Hoc, HOO X

From: Bob Malley <BMalley@cdtechno.com>
Sent: Tuesday, February 11, 2020 5:07 PM
To: Hoc, HOO X
Cc: Vince Grieb; Kristen Jamison; Jon Anderson; Ken Sigman
Subject: [External_Sender] Part 21 Report - KCR-07
Attachments: KCR07 Part 21 Report 200211 CD Technologies.pdf

NRC Ops Desk:

Attached please find a Part 21 report being submitted for issues with KCR-07 batteries.
Please acknowledge receipt.

Bob Malley

VP Customer Experience
Bmalley@cdtechno.com
Office 215-619-7830
Mobile 215-275-0548

C&D TECHNOLOGIES, INC.
Power Solutions

1400 Union Meeting Road
Blue Bell, PA 19422
Phone: (215) 619-7849
Fax: (215) 619-7840

February 11, 2020

US Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2746

Subject: 10CFR Part 21 Evaluation Regarding Container Failure in KCR-07 Batteries

The purpose of this letter is to provide the NRC a report in general conformity to the requirements of 10CFR Part 21.21 (a)(2).

On December 6, 2019 Browns Ferry Nuclear Plant notified C&D of an issue with a KCR-07 battery where a crack had developed in the container wall, and electrolyte levels had dropped below the low-level line. C&D issued a Return Material Authorization to the customer, and the batteries were returned and analyzed. On February 3, 2020 this battery was analyzed, and the cause of the crack was determined to be caused by expansion of the post seals directly stressing the container walls. Although this unit passed capacity testing after return to C&D, undetected loss of electrolyte in field units could impact the operability of KCR-07 systems in the field. Accordingly, C&D is submitting this report to the NRC and notifying C&D's customers that use KCR-07 batteries of this report.

Required information per 10CFR Part 21.21(d)(4) follows:

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

Robert Malley VP Customer Experience designated by

Rick Heller
President and Chief Executive Officer
C&D Technologies, Inc.
1400 Union Meeting Road
Blue Bell, PA 19422-0858

(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.

KCR-07 batteries manufactured prior to January 2012. The battery manufacturing date is on the label.

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

C&D Technologies, Inc.
1400 Union Meeting Road
Blue Bell, PA 19422-0858

(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.

Terminal seal expansion causing container cracking, leading to electrolyte loss. Batteries with insufficient electrolyte may not meet discharge requirements.

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

December 6, 2019

(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.

KCR-07 batteries used in 1E applications shipped prior to January 2012.

	Year Shipped								
Utility - Plant	2004	2005	2006	2007	2008	2009	2010	2011	**Total**
Exelon Fitzpatrick			48						**48**
Exelon Limerick			7					70	**77**
First Energy Perry			3						**3**
TVA Browns Ferry	3	4			67	6	256	188	**524**
TVA Sequoyah				1	58	116	4	58	**237**
TVA Watts Bar	6		232						**238**
Grand Total	**9**	**4**	**290**	**1**	**125**	**122**	**260**	**317**	**1128**

(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.

C&D implemented corrective actions to eliminate expansion of the positive post seal and to reinforce cover designs in 2011. Information from laboratory testing and field experience has shown that these corrective actions were effective at eliminating excessive stress in the post seal, cover, and container.

(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.

U.S. Licensees using batteries possibly containing the potential defect are being notified of the filing of this report with recommendations that they examine their batteries for any signs of similar problems. See attached notification letter.

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

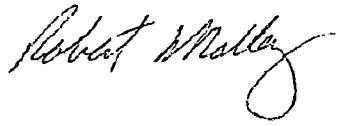
Not applicable

If you have any questions or wish to discuss this matter or this report, please contact:

Robert Malley
VP Customer Experience
bmalley@cdtechno.com
(215) 619-7830

Kristen Jamison
Nuclear Applications Engineer
kjamison@cdtechno.com
(215) 775-1306

Sincerely,



Robert Malley
VP Customer Experience
C&D Technologies, Inc.

Attachment – C&D Letter to Users of KCR-07 Batteries dated February 11, 2020

Cc: R. Heller
K. Sigman
B. Couch
M. Williams
J. Anderson
K. Jamison

C&D TECHNOLOGIES, INC.
Power Solutions

1400 Union Meeting Road
Blue Bell, PA 19422
Phone: (215) 619-2700
Fax: (215) 619-7887

February 11, 2020

Customer Name and Address

Ref: KCR-07 Container Crack

Dear Sir/Madam:

C&D Technologies, Inc. ("C&D") is filing a report with the NRC for a possible risk with cracking KCR-07 containers shipped up to January 2012.

Background:
In December 2019, TVA-Browns Ferry notified C&D of a low electrolyte level in a Class1E KCR-07 battery caused by a crack in the upper corner of the container that extended below the low-level line. (Figure 1). The battery was manufactured in July 2010. C&D issued a Return Material Authorization to the customer, and the battery was returned and analyzed. Capacity testing was performed on receipt of the battery, and the battery ran over 100% capacity, despite the reduced electrolyte level. Testing and analysis continued to determine the cause for the container crack.

