



Conserve O Gram

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Handling And Shipping Cellulose Nitrate Film

Cellulose nitrate motion picture and still photographic film self-destruct at an unpredictable rate over time unless stored at a very low temperature and appropriate relative humidity. Nitrate becomes acidic as it deteriorates and reacts with water in the air. These gases are deep lung irritants. Repeated exposure may cause eye irritation, rashes and sores on the face and skin, vertigo, nausea, headaches, swollen glands, and respiratory irritation.

Nitrate oxide gases from nitrate film also damage surrounding museum materials, causing embrittlement of paper and film and cumulative damage to many organic materials. Deteriorated nitrate film is highly flammable and capable of burning under water. Nitrate fires are almost impossible to put out. Nitrate is not an appropriate material for placement in general museum, archival, library, or office storage. See *Conserve O Gram* 14/8, "Caring for Cellulose Nitrate Film," for further information.

Most collections of motion picture and still negative materials dating from the 1910s to the 1950s contain nitrate. The primary method of preserving nitrate is duplicating the original image onto safety film. For guidance, see *Conserve O Grams* 19/10-19/13, which explain how to prioritize materials for reformatting, select a copy technology, contract for reformatting, and inspect the resulting duplicates.

Methods of Transport

Use Federal Express (FedEx) to ship nitrate negatives (stills) and United Parcel Service (UPS) to ship motion picture film. You must adhere to the following guidelines when using a commercial carrier. There are strict regulations regarding the shipment of cellulose nitrate-based goods.

Packaging Nitrate Film for Shipment

The U.S. Department of Transportation (DOT) has classified cellulose nitrate film as a hazardous material. Title 49, Code of Federal Regulations (49CFR), Parts 100 through 185, govern the transportation of hazardous materials. **All commercial shipments** of cellulose nitrate film must be in accordance with the Hazardous Materials Regulations (HMR) found in parts 171 through 180 of Title 49, CFR.

According to 49CFR, you **CANNOT** offer a shipment of hazardous materials (such as cellulose nitrate film) to a commercial carrier (FedEx, UPS, etc.) for transportation unless it has been packaged, labeled, and prepared for shipment in accordance with the Hazardous Materials Regulations. **You cannot ship hazardous materials using the U.S. Postal Service.**

The Hazardous Materials Regulations require the following:

- All packages and containers that you use for shipping by commercial carrier must meet the requirements of the HMR.
- Individuals that pack and prepare shipping papers must take hazardous materials (HAZMAT) training.

If no one at your park has received hazardous materials training, you can ship cellulose nitrate film using a:

- **Commercial carrier.** If you use a commercial carrier, you must first either:
 1. Hire the services of a HAZMAT packaging contractor. The contractor will prepare your package for shipment according to the HMR. The contractor will forward your shipment to the carrier. Contractors usually charge a base rate plus another fee per package. Companies that offer these services are usually located near large airports. They are listed in the telephone book under "Packaging" and/or "Packing and Crating." **-OR-**
 2. Complete the required hazardous materials training course. Once you have completed the training you can legally pack your own nitrates for commercial transport. There are two training options:
 - a) Attend a HAZMAT training course offered by FedEx, the International Air Transport Association (IATA) or other companies

and organizations. Classes usually take 3-4 days and fees vary.

- b) Obtain the CD-Rom HAZMAT training module available from the DOT (see sources following). The CD-Rom features a self-paced interactive training course that meets the requirements of the HMR. The CD-Rom course takes approximately 3 days to complete.

Note: HAZMAT training is labor-intensive and can be expensive. Parks are encouraged to utilize a HAZMAT packing contractor to prepare nitrate shipments.

Handling and Working with Nitrate

<i>DO...</i>	<i>DON'T...</i>
Set up a work area in a cool, well-ventilated space far from office areas and collections:	Work in this space with nitrates for more than 2-3 hours daily.
<ul style="list-style-type: none"> • Gather necessary equipment, supplies, and tools before you begin. • Plan how you will handle, pack, and ship nitrate before you begin. 	Wait until you are ready to ship the material to begin inventorying it, housing it, and packing it.
<ul style="list-style-type: none"> • Obtain a fan if workspace is poorly ventilated. • Position the airflow from a large floor fan so that it blows directly on you and towards an air intake vent. 	Use an old or damaged fan. Make sure that the fan is in good condition with no electrical shorts that might cause a nitrate fire.
<ul style="list-style-type: none"> • Wear vinyl or latex gloves and a long-sleeved, washable smock for protection when handling nitrate. • Wash gloves with a mild soap and rinse thoroughly at the end of the day or each time you take them off. • Wash smocks at least weekly. 	<ul style="list-style-type: none"> • Touch your eyes or skin with contaminated gloved hands. • Re-use dirty and contaminated gloves.
Wear a rated breathing apparatus, such as a respirator, if you notice any breathing difficulties or build-up of odor in the workspace.	Neglect to read <i>Conserve O Gram 2/13, An Introduction to Respirator Use in Collections Management</i> .
Wear goggles if ventilation is poor or if your eyes are sensitive to nitrate fumes.	Wear contact lenses while working with nitrate. Gases may concentrate and build up under your contacts causing eye injury and contact lens deterioration.
Work on a surface that is either easily washable or use layers of clean non-printed newsprint paper that can be ripped off and disposed of at the end of the day.	Forget to wash your work surface daily with a solution of one teaspoon baking soda to one pint of water to neutralize the acid from the nitrate.
Maintain a log of who works with nitrate and when. Document any problems in the space including odors, discomfort, or ill effects noticed.	Continue working with nitrate if you experience any health problems including breathing, skin, or eye problems. Stop immediately and contact the park safety officer and your doctor.
Select which nitrates deserve duplication based upon: <ul style="list-style-type: none"> • Your Scope of Collections statement. • The degree of deterioration. • The value, use, and risk of the material (see <i>Conserve O Gram 19/10</i>). 	<ul style="list-style-type: none"> • Automatically reformat everything that is nitrate. Instead, take the time to evaluate your collection. • Attempt to ship or reformat nitrate that has a flowing (soft and slipping) or powdery image area. Instead, deaccession and dispose of these items as hazardous waste after talking with your regional/SO curator.

