

**ENCLOSURE 4**

**LTR-SGMP-15-25 NP  
RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION  
ON THE DESIGN FEATURES OF THE SEQUOYAH  
UNIT 2 REPLACEMENT STEAM GENERATORS  
(NON-PROPRIETARY)**

Westinghouse Electric Company

## **Response to NRC Request for Additional Information on the Design Features of the Sequoyah Unit 2 Replacement Steam Generators**

**April 28, 2015**

**Author:**

**Electronically Approved\***

Jesse S. Baron

Steam Generator Management Programs

**Verifier:**

**Electronically Approved\***

Charles T. Harden

Nuclear Component Engineering

**Approved:**

**Electronically Approved\***

Ryan R. Lowes, Acting Manager

Steam Generator Management Programs

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***\*Electronically Approved Records are Authenticated in the Electronic Document Management System.***

1. General information concerning the design of your replacement steam generators (SGs) was provided in the submittal. In order for the staff to better understand the design of your replacement SGs, please provide the following information:
  - a. A tubesheet map depicting the row and column numbers

**Response:**

a,c,e

- b. Tube pitch (e.g., triangular, 1.00-inch center-to-center).

**Response:**

The tubesheet is a triangular pitch design. The pitch is [ ]<sup>a,c,e</sup>. The upper bundle vertical component of the pitch (i.e., Row to Row distance) is “stretched” in the U-bend so that it starts with the standard pitch at the transition of the straight leg tube to the bent portion and maxes out at the apex of the bend. From a fabrication standpoint the overall tube height or length was increased incrementally for each row making the tube-to-tube pitch in the U-bend larger than that in the straight leg portion of the tube bundle. The pitch ranges from [ ]<sup>a,c,e</sup> nominal triangular pitch in the straight leg portion to [ ]<sup>a,c,e</sup> nominal vertical pitch maximum at the apex of the U-bend.

- c. Expansion method and extent (e.g., hydraulic expansion for the full length of the tubesheet)

**Response:**

The tubes are expanded the full length of the tubesheet using a hydraulic expansion method.

- d. Tube support plate and U-bend support material and design

**Response:**

All support structure material in contact with the tubes is [ ]<sup>a,c,e</sup>. The straight leg tube supports are of a grid type design with interlocking [ ]<sup>a,c,e</sup>. The U-bend areas of the tube are supported by [ ]<sup>a,c,e</sup> with varying numbers of vertical and diagonal support elements depending on the location in the variable radius U-bends. The shortest tubes (smallest radius bends) have at least 3 tube-to-support interface points, and the longest tubes (largest radius bends) have up to 9 tube-to-support interface points.

- e. Flow distribution baffle design, if applicable

**Response:**

Not applicable. The Westinghouse Model 57AG+ design does not have a flow distribution baffle.

- f. Whether tubes were stress relieved after bending, and if so, the rows that were stress relieved

**Response:**

Rows [ ]<sup>a,c,e</sup> tubes were stress relief heat treated full length following bending.

- g. The smallest U-bend radius

**Response:**

The smallest U-bend radius (Row 1) is [ ]<sup>a,c,e</sup> nominal.

- h. Tubesheet thickness with and without clad

**Response:**

Base material thickness of the tubesheet is [ ]<sup>a,c,e</sup> nominal and the clad is [ ]<sup>a,c,e</sup> thick minimum. Together the tubesheet with clad is [ ]<sup>a,c,e</sup> minimum.

- i. The naming convention for the U-bend support structures and a more detailed diagram (since it appears that there are various supports running between the vertical straps within the tube bundle)

**Response:**

Reference: Section 5.1.3 of SQN RSG ECT Examination Guidelines (L18140513801).

Support structure measurements are provided in Table 5.2 while Figure 5.2 illustrates a cross-sectional view of the steam generator tube support-structures and specific support nomenclature. Table 5.3 lists all dimensional and design specifics relative to the support structures within the Sequoyah steam generators and Table 5.4 gives the U-bend support structures through which the various tubes pass. Table 5.5 lists tube dimensions by row with respect to straight and curved sections. Figures 5.3 through 5.7 show representative drawings of the supports and Ventilated Support Bars (VSB). Table 5.6 gives the support nomenclature.

