Southern Nuclear

Regulatory Affairs

3535 Colonnade Parkway
Birmingham, AL 35243

205 992 5000

October 22, 2021

Docket No.: 50-348
50-364

NL-21-0909

U.S. Nuclear Regulatory Commission
Attn: NRC Document Control Desk
Washington, DC 20555-0001

30-Day 10 CFR 21 Notification – General Electric Hitachi Trip Unit Rivets Popping Off

In accordance with 10 CFR 21.21(d)(3)(ii), Southern Nuclear Operating Company (SNC) is hereby submitting the enclosed written notification of a manufacturing defect identified by General Electric Hitachi in EC trip units supplied to Joseph M. Farley Nuclear Plant. General Electric Hitachi found that the structural rivets of the EC trip units were popping off and could potentially lead to the failure of the EC trip unit to perform its function. This information was initially reported to the Nuclear Regulatory Commission on September 24, 2021 (ML21267A538). The information provided in Enclosure 1 of this letter meets the reporting requirements of 10 CFR 21.21(d)(4).

The NRC Senior Resident Inspector at Joseph M. Farley Nuclear Plant has been notified.

This letter contains no NRC commitments. If you have any questions, please contact Matt Euten at 205.992.7673.

Cheryl A. Gayheart
Regulatory Affairs Director

CAG/kmo/cbg

Enclosures: 1) Southern Nuclear Form Containing Information Required by 10 CFR 21.21(d)(4)
2) General Electric Hitachi Letter SC 21-01 Rev 2 to Farley Nuclear Plant, "Safety Communication SC 21-01 for PRC 21-01, Transfer of Information," Dated October 20, 2021. (Non-Proprietary Version of SC 21-01 Rev 1)

cc: Regional Administrator, USNRC, Region II
SNC Document Services - RType: AA1.003

30-Day 10 CFR 21 Notification – General Electric Hitachi Trip Unit Rivets Popping Off

Enclosure 1

Southern Nuclear Form Containing Information Required by 10 CFR 21.21(d)(4)

Southern Nuclear Form Containing Information Required by 10 CFR 21.21(d)(4)

(i) Name and address of the individual or individuals informing the Commission.

Ms. Cheryl Gayheart

Southern Nuclear – Regulatory Affairs Director
3535 Colonnade Parkway
Birmingham, AL 35243

(ii) Identification of the facility, the activity, or the basic component supplied for such facility or such activity within the United States which fails to comply or contains a defect.

Joseph M. Farley Nuclear Plant (FNP) Units 1&2

7388 North State Highway 95
Columbia, AL 36319

Each of these EC Trip Units are utilized as a subcomponent of the control panel supply breaker to each of the five (5) emergency diesel generators at FNP.

(iii) Identification of the firm constructing the facility or supplying the basic component which fails to comply or contains a defect.

General Electric Hitachi (GEH) manufactured and supplied the EC Trip Units with the defective rivets.

(iv) Nature of the defect or failure to comply and the safety hazard which is created or could be created by such defect or failure to comply.

Per GEH transfer notice SC 21-01 Rev 1 (Enclosure 2 is Non-Proprietary version of Rev.1 of SC 21-01) dated July 8, 2021, the head of the rivets were failing during the installation process. GEH discovered that rivets manufactured with no radius under the head would cause a stress concentration at that location, and their visual inspection identified turn marks along the shaft of the rivets indicating the cold rolling was not done correctly. Because of the improperly performed cold rolling, the hardness of the rivet was greater than AISI 1008 material, and the stress risers could result in the fracture at the rivet shaft and head location.

In addition to repairing the defective components already shipped to FNP, GEH took an action to update the dedication specification to include a more strenuous visual inspection ensuring the manufacturing of the rivets.

On September 21, 2021, Southern Nuclear concluded its assessment at FNP and determined that a substantial safety hazard could have been created if the rivets of the EC Trip Units had not been repaired and the units had been installed in the control panels of the emergency diesel generators. The structural integrity of the rivets is necessary to ensure that the breaker will be

able to trip open and provide its protective function for the emergency diesel generator control circuitry. If the rivets fail, the breaker may not be able to trip open and remove power from the emergency diesel generator control circuitry in the event of current surge.

