General Information or Other (PAR) Event # 43190

Rep Org: CARRIER CORPORATION		**Notification Date / Time:** 02/27/2007 09:48	(EST)
Supplier: CARRIER CORPORATION		**Event Date / Time:** 02/27/2007	(EST)
		Last Modification: 08/23/2007	
Region: 1		**Docket #:**	
City: SYRACUSE		**Agreement State:** Yes	
County:		**License #:**	
State: NY			
NRC Notified by: ROMAN IWACHIW		**Notifications:** JOHN ROGGE	R1
HQ Ops Officer: PETE SNYDER		EUGENE GUTHRIE	R2
Emergency Class: NON EMERGENCY		ROGER LANKSBURY	R3
10 CFR Section:		DALE POWERS	R4
21.21 UNSPECIFIED PARAGRAPH		TABATABAI (email)	NRR

CHILLER COPPER SLEEVE CRACKS LEADING TO SLOW REFRIGERENT DISCHARGE

Manufacturer provided the following information via facsimile:

Carrier Corporation provided the following information of a potentially reportable condition regarding a Compressor and Bearing Discharge Temperature Sensor, Carrier Part #17FA999-1200-381 supplied by Carrier Corporation's Replacement Components Division to PSE&G Nuclear, LLC for use at Hope Creek Nuclear Station.

"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.

"The operative portion of the Sensor is encased in a copper sleeve 1 1/2 inch in length and 1/4 inch in diameter which is soldered to a brass fitting, which fitting couples the Sensor to the chiller to be monitored. PSE&G notified Carrier of four (4) separate instances where a crack occurred in the Sensor's copper sleeve. This crack did not affect the Sensor's ability to function and the Sensors did not cease to function. However, the crack in the Sensor's copper sleeve did result in a leak of refrigerant from the compressor of the chiller to which the Sensor was coupled. Three (3) of these four (4) instances were noted on chillers with safety-related applications, while the fourth was noted on a chiller dedicated to a non-safety application.

"PSE&G noticed the fast refrigerant leak during a routine, visual equipment inspection. As a result of this discovery, the Sensor was replaced, but a similar refrigerant leak was noticed approximately three (3) months thereafter. At approximately the same time, during pressure testing of another safety-related chiller, PSE&G noticed a similar refrigerant leak.

"Safety Hazard which could be created by such a defect: While the refrigerant leak appeared to have been a slow

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NRR

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process occurring over some period of time, had that refrigerant leak continued uncorrected, the result would have been a loss of enough refrigerant such that the chiller would be automatically shut down by a separate safety feature.

Since mid- 2001 Carrier has sold the sensor to the following facilities:

NRC Region 1: Limerick Generating Station, PSE&G (Hope Creek Generating Station, Salem Generating Station)

NRC Region 2: Catawba Nuclear Station, McGuire Nuclear Station

NRC Region 3: Braidwood Station, Perry Nuclear Power Plant

NRC Region 4: San Onofre Nuclear Generating Station, Waterford 3 Steam Electric Station

* * * UPDATE ON 8/23/07 AT 1424 FROM IWACHIW TO SNYDER * * *

Manufacturer provided the following information via facsimile:

"In response to the notice of a potential defect or failure to comply received from PSE&G, along with a report of various analysis conducted by PSE&G, Carrier convened its 'Nuclear Defect Review Board' (NDRB) to review and respond to PSE&G's notice and report.

"As part of its review, Carrier's NDRB requested various additional information from PSE&G regarding the Sensor's alleged defect or failure to comply experienced by PSE&G, as well as its use and operation of the Sensor and the chillers utilizing the Sensor. The chiller use and operation data provided by FSE&O showed that the chiller was run under such an extremely light cooling capacity that Carrier has no reference test data or experience available. As a result, Carrier cannot accurately predict the effects of this low cooling capacity on the operation of the Sensor.

"Carrier's NDRB also reviewed Carrier's current process of brazing the Sensor's copper sleeve, as compared to the brazing process utilized when the Sensor was first offered for sale approximately 30 years ago. Carrier's NDRB commissioned testing by a third party firm to determine if changes in the brazing process had any impact on the hardness or grain size of the Sensor's copper sleeve. This testing determined that there was no significant difference in the hardness of the Sensor's copper sleeve between a sample using the original brazing method, another sample using the current brazing method and a third sample using an alternate brazing method not previously or currently in use in connection with the Sensor. In addition, the firm indicated that it is typical that a lack of significant difference in hardness will also be an indicator of a lack of significant difference in grain size.

"Carrier's third party test results showing no change in hardness or grain size, PSE&G's operation of the associated chiller at an extremely light cooling capacity and the fact that the PSE&G failures were very isolated occurrences have convinced Carrier's NDRB that the cause of the potential defect or failure to comply was other than a defect inherent in the Sensor. Rather, Carrier's NDRB believes that the potential defect or failure to comply resulted from a cause or causes external to the Sensor.

"Carrier plans to work with PSE&G over the next sixty (60) days to explore these possible external causes and to take corrective actions, as may be necessary, to limit the effects of these external causes on the Sensor and/or to modify the Sensor to better operate in the presence of these external causes.

