



U.S. Department  
of Transportation

**Pipeline and Hazardous  
Materials Safety  
Administration**

1200 New Jersey Avenue SE  
Washington, DC 20590

JUN 16 2011

Ms. Janette Parker  
Project Manager  
Raytheon Network Centric Systems  
Integrated Communication Systems  
1010 Production Road  
M/S D2-12  
Fort Wayne, IN 46808-4106

Ref. No.: 11-0056

Dear Ms. Parker:

This responds to your March 4, 2011 letter requesting clarification of the requirements in the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) applicable to a lithium ion battery. Specifically, you ask us to confirm your understanding that the battery pack described in your letter meets all of the applicable requirements of § 172.102(c), Special Provision 188. In addition to your letter, you enclosed a copy of a test report for a 3-cell battery pack showing compliance with the applicable tests outlined in the United Nations (UN) Manual of Tests and Criteria and a drawing showing the configuration of the lithium ion battery pack.

According to your letter, you intend to ship a mount assembly for a lithium ion battery powered radio. You described the mount assembly as "Lithium ion batteries contained in equipment, UN3481, PG II." For your information, the term "equipment" as it is used in the proper shipping name "Lithium ion batteries contained in equipment" refers to the apparatus or device that performs a function requiring the lithium ion batteries. A lithium ion battery pack placed into a mount and transported without the radio the battery pack is intended to power is properly described as "Lithium ion batteries, UN3480, PG II."

The mount assembly contains three lithium ion battery packs connected in parallel and each lithium ion battery pack contains three cells connected in series. The resulting voltage and capacity of the nine-cell battery pack is 9.6 V and 4200 mAh respectively or approximately 40.32 Wh. In your letter, you state that each battery pack contains two distinct means of protection against short circuiting and internal damage due to overcharge or over discharge. Further, the battery packs are securely installed into the mount and placed into a strong outer packaging.

Based on the information provided in your letter, the battery pack meets the appropriate size limits for lithium ion cells and batteries as required by § 172.102(c), Special Provision 188 and the

battery pack appears to be adequately packaged and protected from short circuits and damage. However, in accordance with paragraph d. of Special provision 188, the 9-cell battery pack described in your letter must be of a type proven to meet the applicable tests in the UN Manual of Tests and Criteria. The test report you provided with your letter describes the component batteries, but not to the completed battery pack placed in the mount assembly and prepared for transport. The 9-cell lithium battery pack is subject to the UN tests regardless even though the component cells or batteries have been tested.

I hope this answers your inquiry. If you need additional assistance, please contact the Standards and Rulemaking Division.

Sincerely,

A handwritten signature in black ink, appearing to read "Ben Supko". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Ben Supko  
Chief, Standards Development Branch  
Standards and Rulemaking Division

04 March 2011

Mr. Charles Betts  
Director of Standards and Rulemaking Division  
PHH-10  
PHMSA-USDOT  
East Building  
1200 New Jersey Avenue SE  
Washington DC 20590-0001

Leary  
3173.185

Batteries  
11-0056

Dear Mr. Betts,

I am writing to request a Letter of Interpretation in accordance with 49 CFR 105.20 addressing Raytheon's ability to ship our Keep Alive Battery (KAB). I am also requesting a response as soon as possible. UPS has refused to accept our KABs for shipment. Raytheon, therefore, missed a delivery to Sikorsky on 15-Feb-11 of four (4) Keep Alive Batteries (KABs) which contain lithium ion cells due to our inability to ship the batteries. We also missed deliveries of twenty (20) KABs to American Eurocopter, ten (10) on 1-Feb-11 and an additional ten (10) on 1-Mar-11. Our inability to ship the KABs is currently preventing American Eurocopter from selling off their US-72A Lakota helicopters and delivering them to the U.S. Military for use in the field.

Raytheon manufactures an airborne radio called SKYFIRE (aka AN/ARC-231) for the DoD. This radio is a high performance, low risk solution used onboard rotary aircraft, including Chinook, Huey, Lakota, Black Hawk, and Apache Helicopters, and fixed wing aircraft such as Joint-STARS, AC-130 Specter Gunship, MC-130 Combat Talon, and MC-12W Liberty planes (additional information available at <http://www.raytheon.com/capabilities/products/arc231/>). Raytheon is a shipper of the ARC-231 radios.

