DANGEROUS GOODS PANEL

Dubai, 31 March to 4 April 2003

Agenda Item 2 : Development of recommendations for amendments to the Technical Instructions for incorporation in the 2005/2006 edition

LITHIUM CELLS AND BATTERIES LOW VOLTAGE TRANSPORT PROHIBITION

(Presented by R. Richard)

1. INTRODUCTION

1.1 The last sentence in Packing Instruction 903 prohibits the transport of any lithium cell which has been discharged to the extent that the open circuit voltage is less than the lower of 2 volts or two-thirds the voltage of the undischarged cell, and any battery containing one or more such cells. No similar prohibition exists in the UN Recommendations or in any other modal transport regulation. This prohibition has been in the Technical Instructions for many years, and was originally introduced based on then-existing lithium battery transport requirements developed in the United States. However, recent investigation in the United States has determined that this prohibition is appropriate only to certain older, primary lithium cell and battery technologies, and that it is not relevant to recently developed lithium battery technologies (e.g., lithium ion, lithium polymer). Indeed - like standard "wet" batteries - newer technology, rechargeable lithium batteries pose lower potential risks in transportation when transported a lower states of change owing to the reduced level of stored energy in the battery.

1.2 The US Panel member is of the opinion that applicability of this prohibition should be limited to only cells with a liquid cathode containing sulphur dioxide, sulphuryl chloride or thionyl chloride. In the past, primary cells and batteries employing these cells chemistries had posed safety problems when in a low voltage state. It appears that in these cell chemistries the depletion of these compounds, as associated with the low voltage condition, can cause removal or breakdown of the passivation film on the lithium anode which can permit the lithium metal to react exothermically with other materials present in the cell. This results in high temperatures, cell venting or rupture, and possibly even fires. However, with other cell chemistries - for example, the newer lithium ion and lithium polymer technologies - no similar problems occur when cells are in a low voltage state. Accordingly, it is unnecessary and inappropriate to impose the existing low voltage cell prohibition on such cells, which, again, actually pose less potential risk when transported at lower states of charge.

2. PROPOSAL

2.1 In light of the foregoing, it is proposed that the last sentence in Packing Instruction 903 be revised to read:

> "Cells ~~assigned to Class 9~~ with a liquid cathode containing sulphur dioxide, sulphuryl chloride or thionyl chloride which have been discharged to the extent that the open circuit voltage is less than the lower of:
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> a) 2 volts; or
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> b) two-thirds of the voltage of the undischarged cell;
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> ~~or~~ and batteries containing one or more such cells, are forbidden from transport."

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