"In addition to the above actions, on June 8, 2007, Carrier personnel made a visit to PSE&G to collect vibration data at the point of failure. The data collected and analyzed showed no abnormalities that would cause cracking of the sensor at the copper sleeve braze joint location.

"Conclusion:

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"Carrier is unable, at this time, to determine the root cause of the defect.

"Post Evaluation Actions

"Upon completion of Carrier's evaluation, analysis and conclusions, Carrier's Nuclear Defect Review Board (NDRB) was reconvened. The NDRB determined that the supplier of the sensor would be asked to provide a modified design of the sensor to eliminate any future potential failures/defects that could result in sensor cracking and subsequent refrigerant leakage. The supplier has complied and provided a modified design of the sensor which has been approved by the NDRB.

"At the present time, the modified sensor is in production. Essentially, the modification involved complete elimination of the sensor's brazed joint. This improved design consists of a probe body manufactured from a single, solid piece of brass, thus eliminating the copper sleeve portion of the probe and the braze joint, from which there could be a possible leak path thru the sensor body. Additionally, the wall thickness of the body has been increased by approximately four times its original thickness. These changes will not impact the fit or function of the sensor. In addition, prior to production for sale, the modified sensor was tested, to determine if the heavier wall would have an impact on the sensors response time. There was little if any change in the sensor's response time. The modified sensor's body is made from the same brass material as the threaded portion of the previous two piece design. The form changes slightly due to the increased wall thickness.

"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.

"Effective July 30, 2007, any purchase orders (PO's) or requests for quotation (RFQ's) received by Carrier for the 17FAS99-1200-381 sensors will be of the modified design described above. Carrier will notify all utilities that may have inventory of the previous design that these sensors may still be used, but only in the Bearing Temperature application, not in the Compressor Discharge Temperature application. Carriers notice will also request the utilities to segregate all previous sensor designs and clearly label them 'For Bearing Temperature Sensor Use Only. Do Not Use As Replacement for Compressor Discharge Temperature Sensor'."

Notified R1DO (Dwyer), R2DO (Payne), R3DO (Lara), R4DO (Clark) and NRR (Hodge and Thorp).

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FAX COVER SHEET

TO: U.S. NRC OPERATIONS CENTER **DATE: 08/23/07**

SUBJECT: 10 CFR PART 21 NOTIFICATION
GENERAL INFORMATION OR
OTHER EVENT NUMBER 43190

COMPANY: U.S. NUCLEAR REGULATORY
COMMISSION

PH. NO.:

FAX NO.: 301-816-5151

FROM: ROMAN IWACHIW
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MESSAGE:

SEE FOLLOWING PAGES

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Replacement Components Division
Carrier Corporation

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Carrier
A United Technologies Company

VIA FAX (301) 816-5151 & DHL OVERNIGHT

August 23, 2007

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Re: 10 CFR Part 21 Notification
General Information or Other Event Number: 43190

"Compressor and Bearing Discharge Temperature Sensor" (Carrier Part #17FA999-1200-381) Supplied by Carrier Corporation's Replacement Components Division to PSE&G's Hope Creek Nuclear Station (PSE&G Ref. #70061918)

Dear Sir or Madame:

The attached document is provided as an addendum to our initial notification of 02/27/2007, as it pertains to 10 CFR Part 21, Section 21.2.1, Para.(4)(vii). This addendum is intended to provide follow up information as to actions taken and closure of the notification.

Please do not hesitate to contact me if there are any questions or concerns. We thank you in advance for your attention to this report.

Very truly yours,

Roman Iwachiw
Manager, Quality Assurance
Replacement Components Division

Carrier Corporation

10 CFR Part 21 Notification
General Information or Other Event Number - 43190

(4)(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.

In response to the notice of a potential defect or failure to comply received from PSE&G, along with a report of various analysis conducted by PSE&G, Carrier convened its "Nuclear Defect Review Board" (NDRB") to review and respond to PSE&G's notice and report.

As part of its review, Carrier's NDRB requested various additional information from PSE&G regarding the Sensor's alleged defect or failure to comply experienced by PSE&G, as well as its use and operation of the Sensor and the chillers utilizing the Sensor. The chiller use and operation data provided by PSE&G showed that the chiller was run under such an extremely light cooling capacity that Carrier has no reference test data or experience available. As a result, Carrier cannot accurately predict the effects of this low cooling capacity on the operation of the Sensor.

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(4)(vii)Addendum: (7/30/2007)

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Conclusion(s):

Carrier is unable, at this time, to determine the root cause of the defect/failure.

Post Evaluation Actions:

Upon completion of Carrier's evaluation, analysis and conclusions, Carrier's Nuclear Defect Review Board (NDRB) was reconvened. The NDRB determined that the supplier of the sensor would be asked to provide a modified design of the sensor to eliminate any future potential failures/defects that could result in sensor cracking and subsequent refrigerant leakage. The supplier has complied and provided a modified design of the sensor which has been approved by the NDRB.

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