Enclosure 7
Reactor Coolant Pump Flywheel Design and Technical Report Contents Slides
(Redacted)

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Reactor Coolant Pump Flywheel Design and Technical Report Contents

December 10, 2013

(Redacted Version)

This material is based upon work supported by the Department of Energy under Award Number DE-NE0000583.

This is a pre-application document and includes preliminary B&W mPower Reactor design or design supporting information and is subject to further internal review, revision, or verification.

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Purpose/Objective

- Describe the design of the RCP flywheel
- Discuss contents of planned Technical Report to be submitted to NRC
- Obtain NRC comments/feedback

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RCP Flywheel Design Overview

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Upper Vessel & Pumps

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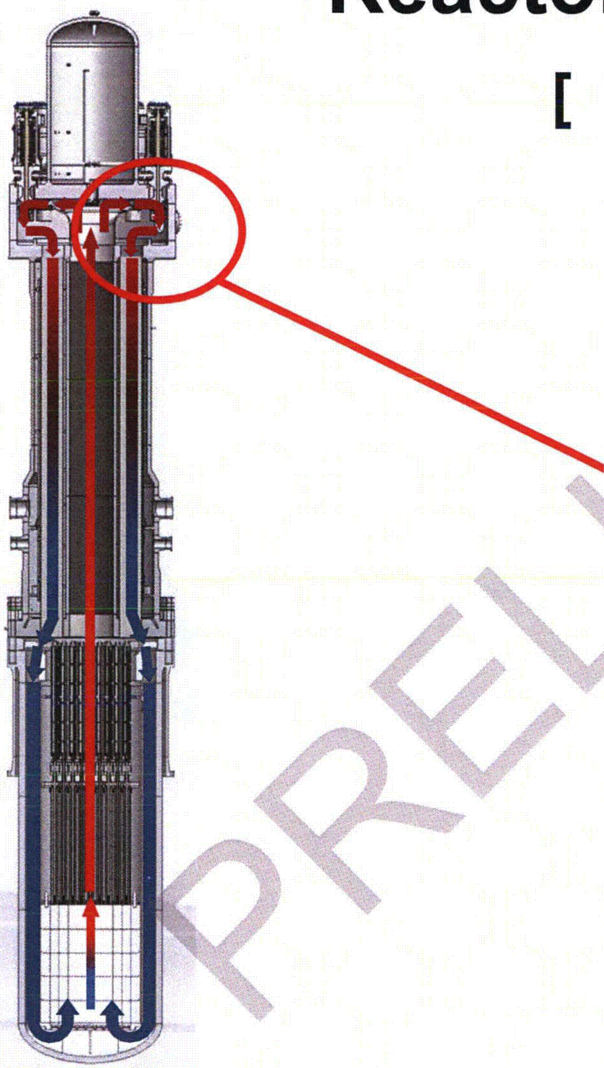
Reactor Coolant flow



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 [Proprietary per Affidavit 4(a)-(f)]

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Reactor Coolant Flow Near Pumps

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Flywheel Testing

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 [Proprietary per Affidavit 4(a)-(f)]

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RCP Technical Report Contents

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RCP Technical Report Status

- RCP flywheel Technical Report is being prepared, planning to submit to NRC by March 31, 2014
- Contents of the Technical Report include:
  - Description of flywheel
  - Design loads
  - Analysis methods and results
    - Primary stresses, fatigue, ductile fracture, fatigue crack growth, SCC, fragment containment
  - Regulatory acceptance criteria for flywheel design
    - Regulatory Guide (RG) 1.14
    - Standard Review Plan (SRP) 5.4.1.1

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Description of RCP

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- The RCPs are axial, single stage canned motor pumps with an internal flywheel
- One common vertical shaft assembly with the motor, flywheel, shaft and hydraulics
- The motor, flywheel, and all rotating components are within the RCPB
- Motor: vertical, induction type with a canned rotor and stator, [ ]
- Variable frequency drives control motor speed

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Description of Flywheel

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Design Criteria for Flywheel Design

- The flywheel design is based on similar flywheel designs
- The RCP flywheel is designed with suitable materials with adequate fracture toughness and conservative design procedures
- The design speed of the flywheel is defined as 125 percent of the design speed of the motor. The design speed envelopes all expected overspeed conditions
- Design loads for RCP flywheel:
  - Normal operating speed for the flywheel: [ ]
  - Design speed: 1.25 x [ ] (in accordance with RG 1.14)

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Analysis Methods and Results

- Performed in accordance with ASME Section III, Subsection NG, Appendix F and Section XI
- For this analysis, the flywheel is a single cylindrical disk with homogenous material and a constant thickness, with stress concentration factors applied for discontinuities.
- Includes:
  - Stress analysis
  - Fatigue analysis
  - Critical speed analysis for ductile fracture (critical speed analysis for non-ductile fracture is not credible)

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Conformance with Regulatory Guidance

- The RCP flywheel complies with the requirement of GDC 4, which requires that components important to safety be protected against the effects of missiles
- The RCP flywheel design conforms to the guidance of SRP 5.4.1.1 and RG 1.14, with exceptions to RG 1.14.
- The Level A stress limits of the ASME Code, Section III, Subsection NG are used as evaluation criteria for most of the components of the flywheel
  - ASME Section II, Part D was used for Alloy 625
- The analysis performed to evaluate the failure by ductile fracture uses the faulted stress limits in Appendix F of Section III of the ASME Code as acceptance criteria

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Exceptions to RG 1.14

RG. 1.14 Regulatory Position	Subject	Exception
[		
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 [Proprietary per Affidavit 4(a)-(f)]

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[Proprietary per Affidavit 4(a)-(f)]

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Conclusions

- RCP flywheel design is consistent with other flywheel designs
- The RCP flywheel design conforms to the guidance of SRP 5.4.1.1 and RG 1.14, with exceptions to RG 1.14.
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Path Forward

- RCP flywheel Technical Report is being prepared, planning to submit the technical report to NRC by March 31, 2014

- Feedback from this meeting will be considered in the development of the technical report

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Questions