

AECOP Workshop #3
NRC Facilitator Handout – Scenarios and Solutions

Questions to stimulate conversation (if needed):

1. Was your result consistent with the NRC's result? If not, why?
2. Are there technology-specific considerations that might change the outcomes?
3. Is the process reasonably easy to understand and execute? If not, why?
4. Do you think the ARCOP SDP process provides reasonable results? If not, why?
5. Do you have any suggestions to improve the process?

Group activity – Example Scenario 1

(For demonstration purpose only)

No PD

While walking down the salt processing system in the reactor building of a MSR project, an NRC inspector observes damage to a system pipe. That portion of the reactor building has not been completed (no roof) and the inspector is aware of a severe weather event that occurred 2 days ago at the site. The licensee informs the NRC inspector that they intend to walkdown all the SSCs that were potentially affected by the weather event, but they hadn't walked down that portion of the reactor building yet. The NRC inspector reviews work requests generated after the weather event and observes that there is an open work request to walkdown the reactor building for potential damage to SSCs.

Extra information:

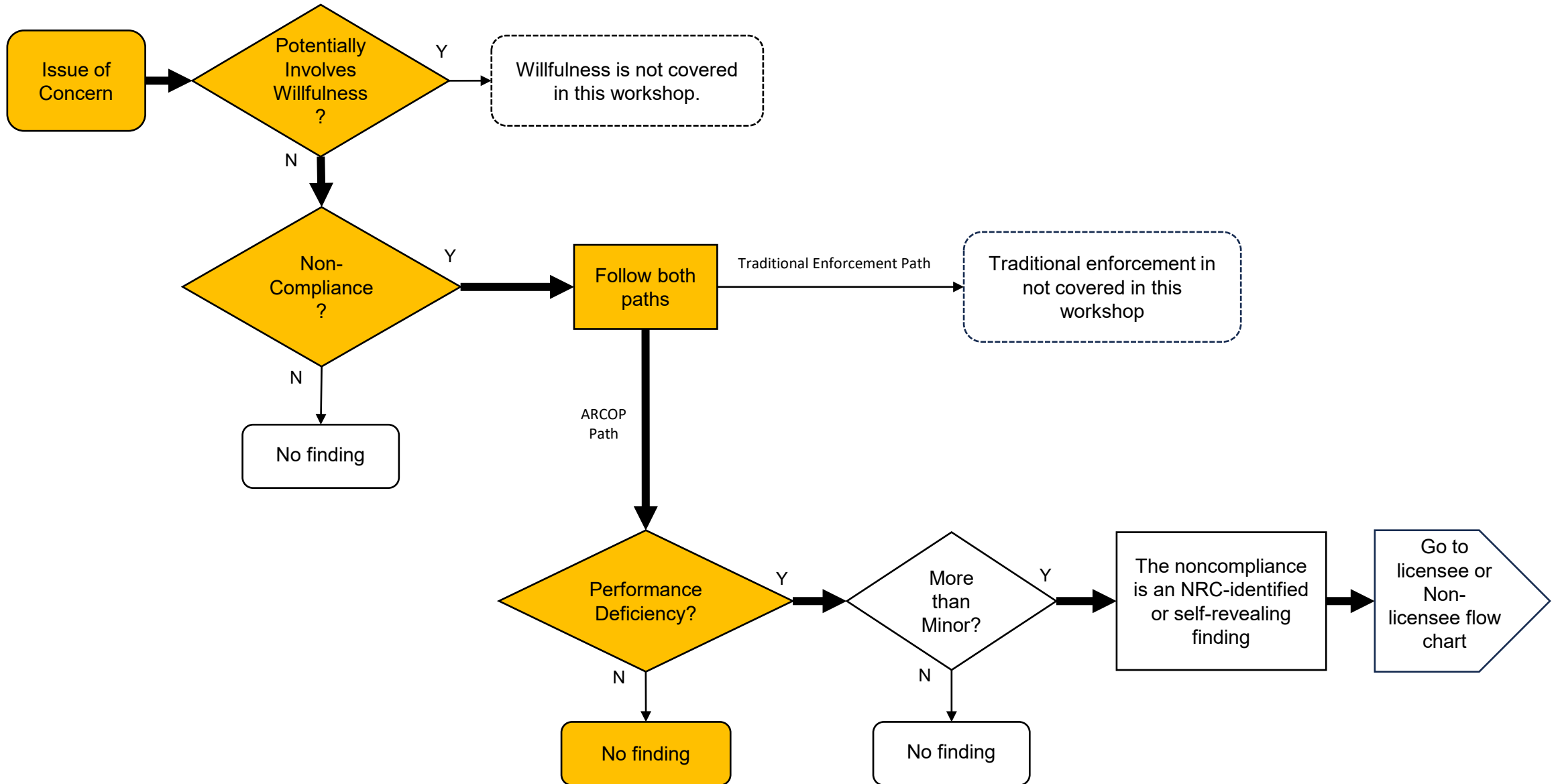
- The salt processing system piping is a SR radionuclide boundary, and the deficiency affects its ASME qualification.
- Exact cause of the damage is unknown but appears to be storm-related
- It is reasonable that the licensee has not walked down the room yet. With no immediate safety concern, they could wait a long time to do it. It should be documented in the work-flow system or CAP if not performed promptly.

Alternate Scenarios:

- What if they didn't have a planned action to identify?
- What if they completed their action to walkdown, but missed this degradation?

Scenario 1 Flowchart

(For demonstration purpose only)



Group activity – Example Scenario 2

(For demonstration purpose only)

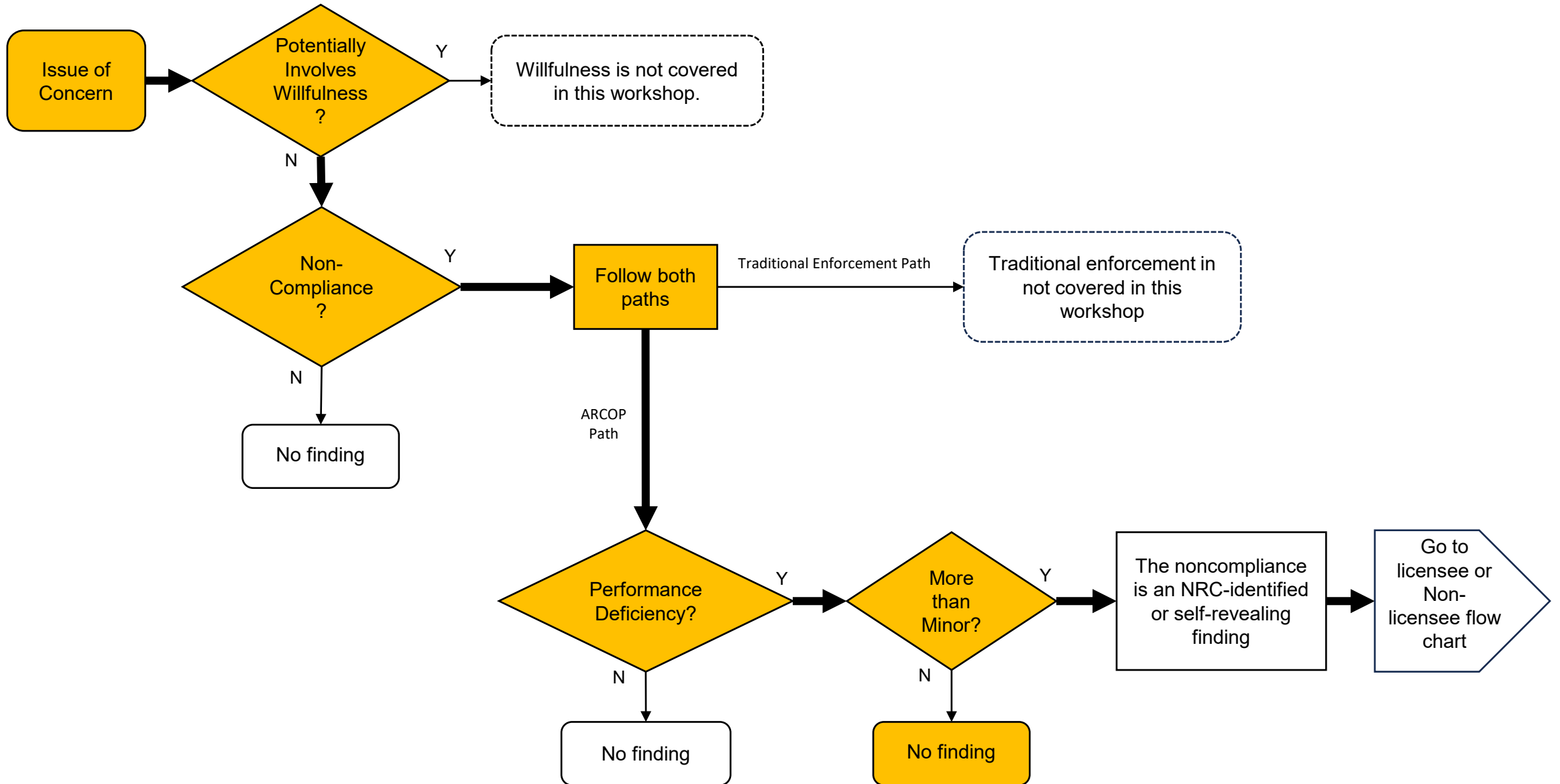
Minor – SCN:

While reviewing condition reports (CAP entries) as part of an auxiliary heat removal system inspection, an NRC inspector reviews a condition report that documents an error in a work procedure that led to 4 nonconforming welds in system piping. The NRC inspector also noted that corrective actions were complete for 2 of the 4 welds (grind out weld and reweld) but not the other 2 welds. Those corrective actions are marked as “pending further evaluation” in the CAP database.

