

CROSSFLOW Ultrasonic Flow Measurement System

CROSSFLOW Status Update

September 12, 2005

CROSSFLOW Status Update - Agenda

<u>Topic</u>	<u>Responsible Party</u>	<u>Minutes</u>
Introduction	NRC, <u>W</u>	5
<ul style="list-style-type: none"> - NRC organization, personnel, and review responsibilities - <u>W</u> organization, personnel, and responsibilities 		
Meeting Objectives	NRC	10
<ul style="list-style-type: none"> - Describe review status - Identify issues and questions - Ensure consistent MUR technical basis 		
Status of System Issues (Regulatory Update)	<u>W</u>	45
<ul style="list-style-type: none"> - Responsibility for draft questions pertaining to flow profile - Explanation of adequacy of existing technical basis for CROSSFLOW - Division of technology responsibilities 		
Evaluation and Implementation of WOG CROSSFLOW User Guidelines	<u>W</u>	30
<ul style="list-style-type: none"> - Discussion of guidelines - Effect of guidelines on Topical Report CENPD-397-P - Applicability of guidelines to already approved MUR power uprates - Applicability of guidelines to current and future MUR power uprates - Division of vendor/licensee implementation responsibilities 		
Break		10
CROSSFLOW X-Beam Topical Report Review	NRC	45
<ul style="list-style-type: none"> - Status - Technical issues - Schedule 		
CROSSFLOW Generic Action Plan (GAP) Initiatives	<u>W</u>	10
<ul style="list-style-type: none"> - Status - Results 		
Westinghouse/AMAG Technology Advancements	<u>W</u>	10
Summarize Commitments and Schedule	NRC, <u>W</u>	15

Westinghouse/AMAG Organization & Responsibilities

- Advanced Measurement & Analysis Group, Inc. (AMAG)
 - Armando Lopez, President
 - Vahid Askari, Vice President
- Westinghouse Electric Company, LLC (Westinghouse)
 - John McInerney, Director, Safety & Monitoring Systems
 - Chris Savage, Director, Systems & Safety Analysis
 - Bill Turkowski, Manager, Plant Systems
 - Chip French, Fellow Engineer
 - Jim Gresham, Manager, Regulatory Compliance & Plant Licensing
 - Chuck Molnar, Senior Engineer

Meeting Objectives

- Address Reactor Systems Branch questions to facilitate review and approval of pending plant-specific license amendment requests (LARs)
- Develop a plan and schedule to complete plant-specific LAR review
- Discuss guidance to achieve acceptable plant-specific implementation
- Concur on CROSSFLOW X-Beam topical report review activities
- Update the NRC on the status of CROSSFLOW Generic Action Plan (GAP) initiatives

CROSSFLOW Implementation and Operation

- Regulatory basis
 - CENPD-397-P-A, Rev. 1 is the licensing basis for CROSSFLOW application including installation and operation
- Establish plant baseline
 - Installation procedures provide rigorous approach for establishing installation baseline
- System operation – alarms and diagnostics
 - Continuous monitoring of system performance
 - System is designed to recognize unacceptable performance and alert users through system alarms
- Periodic surveillance and maintenance
 - Provided in vendor documentation and summarized in Westinghouse Owners Group (WOG) CROSSFLOW Task Force (CTF) User Guidelines
- Operating experience
 - CROSSFLOW performance is consistent with the design and licensing basis

CROSSFLOW System Overview

- CROSSFLOW ultrasonic flow measurement is based on cross-correlation technology; which differs in principle and application from transit-time technology
- Provides an independent feedwater flow measurement
 - Does not replace existing plant instrumentation
 - Used in conjunction with other plant instrumentation
- 40 CROSSFLOW systems for feedwater flow measurement are in operation globally by 20 utilities
 - MUR Appendix K power uprate installations (11 licensed in the USA)
 - Venturi power recovery installations (6 in the USA)
 - Over 100 plant-years of service experience

Regulatory Update

Regulatory Update

- NRC Agenda Topics
 - Explanation of adequacy of existing technical basis for CROSSFLOW
 - Division of technology responsibilities
 - Responsibility for draft questions pertaining to flow profile

