



QME-1  
QUALIFICATION OF  
MECHANICAL  
EQUIPMENT USED IN  
NUCLEAR FACILITIES

OM-2 CODE ON  
COMPONENT  
TESTING  
REQUIREMENTS AT  
NUCLEAR FACILITIES

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# DISCLAIMER

THE OPINIONS EXPRESSED HEREIN ARE MY OWN AND  
NOT THOSE OF ASME

# QME-1 BACKGROUND & CURRENT STANDARD

- QME-1 was developed as a result of NRC Regulatory Guide 1.48.
- In General, QME-1 had not been used for any of the current plants with a few exceptions (Vogel 3 and 4, Newer Chinese Plants).
- While information from QME-1 can be referred to by the current OM, it wasn't as specific as it needed to be.
- As currently formatted, QME has requirements in several different places and uses several appendices.
- OM requires data for IST baseline that could be supplemented by QME Test data.

# THE CURRENT OM CODE

- Directed at Light Water Reactor Plants.
- Written after most of the operating plants were built and operating
- System & Component design issues caused several accommodations.
- PWRs had pumping systems that did not have full flow test loops, while BWRs did. Some lacked valves that are designed to be throttled e.g. gate valves.
- BWRs have Testable Check valves; PWRs do not.
- Valve exercise testing interval based on when the system can be made available for testing.
- Baseline data is difficult to obtain in situ.

# SCOPE OF COMPONENTS

- Components other than ASME Class 1, 2 & 3
- Emergency power
- Significant number of new SMR designs
- Development of an important to safety scope statement for the myriad of new designs is virtually impossible.
- Both QME and OM are Component Documents
- Determination of those components that are important to safety need not rest with the code writers. Instead, it should be with the plant designer and their regulator.

# NEW DESIGNS VERSUS CURRENT PLANTS

- SMR and Gen-IV – A multitude of designs that are significantly different than Light Water Reactors
- Many existing power plants were designed without consideration of IST.
- Terms like Safe Shutdown, Cold Shutdown, Important to Safety, Design Basis Accident may not even apply to newer facilities.
- The new reactors will be used for more than powering electrical grid (process steam, hydrogen generation, district heating, powering ships, remote locations, and backup power).

# FACILITY DESIGN & COMPONENT SELECTION

- A component can never be qualified for parameters that were not included within its design.
- IST cannot correct an incorrectly designed system or component.
- Risk Informed can be used to select components to be qualified and that require IST.
- Pump, valve, and restraint functions are irrespective of system functions..
- Component specification, installation and qualification must include all parameters that it must withstand.
- System and component design must include the provisions necessary for IST.
- Component Qualification is the baseline for subsequent IST in QME (O&M can use data obtained during qualification)

# CONCEPTS APPLICABLE TO QME-1 AND OM-2

- Applicable for any type of facility.
- No selection of components within QME nor OM-2 because;
  - Components requiring qualification will be determined during design/licensing, manufacture process
  - Components required to be in the IST program will have been qualified via QME-1 as determined during the licensing process.
- Consider the function of the component rather than the function of the system in which it is installed
- Provide method to establish a Qualification Program and IST if a component is not called a Pump, Valve, or Dynamic Restraint

## CURRENT QME-1 OR NEW?

- QME-1 has not been used in most of the existing plants
- Currently, no discussion of environmental requirements for metallics, higher temperature.
- Remote actuators are not currently in QME-1
- The current layout is very cumbersome with a good deal of overlap
- Decision to revise the current QME-1

## REVISE OM OR A NEW CODE

- Scoping Issues continue to arise with current OM
  - Components that are not ASME 1, 2 & 3
  - Emergency power
- IST was not a consideration in the design of many operating plants
- Revising the current OM Code will make the document very complicated to use and be very inefficient for new generation plants.
- It was decided that a new IST code would be more efficient and logical.

## PREREQUISITES COMMON TO BOTH

- Scope is determined during facility design and licensing; not by ASME.
- Mechanical Components must be designed and appropriate for their function
- Component is correctly specified and designed

# PREREQUISITES

- QME
  - A Qualification Specification is a Priority
  - The qualification includes obtaining data for subsequent IST
- OM-2
  - The facility is designed to include provisions to do IST.
  - The system and component are designed to be tested when required irrespective of plant mode.
  - QME-1 qualification maintained by IST.

# QME-1 REVISIONS

- Mechanical Equipment and functions that need to be qualified per QME-1 are to be determined by the system designers and the regulator as a prerequisite to QME-1
- QME-1 has been modified to be easier to use
  - QME Sections have been reordered into a logical format
  - Minimize cross references
  - Requirements for each type equipment included within the part for each type
  - No Appendices
- “Active” is removed from the title of the standard as well as its definition
- In General, Current Qualification requirements did not change
- Added requirements for Metallics, High Temperature, and Equipment with remote Actuators

# QME-1 REVISIONS

- The Standard is ordered into Parts and Sections. There are no Appendices
- Separate Part is provided for each type of Mechanical equipment. The Qualification Specification requirements appear in the first Section first in each Part.
- Appendices have been eliminated and applicable requirements are moved into the Part for each type of Mechanical Equipment
- Documentation requirements have been simplified.
- Clear language
- No redefining of words and terms
- All definitions are in a Glossary and a separate Reference Section is provided
- Clear descriptions rather than shorthand terms (if necessary, use more words)
- Avoidance of adjectives that have multiple definitions

## OM-2

- Components requiring IST are selected outside of the Code
- Logical format
- Referencing to other sections almost eliminated
- Clear language
- No redefining of words and terms
- Clear descriptions rather than shorthand terms (if necessary, use more words)
- Avoidance of adjectives that have multiple definitions
- No “if practical/practicable” or other similar interpretive phrases
- Include manufacturer input to establish IST frequency
- Contains links to QME-1 for maintaining component qualification

# FORMAT OF OM-2

- General Requirements is limited to Program Requirements
- Each Component Type has a separate section that;
  - Is stand alone
  - Incorporates applicable portions of the current OM Code Appendices (Condition Monitoring ex.)
  - Valve Leakage Testing is also a stand-alone section
- Accommodations for plant operating mode are eliminated (if not able to full stroke, part stroke etc. is not in OM-2)
- All Definitions in single section
- All References in a single section
- No Appendices

## TESTING REQUIREMENT IN OM-2

- In General, IST requirements in OM-2 are the same as OM except;
  - Test intervals can be based on prior performance or, as determined by the manufacturer of the component
  - When a component needs to be tested, it must be tested irrespective of plant operational mode
  - Increase use of condition monitoring
  - Use of pump and valve groups eliminated
  - Several legacy issues with terminology were eliminated, e.g., operable, practical, practicable

## OM-2 STATUS

- Published and available

## QME-1 STATUS

- Approved through BNCS
- Awaiting Editorial Review
- Expected publication by November 2025

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THANK YOU!

Questions