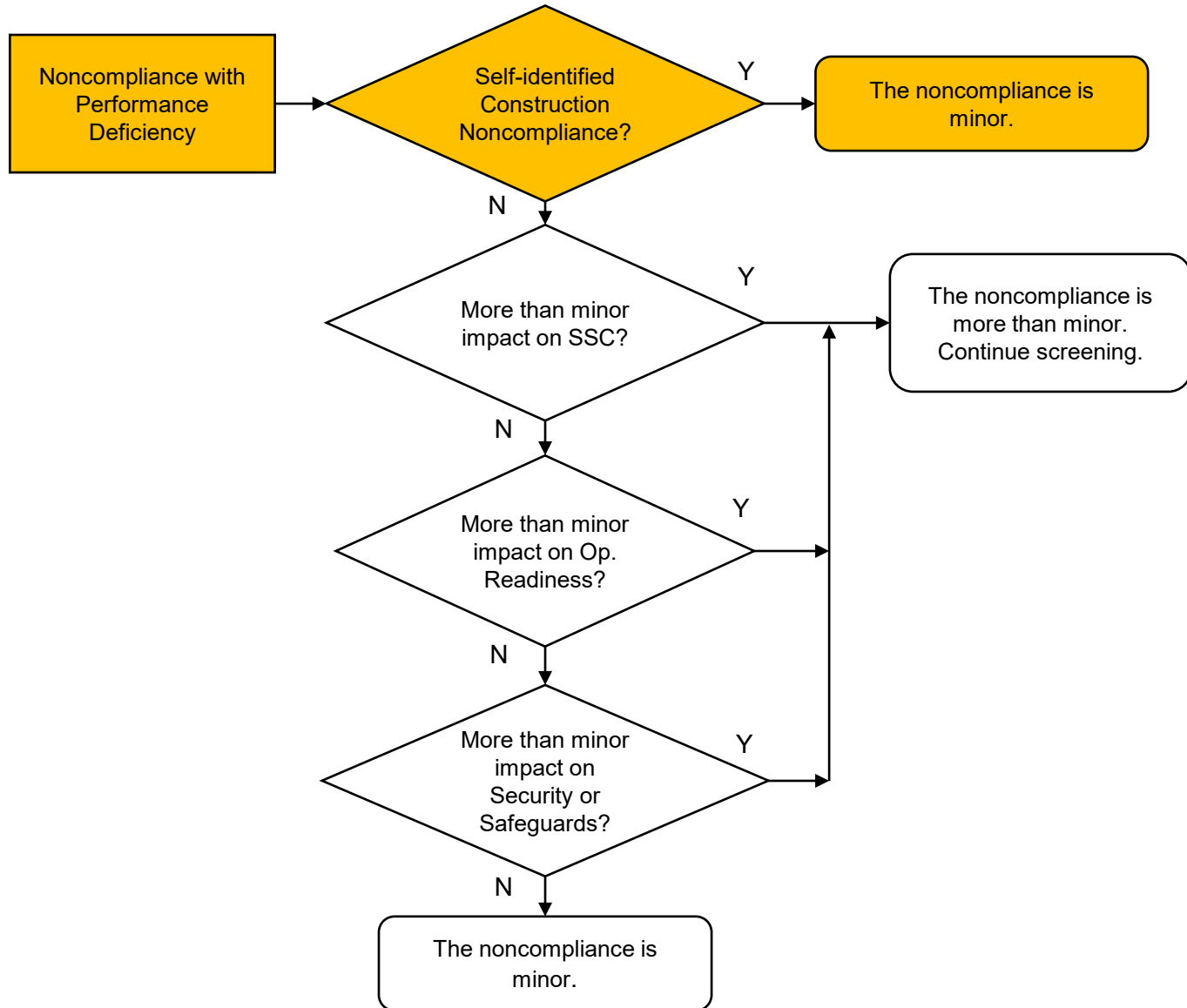
Extra information:

- There is also a completed corrective action to correct the procedural error, which was completed, and the CA fixed the problem adequately.
- No other welds were performed with the procedure.
- The “pending further evaluation” action in the CAP is assigned to the engineering department with no due date – but this isn’t really a problem because the action is assigned a reasonable priority in the CAP to schedule and repair.
- The system is NSRST. The welds are required to be ASME qualified. The system is credited for DID for heat removal for several LBEs.

Scenario 2 Flowchart (For demonstration purpose only)



Scenario 2 Flowchart (For demonstration purpose only)



Self-identified Construction Noncompliances (SCNs)

1. The noncompliance is self-identified (not NRC-identified or self-revealing), and
2. The noncompliance must be in a facility-approved QAP process for correction when evaluated by NRC inspectors, as defined by facility-approved QAP procedures. This may include:
 - Entry into an QAP work-flow process or corrective action program.
 - Proper timing and tracking of planned corrective actions so that the noncompliance will not adversely impact reactor operations.
 - If corrective actions are complete, the corrective actions are adequate.

Note: NRC-identified weaknesses with corrective actions are processed as separate noncompliances.

Group activity – Example Scenario 3

(For demonstration purpose only)

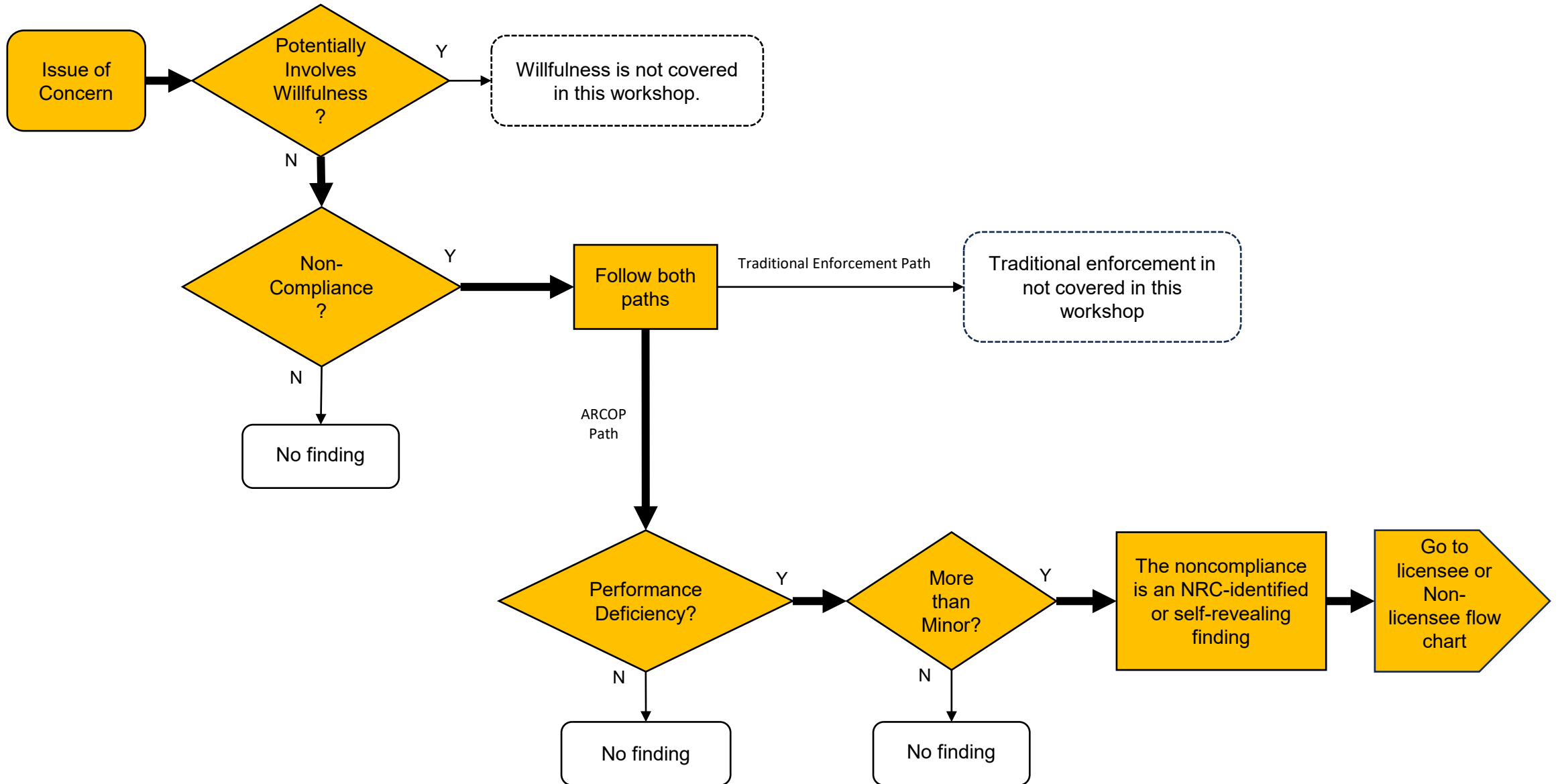
Green - Hazards:

While reviewing seismic design requirements for the safety related portion of the reactor building, an NRC inspector notes that part of the north wall rebar configuration does not match the design drawing. In response to the NRC inspector's observation, the licensee repaired the nonconformance which required substantive rework.

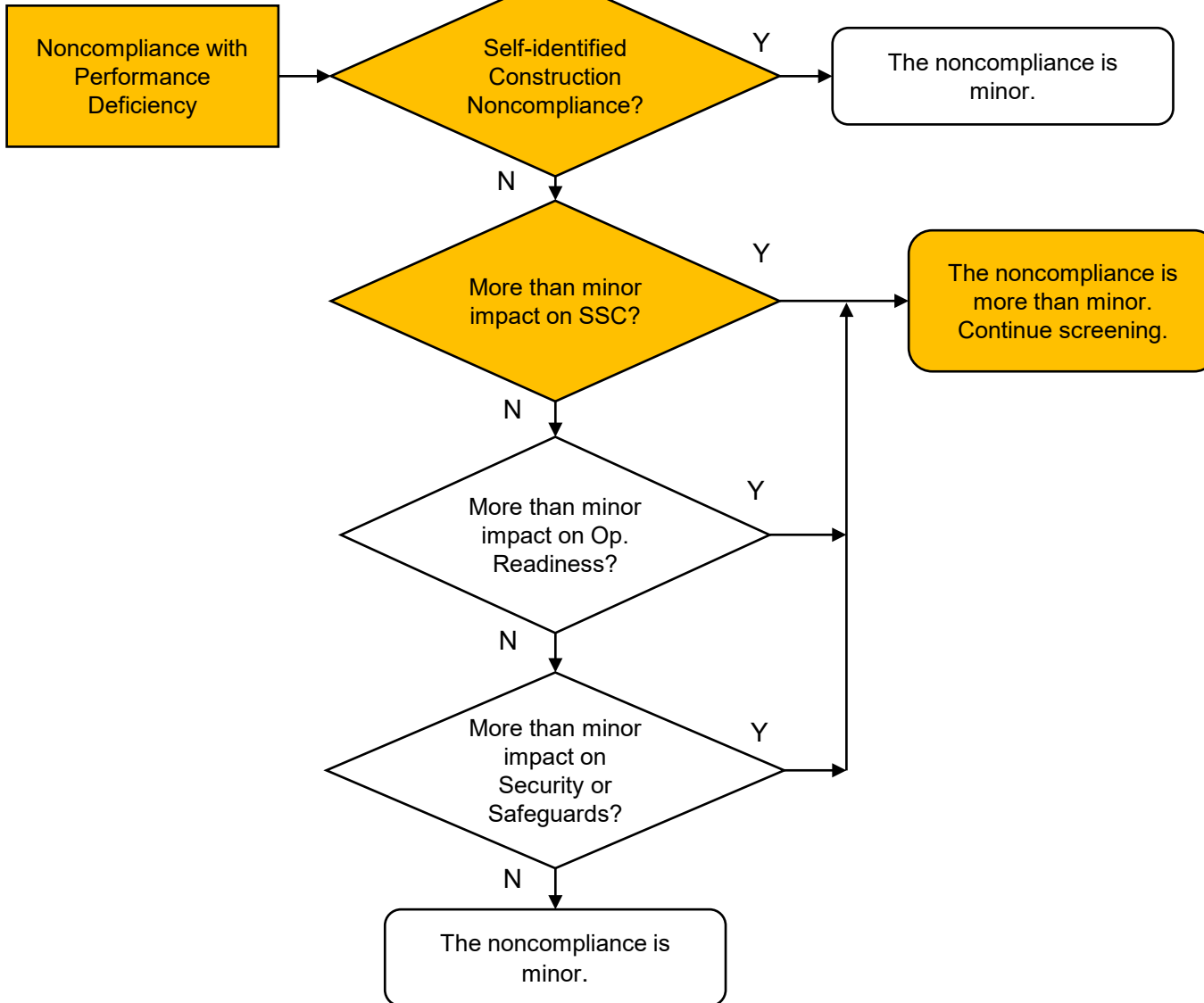
Extra information:

- The design drawing is correct.
- The configuration issue did not affect the ability of the wall to hold its own weight but did affect the seismic qualification or tornado protection.
- No use-as-is analysis was performed to assess the impact of the defect.
- The error in the north wall is traced back to a human performance issue with craft workers.
- The north wall is the first rebar placed in the reactor building; no other SR walls have been constructed.
- The problem's effect on the ability of the wall to resist a DBE is unknown (no detailed analysis was performed). Note: no analysis should be required as the nonconformance was repaired. The issue was screened to green due to the limited scope (i.e, lack of a significant QAP breakdown).