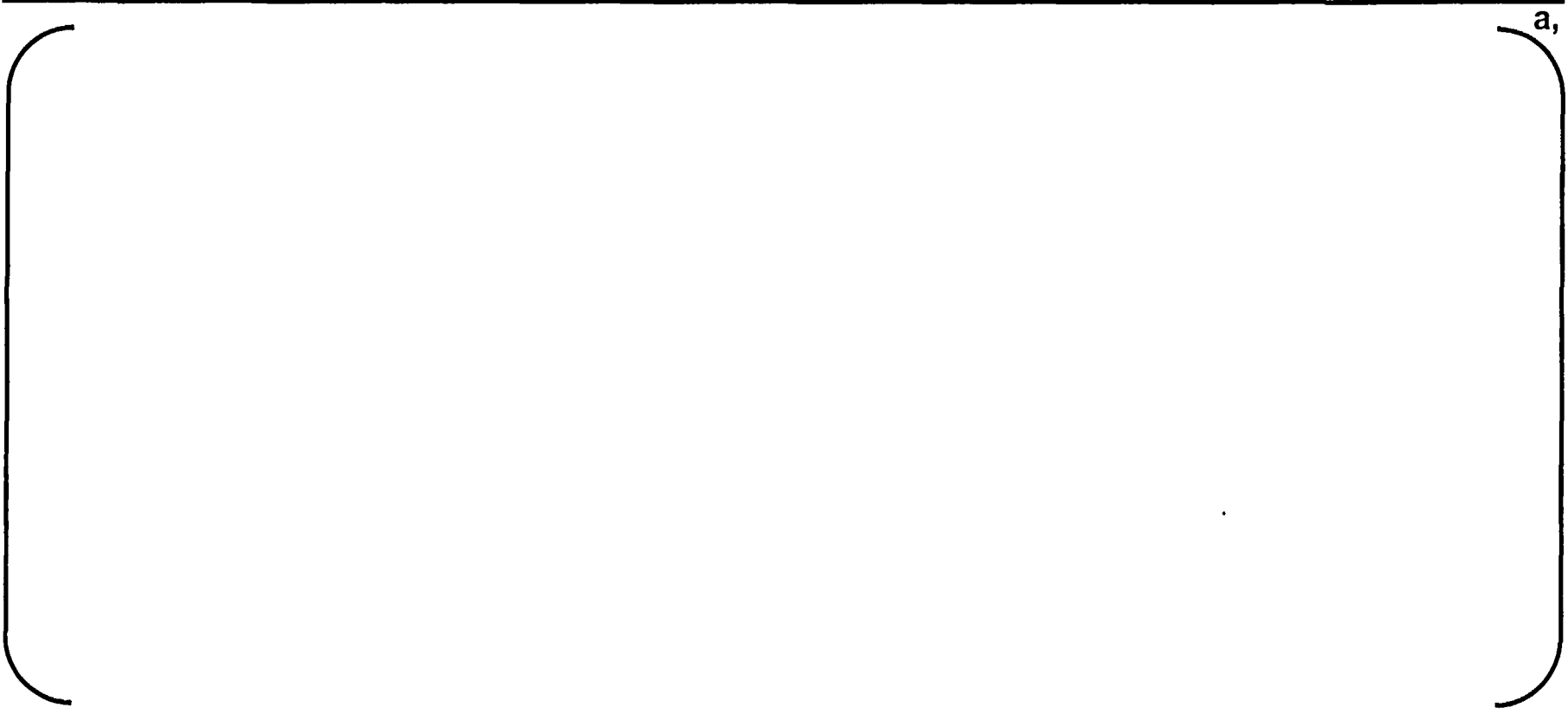
Regulatory Update

- Explanation of adequacy of existing technical basis for CROSSFLOW
 - NRC-approved topical report; CENPD-397-P-A, Rev. 1
 - The topical report and NRC Safety Evaluation (SE) form the basis by which licensees implement requests for Appendix K MUR power uprate license amendments.
 - Numerous technical discussions and meetings with the NRC staff
 - Letters and reports from the WOG and Westinghouse to address questions

