INTRODUCTION

Occasionally DRI employees need to ship samples preserved in formalin. The most cost effective and least onerous method of shipping hazardous materials is in excepted quantities provided excepted quantity shipping is an option noted in the IATA Table of Dangerous Goods and the material to be shipped can be packaged in very small quantities (30 ml or less per inner package) with the total number of inner packages contained in the outer package¹ limited as well.

Note: Formaldehyde solutions are not permitted in checked luggage, carry-on baggage or via airmail.

REQUIRED TRAINING for HAZARDOUS MATERIALS/DANGEROUS GOODS SHIPPERS

All shippers of dangerous goods (including dry ice only packages) are required by law to have applicable training. Before shipping any hazardous material, please ensure you have completed the DRI hazardous material shipper’s training course and that your training is still current. (Training expires every 2 years.) This document serves only as a guideline and does not constitute training. To help ensure your package is prepared correctly, it is highly recommended that you have your package and paperwork reviewed by a trained DRI employee prior to tendering your package for shipment. To make these arrangements, complete the DRI Dangerous Goods Shipping Request Form, http://oldintranet.dri.edu/Services/Safety/Forms/shipping_request.php.

PENALTIES FOR NON-COMPLIANCE

Penalties for non-compliance with shipping regulations can be significant. In addition to potential public safety implications, each violation of the regulations may result in a civil penalty of up to $75,000 or in the case of death, serious illness or severe injury to any person or substantial destruction of property, $175,000. There is no minimum civil penalty except for violations related to training. When a violation continues for more than one day, each day constitutes a separate offense. In addition, persons who willfully violate the regulations may be subject to criminal prosecution with penalties of up to $500,000 and/or five years imprisonment. Note: if the willful violation results in death or bodily injury to any person, the maximum prison sentence doubles.

HAZARD IDENTIFICATION

¹ For the purposes of this guideline, the term ‘inner package’ refers to the container holding the materials being shipped (such as a vial, bottle, etc.). The term ‘outer package’ refers to the container holding and protecting the inner package (usually a cardboard box).
Formaldehyde solutions are classified as dangerous goods. Depending on the concentration of the formaldehyde in the solution, these materials may classified be corrosive liquids; flammable and corrosive liquids; or liquids that have miscellaneous hazards associated with them. Please refer to the table below (excepted from Table 4.2 in the IATA Dangerous Goods Regulations, Section 4) to determine the proper shipping name and hazard class for the formaldehyde solution you are shipping.

<table>
<thead>
<tr>
<th>UN/ID No.</th>
<th>Proper Shipping Name/*Description</th>
<th>Class or Div. (Sub Risk)</th>
<th>Hazard Label(s)</th>
<th>PG</th>
<th>EQ(^4) (see 2.6)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UN2209</td>
<td>Formaldehyde solution with not less than 25% formaldehyde</td>
<td>8</td>
<td>Corrosive</td>
<td>III</td>
<td>E1</td>
</tr>
<tr>
<td>UN1198</td>
<td>Formaldehyde solution, flammable</td>
<td>3 (8)</td>
<td>Flamm. Liquid &amp; Corrosive</td>
<td>III</td>
<td>E1</td>
</tr>
<tr>
<td></td>
<td>Formaldehyde solution with &lt;25% formaldehyde, see Aviation Regulated Liquid, n.o.s. (\dagger)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formalin, see Formaldehyde solution flammable (UN1198) or Formaldehyde solution (UN2209)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UN3334</td>
<td>Aviation Regulated Liquid, n.o.s.(\dagger)</td>
<td>9</td>
<td>Miscellaneous</td>
<td>III</td>
<td>E1</td>
</tr>
</tbody>
</table>

\* Insert in parenthesis after proper shipping the words Formaldehyde Solution

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2 Note: the IATA DGR descriptions for formaldehyde solutions are slightly different than those found in the U.S. DOT Hazardous Materials Table, 49 CFR 172.101. Do not confuse these proper names and descriptions when shipping by air.

3 Note: proper shipping names are listed in bold. When the star symbol follows the proper shipping name the technical name or chemical group is required in parenthesis following the proper shipping name. (The star symbol is not included.) Information not bolded is not to be included in the proper shipping name.

