U.S. Department
of Transportation

**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, D.C. 20590

SEP 24 2007

Mr. Karl Haiden
Senior Systems Engineer
Flo Healthcare
5801 Goshen Springs Road, Suite A
Norcross, GA 30071

Ref. No.: 07-0178

Dear Mr. Kennedy:

This is in response to your September 7, 2007 email concerning the applicability of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) to a power supply containing four lithium-ion battery packs. You intend to ship the lithium-ion battery packs installed and connected to the power supply as if you were shipping four separate battery packs.

In your letter, you describe a power supply contained within a mobile workstation computer cart. The power supply contains four installed and connected lithium-ion battery packs. Each lithium-ion battery pack contains 12, lithium-ion cells with three cells connected in parallel and four cells connected in series. Each cell has 0.66 grams equivalent lithium content (ELC), and each battery pack has 7.92 grams ELC. The four lithium-ion battery packs are electrically isolated from each other through the use of diodes and individual charge control circuits. You propose to ship this power supply as if it contained four separate 7.92 gram lithium-ion batteries under the exceptions provided in the HMR.

Your understanding is not correct. The system you described meets the definition of a battery pack, defined in section 38.3 of the UN Manual of Tests and Criteria as one or more cells electrically connected together by permanent means, including case, terminals and markings. The four battery packs installed in the power supply described in your letter are electrically connected and must be transported as a 48-cell lithium-ion battery pack with 31.68 grams ELC as a Class 9 material in conformance with the requirements of § 173.185.

I hope this information is helpful. Please contact us if you require additional assistance.

Sincerely,

John A. Gale
Chief, Standards Development
Office of Hazardous Materials Standards

070178

173.185

Leary
3173.185
Lithium Battery
07-01

Drakeford, Carolyn <PHMSA>

From: Gale, John <PHMSA>
Sent: Wednesday, September 12, 2007 9:43 AM
To: Drakeford, Carolyn <PHMSA>
Cc: Leary, Kevin <PHMSA>
Subject: FW: Li-Ion Battery Packs - DOT regulation
Attachments: Charger Schematic.pdf; lithium battery pack.jpg; housing.pdf

From: Karl Haiden [mailto:Karl.Haiden@flohealthcare.com]
Sent: Friday, September 07, 2007 5:36 PM
To: Ke, Charles <PHMSA>; Gale, John <PHMSA>
Cc: Richard Halbach
Subject: Li-Ion Battery Packs - DOT regulation

John and Charles,

We got your contact information from George Kerchner, who suggested that we contact you to clarify a Li-Ion transportation issue.

We are planning to introduce a power supply contained within mobile workstation computer carts used in hospitals. The power supply shall employ 4 Li-Ion battery packs. Each battery pack is built up with 12 Li-Ion cells of a charge capacity of 2.2 Ah. The internal cell configuration is as follows: three parallel cell sets connected in a series of 4 to produce a nominal 12 V output. The battery pack is protected with a Texas Instruments Benchmarq chip to avoid overcharge and prevent excessive discharge. The battery pack will be subject to testing by Motorola Product Testing in Lawrenceville, GA.

Each cell has a charge capacity of 2.2 Ah, for an equivalent Lithium content (ELC) of 0.66 g, which is below the limit of 1.5 g. With

12 cells in each pack the battery's ELC is 7.92 g, which is below the limit of 8 g. Therefore, each pack alone meets the requirements for safe transportation.

However, we intend to ship the power supply with the four battery packs installed and connected to the power supply. By design no current can flow from one battery pack to the other as they are isolated by schottky steering diodes and individual charge control circuits. From an electrical point of view, each battery pack is not connected to the other except through the schottky diodes which feed the output load. If the load is removed, as when powered down during shipment, no current can flow from one battery pack to the other.

