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Project No.: 700
Our ref: LTR-NRC-06-40
June 2, 2006

**Subject: Chronology of Westinghouse/AMAG Interactions with the NRC Between
2003 Through the Present**

On April 28, 2006, Westinghouse Electric Company LLC (Westinghouse) and the CROSSFLOW Ultrasonic Flow Measurement System developer Advanced Measurement & Analysis Group, Inc. (AMAG), met with the Nuclear Regulatory Commission (NRC) staff to discuss the ongoing status of various CROSSFLOW activities. During the meeting the NRC requested a list of recent interactions that Westinghouse/AMAG have had with the NRC regarding CROSSFLOW. Westinghouse has assembled a list of the principal interactions for the period 2003 through the present (LTR-NRC-06-40 NP-Attachment).

If you have any further questions regarding this matter, please do not hesitate to contact me at (412) 374-4643.

Very truly yours,

A handwritten signature in black ink, appearing to read 'J. A. Gresham'.

James A. Gresham, Manager
Regulatory Compliance and Plant Licensing

Attachment: As stated

cc: A. G. Howe (NRC, w/o Attachments)
J. A. Nakoski (NRC, w/o Attachments)
G. S. Shukla (NRC, w/ Attachments)

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LTR-NRC-06-40 NP-Attachment

**Chronology of Westinghouse/AMAG Principal Interactions
with the NRC Between 2003 Through the Present**

June 2006

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**Chronology of Westinghouse/AMAG Principal Interactions with the NRC Between
2003 Through the Present***

No.	Date	Reference	Comment
1.	June 26, 2003	1	Initial meeting with NRC (i.e., Steve Alexander and Steve Arndt) in Westinghouse Windsor office regarding allegation concerning CROSSFLOW accuracy
2.	September 5, 2003	2	Issued TB-03-6, "CROSSFLOW Ultrasonic Flow Measurement System Signal Issues" (copy provided to NRC)
3.	September 26, 2003	3	NRC meeting regarding CROSSFLOW signal contamination root cause and corrective actions
4.	December 5, 2003	4	Issued NSAL-03-12, "CROSSFLOW Ultrasonic Flow Measurement System Flow Signal Interference Issues" (copy provided to NRC)
5.	January 16, 2004	5	Response to Allegation RAI regarding CROSSFLOW
6.	February 4, 2004	6	Submittal of X-Beam Topical Report for NRC review
7.	February 12, 2004	7	Issued TB-04-4, "Information Regarding Recent CROSSFLOW Ultrasonic Flow Measurement System Performance Observations" (copy provided to NRC)
8.	March 12, 2004	8	March 12, 2004 NRC meeting with UFM Task Group regarding CROSSFLOW RAIs (also see attached list for documents provided to the Task Group)
9.	March 26, 2004	—	March 26, 2004 NRC meeting regarding with UFM Task Group regarding CROSSFLOW RAIs
10.	April 22, 2004	9	April 22, 2004 NRC meeting with UFM Task Group regarding CROSSFLOW RAIs
11.	May 3, 2004	10	Transmittal of Westinghouse comments on the draft report of the Ultrasonic Flow Meter Task Group
12.	May 25, 2004	11	May 25, 2004 NRC meeting regarding CROSSFLOW activity status update
13.	June 8, 2004	12	WOG CTF Feedback Regarding Westinghouse Technical Bulletin, TB-04-4
14.	June 18, 2004	13	Transmittal of Westinghouse conclusions regarding recent CROSSFLOW performance events at Byron/Braidwood and Ft. Calhoun

* List omits most conference call interactions.

