Part 21 (PAR) Event # 50096

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Last Modification: 05/08/2014

Region: 4
City: IDAHO FALLS
County:
State: ID
Docket #:
Agreement State: No
License #:

NRC Notified by: VINCENT CHERMAK
HQ Ops Officer: STEVE SANDIN
Emergency Class: NON EMERGENCY
10 CFR Section:
21.21(d)(3)(i) DEFECTS AND NONCOMPLIANCE

Notifications:

JOHNATHAN LILLIENDAHL	R1DO
KENNETH RIEMER	R3DO
JACK WHITTEN	R4DO
NRR PART 21	EMAIL

PART 21 - POTENTIAL DEFECT IN NUS-710DU TRIP UNIT TO PRODUCE A VALID TRIP OUTPUT SIGNAL

The following summary was provided by Curtiss-Wright Flow Control Corporation:

"In certain operating configurations, NUS-710DU Trip Units could fail to produce a valid trip output signal.

"Transistor Q8 on the referenced units uses a TO-66 package and is flush mounted on the component side of the PCB. The TO-66 package, based on JDEC drawing TO-213 does not specify the size of the glass-sealed holes in the case (collector) around the base and emitter leads. Random samples measure approximately 0.11" in diameter. The PCB includes standard 0.100" solder pads on both non-component and component sides. During manufacture, Q8 is secured using screws and nuts with leads centered in the through-holes, so no direct solder pad to case contact is possible. However, the presence of the pad on the component side could facilitate, under certain conditions, excessive solder flow, creating a close proximity, or in the extreme case bridging, between solder on the emitter or base solder pad and the Q8 case. Permanent bridging would be detected during acceptance testing. However, in at least one case, with the trip unit mounted in the trip unit chassis via an extender card, the proximity was close enough to create contact when the board was slightly flexed.

"The trip units have two modes of operation, NORM and REV, selectable by switch S2, and four operating configurations: (1) NORM mode, rising trip, energize on trip, (2) REV mode, falling trip, energize on trip, (3) NORM mode, falling trip, de-energize on trip and (4) REV mode, rising trip, de-energize on trip.

"In configuration (1), the set point is applied to the negative terminal of a comparator and the input is applied to the positive terminal. When the input rises above the set point, the output of the comparator goes to the positive rail, turning on Q7. When Q7 turns on, it pulls the base of Q8 low, causing Q8 to turn on. When Q8 turns on, the trip output goes to approximately +24V.

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"In configuration (2), the set point is applied to the positive terminal of the comparator and the input is applied to the negative terminal. When the input drops below the set point, the output of the comparator goes to the positive rail and turns on Q8, resulting in a trip output of approximately +24V.

"In configurations (1) and (2), bridging at Q8 would cause an output trip signal.

"In configuration (3), when the input drops below the reset point, the output of the comparator goes to the negative rail, which causes Q8 to turn off. When Q8 turns off, the trip output goes to approximately zero volts.

"In configuration (4), when the input rises above the reset point, the output of the comparator goes to the negative rail and turns off Q8, de-energizing the unit output.

"In configurations (3) and (4), bridging at Q8 would prevent a valid trip signal from being generated by keeping the output at logic high.

"Plant: Limerick/Part Number: NUS-710DU0TS/Quantity: 2/Serial Numbers:1303582, 1303583
"Plant: Limerick/Part Number: NUS-710DU0TT27000/Quantity: 6/Serial Numbers: 1304197, 1304198, 1304199, 1304200, 1304201, 1304202

"Plant: Columbia/Part Number: NUS-710DU0TT45059/Quantity: 5/Serial Numbers: 1303632, 1303633, 1303634, 1303635, 1303636

"Plant: Grand Gulf/Part Number: NUS-710DU0TT27000/Quantity: 3/Serial Numbers: 1303672, 1303673, 1303674

"Plant: Perry/Part Number: NUS-710DU0TT27000/Quantity: 33/Serial Numbers: 1304219, 1304220, 1304221, 1304222, 1304223, 1304224, 1304225, 1304226, 1304227, 1304228, 1304229, 1304230, 1304231, 1304232, 1304233, 1304234, 1304235, 1304236, 1304237, 1304238, 1304239, 1304240, 1304241, 1304242, 1304243, 1304244, 1304245, 1304246, 1304247, 1304248, 1304249, 1304250, 1304251.

"Should you have any questions regarding this matter, please contact Robert Queenan, Division Manager, Scientech/Instrumentation and Controls, at (208) 524-9311."

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CURTISS-WRIGHT

Instrumentation & Controls Division
200 S. Woodruff Ave.
Idaho Falls, ID 83401
(208) 529-1000

May 8th 2014

Letter Number: AVC-14-005

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

Subject: 10 CFR Part 21 Report Notification, NUS710DU Trip Units

Dear Sir or Madam:

The purpose of this letter is to notify the Nuclear Regulatory Commission of a defect. In certain operating configurations, NUS-710DU Trip Units could fail to produce a valid trip output signal. Details of the defect are provided below.

From 10CFR21.21(d)(4): The written report required by this paragraph shall include, but need not be limited to, the following information, to the extent known:

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

AV Chermak
Quality Manager
Scientech, a business unit of Curtiss-Wright Flow Control Corporation
200 S Woodruff Avenue
Idaho Falls, Idaho 83401

Dan Meils
General Manager
Scientech, a business unit of Curtiss-Wright Flow Control Corporation
29399 US Hwy 19 North, Suite 320
Clearwater, FL 33761

(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.

NUS-710DU0TT; A Master Trip Unit manufactured by Scientech.
NUS-710DU0TS; A Slave Trip Unit manufactured by Scientech.