The defect was identified, and the components were repaired by GEH before being installed in the plant. These defective EC Trip Units never posed a challenge to the safe operation of FNP.

(v) The date on which the information of such defect or failure to comply was obtained.

The manufacturing defect associated with the substantial safety hazard was identified on September 21, 2021.

(vi) In the case of a basic component which contains a defect or fails to comply, the number and location of these components in use at, supplied for, being supplied for, or may be supplied for, manufactured, or being manufactured for one or more facilities or activities subject to the regulations in this part.

While GEH supplied a total of seven (7) Quality Assured (QA) EC Trip Units in late 2020 to FNP, only two (2) had passed receipt inspection prior to the entire allotment being returned to GEH at their behest. FNP Engineering determined that the two (2) EC Trip Units could have been utilized as a subcomponent in any control panel supply breaker to each of the five (5) FNP emergency diesel generators.

(vii) The corrective action which has been, is being, or will be taken; the name of the individual or organization responsible for the action; and the length of time that has been or will be taken to complete the action.

At the behest of GEH, FNP returned all seven (7) QA EC Trip Units in 2020 to GEH for repair of the defective rivet issue. In early 2021, GEH shipped the repaired seven (7) QA EC Trip Units back to FNP. Therefore, no additional corrective action is necessary to address the rivet issue with the EC Trip Units.

(viii) Any advice related to the defect or failure to comply about the facility, activity, or basic component that has been, is being, or will be given to purchasers or licensees.

No. The defect was identified, and the components were repaired by GEH before being installed in FNP.

30-Day 10 CFR 21 Notification – General Electric Hitachi Trip Unit Rivets Popping Off

Enclosure 2

General Electric Hitachi Letter SC 21-01 Rev 2 to Farley Nuclear Plant, "Safety Communication SC 21-01 for PRC 21-01, Transfer of Information," Dated October 20, 2021. (Non-Proprietary Version of SC 21-01 Rev 1)

HITACHI

10 CFR Part 21 Communication

SC 21-01 Rev 2. **October 20, 2021**

To: **Attachment 1**

Subject: **Safety Communication SC 21-01 for PRC 21-01, Transfer of Information**

☐	**Reportable Condition [21.21(d)]**	☐	**60 Day Interim Report [21.21(a)(2)]**
☒	**Transfer of Information [21.21(b)]**	☐	**Safety Information Communication**

Summary:

A defect was found on Safety Related Rivets P/N Q457A664P1 with the heads popping off during assembly on Job # 51529. When accounting for all the inventory, it was discovered that twenty-two (22) of the rivets were assembled on EC-2A Farley Trip Units Jobs # 51487, 51488, 51489 and 51526.

The safety-related rivets from Jobs # 51526 and 51487 were not considered delivered at the customer site; therefore, 10 CFR Part 21 does not apply. The rivets associated with Job # 51488 were not safety-related; therefore, 10 CFR Part 21 does not apply. Job # 51489 were safety-related rivets that were received by the customer. The failure mode, heads popping off the rivets, on safety-related Job # 51489, could potentially lead to a failure of the EC Trip Unit to perform its safety-related function which could potentially lead to a failure of the associated circuit breaker. GEH has determined that we do not have the capability to perform the 10 CFR Part 21 evaluation for Job # 51489 since these components were shipped balance of plant where the purchaser did not designate the end use or application of the basic component. The intention of this "Transfer of Information" notification is to meet the requirements of 10 CFR 21.21 (b) and provide the customer notification that they are responsible for the completion of the evaluation to determine reportability pursuant to 10 CFR Part 21.

Please contact me if there are any questions regarding this information.

