



WESLEYAN
UNIVERSITY

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The Hazardous Material & Biological Specimen Shipment Manual

Wesleyan University

The Department of Environmental Health, Safety & Sustainability

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Adapted from the existing TSCA program at Wesleyan University and programs available online with the EHS office of UNH



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FOREWORD

This manual is designed to provide general instructions on how to properly classify, package, mark and label regulated material in accordance with the DOT and IATA Regulations to include: Hazardous Materials, Biological Specimens, Infectious Agents, Dry Ice, shipments in Aqueous Ethanol and TSCA regulations.

Penalties for non compliance are levied by several governmental and non-governmental organizations in the following formats.

- Up to \$250,000 and up to 1 year in prison for individuals
- Up to \$500,000 per incident for organizations

The following is a list of the governmental and non-governmental organizations that regulate our activities:

- International Air Transport Association (IATA)
- US Department of Transportation (US DOT)
- US Public Health Service (PHS)
- Occupational Health & Safety Administration (OSHA)
- United States Postal Service (USPS)
- Department of Homeland Security (DHS)
- Environmental Protection Agency (EPA)

Hazardous and infectious substances must always be transported according to the appropriate regulations. Carrying dangerous goods by hand or in luggage is illegal in all modes of transportation.

IATA regulations cover all shipments foreign and domestic by air, DOT covers all shipments by ground. This manual is broken out into tabbed sections that address specific instructions on how to ship the following substances:

- Biological specimens
- Infectious substances
- Dry Ice
- Shipment of Ethanol Solutions
- Samples in Aqueous Solutions
- Toxic Substances Control Act (TSCA) Compliance
- DOT Small Quantity Exceptions 49CFR173.4
- Hazardous Waste
- Biomedical Waste
- Radioactive Waste



In order to qualify to package or ship any of the above referenced material you will need to have initial safety training and pass a written exam. Please contact the Dept. of Environmental Health, Safety & Sustainability to schedule your training or questions.

EPA regulated Hazardous Waste and Radioactive Waste must be handled by the Dept of EHS&S please contact us at 860-685-2771 with specific questions or requests.



I. TRAINING REQUIRMENTS:

DOT regulations 49CFR172 require anyone wishing to ship dangerous goods have the appropriate training to include the following:

- General Awareness/Familiarization
- Function specific
- Safety
- Security Awareness
- Hazard Communication training
- Initial and recurrent training
- Recordkeeping regulations

Shipping regulations change frequently, once you have received initial training you will receive updates as the regulations change specific to your job function.

For shipments via an air carrier like FedEx Express (air) IATA regulations must be followed and appropriate training per IATA regulations are mandatory.

Recurrent training will take place every 3 years or as specified by changes in the regulations. The Dept. of Environmental Health, Safety & Sustainability maintains all employee training records and will contact you to schedule any training updates or recurrent classes.



II. SPECIAL PACKAGING PROCEDURES:

BIOLOGICAL MATERIALS

For Wesleyan University shipping purposes biological material should fit into one of the following categories:

- Unregulated Biological material
- Category A Infectious Substances
- Category B Infectious Substances
- Genetically Modified Organisms and Microorganisms

Review each material section to determine how to classify a material. Infectious substance regulations do NOT apply to biological material that cannot cause disease, unless sent by the USPS.

Regardless if the biological material is regulated or not, and it is being shipped in dry ice or liquid nitrogen it must be packaged in accordance with the regulation. If the samples are preserved with flammable or corrosive material such as ethanol or formalin, they must also be package in accordance with the regulation.

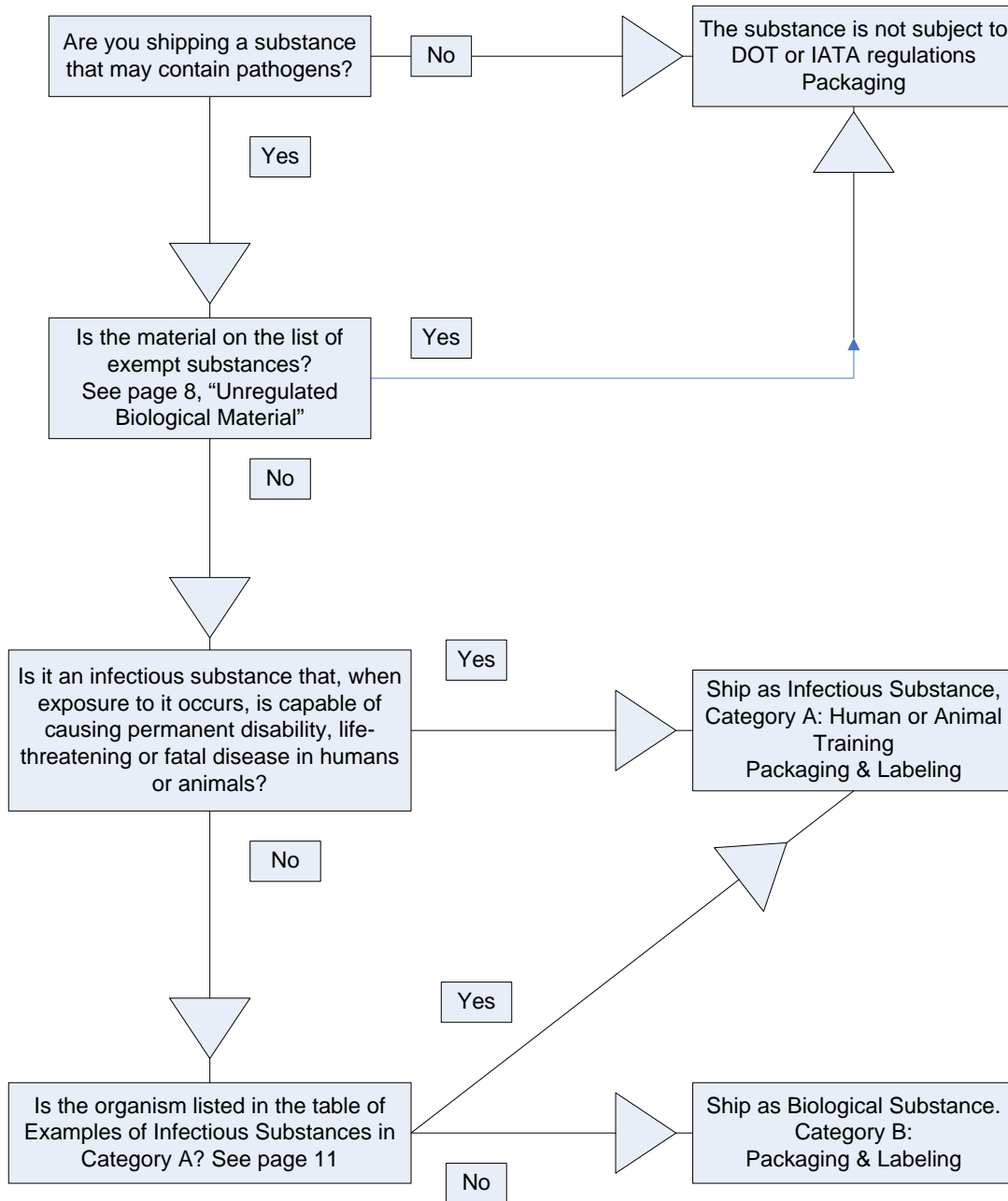
To classify your material please use the flow chart on the next page to help make your decision; each section will describe the best packaging methods to be used.

The same steps are used for all shipments:

1. Classify the material
2. Package, mark and label the material appropriately
3. Fill out the appropriate declaration for dangerous goods
4. special precautions and procedures are required to ship select agents
5. Importing and Exporting biological material requires special permits, contact the EHS&S office for details.



Classification Guide for Infectious Substances ¹



¹ Adapted from UNH Shipment of Biological Materials Manual 2003-2006, University of New Hampshire. This guide does not address bio-toxins or genetically modified organisms or materials.



SECTION 1: UNREGULATED BIOLOGICAL MATERIAL

The following material is EXEMPT from the regulations for infectious substance shipping; however these materials may require a permit for shipment over seas. All shipments of blood or blood products must be accompanied with a biohazard symbol.

1. Material which does not contain infectious substances or which are unlikely to cause disease in humans or animals.
2. Non-infectious biological materials from humans, animals or plants. Including non-infectious cells, tissue cultures, blood or plasma from individuals not suspected of having an infectious disease, DNA, RNA, or other genetic elements
3. Substances containing microorganisms, which are non-pathogenic to humans or animals.
4. Substances that have been neutralized or inactivated such that they no longer pose a health risk
5. Environmental samples which are not considered to pose a significant risk of infection.

PACKAGING RECOMMENDATION:

Triple package the material in the following manner:

Primary Container:

1. Must be water-tight (leak proof). If shipped at ambient or room temp, they may only be of glass, metal or plastic. A water proof, leak-proof seal must be used, (a heat seal, skirted stopper or metal crimp seal). Screw caps must be secured by positive means, (tape, parafilm sealing tape or manufactured sealing closure).
2. Must have the name of the substance contained within on the outside marked in indelible marker
3. Must have an “**For R&D use**” label attached

Secondary Container:

1. Must water-tight (leak-proof)
2. Must contain sufficient absorbent material to absorb the entire contents of all primary receptacles. (The absorbent material must be placed between the secondary packaging and the primary container.
3. If multiple fragile primary containers are placed in a single secondary packaging, they must either be individually wrapped or separated to prevent contact between the containers.

Outer Packaging:

1. The outer package must be constructed and closed so as to prevent any loss of contents that might be caused under normal conditions of transport, by vibration or by changes in atmospheric conditions.
2. Must be labeled in accordance with DOT regulations with packing slips or airbills as required.



SECTION 2: INFECTIOUS SUBSTANCES

1. Known to be, or are reasonably suspected to contain, an animal or human pathogen. (A pathogen is a virus, microorganism including bacteria, plasmids, or other genetic elements, proteinaceous infectious particle (prion) or recombinant microorganism that is known or reasonably expected to cause disease in humans or animals.)
2. Define which category of infectious substance it falls under using the Classification Guide for Infectious Substances located in the front of this manual.

CATEGORY “A” INFECTIOUS SUBSTANCES (see table page 11)

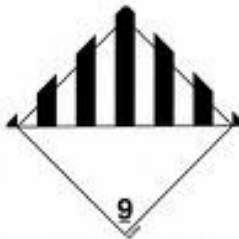
Cat. A Infectious substances are capable of causing permanent disability, life threatening or fatal disease in humans (use **UN2814**) or animals (use **UN2900**) when exposure to them occurs.

