NRC Advanced Reactor Construction Oversight Process (ARCOP)

Stakeholder Workshop Series

Workshop #3

Introduction and Guidelines

Planned Workshop Sessions

Session 1, February 28 and March 20, 2024*:*

Introduction to NRC Advanced Reactor Construction Oversight, and the ARCOP Framework.

Session 2, April 3, 2024*:*

Inspection Scoping

Session 3, May 22, 2024*:*

Enforcement

Session 4, *Date:*

Assessment, Feedback/Wrap Up

Workshop #3 Agenda

9:00 a.m. – 12:00 p.m. (Hybrid Session)

- Recap from Previous Workshops
- Overview of Enforcement Process
- Proposed Concept- Significance Determination Process

12:00 p.m. – 1:30 p.m.

- Lunch Break

1:30 p.m. – 4:00 p.m. (In-Person Only*)

- Facilitated Small Group Exercises- Issue Screening and Significance Determination

*Note: A summary of the results of the small group exercises will be presented at the next workshop.

Purpose and Desired Outcome

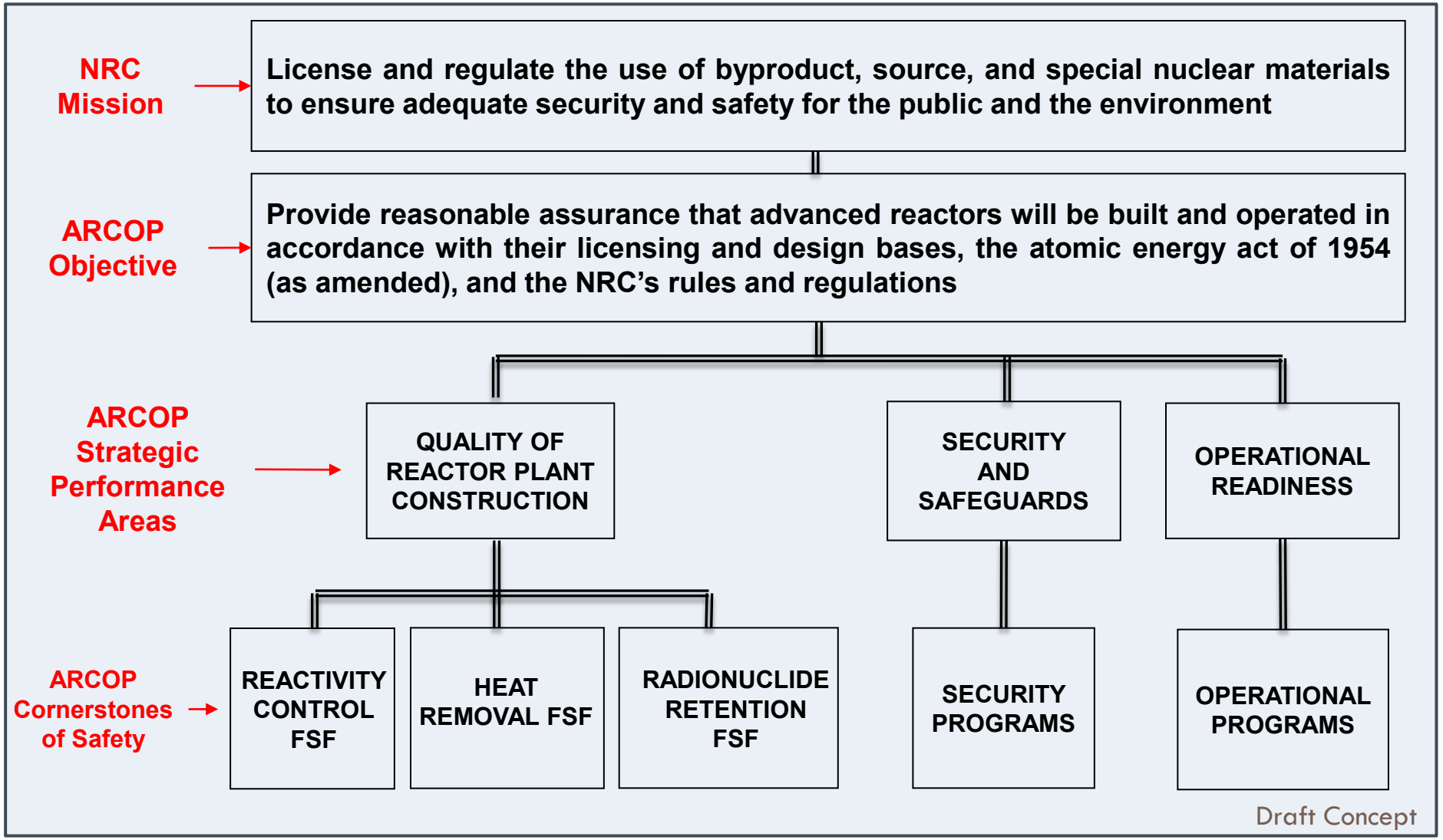
- Discuss the objectives & conceptual framework for the Advanced Reactor Construction Oversight Process.
- Initiate dialogue with stakeholders and the public about the ARCOP options.
- Consider perspectives on the various ARCOP options being considered.

Why ARCOP?

A scalable risk-informed oversight program that:

- Adapts to all advanced reactor technologies.
- Accounts for different licensing pathways under 10 CFR Parts 50, 52, and future Part 53.
- Applies lessons learned from AP1000 and other nuclear construction projects.
- Adjusts for factory manufacturing and shorter expected construction timelines.

Workshop Session #1 Recap: Conceptual ARCOP Framework



Workshop Session #1 Recap Key Decision Points:

#1: Inspection Scoping

#2: Inspection of Manufacturers

#3: Significance Determination Process (SDP)

#4: Dispositioning Manufacturer Inspection Findings

Workshop Session #2 Recap: Inspection Scoping & Planning Matrix

- Inspection Scoping and Planning Matrices support NRC inspection planning, focus inspections on the most risk significant SSCs (ITAAC), and identify SSCs with the greatest value of inspection for identifying a construction or manufacturing flaw.
- Inspection Matrices are not part of the licensing process.
- We plan to seek input on the Matrices during final development.

Workshop Session #2 Recap: Inspection Scoping & Planning Matrix

- Design Specific Matrix for each unique design
  a. Inspection Areas applicable to the design (columns)
  b. Risk-significant SSCs (SR & NSRST/RTNSS) (rows)
  c. ITAAC (when applicable-Part 52)
  d. Risk Importance - Design (PRA, engineering judgement)
  e. Risk Importance- Construction (ConE/OE, engineering judgement)
  f. Minimum & Maximum sample ranges
- Once developed the design specific matrix is used to develop project specific matrices.
- Operational Programs and Security are currently not included in the matrix.

Workshop Session #2 Recap: Inspection Scoping Matrix (example)

Safety Function	SSCs	Rick Importance Design (RI_D)	RI_D Basis	Risk Importance Construction (RI_C)	RI_C Basis	Structures and Buildings	Mechanical Components	Reactor and Internals	Equipment Qualifications (other than ASME)	ASME	Instrumentation and Control
	Minimum Inspection Area Samples Required					**7**	**12**	**3**	**10**	**8**	**5**
	Maximum Inspection Area Samples					**10**	**15**	**6**	**13**	**11**	**8**
Fundamental Safety Functions: - Decay Heat Removal - Reactivity Control - Radionuclide Retention	Water Storage Tanks	High	PRA HR FSF	Medium	complex		X				
	Steam Separators	Medium	PRA HR FSF	Medium	complex		X		X		
	Passive float valves	High	PRA HR FSF	Medium	complex		X		X		
	Dual wall leak barrier - leak detection system	High	PRA HR FSF	High	FOAK						X
	Water level monitor- tank control system	High	PRA HR FSF	High	ConE						X
	Vessel	High		Medium	FOAK			X		X	
	Core barrel	High		High	complex			X			
	Software Lifecycle	High		High (Installation)	complex						X
	Field sensors	High		High	ConE/ complex						X
	Reactor trip system	High		High	ConE						X
	Shutdown Elements	High	Primary DK path	High	FOAK		X				
	Reactor Coolant	High		Medium	complex						
	Spent Fuel Storage Rack	High		High	ConE/ complex		X				
	Rx Bldg. Foundation	High		High	ConE	X					
	Rx Bldg. Structural elements	High		Medium	FOAK	X					

Draft Concept

Workshop Session #3 Discussion Topics

- Dispositioning Issues:
  - How can we best structure significance determination to reflect risk during construction?
  - How do we disposition findings at manufacturing facilities?

NRC Enforcement Policy

- Enforcement supports the NRC's mission to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment.

- Adequate protection is presumptively assured by compliance with NRC requirements. Compliance with NRC requirements provides reasonable assurance to the NRC and the public that safety and security are being maintained.

- Application of this Policy ensures associated enforcement actions properly reflect the safety or security significance of such violations.

Enforcement Policy (Cont'd)

- Consistent with this objective, the Enforcement Policy endeavors to do the following:
  - Deter noncompliance by emphasizing the importance of compliance with NRC requirements.
  - Encourage prompt identification and prompt comprehensive correction of violations of NRC requirements.

Enforcement Policy: Applicability

Applies to all NRC licensees and applicants, to various categories of nonlicensees, and to individual employees of licensed and nonlicensed entities involved in NRC-regulated activities. These include, but are not limited to the following:

a. organizations and individuals holding NRC licenses

b. license applicants

c. contractors and subcontractors to NRC licensees

d. holders of and applicants for various NRC approvals

e. vendors supplying safety-related components to licensees

Enforcement Process

The Enforcement Policy directs that the assessment, disposition, and subsequent NRC action related to inspection findings identified at power reactors under construction are determined by construction oversight process inspection manual chapters.

Enforcement Process

The enforcement process has the following steps:

- First, violations & noncompliances must be identified.
- Next, NRC must assess the severity or significance of the violation.
- Finally, the NRC must disposition the violation or noncompliance.

Throughout the process, an organization or individual subject to an NRC enforcement action has multiple opportunities to provide input.

Enforcement Dispositions

- Minor Violation or Noncompliance
- Non-cited Violation (NCV)
- Notice of Violation (NOV)
- Civil Penalty (CP)
- Orders
- Demand for Information (DFI)
- Administrative Actions:
  - Confirmatory Action Letter (CAL)
  - Notice of Nonconformance (NON)
  - Notice of Deviation (NOD)

Significance Determination

(AP1000 Lessons Learned)

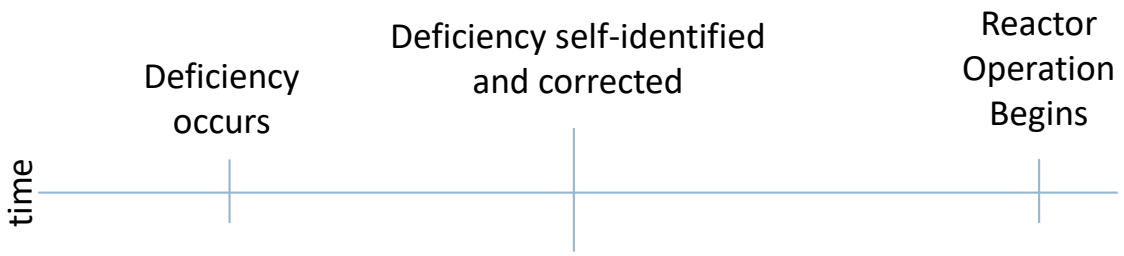
- Determining the significance of findings should not be:
  - overly complex
  - time-consuming
  - require extensive resources
- Significance Determination (including more-than-minor determination) for construction oversight should appropriately characterize finding significance based on risk to operations.

