



High-Density Mobile Storage:

Risk Management in Museums

Proven solutions for museums, archives, and special collections.



Insights from decades of collections care.

Knowing the value museum exhibits provide to their patrons, institutions are exploring new ways to respond effectively to fires, flooding, and other disasters in collections storage areas. In addition, they are uncovering methods to mitigate damage caused by everyday challenges like overcrowding, chemical deterioration, and exposure to light.

The following guides draw from our nearly 50 years of working with museum professionals to find creative ways to manage risk, optimize space, and ultimately provide the very best preservation environments for all types of collections.





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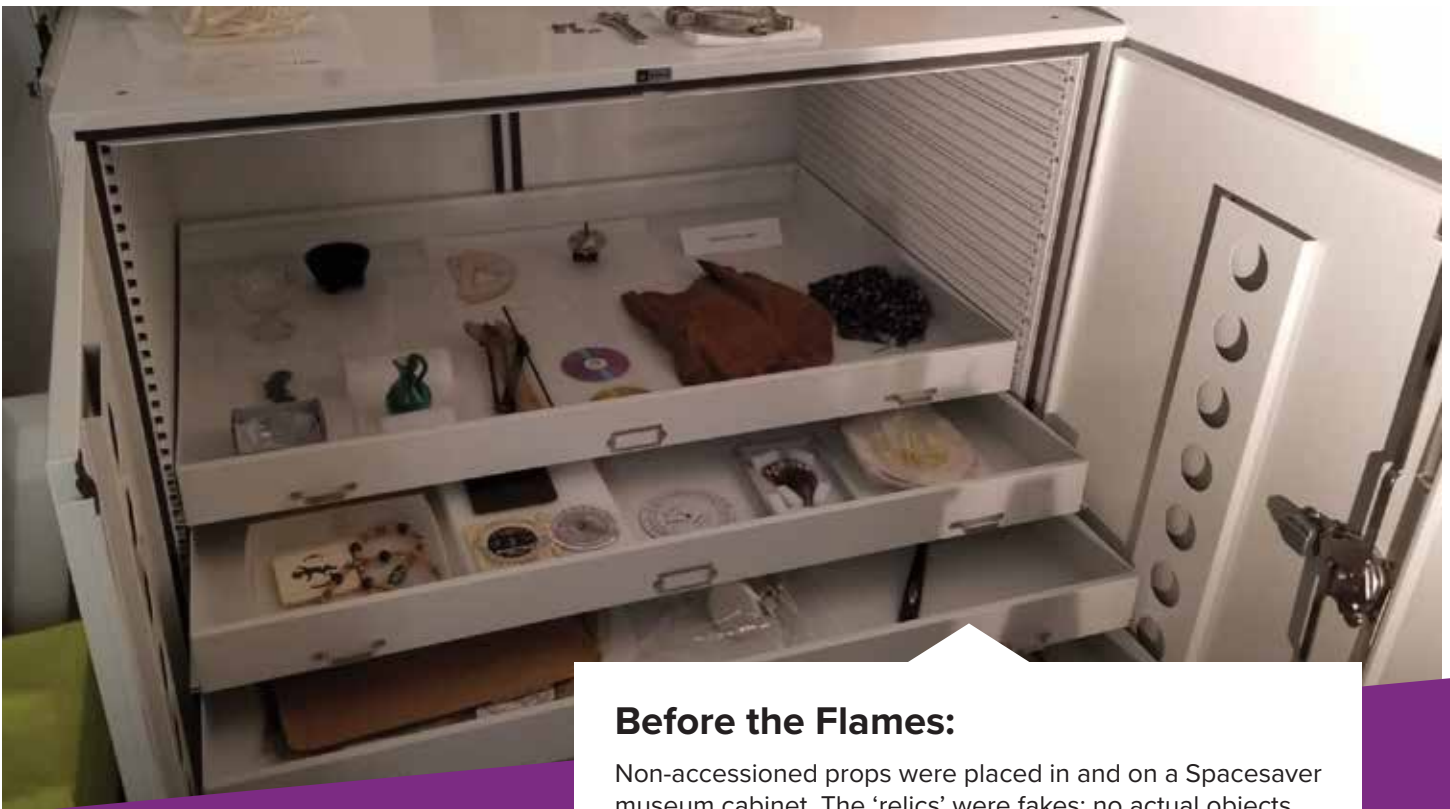
CHAPTER 1

