



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, ILLINOIS 60532-4352

April 26, 2022

Mr. David Rhoades
Senior Vice President
Constellation Energy Generation, LLC
President and Chief Nuclear Officer (CNO)
Constellation Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: BYRON STATION UNIT 1 AND UNIT 2 - REQUEST FOR INFORMATION FOR AN NRC TRIENNIAL HEAT EXCHANGER/SINK PERFORMANCE INSPECTION AND REQUEST FOR INFORMATION; INSPECTION REPORT 05000454/2022002; 05000455/2022002

Dear Mr. Rhoades:

On June 13, 2022, the U.S. Nuclear Regulatory Commission (NRC) will begin the onsite portion of the Triennial Heat Exchanger/Sink Performance Inspection at Byron Station. This inspection will be performed in accordance with NRC baseline Inspection Procedure 71111.07.

The Triennial Heat Exchanger/Sink Performance Inspection focuses on service water cooled heat exchangers, closed loop heat exchangers and the ultimate heat sink (UHS). The inspection verifies that the selected service water cooled heat exchanger(s), closed loop heat exchanger(s) and the UHS remain capable of performing their intended safety functions.

The inspection includes 1 week onsite. The inspection team will consist of three NRC inspectors. The current inspection schedule is as follows:

- Preparation week: June 6 – 10, 2022
- Onsite week: June 13 – 17, 2022

In order to minimize the impact that the inspection has on the site and to ensure a productive inspection, a request for documents needed for the inspection is enclosed. The information request has been divided into three groups:

- The first group lists information necessary for the initial inspection scoping activities. This information should be available to the lead inspector no later than May 16, 2022. The lead inspector will communicate the initial selected set of approximately 2-3 risk significant heat exchangers by May 17, 2022.
- The second group is needed to support the in-office preparation activities. This set of documents, including the calculations associated with the selected heat exchangers, should be available at the Regional Office no later than June 6, 2022. This information should be separated for each selected component, especially if provided electronically (e.g., folder with component name that includes calculations,

condition reports, maintenance history, etc.). During the in-office preparation activities, the inspector may identify additional information needed to support the inspection.

- The last group includes the additional information above as well as plant specific reference material. This information should also be available to the inspector on June 6, 2022. It is also requested that corrective action documents and/or questions developed during the inspection be provided to the inspector as the documents are generated.

All requested documents are to be for the time period from the onsite inspection period back to the documents that were provided in response to the previous Heat Sink Performance Inspection. If no activities were accomplished in that time period, then the request applies to the last applicable document in the previous time period. It is important that these documents be as complete as possible, in order to minimize the number of documents requested during the preparation week or during the onsite inspection.

The lead inspector for this inspection is Elba Sanchez Santiago. We understand that our licensing contact for this inspection is Zoe Cox of your organization. If there are any questions about the inspection or the material requested in the enclosure, please contact the lead inspector at 630-829-9520 or via e-mail at elba.sanchezsantiago@nrc.gov.

This letter does not contain new or amended information collection requirements subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). Existing information collection requirements were approved by the Office of Management and Budget, Control Number 3150-0011. The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid Office of Management and Budget Control Number.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,



Signed by Sanchez Santiago, Elba
on 04/26/22

Elba Sanchez Santiago, Senior Reactor Inspector
Engineering Branch 2
Division of Reactor Safety

Docket Nos. 50-454 and 50-455
License Nos. NPF-37 and NPF-66

Enclosure:
Triennial Heat Sink Performance Inspection
Document Request

cc: Distribution via LISTSERV®

Letter to David Rhoades from Elba Sanchez Santiago dated April 26, 2022.

