



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

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

APR 13 1999

Ref. No: 99-0070

Mr. Dave McCullough
Delphi Hazardous Materials Coordinator
Delphi Automotive Systems
P.O. Box 502650
Indianapolis, Indiana 46256

Dear Mr. McCullough:

This is in response to your letter of February 25, 1999, requesting clarification on the shipment of lithium ion batteries under the Hazardous Materials Regulations (HMR; 49 CFR parts 171-180). Specifically you ask for clarification of the requirements of § 173.185 as they relate to lithium ion batteries. You state that the UN Recommendations for the Transport of Dangerous Goods has adopted a formula for determining equivalent lithium content for lithium ion batteries in Section 38.3.3.2 which reads as follows:

Lithium content means the mass of lithium in the anode of a lithium metal or lithium alloy cell, which for a primary cell is measured when the cell is in an undischarged state and for a rechargeable cell is measured when the cell is fully charged, except in the case of a lithium-ion cell the lithium content is measured in terms of equivalent lithium content, which in grams is calculated to be 0.3 times the rated capacity in ampere hours.

You ask if this formula may be used for determining the size of lithium ion batteries under the provisions of § 173.185. The answer is yes. This method for determining the equivalent lithium content for lithium ion batteries will be proposed for adoption into the HMR in a future rulemaking action.

Sincerely,

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



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173.185



AeroVironment Inc.

5 PAGES

INCLUDING

COVER

ILKER "IKE" BAYRAKTAR
VICE PRESIDENT
SALES AND NEW BUSINESS DEVELOPMENT

Labelle

\$173.185

99-0070

To: Dr. Fenton Carey

(202) 366-1194

Fax: (202) 366-3671

Per our conversation attached please
find our permit renewal / upgrade / update
document.

We really need your help to
speed up the process for us (Delphi-E)
to be able to ship LiLo batteries (!!!)
to our customers and to make our
tight technology delivery schedules

Very respectfully

"IKE"
2-26-99

W: (626) 357-9983 Ext. 505

Fax: (626) 357-9729

Pager: 1-800-397-4498

Residence: (818) 842-5775

DELPHI

Energy & Engine
Management Systems

Date: 2/25/99

To: IKE BAYRAKTAR

Fax: 626-357-9729

Phone:

From: MURRAY SAUBERG

Fax: 317-579-4991

Phone: 317-574-4961

Subject: APPLICATION TO D.O.T. TO SHIP LITHIUM POLYMER BATTERIES

cc:

Number of pages including cover sheet: 4

Problems with the receipt of this transmission, please contact: Stephanie Cline 317-579-3769 (8-362-3769)

IKE,

THIS IS OUR APPLICATION WE DISCUSSED LAST WEEK.

IF YOU NEED ADDITIONAL INFO, CALL ME.

THANK YOU FOR YOUR HELP?

Murray



February 25, 1999

US Department of Transportation
Research Special Programs
Administration Office Of
Hazardous Materials Transportation
400 Seventh Street S.W.
Washington, DC. 20590

Attention: Approvals Division: Mr. James Jones

Re: Approval To Ship Rechargeable Lithium Battery Cells And Batteries

Dear Sir:

On January 15, 1992 Delco Remy Div GMC received approval to ship a rechargeable lithium battery identified as " Delco Remy EKB " from the US Department of Transportation, Office of Hazardous Materials Exemptions and Approvals, CA - 9110001.

Due to new technology, engineering designs, potential applications both automotive and non - automotive the configuration of the lithium cell and battery has changed.

The new configuration is as follows:

- * Anode - carbon/ polymer film laminated to a copper mesh grid.
- * Cathode - manganese oxide/ polymer film laminated to an aluminum mesh grid.
- * Electrolyte - lithium hexafluorophosphate salt in an organic ester carbonate mixture.
- * Lithium - all of the lithium is in ionic form (no metallic lithium). There is a total of 14.417 grams of lithium in the anodes and cathodes of each cell and 57.67 grams of lithium in the battery.
- * Package - hermetically sealed can with a 2 psi vent.

Attached are drawings of the cell and battery which are Delphi Automotive confidential and proprietary.

This new configuration does not comply with 49 CFR, HM 181, 173.185. Noncompliance is based on 173.185 E1 requirement. The new cell configuration has 14.417 grams which exceed the 12 grams maximum. However the new configuration does comply with 173.185 E2 requirement of 500 grams per battery maximum. The content of lithium in the cell and battery is computed using the current formula for determining " equivalent " lithium content.

317-579-3332

In December of 1998 the UN committee For Dangerous Goods Panel met and has forwarded amendments to the International Civil Aviation Organization for review. The specific amendment in question is Attachment 4, Amendments To The UN Model Regulations On The Transport Of Dangerous Goods (Document ST/SG/AC.10/11/Rev.2) Section 38, 38.3.3.2.

- Aggregate lithium content means the sum of the grams of lithium content contained by the cells comprising a battery.
- Equivalent lithium content is defined in the definition of lithium content.
- Large battery means a battery in which the aggregate lithium content of all anodes, when fully charged, is more than 500 grams.
- Large cell means a cell in which the lithium content of the anode, when fully charged, is more than 12 grams.
- Lithium content means the mass of lithium in the anode of a lithium metal or lithium alloy cell, which for a primary cell is measured when the cell is in an undischarged state and for a rechargeable cell is measured when the cell is fully charged, except in the case of a lithium-ion cell the lithium content is measured in terms of equivalent lithium content, which in grams is calculated to be 0.3 times the rated capacity in ampere hours.
- Lithium-ion cell or battery means a rechargeable electrochemical cell or battery in which the positive and negative electrodes are both intercalation compounds (intercalated lithium exists in an ionic or quasi-atomic form with the lattice of the electrode material) constructed with no metallic lithium in either electrode.
- Small battery means a battery composed of small cells, and in which aggregate lithium content of all cell anodes, when fully charged, is not more than 500 grams.
- Small cell means a cell in which the lithium content of the of the anode, when fully charged, is not more than 12 grams.

When the above proposed amendments are approved and entered into the regulations the Delphi lithium-ion cell will meet the requirements of 173.185 E1. The new cell configuration has a 38 ampere hour capacity which would calculate to 11.4 grams per cell and 57.67 grams per battery.

It appears that the amendment would be officially entered into the International and US Federal regulations in January 2001.

The ability to continue research and development processes, meet customer requirements, and remain competitive in the global marketplace is dependent on the ability to ship the lithium-ion cell and battery.

Therefore, Delphi Automotive Systems respectfully requests approval to ship the lithium-ion cell and battery during the interim period from April, 1999 through January, 2001. The shipments would be to domestic customers and international customers located in France, Germany, Italy, Sweden, Japan, and Luxembourg.

Your continued support of our requirements is appreciated. If you have any questions, you can contact me on 317-579-3332 or fax 317-579-3402.

Regards,

Dave McCullough
Delphi Hazardous Material Coordinator