Disaster Recovery Training

In the aftermath of a disaster like a fire or earthquake, personnel need to respond as efficiently as possible to minimize damage that might have impacted collections. Preparedness training helps responders not only preserve collections, but also minimize their physical risk and manage psychological distress. By learning best practices and establishing detailed procedures, museum professionals can help ensure that collection objects are recovered and preserved.

'HOLY SMOKES' WORKSHOP

The “Holy Smokes! Fire Recovery Workshop” was held at the National Fire Research Laboratory near Washington D.C. in late 2018. With the goal of allowing trainees to experience a fire in person and actually handle damaged artifacts, the workshop organizers created a realistic set-up of a museum’s collections storage area. They safely set a fire in a chamber and helped participants document, assess, and salvage items in the aftermath.



Before the Flames:

Non-accessioned props were placed in and on a Spacesaver museum cabinet. The ‘relics’ were fakes; no actual objects from collections were used in the burn chamber.

Photo: Ben Adamitus / Spacesaver



The Aftermath

After the fire was extinguished, workshop participants were organized into teams to process the fake 'artifacts' that were recovered from the burn chamber.

Photo: J. Stoughton/NIST

Although the exterior of the cabinet reached at least 1000 degrees F, the Spacesaver cabinet suffered only minor damage and all objects that were stored inside remained intact. The corrugated panel appears to have acted as a buffer between the extreme heat on the cabinet's exterior and the objects stored inside. The backside of the corrugated panel had residue deposits but showed no signs of deformation or loss of coating.



Photo: Ben Adamitus / Spacesaver

Evaluating Cabinet Performance

Although the primary goal of the workshop was to help participants feel more confident in dealing with the effects of a fire, here at Spacesaver we were eager to see how our sealed cabinet would perform under extreme conditions. Following initial evaluation on-site, the cabinet was returned to our headquarters in Wisconsin.



Fully Functional

All cabinet handle and locking mechanisms remained fully secure & operational.

No Water Damage

Review from the salvage team and thorough evaluation at our facility showed no signs of water damage inside the cabinet.



CHAPTER 2

Preventing Overcrowding & Dissociation

In the aftermath of a disaster like a fire or earthquake, personnel need to respond as efficiently as possible to minimize damage that might have impacted collections. Preparedness training helps responders not only preserve collections, but also minimize their physical risk and manage psychological distress. By learning best practices and establishing detailed procedures, museum professionals can help ensure that collection objects are recovered and preserved.



CREATING AN OPTIMAL ENVIRONMENT

We specialize in helping museums and other institutions manage risk related to overcrowding. Here's 5 steps to help you create your collections uncrowding plan:



1. Conduct a Space Assessment

Contact your local Spacesaver consultant, who will come over to obtain accurate measurements of your existing equipment as well as a variety of structural features, including ceiling heights, sprinkler placement, columns, ductwork, and more.

2. Conduct a Collections Assessment

Assess current storage volumes for various collections, along with projected growth rates. Make special note of any particularly large, heavy, or odd-sized objects or objects that need extra-special care. A spreadsheet is invaluable for keeping this information all in one place, and a column can be added to specify the collections equipment needed for each category.



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3. Evaluate Existing Equipment

If your existing equipment is in good condition, we can help incorporate it into new systems. For example, we designed cabinets and compactor systems that would allow the entomology department at the Field Museum to repurpose many of their existing specimen drawers while also creating more space for specimens.