SUBJECT: BYRON STATION UNITS 1 AND 1 - REQUEST FOR INFORMATION FOR AN NRC TRIENNIAL HEAT EXCHANGER/SINK PERFORMANCE INSPECTION AND REQUEST FOR INFORMATION; INSPECTION REPORT 05000454/2022002; 05000455/2022002

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TRIENNIAL HEAT EXCHANGER/SINK PERFORMANCE DOCUMENT REQUEST

HEAT EXCHANGER/SINK PERFORMANCE REQUEST FOR INFORMATION

I. ADMINISTRATIVE INSPECTION INFORMATION

Inspection Report Number:	05000454/2022002; 05000455/2022002
Onsite Inspection Dates:	June 13 – 17, 2022
Inspection Procedure:	IP 71111.07, "HEAT EXCHANGER/SINK PERFORMANCE"
Lead Inspector:	Elba Sanchez Santiago, Senior Reactor Inspector, DRS 630-829-9520 Elba.sanchezsantiago@nrc.gov
Teammates:	Megan Gangewere, Reactor Inspector, RIII/DRS Muzammil Siddiqui, Reactor Inspector, RIII/DRS

I. Information Requested by: May 16, 2022

1. List of the Generic Letter (GL) 89-13, "Service Water System Problems Affecting Safety-Related Equipment," heat exchangers in order of risk significance.
 - a. Identify if the heat exchanger is service water cooled or a closed loop heat exchanger.
2. Copy of heat exchanger performance trending data tracked for each GL 89-13 heat exchanger.
3. List of corrective action program documents (with a short description) associated with GL 89-13 heat exchangers, heat sinks, silting, corrosion, fouling, or heat exchanger testing, for the previous 3 years or since the last corrective action program document list was sent to the NRC for the previous heat sink performance inspection. The list should include all corrective action program documents not on the last corrective action program document list.
4. Copy of any self-assessment done on any of GL 89-13 heat exchangers.
5. Last two System Health Report(s) and maintenance rule system notebooks for all the GL 89-13 heat exchangers.
6. List of engineering-related operator workarounds (with a short description) associated with GL 89-13 heat exchangers. The requested documents are to be for the time period from the onsite inspection period back to the documents that were provided in response to the previous heat sink performance inspection.

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7. List of permanent and temporary modifications (with a short description) associated with GL 89-13 heat exchangers. The requested documents are to be for the time period from the onsite inspection period back to the documents that were provided in response to the previous heat sink performance inspection.
8. Provide a list of all corrective action documents, with a short description, associated with the UHS for the previous three years or since the last corrective action program document list was sent to the NRC for the previous Triennial Heat Sink Performance Inspection.

II. Information Requested by: June 6, 2022

1. Copies of the GL 89-13 responses.
2. Copy of the Updated Final Safety Analysis Report (UFSAR) section applicable to the GL 89-13 Heat Exchanger Program.
3. Copies of procedures developed to implement the recommendations of GL 89-13 (e.g., the GL 89-13 Heat Exchanger Program description).
4. Copies of the selected corrective action program documents.
5. For the specific heat exchangers selected:
 - a. Copies of the UFSAR sections applicable for each heat exchanger.
 - b. Copy of system description and design basis document for the heat exchangers (as applicable).
 - c. Provide a list of calculations (with a short description) which currently apply to each heat exchanger.
 - i. Establish the limiting design basis heat load required to be removed by each of these heat exchangers;
 - ii. Demonstrate the heat exchangers capacity to remove the limiting heat load;
 - iii. Correlate surveillance testing and/or inspection results from these heat exchangers with design basis heat removal capability (e.g., basis for surveillance test and/or inspection acceptance criteria);
 - iv. Evaluate the potential for water hammer in each heat exchanger or associated piping; and
 - v. Evaluate excessive tube vibration in each heat exchanger.
 - d. Copy of any operability determinations or other documentation of degradation associated with the heat exchangers or the systems that support the operation for the selected heat exchangers.

