



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

March 25, 2013

Letter Number: AVC-13-0018

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

SUBJECT: Update to Event Number 48798: 10 CFR Part 21 Notification, Dual Alarm Modules and Single Alarm Modules

Dear Madam or Sir:

The purpose of this letter is to update the Nuclear Regulatory Commission about the defect in Solid State Relays (SSRs) supplied by Crydom, Inc., that resulted in decreased reliability of Dual Alarm Modules (DAM) and Single Alarm Modules (SAM). Details are provided below.

The written report required 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.

Michael Weinstein
Director of Quality
Scientech, a business unit of Curtiss-Wright Flow Control Corporation
200 S Woodruff Avenue
Idaho Falls, Idaho 83401

Scott Robuck
General Manager
Scientech, a business unit of Curtiss-Wright Flow Control Corporation
200 S Woodruff Avenue
Idaho Falls, ID 83401

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

DAM801, a Dual Alarm Module, manufactured by Scientech, Model DAM801(/1 optional),
Part number EIP-E287PA-1

SAM801, a Single Alarm Module, manufactured by Scientech, Model SAM801(/1 optional),
Part number EIP-E289PA-1

DAM502, a Dual Alarm Module, manufactured by Scientech, Model DAM502,
Part number EIP-E297DD-1, -2, -3

SAM502, a Single Alarm Module, manufactured by Scientech, Model SAM502,
Part number EIP-E297DD-4

DAM503, a Dual Alarm Module, manufactured by Scientech, Model DAM503,
Part number EIP-E304DD-1, -2, -3

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NRR

SAM503, a Single Alarm Module, manufactured by Scientech, Model SAM503, Part number EIP-E304DD-4, -20

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

Scientech, a business unit of Curtiss-Wright Flow Control Corporation
 200 S Woodruff Avenue
 Idaho Falls, ID 83401

(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.

Crydom Inc., the sole supplier to Scientech of D4D07 Solid State Relays (SSRs) since before 2009, informed Scientech that SSRs provided with date codes between 0908 (August 2009) and 1004 (April 2010) may have included faulty diodes which resulted in reduced reliability (early failure) of their SSRs.

The mode of failure is that the module output may not be able to maintain voltage sufficient to activate its external load. It appears that this failure occurs randomly after some duration of operation, typically weeks or months. No common cause has been found.

Scientech screens components for infantile failure by burning-in modules for a minimum of 48 hours prior to final test. There were no SSR failures during burn-in of potentially affected modules; therefore, burn-in was not an effective screen for this issue.

Prior to January 2013, Scientech did not track SSRs by date code. In establishing conservative boundaries for product shipped with suspect SSRs, Scientech can be certain that no suspect SSRs were shipped in Scientech products prior to August 2009 (the earliest suspect date code). It was determined in September 2012 that Scientech did not have any SSRs with a date code of 2010 or earlier in inventory or work-in-progress. Scientech can therefore determine that products shipped after September 2012 do not contain suspect SSRs.

SERIAL NUMBER vs DATE CODE RISK

According to Crydom, the issue existed on their SSR production line from August 2009 thru April 2010. The corresponding date codes are 0908 thru 1004 (format: YYMM). Accordingly, SSRs received at Scientech prior 8/1/09 do not include suspect date codes; this includes SSR PO 09-561 and earlier.

SSR Received Dates	Relative Risk
Before 7/28/09	Least risk
7/29/09 – 11/9/09	None Purchased
11/10/09 – 7/1/10	Highest risk
7/2/10 – 12/27/10	None Purchased
12/28/10 – 11/9/11	Medium risk
11/10/11 – 5/7/12	None Purchased
5/8/12 – 11/27/12	Low risk

CONFIGURATION RISK

When the SAM/DAM800 or SAM/DAM502 Configuration Codes 5 or 6 (and not 3 or 4) are used, the relay output is selected instead of the SSR output, and the module is not at risk as configured. (All current SAM/DAM801, SAM/DAM503, and SAM/DAM504 have the SSR output mode only.)

(v) The date on which the information of such defect or failure to comply was obtained. Submitted for evaluation 02/06/2013; evaluation completed 03/01/2013.