4. Create Sketches and Drawings

After we know more about your space and your collections, we can develop detailed plans for uncrowding your collections care area. Clients often use our drawings to help secure funding, because potential donors can instantly see how uncrowding will help manage the risk of loss or dissociation.



5. Consider configurability

If new storage equipment is needed, be sure to consider configurability as you evaluate your options. Configurable equipment refers to cabinets, textile racks, shelving, and even compactor systems that can be changed over time to make room for new acquisitions or items on loan while also improving organization, efficiency, and access for staff and researchers.



Configurability in Action:

Faculty and staff at this university's art gallery had been using a textile roll racking system that was so difficult to adjust that they had to call in the facilities and maintenance department when they wanted to remove or add rolls to it. We helped them design and install a system that they can reconfigure without special tools, allowing them to save time and protect collections while also making room for new acquisitions. **That means better collections care and better alignment with the institution's mission.**





CHAPTER 3

Cold Storage:

Protecting Collections from Chemical Deterioration

Coolers and freezers provide the best possible preservation environment for film and a variety of other materials, so they're essential components of most museums' risk management strategies. Cold storage is expensive to build and operate, though, so it's essential to understand the needs of various materials in your collection and carefully plan for the move to cold storage.



What needs to be stored in cool or cold conditions?

Negatives (glass plate negatives, sheet film, roll film)

Slides (or any type of transparency)

Motion Picture Film and Videotape

Microfilm and Microfiche

X-Ray Film

Photographic Prints

NOTE: Cellulose nitrate film is flammable and has additional fire code requirements in addition to cold storage. Learn more about how to identify cellulose nitrate in our cold storage planning guide.

How to plan and implement a move to cold storage

Cold storage is expensive storage. You can keep building costs and operating costs down by planning carefully and making the most of every square inch. Here's an overview of how to plan your cold storage space.

1. Assess Collection

Identify materials that need cold storage and sort by items that need cold storage, frozen storage, or typical archival storage. Measure the amount of space required to store items that currently need to be maintained in cold storage and frozen storage, and add curators' estimates for future space needs.



2. Develop a Usage Policy & Procedure

Describe how researchers and others will request access to stored materials, who will be entrusted with access to cold storage areas, where and how materials will be acclimated as they are brought into and out of cold storage, and where and how researchers will be allowed to study materials after they're brought out of storage.



3. Determine Where Items Will Be Stored

Smaller collections can be stored in refrigerators or freezers, but be sure to use models that maintain a constant temperature. Medium-sized collections can be stored on shelving or museum cabinets housed in small walk-in coolers. Larger collections are generally stored in compactors housed in purpose-built cold rooms and walk-in freezers.



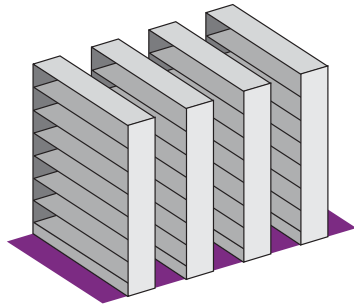
4. Create a Plan for Moving to Cold Storage

Work with vendors to coordinate delivery and installation dates, and determine who will be responsible for scanning (if desired), cataloging, acclimatizing, and moving items. Determine procedures to monitor temperature and relative humidity, and prominently post contact information for vendors in case of refrigeration equipment or humidity control malfunction