Scenario 3 Flowchart (For demonstration purpose only)



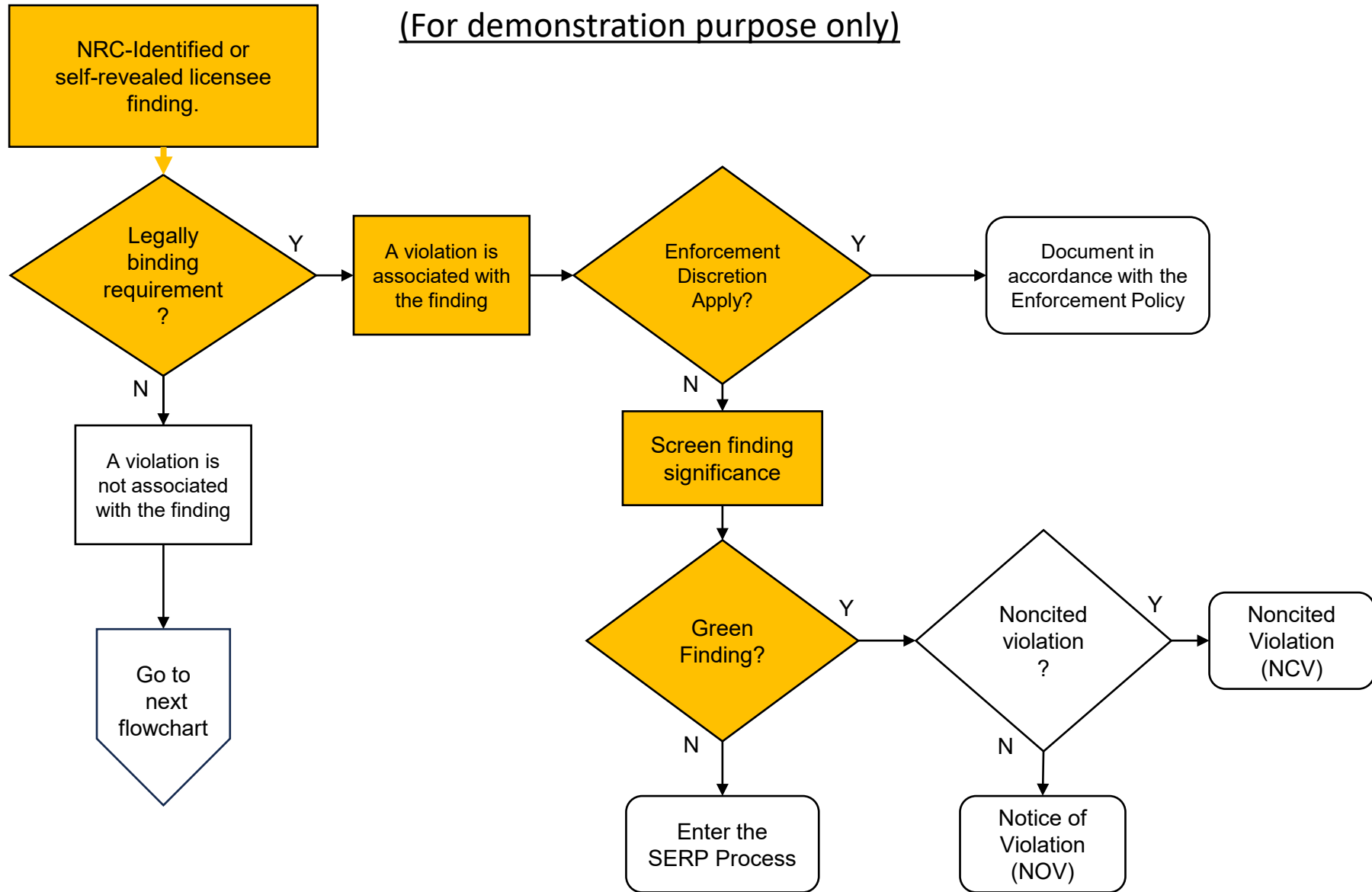
Scenario 3 Flowchart (For demonstration purpose only)



- a. Does the performance deficiency represent an adverse condition that rendered the quality of a risk-significant or safety-related SSC unacceptable or indeterminate, and requires substantive corrective action?
- b. Does the noncompliance represent an irretrievable loss or inadequate documentation of a quality assurance record; or a record-keeping issue that could preclude the licensee from demonstrating adequacy of quality or from properly evaluating risk-significant or safety-related activities?
- c. Does the noncompliance prevent the licensee from meeting an ITAAC Design Commitment or approved Technical Specification?
- d. Does the noncompliance invalidate the performance of an Inspection, Test, or Analysis described in an ITAAC?

Dispositioning *Licensee* Findings (Proposed)

Scenario 3 Flowchart
(For demonstration purpose only)



Scenario 3 (For demonstration purpose only)

| Significance of Finding | Finding's Impact on SSCs |
|-------------------------|--|
| Red | Not applicable to ARCOP findings. |
| Yellow | <ul style="list-style-type: none"> a. The finding, if left uncorrected, would reasonably be expected to result in the loss of a fundamental safety function (FSF)¹ because no systems, trains, or design features are credited for fulfilling the FSF; or b. The finding is not adequately addressed by the significance criteria in this table², and screens as yellow using Appendix F of this IMC. |
| White | <ul style="list-style-type: none"> a. The finding, if left uncorrected, would reasonably be expected to result in the loss of two or more systems, trains, or design feature's ability to fulfill one or more FSFs, and other systems, trains, or design features are credited in fulfilling the FSFs; or b. The finding is not adequately addressed by the significance criteria in this table², and screens as white using Appendix F of this IMC. |
| Green | <ul style="list-style-type: none"> a. The finding, if left uncorrected, would reasonably be expected to result in the loss of one system, train, or design feature's ability to fulfill an FSF, and another system, train, or design feature is credited for fulfilling that FSF; or b. The finding is associated with an issue where no manufacture, fabrication, placement, erection, installation, or modification of hardware associated with the SSC has begun; or c. There is a quality assurance program (QAP) backstop³ for the deficiency associated with the finding; or <li style="background-color: yellow;">d. The finding is associated with a hazard protection feature⁴ and does not potentially represent a significant quality assurance program breakdown⁵; or e. It is demonstrated with reasonable assurance that the design function of the SSC would not be impaired by the deficiency. |

See table notes

Group activity – Example Scenario 4

(For demonstration purpose only)

Green - Loss of a system/train/design feature:

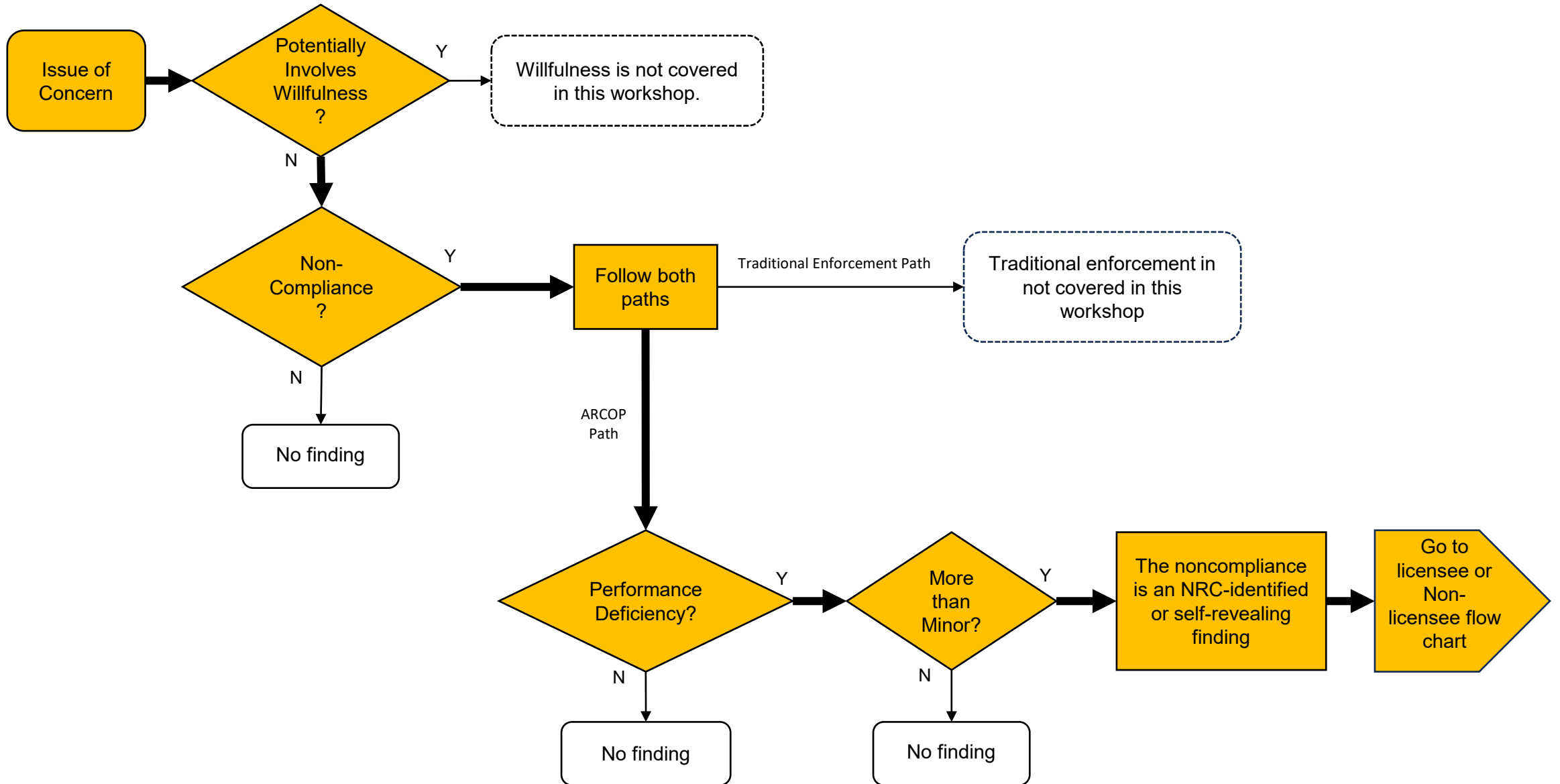
During an NRC inspection, the inspector noted that an orifice in a reactor cavity cooling system pipe was smaller than others in the system (1 of 2 trains affected). The NRC inspector also noted that the orifice size was in accordance with the design drawing. However, the PSAR states that the design flow of ___ is needed for the line, and the design calculations for pipe flow assume a larger orifice (the same size as installed in the other line).

