



Westinghouse
Electric Corporation

Energy Systems

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October 13, 1998
CAW-98-1291

Document Control Desk
US Nuclear Regulatory Commission
Washington, DC 20555

Attention: T. E. Collins, Chief
Reactor Systems Branch
Division of Systems Safety and Analysis

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: "Request for Exemption From the Provisions of 10 CFR 50.44, 10 CFR 50.46, and 10 CFR 50 Appendix K For Two Lead Test Assemblies (LTAs) and Supporting Justification," (Proprietary), October 1998.

Dear Mr. Collins:

The proprietary information for which withholding is being requested in the above-referenced letter is further identified in Affidavit CAW-98-1291 signed by the owner of the proprietary information, Westinghouse Electric Company, a division of CBS Corporation ("Westinghouse"). The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.790 of the Commission's regulations.

Accordingly, this letter authorized the utilization of the accompanying Affidavit by Commonwealth Edison Company.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-98-1291, and should be addressed to the undersigned.

Very truly yours,

Henry A. Sepp, Manager
Regulatory and Licensing Engineering

Enclosures

cc: T. Carter, NRR/DISP (5E7)

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Proprietary Information Notice

Transmitted herewith are proprietary and non-proprietary versions of documents furnished to the NRC. In order to conform to the requirements of 10 CFR 2.790 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.790(b)(1).

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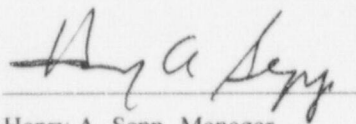
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COMMONWEALTH OF PENNSYLVANIA:

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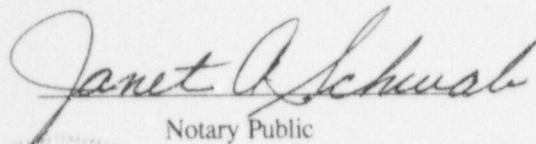
COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared Henry A. Sepp, 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 Company, a division of CBS 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:

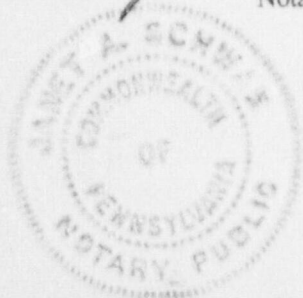


Henry A. Sepp, Manager
Regulatory and Licensing Engineering

Sworn to and subscribed
before me this 13 day
of October, 1998.


Notary Public

Notarial Seal
Janet A. Schwab, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires May 22, 2000
Member, Pennsylvania Association of Notaries



- (1) I am Manager, Regulatory and Licensing Engineering, in the Nuclear Services Division, of the Westinghouse Electric Company, a division of CBS Corporation ("Westinghouse") 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 Units.
- (2) I am making this Affidavit in conformance with the provisions of 10 CFR 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 Units 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, and 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 10 CFR 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) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in "Request for Exemption From the Provisions of 10 CFR 50.44, 10 CFR 50.46, and 10 CFR 50 Appendix K For Two Lead Test Assemblies (LTAs) and Supporting Justification," (Proprietary), October 1998, for information in support of Commonwealth Edison Company letter and Application for Withholding Proprietary Information from Public Disclosure, Henry A. Sepp, Westinghouse, Manager Regulatory and Licensing Engineering to the attention of T. E. Collins, Chief, Division of Systems Safety and Analysis. The proprietary information as submitted is technical summary information given to the NRC on behalf of Commonwealth Edison Company for the Bryon Station Units 1 and 2 exemption request.

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

- (a) Provide the NRC with technical summary information for the Bryon Station Units 1 and 2 exemption request.
- (b) Assist its customers to obtain licenses.
- (c) Optimize reactor design and performance while maintaining a high level of fuel integrity.

Further this information has substantial commercial value as follows:

- (a) Westinghouse can sell support and defense of the product 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 technical evaluation justifications 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 the enclosed improved core thermal performance methodology.

Further the deponent sayeth not.