**Sequoyah 2 Support Structure Measurements**

Location	Inches from TE	Center to Center	a,c,e

**Table 5.2**

**Westinghouse Model 57AG+**

a,c,e



**Figure 5.2**

## SEQUOYAH 2 RSG DESIGN SPECIFICS

Tubesheet Data:  
 Hole diameter – [ ]<sup>a,c,e</sup>  
 Pitch – [ ]<sup>a,c,e</sup>  
 Thickness – [ ]<sup>a,c,e</sup>  
 Expansion process - Hydraulic (full expansion)

Tube Support Data:  
 Hole geometry – [ ]<sup>a,c,e</sup>  
 Lattice dimensions – [ ]<sup>a,c,e</sup>  
 Width x thickness – [ ]<sup>a,c,e</sup>  
 Material – [ ]<sup>a,c,e</sup>

Ventilated Support Bar Data:  
 Lock Bar Shape – [ ]<sup>a,c,e</sup>  
 Width x thickness – [ ]<sup>a,c,e</sup>  
 Straps Shape – [ ]<sup>a,c,e</sup>  
 Width x thickness – [ ]<sup>a,c,e</sup>  
 Material – [ ]<sup>a,c,e</sup>

Tube Data:  
 OD – [ ]<sup>a,c,e</sup>  
 ID – [ ]<sup>a,c,e</sup>  
 Wall thickness:  
 Nominal – [ ]<sup>a,c,e</sup>  
 Number of tubes/SG – [ ]<sup>a,c,e</sup>  
 U-bend radius:  
 Maximum – [ ]<sup>a,c,e</sup>  
 Minimum – [ ]<sup>a,c,e</sup>