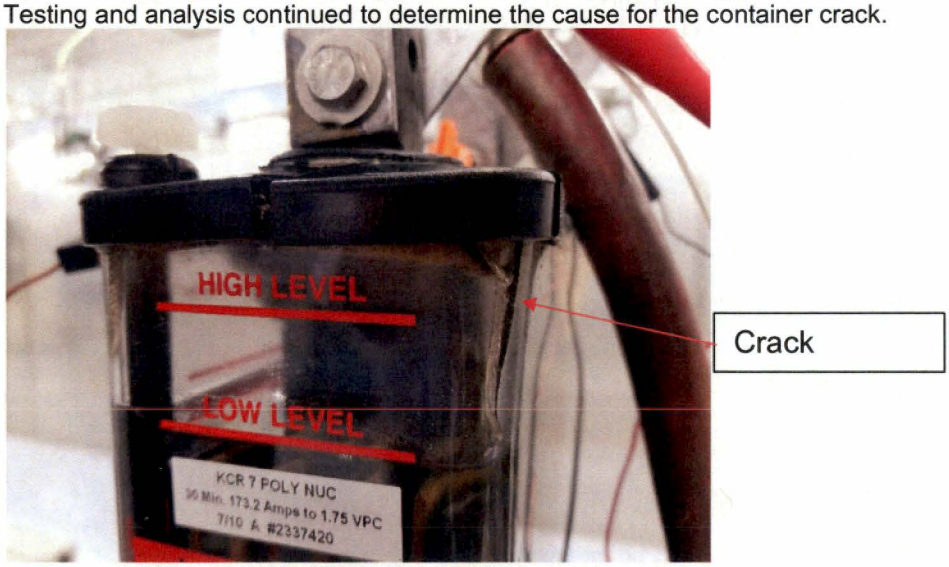


Figure 1

The cause for the container crack was determined to be direct outward stress placed on the container walls by radial corrosion and expansion of the positive post seals. The corrosion of the post seal is caused by acid infiltration into the post seal. Lead metal exposed to acid and the charging potential of the cell is converted to lead dioxide. This conversion expands the post seal radially, placing stress on adjacent plastic parts.

Past experience with post seal corrosion and expansion had only resulted in failure (cracking) of the PVC covers, not the stronger polycarbonate container. Failure of the cover relieved the stress generated by post seal expansion, reducing or eliminating the stress on the container. Failure of the cover posed no operability concern for the battery, as the primary safety function of electrolyte retention is fulfilled by the container.

Engineering analysis indicates that the KCR-07 is more susceptible to container cracking due to the proximity of the internal jar wall in relation to the post seal. In the KCR-07 there is minimal space between the post bushing and the inner edge of the container (Figure 2).

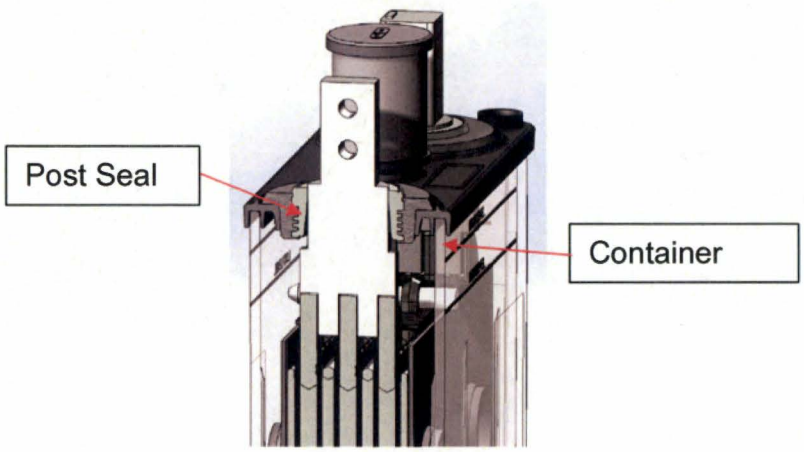


Figure 2

There is insufficient space between the terminal seal and the container wall to relieve stress by failure of the cover material, and the stress is transmitted directly to the container wall. This results in the development of cracks in the upper corners of the container that grow down into the container as the post seal continues to expand exerting outward force on the internal container wall.

The development of post seal corrosion and cover failure was the subject of an intensive investigation from 2010-2011. C&D changed the process for manufacturing post seal assemblies and changed the cover design to minimize and relocate knit lines during this time. Since the changes were completed in late 2011 there have been no reported cases of enhanced post seal corrosion or cover cracking in vented battery products, including 1E products.

For the period 2002-2012 C&D shipped approximately 1200 Class 1E KCR-07 batteries to domestic and international customers. As of this date the only reported instance of container cracking has been at the TVA-Browns Ferry location.

Recommendations: C&D recommends that operators of KCR-07 batteries perform inspection and replace KCR-07 products exhibiting container or cover cracking. As noted above, corrective actions were completed in 2011 for post seal corrosion, and new products should not exhibit this failure mode.

Analysis activities are continuing on the vertical propagation of container cracks vs cover displacement and the effect of shock or seismic events. As more results are received, they will be transmitted to users of older KCR-07 products.

Corrective Actions: As noted above, C&D implemented corrective actions for the root causes of post seal corrosion and cover cracking in 2011, which were fully implemented by January 2012. Further information on these actions is available on request.

C&D Contacts: Further information on this issue can be obtained from:

Kristen Jamison – Nuclear Applications Engineer
Office Phone 215-775-1306
Email: kjamison@cdtechno.com

Robert Malley – VP Customer Experience
Office Phone 215-619-7830
Email: bmalley@cdtechno.com

Best Regards,

Kristen Jamison
Nuclear Applications Engineer
C&D Technologies, Inc.

cc: R. Heller – President and CEO
M. Williams – VP General Counsel
J. Anderson – CTO
K. Sigman – CCO
B. Couch - COO
R. Malley – VP Customer Experience
D. Heimer – Senior Director Product Development