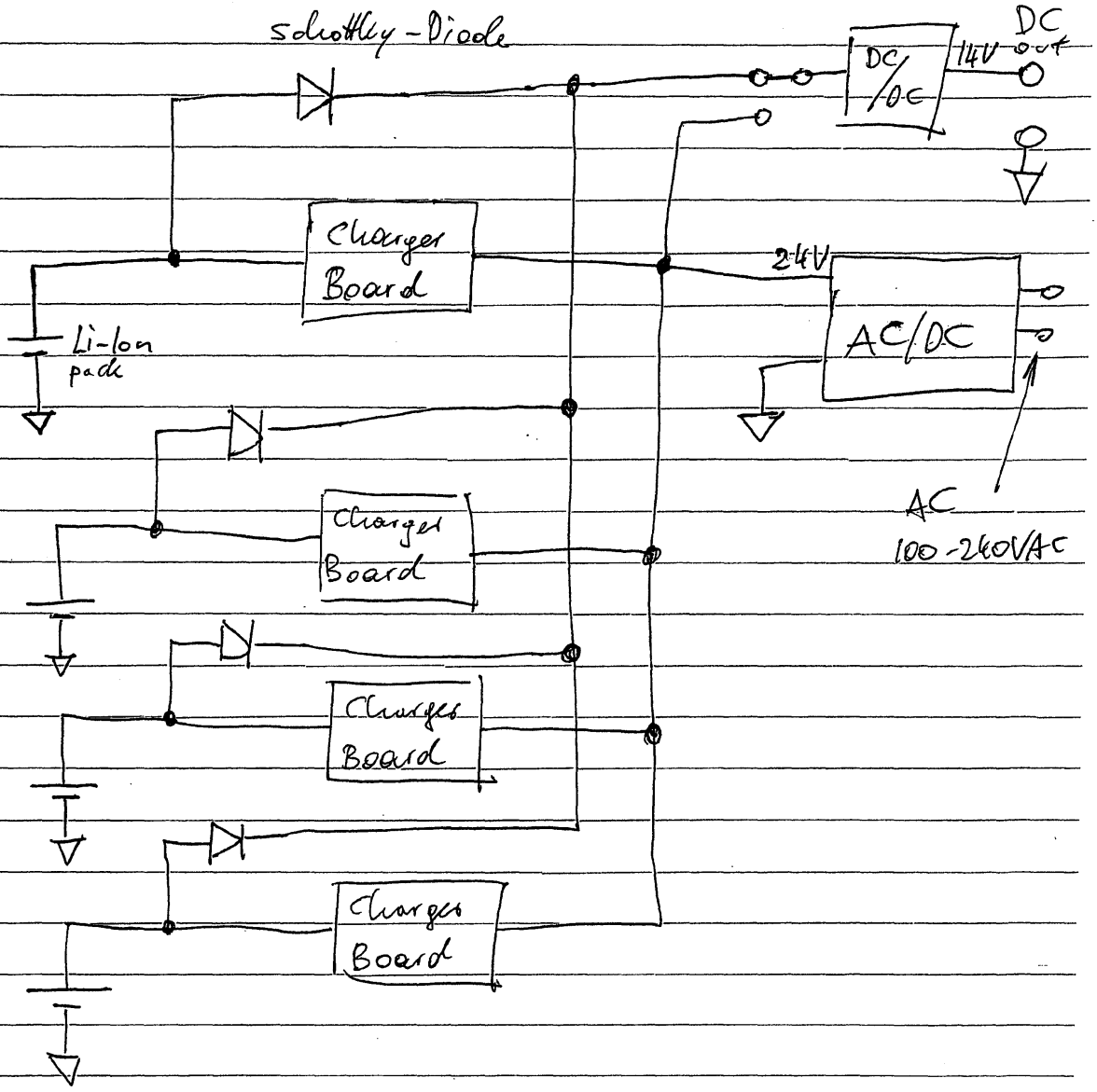
From this point of view, we are proposing to ship the power supply in the same way as if we were shipping 4 electrically disconnected battery packs in strong packaging.