(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	Potentially affected Safety Related Production Units	Potentially affected Safety Related Repair/Refurb Units
Beaver Valley	1	0
Ginna	72	0
HB Robinson	105	3
Indian Point 2	30	0
Indian Point 3	9	0
Kewaunee	23	0
Prairie Island	68	0
Surry	242	0
Turkey Point	241	7
Totals	791	10

(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 determined that it currently has no SSRs with suspect date codes in inventory or work-in-progress and has established receipt inspection criteria to reject SSRs with suspect date codes.
2. Scientech has notified plants with potentially affected safety related units (completed 03/01/2013).
3. Scientech sent affected plants a list of potentially affected safety related modules by part number, serial number and purchase order (completed 03/01/2013).
4. Scientech is communicating with individual utilities the risk categories their modules fall into.
5. Scientech established a SharePoint site on March 13, 2013 to facilitate open communication between the utilities and Scientech. The SharePoint Site includes the following information:

Module Serial Numbers by Crydom SSR PO Risk

This file lists the Serial Numbers, and includes the Scientech Job Number, Plant, Client PO, and Part Number. It is color coded by Relative SSR Risk based on the likelihood that the module contains SSRs from the affected date codes. If more than one risk level applies, the higher risk is indicated.

(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.

Advice was provided in NUS Instruments Technical Bulletin Volume 47 (attached).

(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,



Vince 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: M. Weinstein,
Scott Robuck
Robert Queenan
John McGimpsey
QA File

Attachments: 10 CFR 21 Evaluation 21-13-01 Rev. 0
Scientech Technical Bulletin Volume 47

10CFR21 Evaluation No. 21-13-01 Rev. 0

Background

The I&C division of Scientech, a business unit of Curtiss Wright Flow Control Services Corporation, provides safety related instrumentation to commercial nuclear power plants for use in safety related applications.

Problem Reported On: 2/6/2013

Problem Documented In: NCR 13N-022

Description of Item: (name, manf, model, part no, serial no, function)

Function: Dual Alarm Modules (DAM) and Single Alarm Modules (SAM) replace obsolete bistables.

The DAM is a solid-state unit that produces a voltage or a contact closure when a conditioned input exceeds a preset limit. Each alarm channel is independent of the other, allowing two different setpoints. The SAM has only a single alarm channel and can only operate in the Single Mode and Difference Mode. Alarm channels can be configured to "trip" on a rising signal or on a falling signal. A trip can signal the solid-state relay to pass a signal (NO) or block a signal (NC). The output can be driven by either an external or internal wetting voltage. Input and output ranges are jumper-configurable. Each output of the bistable is driven by a Crydom D4D07 Solid State Relay (SSR).

Description of Problem:

Crydom Inc., the sole supplier to Scientech of D4D07 Solid State Relays (SSRs) since before 2009, has informed Scientech that SSRs provided with date codes between 0908 (August 2009) and 1004 (April 2010) may have included faulty diodes which resulted in reduced reliability (early failure) of their SSRs.

The mode of failure is that the module output may not be able to maintain voltage sufficient to activate its external load. This is somewhat dependent on the characteristics of the load. It appears that this failure occurs randomly after some duration of operation, typically weeks or months. No common cause has been found.

Scientech screens components for infantile failure by burning-in modules for a minimum of 48 hours prior to final test. There were no SSR failures during burn-in of potentially affected modules, therefore burn-in was not an effective screen for this issue.

There has been a spike in returns of modules with failed SSRs with the affected date codes. Fifteen modules containing failed SSRs with affected date codes have been returned to Scientech from customers who reported failure during bench test and in early in-plant operation. Modules returned with failed SSRs with date codes prior to 0908 have been a low background rate (<<1%). There have been no modules returned with failed SSRs with date codes later than 1004.

Potentially affected modules

Scientech purchased several hundred Crydom SSRs through various distributors in various lots throughout 2009 and 2010. However, date code information included in those lots was not recorded. Relays have been purchased under Scientech POs 09-446, 09-1085, 09-554, 09-561, 09-878, 10-0436, 10-0426, 10-0728, 11-01356, 12-00422, 12-0648, 12-01772, 12-02205, and 12-02316.