No.	Date	Reference	Comment
15.	June 29, 2004	14	Westinghouse review of information contained in NRC letter and attachment regarding CROSSFLOW™ Ultrasonic Flow Meter (Proprietary Final Report)
16.	July 1, 2004	—	Participate in NRC Ultrasonic Flow Meter Public Meeting
17.	October 20, 2004	15	WOG CTF transmittal of comparison between feedwater flow measurements made using CROSSFLOW and an ASME flow section installed at the Kewaunee nuclear power plant
18.	October 19, 2004	16	CROSSFLOW technology information update
19.	December 10, 2004	17	Transmittal of WOG CTF white paper discussing assurance that CROSSFLOW technology, installation, and operation maintain design and licensing basis.
20.	June 13, 2005	18	Transmittal of June 10, 2005 Email regarding submittal of CROSSFLOW X-Beam topical report.
21.	July 19, 2005	19	WOG CTF transmittal of CROSSFLOW User Guidelines
22.	September 12, 2005	20	September 12, 2005 NRC CROSSFLOW meeting
23.	October 3 – 6, 2005	21 and 22	CROSSFLOW Technology Meeting
24.	November 17, 2005	—	WOG CTF meeting in Westinghouse Rockville Office attended by NRC staff reviewing CROSSFLOW. The meeting covered a) an overview of current processes and the steps taken by the CROSSFLOW Users to align to these practices, b) CROSSFLOW User Guidelines, c) Calvert Cliffs CROSSFLOW installation and d) presentations by WOG CTF members regarding their CROSSFLOW plant implementation at Palisades, South Texas Project, Kewaunee and San Onofre
25.	March 17, 2006	23	Response to CROSSFLOW RAIs
26.	March 29, 2006	24	March 29, 2006 CROSSFLOW Status Meeting
27.	March 24, 2006	25	Response to CROSSFLOW RAI
28.	March 27, 2006	26	Transmittal of final presentation materials for March 29, 2006 CROSSFLOW Status Meeting
29.	April 28, 2006	27	Transmittal of presentation materials used at April 28, 2006 CROSSFLOW meeting in Westinghouse Rockville Office attended by NRC staff
30.	May 25, 2006	28	Transmittal of PSU/ARL technical paper

No.	Date	Reference	Comment
31.	May 26, 2006	29	Transmittal of ARL Venturi Calibration Report for Ft. Calhoun Nuclear Station
32.	May 30, 2006	30	Projected content for CROSSFLOW topical report revision
33.	May 30, 2006	31	Alden Calibration Report for ChemTrac™
34.	May 31, 2006	32	CROSSFLOW UFM initial installation classifications
35.	June 1, 2006	33	Transmittal of PSU/ARL Theoretical Assessment of CROSSFLOW UFM and ICONE14 Technical Paper
36.	June 1, 2006	34	Comparison of CROSSFLOW UFM to high precision flow measurement instruments
37.	June 2, 2006	35	Transmittal of AMAG Report Regarding Cross-correlation Ultrasonic Flow Measurement Technology {Yuri Orechwa Question}
38.	June 2, 2006	36	Transmittal of Response to NRC Draft Status Report on CROSSFLOW Ultrasonic Flowmeter {Warren Lyon Paper}
39.	June 2, 2006	37	Transmittal of chronology of Westinghouse/AMAG interactions with the NRC between 2003 through the present

References:

1. T. R. Quay (NRC) to R. O. Doney (Westinghouse), October 22, 2003
2. TB-03-6, "CROSSFLOW Ultrasonic Flow Measurement System Signal Issues", September 5, 2003
3. I. C. Rickard (Westinghouse) to USNRC Document Control Desk, "Application for Withholding Proprietary Information from Public Disclosure - Westinghouse CROSSFLOW Presentation to NRC Staff (Proprietary)", September 15, 2003, AW-03-1703
4. NSAL-03-5, "CROSSFLOW Ultrasonic Flow Measurement System Flow Signal Interference Issues", December 5, 2003
5. J. A. Gresham (Westinghouse) to T. R. Quay (NRC), "Response to Request for Additional Information Regarding the CROSSFLOW Ultrasonic Flow Measurement System (Proprietary/Non-proprietary)", LTR-NRC-04-2, January 16, 2004
6. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "CROSSFLOW Ultrasonic Flow Measurement System, X-Beam Modification (Proprietary/Non-Proprietary)", LTR-NRC-04-9, February 4, 2004
7. TB-04-4, "Information Regarding Recent CROSSFLOW Ultrasonic Flow Measurement System Performance Observations", February 12, 2004
8. R. J. Morrison (Westinghouse) to USNRC Document Control Desk, "Application for Withholding Proprietary Information from Public Disclosure - Supporting Material for NRC Meeting Regarding CROSSFLOW Ultrasonic Flow Measurement System Request for Additional Information (Proprietary)", AW-04-1798, March 10, 2004
9. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Application for Withholding Proprietary Information from Public Disclosure - Presentation Material Supporting April 22, 2004 NRC Meeting Regarding CROSSFLOW Ultrasonic Flow Measurement System (Proprietary)", AW-04-1823, April 21, 2004
10. J. A. Gresham (Westinghouse) to S. Dembek (NRC), "Comments on the Draft Report of the Ultrasonic Flow Meter Task Group", LTR-NRC-04-27, May 3, 2004
11. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Application for Withholding Proprietary Information from Public Disclosure - Presentation Material Supporting May 25, 2004 NRC Meeting Regarding CROSSFLOW Ultrasonic Flow Measurement System (Proprietary)", AW-04-1840, May 22, 2004
12. F. P. Schiffley (WOG) to G. Shukla (NRC), "Westinghouse Owners Group - CROSSFLOW Task Force: Feedback Regarding Westinghouse Technical Bulletin, TB-04-4", WOG-04-310, June 8, 2004
13. J. A. Gresham (Westinghouse) to B. W. Sheron (NRC), "Westinghouse Conclusions Regarding Recent CROSSFLOW Ultrasonic Flow Measurement System Performance Events", LTR-NRC-04-37, June 18, 2004
14. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Westinghouse Review of Information Contained in NRC Letter and Attachment Regarding the Westinghouse/AMAG CROSSFLOW Ultrasonic Flow Meter (Proprietary Final Report)", LTR-NRC-04-40, June 29, 2004
15. F. P. Schiffley (WOG) to USNRC Document Control Desk, "Westinghouse Owners Group - Comparison of CROSSFLOW and ASME Flow Section Feedwater Measurement at

