



# PRESERVATION BEST PRACTICES

## SESSION 2

### THE ROLE OF ENVIRONMENT IN COLLECTIONS CARE: TEMPERATURE & RH, LIGHTING AND PEST MANAGEMENT



# Today

- Environment and Environmental Monitoring
- Lighting
- Pest Management





# Environment and Environmental Monitoring









# Poll



# Environment and Environmental Monitoring: Getting Started

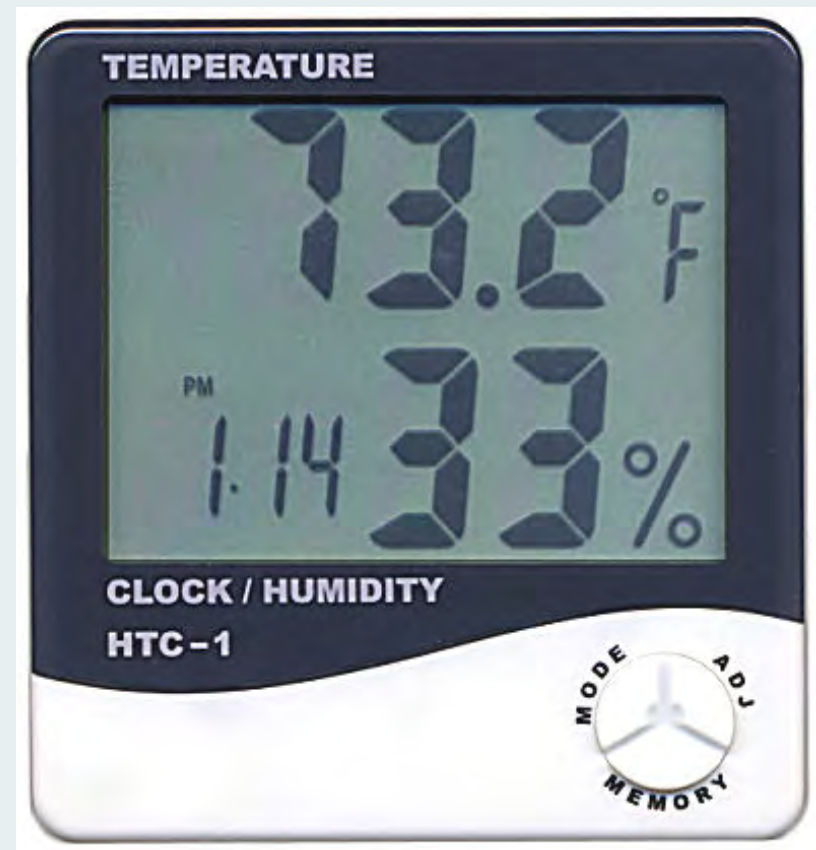
- ▣ Simple measures to improve environmental conditions are in place, such as closing doors, using fans etc.
- ▣ Collections are housed in a manner that protects materials from extremes in environmental fluctuations
- ▣ Collections are stored and exhibited in spaces that are capable of maintaining stable environmental conditions





# Environment and Environmental Monitoring: Getting Started

- Monitoring equipment is available to spot check temperature and relative humidity levels
- Environmental data is regularly collected and retained



# Ideal Environmental Standards

- Control temperature and relative humidity
  - ▣ NISO TR01-1995-Environmental Guidelines for the Storage of Paper Records
- Combined Stack and User Areas:  
70°max 30-50% RH
- Closed Stacks:  
65°max 30-50% RH
- Preservation Stacks:  
30° -65° 30-50% RH





# Dew Point Calculator

IMAGE PERMANENCE INSTITUTE

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How to Use

About

## Welcome to the Dew Point Calculator

Want to provide the best combination of temperature and relative humidity (RH) for long-term preservation of collection materials? Use this calculator to explore various combinations of temperature, RH, and dew point and compare the preservation quality of each environment.

The dew point temperature determines what combinations of temperature and RH will be possible in the storage environment. At a constant dew point, when the temperature goes up, the RH goes down and when the temperature goes down, the RH goes up. Controlling the dew point is key to managing the risk of material decay.

What's your dew point? If you know the T & RH in your space you can use the DP Calculator to get the DP. If your building does not have humidification or dehumidification, the indoor dew point is the same as the outdoor dew point.

