Westinghouse Electric Corporation
Energy Systems

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AW-95-819

May 8, 1995

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

ATTENTION: MR. T. R. QUAY

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

SUBJECT: REVISED MASS AND ENERGY TABLES FOR AP600 LARGE SCALE CONTAINMENT TEST 220.1

Dear Mr. Quay:

The application for withholding is submitted by Westinghouse Electric Corporation ("Westinghouse") pursuant to the provisions of paragraph (b)(1) of Section 2.790 of the Commission's regulations. It contains commercial strategic information proprietary to Westinghouse and customarily held in confidence.

The proprietary material for which withholding is being requested is identified in the proprietary version of the subject report. In conformance with 10CFR Section 2.790, Affidavit AW-95-819 accompanies this application for withholding setting forth the basis on which the identified proprietary information may be withheld from public disclosure.

Accordingly, it is respectfully requested that the subject information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10CFR Section 2.790 of the Commission's regulations.

Correspondence with respect to this application for withholding or the accompanying affidavit should reference AW-95-819 and should be addressed to the undersigned.

Very truly yours,

N. J. Liparulo, Manager
Nuclear Safety Regulatory And Licensing Activities

/nja

cc: Kevin Bohrer NRC 12H5

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

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COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared Brian A. McIntyre, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Corporation ("Westinghouse") and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

Brian A. McIntyre, Manager
Advanced Plant Safety and Licensing

Sworn to and subscribed
before me this 9 day
of May, 1995

Rose Marie Payne
Notary Public

Notarial Seal
Rose Marie Payne, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires Nov. 4, 1996
Member, Pennsylvania Association of Notaries

2405A

(1) I am Manager, Advanced Plant Safety and Licensing, in the Advanced Technology Business Area, of the Westinghouse Electric Corporation and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rulemaking proceedings, and am authorized to apply for its withholding on behalf of the Westinghouse Energy Systems Business Unit.

(2) I am making this Affidavit in conformance with the provisions of 10CFR Section 2.790 of the Commission's regulations and in conjunction with the Westinghouse application for withholding accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by the Westinghouse Energy Systems Business Unit in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.790 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information which is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, an! thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10CFR Section 2.790, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) Enclosed is Letter NTD-NRC-95-4456, May 8, 1995 being transmitted by Westinghouse Electric Corporation (W) letter and Application for Withholding Proprietary Information from Public Disclosure, N. J. Liparulo (W), to Mr. T. R. Quay, Office of NRR. The proprietary information as submitted for use by Westinghouse Electric Corporation is in response to questions concerning the AP600 plant and the associated design certification application and is expected to be applicable in other licensee submittals in response to certain NRC requirements for justification of licensing advanced nuclear power plant designs.

This information is part of that which will enable Westinghouse to:

(a) Demonstrate the design and safety of the AP600 Passive Safety Systems.

(b) Establish applicable verification testing methods.

(c) Design Advanced Nuclear Power Plants that meet NRC requirements.

(d) Establish technical and licensing approaches for the AP600 that will ultimately result in a certified design.

(e) Assist customers in obtaining NRC approval for future plants.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of similar information to its customers for purposes of meeting NRC requirements for advanced plant licenses.

(b) Westinghouse can sell support and defense of the technology to its customers in the licensing process.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar advanced nuclear power designs and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended for developing analytical methods and receiving NRC approval for those methods.

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Attachment 2

Non-proprietary version of Attachment 1

Figures 1-20 and Table 1 contain Westinghouse Proprietary information which is provided in Attachment 1

Large-Scale Blind Post-test Evaluation

WGOTHIC pre-test predictions for large-scale test 220.1 have been completed and documented internally on April 11, 1995, along with the WGOTHIC input decks including the mass and energy of the steam released into the vessel. The mass and energy releases used were provided to the U.S. NRC in March 1995 (Reference 3). The post test data has been obtained from the AP600 test engineering group. The post test condensation rate data showed that the average steam flow used for the pretest prediction is low, and that significant dips seen in the pretest steam flows, taken from the vortex meter, are too low or not real. The measured vessel pressure response is also inconsistent with the vortex meter steam flow data.

A modified steam flow rate will be used in a post-test WGOTHIC simulation with the lumped and distributed models and is explained in detail below. The modified steam flow rate will be based on condensate flow, steam line pressure, and the steam flow meter applicable range.

Figure 1 shows the steam flow use in the pre-test prediction along with the post-test condensate flow rate. Figure 2 shows the same information as Figure 1 but over a different time and flow range to better see the comparison between the condensate and steam flow. (Time zero is defined at 9.1178 hours from Reference 1.) The lower limit on the vortex meter's applicable range is 0.45 lbm/s (Reference 1). The steam flow rate measured by the vortex meter drops below this range in several instances as shown in Figures 1 and 2 and pointed out in Reference 2. In order to better analyze the steam flow rate, the transient will be broken into 4 time ranges:

1. From 5700 seconds to 6100 seconds (the steam enters at 5741 seconds)
2. From 6100 seconds to 7000 seconds
3. From 7000 seconds to 13819 seconds
4. From 13820 seconds to 15302 seconds

The steam flow rate measured by the vortex meter from 5700 seconds to 6100 seconds is shown in Figure 3 and 4. Figure 4 contains the same information as Figure 3, but the y-axis scale is expanded.