SDP Significance Levels

- **Red –** have high safety or security significance
- **Yellow –** have substantial safety or security significance
- **White –** have low-to-moderate safety or security significance
- **Green –** have very low safety or security significance
- **Minor -** less significant than Green. They do not warrant enforcement action and are not normally documented in inspection reports. However, minor violations must be corrected.

New Terms for Construction (Proposed)

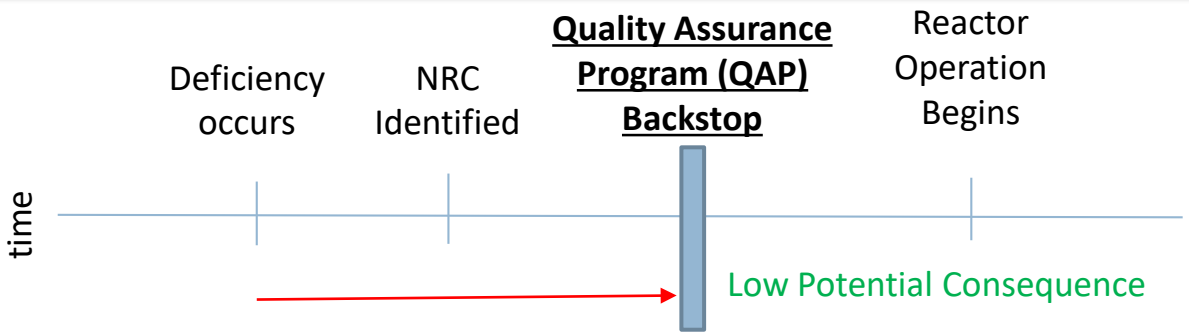
Self Identified Construction Noncompliance (SCN)



Minor Significance

No Exposure Time = No Potential Consequence

NRC Identified Noncompliance



Very Low (Green) Significance

Significance Determination Options Considered

Options

A. Finding significance is assigned based on potential impact to FSFs during reactor operations using a qualitative SDP.

B. Design specific SDPs, including quantitative measures (such as RAW scores) when appropriate, used to inform finding significance.

C. Traditional enforcement significance/enforcement (ref. section 6.5 of the NRC Enforcement Policy)

Proposed Qualitative Significance Determination Process

Option A: A Finding's significance is assigned based on the potential impact to the FSFs during reactor operations using a qualitative SDP applicable to all designs.

ARCOP proposes not to use RED.

Finding Safety or Security Significance	Criteria
Yellow	Substantial potential impact on FSFs during operations
White	Low-to-moderate potential impact on FSFs during operations
Green	Very Low potential impact on FSFs during operations
Minor	No potential impact to FSFs during operations

Proposed Qualitative Significance Determination Process (Cont'd)

Finding Significance	Finding's Impact on SSCs
Green	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 a Fundamental Safety Function (FSF), and another system, train, or design feature is credited for fulfilling that FSF; or b. The finding is associated with an issue where the manufacture, fabrication, placement, erection, installation, or modification of the hardware associated with the SSC has not begun; or

Proposed Qualitative Significance Determination Process (Cont'd)

Finding Significance	Finding's Impact on SSCs
Green	c. There is a quality assurance program (QAP) backstop for the deficiency associated with the finding; or d. The finding is associated with a hazard protection feature and is not a significant QAP breakdown (see Appendix F); or e. It can be demonstrated with reasonable assurance that the design function of the SSC would not be impaired by the deficiency.

Proposed Qualitative Significance Determination Process (Cont'd)

Finding Significance	Finding's Impact on SSCs
White	a. The finding, if left uncorrected, would reasonably be expected to result in the loss of two or more systems, trains, or design features' ability to fulfill one or more FSFs, and other systems, trains, or design features can be credited in fulfilling the FSFs; or b. The finding is not adequately addressed by the significance criteria in this table, and screens as white using appendix F of this IMC.

Proposed Qualitative Significance Determination Process (Cont'd)

Finding Significance	Finding's Impact on SSCs
Yellow	a. The finding, if left uncorrected, would reasonably be expected to result in the loss of a FSF because no systems, trains, or design features can be credited for fulfilling the FSF; or b. The finding is not adequately addressed by the significance criteria in this table, and screens as yellow using appendix F of this IMC.

Questions/Break

Advanced Reactor Construction Oversight Process (ARCOP)

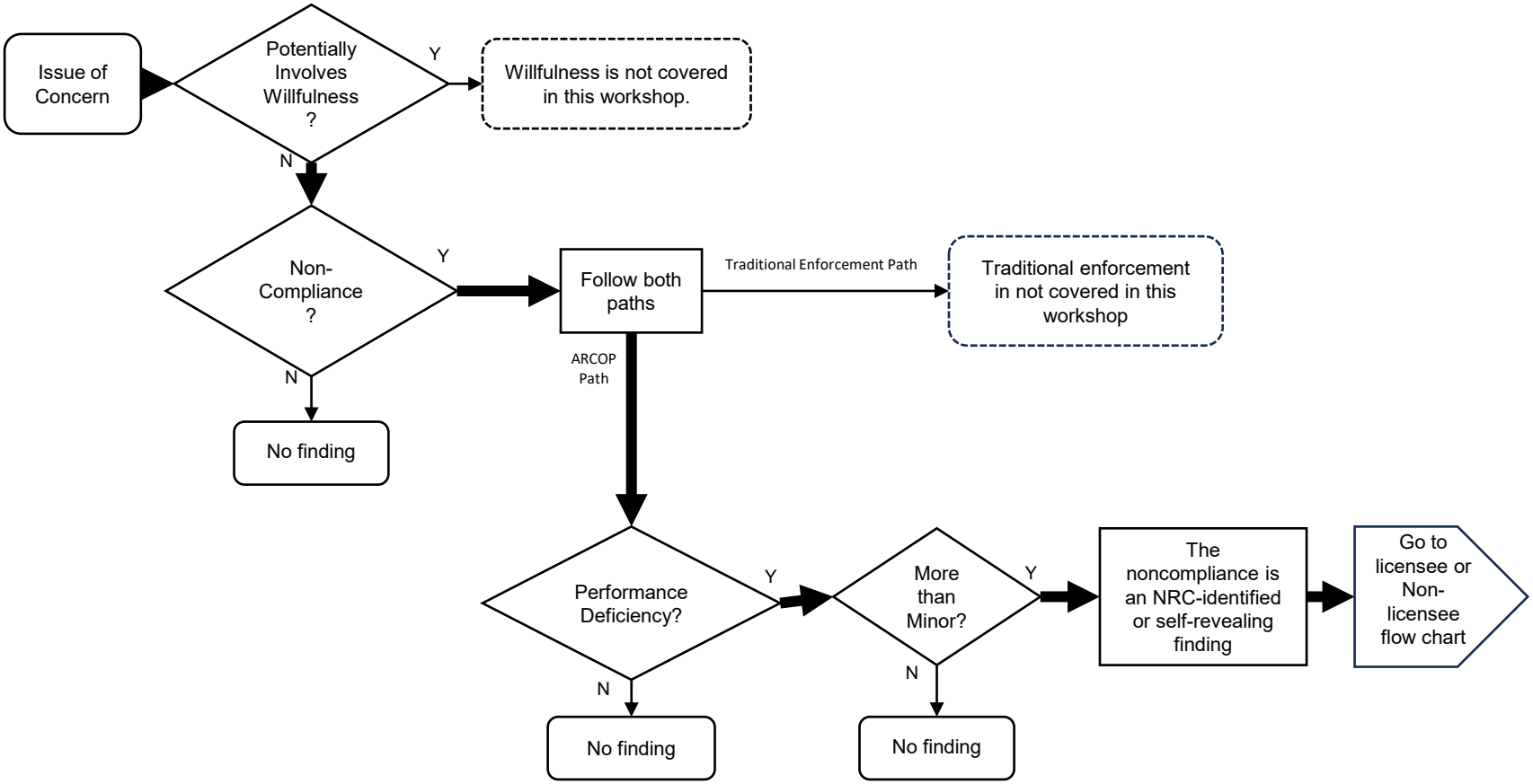
Workshop 3 – Enforcement/Significance Determination Exercise Portion

Enforcement/Significant Determination Exercise Agenda

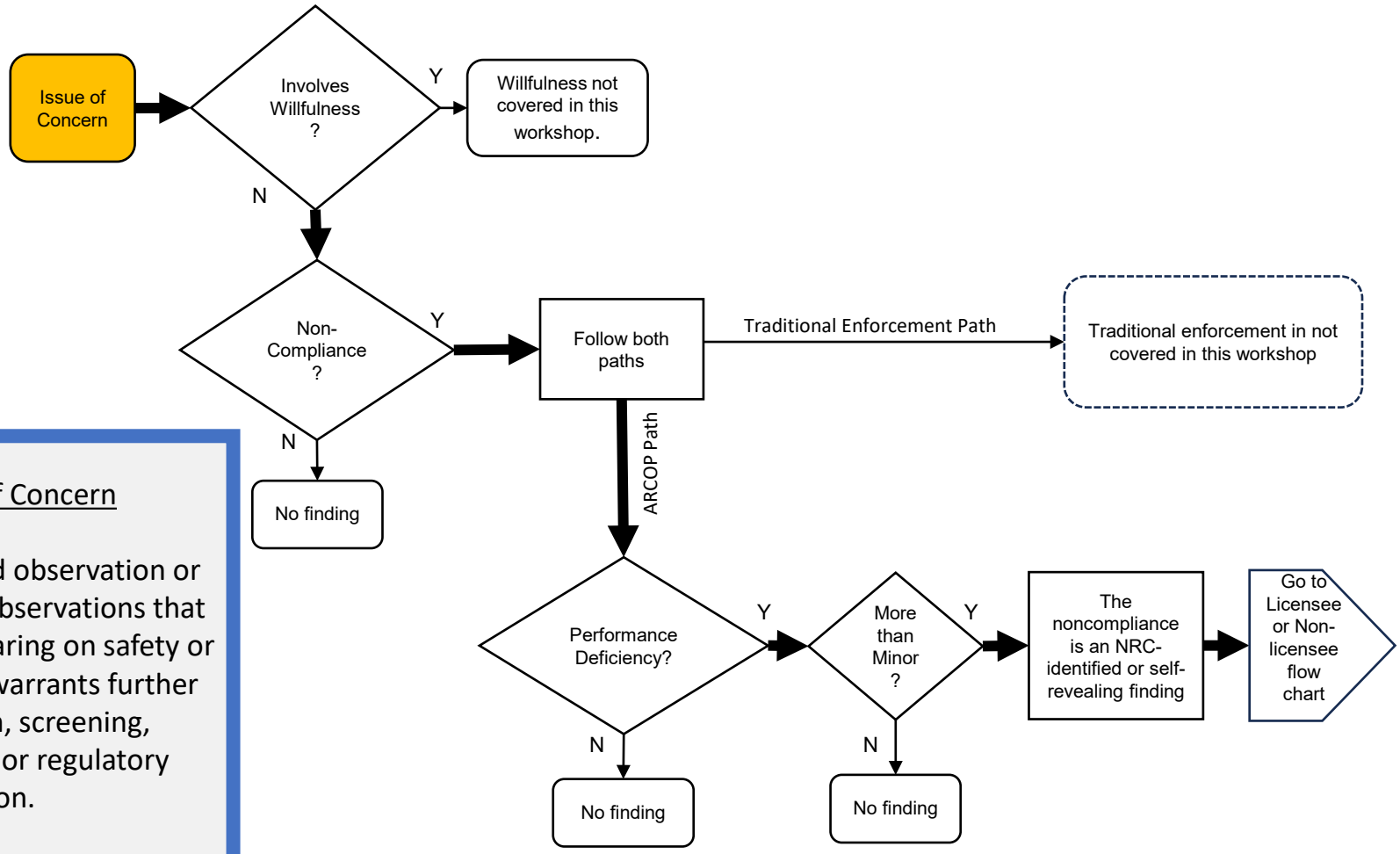
- Issue Dispositioning Process – Flowcharts
- Minor and More than Minor (MTM) Significance
- Findings - Significance Determination Process (SDP) for Structures, Systems, and Components (SSCs)
- (Afternoon) Group analyses of construction examples using ARCOP processes
- (Afternoon/Follow-up workshop) Results Insights