Click to Solve for:

☒ Temperature ☐ % RH ☐ Dew Point

68

50

49



Temperature Scale: ☐ °F ☒ °C

## Preservation Evaluation

Type of Decay	Environment Rating	Preservation Metric
Natural Aging	RISK	PI 44
Mechanical Damage	OK	% EMC 9.3
Mold Risk	GOOD	Days to Mold No Risk
Metal Corrosion	OK	% EMC 9.3

## Record and Compare Values

T	RH	DP	PI	Days to Mold	EMC

Save

Clear

Export

<http://www.dpcalc.org/>



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Click to Solve for:

☒ Temperature

☐ % RH

☐ Dew Point

83

65

69



Temperature Scale: ☐ °F ☒ °C

## Preservation Evaluation

Type of Decay	Environment Rating	Preservation Metric	
Natural Aging	RISK	PI	12
Mechanical Damage	OK	% EMC	11.7
Mold Risk	RISK	Days to Mold	1186
Metal Corrosion	RISK	% EMC	11.7

## Record and Compare Values

T	RH	DP	PI	Days to Mold	EMC

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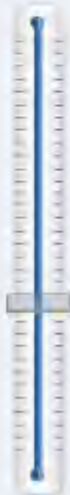
Click to Solve for:

☒ Temperature ☐ % RH ☐ Dew Point

40

35

15



Temperature Scale: ☐ °F ☒ °C

## Preservation Evaluation

Type of Decay	Environment Rating	Preservation Metric
Natural Aging	GOOD	PI 488
Mechanical Damage	OK	% EMC 7.1
Mold Risk	GOOD	Days to Mold No Risk
Metal Corrosion	OK	% EMC 7.1

## Record and Compare Values

T	RH	DP	PI	Days to Mold	EMC

Save

Clear

Export

<http://www.dpcalc.org/>



# Environment and Environmental Monitoring: Good

A systematic program to measure humidity and temperature is in place with hygrothermographs or dataloggers. The system is based on defined monitoring objectives





<http://www.familyarchives.com/products/Hygrothermograph.html>



<https://www.imagepermanenceinstitute.org/environmental/pem2-datalogger>



<http://www.microdaq.com/occ/hobo.php>

# Environment and Environmental Monitoring: Good

- ❑ Staff is trained in use of monitoring equipment
- ❑ Monitoring equipment is recalibrated as recommended by the manufacturer
- ❑ A record is kept of events that might affect environmental conditions, such as receptions, leaks, systems failures, outside weather conditions etc.
- ❑ Desired set points are established that are achievable for the storage and exhibition areas



# Environment and Environmental Monitoring: Better

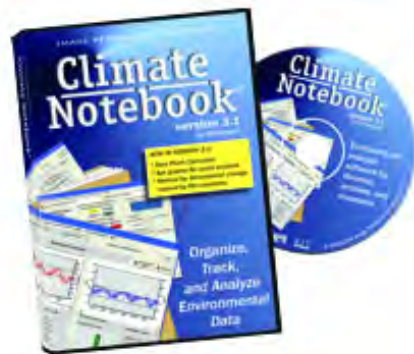
Qualified staff members or consultant analyzes and prepares a summary of environmental data