In establishing conservative boundaries for product shipped with suspect SSRs, Scientech can be certain that no suspect SSRs were shipped in Scientech products prior to August 2009 (the earliest suspect date code). It was determined in September 2012 (Corrective Action Request 12-030) that Scientech did not have any SSRs with a date code of 2010 or earlier in inventory or work-in-progress. Scientech can therefore determine that product shipped after September 2012 does not contain suspect SSRs.

The potentially affected modules comprise the following Scientech part/model numbers (DAM: Dual Alarm Module, SAM: Single Alarm Module):

- o EIP-E287PA -1; DAM801(/1 optional)
- o EIP-E289PA -1; SAM801 (/1 optional)

10CFR21 Evaluation No. 21-13-01 Rev. 0

- EIP-E297DD -1, -2, -3, -4; DAM502, SAM502
- EIP-E304DD -1, -2, -3, -4, -20; DAM503, SAM503
- NUS-A131PA; SAM/DAM 504
- EIP-E263PA; SAM800
- EIP-E233PA; DAM800

Each SAM contains one SSR. Each DAM contains 2 SSRs.

Sciencetech is now recording date codes of Crydom SSRs, and has verified that there have been no SSRs with suspect date codes received since September 2012.

Conclusion:

Crydom SSRs with suspect date codes have shown a higher than normal failure rate. Sciencetech believes that the suspect SSRs were installed in products produced between August 2009 and the end of 2010, however, since affected SSR date codes were not confirmed to have been exhausted from inventory until September 2012, Sciencetech has conservatively identified modules produced through September 2012 as potentially affected.

*10CFR21: **Deviation** means a departure from the technical requirements included in a procurement document, or specified in early site permit information, a standard design certification or standard design approval.*

Is the problem a **deviation**? (include justification for answer) Yes No

Justification:

Sciencetech considers the faulty diodes to constitute a deviation.

**IF NO, PROCEED TO CONCLUSION SECTION
IF YES, CONTINUE**

Has an item with the **deviation** been supplied to a plant as a safety-related item? Yes No

**IF NO, PROCEED TO CONCLUSION SECTION
IF YES, INCLUDE PLANT INFORMATION AND CONTINUE**

Plants supplied with item:

Potentially affected modules were provided to the following customers: H.B. Robinson, Surry, Turkey Point, Kewaunee, Beaver Valley, Farley, Ginna, Indian Point 2/3, North Anna, Prairie Island, Angra and Almaraz. A list of purchase orders and serial numbers for each customer is being compiled for plant notification.

*10CFR21: **Defect** means:*

- (1) A deviation in a basic component delivered to a purchaser for use in a facility or an activity subject to the regulations in this part if, on the basis of an evaluation, the deviation could create a **substantial safety hazard**;
- (2) The installation, use, or operation of a basic component containing a defect as defined in this section;
- (3) A deviation in a portion of a facility subject to the early site permit, standard design certification, standard design approval, construction permit, combined license or manufacturing licensing requirements of part 50 or part 52 of this chapter, provided the deviation could, on the basis of an evaluation, create a substantial safety hazard and the portion of the facility containing the deviation has been offered to the purchaser for acceptance;

(4) A condition or circumstance involving a basic component that could contribute to the exceeding of a safety limit, as defined in the technical specifications of a license for operation issued under part 50 or part 52 of this chapter; or

(5) An error, omission or other circumstance in a design certification, or standard design approval that, on the basis of an evaluation, could create a **substantial safety hazard**.

10CFR21: **Substantial safety hazard** means a loss of safety function to the extent that there is a major reduction in the degree of protection provided to public health and safety for any facility or activity licensed or otherwise approved or regulated by the NRC.

Can Scientech determine if the **deviation** is a **defect**? Yes No

**IF NO, PROCEED TO CONCLUSION SECTION
IF YES, CONTINUE**

Is the **deviation** a **defect**? (include justification for answer) Yes No

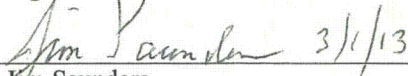
Justification:

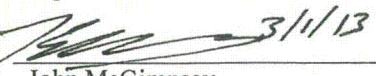
The early failure rate could provide an unacceptable reduction in safety in redundant channels and trains.