NRC Inspection Issue Dispositioning (Proposed)

Initial Screening Flow Chart for Issues of Concern (Proposed)



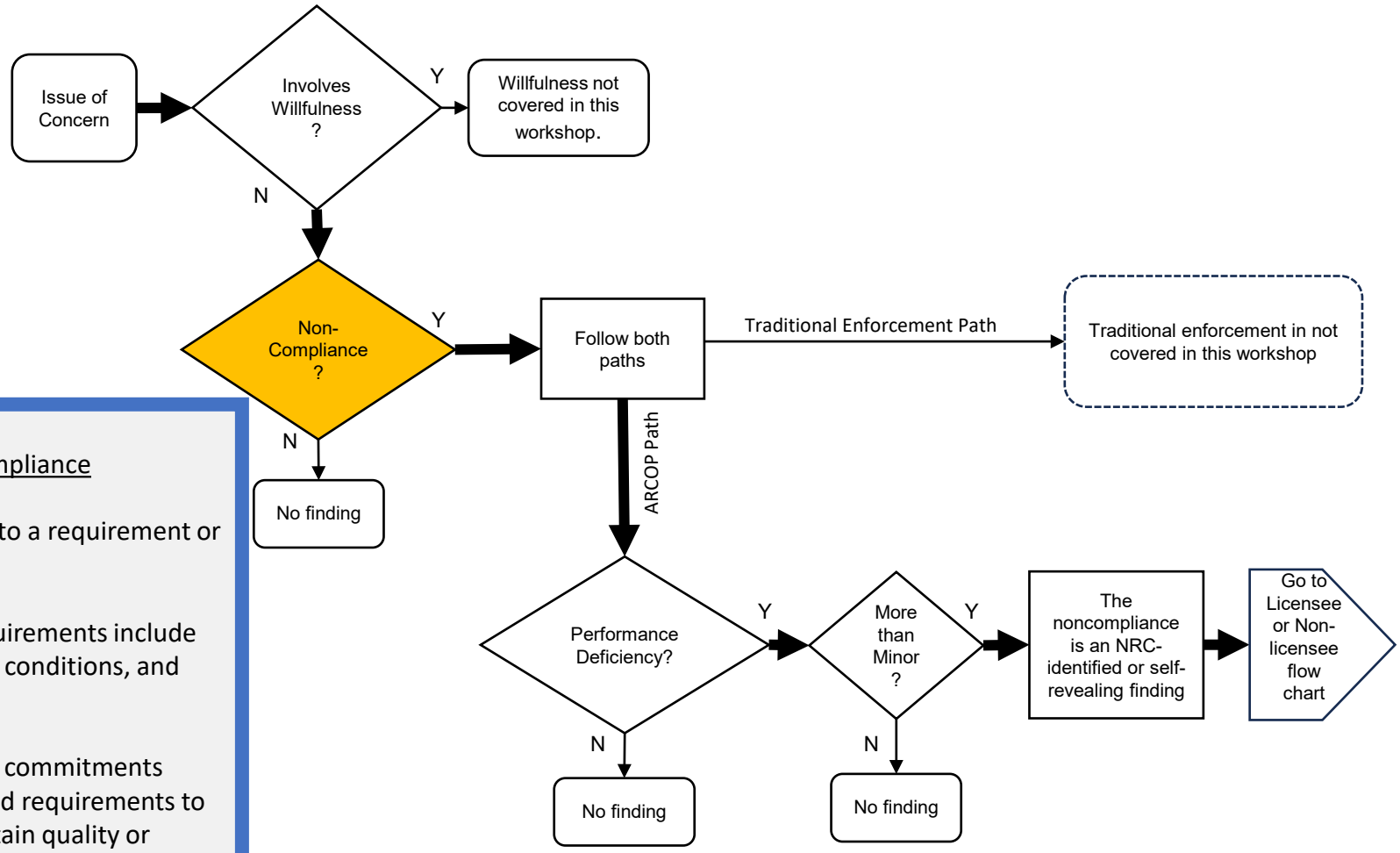
Initial Screening of Inspection Issues of Concern (Proposed)



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.

Initial Screening of Inspection Issues of Concern (Proposed)



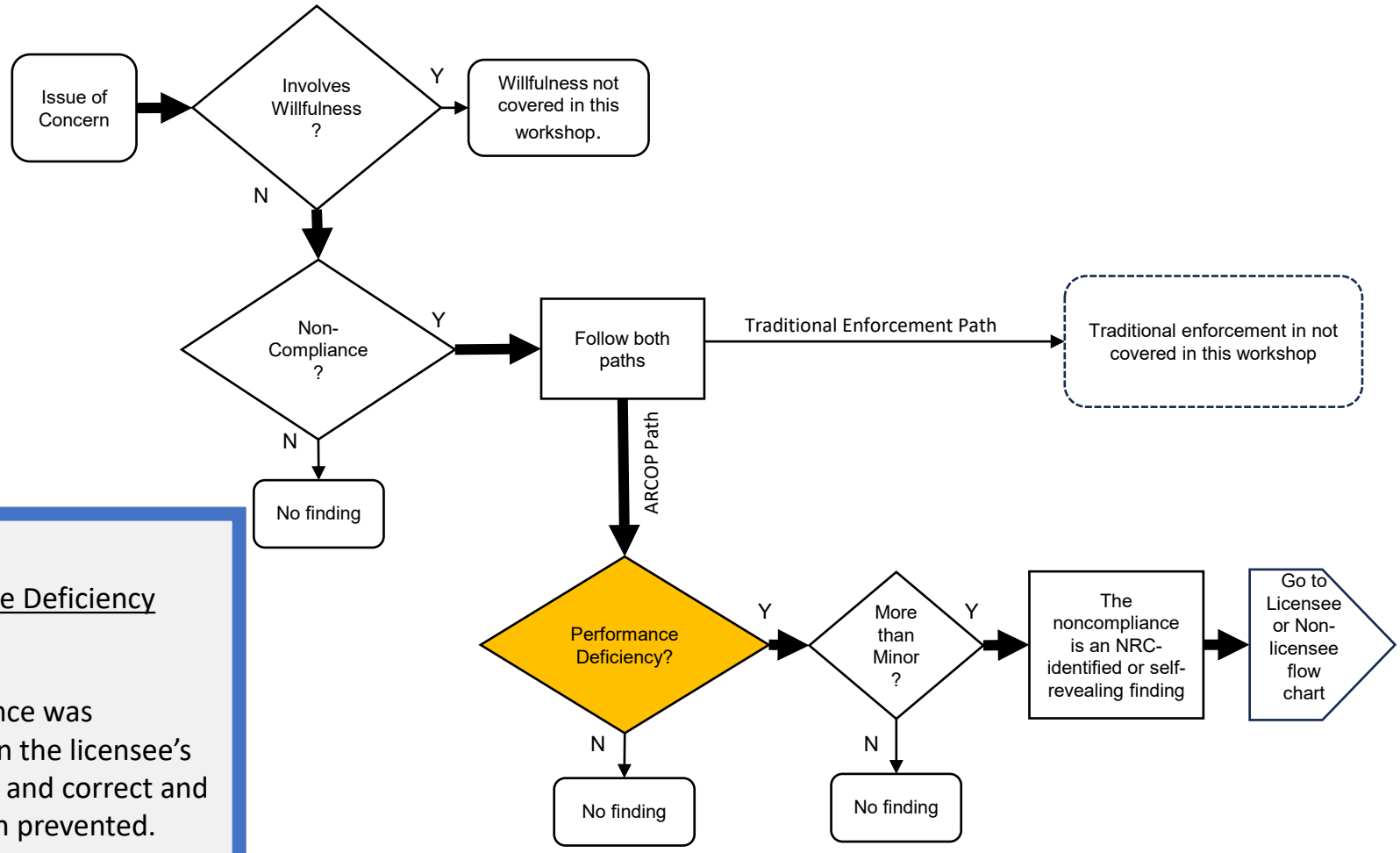
Noncompliance

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.

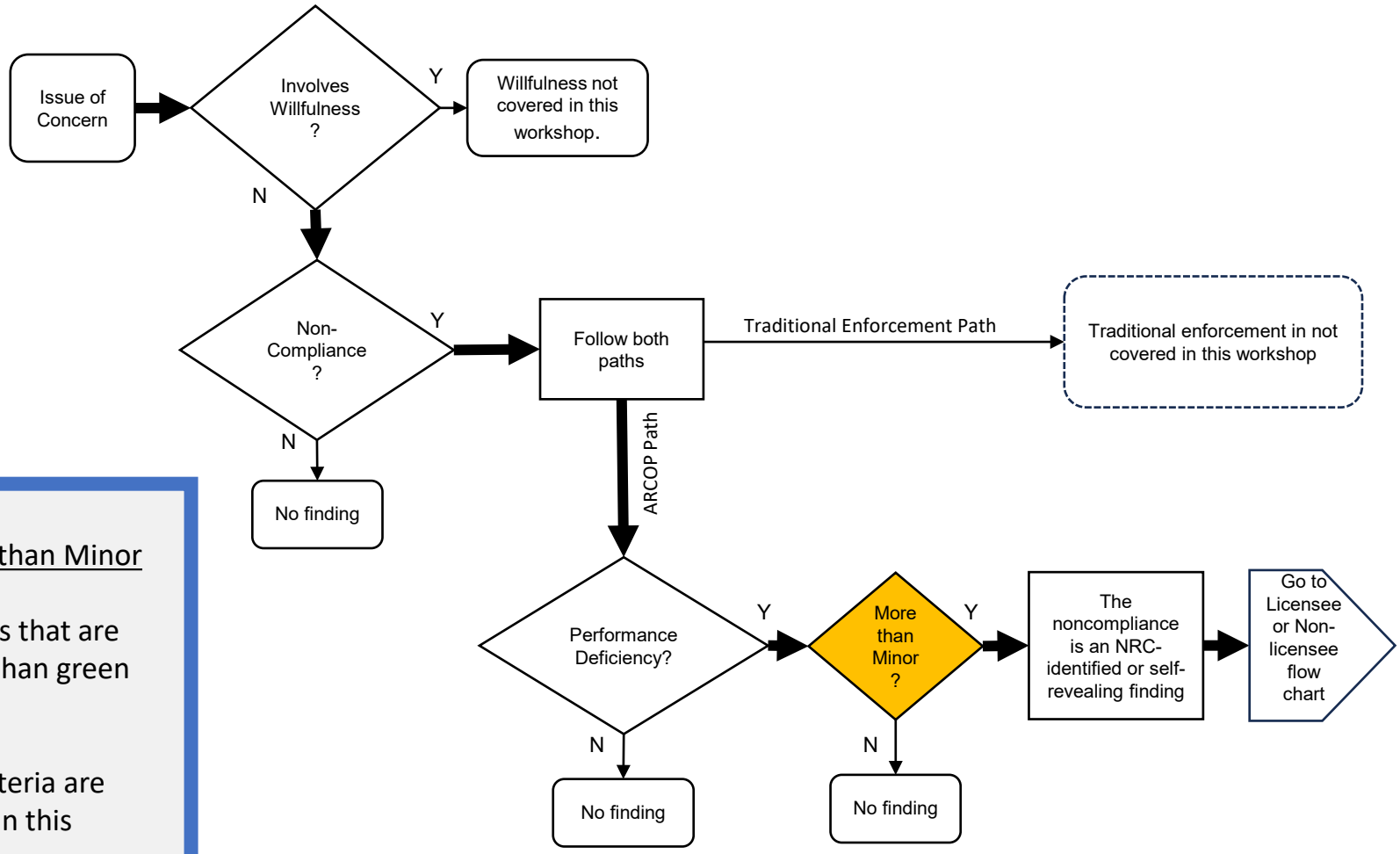
Initial Screening of Inspection Issues of Concern (Proposed)



