



VIA FEDEX (TRACKING NO. 7772 0154 3468)

December 10, 2019  
[NRC-4997]

U.S Nuclear Regulatory Commission  
Document Control Desk  
11555 Rockville Pike  
Rockville, MD 20852

Subject: Reportable Occurrence under 10CFR21: Reported Failure in Analog High Range Radiation Monitor (RP-2C).

To Whom it May Concern:

On December 10, 2019, General Atomics ("GA") notified the NRC Operations Center by telephone and facsimile of a reportable occurrence under Title 10, Chapter I, of the Code of Federal Regulations ("10CFR"), Part 21, involving a hardware failure in GA's Model RP-2C Radiation Monitoring System, manufactured and supplied by GA's Electromagnetic Systems Group ("GA-EMS"). The following information is provided in compliance with the notification requirements of §10CFR21.21(d)(3)(ii) and (d)(4):

**i) Name and address of the person informing the Commission:**

Michael Grogan  
Senior Director, Licensing, Safety and Nuclear Compliance  
General Atomics  
3550 General Atomics Court  
San Diego, CA 92121

**ii) Identification of basic component which contains the defect:**

The defect is contained in the GA-EMS's Radiation Monitoring System Model RP-2C. The RP-2C is a nuclear instrumentation module (NIM) that converts the current from an ion chamber into a radiation value for display, alarming and logging. These radiation monitoring systems are used for NRC Regulatory Guide 1.97 post accident monitoring of the containment area. The malfunction was detected when initiating repairs on an assembly returned to GA-EMS's San Diego, California plant from Exelon Generation Company, Quad Cities Power Station, where it was in service as one of the containment accident monitors.

Inside the RP-2C NIM module are two printed circuit boards (PCBs), one is an electrometer and the other the unit's power supply. The electrometer

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PCB contains the manufacturing defect. GA-EMS part numbers of the electrometer PCB include 02810470-001, 02810470-002, 02810470-003, and 02810470-004.

**iii) Identification of the firm supplying the basic component:**

The RP-2C radiation monitor is designed, manufactured, and supplied by:  
General Atomics  
Electromagnetic Systems  
16530 Via Esprillo  
San Diego, CA 92127

Previously, these units have been manufactured at various times, by GA's then affiliate companies GA-Electronic Systems (GA-ESI), Inc. and Sorrento Electronics, Inc (SEI).

**iv) Nature of the defect and the safety hazard which is created by the defect:**

The defect is contained on the electrometer PCB; specifically the socketed integrated circuits (IC), U1, U2, and U3. The purpose of U2 and U3 is to convert the signal from the ion chamber into a suitable signal that is then used for indication and alarming. The leads of the integrated circuits are clipped to obtain proper seating into their respective sockets. In one instance, the lead length of U2 was clipped too short to positively engage the contacts in the socket. As required by design, the indication of this defect resulted in an annunciated down scale failure as observed by the extinguished green OPERATE light on the RP-2C front panel. In addition, the OPERATE relay state indicated the failure.

This defect would prevent the RP-2C from sensing a high radiation condition resulting in a potential safety hazard to personnel by not indicating the actual radiation value and by not actuating the plant systems connected to the alarm relays.

It is noted however that typically, there are redundant (two or more) high range containment monitoring systems available to the control room operators. During an accident, the operators would be able to rely on the remaining operable channels.

**v) Date on which the information was obtained:**

A Nuclear Safety Related RP-2C Module Assembly, GA-EMS Part number 02810480-001 was received for repair from Exelon Generation Company, Quad Cities Power Station following the GA-EMS standard Return Material Authorization (RMA) process on September 23, 2019. During the repair process, a technician noted that the leads of an IC were too short and informed the cognizant engineer on October 17, 2019. An internal corrective action request was initiated and the formal process of discovery and evaluation was started in accordance with established GA corporate policies and GA-EMS Quality Assurance procedures to evaluate the reported defect for its safety significance and required corrective actions. The evaluation was completed on December 4, 2019, which forms the basis of this reportable occurrence.