ATTACHMENT 1

Request for Exemption From the Provisions of
10 CFR 50.44, 10 CFR 50.46, and 10 CFR 50 Appendix K
For Two Lead Test Assemblies (LTAs)
and Supporting Justification

Byron Station
Units 1 and 2

Purpose

The purpose of this attachment is to provide supporting justification for an exemption request related to the use of low tin ZIRLO™ Lead Test Assemblies (LTAs). The Code of Federal Regulations (10 CFR 50.44, 10 CFR 50.46, and 10 CFR 50, Appendix K) do not allow the use of the proposed LTAs since the composition of tin in the LTAs will be nominally []% which is between the lower bound patent limit []% and the lower bound licensed limit (0.80%).

Background

As the nuclear industry pursues longer operating cycles with increased fuel discharge burnups and more aggressive fuel management, the corrosion performance requirements for the nuclear fuel cladding becomes more demanding. Available industry data from the American Nuclear Society, the International Atomic Energy Agency, the Electric Power Research Institute and Westinghouse indicate that corrosion resistance improves for cladding with a lower tin content. In addition, fuel rod internal pressures (resulting from the increased fuel duty, use of Integral Fuel Burnable Absorbers (IFBAs) and corrosion/temperature feedback effects) have become more limiting with respect to fuel rod design criteria. By reducing the associated corrosion buildup and thus minimizing temperature feedback effects, additional margin to fuel rod internal pressure design criteria is obtained.

To meet these needs, Westinghouse Electric Company has developed a Lead Test Assembly program that incorporates three distinct features: 1) low tin ZIRLO™ (i.e., tin composition below the currently licensed range for ZIRLO™), [

]%. As part of this development program, ComEd and Westinghouse plan to include these features in two LTAs to be initially inserted into the Byron Station Unit 1 Cycle 10 core in non-limiting core locations during the refueling outage currently scheduled to begin March 27, 1999. The Byron Station LTAs will be identical to the current 17x17 VANTAGE + fuel assemblies utilized by ComEd with the exception of the 3 new features. This exemption request is only for the use of low tin ZIRLO™.

The Design Features Section of the Byron Station, Units 1 and 2, Improved Technical Specifications define that the fuel rod cladding material is either Zircaloy or ZIRLO™. Since the ZIRLO™ cladding material, on selected LTA fuel rods and the ZIRLO™ fabricated guide thimble tubes and instrumentation tubes, will have the low tin composition below that currently licensed in WCAP-12610-P-A, exemptions from 10 CFR 50.44, 10 CFR 50.46, and 10 CFR 50, Appendix K are required for the fuel rods clad with the low tin ZIRLO™. It has been determined by Westinghouse [

] ^{a, b, c}.

Therefore, the current ECCS model and Analysis of Record for Byron Station Units 1 and 2 remain applicable and unchanged. Westinghouse has reviewed, in its development program, the details of the LTA fuel features and their associated impacts on the safety analyses. This review demonstrated the acceptability of the LTAs. This demonstrated acceptability and demonstrated compliance with 10 CFR 50.59 requirements, by showing that no Unreviewed Safety Question exists, has been documented separately. The Improved Technical Specifications, previously submitted to the NRC and scheduled to receive approval prior to Byron Station Unit 1 Cycle 10, specifically allow the use of LTAs, thus no additional Technical Specification changes are required for the use of these LTAs.

Technical Justification of Acceptability

ComEd and Westinghouse jointly performed evaluations of the LTAs during the development program phase. These evaluations included both testing and analyses, and addressed all aspects of safety, including mechanical, neutronic, thermal-hydraulic, transient, and Loss of Coolant Accident (LOCA) accident analyses. These evaluations covered all three design feature changes for the LTAs. Those evaluations pertinent to the low tin ZIRLO™, for which this exemption request is being made, are summarized below.

- Mechanical evaluation of the LTAs with respect to criteria that govern acceptability considering its mechanical design have been performed. The same design methods utilized for the current VANTAGE + fuel were used. No new or altered design limits for purposes of 10 CFR 50, Appendix A, General Design Criterion 10, "Reactor Design," need to be applied or are required for this program. A fuel rod design evaluation has been performed for the LTAs. The results of this evaluation show that all fuel rod design criteria (i.e., Specified Acceptable Fuel Design Limits as required by GDC 10) have been met. The evaluations included all three features of the LTA including the low tin ZIRLO™. Based on these results, the LTAs have been shown to be acceptable for the anticipated three cycles of operation. With respect to the mechanical evaluations performed (inclusive of material properties), three specific areas would be potentially impacted by the low tin ZIRLO™. These areas are material properties, corrosion and thermal creep.