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- Kewaunee Nuclear Power Plant (Proprietary) (PA-SEE-0162)", WOG-04-541, October 20, 2004
16. R. M. Span (Westinghouse) to C. I. Grimes (NRC), "UFM Technology Update", LTR-NRC-04-61, October 19, 2004
 17. F. P. Schiffley (WOG) to C. I. Grimes (NRC), "Westinghouse Owners Group - Assurance that CROSSFLOW Technology, Installation, and Operation Maintain Design and Licensing Basis (Proprietary)", WOG-04-622, December 10, 2004
 18. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Application for Withholding Proprietary Information from Public Disclosure - June 10, 2005 Email Regarding Submittal of CROSSFLOW X-Beam Topical Report", AW-05-2006, June 13, 2005
 19. F. P. Schiffley (WOG) to C. I. Grimes (NRC), "Westinghouse Owners Group - Information Copy of CROSSFLOW Ultrasonic Flow Meter User Guidelines, WCAP-16437-P (Proprietary)", WOG-05-339, July 19, 2005
 20. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Application for Withholding Proprietary Information from Public Disclosure - Supporting Material for NRC Meeting Regarding CROSSFLOW Ultrasonic Flow Measurement System Status (Proprietary)", AW-05-2043, August 18, 2005
 21. B. F. Maurer (Westinghouse) to USNRC Document Control Desk, "CROSSFLOW Ultrasonic Flow Measurement System - Technical Meeting with the NRC Staff, October 3-6, 2005, Rockville, Maryland.", LTR-NRC-05-58, October 4, 2005 *{Draft Slides}*
 22. B. F. Maurer (Westinghouse) to USNRC Document Control Desk, "Slide Presentation "CROSSFLOW Ultrasonic Flow Measurement System - Technical Meeting with NRC Staff, October 3-6, 2005, Rockville, Maryland" (Proprietary)", LTR-NRC-05-58, Rev. 1, October 21, 2005 *{Final Slides}*
 23. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Response to Request for Additional Information Regarding the CROSSFLOW Ultrasonic Flow Measurement System (Proprietary / Non-proprietary)", LTR-NRC-06-11, March 17, 2006
 24. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "CROSSFLOW Ultrasonic Flow Measurement System - NRC Status Meeting", LTR-NRC-06-10, March 17, 2006
 25. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Response to Request for Additional Information Regarding the CROSSFLOW Ultrasonic Flow Measurement System (Proprietary / Non-proprietary)", LTR-NRC-06-12, March 24, 2006
 26. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "CROSSFLOW Ultrasonic Flow Measurement System - NRC Status Meeting", LTR-NRC-06-13, March 27, 2006
 27. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Presentation Materials Used at April 28, 2006 CROSSFLOW Meeting (Proprietary/Non-proprietary)", LTR-NRC-06-30, May 24, 2006
 28. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Transmittal of PSU/ARL Technical Paper", LTR-NRC-06-31, May 25, 2006
 29. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Transmittal of ARL Venturi Calibration Report for Ft. Calhoun Nuclear Station", LTR-NRC-06-32, May 26, 2006

