



# Use of Sampling in Commercial Grade Item Dedication

## NUPIC Vendor Meeting

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New Orleans Marriot

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# Practically Speaking

- Anyone that uses acceptance sampling must face the fact that whenever some of the items submitted for acceptance do not conform to specifications, some nonconforming items are likely to be accepted
- The statistical approach to sampling recognizes this fact
  - It attempts to evaluate the risk assumed when using sampling techniques
  - It attempts to decide the degree of protection needed in any instance
    - Then it is possible to select a sampling scheme that provides a desired degree of protection with due consideration for the costs involved

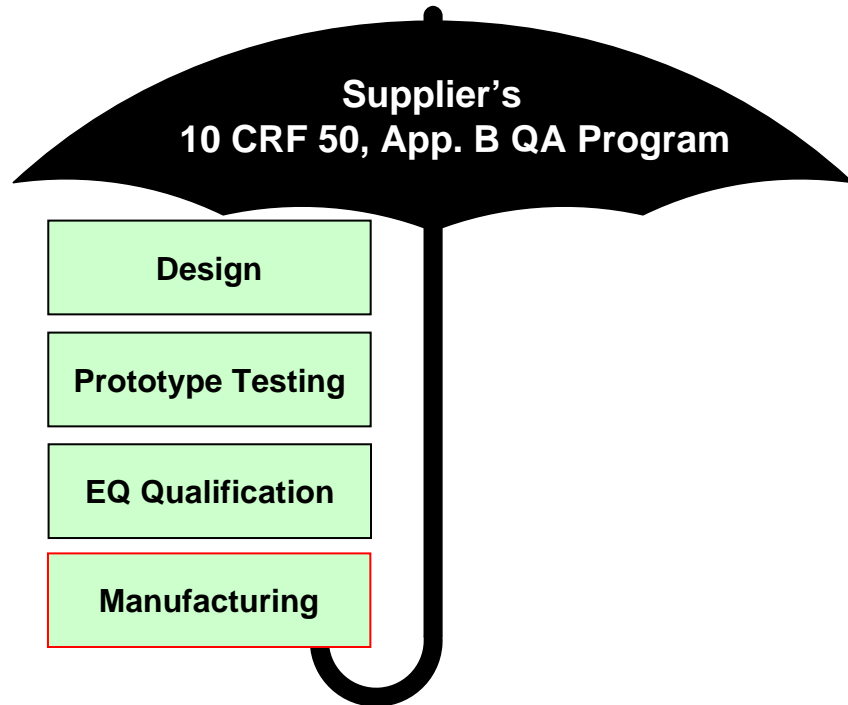
Source: Statistical Quality Control, Fifth Edition, Eugene L. Grant and Richard S. Leavenworth, McGraw-Hill, Inc., 1980

# Regulatory basis for sampling

- Regulatory basis per ANSI N45.2.13:
  - “Sampling may be utilized during receiving inspection when conducted in accordance with established procedures or recognized standards.”
- NRC IP 38703 contains additional discussion
- NRC IP 43004 contains some guidance
- ASME NQA-1 2008 Edition, 2009 Addenda
  - Requirement 10
  - Part II, Subpart 2.2, Section 502.2a
  - Part II, Subpart 2.14, Section 602