Performance Deficiency

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

Initial Screening of Inspection Issues of Concern (Proposed)

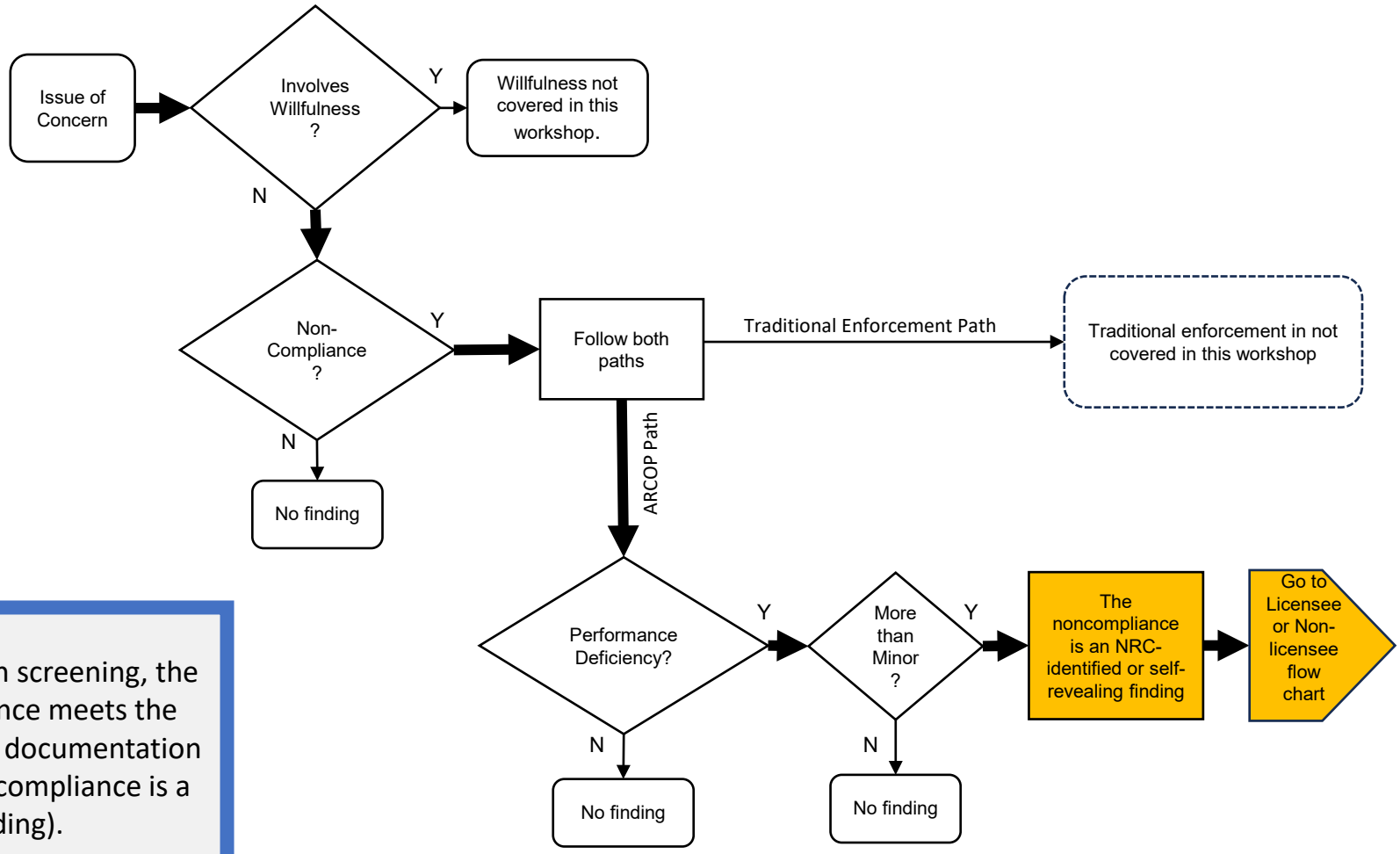


Minor/More than Minor

Noncompliances that are less significant than green findings.

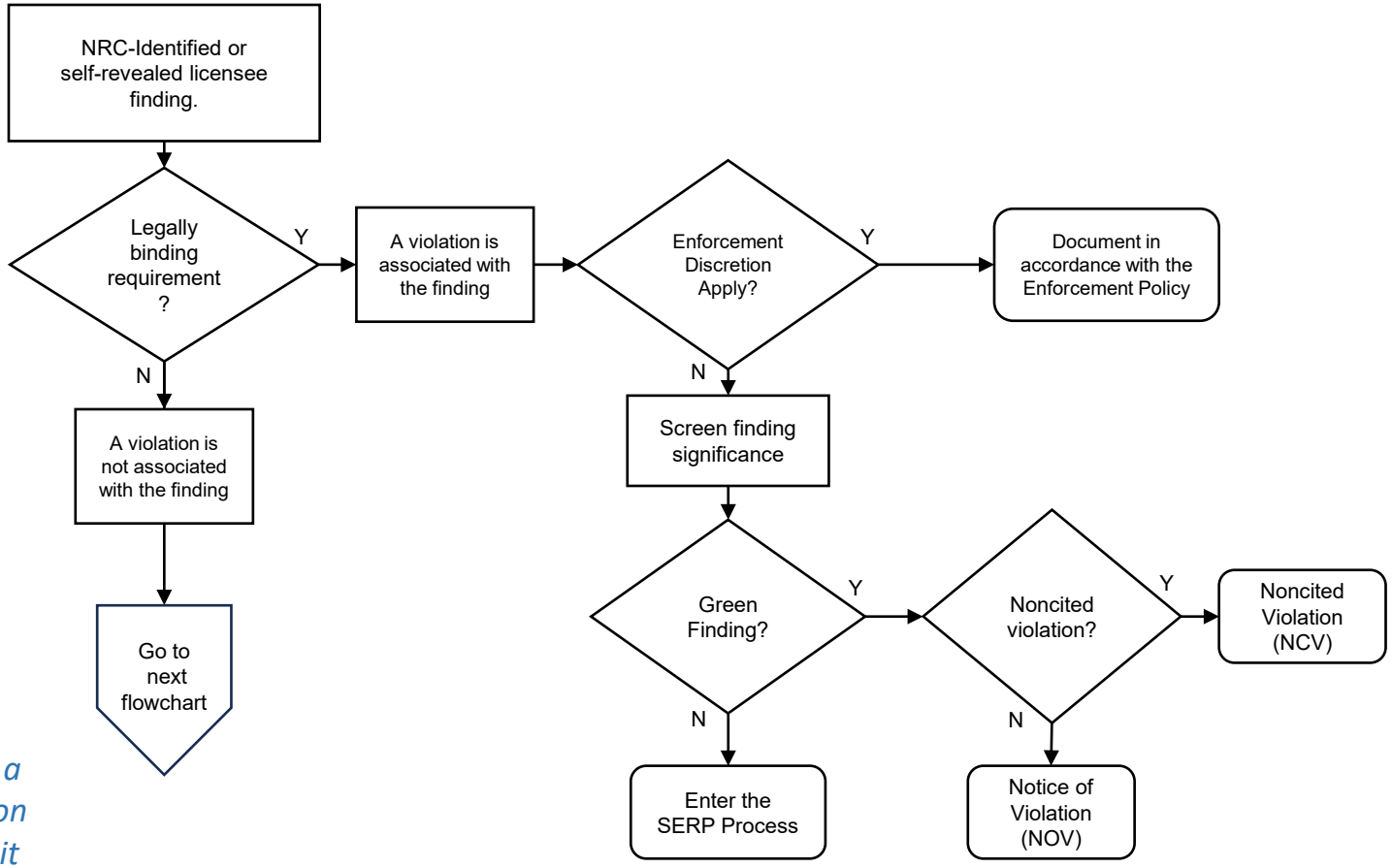
Minor/MTM criteria are discussed later in this presentation.

Initial Screening of Inspection Issues of Concern (Proposed)



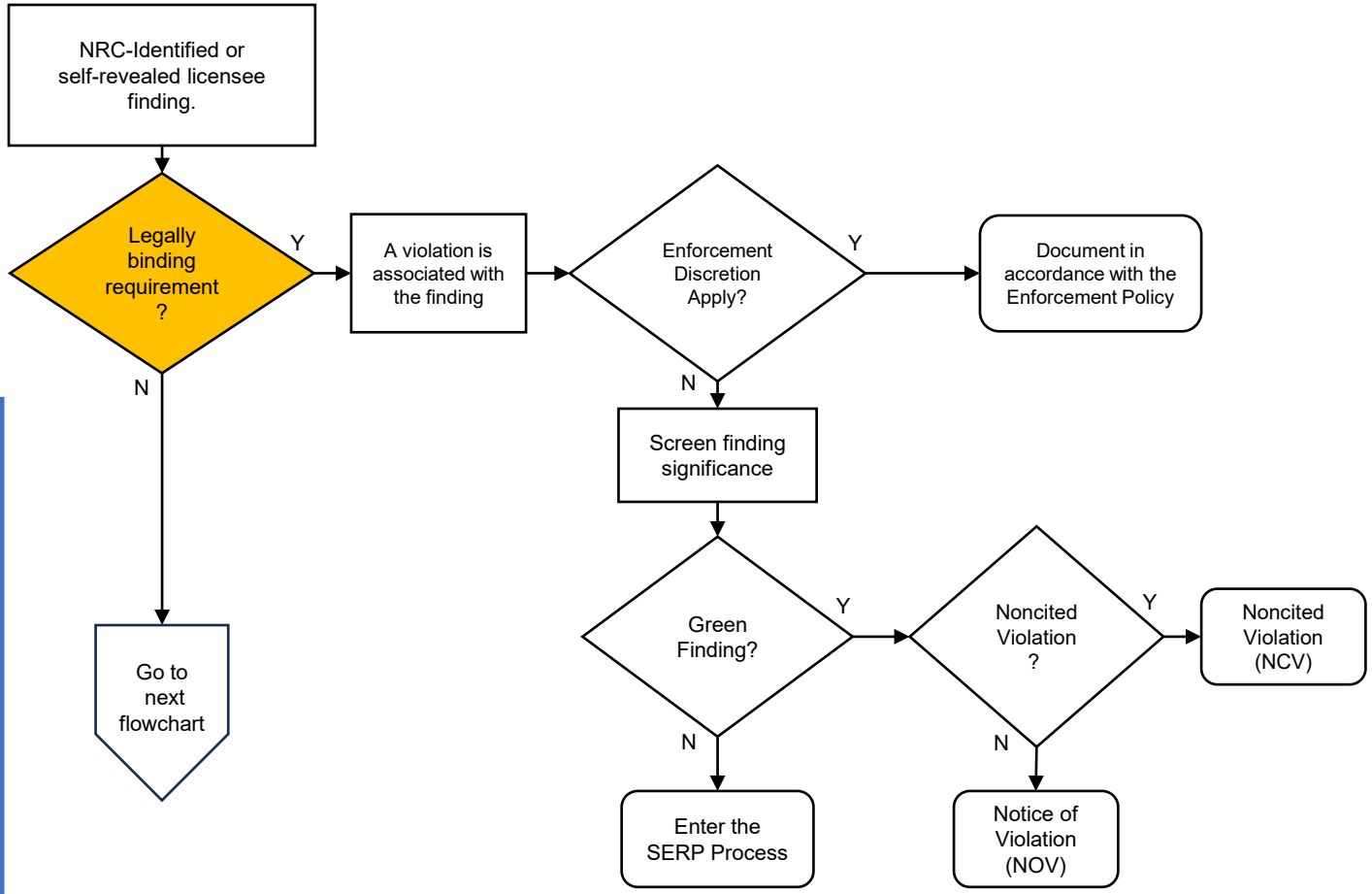
At this point in screening, the noncompliance meets the conditions for documentation (i.e., the noncompliance is a finding).