Regulatory Update

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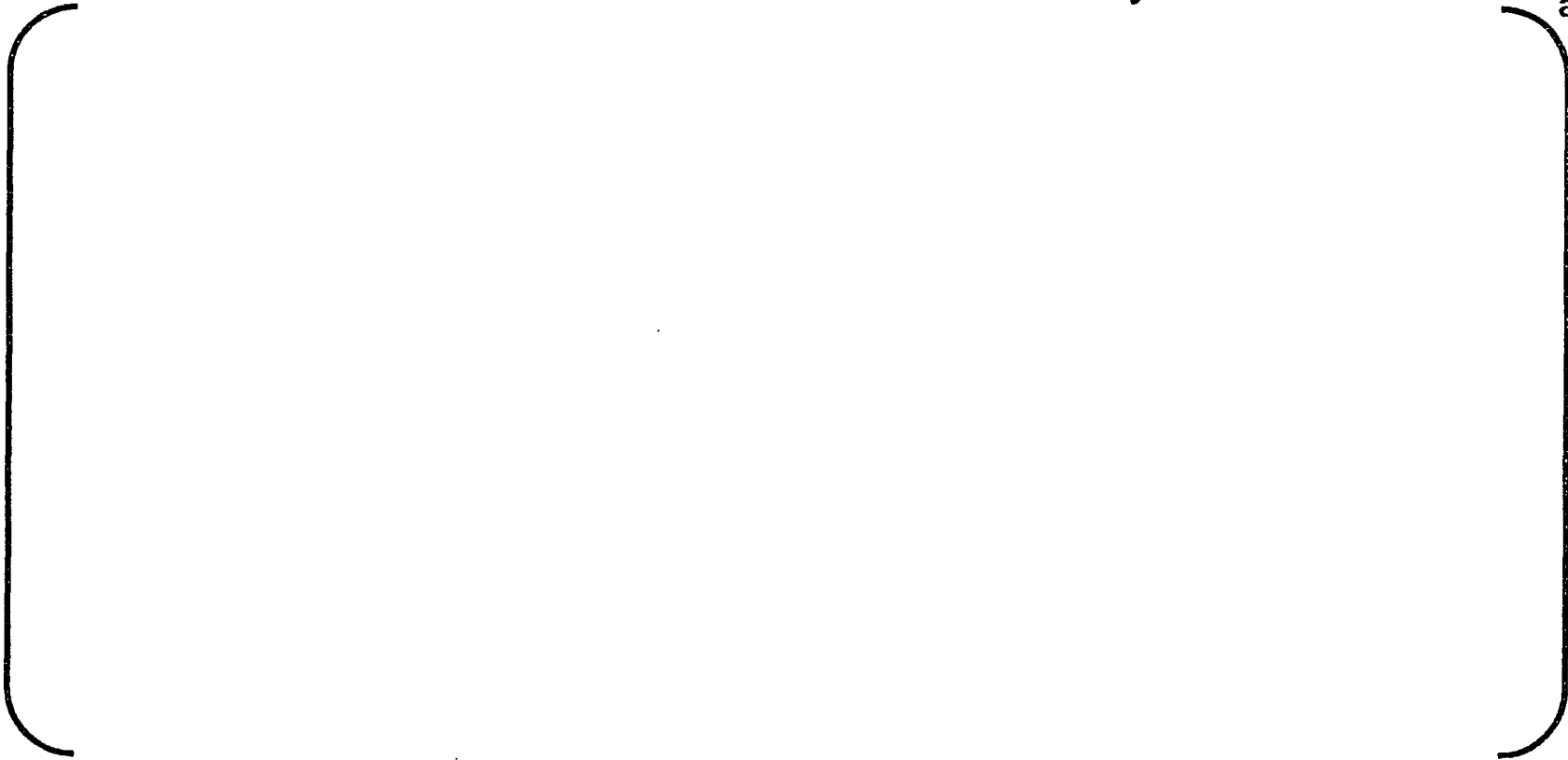
Regulatory Update



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Regulatory Update

- The CROSSFLOW flow measurement uncertainty is:



Regulatory Update

- Division of responsibilities

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- Division of responsibility for CROSSFLOW is consistent with standard industry practice for other plant equipment

Evaluation and Implementation of WOG CROSSFLOW User Guidelines

WOG CROSSFLOW User Guidelines

- NRC Agenda Topics
 - Discussion of guidelines
 - Effect of guidelines on topical report CENPD-397-P-A, Rev. 1
 - Applicability of guidelines to already approved MUR power uprates
 - Applicability of guidelines to current and future MUR power uprates
 - Division of vendor/licensee implementation responsibilities