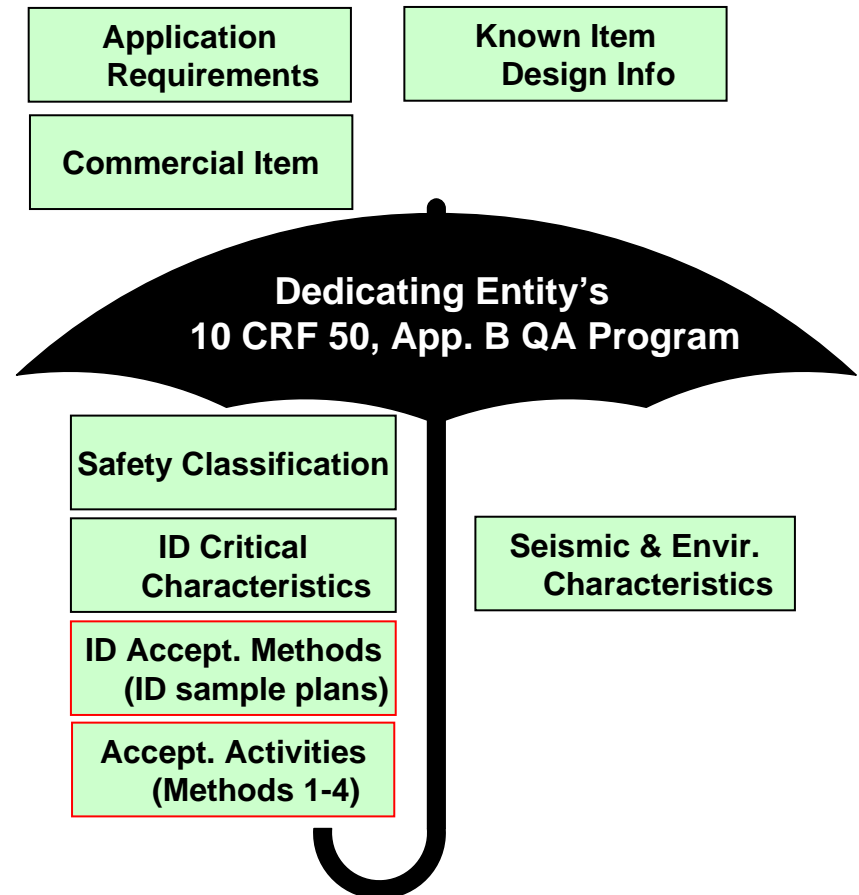
# Basic Component Options

## “Traditional”



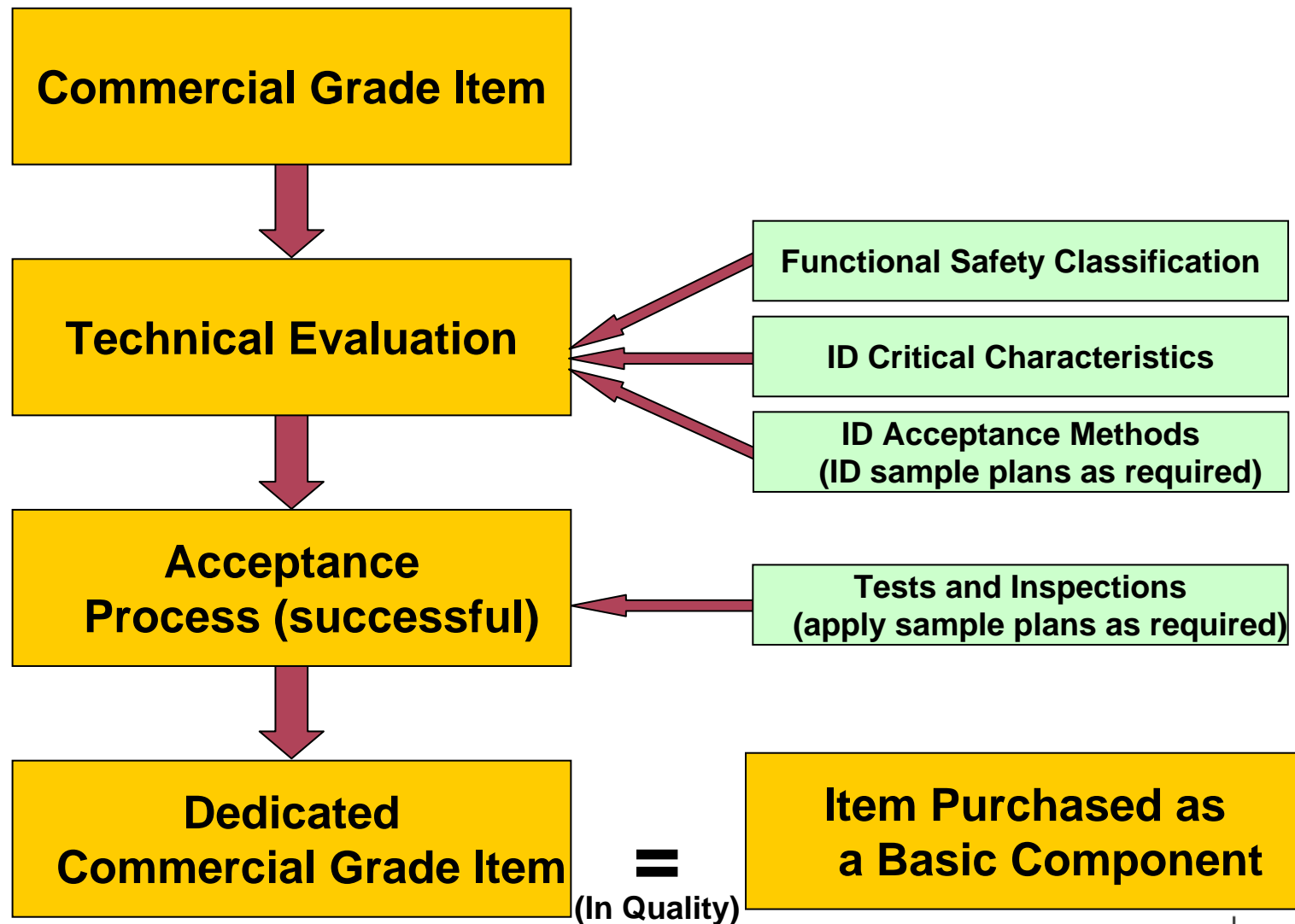
Items meet design requirements

## “CGID – Born of Necessity”

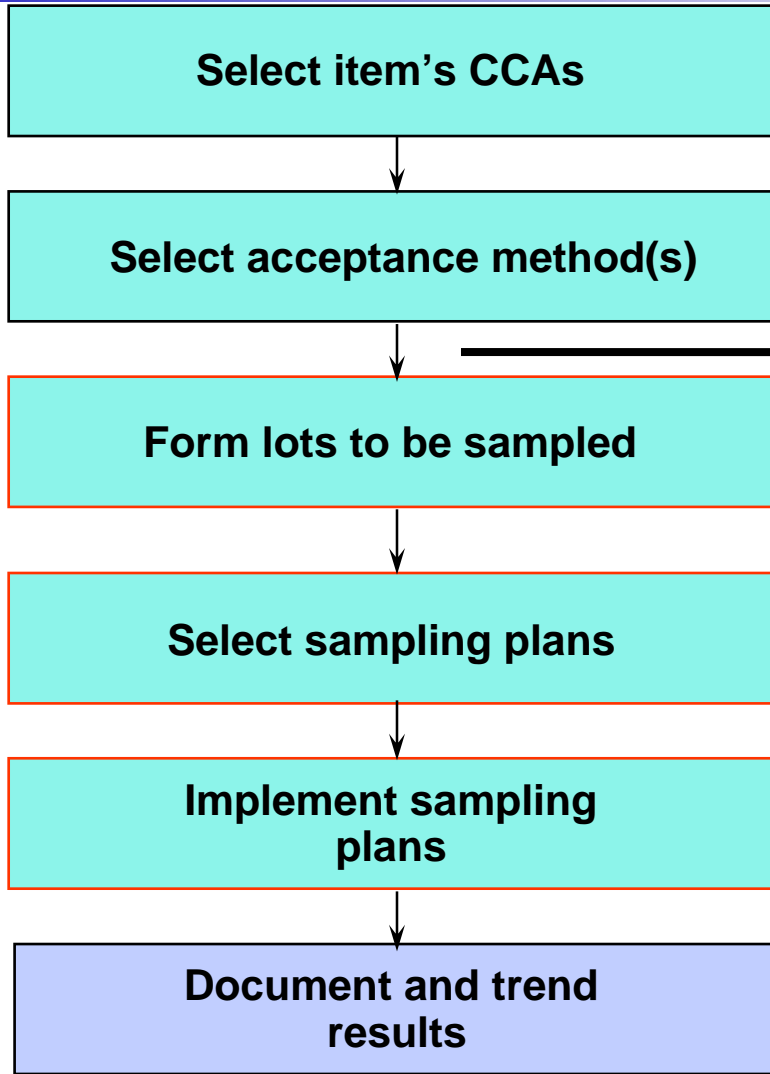


Critical Characteristics are Verified

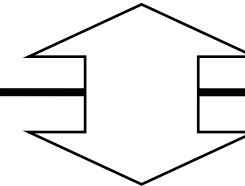
# How Sampling is Used in Commercial Grade Item Dedication



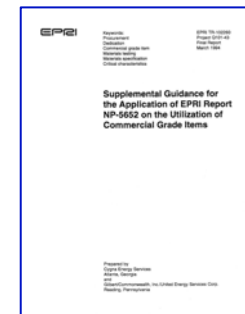
# Use of Sampling in the Acceptance process



**EPRI TR-102260**  
**Supplemental Guidance for the Application of EPRI Report NP-5652 on the Utilization of Commercial Grade Items**