1. Must be shipped using IATA prescribed triple packaging that *conforms to IATA 602(Appendix B) specifications*. Containers certified to be compliant can be purchased from one of the following vendors:

HAZMATPAC, INC.
5301 Polk St. Bldg 18
Houston, TX 77023
800-347-7879
www.hazmatpac.com

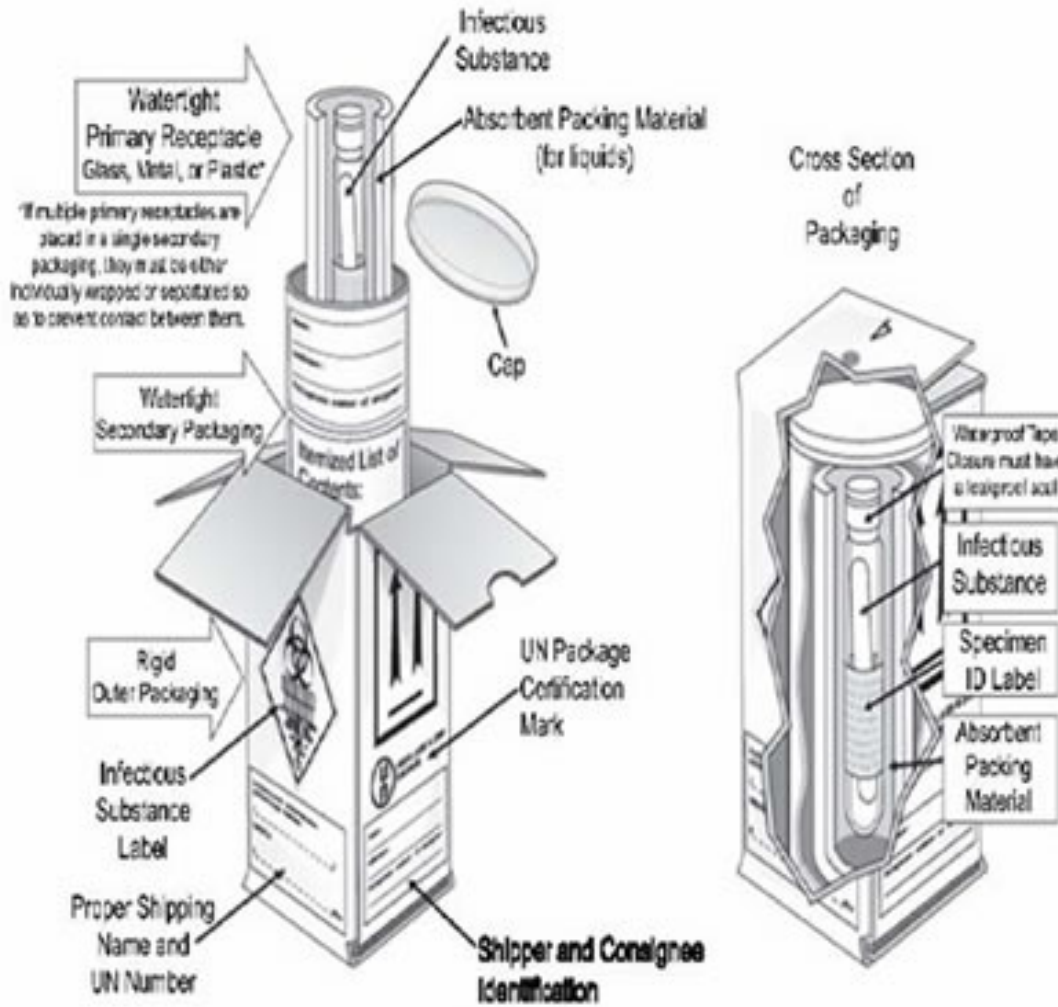
CARGOPak Corporation
3215-A Wellington Court
Raleigh, NC 27615
800-266-0652
www.cargopak.com

2. Cannot exceed 4L or 4kg in one package.
3. Cannot exceed 50mL or 50g in passenger aircraft.
4. Outer Packaging must display the following information
 - Sender & Recipient’s name
 - Infectious substance label
 - “UN2814, Infectious Substance, affecting humans” and the net quantity or;
 - “UN2900, Infectious Substance, affecting animals” and the net quantity
 - Person Responsible 24 hour Emergency Telephone Number
 - Class 9 Label including UN1845 and net weight if packaged in dry ice.
 - Cargo Aircraft Label, when shipping over 50mL or 50g
 - Shipper’s Declaration for Dangerous Goods Appendix D





Packing and Labeling of Category A Infectious Substances (See Packing Instruction 602)





EXAMPLES OF “CATEGORY A” INFECTIOUS SUBSTANCES

Indicative Examples of Infectious Substances Included in Category A in Any Form Unless Otherwise Indicated

UN# and Proper Shipping Name	UN2814 Infectious Substance Affecting Humans	
Bacillus anthracis (cultures only)	Brucella suis (cultures only)	Chlamydia psittaci – avian strains (cultures only)
Brucella abortus (cultures only)	Burkholderia mallei – Pseudomonas mallei – Glanders (cultures only)	Clostridium botulinum (cultures only)
Brucella melitensis (cultures only)	Burkholderia pseudomallei – Pseudomonas pseudomallei (cultures only)	Coccidioides immitis (cultures only)
Coxiella burnetii (cultures only)	Eastern equine encephalitis virus (cultures only)	Flexal virus
Crimean-Congo hemorrhagic fever virus	Escherichia coli, verotoxigenic (cultures only)	Francisella tularensis (cultures only)
Dengue virus (cultures only)	Ebola virus	Guanarito virus
Hantaan virus	Hepatitis B virus (cultures only)	Highly pathogenic avian influenza virus (cultures only)
Hantavirus causing hemorrhagic fever with renal syndrome	Herpes B virus (cultures only)	Japanese Encephalitis virus (cultures only)
Hendra virus	Human immunodeficiency virus (cultures only)	Junin virus
Kyasanur Forest disease virus	Marburg virus	Nipah virus
Lassa virus	Monkeypox virus	Omsk hemorrhagic fever virus
Machupo virus	Mycobacterium tuberculosis (cultures only)	Poliovirus (cultures only)
Rabies virus (cultures only)	Rift Valley fever virus (cultures only)	Shigella dysenteriae type 1 (cultures only)
Rickettsia prowazekii (cultures only)	Russian spring-summer encephalitis virus (cultures only)	Tick-borne encephalitis virus (cultures only)
Rickettsia rickettsii (cultures only)	Sabia virus	Variola virus
Venezuelan equine encephalitis virus (cultures only)	West Nile virus (cultures only)	Yellow fever virus (cultures only)
Yersinia pestis (cultures only)		

UN# and Proper Shipping Name	UN2900 Infectious Substance Affecting Animals	
African swine fever virus (cultures only)	Foot and mouth disease virus (cultures only)	Mycoplasma mycoides – Contagious bovine pleuropneumonia (cultures only)
Avian paramyxovirus Type 1 – Velogenic Newcastle disease virus (cultures only)	Goatpox virus (cultures only)	Peste des petits ruminants virus (cultures only)
Classical swine fever virus (cultures only)	Lumpy skin disease virus (cultures only)	Rinderpest virus (cultures only)
Sheep-pox virus (cultures only)	Swine vesicular disease virus (cultures only)	Vesicular stomatitis virus (cultures only)

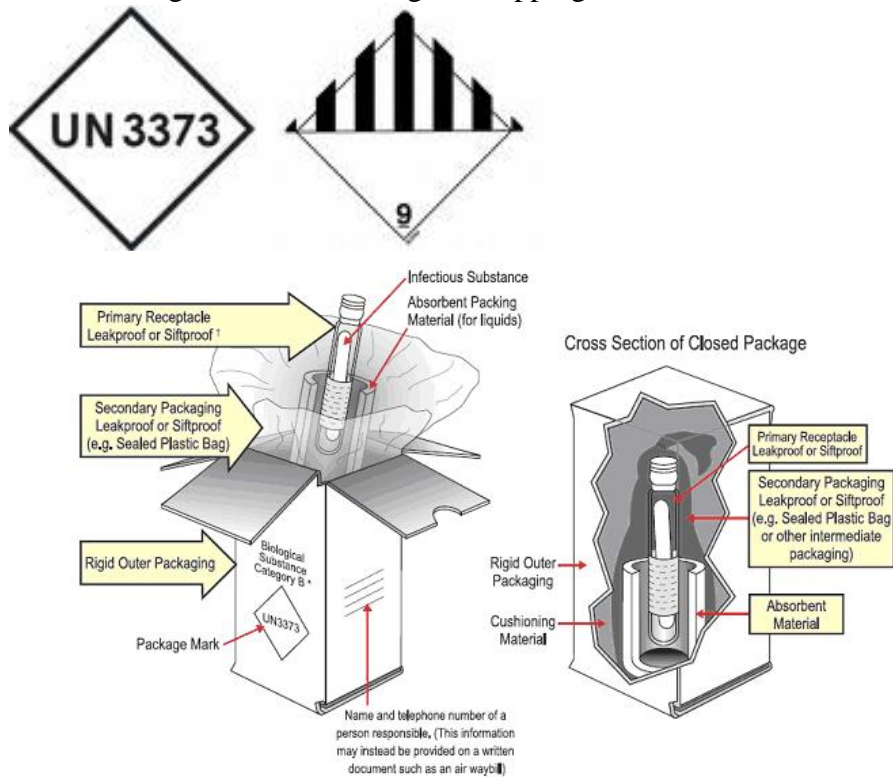


CATEGORY “B” INFECTIOUS SUBSTANCES

Category B infectious substances are materials that are infectious, but do not meet the standard for inclusion in Category A. Category B Infectious Substances are assigned **UN3373**.

- Must be shipped using IATA prescribed triple packaging that *conforms to IATA 650 specifications (Appendix C)*. Containers certified to be compliant can be purchased from one of the following vendors:

<p>HAZMATPAC, INC. 5301 Polk St. Bldg 18 Houston, TX 77023 800-347-7880 www.hazmatpac.com</p>	<p>CARGOpak Corporation 3215-A Wellington Court Raleigh, NC 27615 800-266-0652 www.cargopak.com</p>
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- Cannot exceed 4L or 4kg in a single package.
- Allowed on passenger and cargo aircraft
- Outer Packaging must display the following information
 - Sender & Recipient’s name
 - UN3373 label on the exterior of package
 - Person Responsible 24 hour Emergency Telephone Number
 - Class 9 Label including UN1845 and net weight if packaged in dry ice.
 - The words “**Biological Sample Category B**” on the exterior of package
 - Optional: for small packages place the sealed package in a FedEx Express Orange Clinical Pak Bag for shipping



* The proper shipping names "Biological Substance, Category B"; "Clinical Specimen"; and "Diagnostic Specimen" are authorized until December 31, 2006. From January 1, 2007 only the proper shipping name "Biological Substance, Category B" will be authorized.
 † If multiple fragile primary receptacles are placed in a single secondary packaging they must be either individually wrapped or separated to prevent contact
Note: Follow package manufacturer's closure instructions



Genetically Modified Organisms or Microorganisms

Genetically Modified Organisms (GMO) or Microorganisms (GMMO) are defined as material that has been purposely altered through genetic engineering in a way that does not occur naturally. GMO and GMMO that are not infectious but that can alter animals, plants or microorganisms in a way that is not normally the result of natural reproduction are considered a miscellaneous hazard **Class 9** and are assigned **UN3245**.

GMO and GMMO that are infectious must be assigned **UN2814, UN2900 or UN3373** (see Category A Table 3.6.D page 11).

Packaging

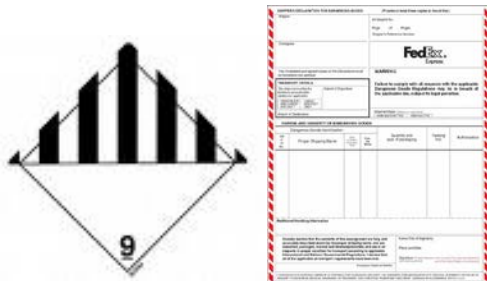
Pack the same as a Category A infectious substance, except there are no testing requirements for the packaging. (See IATA variation packing instruction 913) if 913 packages are not commercially available use packing instruction 602.