WOG CROSSFLOW User Guidelines

- Discussion of guidelines
 - Purpose:
 - Develop WOG CTF User Guidelines to help ensure CROSSFLOW system is consistently operated as designed and licensed.
 - A reference for CROSSFLOW users to help implement plant-specific programs by compiling CROSSFLOW documentation and experience
 - Does not replace vendor documentation
 - Status: Complete
 - Information copy provided to NRC
 - The Guidelines provide information that covers the following areas:
 - Theory and Overview of the CROSSFLOW Technology
 - Use and Application
 - Operation Management
 - » Periodic maintenance, surveillance and training
 - Operating Experience

WOG CROSSFLOW User Guidelines

- Effect of guidelines on Topical Report CENPD-397-P
 - User guidelines do not affect the Topical Report



WOG CROSSFLOW User Guidelines

- Applicability of guidelines to already approved MUR power uprates

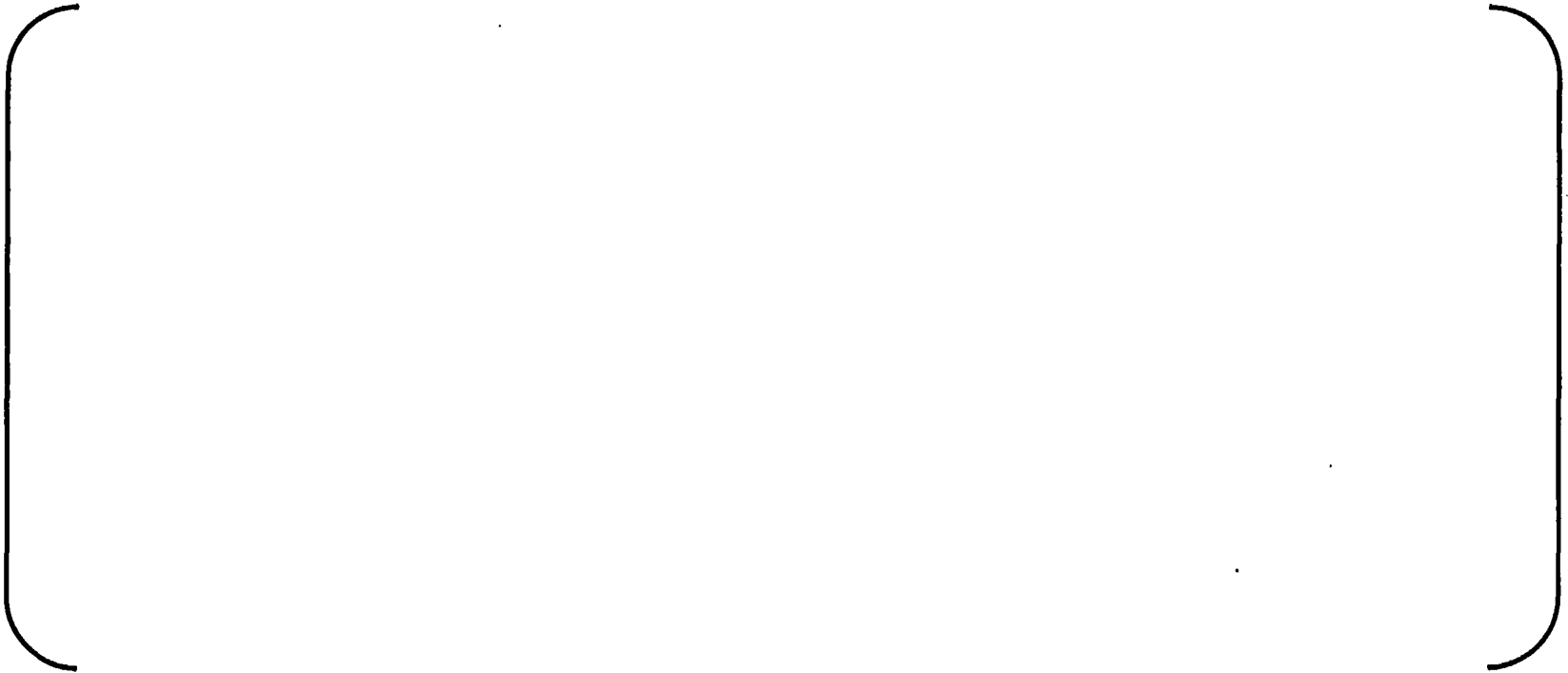


- Applicability of guidelines to current and future MUR power uprates
 - Same as above