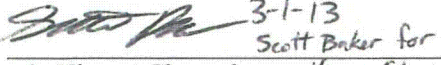
Note: If it is determined that the deviation is a defect, ensure that a director or responsible officer subject to the regulations of 10CFR Part 21 is informed as soon as practicable, and, in all cases, within the 5 working days after completion of the evaluation.


CONCLUSION

- 1 - There is no deviation. No report is required.
- 2 - There is a deviation, but it does not exist in any safety-related item delivered to a plant. No report is required.
- 3 - There is a deviation, but it does not constitute a defect. No report is required.
- 4 - There is a deviation, but Scientech cannot determine if it is a defect. Forward to plant(s) for evaluation and notify purchasers within 5 working days.
- 5 - There is a defect. Report to the NRC per 10CFR21 within 2 calendar days of notifying the responsible officer of the organization.

Engineering: Signature / Date
 3/1/13
 Print Name: Jim Saunders
 Title: Engineering Supervisor

Technical Signature / Date
 Review:  3/1/13
 Print Name: John McGimpsey
 Title: Engineering Manager

Quality Signature / Date
 Assurance:  3-1-13
 Print Name: A. Vincent Chermak
 Title: Quality Assurance Manager

Approved: Signature / Date
 3/1/13
 Print Name: Robert M. Queenan
 Title: Division Manager

Approval required for Category 4 and 5 only.

NOTE: For Category 5, a defect is determined upon the signature of the Division Manager or his designee.

Issue Date: **March 2013**

To: **Almaraz, Angra, Beaver Valley, Farley, Ginna, HB
Robinson, Indian Point 2/3, Kewaunee, North Anna,
Prairie Island, Surry, Turkey Point**

From: **NUS Instruments, a division of Scientech**

Technical Point Of Contact: **Jim Saunders
200 S. Woodruff Avenue
Idaho Falls, ID 83401
(208) 524-9245
jsaunders@curtisswright.com**

Subject: **Solid State Relays**

BACKGROUND (per 10CFR Part 21 Evaluation 21-13-01)

Crydom Inc., the sole supplier to Scientech of D4D07 Solid State Relays (SSRs) since before 2009, has informed Scientech that SSRs provided with date codes between 0908 (August 2009) and 1004 (April 2010) may have included faulty diodes which resulted in reduced reliability (early failure) of their SSRs.

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CONCLUSION:

Crydom SSRs with suspect date codes have shown a higher than normal failure rate. Scientech believes that the suspect SSRs were installed in products produced between August 2009 and the end of 2010, however, since affected SSR date codes were not

confirmed to have been exhausted from inventory until September 2012, Scientech has conservatively identified modules produced through September 2012 as potentially affected.

Scientech reported this issue to the Nuclear Regulatory Commission on March 1, 2013 in accordance with 10CFR Part 21.

CORRECTIVE ACTION

Scientech will provide no-charge replacement of any failed SSR from the suspect date code range 0908-1004. Modules with failed SSRs should be returned to Scientech for replacement.

SUMMARY

Suspect Crydom SSRs are those with date codes from 0908 (August 2009) thru 1004 (April 2010). Crydom SSR Date Code = YYMM, Year and Month of manufacture. (Earlier date codes may vary from this pattern.)

Potentially affected modules are those that may contain a suspect Crydom SSR. They are the part numbers listed below with serial numbers between 0900000 and 1300000.

<u>Part Number</u>	<u>Description</u>
EIP-E233PA	DAM800
EIP-E263PA	SAM800
EIP-E287PA	DAM801
EIP-E289PA	SAM801
EIP-E297DD	DAM502, SAM502
EIP-E304DD	DAM503, SAM503
NUS-A131PA	DAM504, SAM504

A list of the serial numbers of the potentially affected modules delivered to each affected plant, along with the associated purchase order number, is attached. For an electronic version, please use the contact above.

Visual inspection can determine if a potentially affected module contains a suspect Crydom SSR: remove the module side cover to observe the 4-digit date code (typically) located on the upper side of the SSR (the black block) attached to the side of the module. A Digital Inspection Camera may facilitate the observation, as shown at right.



Note: Technical Bulletins are for information only and are not controlled under the NUSI QA program. Any actions to be taken by NUSI in response to an issue shall be tracked through implementation in QA-controlled documents independently of the Technical Bulletin.