Preparing Nitrate Photographic Negatives (Stills) For Shipment

<i>DO...</i>	<i>DON'T...</i>
<ul style="list-style-type: none"> Acquire the appropriate type and number of envelopes that will accommodate each individual nitrate negative. Use only buffered (high calcium carbonate reserve) four-fold envelopes. Buffering will help neutralize the acid. Label each envelope with captions and control numbers for each negative. Place one negative in each envelope. Make sure the label and negative numbers match. Place the envelopes in the smallest box possible. You may put up to 100 negatives within a single small box. 	<ul style="list-style-type: none"> Use plastic or unbuffered housing or sleeves for nitrate negatives. Wait until the negative is in the envelope to label it. This may damage the image. Use sleeves that require you to slide the image, as they may cause further damage if the emulsion is soft. Pack more than 100 nitrate negatives within a single small box.
<ul style="list-style-type: none"> If you have taken the required HAZMAT training, pack the film for shipping according to the HMR. If you have not taken HAZMAT training, find a HAZMAT contractor to finish packing nitrate negatives for shipment with a commercial carrier. 	<ul style="list-style-type: none"> Package nitrate negatives for commercial shipment without proper HAZMAT training. It is against the law.

Preparing Nitrate Motion Picture Film For Shipment

<i>DO...</i>	<i>DON'T...</i>
<ul style="list-style-type: none"> Place each roll of motion picture film inside a secure, uncorroded film can. Add packing materials if the film does not fit snugly. Place film cans in a well-cushioned box for temporary transport to a HAZMAT packaging contractor. 	<ul style="list-style-type: none"> Forget to use ample cushioning materials in film cans and temporary transport box. This will reduce the chance for damage to the original nitrate film.
<ul style="list-style-type: none"> If you have taken the required HAZMAT training, pack the film for shipping according to the HMR. If you have not taken HAZMAT training, find a HAZMAT contractor to finish packing nitrate negatives for shipment with a commercial carrier. 	<ul style="list-style-type: none"> Package nitrate motion picture film for commercial shipment without proper HAZMAT training. It is against the law.

Note: As previously mentioned, **ALL** cellulose nitrate films and negatives must be packaged and labeled for commercial shipment by someone with HAZMAT training in accordance with the Hazardous Materials Regulations.

Shipping Nitrate Film

<i>DO...</i>	<i>DON'T...</i>
<p>PREFERRED OPTIONS:</p> <ul style="list-style-type: none"> • Use the services of a HAZMAT packaging contactor and ship via a commercial carrier. 	<ul style="list-style-type: none"> • Pack nitrate film for commercial shipment unless you have taken HAZMAT training. • Ship nitrate film via the U.S. Postal Service; this is prohibited by law.
<p>LEAST PREFERRED OPTION:</p> <ul style="list-style-type: none"> • Complete HAZMAT training and pack nitrates according to the HMR yourself. 	<ul style="list-style-type: none"> • Offer a shipment of cellulose nitrate film to a commercial carrier unless it has been packaged, labeled, and prepared for shipment according to the HMR.
<p>Call the recipient to let them know when to expect the shipment.</p> <p>Keep a log documenting:</p> <ul style="list-style-type: none"> • All nitrates shipped, dates received by reformatting agency, dates returned with duplicates. • Actions taken to inspect and rehouse the materials. • Ultimate disposition of the original nitrate after the duplicates pass inspection. <p>To ensure against loss, require the contractor to ship original nitrates one day and the duplicates the following day.</p>	<ul style="list-style-type: none"> • Allow contractors to house or ship nitrate negatives and duplicates together. Shipping nitrates and duplicates separately will prevent contact, contamination and the potential to lose all copies of your photos in the case of a shipping accident. • Reuse nitrate housing and packing materials for any other purposes since they will be contaminated. However, you can reuse these materials with future shipments of original nitrate film.

Hazardous Materials Information and Training Sources

Note: The websites listed below are outdated, check with your Regional or Chief Curator for additional information.

HAZMAT training modules and CD-ROMs are available for purchase (\$25) in a variety of formats from the Office of Hazardous Materials Safety:

<http://diy.dot.gov/hazmat>

United States Department of Transportation
Websites:

<http://hazmat.dot.gov/>

<http://hazmat.dot.gov/training.htm>

International Air Transport Association (IATA)
<http://www.iata.org/dangerousgoods>

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The series is distributed to all NPS units and is available to non-NPS institutions and interested individuals on line at <http://www.cr.nps.gov/museum/publications/conservo-gram/cons_toc.html>. For further information and guidance concerning any of the topics or procedures addressed in the series, contact NPS Museum Management Program, 1849 C Street NW (2265), Washington, DC 20240; (202) 354-2000.