Dispositioning *Licensee** Findings (Proposed)



** "Licensees" include applicants and holders of a Limited Work Authorization (LWA), Construction Permit (CP), Combined License (COL), or Manufacturing License (ML)*

Dispositioning *Licensee** Findings (Proposed)



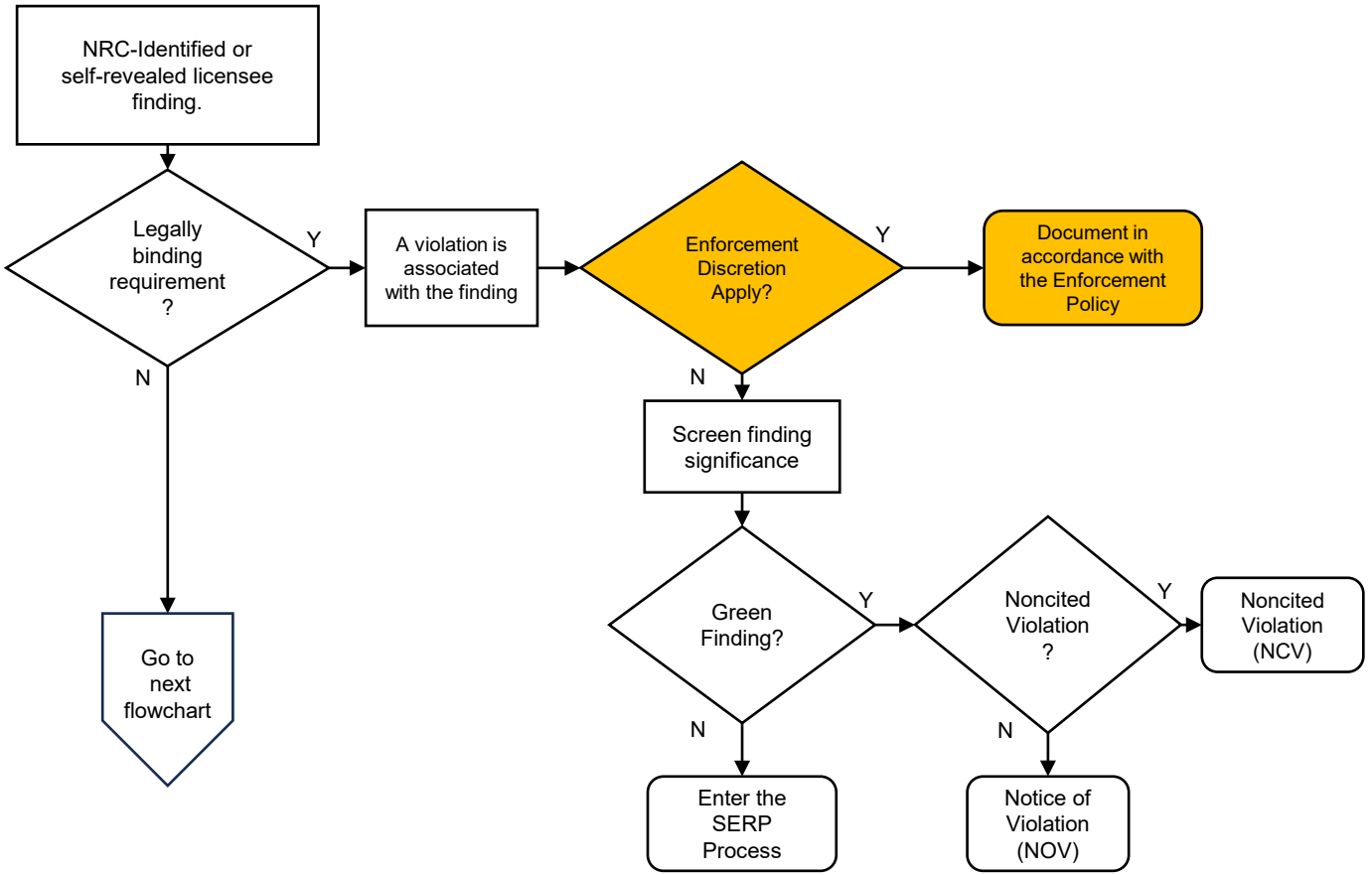
Legally binding requirements

- Regulations
- License conditions
- NRC Orders.

Non-legally binding requirements

Self-imposed requirements to establish and maintain quality

Dispositioning *Licensee** Findings (Proposed)



Enforcement discretion

The NRC may exercise judgment and discretion in determining the severity levels of violations and the appropriate enforcement actions to be taken.

This may include escalation or mitigation of enforcement actions.

See section 3 of the NRC Enforcement Policy for additional guidance.

Dispositioning *Licensee** Findings (Proposed)

Significance Screening

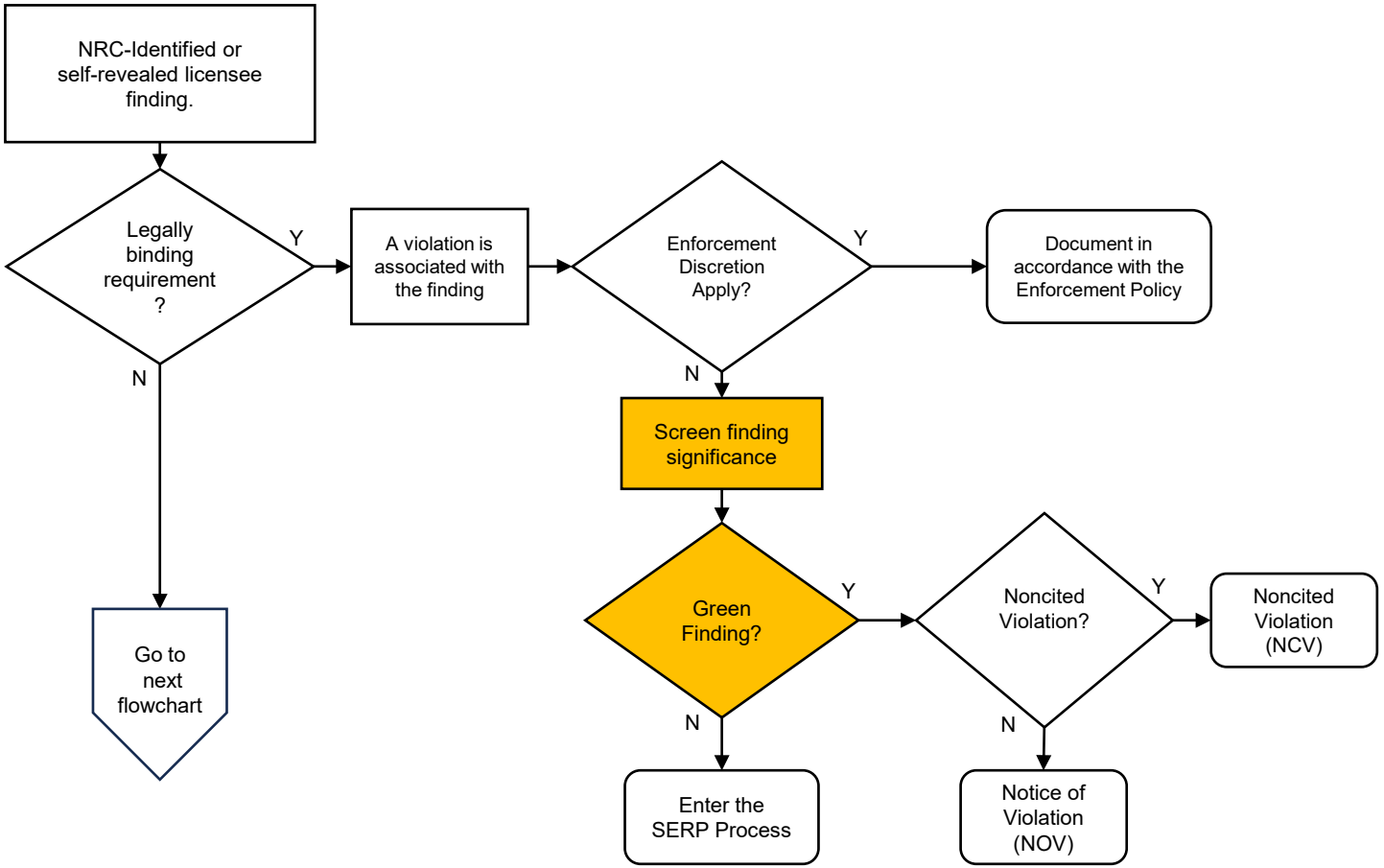
The finding is assigned a significance color:

Green: Very Low Safety or Security Significance

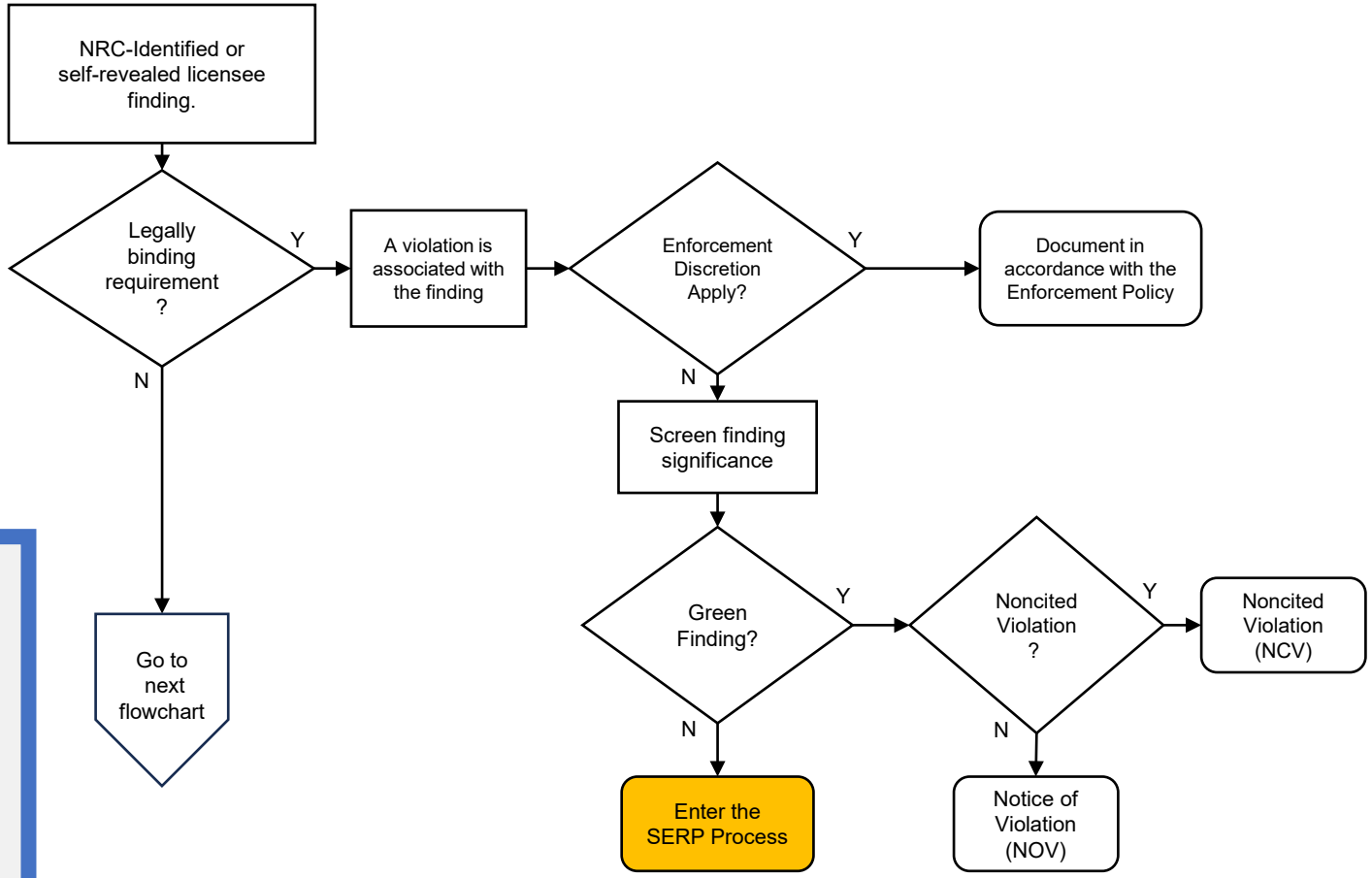
White: Low to Moderate Safety or Security Significance