One of the key components of the ARC-231 is a Keep Alive Battery (KAB), a component of the Mount Assembly in which the radio is installed. The KAB is part of the aircraft's Get Home Safe System. The Get Home Safe System is designed to remain operational in extreme environmental conditions to ensure military personnel's ability to survive. Within the KAB are nine (9) lithium ion cells. Each cell contains 0.66g of lithium, for a total of 5.94g of lithium per KAB. Each cell has a rated capacity of 1400 mAh, which equates to 4.6 Wh, or a total of 41.4 Wh per KAB. Per direction from the U.S. Government the KAB was designed to use Valence Saphion® technology in its lithium ion batteries, a much safer technology than that in standard cobalt oxide based lithium batteries (additional information available at <http://www.youtube.com/watch?v=m2cg4mdN2pU> ).

In addition to the Saphion® technology, the KAB contains two distinct protection design mechanisms that deliver its safe operation. First, a thermistor provides protection against overvoltage, deep discharge, and electronic short circuit. Second, a Raychem type resettable fuse acts like a circuit breaker, providing protection against overcurrent. The combination of the sophisticated technology and internal redundant protective devices were instrumental in the KAB's certification as flight worthy in accordance with the Flight Worthiness Environmental Test Procedure for the AN/ARC-231(V)(C) Radio Set Keep Alive Battery (KAB) Assembly. As such, it is Raytheon's belief that it should be excepted from the requirements of the Department of Transportation 49 CFR.

It is Raytheon's interpretation that our KABs are not subject to any requirements of subchapter 49 CFR because they meet the requirements listed in 173.185 paragraphs (c) and (f), specifically,

Paragraph (c):

Requirement	Raytheon's Keep Alive Batteries
(1) The lithium content of the anode of each cell, when fully charged, is not more than 5 g;	(1) Each lithium ion cell contains 0.66 g of equivalent lithium content, below the CFR maximum limit of 5 g.
(2) The aggregate lithium content of the anodes of each battery, when fully charged, is not more than 25 g;	(2) Each lithium ion battery contains an aggregate quantity of 5.94 g of equivalent lithium content, below the CFR maximum limit of 25 g.
(3) Each cell or battery is of the type proven to be non-dangerous by testing in accordance with tests in the UN Manual of Tests and Criteria (see § 171.7 of this subchapter). Such testing must be carried out on each type of cell or battery prior to the initial transport of that type; and	(3) Our lithium ion batteries have been proven non-dangerous by testing in accordance with Tests in the UN Manual of Tests and Criteria, Third Revised Edition, 1999, Section 38.8 Lithium Batteries.
(4) Cells and batteries are designed or packed in such a way as to prevent short circuits under conditions normally encountered in transportation.	(4) Our lithium ion batteries are both designed and packed in such a way as to prevent short circuits under conditions normally encountered in transportation. Per direction from the U.S. Government, our KAB was designed to use Valence Saphion® technology. Additionally, it contains two distinct protection design mechanisms that deliver its safe operation. First, a thermistor provides protection against overvoltage, deep discharge, and electronic short circuit. Second, a Raychem type resettable fuse acts like a circuit breaker, providing protection against overcurrent.  Our KABs are contained in equipment, each piece of which is individually packed in strong, non-conductive packaging.

Paragraph (f):

Requirement	Raytheon's Keep Alive Batteries
Equipment containing or packed with cells and batteries meeting the requirements of paragraph (b) or (c) of this section is excepted from all other requirements of this subchapter.	Our KABs meet paragraph (c) of section 173.185, as evidenced above.

Even though our Keep Alive Batteries are not subject to any requirements of the subchapter based on our interpretation, we believe it to be prudent to label our shipments so that they comply with the expected changes per the Final Ruling publication and Notice of Proposed Rulemaking due to be published on April 19<sup>th</sup>, 2011. Accordingly, Raytheon's KABs:

- Will be labeled as "Lithium Ion Battery" per Figure 7.4.1 IATA Dangerous Goods Regulations, including the required telephone number on the label for additional information.

- Will be accompanied in shipment by a document such as a waybill that includes the words “Lithium ion batteries”, “not restricted”, and “PI 967” included in the Additional Handling Information section.
- Will be prepared and offered for transport by trained personnel.

I am including a copy of the test report showing compliance with UN Manual of Tests and Criteria, Part III, sub-section 38.3, as well as the Air-Worthiness Test Report EETL-2415. Should you desire any additional information, please contact me at 260.429.6684 or [janette.parker@raytheon.com](mailto:janette.parker@raytheon.com).

Thank you in advance for your assistance in our efforts to resolve this issue with UPS and resume our shipments in support of the US's armed forces.

Sincerely,



Janette Parker  
Project Manager and Program Manager, ARC-231 Ancillaries  
Raytheon Network Centric Systems  
Integrated Communication Systems

Enclosures

UN Manual of Tests and Criteria, Part III, sub-section 38.3  
Air-Worthiness Test Report EETL-2415