1. Maximum allowable quantity per primary receptacle is 100mL or 100g.
2. No Maximum net quantity per package

Labeling

The outer container of GMO or GMMO assigned to **UN3245** must display the following information.

1. The full name and address of the sender and recipient
2. Class 9 label
3. The proper shipping name “UN3245 Genetically modified microorganism”
4. Net quantity
5. Shipper’s declaration for Dangerous Goods Appendix D





FORMALDEHYDE AND FORMALIN SOLUTION FACTS:

Title 49CFR172.101 provides two entries for formaldehyde solutions: **Formaldehyde Solutions, Flammable, UN1198** and **Formaldehyde Solutions with not less than 25% Formaldehyde UN2209**.

Both materials are regulated by highway, water and air. These entries imply that Formaldehyde Solutions, which are not flammable or have less than 25% formaldehyde, are not regulated, however 10-24.9% require regulation as a Hazard Class 9 material when shipped by air. Formaldehyde solutions in these concentrations are noxious and can cause extreme annoyance or discomfort to crew members in the event of a spill or leak on an aircraft.

The basic shipping description for 10-24.9% formaldehyde solutions shipped by air is “**UN3334 Aviation Regulated Liquid N.O.S. (formaldehyde), 9**” This basic description is required for all multi-modal shipments that have the potential to be transported by air; Ground shipments thru companies like FedEx does not guarantee that the shipment will not be put on an airplane; ground packages may be put on airplanes if there is room and it saves the freight company money. Always assume that all commercially shipped packages could end up on an airplane.

When shipping Formalin solutions refer to the MSDS to determine the % of formaldehyde, full strength formalin is 37% formaldehyde and will be shipped as “**UN1198 Formaldehyde Solutions, Flammable, 3**”

25% Formalin solutions have approximately 9% formaldehyde and are classified as “**UN3334, Aviation Regulated Liquid, N.O.S. (formaldehyde), 9**” for transportation by air.

Shipments of 10-24.9% formaldehyde by ground do not require classification as a hazardous material. Be sure to check the flashpoint and percentage of formaldehyde for all shipments containing Formalin.

IATA regulations for shipping “**Aviation Regulated Liquid, N.O.S.**” must be followed for all air shipments of formaldehyde, formalin and formalin fixed samples.

10% Neutral buffered formalin solutions (commonly used as a preservative) contain 3.7% formaldehyde.



SECTION 3: SHIPMENT OF <10% FORMALDEHYDE SOLUTIONS

DOT and IATA regulate shipments of some concentrations for formaldehyde because it is a hazardous material. Use the following procedures to package a material being shipped in formaldehyde solutions.

Formaldehyde solutions are NOT allowed to be transported as checked baggage, carry-on or sent via USPS airmail. This section applies to formalin solutions of less than 10%; these are not considered hazardous materials, concentrations above 10% are subject to specific requirements not outlined here. Please contact the EHS&S office if you need to ship formaldehyde in >10% solutions.

Formaldehyde solutions can cause eye, skin and respiratory tract irritation, and is regulated by OSHA as a carcinogen. Exposure to formaldehyde solutions may cause an allergic respiratory reaction. By properly packaging formalin solutions you minimize the chance of leakage during transport. Properly labeling the package will communicate the appropriate hazards to the transportation employees who may be exposed in the event of an accident or release.

There are no quantity limits for shipments of solutions of <10% formaldehyde.

PACKAGING RECOMMENDATION:

Triple package the material in the following manner:

Primary Container:

1. Must be water-tight (leak proof). If shipped at ambient or room temp, they may only be of glass, metal or plastic. A water proof, leak-proof seal must be used, (a heat seal, skirted stopper or metal crimp seal). Screw caps must be secured by positive means, (tape, parafilm sealing tape or manufactured sealing closure).
2. Must have the name of the substance contained within on the outside marked in indelible marker
3. Must have an **“For R&D use”** label attached

Secondary Container:

1. Must water-tight (leak-proof) Zip lock bags are acceptable
2. Must contain sufficient absorbent material to absorb the entire contents of all primary receptacles. (the absorbent material must be placed between the secondary packaging and the primary container.
3. If multiple fragile primary containers are placed in a single secondary packaging, they must either be individually wrapped or separated to prevent contact between the containers.



Outer Packaging:

1. The outer package must be constructed and closed so as to prevent any loss of contents that might be caused under normal conditions of transport, by vibration or by changes in atmospheric conditions.
2. Must be labeled in accordance with DOT regulations with packing slips or airbills as required.

SPECIAL PACKAGE TESTING PROCEDURES:

All packaging used for shipments of formaldehyde solutions must pass a drop test and a compressive load test without any breakage or leakage of any inner packaging and without any significant reduction in package effectiveness. Perform the following tests on a representative example of your packaging and keep a record of the results. (refer to IATA package performance testing standards)

DROP TEST: From a height of about 2M (6.5ft) drop a representative package directly onto a solid unyielding surface:

- a. One drop flat on bottom
- b. One drop flat on top
- c. One drop flat on the long side
- d. One drop flat on the short side
- e. One drop on a corner at the junction of three intersecting edges
- f. Record the results

COMPRESSIVE LOAD TEST: Apply a force to the top surface of a representative package for a duration of 24 hours, equivalent to the total weight of identical packages if stacked to a height of 3M (10ft)

The test report must describe the packaging used in the test and verify that the contents did not leak during any point of the test.



SECTION 4: SHIPMENT OF 10-25% FORMALDEHYDE SOLUTIONS

DOT and IATA regulate shipments of formaldehyde because it is a hazardous material. Use the following procedures to package a material being shipped in <25% formaldehyde solutions.

Formaldehyde solutions are NOT allowed to be transported as checked baggage, carry-on or sent via USPS airmail. This section applies to formaldehyde solutions of less than or equal to 25%, these are considered to be hazardous materials. Formaldehyde solutions can cause eye, skin and respiratory tract irritation, and is regulated by OSHA as a carcinogen. Exposure to formaldehyde solutions may cause an allergic respiratory reaction. By properly packaging formalin solutions you minimize the chance of leakage during transport. Properly labeling the package will communicate the appropriate hazards to the transportation employees who may be exposed in the event of an accident or release. Please consult your MSDS before handling formaldehyde solutions.

Formaldehyde solutions <25% are assigned to hazard class 9, packing group II. Each inner package may not contain more than 30mL. Each outer package may not contain more than 500mL. (If you are shipping vials with a maximum volume of 10mL than you may put up to 50 vials in one box)

PACKAGING RECOMMENDATION:

Triple package the material in the following manner:

Primary Container:

1. Must be water-tight (leak proof). If shipped at ambient or room temp, they may be of glass, metal or plastic. A water proof, leak-proof seal must be used, (a heat seal, skirted stopper or metal crimp seal). Screw caps must be secured by positive means, (tape, parafilm sealing tape or manufactured sealing closure).
2. Must leave at least 10% headspace to allow for expansion in each vial.
3. Must have the name of the substance contained within on the outside marked in indelible marker
4. Must have an **“For R&D use”** label attached

Secondary Container:

1. Must water-tight (leak-proof) Zip lock bags are acceptable, use two bags for safety
2. Must contain sufficient absorbent material to absorb the entire contents of all primary receptacles. The absorbent material must be placed between the secondary packaging and the primary container and must not react with the formaldehyde.
3. If multiple fragile primary containers are placed in a single secondary packaging, they must either be individually wrapped or separated to prevent contact between the containers.



Outer Packaging:

1. The outer package must be constructed and closed so as to prevent any loss of contents that might be caused under normal conditions of transport, by vibration or by changes in atmospheric conditions.
2. Must be labeled in accordance with DOT regulations with packing slips or airbills as required.
3. Formaldehyde solutions may not be shipped in envelopes, tyvek sleeves or other non-rigid mailers.
4. The dimensions of the container **MUST** be at least 100mm (4 inches) on two sides

PACKAGE LABELS

The outer packaging must display the following marks and labels

1. **Dangerous goods in Excepted Quantities Label:**
2. Affix it to one vertical side of the outer container
3. Enter UN3334



SPECIAL PACKAGE TESTING PROCEDURES:

All packaging used for shipments of formaldehyde solutions must pass a drop test and a compressive load test without any breakage or leakage of any inner packaging and without any significant reduction in package effectiveness. Perform the following tests on a representative example of your packaging and keep a record of the results. (Refer to IATA package performance testing standards)

DROP TEST: From a height of about 2M (6.5ft) drop a representative package directly onto a solid unyielding surface:

- g. One drop flat on bottom
- h. One drop flat on top
- i. One drop flat on the long side
- j. One drop flat on the short side
- k. One drop on a corner at the junction of three intersecting edges
- l. Record the results



COMPRESSIVE LOAD TEST: Apply a force to the top surface of a representative package for a duration of 24 hours, equivalent to the total weight of identical packages if stacked to a height of 3M (10ft)

The test report must describe the packaging used in the test and verify that the contents did not leak during any point of the test.

Proper documentation is required for all shipment of hazardous materials; if you are not using FedEx please contact the office of EHS&S for specific shipping details.

For domestic shipments using FedEx Express:

- a. Use standard US airbill
- b. In section 6 “Special Handling” check the “Yes, Shipper’s Declaration not Required” box
- c. On the top of the form above the waybill tracking number handwrite the following: “Dangerous Goods in Excepted Quantities”.



SECTION 5: SHIPMENT OF DRY ICE (SOLID CARBON DIOXIDE)

Packages refrigerated with dry ice are normally shipped by air in order to reach their destinations rapidly. The following recommendation is for shipments of dry ice by air only. If you intend to ship your package by other means such as ground, contact the office of EHS&S for shipping details.

DO NOT SHIP DRY ICE WITH THE USPS OR UPS ONLY USE FED EX!

DOT and IATA regulate shipments of dry ice because it is a hazardous material, classified as “**Miscellaneous, Hazard Class 9**”. Dry Ice is considered hazardous as an explosion hazard, suffocation hazard and a contact hazard. Solid carbon dioxide releases a large volume of CO² gas as it sublimates. If packaged in a container that does not allow for the gas to escape it could explode, causing personal injury and property damage. A large volume of carbon dioxide gas emitted in a confined space may create an oxygen deficient atmosphere (cargo hold). Dry ice is a cryogenic material that causes severe frostbite upon contact with skin.

Properly packaging dry ice will minimize the risk to personnel transporting the material. The explosion hazard will be eliminated with a package designed to vent gaseous carbon dioxide, use or reuse Styrofoam dry ice packaging. Suffocation and contact hazards will be greatly reduced by labeling the package correctly. Use the following procedures to package a material being shipped in dry ice.

PACKAGING RECOMMENDATION:

Dry Ice packaging must allow for the release of carbon dioxide gas, Styrofoam shipping boxes are excellent for this purpose. Never package dry ice in a container with a tight seal like a screw cap bottle.

Primary Container: (for the sample being shipped on dry ice)

1. Must be water-tight (leak proof). A water proof, leak-proof seal must be used, (a heat seal, skirted stopper or metal crimp seal). Screw caps must be secured by positive means, (tape, parafilm sealing tape or manufactured sealing closure).
2. Must leave at least 10% headspace to allow for expansion in each vial.
3. Must have the name of the substance contained within on the outside marked in indelible marker
4. Must have an “**For R&D use**” label attached

Secondary Container: (This holds the primary container being shipped on dry ice)

1. Must be water-tight (leak-proof) Zip lock bags are acceptable, use two bags for safety
2. Must contain sufficient absorbent material to absorb the entire contents of all primary receptacles. The absorbent material must be placed between the secondary packaging and the primary. If multiple fragile primary containers are placed in a single secondary packaging, they must either be individually wrapped or separated to prevent contact between the containers.