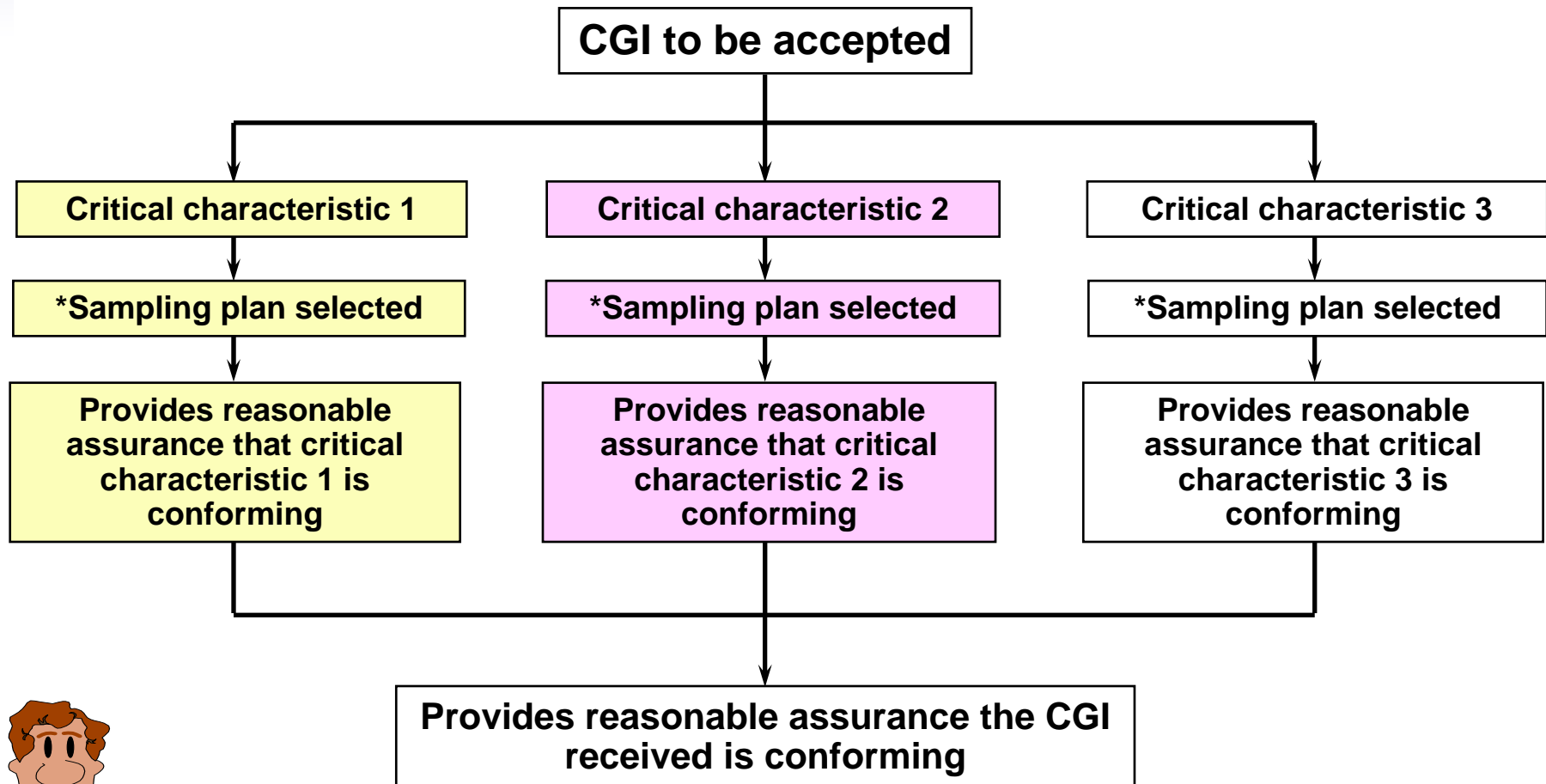
**EPRI TR-017218-R1**  
**Guideline for the Utilization of Sampling Plans for Commercial Grade Item Acceptance**