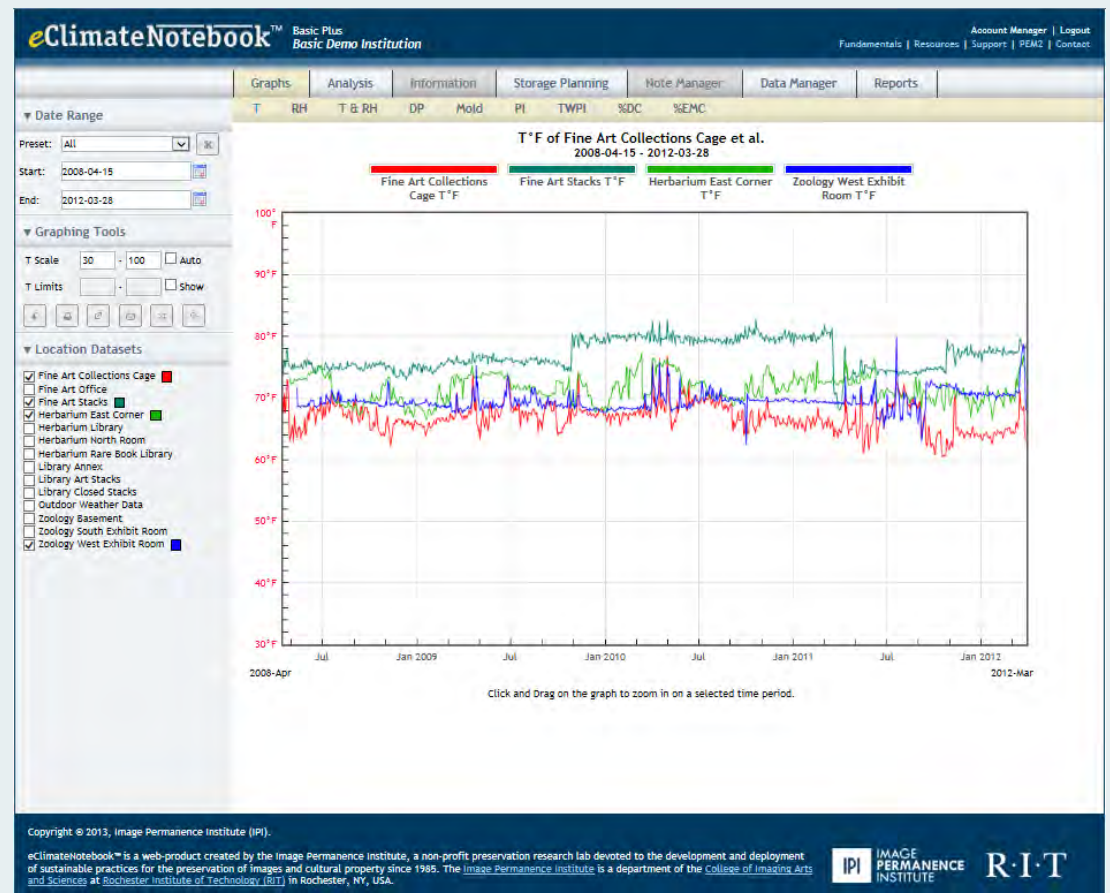
<http://www.semwisdom.com/blog/wp-content/uploads/data-analysis-cartoon-1.gif>

# Environment and Environmental Monitoring

## Environmental Analysis



**eClimateNotebook™**  
COLLECTION STORAGE INFORMATION SYSTEM



<https://www.eclimatenotebook.com/graphs.php>



# Environment and Environmental Monitoring: Better

- Environmental monitoring data is used to adjust environmental control systems and procedures
- The monitoring program is reviewed at regular intervals
- An environmental engineer is hired on an annual basis to ensure systems are working at their highest efficiency
- Specialized environments are established for sensitive collections materials
- Monitoring is done for levels of air pollutants



# Lighting

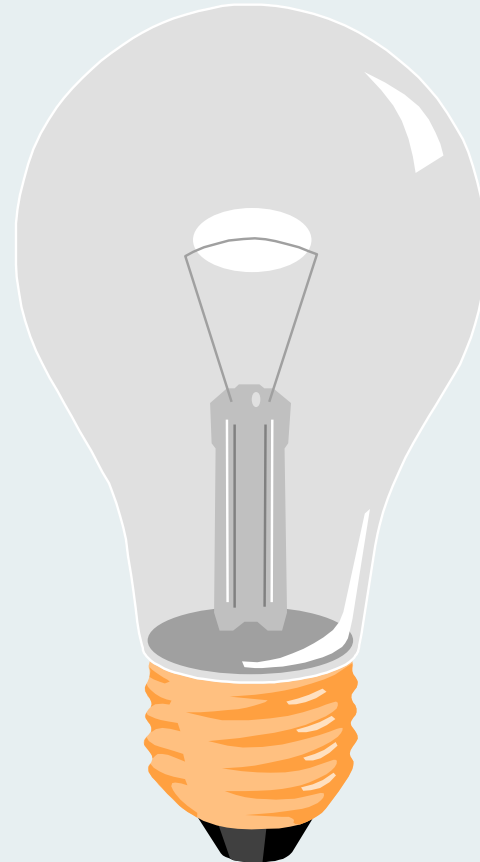


# Poll



# Light Damage

- Cumulative
- Irreversible
- Fading
- Color change
- Brittle







USS Oregon to sea from Overseas, Portland, N. H. May 1st, 1907.  
Looking at Commercial Wharf - Boston, Mass.  
Ship left America's Coast that evening. Portland, April 29th, 1907.





