

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, D.C. 20555

July 2, 1992

**NRC INFORMATION NOTICE 92-48: FAILURE OF EXIDE BATTERIES**

Addressees

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to inform addressees of failure of a Type GC battery manufactured by Exide used in safety-related applications and the potential failure of Type GN batteries used in safety-related applications. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate. However, no specific action or written response is required.

Description of Circumstances

On October 7, 1991, Omaha Public Power District reported cracking on the face of Exide's Class 1E Type GC-23 battery jars installed in February 1980, at the Fort Calhoun nuclear station (Fort Calhoun), causing leakage of electrolyte and subsequent inoperability of the battery.

The root cause was attributed to inadequately designed battery terminal post seals. The terminal post radial gland seal cracked due to corrosion buildup which led to cracking on the jar cover and face and subsequent leakage of electrolyte.

Discussion

Exide discovered the cracking problem in 1982 when the Southern New England Telephone Company informed Exide that the terminal post seals had cracked on a Type GW battery purchased from Exide. Exide's battery Types GC, GN (nuclear grade) and GW had identically designed terminal post radial gland seals. Exide evaluated the problem and determined that the seal between the cover and terminal posts was inadequately designed. Corrosion builds up over time in the seal area at the positive post because electrolyte enters, becomes trapped, and reacts with the post material. The corrosion buildup stresses the seal area and the plastic nut around the seal, and, ultimately, the cell cover cracks. Consequently, in 1983, after notifying all holders of Type GN cells, Exide corrected the design of the seals at the battery terminal. However, due to a time lag in the supply chain, batteries received prior to 1985 may still have been of the old design. The old design is characterized by an eight-sided nut around each battery terminal post.

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On March 24, 1983, the licensee for the Palo Verde nuclear plant notified the NRC staff of a deficiency in Exide GN batteries involving cracking of the plastic seals/covers at the terminal posts and electrolyte leakage. The notification was based on Exide's service bulletin which addressed this issue for Type GN batteries and suggested three levels of optional field modifications (Levels I, II, and III) to repair batteries installed in nuclear plants. Fort Calhoun had a Level III repair performed because of numerous cracks on the battery covers. The Level III repair technique creates an all-enveloping secondary cover over the cracked cover. However, this repair tends to mask any further cracking until catastrophic battery failure occurs, as was the case at Fort Calhoun when one-third of the electrolyte leaked out and the battery had to be replaced.

The NRC wants to inform the nuclear industry that Exide Type GC and GN batteries received prior to 1985 with an eight-sided nut around each battery terminal post may be susceptible to corrosion buildup and subsequent cracking at the positive terminal posts; this condition could ultimately render the battery incapable of performing its intended safety function. This phenomenon could occur regardless of whether or not the batteries had the optional field modifications installed.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

  
Charles E. Rossi, Director  
Division of Operational Events Assessment  
Office of Nuclear Reactor Regulation

Technical contacts: Randolph N. Moist: NRR  
(301) 504-2945

Frederick H. Burrows: NRR  
(301) 504-2901

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED  
 NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
92-47	Intentional Bypassing of Automatic Actuation of Plant Protective Features	06/29/92	All holders of OLs or CPs for nuclear power reactors.
92-46	Thermo-Lag Fire Barrier Material Special Review Team Final Report Findings, Current Fire Endurance Tests, and Ampacity Calculation Errors	06/23/92	All holders of OLs or CPs for nuclear power reactors.
92-45	Incorrect Relay Used in Emergency Diesel Generator Output Breaker Control Circuitry	06/22/92	All holders of OLs or CPs for nuclear power reactors.
92-44	Problems with Westinghouse DS-206 and DSL-206 Type Circuit Breakers	06/18/92	All holders of OLs or CPs for nuclear power reactors.
92-43	Defective Molded Phenolic Armature Carriers Found on Elmwood Contactors	06/09/92	All holders of OLs or CPs for nuclear power reactors.
92-42	Fraudulent Bolts in Seismically Designed Walls	06/01/92	All holders of OLs or CPs for nuclear power reactors.
92-41	Consideration of the Stem Rejection Load in Calculation of Required Valve Thrust	05/29/92	All holders of OLs or CPs for nuclear power reactors.
92-40	Inadequate Testing of Emergency Bus Under-voltage Logic Circuitry	05/27/92	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License  
 CP = Construction Permit

On March 24, 1983, the licensee for the Palo Verde nuclear plant notified the NRC staff of a deficiency in Exide GN batteries involving cracking of the plastic seals/covers at the terminal posts and electrolyte leakage. The notification was based on Exide's service bulletin which addressed this issue for Type GN batteries and suggested three levels of optional field modifications (Levels I, II, and III) to repair batteries installed in nuclear plants. Fort Calhoun had a Level III repair performed because of numerous cracks on the battery covers. The Level III repair technique creates an all-enveloping secondary cover over the cracked cover. However, this repair tends to mask any further cracking until catastrophic battery failure occurs, as was the case at Fort Calhoun when one-third of the electrolyte leaked out and the battery had to be replaced.