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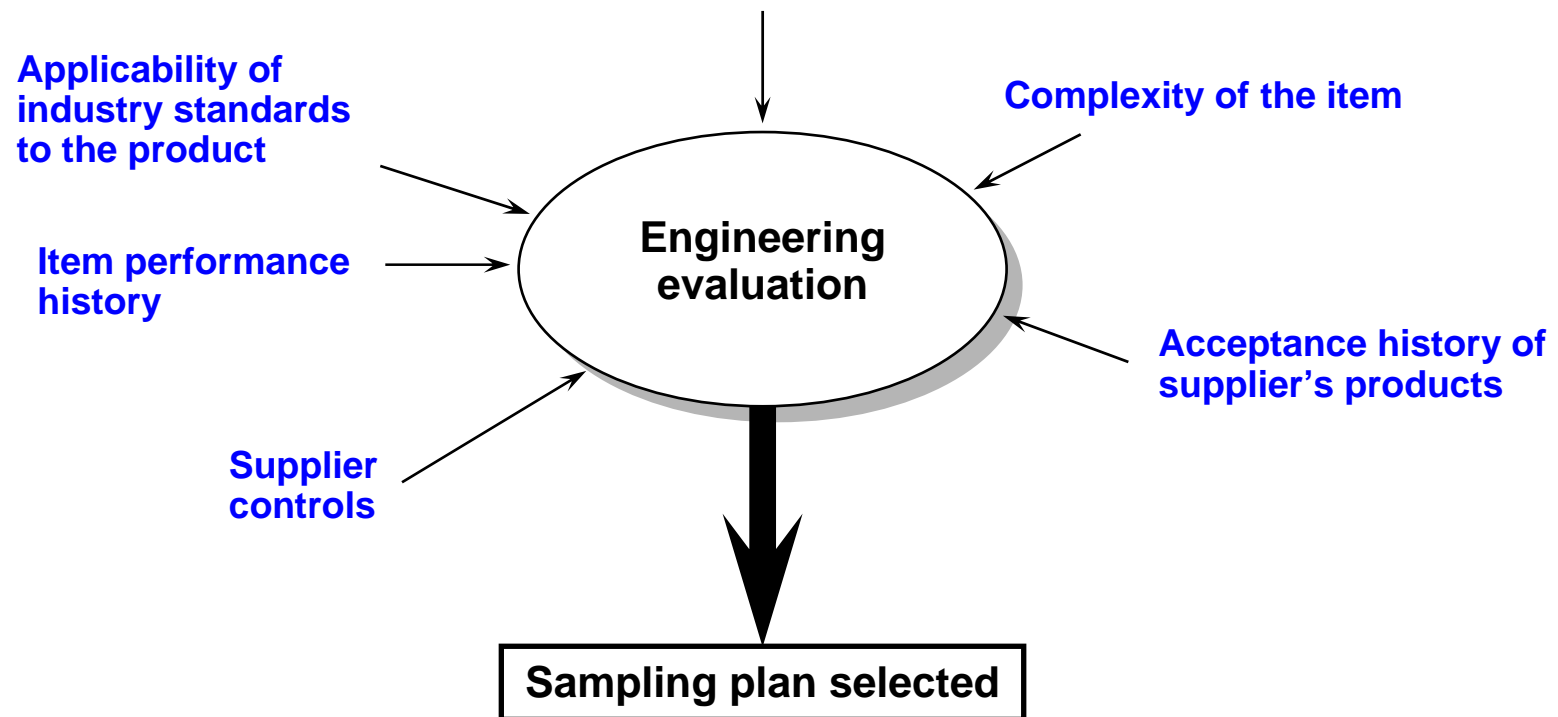
# Selection of Sampling Plans for Each CC



