

## IR-4 Advisory #2007-01 (9/20/07)

**Title:** Shipping with Dry Ice and Training/Certification Guidance

**Issue/**

**Question:** Can IR-4 provide some guidance on shipping with dry ice and the training/certification requirements?

**Background:** Shipping with dry ice: Frozen residue samples need to be kept frozen during shipping to maintain sample integrity, and this requires packing with dry ice when shipping is not by a freezer truck service, such as A.C.D.S. Neither regular nor blue ice is adequate to maintain frozen samples for more than a few hours. Please note that air shipping is **not** the preferred means of shipping residue samples to the analytical lab. On occasion air shipment may be required in the protocol, because the analysis is time sensitive. Alternately, the analytical lab may request air shipment, or it is the only recourse from sites not visited by a freezer truck service.

Training/Certification: Dry ice is classified as a “miscellaneous” hazard, Class 9, by the U.S. Department of Transportation (DOT) and the International Air Transport Association (IATA), and is characterized as an 1) explosion hazard, 2) suffocation hazard, and 3) contact hazard. The FAA requires training prior to handling/shipping hazardous materials, including dry ice. Although some institutions provide training sessions for shipping with dry ice, this may not be true for all IR-4 research sites.

**Resolution:** This advisory DOES NOT replace the appropriate training/certification, but simply provides 1) general information on packaging/shipping with dry ice; 2) a reminder that IR-4 researchers should be properly trained/certified for shipping with dry ice, as appropriate, per guidance from their host institutions; and 3) potential locations to seek information about shipping dry ice and training/certification.

### **Shipping with dry ice:**

**Dry Ice – type and amount:** Obtain dry ice from a commercial or university producer, when possible. Large volume production dry ice blocks (or slabs) are denser than dry ice pellets or blocks made with a portable dry ice maker. Having less surface area, these denser blocks or slabs last longer, and are preferable to the other types of dry ice. The amount of dry ice needed depends on the type of dry ice used, the shipping distance and the density of the residue samples. Leafy greens and blueberries will thaw much faster than potatoes. A common ratio in the literature is 4 lbs dry ice per pound of sample per 24 hours of travel. Experienced air shippers recommend 40 lbs of block dry ice, regardless of the sample weight, increasing the amount to 50 lbs if there is any concern that the samples might be delayed (i.e. take more than two days).

**Freezer Boxes/Coolers:** Freezer boxes or thick-walled foam containers are preferable to coolers for shipping with dry ice, as they allow for better venting. IR-4 has used coolers with no adverse issues; just remember to allow for adequate release of the carbon dioxide gas when taping the coolers. Note that non-insulated plastic containers can become brittle under the low temperature conditions generated by dry ice. Shipping boxes can be made by lining good, heavy, strong

cardboard boxes with thick sheets of an insulating material cut to size (tight fit). Non-lined cardboard boxes should never be used as they often lose their integrity during shipping, due to condensation and space voids as the dry ice sublimates.

**Packing for shipment:** Be sure the residue samples are completely frozen before packing. If not, contact the Study Director. Try to “surround” the samples with dry ice and/or place dry ice in the bottom of the container, then samples, then dry ice, then samples, then dry ice. Be sure that there is dry ice on top of the samples as cold air settles. Try to use a container of appropriate size to fit the samples and dry ice snugly. Fill any voids with wadded paper or bubble wrap to minimize sample movement as dry ice sublimates. The labs request that foam peanuts or shredded paper NOT be used, as they make a horrible mess when unpacking.

**Ship Monday to Wednesday** by next day AM delivery. After Wednesday there is not enough time before the weekend if there are any problems or delays. Always **get confirmation from the lab** that someone will be there to receive the samples before air shipping. There is always a possibility that the lab would not be able to receive your samples on that date due to holidays, vacations, etc. It is advisable that you track your shipment to confirm arrival at the destination.

#### **Training/Certification:**

Check with your university, organization, state and/or air carrier for training/certification required (and availability) if you are shipping with dry ice. Read the DOT regulations in 40 CFR 172 regarding shipping/transporting hazardous materials. If your institution, organization, state or air carrier does not provide training, check out the following websites for other options: [www.iata.org/training](http://www.iata.org/training), [http://www.eduwhere.com/c\\_dryice.php?r=g](http://www.eduwhere.com/c_dryice.php?r=g), [www.thecompliancecenter.com/training](http://www.thecompliancecenter.com/training), [www.aacargo.com/shipping](http://www.aacargo.com/shipping), <http://www.fedex.com/us/services/options/hazmat/index.html?link=2>.

Additional information is available from:

University of New Hampshire:

<http://www.unh.edu/ehs/pdf/Guide-to-Shipping-with-Dry-Ice.pdf>

Arizona State University:

<http://www.asu.edu/uagc/EHS/hazardous.htm>

Northwestern University:

[http://www.research.northwestern.edu/research/ors/pdfs/Bio-Ship-Dryice\\_Shipping\\_Manual.pdf](http://www.research.northwestern.edu/research/ors/pdfs/Bio-Ship-Dryice_Shipping_Manual.pdf)

It is imperative that anyone shipping frozen samples on dry ice secure the appropriate hazmat training and certification, as appropriate. Fines can be significant. If you do complete any kind of training/certification, don't forget to include this information in your CV/training records.

If you have any questions, please contact your Regional/ARS Field Coordinator or the appropriate Study Director for further guidance.