. The probability of this equipment being unavailable due to failure, test, or maintenance is approximately 1E-4 when credited as "Remaining Mitigation Capability."</p>	4 (=2+2)
<p>Operator Action Credit</p> <p>Major actions performed by operators during accident scenarios (e.g., primary heat removal using bleed and feed, etc.). These actions are credited using three categories of human error probabilities (HEPs). These categories are Operator Action = 1 which represents a failure probability between 5E-2 and 0.5, Operator Action = 2 which represents a failure probability between 5E-3 and 5E-2, and Operator Action = 3 which represents a failure probability between 5E-4 and 5E-3.</p>	1, 2, or 3

Table 4 - Remaining Mitigation Capability Credit

Counting Rule Worksheet

Step	Instructions
(1)	Enter the number of sequences with a risk significance equal to 9. (1) _____
(2)	Divide the result of Step (1) by 3 and round down. (2) _____
(3)	Enter the number of sequences with a risk significance equal to 8. (3) _____
(4)	Add the result of Step (3) to the result of Step (2). (4) _____
(5)	Divide the result of Step (4) by 3 and round down. (5) _____
(6)	Enter the number of sequences with a risk significance equal to 7. (6) _____
(7)	Add the result of Step (6) to the result of Step (5). (7) _____
(8)	Divide the result of Step (7) by 3 and round down. (8) _____
(9)	Enter the number of sequences with a risk significance equal to 6. (9) _____
(10)	Add the result of Step (9) to the result of Step (8). (10) _____
(11)	Divide the result of Step (10) by 3 and round down. (11) _____
(12)	Enter the number of sequences with a risk significance equal to 5. (12) _____
(13)	Add the result of Step (12) to the result of Step (11). (13) _____
(14)	Divide the result of Step (13) by 3 and round down. (14) _____
(15)	Enter the number of sequences with a risk significance equal to 4. (15) _____
(16)	Add the result of Step (15) to the result of Step (14). (16) _____

- If the result of Step 16 is greater than zero, then the risk significance of the inspection finding is of high safety significance (RED).
- If the result of Step 13 is greater than zero, then the risk significance of the inspection finding is at least of substantial safety significance (YELLOW).
- If the result of Step 10 is greater than zero, then the risk significance of the inspection finding is at least of low to moderate safety significance (WHITE).
- If the result of Steps 10, 13, and 16 are zero, then the risk significance of the inspection finding is of very low safety significance (GREEN).

Phase 2 Result: GREEN WHITE YELLOW RED

Table 5 - Counting Rule Worksheet