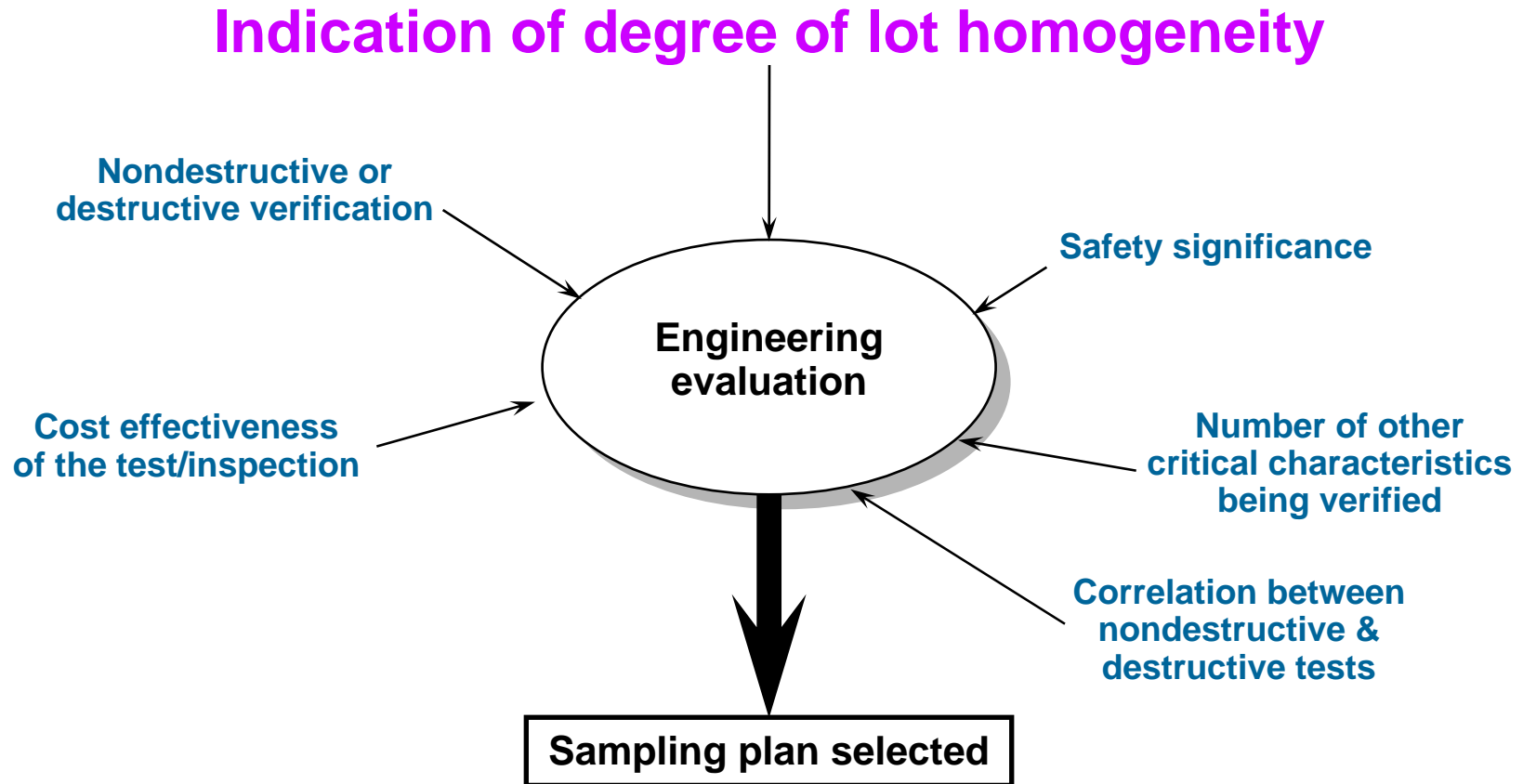
A unique sampling plan for each CCA

# Supplier/Item-Related Selection factors

## Indication of degree of lot homogeneity



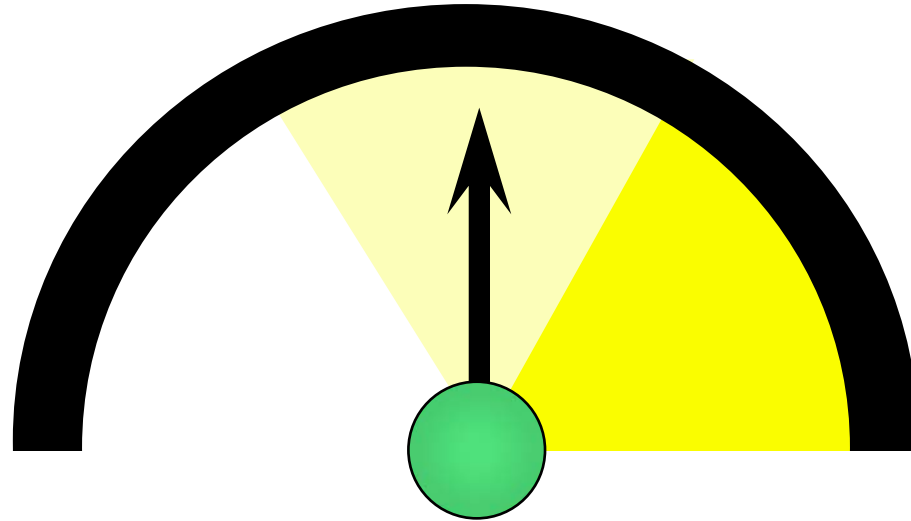
# Test / Inspection-Related Sampling Plan Selection Factors



# Sampling plans for *nondestructive* tests and inspections

- The EPRI guide suggests using a graded approach
- It provides three “benchmarks” to consider before making a final determination as to which sampling plan, if any, is appropriate
  - Normal
  - Reduced
  - Tightened
- After considering the benchmarks, you select the sample size you think is appropriate
- Your sample size can range is from 1 to 100%!

# Normal sampling plan selection factors

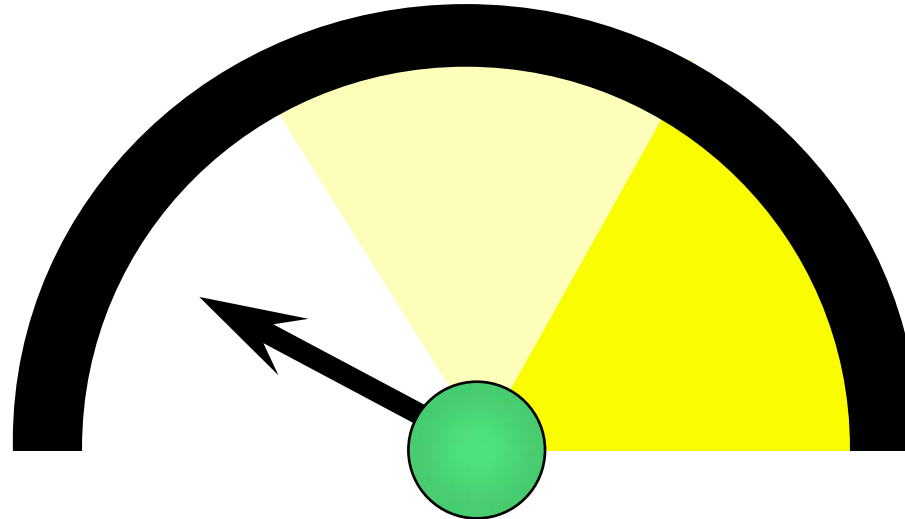


- Expectation that the lot will be acceptable
- Sufficient degree of homogeneity

Let's discuss the sampling tables contained in the report!