Extra information:

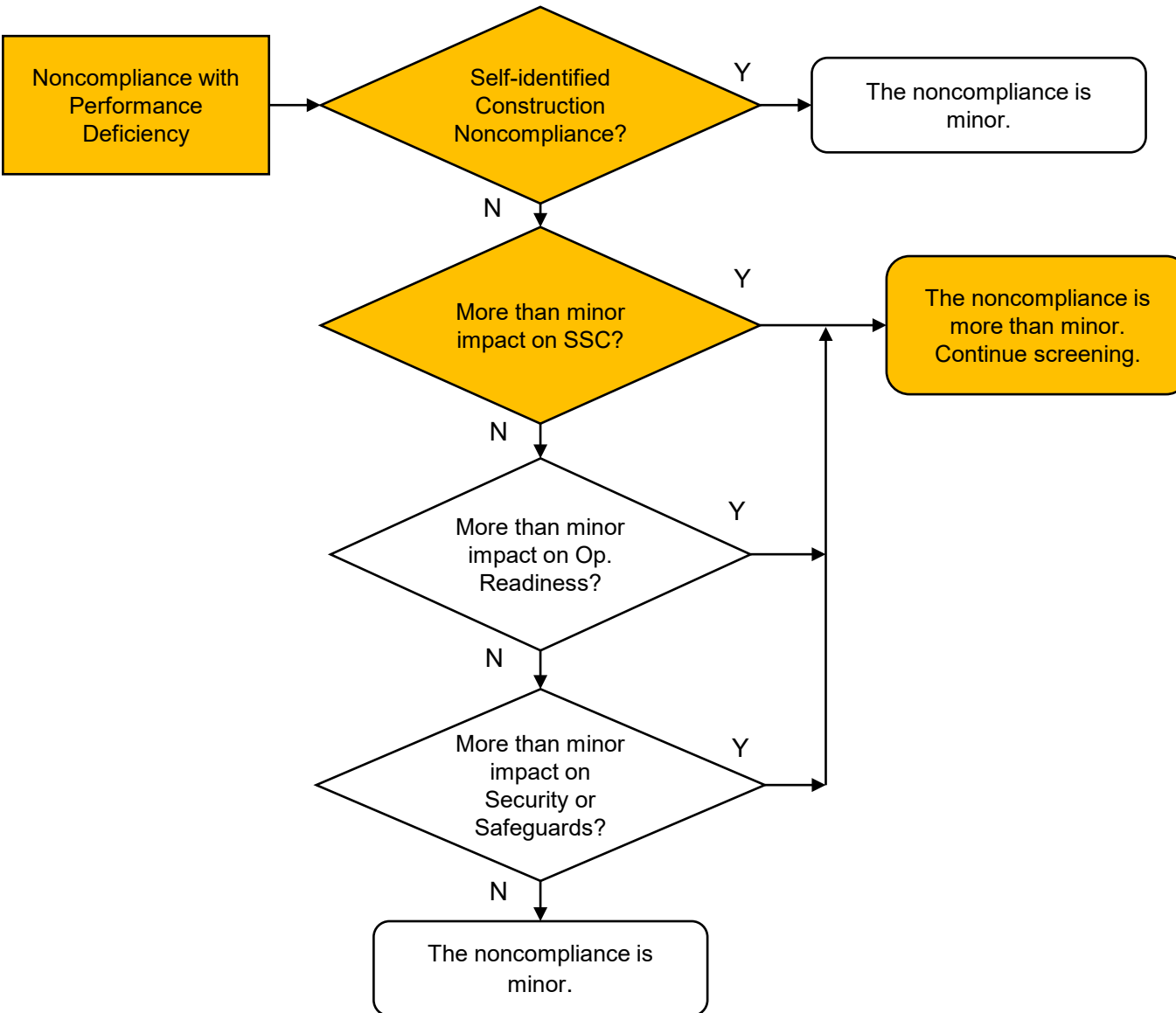
- There are 2 redundant sets of reactor cavity cooling pipes/standpipes. Only 1 set/train is affected.
- The reactor cavity cooling system is the SR system credited for the HR FSF for most LBEs.
- The design drawing error appears to be isolated (no other errors were identified). The licensee initiated a CR to determine the cause of the error after the NRC inspector's observation.
- The calculations were not reperformed with the smaller orifice to see if flow would have been sufficient with the wrong orifice installed. Instead, the licensee has elected to replace the orifice and revise the design drawing to be consistent with the PSAR. Note: should get to green without the analysis (criterion a.)

Scenario 4 Flowchart

(For demonstration purpose only)



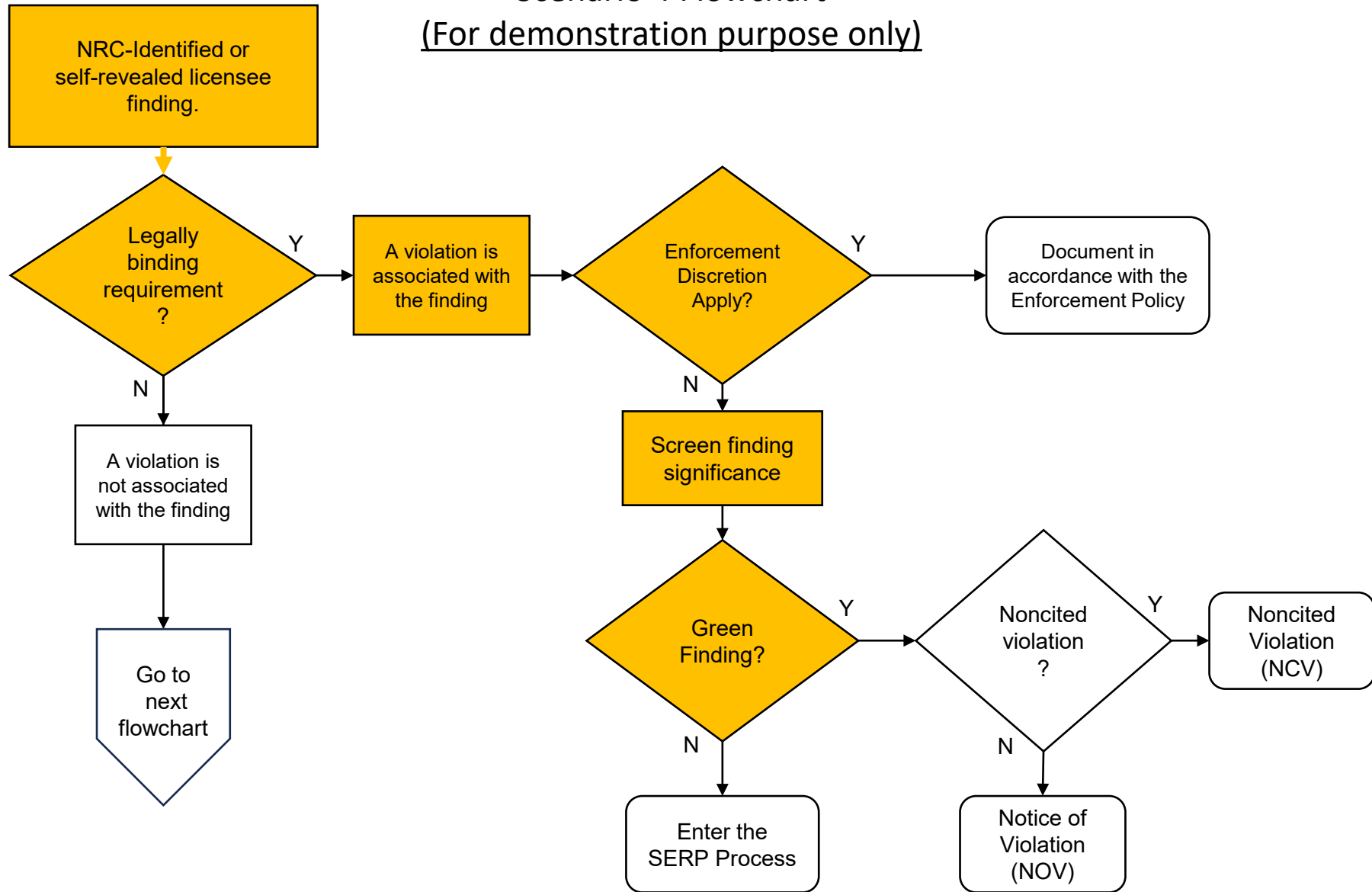
Scenario 4 Flowchart (For demonstration purpose only)



- a. Does the performance deficiency represent an adverse condition that rendered the quality of a risk-significant or safety-related SSC unacceptable or indeterminate, and requires substantive corrective action?
- b. Does the noncompliance represent an irretrievable loss or inadequate documentation of a quality assurance record; or a record-keeping issue that could preclude the licensee from demonstrating adequacy of quality or from properly evaluating risk-significant or safety-related activities?
- c. Does the noncompliance prevent the licensee from meeting an ITAAC Design Commitment or approved Technical Specification?
- d. Does the noncompliance invalidate the performance of an Inspection, Test, or Analysis described in an ITAAC?