**vi) Locations affected by the reported condition:**

Table 1 (attached) lists the sites that operate with safety related RP-2C modules.

**vii) Name of the implementing organization and time frame for implementing the corrective actions:**

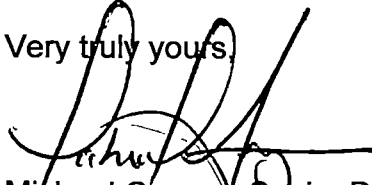
The implementation of the corrective action will be performed by GA-EMS. The corrective action required that engineering determine the appropriate length of the IC leads to prevent them from being clipped too short during assembly. This has been completed, and is being incorporated into the design by the GA-EMS engineering change notice (ECN) process. The required revision to the design drawings will be available to GA-EMS manufacturing by December 20, 2019. All affected material in work or in stock has been quarantined. Material will be reworked once the ECN is released.

**viii) Advice related to the defect that will be given to the purchasers:**

GA-EMS will issue a Quality Bulletin to the affected plant sites that will include additional detail in identifying affected modules and what to do if a defect is found. Only modules that utilize the 02810470 version of the electrometer PCB are affected. Sites are advised that they should continue to perform their normal surveillance testing of the RP-2C module by utilizing the front panel CHECK test feature. The CHECK test feature will validate that the circuit including U2 and U3 are functioning correctly.

If you have any questions or need additional information concerning this report, please do not hesitate to contact the undersigned at (858) 455-2809 or Michael.Grogan@ga.com. Technical questions can be directed to Mr. Arthur Evans at (858) 964-6948.

Very truly yours,

A handwritten signature in black ink, appearing to read "Michael Grogan", written over a horizontal line.

Michael Grogan, Senior Director  
Licensing, Safety and Nuclear Compliance

**Table 1: List of Affected Safety Related RP-2C Module Sites**

<b>AFFECTED SITES</b>	
<b>NRC Region 1</b>	<b>NRC Region 3</b>
FitzPatrick	Fermi
Millstone	La Salle
Peach Bottom	Palisades
Pilgrim	Point Beach
Susquehanna	Prairie Island
	Quad Cities
<b>NRC Region 2</b>	<b>NRC Region 4</b>
Catawba	Arkansas Nuclear
McGuire	Columbia Generating Station
Saint Lucie	
Sequoyah	<b>Reactors in Decommissioning</b>
Turkey Point	Crystal River
Watts Bar	Kewaunee
	San Onofre
	Zion



Date: 12/10/19

To: U.S. Nuclear Regulatory Commission  
Operation Center

Fax: (301) 816-5100

From: Michael J. Grogan, Senior Director of Licensing, Safety and Nuclear Compliance  
(NRC-4997)

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To whom it may concern:

The following notification is provided in compliance with the notification requirements of §10CFR21.21(d)(3)(i).

If you have any questions or need additional information, please feel free to contact me by phone at (858) 455-2809 or email at [michael.grogan@ga.com](mailto:michael.grogan@ga.com).

Best Regards,

A handwritten signature in black ink, appearing to be "Michael J. Grogan", written over a horizontal line.

Michael J. Grogan

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Date: 12/10/19  
To: U.S. Nuclear Regulatory Commission  
Operation Center  
Fax: (301) 816-5100  
From: Michael J. Grogan, Senior Director of Licensing, Safety and Nuclear Compliance  
(NRC-4997)

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Best Regards,  
  
Michael J. Grogan

GENERAL ATOMICS, INC. - 3650 GENERAL ATOMICS COURT, SAN DIEGO, CA 92121 - FAX (619) 456-2822 - TEL. (619) 456-2808

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Abbreviations:

HS: Host send      PL: Polled local      MP: Mailbox print      CP: Completed      TS: Terminated by system  
HR: Host receive      PR: Polled remote      RP: Report      FA: Fall      G3: Group 3  
WS: Waiting send      MS: Mailbox save      FF: Fax Forward      TU: Terminated by user      EC: Error Correct