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

Scientech, a business unit of Curtiss-Wright Flow Control Corporation
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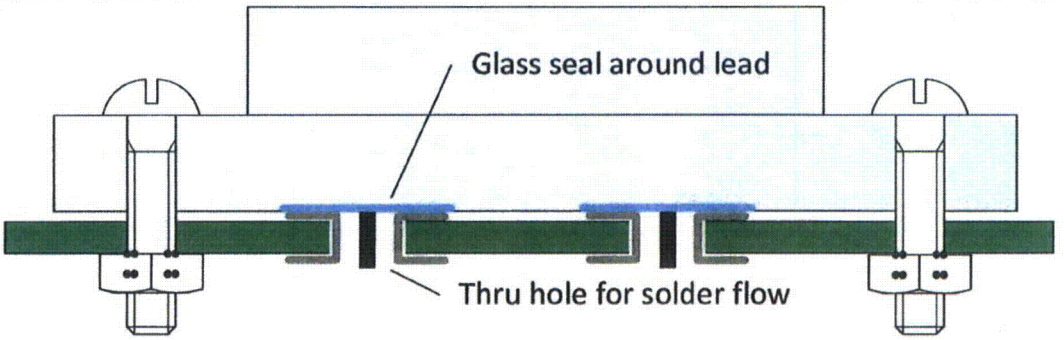
(iv) Nature of the defect or failure to comply and the safety hazard which is created or could be created by such defect or failure to comply.

In certain operating configurations, NUS-710DU Trip Units could fail to produce a valid trip output signal.



Transistor Q8 on the referenced units uses a TO-66 package and is flush mounted on the component side of the PCB. The TO-66 package, based on JDEC drawing TO-213 does not specify the size of the glass-sealed holes in the case (collector) around the base and emitter leads. Random samples measure approximately 0.11" in diameter. The PCB includes standard 0.100" solder pads on both non-component and component sides. During manufacture, Q8 is secured using screws and nuts with leads centered in the through-holes, so no direct solder pad to case contact is possible. However, the presence of the pad on the component side could facilitate, under certain conditions, excessive solder flow, creating a close proximity, or in the extreme case bridging, between solder on the emitter or base solder pad and the Q8 case. Permanent bridging would be detected during acceptance testing. However, in at least one case, with the trip unit mounted in the trip unit chassis via an extender card, the proximity was close enough to create contact when the board was slightly flexed.

The trip units have two modes of operation, NORM and REV, selectable by switch S2, and four operating configurations: (1) NORM mode, rising trip, energize on trip, (2) REV mode, falling trip, energize on trip, (3) NORM mode, falling trip, de-energize on trip and (4) REV mode, rising trip, de-energize on trip.

In configuration (1), the set point is applied to the negative terminal of a comparator and the input is applied to the positive terminal. When the input rises above the set point, the output of the comparator goes to the positive rail, turning on Q7. When Q7 turns on, it pulls the base of Q8 low, causing Q8 to turn on. When Q8 turns on, the trip output goes to approximately +24V.

In configuration (2), the set point is applied to the positive terminal of the comparator and the input is applied to the negative terminal. When the input drops below the set point, the output of the comparator goes to the positive rail and turns on Q8, resulting in a trip output of approximately +24V.

In configurations (1) and (2), bridging at Q8 would cause an output trip signal.

In configuration (3), when the input drops below the reset point, the output of the comparator goes to the negative rail, which causes Q8 to turn off. When Q8 turns off, the trip output goes to approximately zero volts.

In configuration (4), when the input rises above the reset point, the output of the comparator goes to the negative rail and turns off Q8, de-energizing the unit output.

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In configurations (3) and (4), bridging at Q8 would prevent a valid trip signal from being generated by keeping the output at logic high.

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

Submitted for evaluation 4/29/2014. The evaluation was completed on 5/7/2014

(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.

Plant	Part Number	Quantity	Serial Numbers
Limerick	NUS-710DU0TS	2	1303582, 1303583
	NUS-710DU0TT27000	6	1304197, 1304198, 1304199, 1304200, 1304201, 1304202
Columbia	NUS-710DU0TT45059	5	1303632, 1303633, 1303634, 1303635, 1303636
Grand Gulf	NUS-710DU0TT27000	3	1303672, 1303673, 1303674
Perry	NUS-710DU0TT27000	33	1304219, 1304220, 1304221, 1304222, 1304223, 1304224, 1304225, 1304226, 1304227, 1304228, 1304229, 1304230, 1304231, 1304232, 1304233, 1304234, 1304235, 1304236, 1304237, 1304238, 1304239, 1304240, 1304241, 1304242, 1304243, 1304244, 1304245, 1304246, 1304247, 1304248, 1304249, 1304250, 1304251

(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.

1. Scientech has identified a design change that corrects the problem. The correction is to install spacers under Q8 to provide clearance from the board. The Design Change Notice was complete May 7, 2014.
2. Scientech has placed a hold on all affected in-house modules, and will incorporate the design change prior to ship.
3. Scientech will notify the plants listed per 21.21(d)(4)(vi) above, and offer to correct the affected units at Scientech's facility by close of business May 8, 2014.

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(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.

None.

(ix) In the case of an early site permit, the entities to whom an early site permit was transferred

Not applicable.

Should you have any questions regarding this matter, please contact Robert Queenan, Division Manager, Scientech/Instrumentation and Controls, at (208) 524-9311.

Sincerely,

A Vincent Chermak, SSBB, PMP
Quality Assurance Manager
I&C Division
Scientech, a business unit of Curtiss-Wright Flow Control Company
Office (208) 524-9202 | Fax (208) 524-9238

Cc: Dan Meils
Robert Queenan
John McGimpsey
Michael Weinstein
QA File