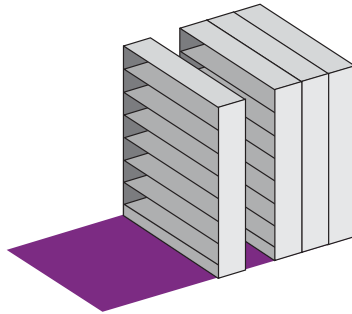


5. Optimize Space within the Cool Room or Freezer

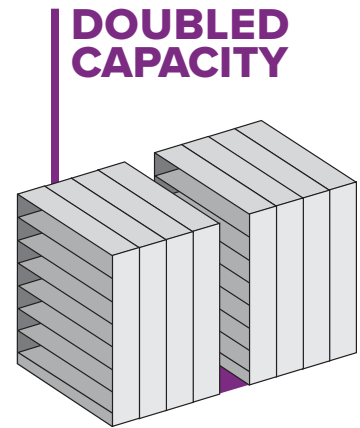
Adjust shelving to avoid wasting space between shelves, and keep in mind that compactors consolidate materials into a smaller space. Installing our high density shelving in your cold storage space can double the usable storage space without expanding your room size, maximizing space efficiency.



Static shelving sections waste space between aisles.



Mobile sections double space by compacting aisles.



Maximize your capacity with additional carriages.



Planning is Key

Cold storage is expensive, but it doesn't have to be out of reach for your institution. Careful preparation and planning can help build a system that ensures materials are preserved for future generations – and that there's room to grow in the future.



CHAPTER 4

Creative Ways to Limit Light Exposure

Limiting unnecessary light exposure is always a major concern as museums seek to balance collection preservation with access to collections. Even dim lighting affects delicate materials, so lighting should be a significant consideration of any institution's risk management strategy for collections storage areas. Here are 6 creative ways to limit light exposure in your museum collections areas.



HOW TO LIMIT LIGHT EXPOSURE IN COLLECTIONS AREAS:

1. Block Windows

Most modern collections storage areas are windowless, but if your collections storage area is in an historic building, you'll need to block window light with shades and heavy curtains, or you might be able to board them up entirely. Be sure to check with your facility's building manager first to maintain compliance with egress codes.



2. Consider Automatic Aisle Lights

If you're planning a collections area renovation and are considering compact storage (shelves that slide on rails), opt for automatic aisle lights. These LED lighting fixtures illuminate when an aisle in a compactor system is opened, and they turn off automatically when the aisle is closed.



3. Consider Sliding Art Racks

Some museums are incorporating visible storage areas, which double as public viewing areas and storage. In this museum, sliding art racks offer visitors a glimpse into the collection while allowing museum staff to control which paintings are exposed to light. In addition to protecting the works from unnecessary light exposure, this solution also minimizes the risks inherent to handling and transport. That's because the entire racks are moved instead of moving individual paintings (paintings are generally hung on the art racks and left in the same place).

4. Determine the Acceptable Light Levels

Some materials, like stone, metal, and glass, are unaffected by light exposure, while others will degrade quickly if exposed to light. This chart, developed by the Conservation Center for Art and Historic Artifacts, shows recommended light levels for various materials in storage and work areas.

Light Levels for Exhibition* Space:

Material	Visible Light Level	Ultraviolet Light
<ul style="list-style-type: none"> Fragile Paper Silk Albumen & Tinted Photographs Sensitive Pigments & Dyes 	5 Footcandles 50 Lux for 3 Months or Less	< 75 u/lum**
<ul style="list-style-type: none"> Watercolors Paintings with Organic Pigments and Dyes Textiles in Poor Condition or with Organic Dyes Colored Papers 	5 Footcandles 50 Lux for 6 Months or Less	< 75 u/lum**
<ul style="list-style-type: none"> Paintings with Mineral Pigments Paper in Good Condition Pastels Textiles in Good Condition or with Aniline Dyes Dyed Leather Photographs Pencil Drawings Tempera Paintings 	5-10 Footcandles 50-100 Lux for 12 Months or Less	< 75 u/lum**
<ul style="list-style-type: none"> Ivory and Bone Wood Oil Paintings Undyed Leather Enamel 	5-15 Footcandles 50-150 Lux for 24 Months or Less	< 75 u/lum**
<ul style="list-style-type: none"> Stone Metal Glass Ceramics 	Unlimited	Unlimited

Light Levels for Storage Space

Storage	1-5 Footcandles, 10-50 Lux	< 75 u/lum*
Reading & Work Areas	30-60 Footcandles, 330-660 Lux	< 75 u/lum*

Chart sourced from the Conservation Center for Art & Historic Artifacts

* u/lum = microwatts per lumen

5. Cover or Contain Sensitive Objects

If ambient light can't be limited sufficiently, cover sensitive objects with a non-reactive material or place them in a museum cabinet to protect them. Remove them from their protective environment only when they are needed for research, conservation, or other specific uses.