Outer Packaging: (This holds the dry ice and the shipping documents)

1. The outer package must be of adequate strength for its intended use. It must be strong enough to withstand the loading and unloading normally encountered in transport. It must also be constructed and closed in order to prevent any loss of contents that might be caused by vibration or by changes in temperature, humidity or altitude BUT must allow for the CO₂ gas to escape.
2. Do not use plastics that can be rendered brittle or permeable by the temperature of dry ice. This problem can be avoided by using commercially available packages intended to contain dry ice.
3. If using a Styrofoam box you must have a corrugated outer container too! Be careful not to tape the box so that gas cannot escape.

PACKAGE LABELS: When shipping by FedEx Express the outer packaging must display the following marks and labels

1. Using the USA domestic Airbill the dry ice box in section 6 must be checked
2. Fill in the number of containers X net weight in kg of dry ice (1kg = 2.2lbs)
3. Affix a class 9 label to one vertical side of the outer container
4. Complete the FedEx Express class 9 dry ice label fully

Shipper's Declaration not Required.
Part II is required
Dry ice amount must be in kilograms.
Note: 2 lbs. = 1 kg.

Airwaybills / airbills must have the following:
1. "Dangerous Goods - Shipper's Declaration not required"
2. Dry Ice; UN 1845; III
3. Net weight in kg 004
Printed Date

Dry Ice _____ kg.

Shipper's Name and Address _____

9

UN 1845

Consignee Name and Address _____

15621107 100



SPECIAL RECOMMENDATIONS:

Do not write “Specimens” or “Diagnostic Specimens” on the outer container. If your shipment contains a biological or infectious material please see the appropriate section of this manual for further directions.

If reusing an existing Styrofoam container for this shipment, you must obliterate or remove all labels not pertaining to this shipment. Only reuse a box that you can guarantee the physical integrity of. Secure your samples in the container so that when the dry ice sublimates the samples don't roll around inside, refer to the inner packaging section to ensure proper protection of your shipment.

Minimize the volume of air to which the dry ice is exposed in order to slow the rate of sublimation. If there is any air space after you fill your package with dry ice, fill it with packing peanuts or newspaper.

Shipments are generally recommended to contain 2.27-4.54kg (5-10lbs) of dry ice per 24 hours. Refer to your package manufacturer's recommendations. Make sure the person you are sending your samples to, is aware that they are coming and is able to receive them on the day they are expected to arrive.



SECTION 6: SHIPMENT OF 55-100% ETHANOL SOLUTIONS

Ethyl Alcohol (Ethanol) is regulated by the DOT and IATA as a hazardous material; specific procedures must be followed when packaging and shipping ethanol. **Ethanol is considered hazardous when shipped by air.** 55-100% Ethanol is a flammable liquid NFPA flammable rating is 3 (out of 4) and its vapor can travel a considerable distance to an ignition source and flash back. Contact of ethanol with strong oxidizers, peroxides, strong alkalis and strong acids may cause fires and explosions. Refer to the MSDS for specifics on your ethanol solution.

Ethanol solutions are not permitted to be transported in checked baggage, carry-on baggage, and airmail or in personal vehicles. This document will assist in properly packaging ethanol preserved samples and specimens

PACKAGING RECOMMENDATION:

Packaging must minimize the chance of leakage during transportation; proper labeling and documenting will communicate the hazard to transportation employees in the event of a leak.

1. **Quantity limits:** Each inner package may not contain more than 30mL; each outer package may not contain more than 500mL of ethanol solutions.
2. **Ethanol Solutions:** UN1170 hazard class 3 PGII

Packaging

Primary Container: (inner package that the sample is contained in)

5. Must be water-tight (leak proof) vial, tube, jar etc. A water proof, leak-proof seal must be used, (a heat seal, skirted stopper or metal crimp seal). Screw caps must be secured by positive means, (tape, parafilm sealing tape or manufactured sealing closure).
6. Must leave at least 10% headspace to allow for expansion in each vial.
7. Must have the name of the substance contained within on the outside marked in indelible marker
8. Must have an **“For R&D use”** label attached

Secondary Container: (This holds the primary container of sample)

3. Must be water-tight (leak-proof) Zip lock bags are acceptable, use two bags for safety
4. Must contain sufficient absorbent material to absorb the entire contents of all primary receptacles. The absorbent material must be placed between the secondary packaging and the primary. If multiple fragile primary containers are placed in a single secondary packaging, they must either be individually wrapped or separated to prevent contact between the containers.
5. Seal each water-tight bag with packaging tape



Outer Packaging: (this holds the primary & secondary containers and the shipping documents)

1. The outer package must be of adequate strength for its intended use.
2. It must be strong enough to withstand the loading and unloading normally encountered in transport.
3. It must also be constructed and closed in order to prevent any loss of contents that might be caused by vibration or by changes in temperature, humidity or altitude.
4. Reuse of cardboard boxes is acceptable; remove/deface any old labels
5. Ethanol Solutions CANNOT be shipped in Tyvek® sleeves or other non-rigid mailing containers.
6. The Outer Packaging must have two vertical faces that are at least 100mm (4in) in its longest dimension.

PACKAGE LABELS: When shipping by FedEx Express the outer packaging must display the following marks and labels: **For domestic shipments using Fed Ex:**

1. **Dangerous Goods in Excepted Quantities Label**
2. Affix it to one vertical side of the outer container
3. Enter UN1170
4. Use the FedEx Express US Airbill; fill out form completely
5. In section 6 “Special Handling” check the “**Yes, Shipper’s Declaration not Required**” box
6. On the top of the form above the waybill tracking number handwrite the following: “**Dangerous Goods in Excepted Quantities**”.





SPECIAL PACKAGE TESTING PROCEDURES:

All packaging used for shipments of Ethanol solutions must pass a drop test and a compressive load test without any breakage or leakage of any inner packaging and without any significant reduction in package effectiveness. Perform the following tests on a representative example of your packaging and keep a record of the results. (Refer to IATA package performance testing standards) or purchase a certified package from one of the following vendors.

HAZMATPAC, INC.
5301 Polk St. Bldg 18
Houston, TX 77023
800-347-7881
www.hazmatpac.com

CARGOpak Corporation
3215-A Wellington Court
Raleigh, NC 27615
800-266-0652
www.cargopak.com

DROP TEST: From a height of about 2M (6.5ft) drop a representative package directly onto a solid unyielding surface:

1. One drop flat on bottom
2. One drop flat on top
3. One drop flat on the long side
4. One drop flat on the short side
5. One drop on a corner at the junction of three intersecting edges
6. Record the results

COMPRESSIVE LOAD TEST: Apply a force to the top surface of a representative package for a duration of 24 hours, equivalent to the total weight of identical packages if stacked to a height of 3M (10ft)

The test report must describe the packaging used in the test and verify that the contents did not leak during any point of the test.

Proper documentation is required for all shipment of hazardous materials; if you are not using FedEx please contact the office of EHS&S for specific shipping details.



III. TOXIC SUBSTANCES CONTROL ACT (TSCA) COMPLIANCE:

TSCA (40CFR720) was enacted by Congress to give the EPA the ability to track >75,000 industrial chemicals currently produced or imported into the United States. The language of this statute was written for industry. The result of this is that academic laboratories have to comply with the TSCA regulations unless they can prove the exemptions set forth in Section 5 of the regulations.

R&D Exemptions 40CFR720.36

The exemption from certain notification and “new use” requirements applies when small quantities of new chemicals are imported, exported and/or used for Research and Development (R&D) purposes while under the supervision of a technically qualified individual.

To comply with the exemption set forth in the standard, certain conditions must be applied to the handling, labeling and shipping of synthesized chemicals off campus to include:

1. The manufacture or synthesis of substances must be used solely for research and development purposes and never be sold or exchanged for profit.
2. A technically qualified individual must directly supervise their use.
3. The chemical’s potential risk must be determined if possible
4. Prudent laboratory practices must be identified for each chemical’s use in the laboratory
5. Certain disposal and recordkeeping requirements are required.
6. Containers of these compounds need to bear the labels noting “For R&D Use Only”
7. If such chemicals are to be shipped to another academic institution or other site for use, analysis or further synthesis, documentation of the transfer must accompany the chemical, and a record must be maintained by the shipping and receiving organizations.

According to the EPA the following activities may be considered R&D:

1. Chemical synthesis and physical/chemical properties testing in the laboratory
2. Health and environmental effects testing
3. Tests or demonstrations of equipment or production processes
4. Efficacy and performance tests.

We must be able to demonstrate that our activities are eligible for the R&D exemption. We have developed a 2 page form to simplify this process. The Researcher’s responsibility to comply with this regulation requires you to accurately and completely fill out the TSCA PMN form for any substance you are shipping off site.

Each Department’s administrative office has a trained “TSCA Facilitator”. The Facilitator’s will assist you in the proper handling, labeling and packaging of your shipment.

If you have any questions specific to your sample please contact the Dept. of Environmental Health, Safety & Sustainability.



Section 1: Domestic shipments

Shipments of chemical and biological substances, chemical and biological samples, or chemicals and biological substances being shared at other locations for R&D purposes within the US must be accompanied by documentation that informs the recipient of potential or actual hazards.

Chemical and biological substances, chemical and biological samples, or chemicals and biological substances are not permitted to be transported in checked baggage, carry-on baggage, airmail or in personal vehicles. This document will assist in properly packaging your samples and specimens.

TSCA SHIPMENT GUIDELINES:

Researcher/Shipper Responsibilities:

1. Completely fill out the TSCA Research Exempt Substances Notification Form
2. Package your shipment in accordance with applicable DOT & IATA regulations **DO NOT SEAL THE OUTER PACKAGING** your shipment must be inspected prior to final sealing of the exterior package
3. Present your shipment to the TSCA Facilitator for verification of packaging and paperwork

TSCA Facilitator Responsibilities:

1. Inspect all documentation to ensure all entries are complete and accurate
2. Inspect all packaging to ensure proper packing for the material being shipped (refer to applicable parts of this manual for shipping samples).
3. If the package is *improperly* prepared return it to the researcher with directions to comply with the regulations or;
4. If the package is *properly* prepared for shipment; have a trained TSCA Manager sign the TSCA Research Exempt Substances Notification Form
5. Make a copy of the form with the approving signature and place the copy in the package
6. File the original Form in the TSCA binder and return to the Dept. of Environmental Health, Safety & Sustainability at the end of each calendar year for filing.
7. Using the applicable parts of this manual seal up the package and label with the appropriate labels for the shipment.
8. Apply a red bordered label that reads “Contents to be used for Research and Development Purposes Only” to the exterior of the package on the same side as other regulatory labels.

IMPORTING AND EXPORTING CHEMICAL AND BIOLOGICAL MATERIAL

Special rules and permits are required for sending material out of the country or bringing material into the country. Please contact the Dept. of Environmental Health, Safety & Sustainability for details.



TSCA GLOSSARY OF TERMS:

§ 720.3 Definitions.¹

(a)(1) For the purposes of this part, the terms *cosmetic*, *device*, *drug*, *food*, and *food additive* have the meanings contained in the Federal Food, Drug, and Cosmetic Act, 21 U.S.C. 321 *et seq.*, and the regulations issued under it. In addition, the term "food" includes poultry and poultry products, as defined in the Poultry Products Inspection Act, 21 U.S.C. 453 *et seq.*; meats and meat food products, as defined in the Federal Meat Inspection Act, 21 U.S.C. 60 *et seq.*; and eggs and egg products, as defined in the Egg Products Inspection Act, 21 U.S.C. 1033 *et seq.*

(2) The term *pesticide* has the meaning contained in the Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. 136 *et seq.* and the regulations issued under it.