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30. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Projected Content for CROSSFLOW Topical Report Revision", LTR-NRC-06-33, May 30, 2006
 31. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Transmittal of ChemTrac™ Chemical Tracer Calibration Calculation", LTR-NRC-06-34, May 30, 2006
 32. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "CROSSFLOW Ultrasonic Flow Measurement System Initial Installation Classifications (Proprietary / Non-proprietary)", LTR-NRC-06-35, May 31, 2006
 33. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Transmittal of PSU/ARL Theoretical Assessment of CROSSFLOW UFM", LTR-NRC-06-36, June 1, 2006
 34. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Comparison of CROSSFLOW UFM to High Precision Flow Measurement Instruments in Nuclear Power Plants (Proprietary / Non-proprietary)", LTR-NRC-06-37, June 1, 2006
 35. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Transmittal of AMAG Report Regarding Cross-correlation Ultrasonic Flow Measurement Technology (Proprietary)", LTR-NRC-06-38, June 2, 2006
 36. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Transmittal of Response to NRC Draft Status Report on CROSSFLOW Ultrasonic Flowmeter (Proprietary)", LTR-NRC-06-39, June 2, 2006
 37. J. A. Gresham (Westinghouse) to USNRC Document Control Desk, "Transmittal of Chronology of Westinghouse/AMAG Interactions with the NRC Between 2004 Through the Present", LTR-NRC-06-40, June 2, 2006

List of Reference Documents Supporting March 12, 2004 NRC Meeting Regarding CROSSFLOW Ultrasonic Flow Measurement System

No.	Document Reference	Proprietary Yes/No
1.	AW-04-1798, "Application for Withholding Proprietary Information from Public Disclosure - Supporting Material for NRC Meeting Regarding CROSSFLOW Ultrasonic Flow Measurement System Request for Additional Information (Proprietary)" [Note: The below listed documents are covered by this withholding request.]	Yes
2.	List of CROSSFLOW Installations and related information requested by RAI #1. Initially emailed on 3/9/04, revision emailed on 3/10/04. [This material is superseded by the CROSSFLOW Installation list provided in the meeting slide package.]	Yes
3.	March 12, 2004 NRC Meeting Slide Package	Yes
4.	BWR Feedwater Flow Uncertainty Calculation (Charge No. 109166)	Yes
5.	BWR Core Thermal Power Calculation (Charge No. 110341)	Yes
6.	BWR Feedwater Flow Uncertainty Calculation for Proof Test (No. A-SU1-PS-0001)	Yes
7.	PWR Feedwater Flow Uncertainty Calculation (No. A-SA2-PS-0001)	Yes
8.	Alden Research Laboratory Ultrasonic Feedwater Calibration Test (MISC-PENG-CALC-048)	Yes
9.	Signal Conditioning Unit Commissioning and Self-Test, AMAG-INS-PR-008, Rev. 2	Yes
10.	Signal Conditioning Unit Calibration, AMAG-INS-PR-007, Rev. 1	Yes
11.	System User's Manual CROSSFLOW Version, AMAG-MAN-EN-008, Rev. 0	Yes
12.	CROSSFLOW Customer Survey Questions	Yes
13.	Responses to NRC 3/17/04 RAI Regarding 3/12/04 CROSSFLOW Meeting	Yes
14.	CROSSFLOW Communications List	Yes
15.	CROSSFLOW Installation List (U.S.) dated 03/18/04	Yes
16.	V. Agranat, Y. Gurevich and A. Lopez, "Modeling of Turbulent Fluid Flows in Bent Pipes for Non-Invasive Flow Measurement Applications"	No
17.	V. Agranat, "Fluid Flow Simulation and Flow Profile Correction Factor Analysis Within Arbitrary Pipe Configuration", Progress Report, July 1997	Yes
18.	Supplemental Slide Presentation entitled "Principles of CROSSFLOW Operation and Accuracy"	Yes
19.	CROSSFLOW Generic Action Plan - March 24, 2004 (Living Plan)	Yes
20.	CROSSFLOW OPPD Action Plan - March 23, 2004 (Living Plan)	Yes
21.	CROSSFLOW Exelon Action Plan - March 25, 2004 (Living Plan)	Yes
22.	CROSSFLOW Hydraulic Test Results - Toshiba Laboratory, HTR-5011-01, Rev. 0	Yes
23.	Three (3) pages of CROSSFLOW Root Cause Analysis Report (Executive Summary, Problem Statement, Recommendations)	Yes
24.	Letter, Kewaunee - February 19, 2004, WPS-04-18	Yes
25.	INPO Topical Report TR4-34, Review of Feedwater System Ultrasonic Flowmeter Problems, March 2004	No