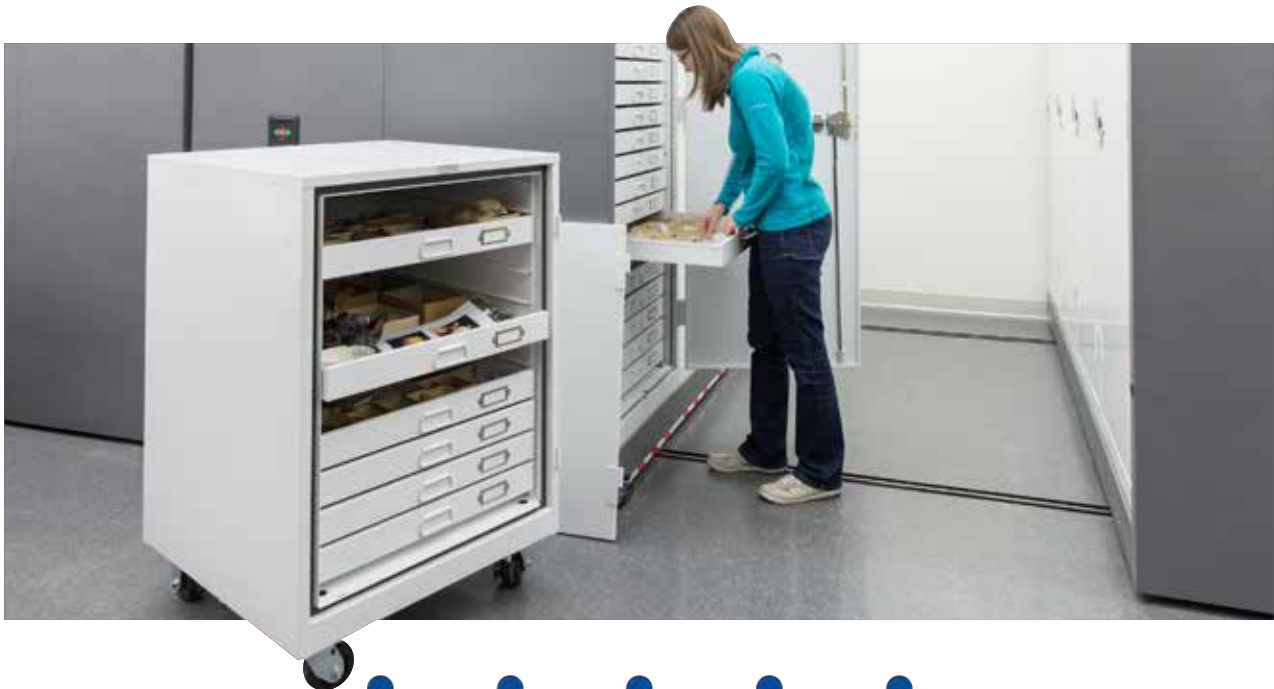


6. Be Sure to Turn Off the Lights

It might sound obvious, but it's important to post signs reminding staff and visiting researchers to turn off the lights when they leave collections storage areas. Invest in motion detectors to help prevent unnecessary light exposure.

Providing the Best Environment for your Collections:

Light damage is permanent, which means there's no way to restore an object or specimen that's been damaged by light exposure. By limiting light exposure and providing the best environment for materials entrusted to your care, you can help ensure that materials will be available to future generations.



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