Dispositioning *Licensee* Findings (Proposed)

Scenario 4 Flowchart
(For demonstration purpose only)



Scenario 4 (For demonstration purpose only)

| Significance of Finding | Finding's Impact on SSCs |
|-------------------------|---|
| Red | Not applicable to ARCOP findings. |
| Yellow | <ul style="list-style-type: none"> a. The finding, if left uncorrected, would reasonably be expected to result in the loss of a fundamental safety function (FSF)¹ because no systems, trains, or design features are credited for fulfilling the FSF; or b. The finding is not adequately addressed by the significance criteria in this table², and screens as yellow using Appendix F of this IMC. |
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| Green | <ul style="list-style-type: none"> a. The finding, if left uncorrected, would reasonably be expected to result in the loss of one system, train, or design feature's ability to fulfill an FSF, and another system, train, or design feature is credited for fulfilling that FSF; or b. The finding is associated with an issue where no manufacture, fabrication, placement, erection, installation, or modification of hardware associated with the SSC has begun; or c. There is a quality assurance program (QAP) backstop³ for the deficiency associated with the finding; or d. The finding is associated with a hazard protection feature⁴ and does not potentially represent a significant quality assurance program breakdown⁵; or e. It is demonstrated with reasonable assurance that the design function of the SSC would not be impaired by the deficiency. |

See table notes

Group activity – Example Scenario 5

(For demonstration purpose only)

White - Loss of multiple systems/trains/design features:

During a review of measurement and test equipment (M&TE) records, an NRC inspector noted that a differential pressure instrument was not calibrated within its required periodicity as defined by the site M&TE program QA procedures. The inspector also noted that the instrument was used during pre-operational tests of the Boron Injection System and the system was turned over to operations.

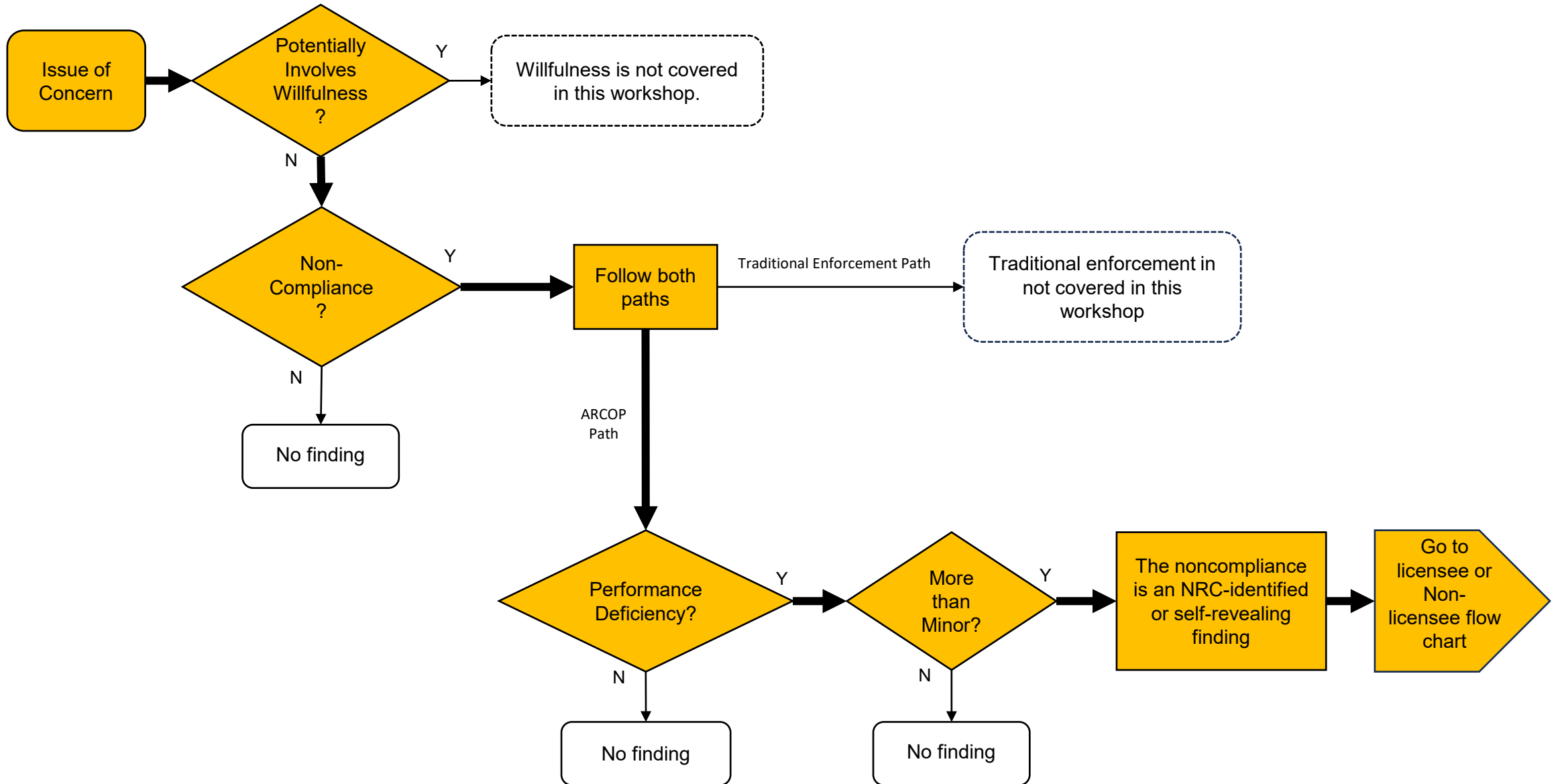
Extra Information:

- The affected instruments were used on both (2 of 2) boron injection line tests and were used to adjust flow in the line.
- Flow was adjusted during both pre-op tests to lower flow as indicated on the instrument.
- When the instrument calibration was rechecked, the instrument was significantly inaccurate in the non-conservative direction.
- The test was subsequently reperformed and the as-found flows were significantly lower than required by the design calcs.

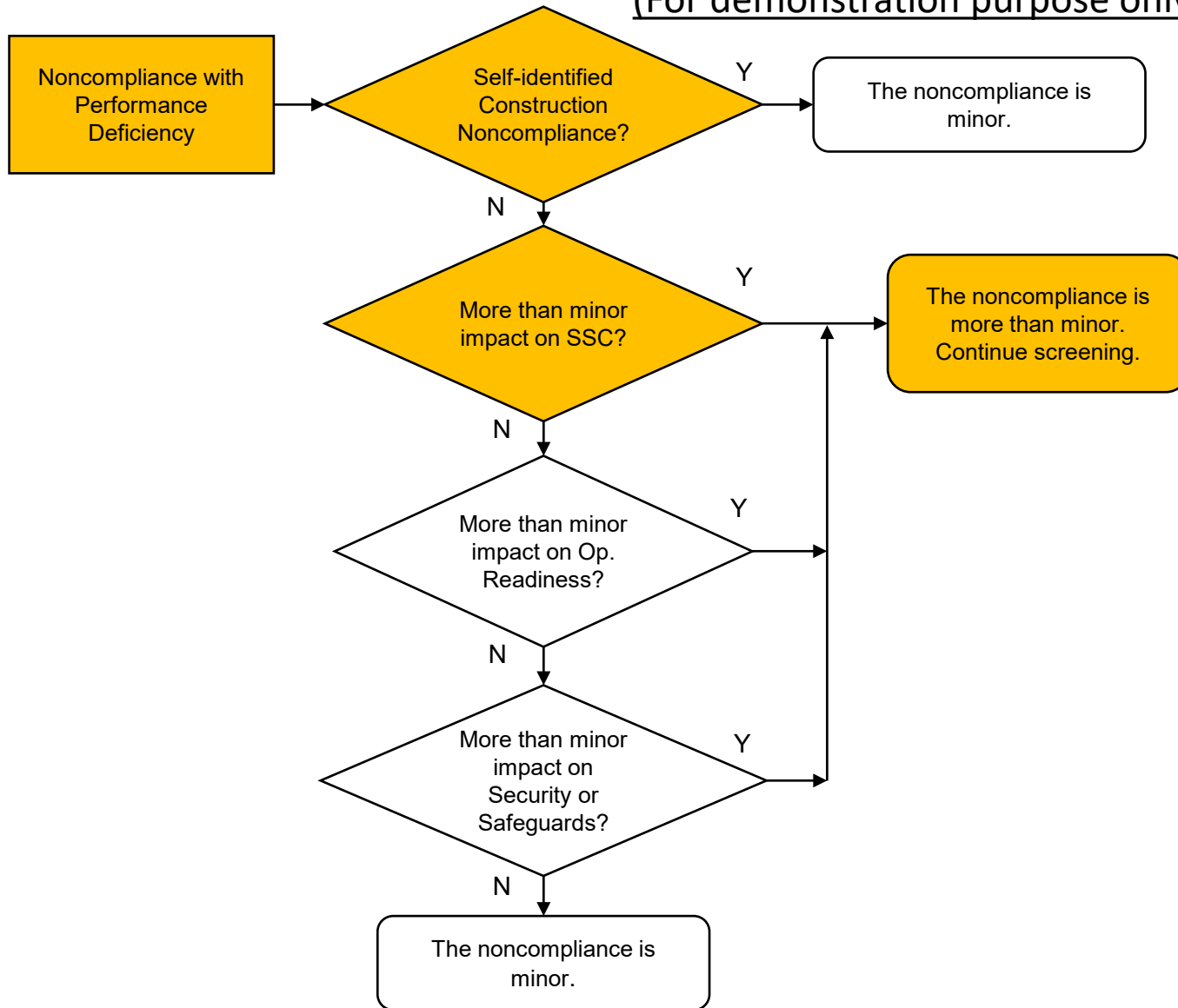
Alternate Scenarios:

- What if pre-operational testing had not yet been performed, which represents a reasonable opportunity for the licensee to identify and correct prior to operations (e.g., QAP Backstop would screen to Green).

Scenario 5 Flowchart (For demonstration purpose only)