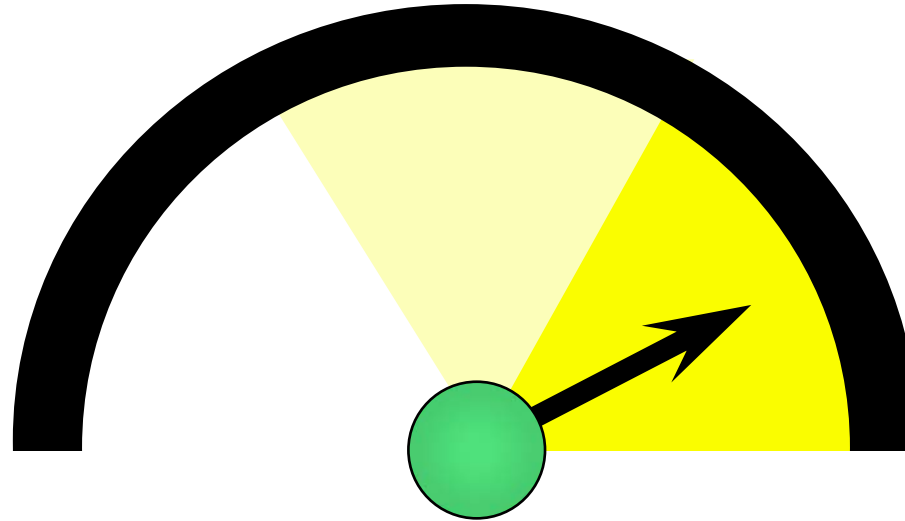


# Factors indicating when reduced sampling may be appropriate



- **Production traceability** (high indication of lot homogeneity)
- Satisfactory acceptance history
- Verification of multiple critical characteristics
- Knowledge of supplier's activities (e.g. CG Survey)
- Satisfactory item performance history
- Produced to a national standard
- Item is simple
- CCA has relatively low safety significance

# Factors indicating when tightened sampling may be appropriate



- Low indication of lot homogeneity
- Concern that the lot is non-conforming
- Item not produced to national standards
- Item is a complex assembly
- Item or characteristic has relatively high safety significance

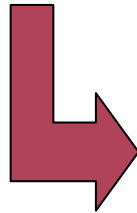
# Destructive tests and inspections

- The employment of small, representative samples for destructive testing is **an accepted practice** used in both material testing standards and equipment qualification testing.
- When destructive testing is required, an engineering evaluation should be performed to determine appropriate factors or additional activities that can justify a small sample size.
- Document the basis for selection of the sample size



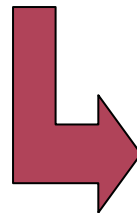
# Sampling plans for destructive testing

When *production traceability* has been established



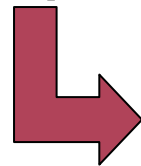
A sample of 1 item is typically sufficient

When *single product manufacturer traceability* has been established



Lot Size	Sample Size
1 - 10	1
11 - 30	2
31 - 70	3
71 - 150	4
151 - 310	5
311 - 630	6
631 - 1270	7
1271 - 2550	8
2551 or more	9

When only multiple product manufacturers traceability has been established:



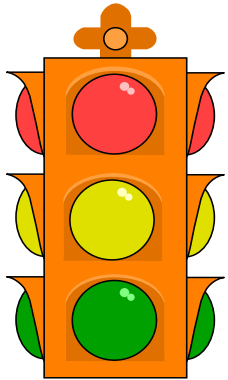
Consider the “reduced” sampling plan provided in 017218-R1

# Sampling plan implementation

- Chronology of tests
  - Verifying the CCAs most easily tested first (to provide justification for verifying other CCAs on a smaller sample and to provide higher confidence in the homogeneity of the lot)
- Destructive test sample considerations
  - Based on the number of test samples needed, the **order quantity should be adjusted**
  - In certain cases, the item cannot be tested in its final form
- Selection of items to be sampled
  - Approach A - The **same samples** are used to verify all the critical characteristics
  - Approach B - A **different sample** is taken from the lot to verify each critical characteristic

# Evaluation of results

- A sampled item is considered defective if one or more critical characteristics do not meet the established acceptance criteria
- Why?
  - One or more items do not meet specified requirements!
- The lot acceptance basis is as follows:
  - Reject the lot if the sample has one or more defective items
  - Accept the lot if the sample has zero defective items.