<http://www.lynnbecker.com/repeat/seattle/seattlepl.htm>

# Recommended Light Levels

- Storage
  - 0-5 Footcandles;  
0-55 Lux
- Display/Exhibitions
  - 5-15 Footcandles;  
5-165 Lux
- Reading/Work
  - 30-60 Footcandles;  
330-660 Lux
- Ultraviolet Content
  - < 50 microwatts per lumen;  
< 2-4% UV



"In the Library" By Yuri Levchenko, [www.flickr.com](http://www.flickr.com)

# Lighting: Getting Started

- ❑ All windows in storage and exhibition areas are covered
- ❑ Light sources are not placed directly over collections materials
- ❑ Lights are turned on in storage areas only when materials are being retrieved
- ❑ Fluorescent lights are covered using ultraviolet filtering films





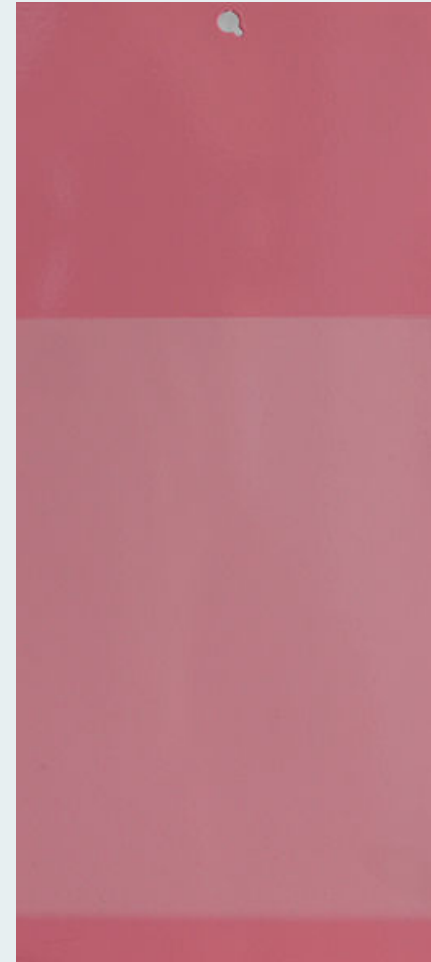


[https://www.preservationequipment.com/Store/Products/Equipment-\\$4-Tools/Lighting/UV-Fluorescent-Light-Filters](https://www.preservationequipment.com/Store/Products/Equipment-$4-Tools/Lighting/UV-Fluorescent-Light-Filters)