(3) The terms *byproduct material*, *source material*, and *special nuclear material* have the meanings contained in the Atomic Energy Act of 1954, 42 U.S.C. 2014 *et seq.* and the regulations issued under it.

(b) *Act* means the Toxic Substances Control Act, 15 U.S.C. 2601 *et seq.*

(c) *Article* means a manufactured item (1) which is formed to a specific shape or design during manufacture, (2) which has end use function(s) dependent in whole or in part upon its shape or design during end use, and (3) which has either no change of chemical composition during its end use or only those changes of composition which have no commercial purpose separate from that of the article and that may occur as described in §720.36(g)(5), except that fluids and particles are not considered articles regardless of shape or design.

(d) *Byproduct* means a chemical substance produced without a separate commercial intent during the manufacture, processing, use, or disposal of another chemical substance or mixture.

(e) *Chemical substance* means any organic or inorganic substance of a particular molecular identity, including any combination of such substances occurring in whole or in part as a result of a chemical reaction or occurring in nature, and any chemical element or uncombined radical, except that "chemical substance" does not include:

(1) Any mixture.

(2) Any pesticide when manufactured, processed, or distributed in commerce for use as a pesticide.

(3) Tobacco or any tobacco product.

(4) Any source material, special nuclear material, or byproduct material.

(5) Any pistol, firearm, revolver, shells, or cartridges.

(6) Any food, food additive, drug, cosmetic, or device, when manufactured, processed, or distributed in commerce for use as a food, food additive, drug, cosmetic, or device.

(f) *Commerce* means trade, traffic, transportation, or other commerce (1) between a place in a State and any place outside of such State, or (2) which affects trade, traffic, transportation, or commerce between a place in a State and any place outside of such State.

(g) *Customs territory of the United States* means the 50 States, Puerto Rico, and the District of Columbia.

(h) *Director* means the Director of the EPA Office of Pollution Prevention and Toxics.

(i) *Distribute in commerce* means to sell in commerce, to introduce or deliver for introduction into commerce, or to hold after introduction into commerce.

(j) *EPA* means the U.S. Environmental Protection Agency.

(k) *Health and safety study* or *study* means any study of any effect of a chemical substance or mixture on health or the environment or on both, including underlying data and epidemiological studies, studies of occupational exposure to a chemical substance or mixture, toxicological, clinical, and ecological, or other studies of a chemical substance or mixture, and any test performed under the Act. Chemical identity is always part of a health and safety study.



(1) Not only is information which arises as a result of a formal, disciplined study included, but other information relating to the effects of a chemical substance or mixture on health or the environment is also included. Any data that bear on the effects of a chemical substance on health or the environment would be included.

(2) Examples include:

(i) Long- and short-term tests of mutagenicity, carcinogenicity, or teratogenicity; data on behavioral disorders; dermatotoxicity; pharmacological effects; mammalian absorption, distribution, metabolism, and excretion; cumulative, additive, and synergistic effects; acute, subchronic, and chronic effects; and structure/activity analyses.

(ii) Tests for ecological or other environmental effects on invertebrates, fish, or other animals, and plants, including: Acute toxicity tests, chronic toxicity tests, critical life stage tests, behavioral tests, algal growth tests, seed germination tests, plant growth or damage tests, microbial function tests, bioconcentration or bioaccumulation tests, and model ecosystem (microcosm) studies.

(iii) Assessments of human and environmental exposure, including workplace exposure, and impacts of a particular chemical substance or mixture on the environment, including surveys, tests, and studies of: Biological, photochemical, and chemical degradation; air, water, and soil transport; biomagnification and bioconcentration; and chemical and physical properties, e.g., boiling point, vapor pressure, evaporation rates from soil and water, octanol/water partition coefficient, and water solubility.

(iv) Monitoring data, when they have been aggregated and analyzed to measure the exposure of humans or the environment to a chemical substance or mixture.

(v) Any assessments of risk to health and the environment resulting from the manufacture, processing, distribution in commerce, use, or disposal of the chemical substance.

(l) *Importer* means any person who imports a chemical substance, including a chemical substance as part of a mixture or article, into the customs territory of the United States. "Importer" includes the person primarily liable for the payment of any duties on the merchandise or an authorized agent acting on his or her behalf. The term also includes, as appropriate:

(1) The consignee.

(2) The importer of record.

(3) The actual owner if an actual owner's declaration and superseding bond has been filed in accordance with 19 CFR 141.20; or

(4) The transferee, if the right to draw merchandise in a bonded warehouse has been transferred in accordance with subpart C of 19 CFR part 144. (See "principal importer.")

(m) *Impurity* means a chemical substance which is unintentionally present with another chemical substance.

(n) *Intermediate* means any chemical substance that is consumed, in whole or in part, in chemical reactions used for the intentional manufacture of another chemical substance(s) or mixture(s), or that is intentionally present for the purpose of altering the rates of such chemical reactions.

(o) *Inventory* means the list of chemical substances manufactured or processed in the United States that EPA compiled and keeps current under section 8(b) of the Act.

(p) *Known to or reasonably ascertainable by* means all information in a person's possession or control, plus all information that a reasonable person similarly situated might be expected to possess, control, or know.

(q) *Manufacture* means to produce or manufacture in the United States or import into the customs territory of the United States.

(r) *Manufacture or import for commercial purposes* means:

(1) To import, produce, or manufacture with the purpose of obtaining an immediate or eventual commercial advantage for the manufacturer or importer, and includes, among other things, "manufacture" of any amount of a chemical substance or mixture:

(i) For commercial distribution, including for test marketing.

(ii) For use by the manufacturer, including use for product research and development or as an intermediate.



(2) The term also applies to substances that are produced coincidentally during the manufacture, processing, use, or disposal of another substance or mixture, including byproducts that are separated from that other substance or mixture and impurities that remain in that substance or mixture. Byproducts and impurities without separate commercial value are nonetheless produced for the purpose of obtaining a commercial advantage, since they are part of the manufacture of a chemical substance for commercial purposes.

(s) *Manufacture solely for export* means to manufacture or import for commercial purposes a chemical substance solely for export from the United States under the following restrictions on activities in the United States:

(1) Distribution in commerce is limited to purposes of export or processing solely for export as defined in §721.3 of this chapter.

(2) The manufacturer or importer, and any person to whom the substance is distributed for purposes of export or processing solely for export (as defined in §721.3 of this chapter), may not use the substance except in small quantities solely for research and development in accordance with §720.36.

(t) *Manufacturer* means a person who imports, produces, or manufactures a chemical substance. A person who extracts a component chemical substance from a previously existing chemical substance or a complex combination of substances is a manufacturer of that component chemical substance. A person who contracts with a manufacturer to manufacture or produce a chemical substance is also a manufacturer if (1) the manufacturer manufactures or produces the substance exclusively for that person, and (2) that person specifies the identity of the substance and controls the total amount produced and the basic technology for the plant process.

(u) *Mixture* means any combination of two or more chemical substances if the combination does not occur in nature and is not, in whole or in part, the result of a chemical reaction; except "mixture" does include (1) any combination which occurs, in whole or in part, as a result of a chemical reaction if the combination could have been manufactured for commercial purposes without a chemical reaction at the time the chemical substances comprising the combination were combined, and if all of the chemical substances comprising the combination are not new chemical substances, and (2) hydrates of a chemical substance or hydrated ions formed by association of a chemical substance with water, so long as the nonhydrated form is itself not a new chemical substance.

(v) *New chemical substance* means any chemical substance which is not included on the Inventory.

(w) *Nonisolated intermediate* means any intermediate that is not intentionally removed from the equipment in which it is manufactured, including the reaction vessel in which it is manufactured, equipment which is ancillary to the reaction vessel, and any equipment through which the chemical substance passes during a continuous flow process, but not including tanks or other vessels in which the substance is stored after its manufacture.

(x) *Person* means any natural person, firm, company, corporation, joint-venture, partnership, sole proprietorship, association, or any other business entity, any State or political subdivision thereof, any municipality, any interstate body, and any department, agency or instrumentality of the Federal Government.

(y) *Possession or control* means in possession or control of the submitter, or of any subsidiary, partnership in which the submitter is a general partner, parent company, or any company or partnership which the parent company owns or controls, if the subsidiary, parent company, or other company or partnership is associated with the submitter in the research, development, test marketing, or commercial marketing of the chemical substance in question. (A parent company owns or controls another company if the parent owns or controls 50 percent or more of the other company's voting stock. A parent company owns or controls any partnership in which it is a general partner). Information is included within this definition if it is:

(1) In files maintained by submitter's employees who are:

(i) Associated with research, development, test marketing, or commercial marketing of the chemical substance in question.

(ii) Reasonably likely to have such data.

(2) Maintained in the files of other agents of the submitter who are associated with research, development, test marketing, or commercial marketing of the chemical substance in question in the course of their employment as such agents.

(z) *Principal importer* means the first importer who, knowing that a new chemical substance will be imported rather than manufactured domestically, specifies the identity of the chemical substance and the total amount to be imported. Only persons who are incorporated, licensed, or doing business in the United States may be principal importers.

(aa) *Process* means the preparation of a chemical substance or mixture, after its manufacture, for distribution in commerce (1) in the same form or physical state as, or in a different form or physical state from, that in which it was received by the person so preparing such substance or mixture, or (2) as part of a mixture or article containing the chemical substance or mixture.

(bb) *Processor* means any person who processes a chemical substance or mixture.



(cc) *Small quantities solely for research and development* (or "small quantities solely for purposes of scientific experimentation or analysis or chemical research on, or analysis of, such substance or another substance, including such research or analysis for the development of a product") means quantities of a chemical substance manufactured, imported, or processed or proposed to be manufactured, imported, or processed solely for research and development that are not greater than reasonably necessary for such purposes.

(dd) *State* means any State of the United States and the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, the Canal Zone, American Samoa, the Northern Mariana Islands, and any other territory or possession of the United States.

(ee) *Technically qualified individual* means a person or persons (1) who, because of education, training, or experience, or a combination of these factors, is capable of understanding the health and environmental risks associated with the chemical substance which is used under his or her supervision, (2) who is responsible for enforcing appropriate methods of conducting scientific experimentation, analysis, or chemical research to minimize such risks, and (3) who is responsible for the safety assessments and clearances related to the procurement, storage, use, and disposal of the chemical substance as may be appropriate or required within the scope of conducting a research and development activity.

(ff) *Test data* means data from a formal or informal test or experiment, including information concerning the objectives, experimental methods and materials, protocols, results, data analyses, recorded observations, monitoring data, measurements, and conclusions from a test or experiment.

(gg) *Test marketing* means the distribution in commerce of no more than a predetermined amount of a chemical substance, mixture, or article containing that chemical substance or mixture, by a manufacturer or processor, to no more than a defined number of potential customers to explore market capability in a competitive situation during a predetermined testing period prior to the broader distribution of that chemical substance, mixture, or article in commerce.

(hh) *United States*, when used in the geographic sense, means all of the States.