4 EQ refers to excepted quantity code. The code explanations are located in the IATA Dangerous Goods Regulations, Table 2.6A
QUANTITY LIMITS FOR EXCEPTED QUANTITIES OF FORMALDEHYDE SOLUTIONS

All of the listed formaldehyde solutions may be shipped in excepted quantities if the quantity limits for E1, listed below, are met.

1. Inner Packaging. Inner packaging may contain no more than 30 ml of a formaldehyde solution

2. Outer Packaging. The total amount of the inner packages contained together in the same outer packaging may not exceed 1 Liter.

PACKAGING COMPONENTS FOR EXCEPTED QUANTITIES

Packages of excepted quantities of liquids must include three basic components:

1. Inner (primary) packaging, such as a vial, jar, etc. Do not completely fill inner packaging; allow 10% headspace for liquid expansion. Liquids must not completely fill inner packaging at a temperature of 55°C (130°F). Inner package closures must be held securely in place with tape, wire, metal crimps or other positive means.

2. Intermediate (secondary) packaging, such as a sturdy zip lock or similar plastic bag. Use good quality bags that can be well sealed. Intermediate packaging must contain enough absorbent materials to absorb all the contents of the primary containers. Absorbent material must be compatible with the material it is protecting.

3. Outer packaging, such as a fibreboard (cardboard) box. FedEx boxes may not be used for dangerous goods shipment, including excepted quantity shipments. In addition, flammable liquids may not be shipped in envelopes, Tyvek sleeves or other non-rigid mailers. The dimensions of the outer box must be at least 100 mm (~4 inches) on two of the three sides. The complete package as prepared for transport must be capable of withstanding, as demonstrated by testing which is appropriately documented, without breakage or leakage of inner packaging and without significant reduction of effectiveness. Two performance tests are required:

   a. Drop Test. Drop a representative package from a height of 1.8 m (5.9 feet) direction onto a solid unyielding surface.
      - One drop flat on the base
      - One drop flat on the top
      - One drop flat on the longest side
      - One drop flat on the shortest side and
      - One drop on a corner
b. Compressive Load Test. Apply a force to the top surface of a representative package equivalent to the total weight of identical packages stacked to a height of 3 meters for a duration of 24 hours.

PACKAGE LABELING AND MARKING

The outer package must display the following marks and labels:

1. Dangerous Goods in Excepted Quantity Label (see figure 1). An Excepted Quantities of Dangerous Goods Label must be filled out and affixed to the outer packaging. Minimum size for this label is 100 x 100 mm (4 x 4 inches) and it must conform to the shape, color, format and text of the label in figure 1.

   Figure 1—Excepted Quantity Label

The primary hazard class number that must be added to this label under the E will depend on the concentration of the formaldehyde solutions. For a Formaldehyde solution, which is flammable insert 3; for Formaldehyde solution with not less than 25% formaldehyde, insert 8, for Aviation Regulated Liquid, n.o.s. (Formaldehyde solution with <25% formaldehyde), insert 9. Use a black permanent marker to write in the hazard class number.

If the outer package containing excepted quantities is included in an overpack, this label must also be clearly visible or appear on the overpack too.

2. The Name and Address of the Shipper and consignee, unless using a FedEx ShipManager generated shipping label, which contains this information.

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5 When reusing shipping boxes, completely obliterate all unnecessary labels and marks.
DRI Guidelines for Shipping Excepted Quantities of Formaldehyde Solutions by Air (IATA/ICAO Regulations)

REQUIRED DOCUMENTATION

For shipment to the 50 U.S. states, no hazard (shipper’s) declaration is required and you do not have to access or enter any data into the dangerous goods screens when using FedEx ShipManager; however if you use a paper FedEx airbill you must check the box in Section 6 “Dangerous Goods no Shipper’s Declaration Required” and add above the FedEx Tracking number the statement “Dangerous Goods in Excepted Quantities”.

International shipments of excepted quantities, including shipments to Guam and Puerto Rico, may have different requirements or be subject to export/import or TSCA regulations. Before shipping dangerous goods overseas, even in excepted quantities, please check with your carrier.

ADDITIONAL INFORMATION

Full details about shipping excepted quantities by air are located in Section 2.6 of the IATA DGR. For additional information or questions about the information contained in this guideline, email to dgshipping@dri.edu. More information on hazardous materials/dangerous goods shipping is posted on the DRI shipping pages, http://www.dri.edu/dangerous-goods-shipping.