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New Plant Seismic Issues Resolution Program

High-Frequency Response Effects: Structures, Large Components, Systems

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Effects of High Frequency (HF) Motions on Structures, Systems, Large Components

- EPRI White Paper (March 2007) concluded HF motions are non-damaging to virtually all NPP SSCs
- Bases:
  - Actual earthquake experience (e.g., Perry, Summer)
  - Analyses of LF structures
  - Qualification testing with HF inputs
  - Accepted by NRC for operating NPPs (IPEEE, Watts Bar, Perry, Summer, R.G. 1.166)

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Effects of High Frequency (HF) Motions on Structures, Systems, Large Components

- Structures and large components
  - Recent analyses/sample analysis show no significant effects of HF motions
  - Examples:
    - Shield building
    - RC loop supports
    - Reactor pressure vessel and internals
    - Primary components and supports
    - Equipment

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Effects of High Frequency (HF) Motions on Structures and Large Components

- Test/analysis experience with large components
  - Components have been successfully qualified for HF BWR hydrodynamic RRS for 25 years
  - Examples:
    - Piping
    - Large motors
    - MSIVs
    - Equipment

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Effects of High Frequency (HF) Motions on Piping Systems

- Piping systems have no credible *HF* failure modes
  - Known failure modes include fatigue ratcheting, support failures
  - These failure modes require significant imposed displacements
  - HF motions do not result in significant displacements
- Conclusions
  - HF not an issue for structures, large components or piping
  - No additional sample analyses warranted

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