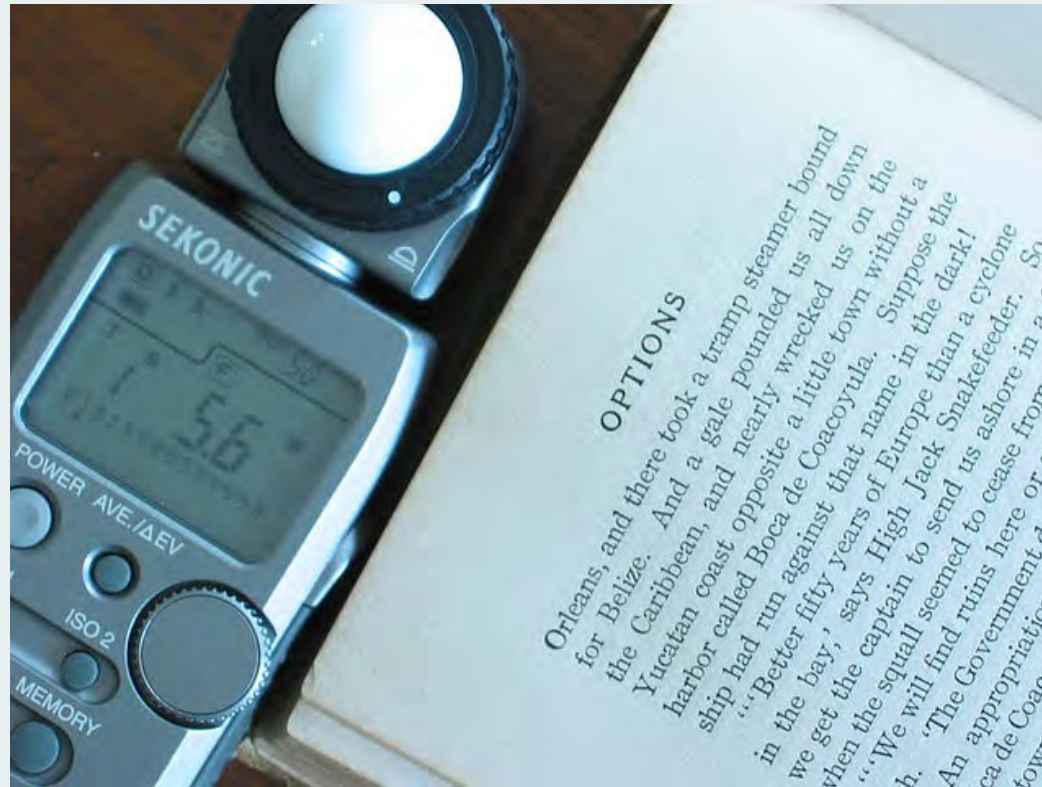
# Lighting: Good

- ▣ Light sensitive materials on exhibit are regularly rotated
- ▣ Records are kept on light exposure for materials placed on exhibition
- ▣ A schedule is in place for testing and replacement of ultraviolet filtering film
- ▣ Light sensitive materials are not left out in work areas for extended periods of time



# Lighting: Better

- ▣ Light meters are owned by the institution and light levels are checked regularly



“Metered Light” By Chad Miller, [www.flickr.com](http://www.flickr.com)

# Light Meters



[http://www.scotttech.net/pages/littlemore\\_scientific\\_engineerin/](http://www.scotttech.net/pages/littlemore_scientific_engineerin/)

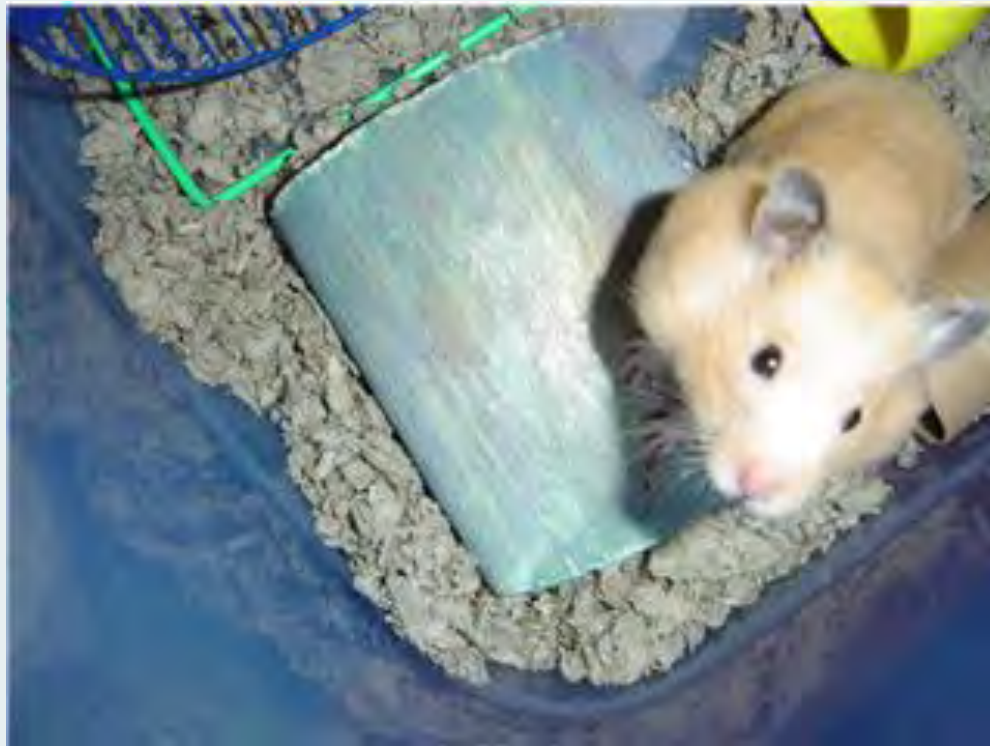


[http://www.conservation-resources.co.uk/index.php?main\\_page=index&cPath=44](http://www.conservation-resources.co.uk/index.php?main_page=index&cPath=44)