Attached, please see a top level schematic of the power supply with the Li-Ion battery packs, the outer package of the Li-Ion battery packs (UL approved flame retardant foam) and the power supply.

<<Charger Schematic.pdf>> <<lithium battery pack.jpg>> <<housing.pdf>>

We would like to get in touch with you at your earliest convenience and hear your opinion about this transportation issue. What would be a good time to call you and discuss further.

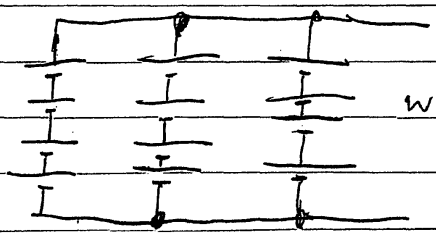
Best regards,



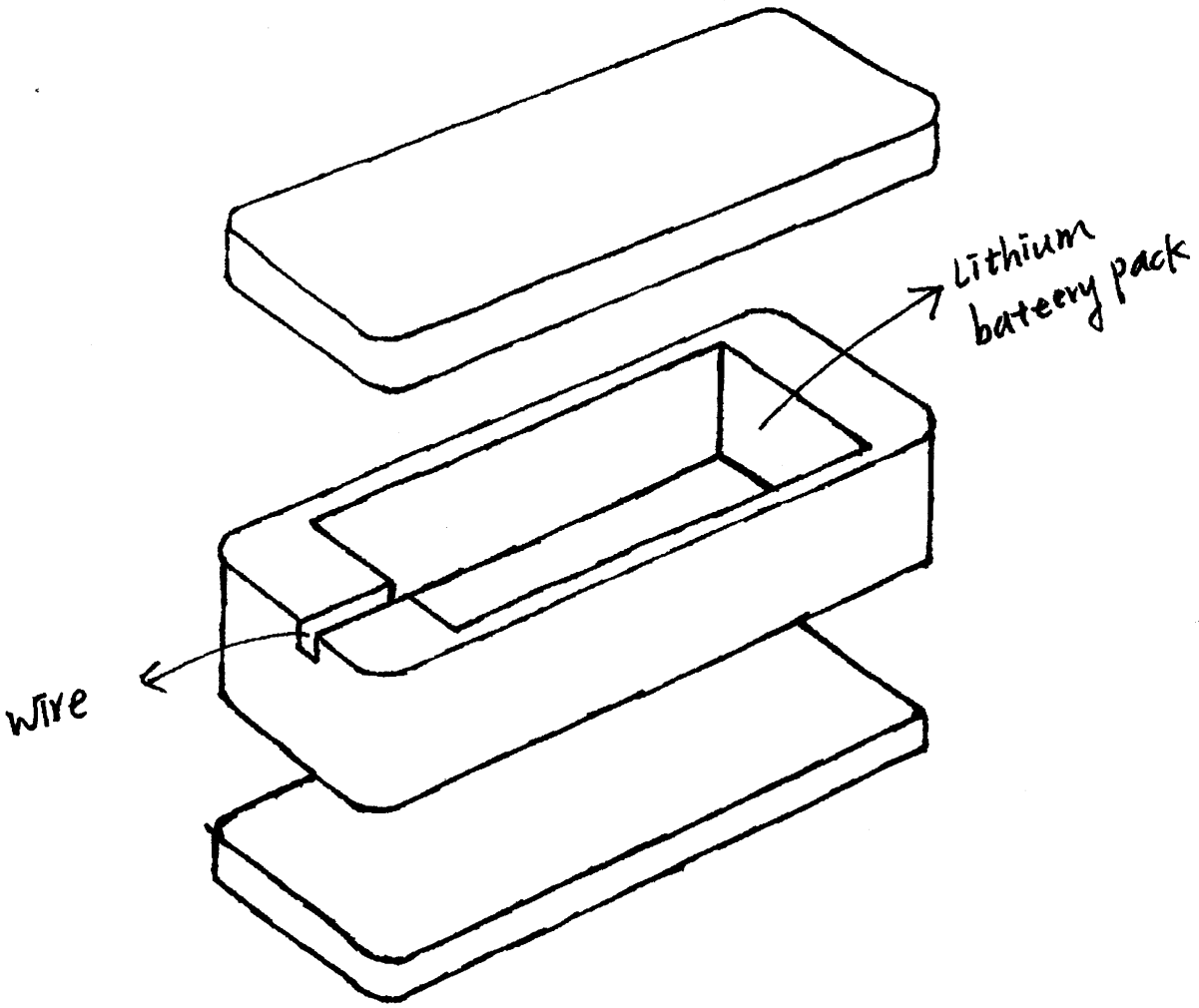
Li-Ion Pack

12 Li-Ion cells

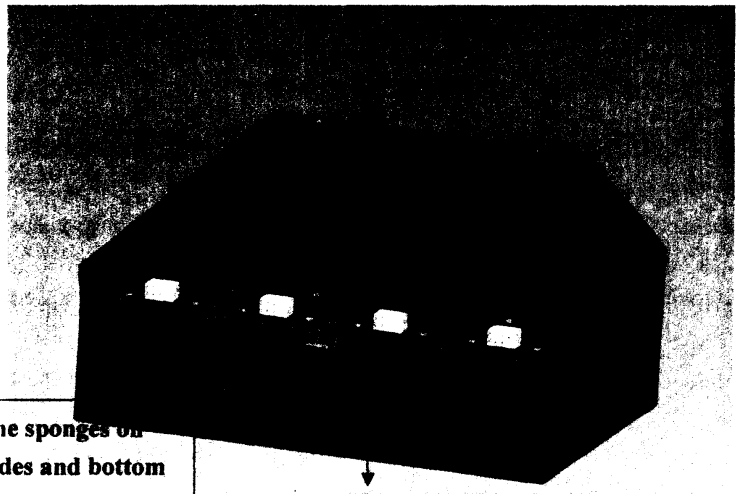
< 8g Li-Ion Eq.



with Benchmark clip

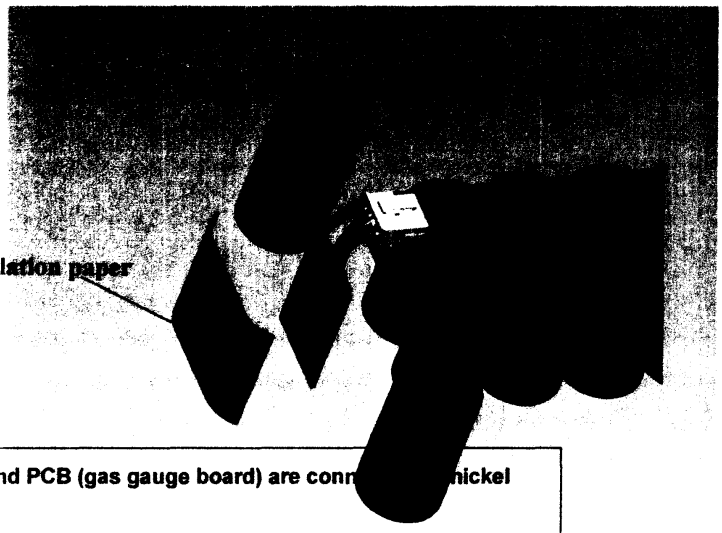


material : sponge



1. We stick the sponges on the both sides and bottom of metal sheet which can protect the battery pack.
2. We also stick the sponges on the top of each battery pack.

This is metal track and battery pack can slide into the case. This track is mounted on the metal sheet and we stick the sponges on the both sides of track to protect the battery pack. This track can prevent the battery packs crash.



3. Insulation paper

1. The cells and PCB (gas gauge board) are conn[illegible]nickel plates.
2. We used the insulation tape to attach the PCB on battery pack.
3. We used the insulation paper to protect the components on PCB.
4. The battery pack is packed by thick heat-shrinkable tubing.