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- e. Copy of the construction code, Design Specification, heat exchanger data sheets, and vendor documents including component drawings applicable for the heat exchangers.
 - f. Copies of normal, abnormal, and emergency operating procedures associated with the selected heat exchangers.
6. For the ultimate heat sink (UHS):
- a. Copies of the applicable UFSAR sections.
 - b. Copy of system description and design basis document (as applicable).
 - c. Copy of any operability determinations or other documentation of degradation associated with the UHS.
 - d. Copy of the document (e.g., UFSAR, Technical Requirements Manual or procedure) that states the maximum cooling water system inlet temperature limit that still allows full licensed power operation of the nuclear reactor.
 - e. Copy of system description and design basis document (as applicable).
 - f. Copy of the construction code and Design Specification.
 - g. Copies of normal, abnormal, and emergency operating procedures associated with the UHS including procedures for loss of this systems.
 - h. Provide a list of calculations (with a short description), which currently apply to UHS.
 - i. Provide a list of instruments (with a short description) associated with automatic or alarm functions for the UHS.
 - j. Provide a list of any design change (with a short description) performed on the UHS since the last heat sink performance inspection.
7. A schedule of all inspections, cleanings, maintenance, or testing of any safety-related plant heat exchanger to be performed during the on-site portion of the inspection.

III. Information Requested to be Available for Inspection Preparation by: May 6, 2022

1. For the specific service water cooled heat exchangers selected:
- a. Copy of the calculation which correlates surveillance testing results from these heat exchangers with design basis heat removal capability (e.g., basis for surveillance test acceptance criteria).
 - b. Copies of the two most recent completed tests and evaluation data confirming thermal performance for those heat exchangers which are performance tested.

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- c. Documentation and procedures that identify the types, accuracy, and location of any instrumentation used for the two most recently completed thermal performance tests for the heat exchangers (e.g., high accuracy ultrasonic flow instruments or temperature instruments). Include calibration records for the instruments used during these tests.
- d. Information regarding any alarms which monitor on-line performance.
- e. Copy of the document describing the inspection results of each heat exchanger. The requested documents are to be for the time period from the onsite inspection period back to the documents that were provided in response to the previous heat sink performance inspection.
- f. The cleaning and inspection maintenance schedule for each heat exchanger for the next 5 years.
- g. Copy of the design specification and heat exchanger data sheets for each heat exchanger.
- h. Copy of the vendor manuals including component drawings for each heat exchanger.
- i. Copy of the calculation which establishes the limiting (maximum) design basis heat load which is required to be removed by each of these heat exchangers.
- j. Copy of the operating procedures that ensure that the maximum cooling water system inlet temperature limit is not exceeded.
- k. Copy of the calculations or documents which evaluate the potential for water hammer in each heat exchanger or associated piping.
- l. Copy of the calculations that evaluate excessive tube vibration in each heat exchanger and the documents that describe the controls that prevent heat exchanger degradation due to excessive flow induced vibration during operation.
- m. Copy of the periodic flow testing at or near maximum design flow. The requested documents are to be for the time period from the onsite inspection period back to the documents that were provided in response to the previous heat sink performance inspection.
- n. Copy of the document which identifies the current number of tubes in service for each heat exchanger and the supporting calculation which establishes the maximum number of tubes which can be plugged in each heat exchanger.
- o. Copy of the document establishing the repair criteria (plugging limit) for degraded tubes which are identified in each heat exchanger.
- p. Copies of the documents that verify the structural integrity of the heat exchanger (e.g., eddy current summary sheets, ultrasonic testing results, and visual inspection results).