- * Material Properties: [

] a, b, c.

* Corrosion: [

] a, b, c.

* Thermal Creep: [

] a, b, c.

- ComEd and Westinghouse have performed nuclear design evaluations of the LTAs impact on the nuclear design. The standard reload methodologies approved by the NRC (WCAP-9272-P-A, "Westinghouse Reload Safety Evaluation Methodology" and NFSR-0081, "Benchmark of PWR Nuclear Design Methods Using PHOENIX-P and ANC Computer Codes") can be used to model the LTAs. The features of the LTAs do not challenge the validity of the standard methodologies. ComEd will use the standard reload methodologies for the Byron Station reload design containing the LTAs and will assure the assemblies are not placed in the highest rod power density locations.
- Thermal-hydraulic Design evaluation of the LTAs was performed by Westinghouse using their approved methods and information on the characteristics of the core internals and the resident fuel. Evaluations performed accounted for the LTAs' impact on minimum Departure from Nucleate Boiling Ratio (DNBR), pressure drop, and fuel assembly lift and lateral flow velocities. As expected, the resident fuel Analysis of Record will bound the DNBR performance for the LTAs. The proposed changes in the LTAs are applied within the geometric envelope of the resident fuel. With no change to the grids, bottom nozzle, top nozzle or thimble design, or external fuel rod dimension, the LTAs represent no change to the hydraulic performance as compared to the resident fuel. The LTAs have equivalent assembly and component hydraulic characteristics (e.g., pressure drop) as that for the resident fuel. This ensures that implementation of the LTAs have no impact on thermal hydraulic evaluations and safety limits associated with the fuel design.
- A Loss of Coolant Accident (LOCA) safety analysis evaluation for the LTAs has been performed by Westinghouse using the current Byron Station Emergency Core Cooling System (ECCS) Model Safety Analysis of Record (R. M. Krich (ComEd) letter to U.S. Nuclear Regulatory Commission, "Revision to Report Submitted Under 10 CFR 50.46," dated July 30, 1998). The features of the LTAs were evaluated for effect on the LGCA analyses. This included consideration of fuel pellet temperature, fuel pellet density and mass, fuel rod internal pressure, pellet thermal conductivity, and cladding thermo-mechanical properties. The cladding thermo-mechanical property review included the high temperature creep model, burst temperature and burst strain models, oxidation rate, and specific heat. As stated previously, []^{a, b, c}.
The current ECCS Analysis of Record covers Zircaloy-4 and current ZIRLO™ clad fuel. Since []^{a, c}, the current Analysis of Record remains bounding for the LTAs and all 10 CFR 50.46 Acceptance Criteria are met.
- Non-LOCA transient safety analysis evaluations have been performed by Westinghouse to assess the impact of the LTAs on all the Chapter 15 non-LOCA accident analyses. Westinghouse used NRC approved methodology to assess LTA design features that could impact the safety analyses of record. Since the LTAs are geometrically identical to the current

resident fuel and there is no appreciable change to the ZIRLO™ material properties and because the LTAs will not be placed in the highest rod power density locations, they will be bounded by the current transient safety Analyses of Record performed for the resident fuel. Therefore, the current transient Analyses of Record remain applicable and no safety criteria (DNB, cladding temperature, system pressures) will be violated.

Where any differences exist between Byron Station Unit 1 and Unit 2 designs, a bounding approach has been taken for the aforementioned evaluations to support operation of the two LTAs in either Byron Station Unit 1 or Unit 2. This is necessary to support the capability to use the two LTAs in either unit. This degree of flexibility is desirable if re-insertion is delayed to allow time, off critical path, to perform more extensive characterization examination of the assemblies after one or two cycles of operation. Upon completion of the examinations, rather than waiting a year or more for the next refueling outage to re-insert the LTAs, the assemblies could instead be incorporated into the next cycle of the other unit. Any effect of using the LTAs will be incorporated into the cycle specific reload analyses for each applicable cycle.

