



Westinghouse
Electric Corporation

Energy Systems

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NSRA-APSL-93-0304
Docket No.: STN-52-003

August 16, 1993

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

ATTENTION: MR. R. W. BORCHARDT

SUBJECT: REFERENCES FOR BASIC RESEARCH TESTS ON CONDENSATION
PERFORMED IN SUPPORT OF THE AP600 DESIGN

Dear Mr. Borchardt:

Please find enclosed with this letter a listing of references which provide information on the basic research tests on condensation performed at the University of Wisconsin-Madison (UW-M) in support of the AP600 design. This fulfills a request by the NRC staff made during the March 23-24, 1993 meeting on AP600 containment tests. Also enclosed are the following UW-M PhD theses from the enclosed list:

- (1) M. H. Kim, Modelling of Condensation Heat Transfer in a Reactor Containment, PhD Thesis (1985). [Model of Condensation H.T. - Correlation-2-D Model]
- (2) J. J. Barry, Effects of Interfacial Structure on Film Condensation, PhD Thesis (1987). [Experiments for Condensation on a Horizontal Surface Upward]
- (3) I. K. Huhtiniemi, Condensation in the Presence of Noncondensable Gas: The Effect of Surface Orientation, Prelim Thesis (1990). [AP600-1 Experiments and Initial AP600-2 tests] (Westinghouse Proprietary Class 2)
- (4) I. K. Huhtiniemi, Condensation in the Presence of Noncondensable Gas: The Effect of Surface Orientation, Prelim Thesis (1990). [AP600-1 Experiments and Initial AP600-2 tests] (Westinghouse Non-proprietary)

The Westinghouse Electric Corporation copyright notice, proprietary information notice, application for withholding and affidavit are attached.

This submittal contains Westinghouse proprietary information consisting of trade secrets, commercial information or financial information which we consider privileged or confidential pursuant to 10CFR2.790. Therefore, it is requested that the Westinghouse proprietary information attached hereto be handled on a confidential basis and be withheld from public disclosures.

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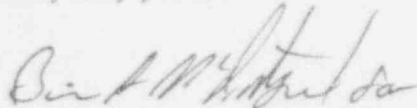
August 16, 1993

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Correspondence with respect to the application for withholding should reference AW-93-507, and should be addressed to N. J. Liparulo, Manager of Nuclear Safety And Regulatory Activities, Westinghouse Electric Corporation, P.O. Box 355, Pittsburgh, Pennsylvania, 15230-0355.

Please contact Brian A. McIntyre on (412) 374-4334 if you have any questions concerning this transmittal.

Very truly yours,



N. J. Liparulo, Manager
Nuclear Safety & Regulatory Activities

/nja

Enclosures
Attachments

cc: T. Kenyon, NRC (w/o Enclosures/Attachments)
R. Hasselberg, NRC (3 copies of Enclosures)
B. A. McIntyre, Westinghouse (w/o Enclosures/Attachments)

Enclosure to Westinghouse Letter ET-NRC-93-3945

Thesis

- (1) M. H. Kim, Modelling of Condensation Heat Transfer in a Reactor Containment, PhD Thesis (1985). [Model of Condensation H.T. - Correlation-2-D Model]
- (2) J. J. Barry, Effects of Interfacial Structure on Film Condensation, PhD Thesis (1987). [Experiments for Condensation on a Horizontal Surface Upward]
- (3) I. K. Huhtiniemi, Condensation in the Presence of Noncondensable Gas: The Effect of Surface Orientation, Prelim Thesis (1990). [AP600-1 Experiments and Initial AP600-2 tests]
- (4) I. K. Huhtiniemi, Condensation in the Presence of Noncondensable Gas: Effect of Surface Orientation, PhD Thesis (1992). [AP600-2 Experimental Test Series]
- (5) A. Pernsteiner-Condensation in the Presence of Noncondensable Gas: Effect of a Light Gas and Natural Convections-MS Thesis (1993). [Helium-Air-Steam Tests with/without Forced Convection]

Referred Publications

- (1) M. H. Kim, M. L. Corradini, "Modelling of Condensation Heat Transfer in a Reactor Containment," Nuclear Engineering and Design, V118 (1990).
- (2) I. Huhtiniemi, M. L. Corradini, "Condensation in the Presence of a Noncondensable Gas: Effect of Surface Orientation," AIChE Symposium Series, No. 269, Vol. 85, S. B. Yilmaz, Ed. (August 1989).
- (3) I. Huhtiniemi, A. Pernsteiner, M. Corradini, "Steam Condensation in the Presence of Noncondensable Gas: Effect of Surface Orientation," AIChE Symposium Series, No. 283, Vol. 87, S. B. Yilmaz, Editor (July 1991).
- (4) I. Huhtiniemi, A. Pernsteiner, M. L. Corradini, "Condensation in the Presence of Noncondensable Gases," Nuclear Engineering Design (Accepted for publication in 1992).
- (5) M. L. Corradini, "Turbulent Condensation in the Presence of a Noncondensable Gas," International Meeting on Hydrogen Behavior, Albuquerque, NM (October 1982).
- (6) M. L. Corradini, "Turbulent Condensation on a Cold Wall in the Presence of a Non-Condensable Gas," Nuclear Technology, Volume 64, (1984).

Enclosure to Westinghouse Letter ET-NRC-93-3945

Referred Publications (Cont.)

- (7) M. H. Kim, M. L. Corradini, "Turbulent Condensation in a Noncondensable Gas," ANS Proceedings of the Third International Meeting on Thermal-Hydraulics, Newport, RI (October 1985).
- (8) J. J. Barry, M. L. Corradini, "Film Condensation in the Presence of Interfacial Waves," ASME/AIChE National Heat Transfer Conference, Houston, Texas (July 1988).
- (9) I. Huhtiniemi, J. J. Barry, M. L. Corradini, "Condensation in the Presence of a Noncondensable Gas: The Effect of Surface Orientation," National Heat Transfer Conference, Philadelphia, PA (August 1989).
- (10) I. Huhtiniemi, A. Pernsteiner, M. Corradini, "Steam Condensation in the Presence of Noncondensable Gas: Effect of Surface Orientation," National Heat Trans. Conference, Minneapolis, MN (July 1991).
- (11) A. Pernsteiner, I. K. Huhtiniemi, M. L. Corradini, "Condensation in the Presence of Noncondensable Gases: Effect of Helium," Proc of NURETH-5 Meeting, Salt Lake City, Utah (September 1992).