U.S. Department
of Transportation
**Research and
Special Programs
Administration**

400 Seventh Street, S.W.
Washington, D.C. 20590

JUN 28 1999

Mr. Neil Rasmussen
Vice President, Chief Technical Officer
American Power Conversion
755 Middlesex Turnpike
Billerica, MA 01821-3945

Ref. No. 98-0228

Dear Mr. Rasmussen:

This is in response to your letter dated July 31, 1998, requesting clarification on shipping batteries manufactured by your company under the provisions in § 173.159(d) of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180). Specifically, you are requesting clarification on whether your shipping scenario meets the requirements of § 173.159(d) which require batteries to be protected against short circuits and securely packaged.

According to your letter, your shipping scenario is as follows:

A product with a sealed lead-acid battery is shipped with the battery installed in the product and connected by wires to a printed wiring board assembly where the high power battery connections of both polarities of the battery are directly connected to multiple adjacent exposed copper pads and traces and to various electronic components. The exposed connections may be bridged by foreign matter in such a way that the foreign matter or the electrical components could become energized and dissipate sufficient power to generate combustion. Combustion is demonstrated to trigger a sustained electrical fire not limited by a protective device.

Section 173.159(d) does not address the situation where a battery is connected to a device (product). The scenario described above indicates that the batteries as packaged may allow combustion and short circuits to take place. It is the opinion of this Office that the configuration of a battery connected to a device (product) as described in your letter, does not provide protection to prevent a short circuit.

I hope this answers your inquiry.

Sincerely,

Delmer F. Billings
Chief, Standards Development
Office of Hazardous Materials Standards

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173.159

Polydores
§ 173.159

AMERICAN POWER CONVERSION

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July 31, 1998

Mr. Delmar Billings
Chief of Standards Development
Office of Hazardous Material Standards
Dept. of Transportation
400 7th Street SW
Washington, DC 20590

Dear Mr. Billings,

As we discussed, APC is attempting to lead our industry in improving transportation safety. In my previous letter, I explained how we discovered an industry-wide hazard related to certain battery powered products. To help us bring together industry members and focus their attention on this issue, we are requesting clarification on the interpretation of Final Rule dated Sept 30, 1993 paragraph 173.159(d) regarding sealed lead batteries which states:

"The battery must be protected against short circuits and securely packaged"

We are requesting you to advise us as to whether a product with the following characteristics would be considered compliant with this regulation or any other related regulations, the characteristics being:

> A product with a sealed lead-acid battery, where during shipment the battery is shipped installed in the product and connected by wires to a printed wiring board assembly where the high power battery connections of both polarities of the battery are directly connected to multiple adjacent exposed copper pads and traces and to various electronic components, and where the exposed connections may be bridged by foreign matter in such a way that the foreign matter or the electrical components could become energized and dissipate sufficient power to generate combustion, and further where such combustion is demonstrated to trigger a sustained electrical fire not limited by a protective device.

Based on our telephone conversation, I believe I understood you to say approximately the following regarding this subject:

> A product with the characteristics described above does not meet the requirement since foreign materials bridging the described printed wiring assembly could reasonably be characterized as "short circuits" within the meaning of the regulation and if the product behaves as described in the question it cannot be considered to be "protected" against this type of event.

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If you could provide this answer or whatever you think is the most appropriate answer in writing it would facilitate the focus of our industry and be greatly appreciated. It is our intention at APC to combine our safety research findings with your reply and present an advisory notice to leaders in our industry which we hope will lead to product design improvements that will improve transportation safety in our industry. In addition, it is my hope that we can develop industry standards or make recommendations back to the DOT on regulation changes or clarifications that can formalize these safety improvements across many product categories that use batteries.

Regards,

Neil Rasmussen
Vice President
Chief Technical Officer