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ASME OM Code Comprehensive Pump Test Issues

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Comprehensive Pump Test (CPT) – History and Background

- CPT incorporated in 1995 and later editions of the ASME Code for Operation and Maintenance of Nuclear Power Plants (OM Code).
- Previous codes did not distinguish between Group A tests (quarterly for routinely used pumps), Group B tests (quarterly for standby use pumps) and comprehensive pump tests (biennially for all pumps).
- Previous codes basically required a quarterly test for all pumps - measuring head, flow, and vibration. No flow condition specified other than flow at "reference value" established "when the pump is known to be operating acceptably."
- Bypass loops (min. flow lines) were typically used for testing as long as manufacturer's minimum flow requirements were met. No code requirement to test near full flow in earlier editions.

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Comprehensive Pump Test (CPT) – History and Background (cont.)

- CPT developed by OM Code Committee to provide a more meaningful test – quarterly tests provide 'trend', CPT provides good assessment of component health and operational readiness (as well as trend)
- Requirements for quarterly testing relaxed – requires less time testing at minimum flow condition, with potential avoidance of pump wear and "off normal" vibration conditions that make diagnosis more difficult.
- High quality test (near full flow, accurate instruments) conducted at 2 year frequency to detect degradation and provide assurance of operability

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Purpose of CPT

- Provide assurance of operational readiness
- Detect degradation to prevent loss of function
- Accomplished through more stringent requirements compared to previous code tests, although on a less frequent (2 yr. vs. qrtly.) basis
  - Test flow at design flow +/- 20%
  - More accurate pressure and differential pressure instruments (1/2% vs. 2%)
  - Tighter acceptance criteria (ex.: 0.93-1.03 times ref. value vs. 0.90 – 1.10 times ref. value)
  - Vibration test (not required for Group B tests)

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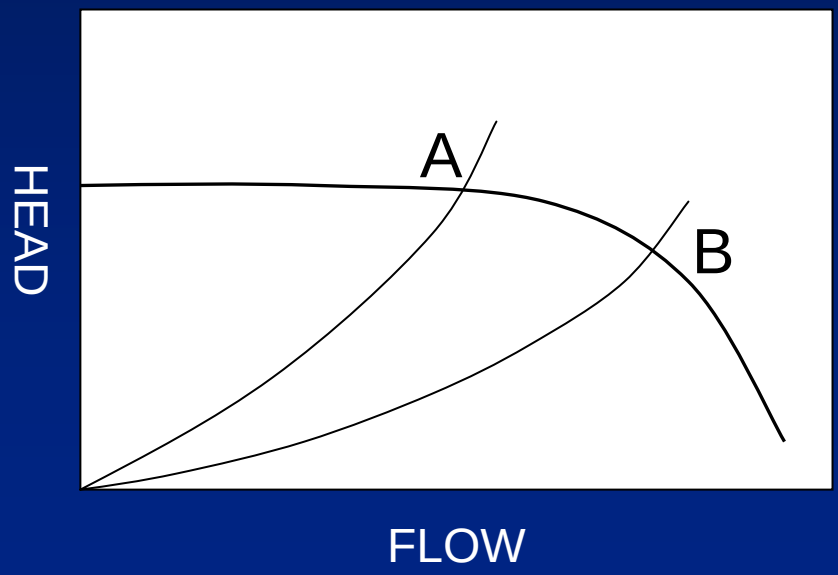
CPT Issues

- What is design flow?
  - Accident analysis flow? Pump design flow? Pump best efficiency point?
  - NRC places strong emphasis on verification of ability to perform under design basis accident conditions
  - Relocation of specific surveillance requirements from Technical Specifications to the licensee's Inservice Testing program under the Standard Technical Specifications increases the importance of pump testing at design conditions
    - OM Code test is no longer purely a component test measuring health of individual components
    - Also provides verification of component performance capability

CPT Issues (cont.)

- Does test provide a method to readily detect degradation?



Pt. A – minimal change in head with flow: difficult to detect degradation

Pt. B – head varies with flow: degradation more readily detected

High flow rate gives a "better" test

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Relief Requests involving CPT

- Test flow rate less than design flow +/- 20%
- Use of less accurate test instruments
- Use of wider acceptance band limits

Often, the net effect is to essentially perform an augmented Group A test

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Summary

- NRC, and ASME OM Code, view CPT as an important test – has both component health and operability aspects
- Licensees should make best effort to perform a true CPT – relief requests should not be used to change code requirements and essentially create another Group A type test
- Engage ASME OM Committee to make changes where appropriate – NRC places high value on use of consensus standards