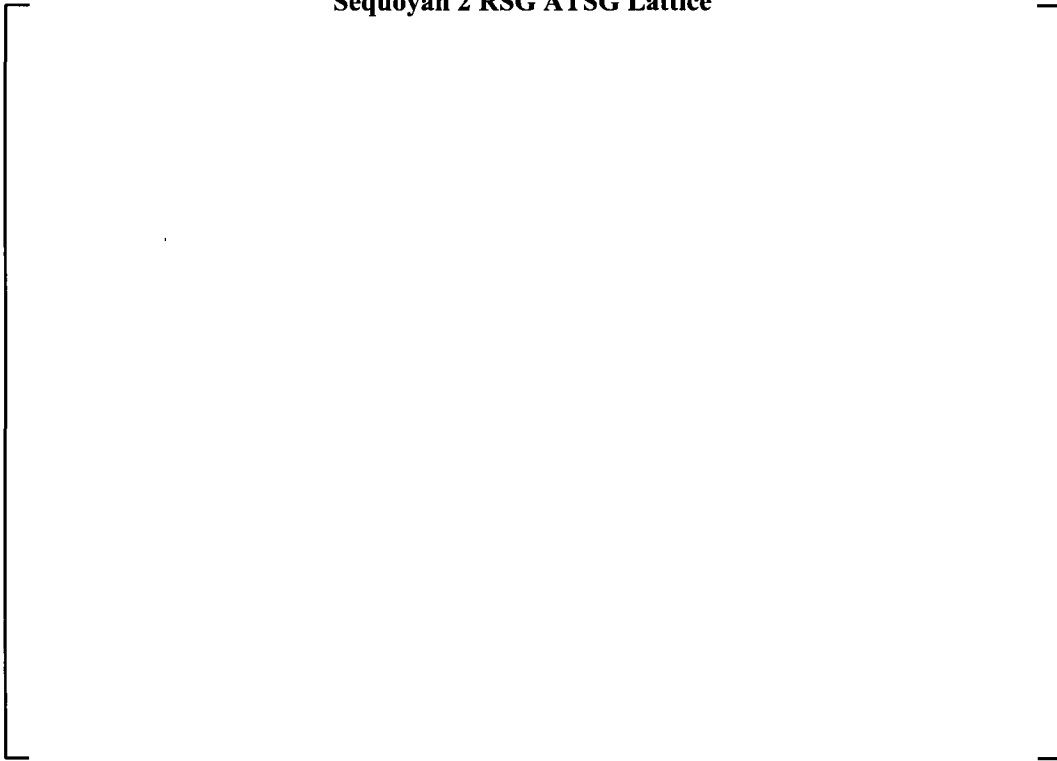
**Table 5.3**

## Sequoyah 2 RSG U-Bend Support Intersections

[illegible]**Table 5.4**

**Sequoyah 2 RSG ATSG Lattice**

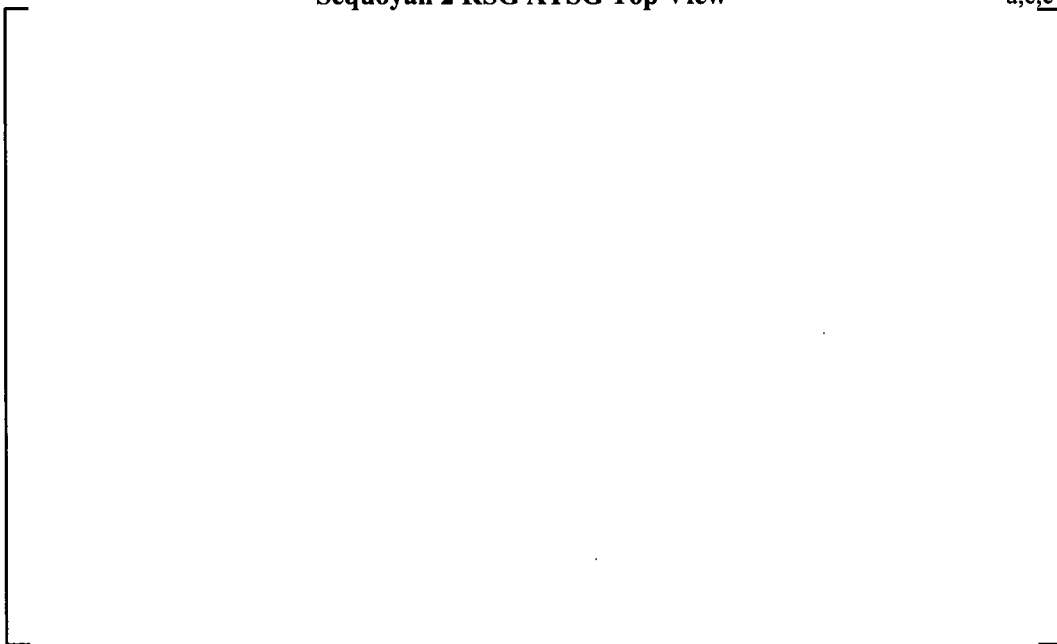
a,c,e



**Figure 5.3**

**Sequoyah 2 RSG ATSG Top View**

a,c,e



**Figure 5.4**

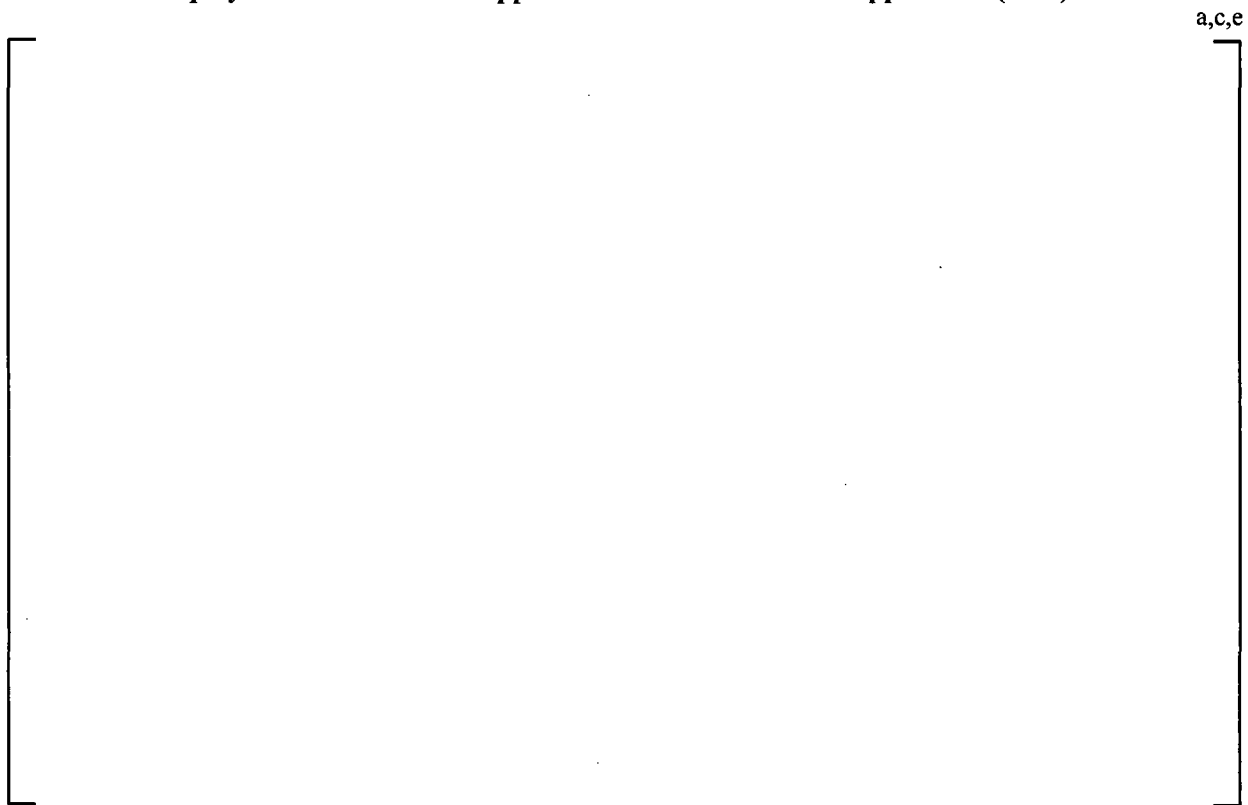


**Sequoyah 2 RSG ATSG (Advanced Tube Support Grid)**



**Figure 5.5**

**Sequoyah 2 RSG U-Bend Support Structures Ventilated Support Bar (VSB)**



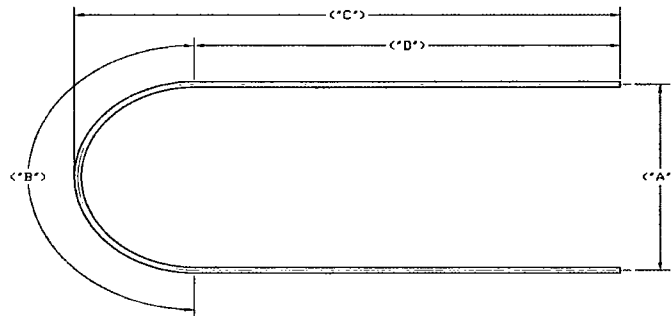
**Figure 5.6**

**Sequoyah 2 RSG U-Bend Support Straps Ventilated Support Bars (VSB)**



**Figure 5.7**

### Sequoyah 2 RSG Tube Dimensions by Row

[illegible][illegible]

LTR-SGMP-15-25  
NP-Attachment

[illegible][illegible]**Table 5.5**

a,c,e

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**ENCLOSURE 3**

**WESTINGHOUSE AFFIDAVIT FOR LTR-SGMP-15-25 P**



Westinghouse Electric Company  
Engineering, Equipment and Major Projects  
1000 Westinghouse Drive, Building 3  
Cranberry Township, Pennsylvania 16066  
USA

U.S. Nuclear Regulatory Commission  
Document Control Desk  
11555 Rockville Pike  
Rockville, MD 20852

Direct tel: (412) 374-4643  
Direct fax: (724) 940-8560  
e-mail: greshaja@westinghouse.com  
Proj letter: TVA-15-29

CAW-15-4168

April 28, 2015

**APPLICATION FOR WITHHOLDING PROPRIETARY  
INFORMATION FROM PUBLIC DISCLOSURE**

Subject: LTR-SGMP-15-25 P-Attachment, "Response to NRC Request for Additional Information on the Design Features of the Sequoyah Unit 2 Replacement Steam Generators" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-15-4168 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. 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 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying Affidavit by Tennessee Valley Authority.

Correspondence with respect to the proprietary aspects of the Application for Withholding or the Westinghouse Affidavit should reference CAW-15-4168, and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, 1000 Westinghouse Drive, Building 3 Suite 310, Cranberry Township, Pennsylvania 16066.

Very truly yours,

A handwritten signature in black ink, appearing to read 'James A. Gresham', written over a horizontal line.

James A. Gresham, Manager  
Regulatory Compliance

April 28, 2015

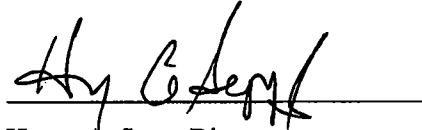
AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

I, Henry A. Sepp, am authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of my knowledge, information, and belief.

A handwritten signature in black ink, appearing to read "Hy A. Sepp", is written over a horizontal line.

Henry A. Sepp, Director