Yellow: Substantial Safety or Security Significance

Red: High Safety or Security Significance (Not applicable to ARCOP findings – Proposed)



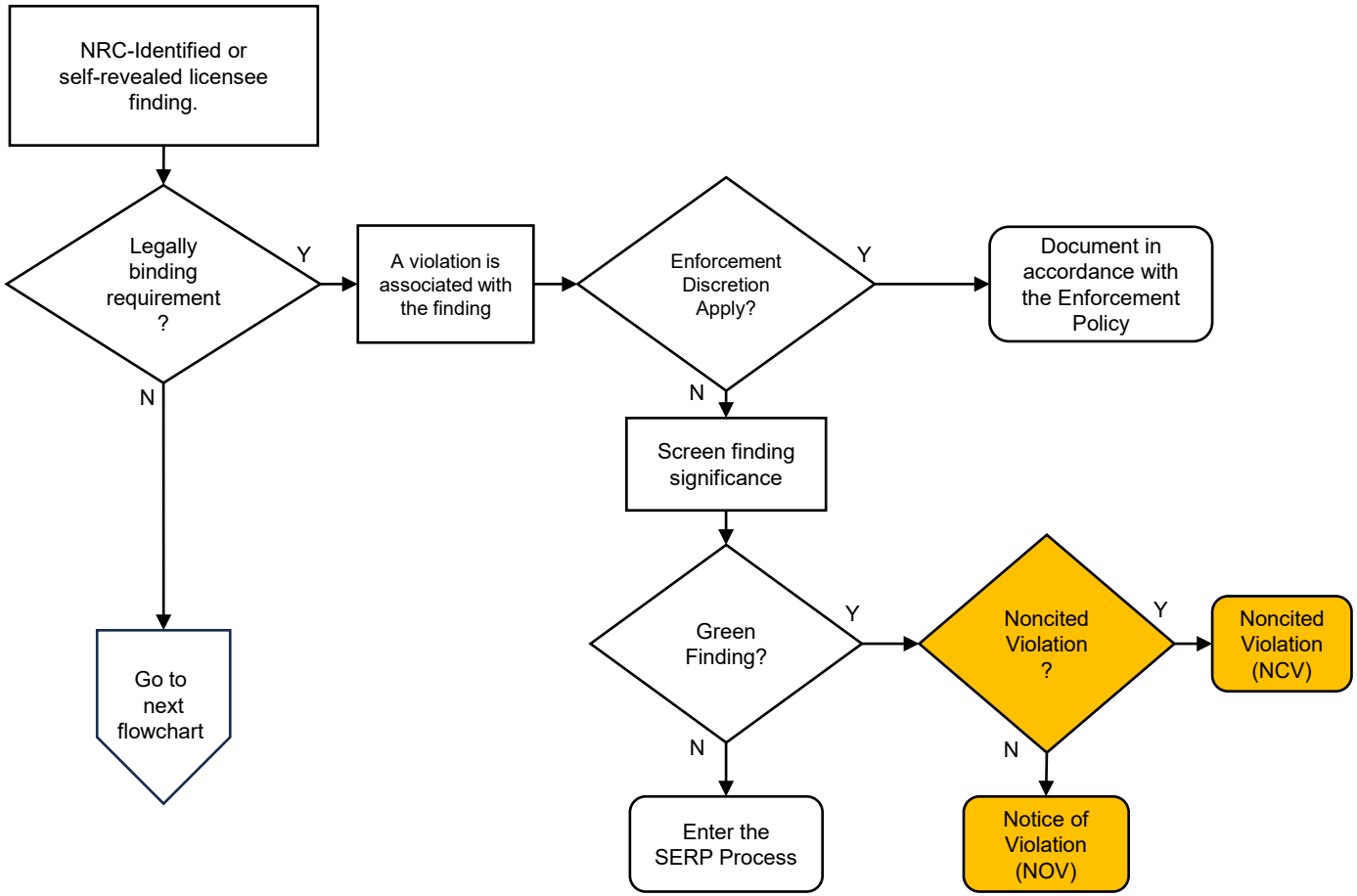
Dispositioning *Licensee** Findings (Proposed)



Significance Enforcement Review Panel (SERP)

A SERP consists of NRC managers, inspectors and enforcement specialists. The SERP reviews all findings initially screening as greater than green (GTG).

Dispositioning *Licensee** Findings (Proposed)

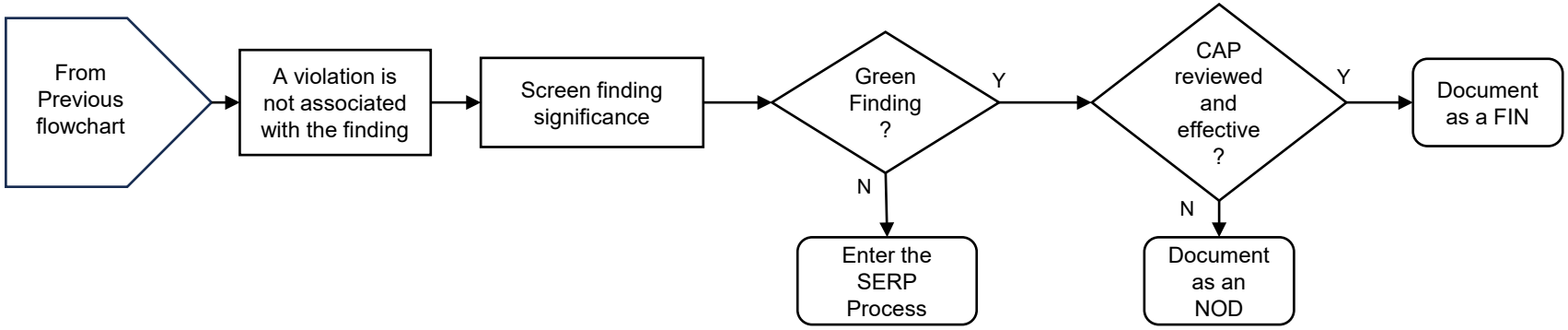


Noncited Violation (NCV) vs. Notices of Violation (NOV)

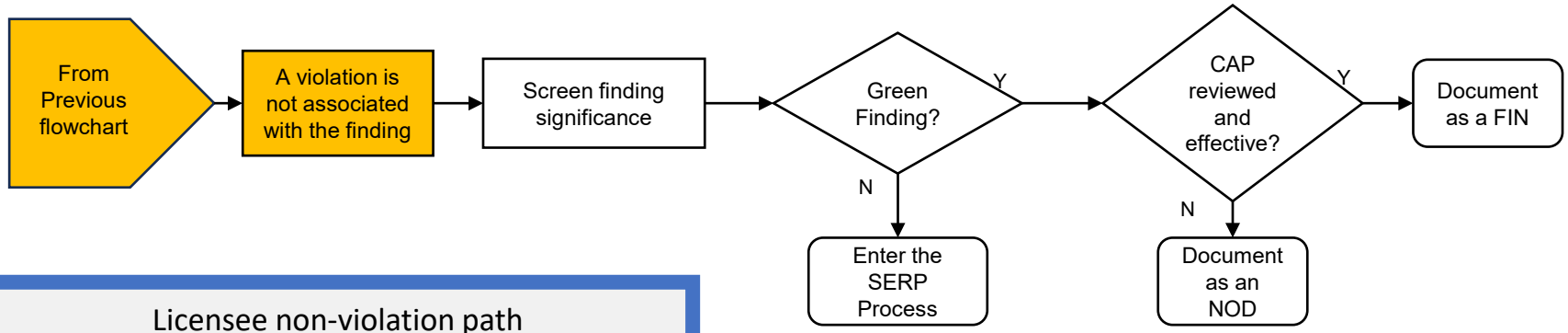
NOV: Written notice of violation requiring a written response describing violation reasons, completed and planned corrective actions, expected date of compliance.

NCV: Normally used in lieu of Green NOVs if the licensee's corrective action program has been inspected and found to meet regulatory guidance, industry standards, or both. Does not require a written response.

Dispositioning *Licensee** Findings – ***No Violation*** (Proposed)



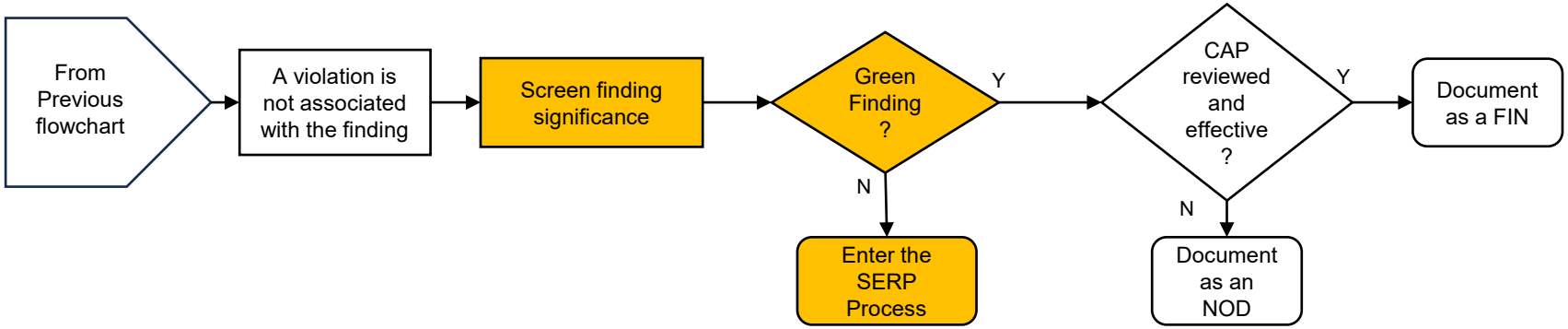
Dispositioning *Licensee** Findings – No Violation (Proposed)



Licensee non-violation path

The noncompliance is not a violation but has MTM impact on safety or security.