The steam flow rate is manually controlled by a turning a valve. The operator opened and partially closed the valve in order to obtain the immediate increase in steam flow (from 0 to ~ 6 lbm/sec) and the rapid decrease in steam flow (from 6 lbm/sec to 0.4 lbm/sec) respectively, over approximately 40 seconds.

The steam flow can be compared to the steam line pressure (Channel 293) shown in Figure 5 (and 5a with a different y-axis scale). Changes in the steam flow rate can be compared to distinct changes in the steam line pressure (See Figures 6,7, and 8) in order to verify the steam flow rate.

There is a change in slope of the steam line pressure at point 1 (Figure 8). This corresponds to the time that the steam flow stops increasing (Figure 6). There is also a change in slope in the steam line pressure at point 2. This corresponds to the decrease in steam flow rate at point 2 in Figure 6 and 7. Between points 2 and 3, the steam flow rate decreases to below the vortex

meter's applicable range and then increases.

Points 3 and 4 are shown in Figures 7 and 8 where the decrease in steam flow corresponds to the steam line pressure slope shown between points 3 and 4 in Figure 8. It is believed that the steam flow rate is decreasing at point three, however the vortex meter indication of this decrease is not reliable for two reasons. First, it is significantly below the applicable range of the vortex meter. Second, the steam line pressure does not support this severe decrease in steam flow (Figure 8). Point 5 is the point in time when the steam line pressure and flow rate tend to slightly increase and then steady to a relatively constant value.

To account for anomalies between the steam flow and the steam line pressure and to account for the time ranges over which the steam flow measured goes below the vortex meter's applicable range, the steam flow rate will be set to a minimum value of 0.45 lbm/sec which is the vortex meter's minimum reliable reading. This occurs between points 2 and 3, and 3 and 4. The modified steam flow for this time range is shown in Figures 9 and 10.

The second time range is between 6100 seconds and 7000 seconds. The steam flow rate used for the pre-test prediction is shown in Figure 11. The steam flow rate in question is between points 6 and 10 in Figure 11. This decrease in steam flow did not likely occur because by this time the control valve is set at a constant opened position and is kept constant for the entire test after the initial blow down. Howeve-, there are distinct changes in the steam line pressure (Channel 293) and in the steam line temperature (Channel 334) at the times that the steam flow rate is changing (Figures 12 and 13 respectively) . Therefore, it is difficult to discount this decrease in steam flow. The steam flow rate shown in Figure 11 will only be modified by increasing the minimum to the meter's minimum value of 0.45 lbm/sec. The revised steam flow rate for this time period is shown in Figure 14. The difference between the pre-test and post-test steam flows at ~7000 seconds, as shown in Figure 14, is described below.

From 7000 seconds to 13819 seconds, reliable condensate measurements are available (Figure 2). The significant decrease in steam flow (Figure 15) for an extended time period (between 7500 seconds and 8600 seconds) is not valid for three reasons. First, the meter drops significantly below its minimum range. Second, there is no indication from the condensate flow that there is a decrease in flow rate for an extended period of time. Third, there is no notable change in the steam line pressure (Channel 293) or temperature (Channel 334) during this time range (Figures 16 and 17 respectively).

Because the condensate flow is not an instantaneous measure of the steam flow and because it is relatively constant, a time averaged value of the condensate flow from 6950 seconds to 13819 seconds will be used as the steam flow input for the post-test prediction. (Note: The last condensate measurement before the steam valve begins to close, marking the end of the test, is at 13819 seconds.) Using this methodology, the modified steam flow rate from 7000 seconds to 13819 seconds is shown in Figure 18.

During the last time period (13820 seconds to 15302 seconds), the valve was being closed and the steam flow rate shut off. Since there is a rapid change in steam flow and the condensate rate lags behind the steam flow rate, the steam flow rate from the vortex meter used in the pre-test

prediction will be used during this time range (Figure 19). However, it should be noted that the steam vortex meter drops below its applicable range as the valve is closed and the steam flow is stopped.

In summary, the following changes have been made to the steam flow:

1. The steam flow rate was set to 0.45 lbm/sec (the minimum value in the vortex meter's applicable range) when the vortex meter reading falls below its range except at the very end of the test when the steam is being shut off.
2. The time averaged condensate flow is used from 6950 seconds to 13819 seconds.
3. The steam flow rate from 13820 seconds to the end of the test at 15302 seconds will be unchanged from what was used in the pre-test prediction. Because there is a rapid decrease in steam flow rate due to the operator shutting the valve, the condensate flow cannot capture this instantaneous change in flow.

The resulting steam flow rate for the entire transient is shown in Figure 20 and tabulated in Table 1. This steam flow will be used for a post-test prediction with both the lumped and distributed parameter WGOTHIC input decks. This is the only change to be made to the input decks.

References

1. WCAP-14135, Final Data Report for PCS Large-Scale Tests, Phase 2 and 3, July 1994.
2. Presentation to the United States Nuclear Regulatory Commission, AP600 Passive Containment Cooling System Analysis Program, November 16, 1994.
3. NTD-NRC-95-442, Mass and Energy Release for AP600 PCS Large-Scale Test 220.1, March 27, 1995.