Justification of Exemption and Special Circumstances

10 CFR 50.12(a), Specific Exemption:

The standards set forth in 10 CFR 50.12(a) provide that the NRC may grant exemptions from the requirements of the regulations of this part for reasons consistent with the following:

- the exemption is authorized by law;
- the exemption will not present undue risk to the public health and safety;
- the exemption is consistent with the common defense and security; and
- special circumstances are present.

This exemption is authorized by law. The remaining standards for the exemption are also satisfied, as described below.

The exemption will not present undue risk to the public health and safety. The Westinghouse LTA safety evaluation (documented separately) demonstrates that all aspects of safety, including mechanical, thermal hydraulic, neutronic, and non-LOCA transient analyses results are within those approved for the current 17x17 VANTAGE + fuel assemblies utilized by ComEd in Byron Station, Units 1 and 2 (i.e., there are no Unreviewed Safety Questions, in accordance with requirements of 10 CFR 50.59). In addition, the Westinghouse LTA safety evaluation demonstrates that the LOCA accident analyses results satisfy the LOCA Acceptance Criteria. Cycle specific analyses (in accordance with NRC approved methodology, i.e., WCAP-9272-P-A) are expected to demonstrate that the LOCA analyses results for the LTAs are within those approved for the current 17x17 VANTAGE + fuel assemblies utilized by ComEd in Byron Station, Units 1 and 2. The LTAs will be placed in non-limiting core locations that do not experience the highest core power density throughout the three cycles of

anticipated operation. Therefore, the use of the two LTAs will not present an undue risk to the public health and safety and is consistent with the common defense and security.

This request for an exemption involves special circumstances as set forth in 10 CFR 50.12(a)(2)(ii), which states that special circumstances are present whenever "Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule."

The underlying purpose of 10 CFR 50.44 is to ensure that there is an adequate means of controlling generated hydrogen. The hydrogen produced in a post-LOCA scenario comes from a metal-water reaction. Tests performed by Westinghouse on the low tin ZIRLO™ alloy have demonstrated that the reduction in tin content has an []^{a, c} versus current ZIRLO™. Therefore, the use of low tin ZIRLO™ will have no significant effect on current assessments of hydrogen gas production.

10 CFR 50.46 identifies acceptance criteria for ECCS performance at nuclear power plants. The effectiveness of the ECCS in Byron Station will not be affected by the insertion of the two LTAs. Due to the similarities in the material properties of the low tin ZIRLO™ and current ZIRLO™, the current ECCS model remains applicable and unchanged. In addition, the location of the LTAs will be in non-limiting locations. Therefore, it can be concluded that the ECCS performance of Byron Station will not be adversely affected.

The intent of paragraph 1.A.5 of Appendix K to 10 CFR Part 50 is to apply an equation for rates of energy release, hydrogen generation, and cladding oxidation from a metal-water reaction which conservatively bounds all post-LOCA scenarios (i.e., the Baker-Just equation). Due to the similarities in the composition of the low tin ZIRLO™ and current ZIRLO™, the application of the Baker-Just equation will continue to conservatively bound all post-LOCA scenarios.

Conclusion

10 CFR 50.44, 10 CFR 50.46, and 10 CFR 50, Appendix K only allow the use of fuel rods clad with Zircaloy or ZIRLO™. 10 CFR 50.44, 10 CFR 50.46, and 10 CFR 50, Appendix K do not allow the use of the proposed LTAs since the composition of tin in the LTAs will be nominally []^{a, c} which is between the lower bound patent limit []^{a, c} and the lower bound licensed limit (0.80%). The composition of tin is less than the licensing basis for ZIRLO™, as defined in WCAP-12610-P-A, which specifies the tin composition as being between 0.80% and 1.20%. In order to support development of new cladding materials with improved corrosion resistance, an exemption from the requirements of 10 CFR 50.44, 10 CFR 50.46, and 10 CFR 50, Appendix K is requested. Testing and evaluations demonstrate that the intent of the regulations continue to be met since all aspects of safety, including mechanical, neutronic, thermal hydraulic, transient, and LOCA accident analyses results fall within those approved for the current 17x17 VANTAGE + fuel assemblies Analyses of Record for Byron Station, Units 1 and 2. Therefore, granting approval of this exemption request does not violate the

underlying purpose of the rule and special circumstances exist to justify the approval of an exemption from the subject requirements.