



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

REGION III  
2443 WARRENVILLE RD. SUITE 210  
LISLE, IL 60532-4352

September 29, 2017

Mr. Bryan C. Hanson  
Senior VP, Exelon Generation Company, LLC  
President and CNO, Exelon Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

**SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2—NOTIFICATION OF AN NRC  
TRIENNIAL HEAT SINK PERFORMANCE INSPECTION AND REQUEST FOR  
INFORMATION; INSPECTION REPORT 05000456/2017004; 05000457/2017004**

Dear Mr. Hanson:

On Monday, November 16, 2017, the U.S. Nuclear Regulatory Commission (NRC) will begin the onsite portion of the Triennial Heat Sink Performance Inspection at your Braidwood Station, Units 1 and 2. This inspection will be performed in accordance with NRC Baseline Inspection Procedure 71111.07.

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

- The first group lists information necessary for our initial inspection scoping activities. This information should be available to the lead inspector no later than October 9, 2017. By October 11, 2017, the inspector will communicate the selected set of approximately 2–3 risk-significant heat exchangers.
- The second group is needed to support our 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 November 2, 2017. 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 be available onsite to the inspector on November 13, 2017. 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 Gerard O'Dwyer. We understand that our licensing contact for this inspection is Richard Schliessmann of your organization. If there are any questions about the inspection or the material requested in the enclosure, please contact the lead inspector at 630-829-9624 or via e-mail at [Gerard.ODwyer@nrc.gov](mailto:Gerard.ODwyer@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.

This letter and its enclosure will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

*/RA/*

Gerard O'Dwyer, Reactor Engineer  
Engineering Branch 2  
Division of Reactor Safety

Docket Nos. 50-456; 50-457  
License Nos. NPF-72; NPF-77

Enclosure:  
Triennial Heat Sink Performance  
Inspection Document Request

cc: Distribution via LISTSERV®

Letter to Bryan C. Hanson from Gerard O'Dwyer dated September 29, 2017

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2—NOTIFICATION OF AN NRC TRIENNIAL HEAT SINK PERFORMANCE INSPECTION AND REQUEST FOR INFORMATION; INSPECTION REPORT 05000456/2017004; 05000457/2017004

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## TRIENNIAL HEAT SINK PERFORMANCE INSPECTION DOCUMENT REQUEST

**Inspection Report:** 05000456/2017004; 05000457/2017004

**Inspection Dates:** November 13 – 17, 2017

**Inspection Procedure:** IP 71111.07, "Heat Sink Performance"

**Lead Inspector:** Gerard O'Dwyer  
630-829-9624  
[Gerard.ODwyer@nrc.gov](mailto:Gerard.ODwyer@nrc.gov)

### ***I. Information Requested By October 9, 2017:***

1. List of the Generic Letter (GL) 89-13, "Service Water System Problems Affecting Safety-Related Equipment," heat exchangers in order of risk significance.
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 U.S. Nuclear Regulatory Commission (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.
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.

### ***II. Information Requested By November 2, 2017:***

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.

Enclosure

## TRIENNIAL HEAT SINK PERFORMANCE INSPECTION DOCUMENT REQUEST

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.
  - 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) and the safety-related service water system (or equivalent):
  - 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 and the safety-related service water system.

## TRIENNIAL HEAT SINK PERFORMANCE INSPECTION DOCUMENT REQUEST

- d. Copy of the document (e.g., UFSAR or Technical Requirements Manual) 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 and safety-related service water systems including procedures for loss of these systems.
  - h. Copies of corrective action documents associated with waterhammer or hydraulic transients in the service water system since the last Heat Sink Inspection.
  - i. If available, provide an electronic copy of piping and instrumentation diagrams for the service water system, including the intake structure.
  - j. Provide a list of calculations (with a short description), which currently apply to UHS and safety-related service water system.
  - k. Provide a list of instruments (with a short description) associated with automatic or alarm functions for the safety-related service water system and/or UHS.
7. A schedule of all inspections, cleanings, maintenance, or testing of any safety-related plant heat exchanger to be performed during the onsite portion of the inspection.

### ***III. Information Requested to be Available on First Day of Inspection, November 13, 2017:***

1. For the specific 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.
  - c. Documentation and procedures that identify the types, accuracy, and location of any special 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.

## TRIENNIAL HEAT SINK PERFORMANCE INSPECTION DOCUMENT REQUEST

- 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 procedure that ensures 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).
- q. Copies of those documents that describe the methods taken to control water chemistry in the heat exchangers.

## TRIENNIAL HEAT SINK PERFORMANCE INSPECTION DOCUMENT REQUEST

2. For the UHS:
  - a. Copies of the inspection procedures for the verification of the structural integrity of underwater UHS 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 maintenance and/or inspection procedures for underwater UHS sediment intrusion and the associated results including underwater diving inspections and/or sediment removal activities. 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.
  - c. Copies of calculations and surveillances that determine the UHS reservoir capacity and heat transfer capability.
  - d. Copies of surveillance procedures and testing results performed on the instrumentation relied upon to determine UHS reservoir capability. 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.
3. For the review of the performance testing of the safety-related service water system (or equivalent) and the UHS:
  - a. Copies of the last two completed performance tests, such as the American Society of Mechanical Engineers in-service tests, for the 1B and 2A SX pumps; and 1SX173, 2SX007 and 2SX136 valves and the results documenting successful performance. If the components are not performance tested, please provide documentation verifying performance by the methods actually used.
  - b. Copies of the documents that demonstrate that flow balance testing was performed during the last 3 years and results. If the last flow test was performed longer than 3 years, then provide the last flow test.
  - c. Copies of the documents that demonstrate that flow balance testing will continue to be periodically done in the future.
  - d. Copies of completed procedures and test results documenting adequate performance of interface valves between the safety-related section of the service water system and the nonsafety-related sections in particular with respect to the leakage rate assumptions in the design basis calculations, (e.g., UHS total volume assurance with leakage). 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 Triennial Heat Sink Performance Inspection that inspected Inspection Procedure 71111.07, Section 02.02.d.5(c) which was NRC Braidwood Inspection Report 2008005.



## TRIENNIAL HEAT SINK PERFORMANCE INSPECTION DOCUMENT REQUEST

- e. Copies of the completed procedures that verify the performance of risk-significant non-safety functions 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 NRC Braidwood Inspection Report 2008005.

If the information requested above will not be available, please contact Gerard O'Dwyer as soon as possible at 630-829-9624 or e-mail [Gerard.ODwyer@nrc.gov](mailto:Gerard.ODwyer@nrc.gov).