CRE-Systems and Components Engineering



- (1) I am Director, CRE-Systems and Components Engineering, Westinghouse Electric Company LLC (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 rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.
- (2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.
- (3) I have personal knowledge of the criteria and procedures utilized by Westinghouse 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 2.390 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 constitute Westinghouse policy and provide 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.
- (iii) 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 that 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.
- (iv) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.
- (v) 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.
- (vi) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in LTR-SGMP-15-25 P-Attachment, "Response to NRC Request for Additional Information on the Design Features of the Sequoyah Unit 2 Replacement Steam Generators" (Proprietary), for submittal to the Commission, being transmitted by Tennessee Valley Authority letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with providing a response to an NRC staff request for additional information concerning the Sequoyah Unit 2 replacement steam generator design features, and may be used only for that purpose.

- (a) This information is part of that which will enable Westinghouse to:
  - (i) Provide the information (e.g., component dimensions, material of construction, drawings, etc.) requested by the NRC staff concerning the design features of the Sequoyah Unit 2 replacement steam generators.
- (b) Further this information has substantial commercial value as follows:
  - (i) Westinghouse plans to sell the use of similar design features to its customers for Westinghouse replacement steam generators.
  - (iii) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

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 design features 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.

Further the deponent sayeth not.

## **PROPRIETARY INFORMATION NOTICE**

Transmitted herewith are proprietary and non-proprietary versions of documents furnished to the NRC associated with providing a response to an NRC staff request for additional information concerning the Sequoyah Unit 2 replacement steam generator design features, and may be used only for that purpose.

In order to conform to the requirements of 10 CFR 2.390 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 2.390(b)(1).

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