# Documentation



- A documented basis for the sample plant selected is important as emphasized in NRC IPs 38703 and 43004
- The **sampling process and the bases for sampling** should be documented
- Documentation should **address the factors that were considered** prior to selecting a sampling plan
- Documentation should present the **technical justification** for sampling
- EPRI guidance does not define a format for documenting the sampling justification



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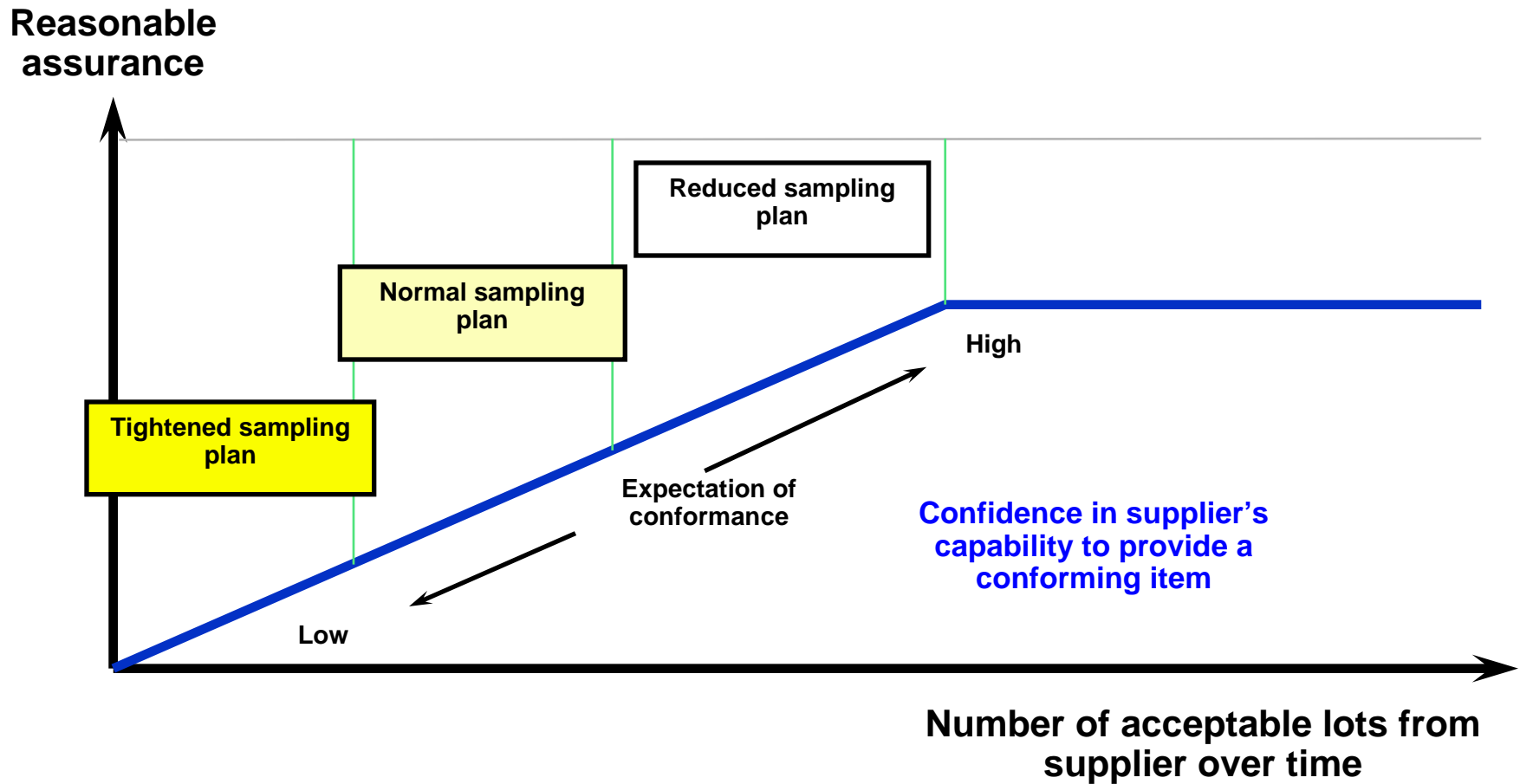
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# Questions?



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# Relationship between acceptance history and the selected sampling plans



# Objective Evidence of Quality Furnished by the Sub-supplier

**When the quality is *poor*, common sense says to:**

- Increase sample size of items being tested/inspected
- Conduct performance-based evaluations more frequently
- Perform source verification of sub-supplier/manufacturere

**When the quality is *good*, common sense says to:**

- Decrease sample size of items being tested/inspected
- Conduct performance-based evaluations less frequently
- Less need to consider source verification

# Items Not Meeting Acceptance Criteria

- If the acceptance criteria is NOT met, **the item is rejected**
  - The item does not conform to the manufacturer's design
  - The cause of failure should be documented
- Other like items should be evaluated to determine if they would exhibit the same failure
- The supplier's procedures for handling non-conformances (extent of condition) and taking corrective actions should be implemented



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**Questions?**



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