<http://www.gaylord.com/adblock.asp?abid=157>

# Pest Management





# Poll





## Mouse Damage

[Insectimages.org](http://Insectimages.org)



## Silverfish Damage

[Library.nyu.edu](http://Library.nyu.edu)



## Cockroach Damage

[archives.gov.on.ca](http://archives.gov.on.ca)

## Powder Post Beetle Damage

[Insectimages.org](http://Insectimages.org)



# Pest Management: Getting Started

- Storage areas and furniture are cleaned on a regular basis
- All trash containing food is removed from the building on a daily basis
- Staff keeps food in airtight containers and cleans all eating areas daily



"Waste Watcher Recycling Bin" By Busch Systems, [http://en.wikipedia.org/wiki/File:Waste\\_Watcher\\_Recycling\\_Station.jpg](http://en.wikipedia.org/wiki/File:Waste_Watcher_Recycling_Station.jpg)



<http://uncrate.com/stuff/oxo-pop-containers/>

# Pest Management: Getting Started

- All incoming items are examined for pest and mold infestations. Remedial action is taken to prevent the spread to the rest of the collection.
- Any items exhibiting signs of pests are isolated from the rest of the collection until treated



“Bookworm Damage on Errata Page” Bu Ragesoss, [http://en.wikipedia.org/wiki/File:Bookworm\\_damage\\_on\\_Errata\\_page.jpg](http://en.wikipedia.org/wiki/File:Bookworm_damage_on_Errata_page.jpg)



# Pest Management: Good

- ❑ Vulnerabilities for an infestation are mitigated, such as sealing possible infiltration areas, use of outside lighting, correction of draining problems, sweeping gasket on exterior doors, and use of screens
- ❑ Storage and exhibition areas are monitored for the presence of pests with glue boards



<http://www.thefind.com/garden/info-catchmaster-glue-boards>



<http://www.stonybrook.edu/ehs/pest/>

# Pest Management: Good

- All pests are identified and records are kept about location, number found, as well as records of special events that might affect environmental conditions, such as receptions, leaks, systems failures etc.
- The institution's selected pest management company understands the specific pest control needs for safety of staff, visitors, and the collection. No insecticides are used consistently as a pest deterrent
- Advice is sought from a conservator before treating any affected materials



<http://ellencarrlee.wordpress.com/2009/03/19/integrated-pest-management-made-easy/>

# Pest Management: Better

- ▣ Instructions for cleaning storage and exhibition areas are written and followed
- ▣ An formalized integrated pest management program is in place for monitoring and responding to an infestation



<http://www.propacificpestcontrol.com/>

# IPM

“Preservation professionals increasingly recommend a strategy called *integrated pest management* (IMP). **This approach relies primarily on non-chemical means (such as controlling climate, food sources, and building entry points) to prevent and manage pest infestation.** Chemical treatments are used only in a crisis situation threatening rapid losses or when pests fail to succumb to more conservative methods.”

- Beth Lindblom Patkus



# Principles of IPM

- Prevention
  - ▣ Take necessary measures to prevent the need to use chemical extermination
    - Facilities, Environment, Housekeeping
- Early Detection
  - ▣ Consistent monitoring and inspection
- Elimination
  - ▣ Take necessary actions to eliminate pests, preferably through non-chemical means



<http://nature.berkeley.edu/upmc/insectlist.php>

# Pest Management: Better

- ▣ Selection of pest infestation treatments, traps, and bailing are appropriate for the safety of collections and people
- ▣ A specialist in integrated pest management programs for cultural institutions review the IPM program at regular intervals
- ▣ A separate space is available for segregation of infested materials or those suspected of infestation

# Thank you and Questions

Questions about  
collections care?

Contact the California  
Preservation Program  
[info@calpreservation.org](mailto:info@calpreservation.org)



# Next Session

Session 3: Handling,  
Access, Storage, and  
Exhibition

December 12, 2013



Archives of American Art