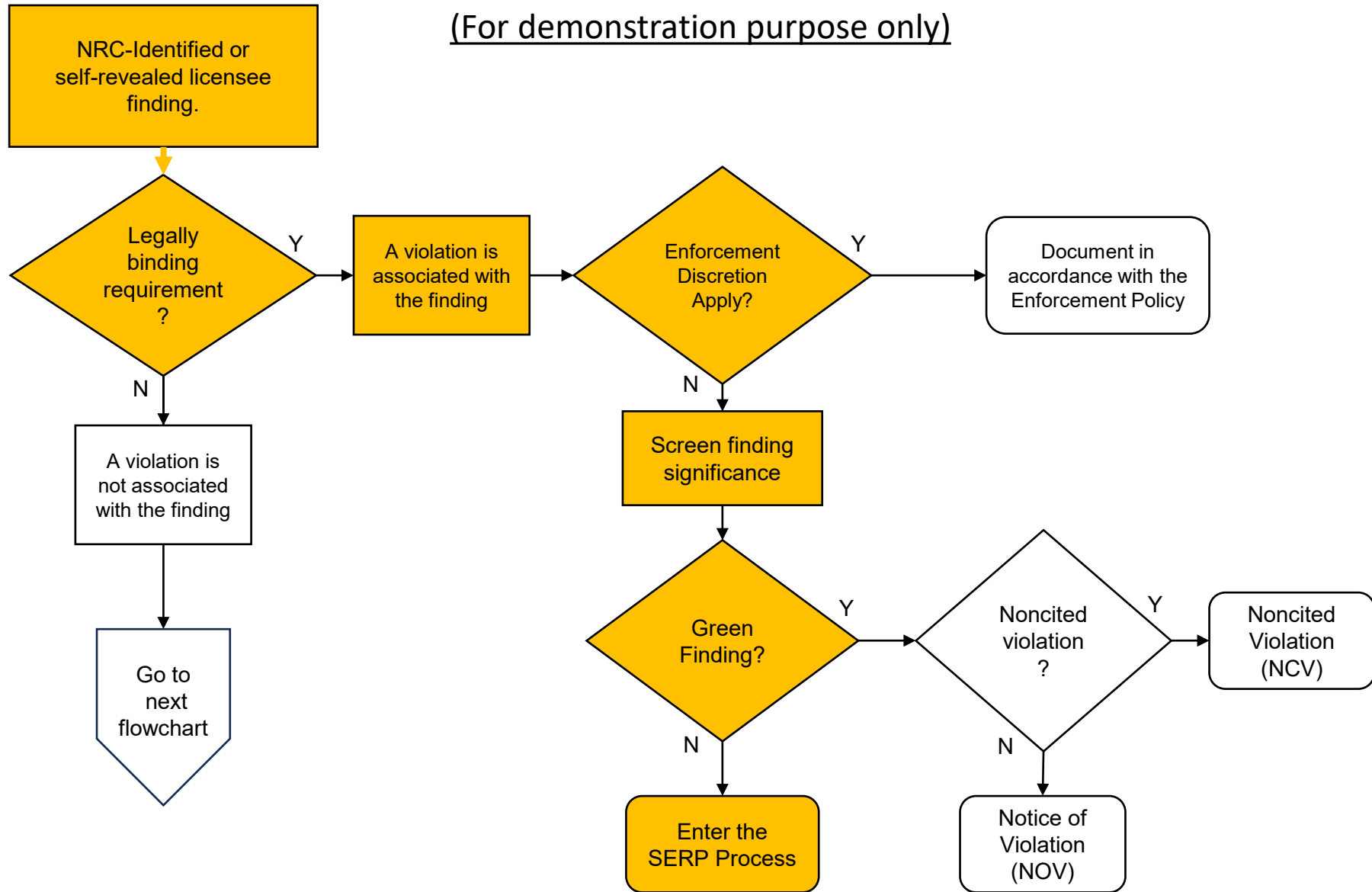
Scenario 5 Flowchart (For demonstration purpose only)



- a. Does the performance deficiency represent an adverse condition that rendered the quality of a risk-significant or safety-related SSC unacceptable or indeterminate, and requires substantive corrective action?
- b. Does the noncompliance represent an irretrievable loss or inadequate documentation of a quality assurance record; or a record-keeping issue that could preclude the licensee from demonstrating adequacy of quality or from properly evaluating risk-significant or safety-related activities?
- c. Does the noncompliance prevent the licensee from meeting an ITAAC Design Commitment or approved Technical Specification?
- d. Does the noncompliance invalidate the performance of an Inspection, Test, or Analysis described in an ITAAC?

Dispositioning *Licensee* Findings (Proposed)

Scenario 5 Flowchart
(For demonstration purpose only)



Scenario 5 (For demonstration purpose only)

| Significance of Finding | Finding's Impact on SSCs |
|-------------------------|--|
| Red | Not applicable to ARCOP findings. |
| Yellow | <ul style="list-style-type: none"> a. The finding, if left uncorrected, would reasonably be expected to result in the loss of a fundamental safety function (FSF)¹ because no systems, trains, or design features are credited for fulfilling the FSF; or b. The finding is not adequately addressed by the significance criteria in this table², and screens as yellow using Appendix F of this IMC. |
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Group activity – Example Scenario 6

(For demonstration purpose only)

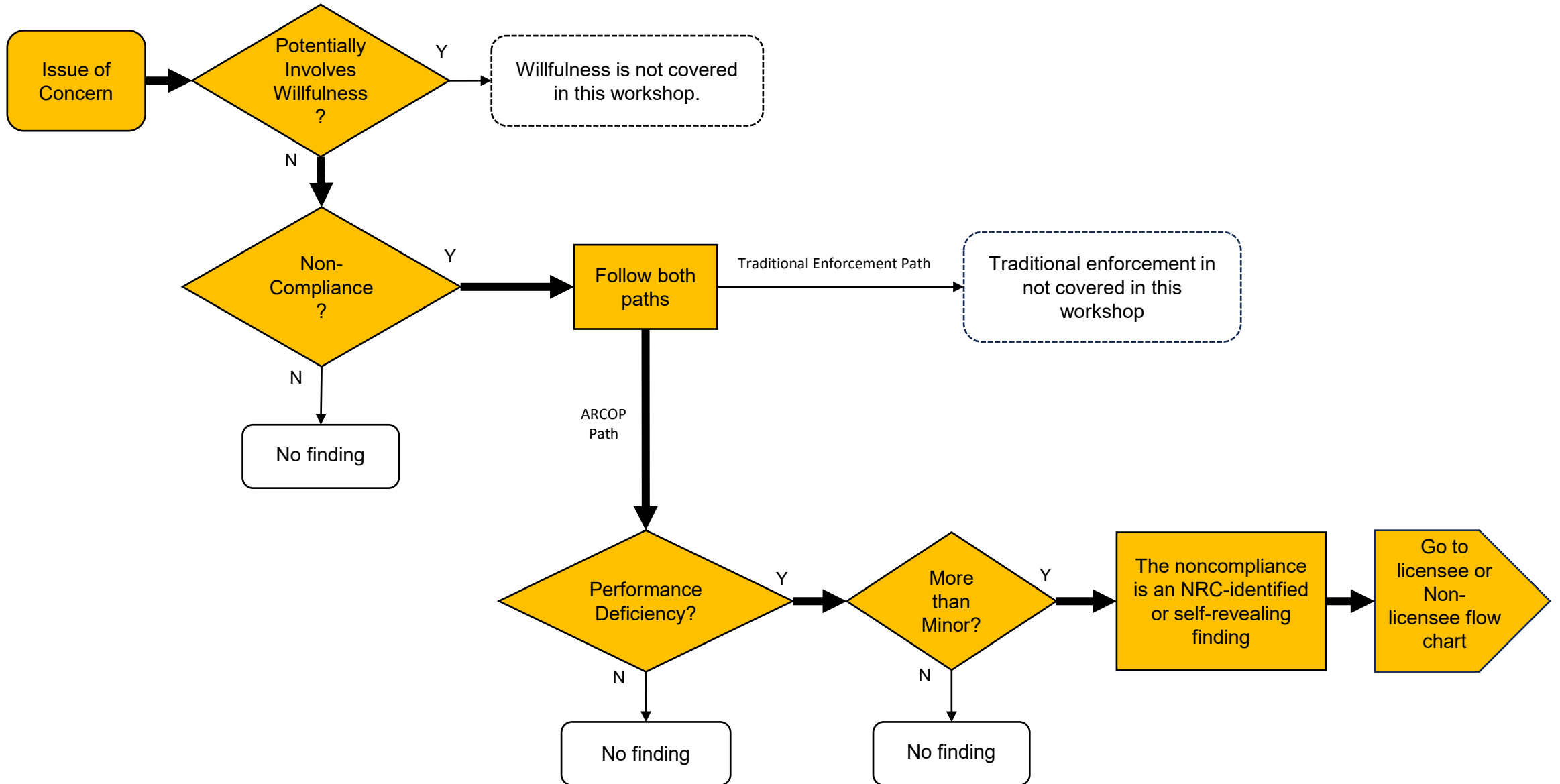
Yellow - Loss of FSF:

NRC inspectors identified a generic setpoint control program problem that resulted in non-conservative setpoints in the reactor protection system. All scram and runback setpoints, and all RPS trains were adversely/non-conservatively affected. Systems had already been turned over to operations (e.g., there was no reasonable opportunity for the licensee to have identified and corrected the issue prior to operations).

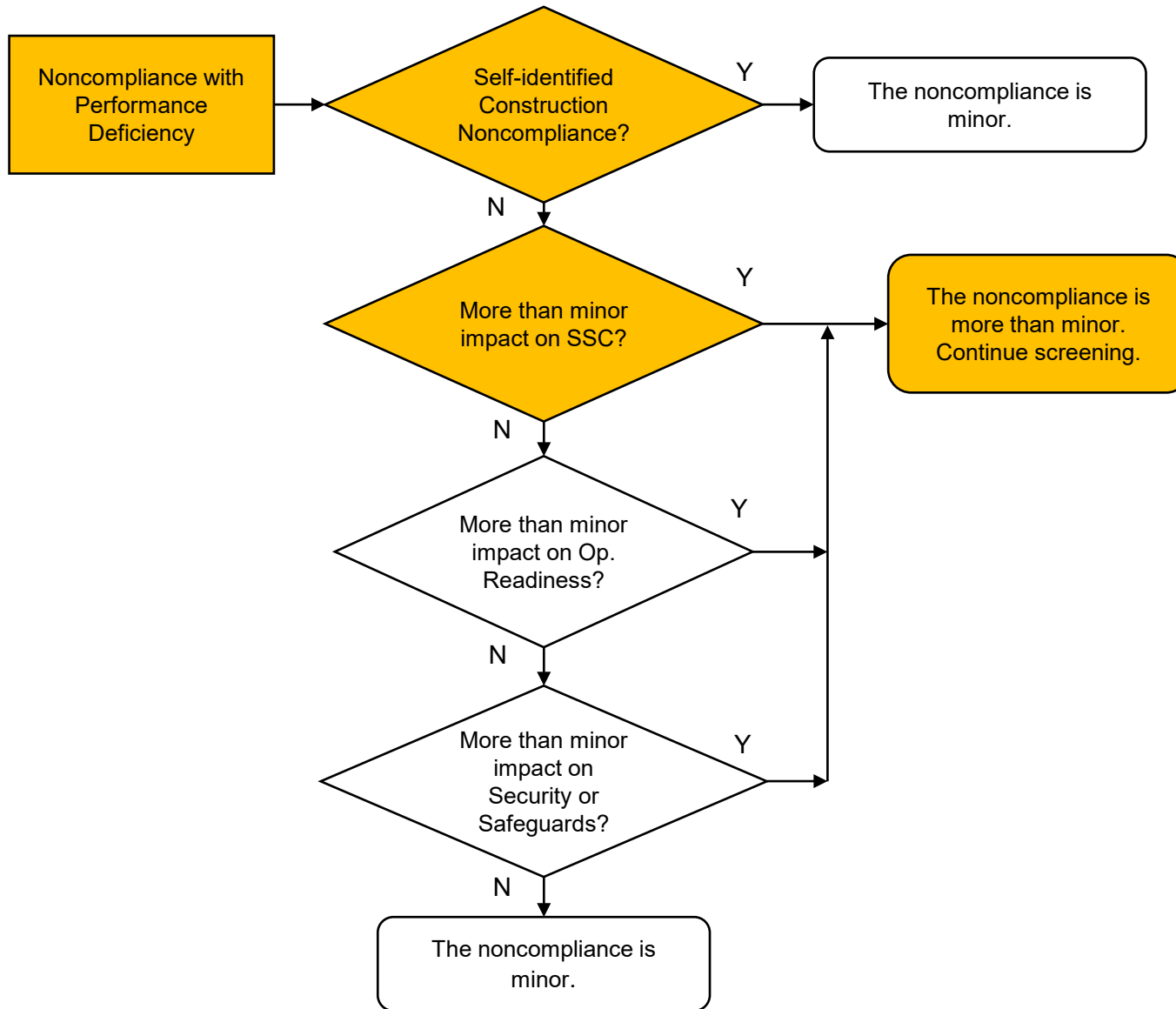
Extra Information:

- Reactor protection system is the sole credited (safety-related or NSRST) system to fulfill the reactivity control FSF.
- All setpoints are significantly non-conservative (no analysis can demonstrate safety).