Issued by: Michelle P. Catts

Michelle Catts, Safety Evaluation Program Manager
GE Hitachi Nuclear Energy
3901 Castle Hayne Rd., Wilmington NC 28402
(910) 200-9836

SCOPE

GEH found the rivets on the EC-2A Trip Units failing during installation at the Philadelphia Service Center. These rivets secure the EC-2A Dashpot to the Magnet Assembly. During the installation of the rivets, a fracture of the rivet was occurring just below the head where the rivet shaft ties into the rivet head. Reference Figure 1.

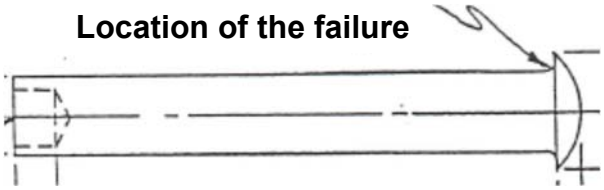

FIGURE 1

BACKGROUND

On October 23, 2020, GEH noticed failures with the rivets being installed on the EC-2A Trip Units. The head of the rivet was failing during the installation of the rivet. The rivet is installed with an air-regulated press, which the air pressure is monitored. GEH initiated a non-conformance report on the rivets and quarantined the remaining safety-related stock, SS-20-414. On November 6, 2020, GEH began noticing the same type of failure of the rivets on two other lots, SS-20-601, and SS-20-602. These lots were quarantined.

DISCUSSION

The rivets were sent to GEH-Wilmington to perform the necessary tests to determine the nature of the failures. Three tests were performed: visual inspection of the rivets, material testing of the rivets, and hardness test. These inspections were performed on random rivets from the failed lots, SS-20-601, and SS-20-602.

Visual Inspection

The visual inspection of the rivets indicated 100% of the sampled lot did not have the radius under the head of the rivet per drawing, see Figures 2 and 3.

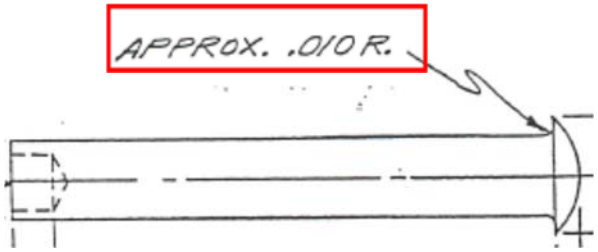

FIGURE 2

FIGURE 3

All the rivets from the sampled lot, had turn marks along the shaft of the rivet as shown in Figure 3. These turn marks around the shaft is more than likely from the cold-rolling process during the manufacturing of the rivets. The GE material specification B4B9A1 states the material should be an AISI Type 1008 – "Annealed In-Process, Extra Clean, Smooth, Bright Wire". All the rivets inspected from the sampled lot adhered to the dimensional requirements stated on the GE drawing.

Material

All the rivets inspected from the sampled lot tested as an iron and zinc alloy which is per design. Some of the rivets indicated a slight increase in iron which in turn would make them harder. The material along the shaft was not smooth, reference Figure 3, as stated in the material specification. The turn marks seen in Figure 3 along the shaft of the rivets is from the rolling process during the manufacturing of the rivets.

Hardness

Based on the material AISI 1008, the hardness should be in the range of 55 HRB. The hardness measurements were taken on the center of the head were 73 HRB.

EXTENT OF CONDITION

The extent of condition has been determined to be a total of eleven (11) EC-2A Trip Units, and twenty-two (22) rivets, effected at one customer location. The extent of condition history is shown below:

Job Number	Trip Units Installed	Qty	Station	Shipped
51487	1	2	Farley	9/18/20
51488	4	8	Farley	9/21/20
51489	2	4	Farley	9/1/20
51526	4	8	Farley	11/16/20

Eleven (11) EC-2A Trip Units were refurbished at the Philadelphia Service Center for Farley Nuclear Station. These EC-2A Trip Units contained 22 rivets from the suspect lots. All the rivets installed on the EC-2A Trip Units were sent to one customer, Farley Nuclear Station. All the remaining rivets from the suspect lots, SS-20-414, SS-20-601, and SS-20-602 have been quarantined and removed from safety-related stock.