[48 FR 21742, May 13, 1983, as amended at 51 FR 15101, Apr. 22, 1986]

1: www.gpoaccess.gov/ECFR/40CFR720.3



IV. DOT SMALL QUANTITY EXCEPTIONS 49CFR173.4:

Some substances within the regulation are excluded from parts of the regulation due to the small quantity exception. This section should clarify which substances can be applied to the small quantity exception.

The small quantity exception may be used when shipping materials with UPS and Fed EX Ground, material shipped by air are regulated by IATA regulations (see packing procedures in this manual). The USPS will not ship hazmat for R&D purposes, they will only ship material for resale.

MATERIALS WITH EXCEPTIONS:

The following materials are covered by the small quantity exceptions, see the full text of the regulation later in this document for a complete list by hazard class:

1. Flammable liquids
2. Flammable solids
3. Spontaneously combustible material
4. Dangerous when wet materials
5. Oxidizers
6. Organic Peroxides
7. Poisonous materials
8. Corrosives

The following materials have NO exceptions in the regulations:

1. Explosives
2. Gases
3. Infectious Substances

Materials covered by this exception are exempt from all other requirements when they are shipped in accordance with the requirements set out below in the quantity limit and special packaging section of the regulation.

49CFR173.4

Title 49: Transportation

[PART 173—SHIPPERS—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS](#)
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§ 173.4 Small quantities for highway and rail.

(a) When transported domestically by highway or rail in conformance with this section, small quantities of Class 3, Division 4.1, Division 4.2 (PG II and III), Division 4.3 (PG II and III), Division 5.1, Division 5.2, Division 6.1, Class 7, Class 8, and Class 9 materials that also meet the definition of one or more of these hazard classes, are not subject to any other requirements of this subchapter when—



QUANTITY LIMITS

(1) The maximum quantity of material per inner receptacle or article is limited to—

- (i) Thirty (30) mL (1 ounce) for authorized liquids, other than Division 6.1, Packing Group I, Hazard Zone A or B materials;
- (ii) Thirty (30) g (1 ounce) for authorized solid materials;
- (iii) One (1) g (0.04 ounce) for authorized materials meeting the definition of a Division 6.1, Packing Group I, Hazard Zone A or B material; and
- (iv) An activity level not exceeding that specified in §§173.421, 173.424, 173.425 or 173.426, as appropriate, for a package containing a Class 7 (radioactive) material.

SPECIAL PACKAGING RECCOMENDATIONS

(2) With the exception of temperature sensing devices, each inner receptacle:

- (i) Is not liquid-full at 55 °C (131 °F), and
- (ii) Is constructed of plastic having a minimum thickness of no less than 0.2 mm (0.008 inch), or earthenware, glass, or metal;

(3) Each inner receptacle with a removable closure has its closure held securely in place with wire, tape, or other positive means;

(4) Unless equivalent cushioning and absorbent material surrounds the inside packaging, each inner receptacle is securely packed in an inside packaging with cushioning and absorbent material that:

- (i) Will not react chemically with the material, and
- (ii) Is capable of absorbing the entire contents (if a liquid) of the receptacle;

(5) The inside packaging is securely packed in a strong outside packaging;

PACKAGING TESTING

(6) The completed package, as demonstrated by prototype testing, is capable of sustaining—

(i) Each of the following free drops made from a height of 1.8 m (5.9 feet) directly onto a solid unyielding surface without breakage or leakage from any inner receptacle and without a substantial reduction in the effectiveness of the package:

- (A) One drop flat on bottom;
- (B) One drop flat on top;
- (C) One drop flat on the long side;
- (D) One drop flat on the short side; and
- (E) One drop on a corner at the junction of three intersecting edges; and

(ii) A compressive load as specified in §178.606(c) of this subchapter.

Note to paragraph (a)(6): Each of the tests in paragraph (a)(6) of this section may be performed on a different but identical package; *i.e.*, all tests need not be performed on the same package.

(7) Placement of the material in the package or packing different materials in the package does not result in a violation of §173.21;



- (8) The gross mass of the completed package does not exceed 29 kg (64 pounds);
- (9) The package is not opened or otherwise altered until it is no longer in commerce; and
- (10) The shipper certifies conformance with this section by marking the outside of the package with the statement "This package conforms to 49 CFR 173.4 for domestic highway or rail transport only."
- (b) A package containing a Class 7 (radioactive) material also must conform to the requirements of §173.421(a)(1) through (a)(5) or §173.424(a) through (g), as appropriate.**
- (c) Packages which contain a Class 2, Division 4.2 (PG I), or Division 4.3 (PG I) material conforming to paragraphs (a)(1) through (a)(10) of this section may be offered for transportation or transported if specifically approved by the Associate Administrator.**
- (d) Lithium batteries and cells are not eligible for the exceptions provided in this section.**

74 FR 2253, Jan. 14, 2009]

Title 49: Transportation

[PART 173—SHIPPERS—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS](#)

[Subpart A—General](#)

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§ 173.4a Excepted quantities.

(a) Excepted quantities of materials other than articles transported in accordance with this section are not subject to any additional requirements of this subchapter except for:

- (1) The shipper's responsibilities to properly class their material in accordance with §173.22 of this subchapter;
- (2) Sections 171.15 and 171.16 of this subchapter pertaining to the reporting of incidents; and
- (3) For a Class 7 (Radioactive) material the requirements for an excepted package.

(b) *Authorized materials* . Only materials authorized for transport aboard passenger aircraft and appropriately classed within one of the following hazard classes or divisions may be transported in accordance with this section:

- (1) Division 2.2 materials with no subsidiary hazard;
- (2) Class 3 materials;
- (3) Class 4 (PG II and III) materials except for self-reactive materials;
- (4) Division 5.1 (PG II and III);
- (5) Division 5.2 materials only when contained in a chemical kit or a first aid kit;
- (6) Division 6.1, other than PG I, Hazard Zone A or B material;
- (7) Class 7, Radioactive material in excepted packages
- (8) Class 8 (PG II and III), except for UN2803 (Gallium) and UN2809 (Mercury); and
- (9) Class 9, except for UN1845 (Carbon dioxide, solid or Dry ice), and lithium batteries and cells.

(c) *Inner packaging limits* . The maximum quantity of hazardous materials in each inner packaging is limited to:



(1) 1 g (0.04 ounce) or 1 mL (0.03 ounce) for solids or liquids of Division 6.1, Packing Group I or II or other materials that also meet the definition of a toxic material;

(2) 30 g (1 ounce) or 30 mL (1 ounce) for solids or liquids other than those covered in paragraph (c)(1) of this section; and

(3) For gases a water capacity of 30 mL (1.8 cubic inches) or less.

(d) Outer packaging aggregate quantity limits . The maximum aggregate quantity of hazardous material contained in each outer packaging must not exceed the limits provided in the following paragraphs. For outer packagings containing more than one hazardous material, the aggregate quantity of hazardous material must not exceed the lowest permitted maximum aggregate quantity. The limits are as follows:

(1) For other than a Division 2.2 or Division 5.2 material:

(i) Packing Group I—300 g (0.66 pounds) for solids or 300 mL (0.08 gallons) for liquids;

(ii) Packing Group II—500 g (1.1 pounds) for solids or 500 mL (0.1 gallons) for liquids;

(iii) Packing Group III—1 kg (2.2 pounds) for solids or 1 L (0.2 gallons) for liquids;

(2) For Division 2.2 material, 1 L (61 cubic inches); or

(3) For Division 5.2 material, 500 g (1.1 pounds) for solids or 250 mL (0.05 gallons) for liquids.

(e) Packaging materials . Packagings used for the transport of excepted quantities must meet the following:

(1) Each inner receptacle must be constructed of plastic, or of glass, porcelain, stoneware, earthenware or metal. When used for liquid hazardous materials, plastic inner packagings must have a thickness of not less than 0.2 mm (0.008 inch).

(2) Each inner packaging with a removable closure must have its closure held securely in place with wire, tape or other positive means. Each inner receptacle having a neck with molded screw threads must have a leak proof, threaded type cap. The closure must not react chemically with the material.

(3) Each inner packaging must be securely packed in an intermediate packaging with cushioning material in such a way that, under normal conditions of transport, it cannot break, be punctured or leak its contents. The intermediate packaging must completely contain the contents in case of breakage or leakage, regardless of package orientation. For liquid hazardous materials, the intermediate packaging must contain sufficient absorbent material that:

(i) Will absorb the entire contents of the inner packaging. In such cases, and

(ii) Will not react dangerously with the material or reduce the integrity or function of the packaging materials.

(iii) The absorbent material may be the cushioning material.

(4) The intermediate packaging must be securely packed in a strong, rigid outer packaging.

(5) Placement of the material in the package or packing different materials in the package must not result in a violation of §173.21.

(6) Each package must be of such a size that there is adequate space to apply all necessary markings.

(7) The package is not opened or otherwise altered until it is no longer in commerce.

(8) Overpacks may be used and may also contain packages of hazardous material or other materials not subject to the HMR subject to the requirements of §173.25.

(f) Package tests . The completed package as prepared for transport, with inner packagings filled to not less than 95% of their capacity for solids or 98% for liquids, must be capable of withstanding, as demonstrated by testing which is appropriately documented, without breakage or leakage of any inner packaging and without significant reduction in effectiveness:

(1) Drops onto a solid unyielding surface from a height of 1.8 m (5.9 feet):



(i) Where the sample is in the shape of a box, it must be dropped in each of the following orientations:

- (A) One drop flat on the bottom;
- (B) One drop flat on the top;
- (C) One drop flat on the longest side;
- (D) One drop flat on the shortest side; and
- (E) One drop on a corner at the junction of three intersecting edges.

(ii) Where the sample is in the shape of a drum, it must be dropped in each of the following orientations:

- (A) One drop diagonally on the top chime, with the center of gravity directly above the point of impact;
- (B) One drop diagonally on the base chime; and
- (C) One drop flat on the side.

(2) A compressive load as specified in §178.606(c) of this subchapter. Each of the tests in this paragraph (f) of this section may be performed on a different but identical package; that is, all tests need not be performed on the same package.

(g) Marking . Excepted quantities of hazardous materials packaged, marked, and otherwise offered and transported in accordance with this section must be durably and legibly marked with the following marking:



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(1) The “*” must be replaced by the primary hazard class, or when assigned, the division of each of the hazardous materials contained in the package. The “**” must be replaced by the name of the shipper or consignee if not shown elsewhere on the package.

(2) The symbol shall be not less than 100 mm (3.9 inches) x 100 mm (3.9 inches), and must be durable and clearly visible.

(h) Documentation . (1) For transportation by highway or rail, no shipping paper is required.

(2) For transport by air, a shipping paper is not required, except that, if a document such as an air waybill accompanies a shipment, the document must include the statement “Dangerous Goods in Excepted Quantities” and indicate the number of packages.

(3) For transport by vessel, a shipping paper is required and must include the statement “Dangerous Goods in Excepted Quantities” and indicate the number of packages.

(i) Training . Each person who offers or transports excepted quantities of hazardous materials must know about the requirements of this section.

(j) Restrictions . Hazardous material packaged in accordance with this section may not be carried in checked or carry-on baggage.



V. EXPORTING CHEMICALS AND CHEMICAL SUBSTANCES:

When certain chemical substances are exported or hand carried out of the United States, the EPA must be notified in writing. In some instances the notification is a "one time" notification and in other cases the EPA must be notified annually. If you are exporting or hand carrying a chemical to a foreign country, check the EPA Chemical Export Notification List (approximately 1,500 items) for which notification is required. This list can be found in a variety of formats and contains many common laboratory chemicals. If the chemical substance you are exporting is on the list a notification is necessary. Contact the DEHS for assistance in making the notification.