Scenario 6 Flowchart (For demonstration purpose only)



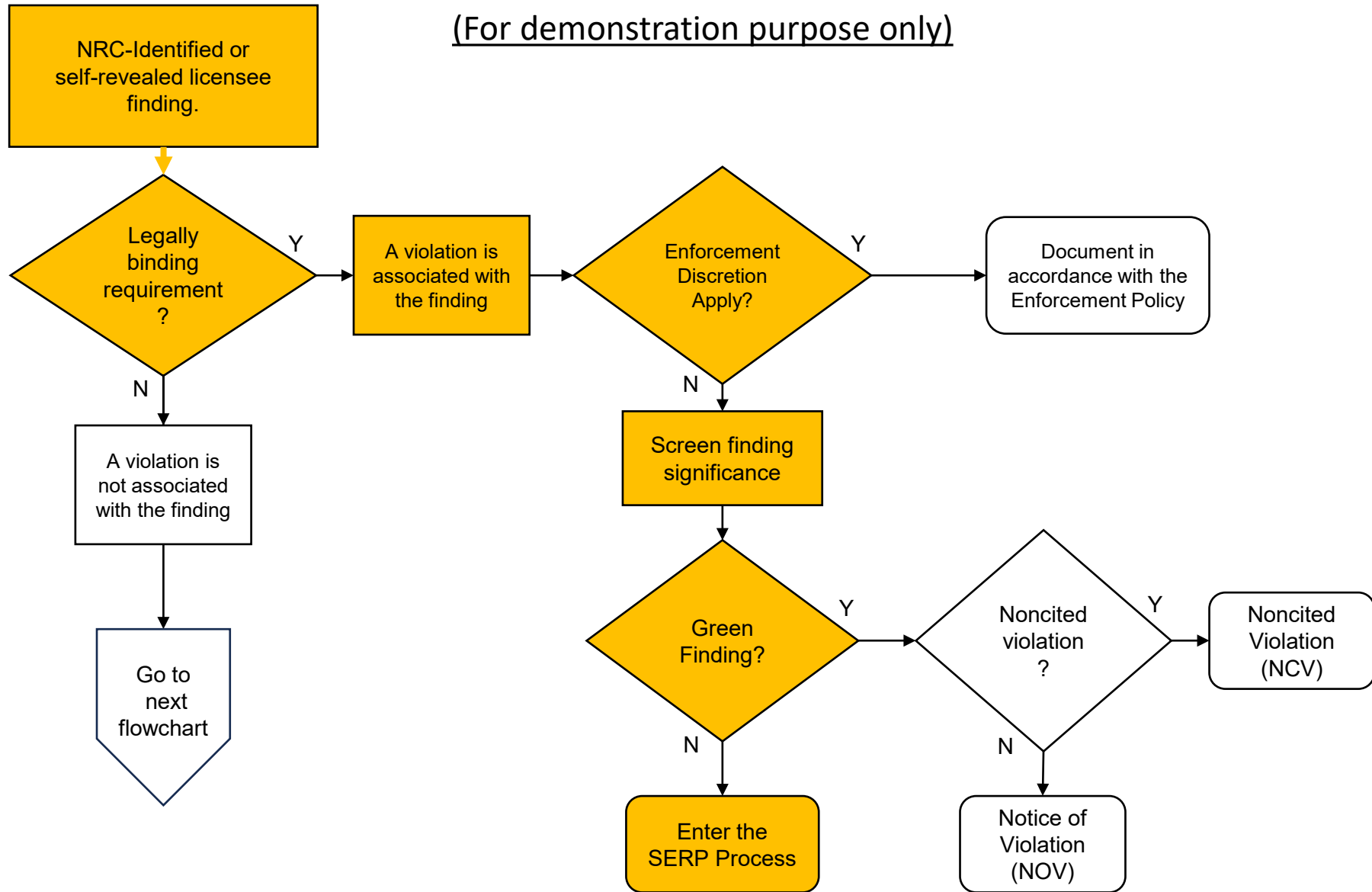
Scenario 6 Flowchart (For demonstration purpose only)



- a. Does the performance deficiency represent an adverse condition that rendered the quality of a risk-significant or safety-related SSC unacceptable or indeterminate, and requires substantive corrective action?
- b. Does the noncompliance represent an irretrievable loss or inadequate documentation of a quality assurance record; or a record-keeping issue that could preclude the licensee from demonstrating adequacy of quality or from properly evaluating risk-significant or safety-related activities?
- c. Does the noncompliance prevent the licensee from meeting an ITAAC Design Commitment or approved Technical Specification?
- d. Does the noncompliance invalidate the performance of an Inspection, Test, or Analysis described in an ITAAC?

Dispositioning *Licensee* Findings (Proposed)

Scenario 6 Flowchart
(For demonstration purpose only)



Scenario 6 (For demonstration purpose only)

| Significance of Finding | Finding's Impact on SSCs |
|-------------------------|--|
| Red | Not applicable to ARCOP findings. |
| Yellow | <ul style="list-style-type: none"> a. The finding, if left uncorrected, would reasonably be expected to result in the loss of a fundamental safety function (FSF)¹ because no systems, trains, or design features are credited for fulfilling the FSF; or b. The finding is not adequately addressed by the significance criteria in this table², and screens as yellow using Appendix F of this IMC. |
| White | <ul style="list-style-type: none"> a. The finding, if left uncorrected, would reasonably be expected to result in the loss of two or more systems, trains, or design feature's ability to fulfill one or more FSFs, and other systems, trains, or design features are credited in fulfilling the FSFs; or b. The finding is not adequately addressed by the significance criteria in this table², and screens as white using Appendix F of this IMC. |
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See table notes

Group activity – Example Scenario 7

(For demonstration purpose only)

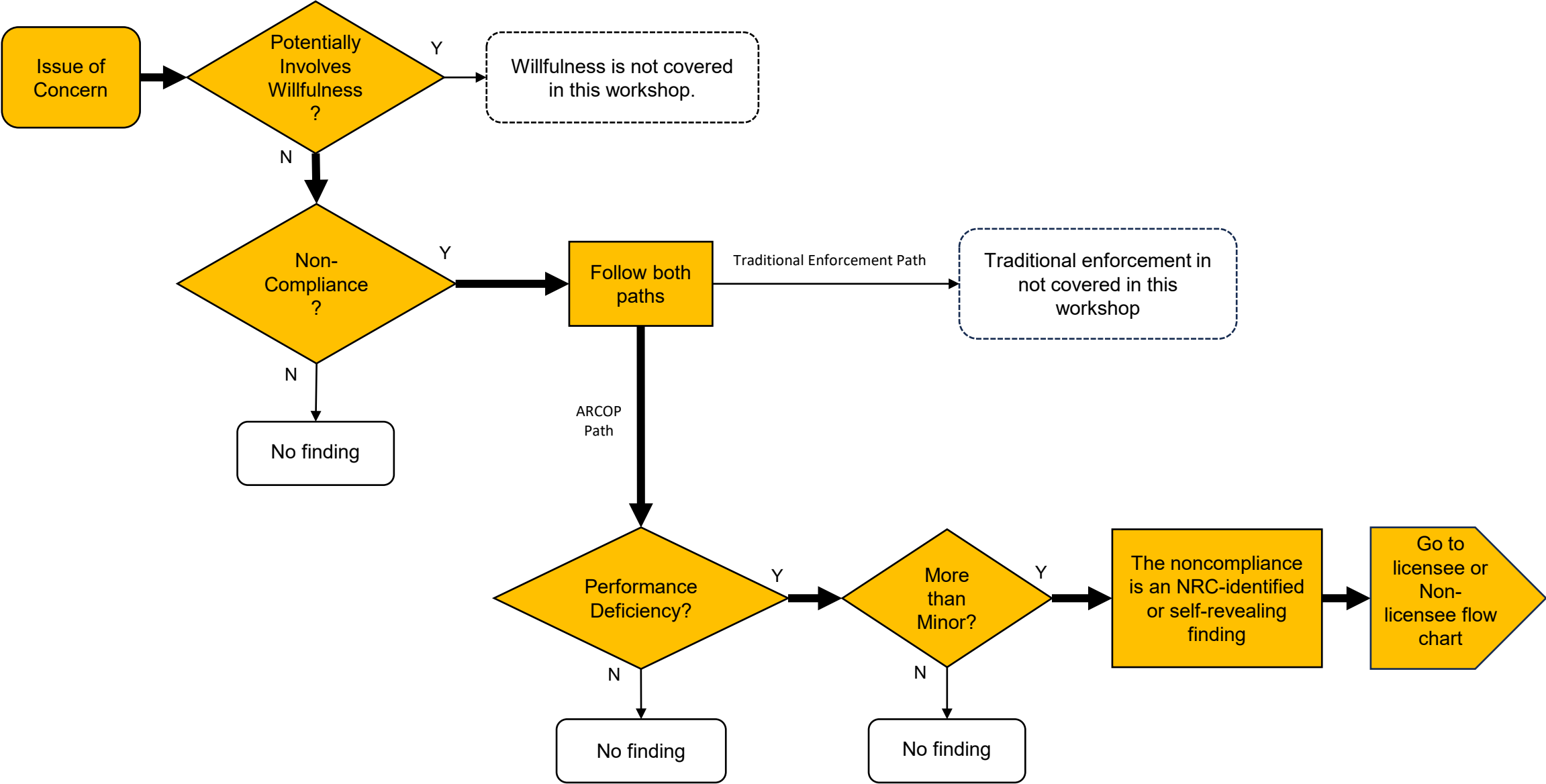
Nonconformance:

While reviewing radiographs at the manufacturing facility of a non-licensed manufacturer for the CVCS piping system associated with an SMR, the NRC inspector observed a previously unidentified unacceptable weld indication on the radiograph. The radiograph had already been reviewed/accepted by the manufacturer's NDE personnel.