CONCLUSION

Based on the inspections performed, it is concluded that the manufacturing process of the rivets lead to the failure. The rivets manufactured with no radius under the head would cause a stress concentration at that location. The stresses in that area would be significantly higher, especially during the installation process. The visual inspection indicated turn marks along the shaft of the rivets which questions the manufacturing process of the rivets. The turn marks are from the rollers used in the cold-rolling process to fabricate the rivets. The rolling process applies a force to the part to stretch to the desired shape and thickness through a series of rollers. Cold rolling is done without the use of heat. If the rolling process is not done correctly it leads to these associated issues:

1. Increasing the cold-rolling percentage leads to a decrease in tensile strength, yield strength and ductility in the material.
2. Increasing the cold-rolling percentage leads to an increase in hardness.
3. Increasing the cold-rolling percentage increases the elongation of the grains which leads to fracture.

The hardness of the rivet was greater than AISI 1008 material. The harder material associated with the stress risers could result in the fracture at the rivet shaft and head location.

The corrective/preventative actions taken will be as follows:

1. GEH will quarantine existing safety-related stock located at the Philadelphia Service Center.
2. Receive the EC-2A Trip Units listed in the “Extent of Condition” back to make the necessary repairs as a warranty repair.
3. Update the dedication specification to include a more strenuous visual inspection ensuring the manufacturing of the rivets.

The above listed actions have all been completed, and the units have been returned to the customer.

The safety-related rivets from Jobs # 51526 and 51487 were not considered delivered at the customer site; therefore, 10 CFR Part 21 does not apply. The rivets associated with Job # 51488 were not safety-related; therefore, 10 CFR Part 21 does not apply. Job # 51489 were safety-related rivets that were received by the customer. The failure mode, heads popping off the rivets, on safety-related Job # 51489, could potentially lead to a failure of the EC Trip Unit to perform its safety-related function which could potentially lead to a failure of the associated circuit breaker. GEH has determined that we do not have the capability to perform the 10 CFR Part 21 evaluation for Job # 51489 since these components were shipped balance of plant where the purchaser did not designate the end use or application of the basic component. The intention of this "Transfer of Information" notification is to meet the requirements of 10 CFR 21.21 (b) and provide the customer notification that they are responsible for the completion of the evaluation to determine reportability pursuant to 10 CFR Part 21.

Attachment 1
List of Potentially Affected Plants

Utility	Plant
Southern	Farley

Attachment 2 – Recent GE Hitachi Nuclear Energy 10 CFR Part 21 Communications

The following is a list of recent 10 CFR Part 21 communications that GE Hitachi Nuclear Energy (GEH) has provided to affected licensees as Reportable Conditions (RC), Transfers of Information (TI), 60-Day Interim Reports (60 Day) or Safety Information Communications (SC).

Number	Ref.	Subject	Date
SC 21-01	PRC 21-01	EC Trip Unit Rivet Failure	1/29/21
SC 21-02	PRC 21-02	NUMAC PRNM LPRM I/V Curve Function	3/9/2021
SC 21-03	PRC 21-03	Safety Communication SC 21-06 for PRC 21-03, Transfer of Information	4/9/2021
SC 21-04 Revision 0	PRC 21-04	Fuel Support Side Entry Orifice Meta-Stable Flow For 2 Beam Locations in the BWR/6 Reactors	4/19/2021
SC 21-05	PRC 21-05	Dedicated Relay DA317A6541P004 with "Use As-Is" Disposition for Drop-Out Time Requirement, Transfer of Information	5/10/2021
SC 21-04 Revision 1	PRC 21-04	Fuel Support Side Entry Orifice Meta-Stable Flow For 2 Beam Locations in the BWR/6 Reactors	6/18/2021
SC 21-06	PRC 21-04	Fuel Support Side Entry Orifice Meta-Stable Flow For 2 Beam Locations in the BWR/6 Reactors Non-US Plants	6/18/2021
SC 21-01 Revision 1	PRC 21-01	EC Trip Unit Rivet Failure	7/8/2021
SC 21-01 Revision 2	PRC 21-01	EC Trip Unit Rivet Failure	10/20/2021