WOG CROSSFLOW User Guidelines

- Division of vendor/licensee implementation responsibilities

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CROSSFLOW Generic Action Plan (GAP) Initiatives

Status of CROSSFLOW Phase 2 GAP Initiatives

CROSSFLOW Generic Action Plan (GAP) Initiatives

- The following Generic Action Plan (GAP) Phase 2 initiatives were established:



CROSSFLOW Generic Action Plan (GAP) Initiatives

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CROSSFLOW Generic Action Plan (GAP) Initiatives

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CROSSFLOW Generic Action Plan (GAP) Initiatives

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Westinghouse/AMAG Technology Advancements

Phase 3 GAP Initiatives

Westinghouse/AMAG Technology Advancements

- Phase 3 GAP Initiatives

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X-Beam Topical Report Review

Discussion

Summarize Commitments and Schedule

Summary

- Regulatory basis
 - CENPD-397-P-A, Rev. 1 is the licensing basis for CROSSFLOW application including installation and operation
- Establish plant baseline
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- System operation – alarms and diagnostics
 - Continuous monitoring of system performance
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- Periodic surveillance and maintenance
 - Provided in vendor documentation and summarized in WOG CTF User Guidelines
- Operating experience
 - CROSSFLOW performance is consistent with the design and licensing basis

Schedule / Next Actions

- Plant-specific LARs for Fort Calhoun and Calvert Cliffs are consistent with the approved CROSSFLOW base topical/SER.
- Next actions
 - Identify any LAR-specific issues delaying approval
 - Reactor Systems Branch reviewer(s) meeting for in-depth CROSSFLOW technology discussions with Westinghouse/AMAG
 - Define the vendor/utility responsibilities to resolve the Reactor System Branch questions.
 - Establish a schedule for issuance of Fort Calhoun and Calvert Cliffs LARs

Appendix

CROSSFLOW Status Update

- CROSSFLOW Topical Reports
 - CENPD-397-P-A, Rev. 1, “Improved Flow Measurement Accuracy Using CROSSFLOW Ultrasonic Flow Measurement Technology”, May 2000
 - This is the licensing basis document for CROSSFLOW technology.
 - WCAP-15689-P, Rev. 1, “Evaluation of Transit-Time and Cross-Correlation Ultrasonic Flow Measurement Experience with Nuclear Plant Feedwater Flow Measurement”, September 2002
 - Submitted to provide information relative to Caldon Report ER-262, “Effects of Velocity Profile Changes Measured In-Plant on Feedwater Flow Measurement Systems ”.
 - WCAP-16163-P, Rev. 0, “CROSSFLOW Ultrasonic Flow Measurement System, X-Beam Modification”, February 2005
 - Currently under NRC review.

CROSSFLOW Status Update

- Recent CROSSFLOW Vendor Communications
 - Signal Interference
 - TB-03-6, "CROSSFLOW Ultrasonic Flow Measurement System Signal Issues", September 5, 2003.
 - NSAL-03-12, "CROSSFLOW Ultrasonic Flow Measurement System Flow Signal Interference Issues", December 5, 2003.
 - Configuration/Alignment Sensitivity Observations
 - TB-04-4, "Information Regarding Recent CROSSFLOW Ultrasonic Flow Measurement System Performance Observations", February 12, 2004

CROSSFLOW Performance Documentation

- Correspondence regarding adequacy of CROSSFLOW performance
 - June 8, 2004, WOG Letter
 - “Westinghouse Owners Group, CROSSFLOW Task Force: Feedback Regarding Westinghouse Technical Bulletin, TB-04-4”, WOG-04-310
 - June 18, 2004, Westinghouse Letter
 - “Westinghouse Conclusions Regarding Recent CROSSFLOW Ultrasonic Flow Measurement System Performance Events”, LTR-NRC-04-37
 - Oct. 19, 2004, Westinghouse Letter
 - “UFM Technology Update “, LTR-NRC-04-61
 - Oct. 20, 2004, WOG Letter
 - “Westinghouse Owners Group, Comparison of CROSSFLOW and ASME Flow Section Feedwater Flow Measurement at Kewaunee Nuclear Power Plant (Proprietary) (PA-SEE-0162)”, WOG-04-541
 - Dec. 10, 2004, WOG Letter
 - “Westinghouse Owners Group, Assurance that CROSSFLOW Technology, Installation, and Operation Maintain Design and Licensing Basis (Proprietary)”, WOG-04-622