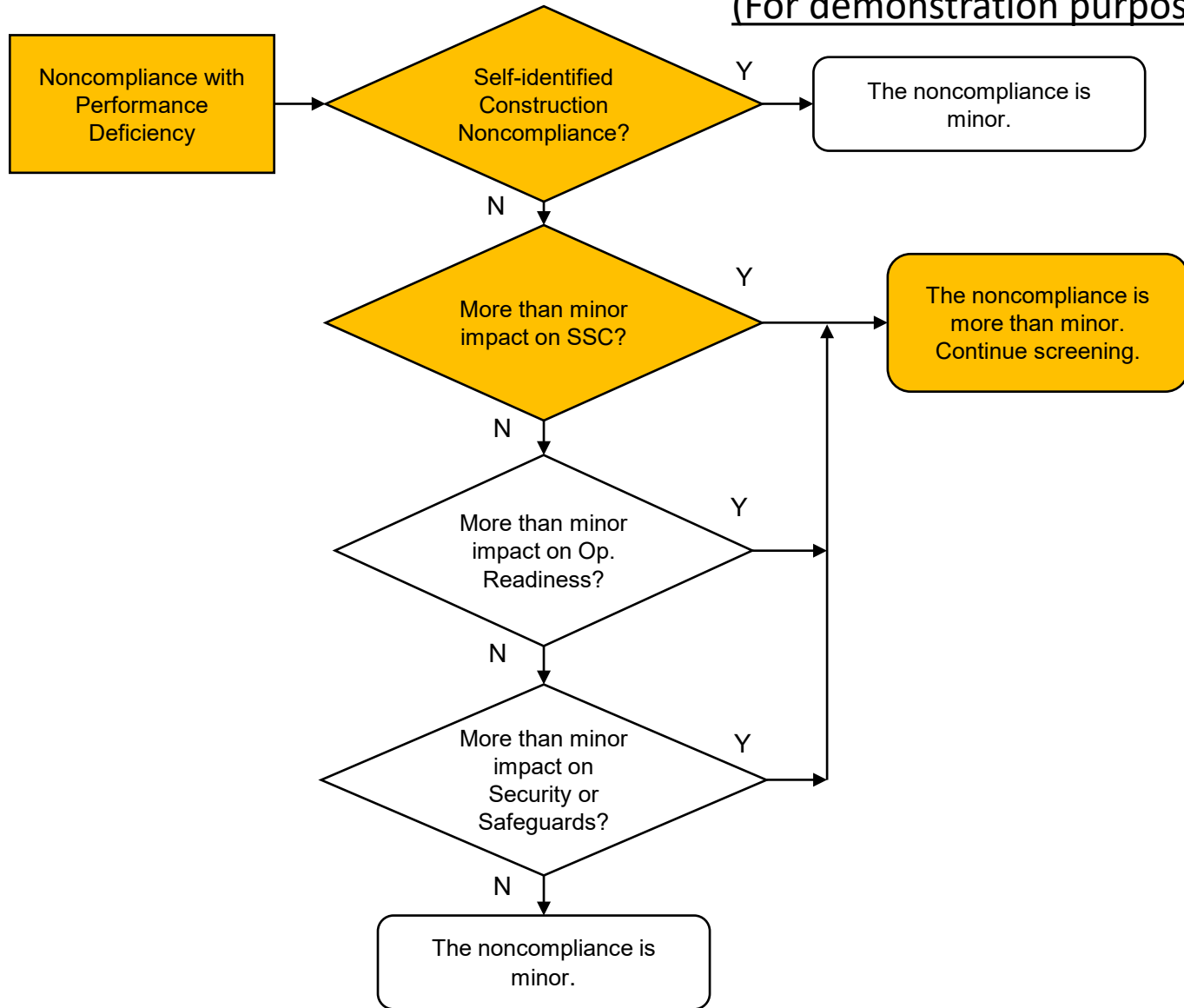
Extra information:

- The CVCS piping is a SR reactor coolant pressure boundary, and the deficiency affects its ASME qualification.
- The cause and full extent of the weld indication is unknown.

Scenario 7 Flowchart
(For demonstration purpose only)

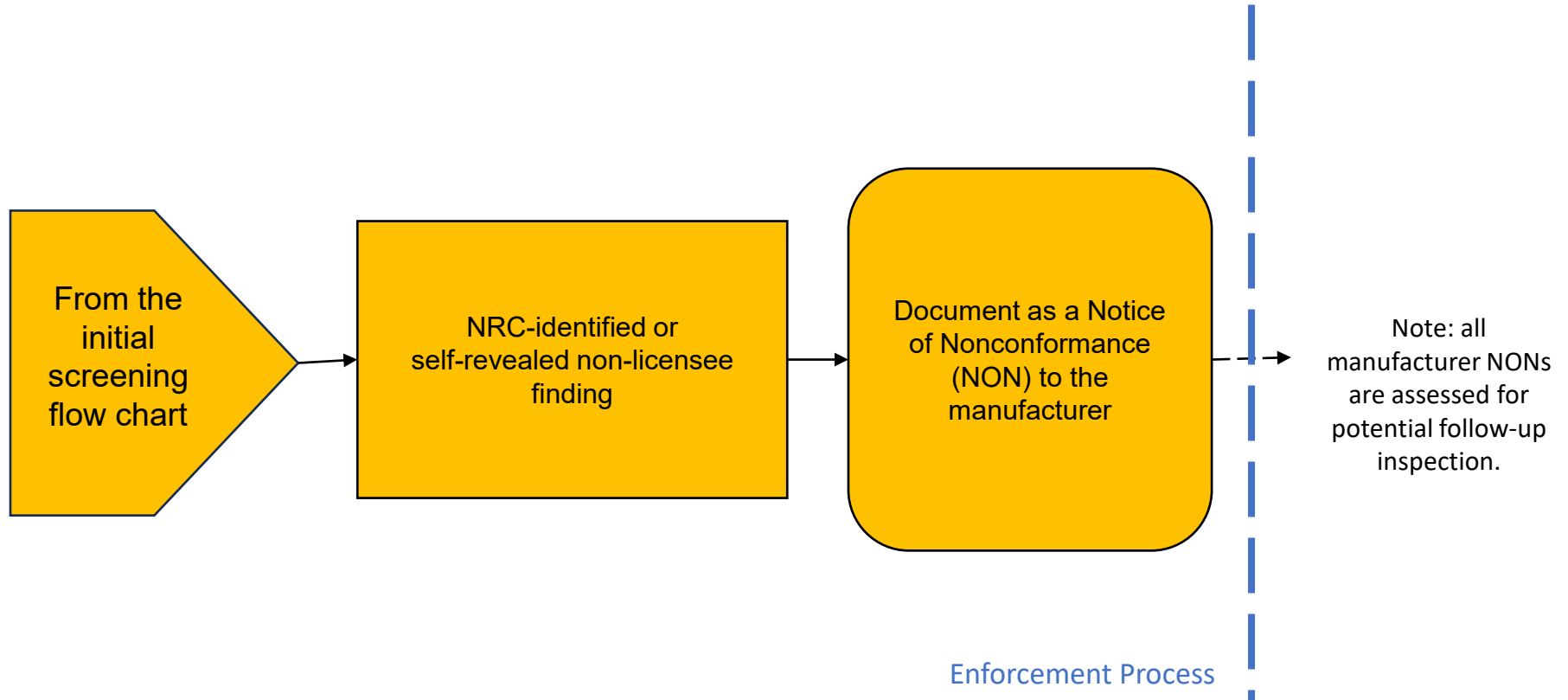


Scenario 7 Flowchart (For demonstration purpose only)



Dispositioning *Non-Licensee* Findings

Scenario 7 Flowchart
(For demonstration purpose only)



Backup Slides

Flowchart Instructions
(DRAFT)

Issue of Concern

A well-defined observation or collection of observations that may have a bearing on safety or security and warrants further inspection, screening, evaluation, or regulatory action.

Noncompliance

A failure to adhere to a requirement or commitment.

Legally binding requirements include regulations, license conditions, and NRC Orders.

Non-legally binding commitments include self-imposed requirements to establish and maintain quality or requirements specified in procurement contracts.

Performance Deficiency

The noncompliance was reasonably within the licensee's ability to foresee and correct and should have been prevented.

Legally Binding Requirements

- Regulations
- License conditions
- NRC Orders

Non-legally binding requirements

Self-imposed requirements to establish and maintain quality

Flowchart Instructions (Minor/More-than-Minor Screening) (DRAFT)

Self-identified Construction Noncompliance (SCN) Criteria

1. The noncompliance is self-identified (not NRC-identified or self-revealing), and
2. The noncompliance must be in a facility-approved QAP process for correction when evaluated by NRC inspectors, as defined by facility-approved QAP procedures. This may include:
 - Entry into an QAP work-flow process or corrective action program.
 - Proper timing and tracking of planned corrective actions so that the noncompliance will not adversely impact reactor operations.
 - If corrective actions are complete, the corrective actions are adequate.

Note: NRC-identified weaknesses with corrective actions are processed as separate noncompliances.

SSC Issues - Minor Criteria Questions

- a. Does the performance deficiency represent an adverse condition that rendered the quality of a risk-significant or safety-related SSC unacceptable or indeterminate, and requires substantive corrective action?
- b. Does the noncompliance represent an irretrievable loss or inadequate documentation of a quality assurance record; or a record-keeping issue that could preclude the licensee from demonstrating adequacy of quality or from properly evaluating risk-significant or safety-related activities?
- c. Does the noncompliance prevent the licensee from meeting an ITAAC Design Commitment or approved Technical Specification?
- d. Does the noncompliance invalidate the performance of an Inspection, Test, or Analysis described in an ITAAC?

SSC SDP Table Notes **(DRAFT)**

Note 1: Fundamental safety functions (FSFs), as used in ARCOP, are:

- Control of Heat Generation (Reactivity and Power Control),
- Control of Heat Removal (including reactor and spent fuel decay heat and heat generated from waste stores), and
- Radionuclide Retention.

Note 2: Findings not adequately addressed by the significance criteria of the SDP table. When the ARCOP construction significance determination process guidance is not adequate to provide a reasonable estimate of the significance of an inspection finding, the safety significance should ultimately be determined by using engineering judgement and regulatory oversight experience, which is acceptable in a risk-informed process. Appendix F provides guidance to the NRC to apply a consistent process for risk-informed decision making.

Note 3: Quality assurance program (QAP) backstop. A QAP backstop is a scheduled QAP activity designed to detect SSC deficiencies or noncompliances that are associated with the finding. To give credit for a QAP backstop, the QAP activity must be reasonably defined or contained in a procedure, scheduled prior to the receipt of an operating license (Part 50) or before the 103(g) finding (Part 52), and would reasonably be able to detect the deficiency or noncompliance associated with the finding.

Note 4: Hazard protection features are those SSCs and design features that mitigate the effects of internal (e.g., fire, internal flooding, internal chemical release) or external (e.g., seismic event, external flooding, severe weather events) hazards.

Note 5: Use Appendix F of this IMC to determine if an issue should be considered a potentially significant quality assurance program breakdown.