The Department of Transportation regulates the transport of chemicals and all packages of chemicals must be packed and labeled in accordance with their regulations prior to shipment. Contact the DEHS for assistance in packing the chemical substances you are shipping within or outside the United States

Current List of Chemical Substances Subject to TSCA Section 12(b) Export Notification Requirements

(Current as of October 24, 2008)

All of the chemical substances appearing on this list are subject to the Toxic Substances Control Act (TSCA) section 12(b) export notification requirements delineated at 40 CFR part 707, subpart D. The chemicals in the following tables are listed in one of four ways: by Chemical Abstracts Service (CAS) Registry Number; by Premanufacture Notification (PMN) number; by Low Volume Exemption (LVE) number; or by Accession Number.

TSCA Regulatory Actions Triggering Section 12(b) Export Notification

TSCA section 12(b) requires any person who exports or intends to export a chemical substance or mixture to notify the Environmental Protection Agency (EPA) of such exportation if any of the following actions have been taken under TSCA with respect to that chemical substance or mixture:

- (1) data are required under section 4 or 5(b),
- (2) an order has been issued under section 5,
- (3) a rule has been proposed or promulgated under section 5 or 6, or
- (4) an action is pending, or relief has been granted under section 5 or 7.

Other Section 12(b) Export Notification Considerations

The following additional provisions are included in the Agency's regulations implementing section 12(b) of TSCA (i.e. 40 CFR part 707, subpart D):

- (a) No notice of export will be required for articles, except PCB articles, unless the Agency so requires in the context of individual section 5, 6, or 7 actions.
- (b) Any person who exports or intends to export polychlorinated biphenyls (PCBs) or PCB articles, for any purpose other than disposal, shall notify EPA of such intent or exportation under section 12(b). PCBs and PCB articles have the definitions published in 40 CFR 761.3.
- (c) Any person who would be prohibited by a section 5 or 6 regulation from exporting a chemical substance or mixture, but who is granted an exemption by EPA to export that chemical substance or mixture, shall notify EPA under section 12(b) of such intent to export or exportation.
- (d) An exporter will be subject to possible enforcement action (including penalties) for not complying with the applicable provisions of section 12(b).



Disclaimer



This listing is intended simply as an information resource to facilitate compliance with TSCA section 12(b). While EPA has attempted to be as accurate as possible in compiling this list, exporters subject to the requirements of section 12(b) should be aware that this list may contain unintended errors or omissions, and that the absence of a chemical from this list does not mean that export of the chemical is exempt from section 12(b) reporting requirements. Exporters should be aware that they have an affirmative obligation to review the *Federal Register* for future publication of actions that may trigger section 12(b) reporting obligations. This list should not be relied upon in lieu of relevant *Federal Register* documents, orders, or the *Code of Federal Regulations*, and in the event of a conflict between this list and any *Federal Register* document, order, or the *Code of Federal Regulations*, this list will not be considered controlling. Exporters are encouraged to check this list from time to time, as EPA intends to revise it periodically, and will do so without prior public notice. EPA also encourages exporters or others to alert the Agency to any errors or omissions in the list. Comments can be sent to ccd.citb@epa.gov.

Notes:

1. Chemical substances subject to TSCA section 4 actions “sunset” after a specific period of time (see “Sunset Date/Status of TSCA Section 4 Testing, Reimbursement, and Reporting Requirements and TSCA Section 4-Triggered TSCA Section 12(b) Export Notification Requirements” at < <http://www.epa.gov/opptintr/chemtest/sunset.htm> > for the latest sunset table and further information). Be aware that a section 4 chemical that has “sunset” may also be the subject of another TSCA action triggering export notice requirements so that export notice may still be required.
2. In some instances, the CAS Registry Number originally cited has been revised or replaced by CAS since the issuance of the triggering TSCA action. Consequently, other information sources and indices may reference this “new” CAS number for the same chemical substance and may or may not cross-reference the originally cited CAS Registry Number contained in the TSCA regulatory action. Where EPA is aware of such changes, a cross-reference from the new CAS number to the originally published CAS number is provided.



Chemicals Subject to TSCA 12(b) Export Notification Requirements

as of February 29, 2008

Chemicals and categories without numeric identifiers

Name	TSCA Section	Comments
Alkylamine tetrachlorophenate	4	See 40 CFR parts 766 and 707.72 to determine the testing and export notification requirements for this chemical.
Asbestos	6	40 CFR 763.163 defines "asbestos" to mean the asbestiform varieties of chrysotile (serpentine); crocidolite (riebeckite); amosite (cummingtonite-grunerite); tremolite; anthophyllite; and actinolite. See 40 CFR Part 763 for further information regarding the restrictions for these substances and for products that contain or are made from these substances.
Fluoropolymer Composites	4	Only those composites identified specifically in the TSCA Section 4 Enforceable Consent Agreement (ECA); see 70 FR 39630 dated July 8, 2005, and 40 CFR 799.5025.
Fluorotelomer-Based Polymer Composites	4	Only those composites identified specifically in the TSCA Section 4 Enforceable Consent Agreement (ECA); see 70 FR 39624 dated July 8, 2005, and 40 CFR 799.5025.
Hexavalent chromium water treatment chemicals	6	Only those hexavalent chromium chemicals that can be used for water treatment, either alone or in any combination with other chemical substances when the mixture can be used to treat water cooling systems, trigger the TSCA section 12(b) export notification requirements. Other hexavalent chromium chemicals are not subject. Refer to 59 FR 42773 and 40 CFR 749.68. Examples of these hexavalent chromium chemicals are included in the CAS Registry Number table.
Lead- and zinc-containing fishing sinkers	6	See Proposed Rule (59 FR 11122, March 9, 1994). Includes export of lead- or zinc-containing fishing sinkers.
Nitrites of Group IA elements	5	See 40 CFR 721.4740. Individual nitrites may not necessarily be identified separately in the following tables.
Paper mill sludge	6	See Proposed Rule (56 FR 21802, May 10, 1991). Includes export of pulp and paper mill sludge or paper mill sludge. "Pulp and paper mill sludge or paper mill sludge means sludge generated during the treatment of process wastewater from chlorine and/or chlorine derivative bleaching processes. This includes products derived from such sludge (e.g., a mixture of such sludge and wood chips)."



12(b) Non-Confidential Chemicals Identified by CAS Registry Number

CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section
50-07-7	5	79-00-5	4	100-44-7	4	118-82-1	4	355-03-3	5
50-29-3	5	79-20-9	4	101-55-3	5	120-36-5	4	355-46-4	5
50-55-5	5	79-46-9	4	106-42-3	4	120-80-9	4	359-07-9	5
51-79-6	5	79-94-7	4	106-46-7	4	120-83-2	4	372-39-4	5
56-04-2	5	79-95-8	4	106-65-0	4	122-39-4	4	375-03-1	5
56-49-5	5	84-65-1	4	107-04-0	5	123-33-1	4	375-81-5	5
56-53-1	5	85-22-3	5	107-06-2	4	123-42-2	4	375-92-8	5
62-44-2	5	87-10-5	4	107-31-3	4	123-54-6	5	376-14-7	5
62-50-0	5	87-63-8	5	108-03-2	4	123-63-7	5	383-07-3	5
70-25-7	5	91-20-3	4	108-19-0	4	126-72-7	5	409-02-9	4
70-30-4	5	92-52-4	4	108-60-1	4	127-19-5	4	423-50-7	5
72-20-8	4	92-66-0	5	108-90-7	4	142-82-5	4	423-82-5	5
74-93-1	4	92-86-4	5	108-93-0	4	149-44-0	4	423-86-9	5
74-95-3	4	92-87-5	5	109-66-0	4	150-76-5	4	428-59-1	5
75-05-8	4	94-04-2	5	109-86-4	5	306-83-2	5	460-70-8	5
75-15-0	4	95-35-4 (see also 99-35-4)	5	109-99-9	4	307-35-7	5	460-92-4	5
75-35-4	4	95-69-2	5	110-12-3	4	307-51-7	5	488-47-1	4
75-36-5	4	95-77-2	4	110-44-1	4	320-72-9	4	531-85-1	5
75-70-7 (see also 594-42- 3)	4	95-94-3	5	110-49-6	5	335-24-0	5	547-68-2	5
75-88-7	5	95-95-4	4	110-80-5	5	335-71-7	5	573-58-0	5
76-01-7	5	98-29-3	4	111-15-9	5	335-77-3	5	576-24-9	4
77-73-6	4	99-28-5	4	111-84-2	4	335-97-7	5	583-78-8	4
78-11-5	4	99-35-4 (see also 95-35-4)	5	112-52-7	4	353-50-4	5	591-78-6	5
78-59-1	4	100-00-5	4	118-75-2	4	354-21-2	5	594-42-3 (see also 75-70-7)	4
78-87-5	4	100-01-6	4	118-79-6	4	354-25-6	5	608-71-9	4



12(b) Non-Confidential Chemicals Identified by CAS Registry Number

CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section
608-93-5	4	1511-62-2	5	2429-79-0	5	2991-52-8	5	4335-09-5	5
615-53-2	5	1649-08-7	5	2429-81-4	5	3052-70-8	5	4694-91-1	5
615-58-7	4	1652-63-7	5	2429-82-5	5	3083-25-8	5	5117-12-4	5
622-86-6	5	1660-95-3	5	2429-83-6	5	3089-19-8	5	5384-21-4	5
624-83-9	4	1690-76-2	5	2429-84-7	5	3107-18-4	5	5397-03-5	5
640-19-7	4	1691-99-2	5	2432-99-7	5	3132-64-7	5	5958-25-8	5
680-31-9	5	1705-60-8	5	2479-46-1	5	3165-93-3	5	6196-98-1	5
690-27-7	5	1737-93-5	5	2568-33-4	5	3377-92-2	5	6304-39-8	5
693-38-9	5	1763-23-1	5	2577-72-2	4	3389-71-7	5	6358-80-1	5
693-57-2	5	1869-77-8	4,5	2586-58-5	5	3397-65-7	5	6360-29-8	5
754-91-6	5	1885-48-9	5	2602-34-8	5	3530-19-6	5	6360-54-9	5
773-14-8	5	1888-71-7	5	2602-46-2	5	3567-65-5	5	6712-98-7	5
930-33-6	5	1893-52-3	5	2615-25-0	5	3626-28-6	5	6752-33-6	5
930-55-2	5	1937-37-7	5	2682-20-4	5	3772-94-9	4	6921-17-1	5
931-35-1	5	1940-42-7	4	2682-49-7	5	3811-71-0	5	7345-69-9	5
933-75-5	4	2052-07-5	5	2706-91-4	5	3820-83-5	5	7439-97-6	5
1116-54-7	5	2113-57-7	5	2716-10-1	5	3871-50-9	5	7446-14-2	5
1129-42-6	5	2146-71-6	5	2716-12-3	5	3871-99-6	5	7738-94-5	6
1163-19-5	4	2250-98-8	5	2795-39-3	5	3872-25-1	5	7758-97-6	5
1187-03-7	5	2263-09-4	5	2840-00-8	5	3971-28-6	5	7775-11-3	6
1324-76-1	4	2302-97-8	5	2893-80-3	5	3984-22-3	5	7778-50-9	6
1333-82-0 (see also 1333-83-0)	6	2362-14-3	5	2941-64-2	4	4080-98-2	5	7789-00-6	6
1333-83-0 (see also 1333-82-0)	6	2368-80-1	5	2965-52-8	5	4151-50-2	5	7789-99-3	5
1336-36-3	6	2417-04-1	5	2991-50-6	5	4161-22-2	5	8005-02-5	4
1489-69-6	5	2429-73-4	5	2991-51-7	5	4162-45-2	4	8014-91-3	5