The NRC wants to inform the nuclear industry that Exide Type GC and GN batteries received prior to 1985 with an eight-sided nut around each battery terminal post may be susceptible to corrosion buildup and subsequent cracking at the positive terminal posts; this condition could ultimately render the battery incapable of performing its intended safety function. This phenomenon could occur regardless of whether or not the batteries had the optional field modifications installed.

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\*See previous concurrence.

RIS-2:VIB	DST:SELB	AC:RIS-2	TECHEDIT
*RMoist	*FBurrows	*JJacobson	*JMain
5/14/92	5/14/92	5/14/92	5/14/92

BC:VIB:DRIS	DIR:DRIS	OGCB:DOEA	DIR:DOEA
*LJNorrholm	*BKGrimes	*CBerlinger	CERossi
5/18/92	5/20/92	5/27/92	5/20/92

DOCUMENT NAME: 92-48.IN

On March 24, 1983, the licensee for the Palo Verde nuclear plant notified the NRC staff of a deficiency in Exide GN batteries involving cracking of the plastic seals/covers at the terminal posts and electrolyte leakage. The notification was based on Exide's service bulletin which addressed this issue for Type GN batteries and suggested three levels of optional field modifications (Levels I, II, and III) to repair batteries installed in nuclear plants. Fort Calhoun had a Level III repair performed because of numerous cracks on the battery covers. The Level III repair technique creates an all-enveloping secondary cover over the cracked cover. However, this repair tends to mask any further cracking until catastrophic battery failure occurs, as was the case at Fort Calhoun when one-third of the electrolyte leaked out and the battery had to be replaced.

The NRC wants to inform the nuclear industry that Exide Type GC and GN batteries manufactured prior to the 1983-1985 time period with an eight-sided nut around each battery terminal post may be susceptible to corrosion buildup and subsequent cracking at the positive terminal posts; this condition could ultimately render the battery incapable of performing its intended safety function. This phenomenon could occur regardless of whether or not the batteries had the optional field modifications installed.

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RMoist *	FBurrows *	JJacobson *	JMain <i>JM</i>
5/14/92	5/14/92	5/14/92	5/14/92
BC:VIB:DRIS	DIR:DRIS	OGCB:DOEA	DIR:DOEA
LJNorrholm	BKGrimes	CBerlinger	CERossi <i>CR</i>
5/18/92 *	5/20/92 *	5/27/92 *	5/ /92

\* previously concurred

EXIDE1.IN  
92-48.IN

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The NRC wants to inform the nuclear industry that Exide Type GC and GN batteries manufactured prior to the 1983-1985 time period with an eight-sided nut around each battery terminal post may be susceptible to corrosion buildup and subsequent cracking at the positive terminal posts; this condition could ultimately render the battery incapable of performing its intended safety function. This phenomenon could occur regardless of whether or not the batteries had the optional field modifications installed.

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5/14/92	5/14/92	5/14/92	5/14/92	5/15/92
BC:VIB:DRIS	DIR:DRIS <i>cm</i>	OGCB:DOEA	DIR:DOEA	
LJN <i>pp</i> rhlm	BKerimes	CBerlinger	CERossi	
5/18/92	5/20/92	5/27/92	5/ /92	

\* previously concurred + concurred by telephone on 5/15/92  
FOR TECHNICAL CONTENT R.11.77.

On March 24, 1983, the licensee for Palo Verde notified the NRC staff of a deficiency in Exide GN batteries involving cracking around terminal posts and electrolyte leakage. The notification was based on Exide's service bulletin which addressed this issue for Type GN batteries and suggested three levels of optional field modifications (Level I, II, III) to repair batteries installed in nuclear plants. Fort Calhoun had a Level III repair performed because the battery covers exhibited numerous cracks. The Level III repair technique creates an all enveloping secondary cover over the old one. However, this repair may not be adequate as it tends to mask any further cracking until it is too late and catastrophic battery failure occurs as was the case of Fort Calhoun when one third of the electrolyte was lost and the battery had to be replaced.

The NRC wants to inform the nuclear industry that Exide Type GC and GN batteries manufactured prior to the 1983-1984 time period with an 8-sided nut around each battery terminal post may be susceptible to corrosion build up and subsequent cracking around the positive terminal posts which could ultimately render the battery incapable of performing its intended safety function. This phenomena could occur regardless of whether or not the batteries had the optional field modifications installed.

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BC:VIB:DRIS LJNorrholm 5/ /92	DIR:DRIS BKGrimes 5/ /92	OGCB:DOEA CBerlinger 5/ /92	DIR:DOEA CERossi 5/ /92	