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2. For the specific closed loop heat exchangers selected:
 - a. Copy of the design specification and heat exchanger data sheets for each heat exchanger.
 - b. Copy of the vendor manuals including component drawings for each heat exchanger.
 - c. Copy of the calculation which establishes the limiting (maximum) design basis heat load which is required to be removed by each of these heat exchangers.
 - d. Copy of the operating procedures that ensure that the maximum cooling water system inlet temperature limit is not exceeded.
 - e. Copy of the calculations or documents which evaluate the potential for water hammer in each heat exchanger or associated piping.
 - f. Copy of the calculations that evaluate excessive tube vibration in each heat exchanger and the documents that describe the controls that prevent heat exchanger degradation due to excessive flow induced vibration during operation.
 - g. Copy of the periodic flow testing at or near maximum design flow. The requested documents are to be for the time period from the onsite inspection period back to the documents that were provided in response to the previous heat sink performance inspection.
 - h. Copy of the document which identifies the current number of tubes in service for each heat exchanger and the supporting calculation which establishes the maximum number of tubes which can be plugged in each heat exchanger.
 - i. Copy of the document establishing the repair criteria (plugging limit) for degraded tubes which are identified in each heat exchanger.
 - j. Copies of the documents that verify the structural integrity of the heat exchanger (e.g., eddy current summary sheets, ultrasonic testing results, and visual inspection results).
 - k. Copies of those documents that describe the methods taken to control water chemistry in the heat exchangers.
3. For review of the operation of the service water system and UHS:
 - a. Copies of any design change performed on the UHS. The requested documents are to be for the time period from the onsite inspection period back to the documents that were provided in response to the previous heat sink performance inspection.
 - b. Copies of any design change performed on the safety-related service water system. The requested documents are to be for the time period from the onsite inspection period back to the documents that were provided in response to the previous heat sink performance inspection.

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- c. Copies of procedures for a loss of UHS. Provide documentation that the instrumentation, which is relied on for decision-making is available and functional.
 - d. Copies of procedures for a loss of service water system.
 - e. Inspections and/or maintenance related to preventing macrofouling (e.g., silt, dead mussel shells, or debris) and biotic fouling (e.g., fish, algae, grass, or kelp). The requested documents are to be for the time period from the onsite inspection period back to the documents that were provided in response to the previous heat sink performance inspection.
 - f. Copies of chemistry procedures that monitor for pH, calcium hardness, etc. Also, provide copies of the associated results. The requested documents are to be for the time period from the onsite inspection period back to the documents that were provided in response to the previous heat sink performance inspection.
 - g. Copies of documents associated with the monitoring of pump performance for potential strong-pump vs. weak-pump interaction.
4. For the review associated with the system walkdown of the selected service water and/or closed cooling water systems:
- a. Copies of the testing, inspection, or monitoring program procedures for buried or inaccessible piping and the associated results. The requested documents are to be for the time period from the onsite inspection period back to the documents that were provided in response to the previous heat sink performance inspection.
 - b. Copies of the ultrasonic test results and/or visual inspections that verify the structural integrity of the piping.
 - c. Copies of the procedures to monitor, assess, and disposition active thru wall pipe leaks, including structural evaluations and/or planned corrective actions.
 - d. History of any thru wall pipe leak on the system. The requested documents are to be for the time period from the onsite inspection period back to the documents that were provided in response to the previous heat sink performance inspection.
 - e. Copies of the documents associated with the periodic inspection program used to detect protective coating failure, corrosion, and erosion.
 - f. Copies of the in-service testing (IST) vibration monitoring results and operational history for deep draft vertical pumps, if applicable. The requested documents are to be for the time period from the onsite inspection period back to the documents that were provided in response to the previous heat sink performance inspection.
 - g. Copies of surveillance procedures and testing results performed on the service water pump bay water level instruments. The requested documents are to be for the time period from the onsite inspection period back to the documents that were provided in response to the previous heat sink performance inspection.

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- h. Copies of procedures associated with operating during adverse weather conditions (e.g., icing, high temperatures, or low level).
- i. Copy of the evaluation for the potential effects of low flow/level on underwater weir walls intended to limit silt or sand intake, if applicable.

If the information requested above will not be available, please contact Elba Sanchez Santiago as soon as possible at 630-829-9520 or via e-mail at elba.sanchezsantiago@nrc.gov.