12(b) Non-Confidential Chemicals Identified by CAS Registry Number

CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section
8068-03-9	5	13530-65-9	6	21160-95-2	5	37853-59-1	4	55120-77-9	5
10190-55-3	5	13530-68-2	6	21807-69-2	5	37853-61-5	4	55205-38-4	4
10192-46-8	5	13654-09-6	5	21850-44-2	4	38006-74-5	5	55910-10-6	5
10588-01-9	6	14018-95-2	6	22094-81-1	5	38850-52-1	5	56372-23-7	5
11103-86-9	6	14035-94-0	5	22094-83-3	5	38850-58-7	5	56553-60-7	5
12027-96-2	5	14650-24-9	5	22094-85-5	5	38850-60-1	5	56773-42-3	5
12031-65-1	5	14720-55-9	5	22576-65-4	5	39142-28-4	5	56875-68-4	5
12032-75-6	5	15827-56-2	5	23153-23-3	5	39290-90-9	5	57589-85-2	5
12036-37-2	5	15930-94-6 (see also 153936-94-6)	6	24307-26-4	5	39318-30-4	5	58576-98-0	5
12049-47-7	5	16068-37-4	5	24448-09-7	5	40088-47-9	5	58577-08-5	5
12056-51-8	5	16071-86-6	5	24924-36-5	5	41088-52-2	5	58857-49-1	5
12057-17-9	5	16079-88-2	5	25013-15-4	4	41240-76-0	5	58920-31-3	5
12141-67-2	5	16096-31-4	5	32315-10-9	5	43048-08-4	5	59071-10-2	5
12163-45-0	5	16298-38-7	5	32534-81-9	4,5	50598-28-2	5	59447-55-1	5
12175-02-9	5	16532-79-9	4	32536-52-0	4,5	50598-29-3	5	59789-51-4	5
12230-80-7	5	17202-41-4	5	32539-16-5	5	50622-20-3	5	60270-55-5	5
12232-96-1	5	18241-31-1	5	34415-31-1	5	51032-47-4	5	60466-61-7	5
12438-71-0	5	18934-00-4	5	34455-03-3	5	51160-97-5	5	60825-27-6	5
12510-42-8	5	19019-43-3	5	34590-94-8	4	51851-37-7	5	61577-14-8	5
12656-57-4	5	19201-36-6	5	34621-99-3	5	51868-46-3	5	61660-12-6	5
12656-85-8	5	19372-44-2	5	35544-45-7	5	52032-20-9	5	62435-71-6	5



CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section
12709-98-7	5	19721-22-3	5	36483-60-0	5	67939-98-4	5	68259-15-4	5
13169-90-9	5	19829-42-6	5	37338-48-0	5	67940-02-7	5	68259-38-1	5
13417-01-1	5	20138-28-7	5	52166-82-2	5	67969-65-7	5	68259-39-2	5
13439-89-9	5	21055-88-9	5	52495-71-3	5	67969-69-1	5	68298-06-6	5
66008-68-2	5	25327-89-3	4	52550-45-5	5	68081-83-4	5	68298-08-8	5
66008-69-3	5	25608-40-6	5	54423-67-5	5	68084-62-8	5	68298-09-9	5
66008-70-6	5	26172-55-4	5	63936-56-1	5	68156-00-3	5	68298-10-2	5
66988-04-3	5	26694-69-9	5	64712-27-2	5	68156-01-4	5	68298-11-3	5
67584-42-3	5	27603-25-4	5	64723-18-8	5	68156-06-9	5	68298-13-5	5
67584-48-9	5	27610-48-6	5	65992-66-7	5	68156-07-0	5	68298-60-2	5
67584-49-0	5	27753-52-2	5	67906-71-2	5	68227-87-2	5	68298-62-4	5
67584-50-3	5	27858-07-7	5	67906-73-4	5	68227-94-1	5	68298-78-2	5
67584-52-5	5	27936-88-5	5	67906-74-5	5	68227-96-3	5	68298-80-6	5
67584-53-6	5	28554-31-6	5	67923-61-9	5	68227-97-4	5	68298-81-7	5
67584-54-7	5	29081-56-9	5	67939-36-0	5	68227-98-5	5	68298-89-5	5
67584-56-9	5	29091-20-1	5	67939-37-1	5	68227-99-6	5	68299-20-7	5
67584-57-0	5	29117-08-6	5	67939-42-8	5	68239-72-5	5	68299-21-8	5
67584-58-1	5	29457-72-5	5	67939-61-1	5	68239-73-6	5	68299-29-6	5
67584-60-5	5	30025-38-8	5	67939-87-1	5	68239-74-7	5	68299-39-8	5
67584-61-6	5	30381-98-7	5	67939-88-2	5	68239-75-8	5	68310-02-1	5
67584-62-7	5	30486-37-4	5	67939-90-6	5	68259-06-3	5	68310-17-8	5
67906-38-1	5	30813-81-1	5	67939-92-8	5	68259-07-4	5	68310-75-8	5
67906-40-5	5	31506-32-8	5	67939-93-9	5	68259-08-5	5	68318-34-3	5



CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section
67906-41-6	5	31775-16-3	5	67939-94-0	5	68259-09-6	5	68318-36-5	5
25245-34-5	5	36177-92-1	5	67939-96-2	5	68259-12-1	5	68329-56-6	5
25268-77-3	5	36355-01-8	5	67939-97-3	5	68259-14-3	5	68391-09-3	5
CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section
68541-01-5	5	68957-32-4	5	73019-28-0	5	90194-13-1	5	105658-30-8	5
68541-02-6	5	68957-53-9	5	73038-33-2	5	90884-29-0	5	148124-42-9	5
68541-80-0	5	68957-54-0	5	73231-04-6	5	91081-99-1	5	148240-78-2	5
68555-69-1	5	68957-55-1	5	73275-59-9	5	91144-26-2	5	148240-80-6	5
68555-70-4	5	68957-57-3	5	73772-32-4	5	91788-83-9	5	148240-81-7	5
68555-71-5	5	68957-58-4	5	73772-33-5	5	92044-87-6	5	148240-82-8	5
68555-72-6	5	68957-60-8	5	73772-34-6	5	92484-07-6	5	148373-01-7	5
68555-73-7	5	68957-61-9	5	75405-06-0	5	93072-06-1	5	148684-79-1	5
68555-74-8	5	68957-62-0	5	77939-50-5	5	93589-69-6	5	149303-87-7	5
68555-75-9	5	68957-63-1	5	77986-14-2	5	94054-35-0	5	149564-65-8	5
68555-76-0	5	68958-60-1	5	78245-94-0	5	94133-90-1	5	151686-36-1	5
68555-78-2	5	68958-61-2	5	78543-39-2	5	94148-67-1	5	151717-27-0	5
68555-79-3	5	69938-76-7	5	79710-86-4	5	94213-53-3	5	152007-82-4	5
68555-81-7	5	70225-14-8	5	79771-08-7	5	94317-64-3	5	153280-11-6	5
68555-90-8	5	70225-15-9	5	79771-09-8	5	94933-05-8	5	153454-44-5	5
68555-91-9	5	70225-16-0	5	80584-91-4	5(f),6	95590-48-0	5	153590-17-1	5
68555-92-0	5	70225-17-1	5	80584-92-5	5(f),6	96152-42-0	5	153699-23-1	5
68568-77-4	5	70225-20-6	5	81190-38-7	5	96478-09-0	5	153936-94-6 (see also 15930-94-6)	6
68586-14-1	5	70225-24-0	5	81711-69-5	5	96549-95-0	5	155613-93-7	5
68608-13-9	5	70225-26-2	5	82799-44-8	5	98999-57-6	5	156294-54-1	5
68608-14-0	5	70248-52-1	5	83048-65-1	5	99636-32-5	5	157627-99-1	5
68611-64-3	4	70776-36-2	5	83748-27-0	5	99742-80-0	5	157707-95-4	5
68649-26-3	5	70900-40-2	5	83748-28-1	5	100402-91-3	5	159574-72-8	5
68797-76-2	5	71463-74-6	5	84268-08-6	5	100545-50-4	5	158948-13-1	5
68815-72-5	5	71463-78-0	5	85029-61-4	5	100912-15-0	5	160901-25-7	5
68867-60-7	5	71463-79-1	5	85137-09-3	5	101646-62-2	5	161717-32-4	5
68867-62-9	5	71463-80-4	5	85204-21-3	5(f),6	101646-63-3	5	163206-28-8	5
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68891-97-4	5	71526-07-3	5	85712-27-2	5	103490-06-8	5	163292-61-3	5
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68891-99-6	5	72804-49-0	5	86273-46-3	5	103580-64-9	5	163436-84-8	5
68909-15-9	5	73018-93-6	5	86917-58-0	5	103697-96-7	5	163879-69-4	5
68928-80-3	5	73019-19-9	5	87676-07-1	5	104503-68-6	5	163961-26-0	5
68957-31-3	5	73019-20-2	5	89610-32-2	5	105362-40-1	5	163961-34-0	5



CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section	CAS NUMBER	TSCA Section
164383-18-0	5	199487-82-6	5	290364-23-7	5	477725-72-7	5		
166432-57-1	5	200443-94-3	5	290364-24-8	5	591773-92-1	5		
166432-58-2	5	201167-69-3	5	297175-71-4	5	595585-15-2	5		
166514-73-4	5	201687-58-3	5	300371-38-4	5	671756-61-9	5		
167412-23-9	5	202483-48-5	5	306973-46-6	5	676143-36-5	5		
168113-88-0	5	203809-20-5	5	306973-47-7	5	863132-14-3	5		
168811-65-2	5	204336-40-3	5	306974-19-6	5				
170678-69-0	5	204401-83-2	5	306974-28-7	5				
174254-18-3	5	205764-98-3	5	306974-45-8	5				
174305-36-3	5	206009-82-7	5	306974-63-0	5				
174333-80-3	5	206886-68-2	5	306975-56-4	5				
174489-43-1	5	208408-03-1	5	306975-57-5	5				
174489-76-0	5	210181-71-8	5	306975-62-2	5				
174974-45-9	5	211389-36-5	5	306975-84-8	5				
175205-96-6	5	211578-04-0	5	306975-85-9	5				
177528-09-5	5	211578-08-4	5	306976-25-0	5				
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178452-72-7	5	212335-62-1	5	306977-10-6	5				
178535-22-3	5	215856-72-7	5	306977-58-2	5				
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182635-99-0	5	216593-54-3	5	332350-93-3	5				
182970-05-4	5	216593-55-4	5	333784-10-4	5				
183562-46-1	5	216977-01-4	5	333955-69-4	5				
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184785-38-4	5	220075-01-4	5	333955-79-6	5				
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193635-72-2	5	251099-16-8	5	391232-99-8	5				
195008-77-6	5	251553-55-6	5	406207-51-0	5				
196109-17-8	5	253685-23-3	5	452082-53-0	5				
196521-82-1	5	258839-39-3	5	474095-58-4	5				
197527-19-8	5	259871-68-6	5	477218-59-0	5				