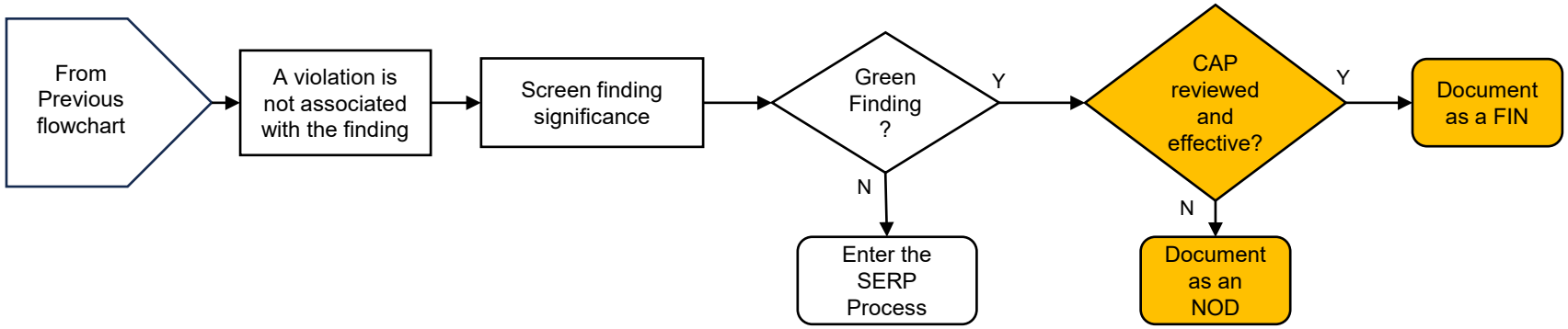
Dispositioning *Licensee** Findings – No Violation (Proposed)



Significance Screening

Uses the same screening criteria used for violations. Findings initially screened as GTG are reviewed by a SERP.

Dispositioning *Licensee** Findings – No Violation (Proposed)

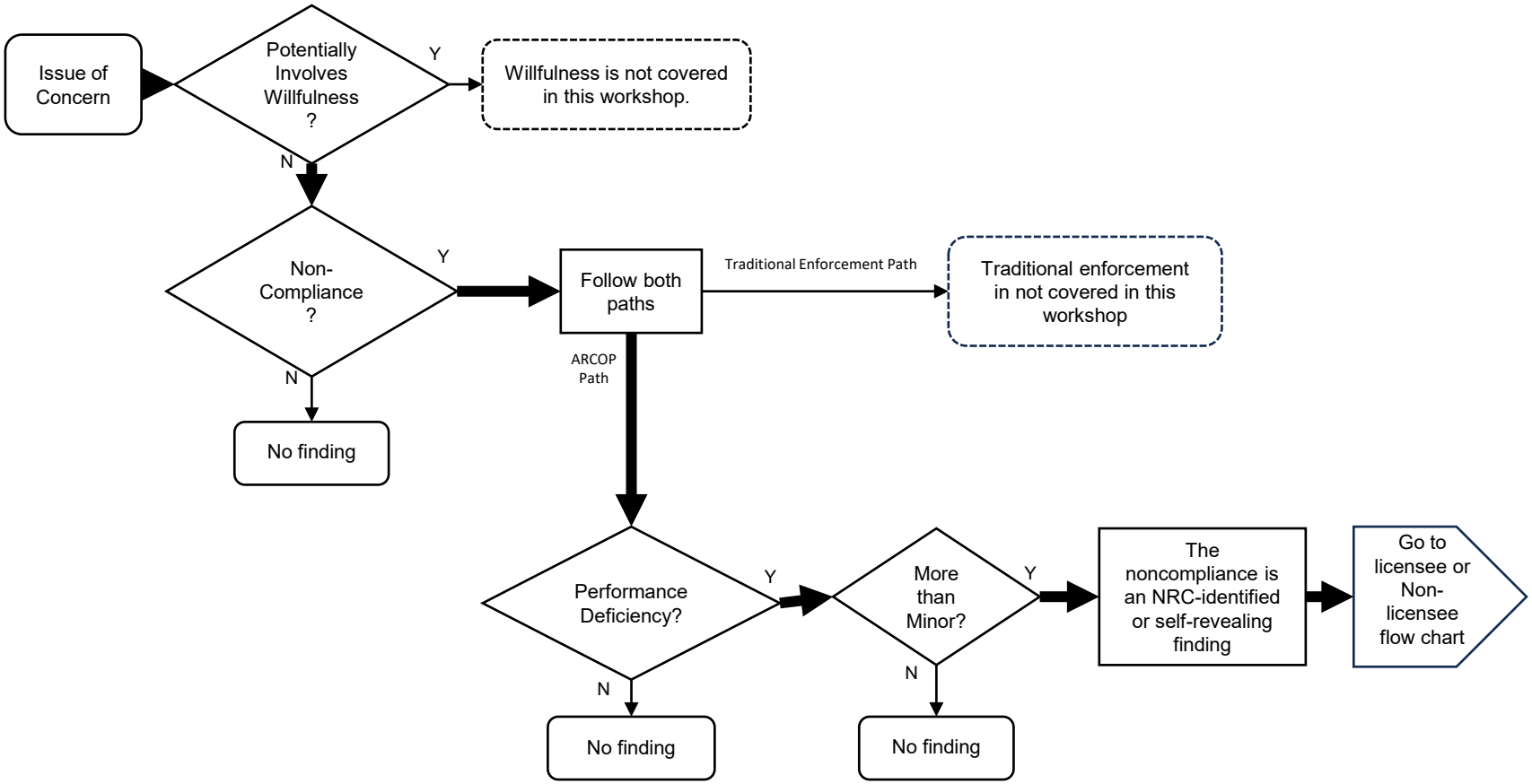


Corrective Action Program (CAP) Reviewed?

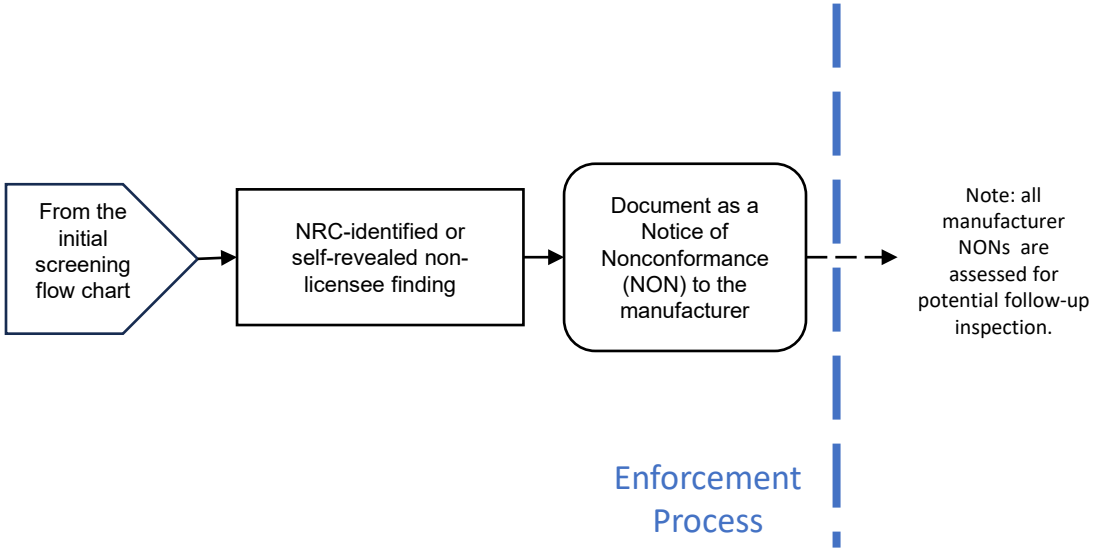
A Notice of Deviation (NOD) requires a written response like the response required for NOVs.

A Finding (FIN) does not require a written response.

Initial Screening Flow Chart for Issues of Concern (Proposed)

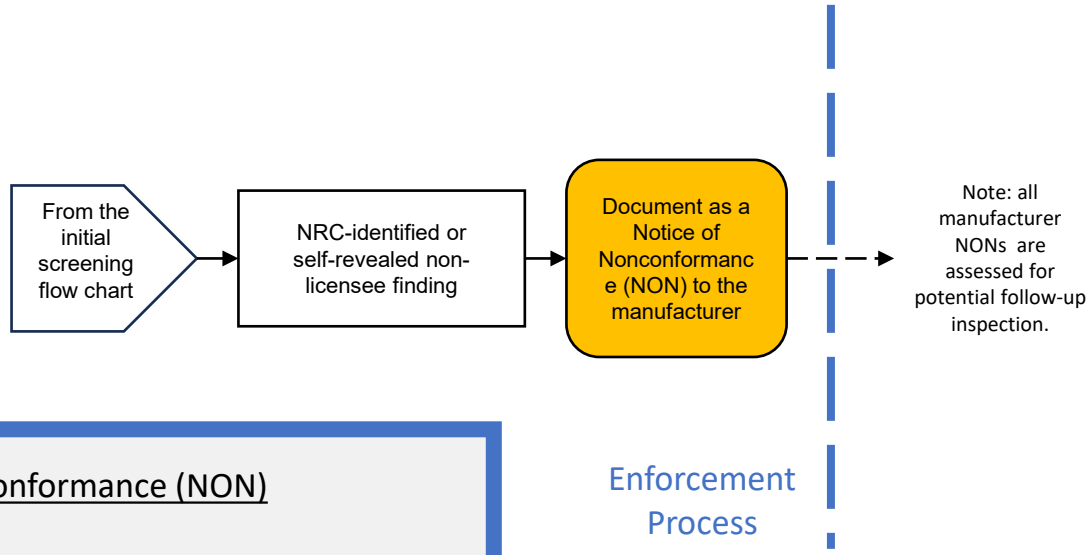


Dispositioning *Non-Licensee Manufacturer** Findings (Proposed)



Non-Licensee Manufacturers: The ARCOP noncompliance dispositioning process is only used for non-licensed manufacturer noncompliances (and not other non-licensed suppliers/vendors).

Dispositioning *Non-Licensee Manufacturer* Findings (Proposed)

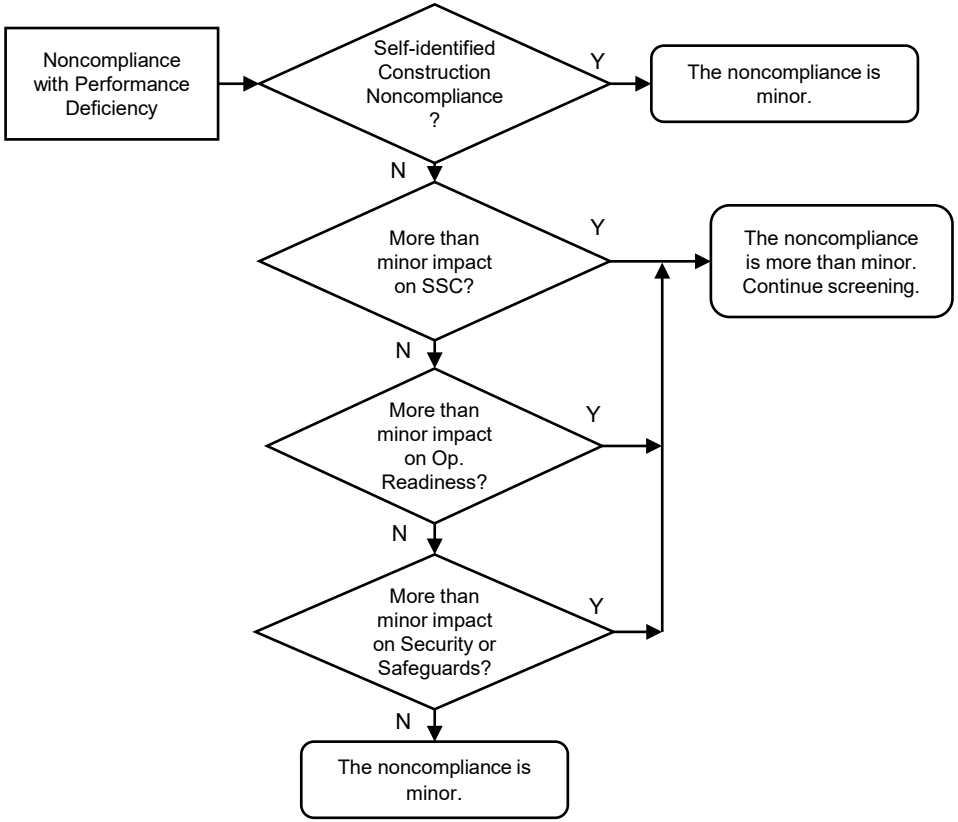


Notice of Nonconformance (NON)

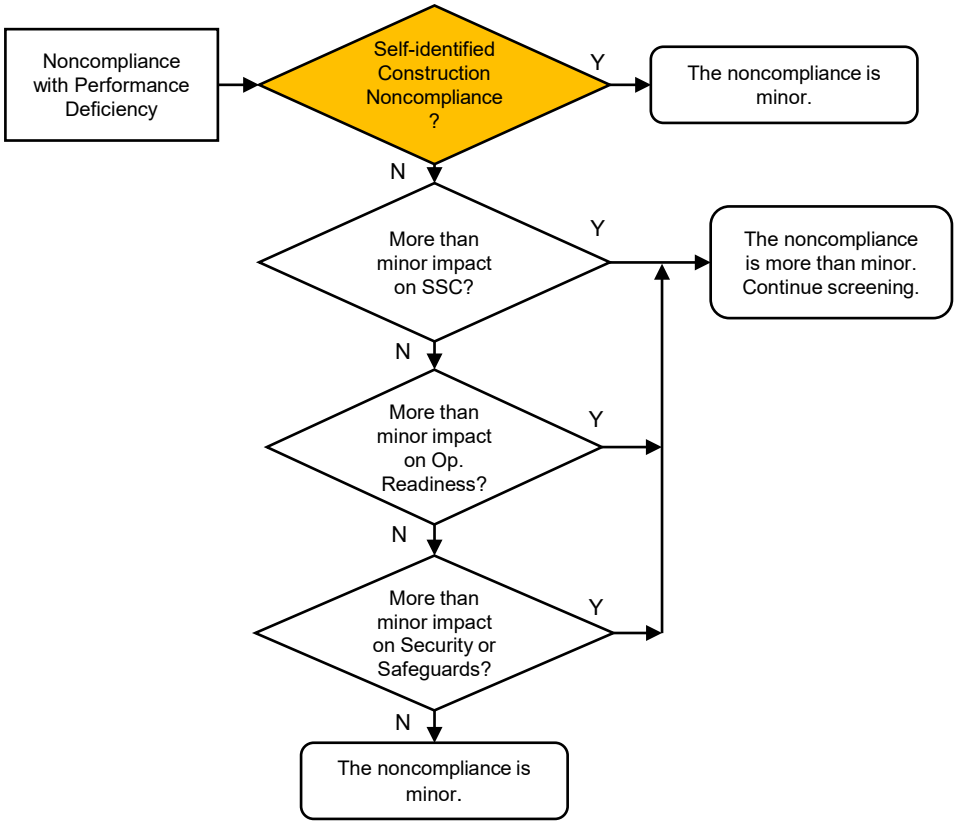
A NON is a written notice to a non-licensed manufacturer describing its failure to meet commitments related to NRC activities. The commitments are normally contained in contract requirements and are not direct violations of regulations.

E.g., Licensees establish a contract with a manufacturer to fabricate safety-related components using a QA program that complies with 10 CFR 50, appendix B.

Minor/More than Minor Determinations (Proposed)



Minor/More than Minor Determinations (Proposed)



Self-identified Construction Noncompliances (SCNs)

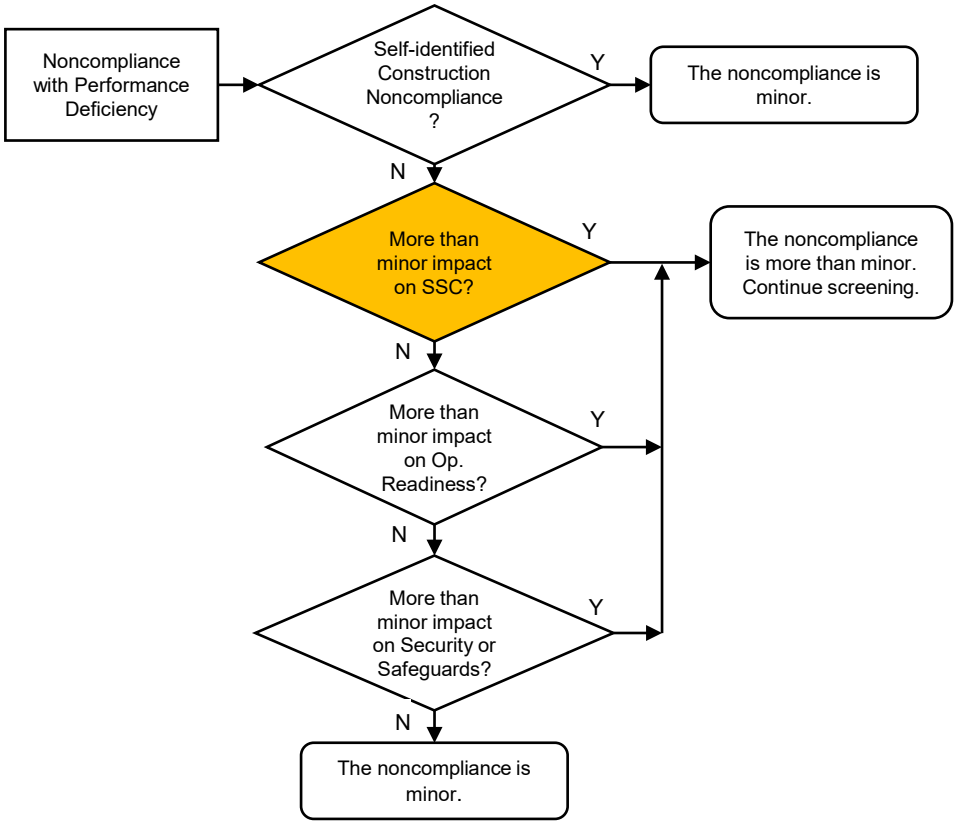
1. The noncompliance is self-identified (not NRC-identified or self-revealing), and

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.

Minor/More than Minor Determinations (Proposed)



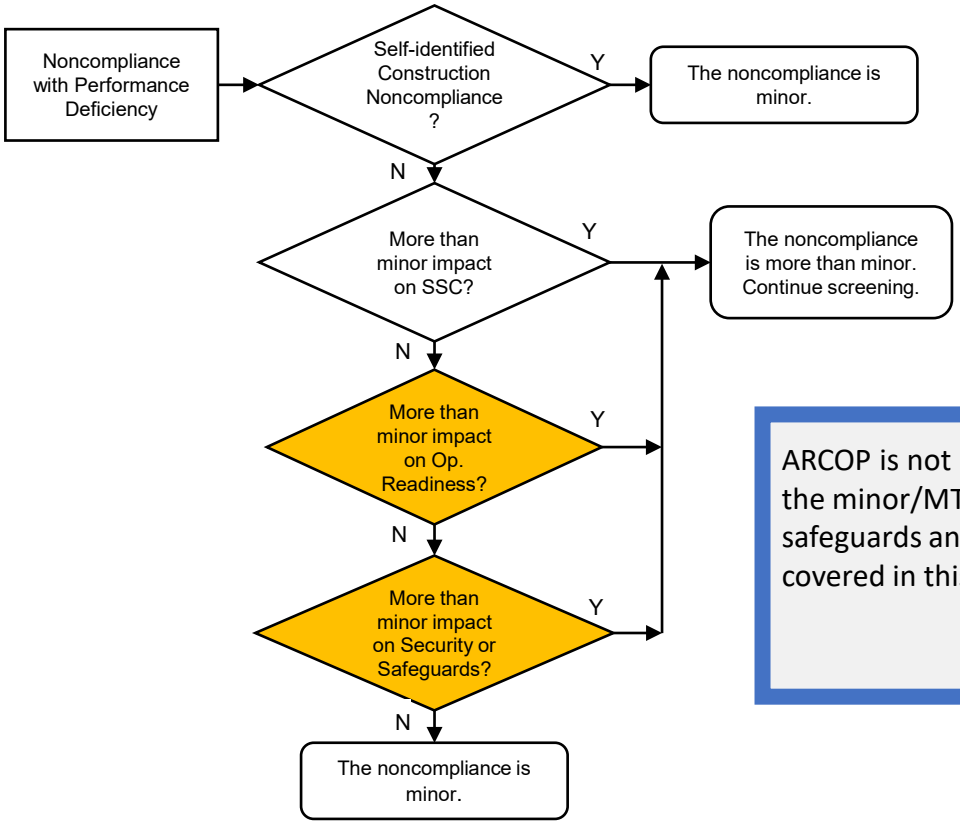
a. Does the performance deficiency represent an adverse condition that rendered the quality of a risk-significant or safety-related SSC unacceptable or indeterminate, and requires substantive corrective action?

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?

Minor/More than Minor Determinations (Proposed)



ARCOP is not proposing to make substantive changes to the minor/MTM criteria for operational programs or safeguards and security, and that information will not be covered in this workshop.

SSC Noncompliance Significance Determination Process Table (Proposed)

Significance of Finding	Finding's Impact on SSCs
Red	Not applicable to ARCOP findings.
Yellow	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 table[2], and screens as yellow using Appendix F of this IMC.
White	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 table[2], and screens as white using Appendix F of this IMC.
Green	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 not begun; or c. There is a quality assurance program (QAP) backstop[3] for the deficiency associated with the finding; or d. The finding is associated with a hazard protection feature[4] and does not potentially represent a significant quality assurance program breakdown[5]; or e. It is demonstrated with reasonable assurance that the design function of the SSC would not be impaired by the deficiency.

SSC SDP Table Notes

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.

Acronyms

ARCOP – Advanced Reactor Construction Oversight Process
CFR – Code of Federal Regulations
ConE – Construction Experience
DD – Division Director
DRA – Deputy Regional Administrator
EDO – Executive Director of Operations
FSF – Fundamental Safety Function
GTG – Greater than Green
IR – Inspection Report
ITAAC – Inspections, Tests, Analyses, and Acceptance Criteria
MTM – More than Minor
NCV- Non-Cited Violation
NOD – Notice of Deviation
NOV – Notice of Violation
NON – Notice of Nonconformance
NRC – Nuclear Regulatory Commission
NSR – Non-safety Related (no special treatment)
NSRST – Non-safety related special treatment
OE – Operating Experience

Acronyms

PRA – Probabilistic Risk Assessment
RA – Regional Administrator
QAP – Quality Assurance Program
RAW – Risk Achievement Worth
RTNSS – Regulatory Treatment of Non-safety Related Systems
ROP – Reactor Oversight Process
SCN – Self-identified Construction Noncompliance
SDP – Significance Determination Process
SL- Severity Level
SR – Safety Related
SSC – Structures, Systems, and Components

Stakeholder Input

End of Morning Session

Planned Workshop Sessions

Session 1, February 28, 2024, and March 20, 2024:

Introduction to NRC Advanced Reactor Construction Oversight, and the ARCOP Framework.

Session 2, April 3, 2024:

Inspection Scoping

Session 3, May 22, 2024:

Enforcement

Session 4, *Date*:

Assessment, Feedback/Wrap Up

Feedback on this Public Meeting

https://feedback.nrc.gov/pmfs/feedback/form?meetingcode=20240651