Storage for Infinity: Part 1

Museum 202, Section 2

Agents of Deterioration

presented by

Helen Alten

Northern States Conservation Center
P.O. Box 8081, St. Paul, MN 55108 USA
651-659-9420 / helen@collectioncare.org

Course Agenda

Section I: Storage Philosophy

Section 2: Agents of Deterioration

Section 3: Storage Facilities

Section 4: Storage Furniture

Section 5: Conclusion

Section 2 Agenda

1: Framework for Preservation
2: Agents of Deterioration
3: Risk Assessment
4: Preservation Planning
5: Emergency Preparedness Planning

It is wiser and less expensive to prevent damage and maintain each object's integrity, rather than rely on conservation treatment.

Framework for Preservation CCI Chart

- **<u>Vertical Axis:</u> 9 Agents of Deterioration**
- **<u>Horizontal Axis:</u> 3 mitigation levels**

(1) Building Features
(such as storage & display areas)
(2) Portable Features
(cabinets, exhibit cases)
(3) Staff Procedures

Framework for Preservation CCI Chart

Agents	Building Features			Portable Fittings			Procedures
	Storage	Display	Transit	Storage	Display	Transit	
Direct Physical Forces							
Thieves, Vandals, Displacers							
Fire							
Water							
Pests							
Contaminants							
Radiation							
Incorrect Temperature							
Incorrect Relative Humidity							

Agents of Deterioration

Direct Physical Forces	Thieves, Vandals, Displacers	Fire
Water	Pests	Contaminants
Radiation	Incorrect Temperature	Incorrect Relative Humidity

Direct Physical Forces

- **Sudden & Catastrophic: handling or moving shocks, collapse of shelving or supports, earthquakes, tornadoes, war.**
- **Long-term & Gradual: inadequate support in display or storage, stacking, continual minor vibration.**

Sudden & Catastrophic:
Broken Ceramic

Long-Term & Gradual:
Crushed Basket

Reducing Direct Physical Forces in Storage

- **Pad between objects**
- **Stabilize shelves/cabinets**
- **Smooth motion for drawers, compactors, any moving parts**
- **Fully supporting storage mounts**
- **Pad surfaces on which artifacts rest**
- **Train staff in handling and packing**

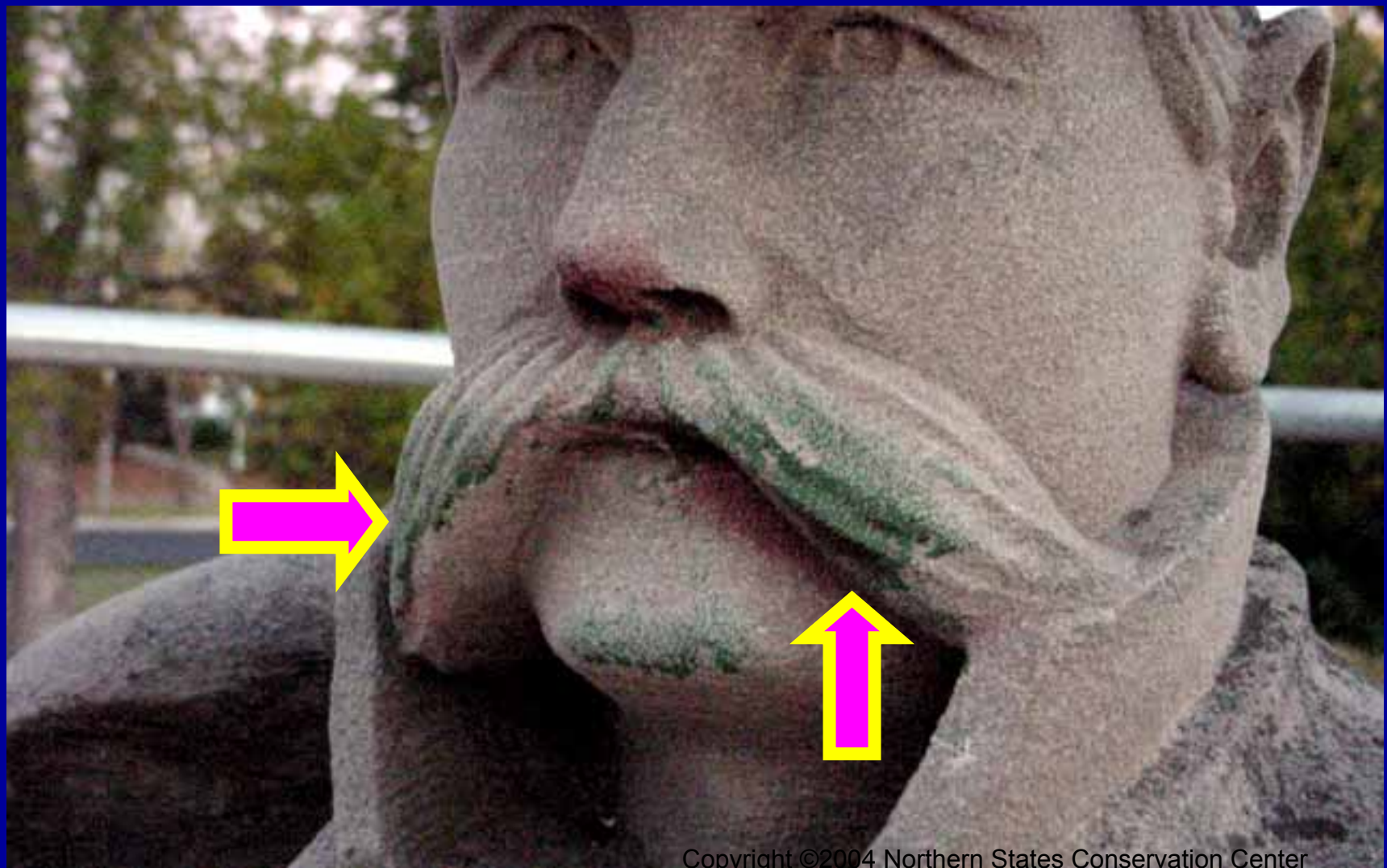
Support Mounts

Reduce chips, abrasion, breaks

Thieves, Vandals & Displacers

- **Thieves target high value items**
- **Vandals attack high profile items & inflict severe damage**
- **Displaced Items are inadvertently misplaced within the museum, usually by staff, and cannot be found. Same effect as theft.**

High Profile Item:
Green Paint on Sculpture



High Profile Item:
Vandals Kicked Fossil

Reducing Theft in Storage

- **Lock and alarm doors and windows**
- **Clear sight lines and appropriate lighting**
- **Separate room for researchers**
- **Lock cabinets/shelves**
- **Limit keys**
- **No exterior walls/exits**

Electronic Access

Reducing Displacement in Storage

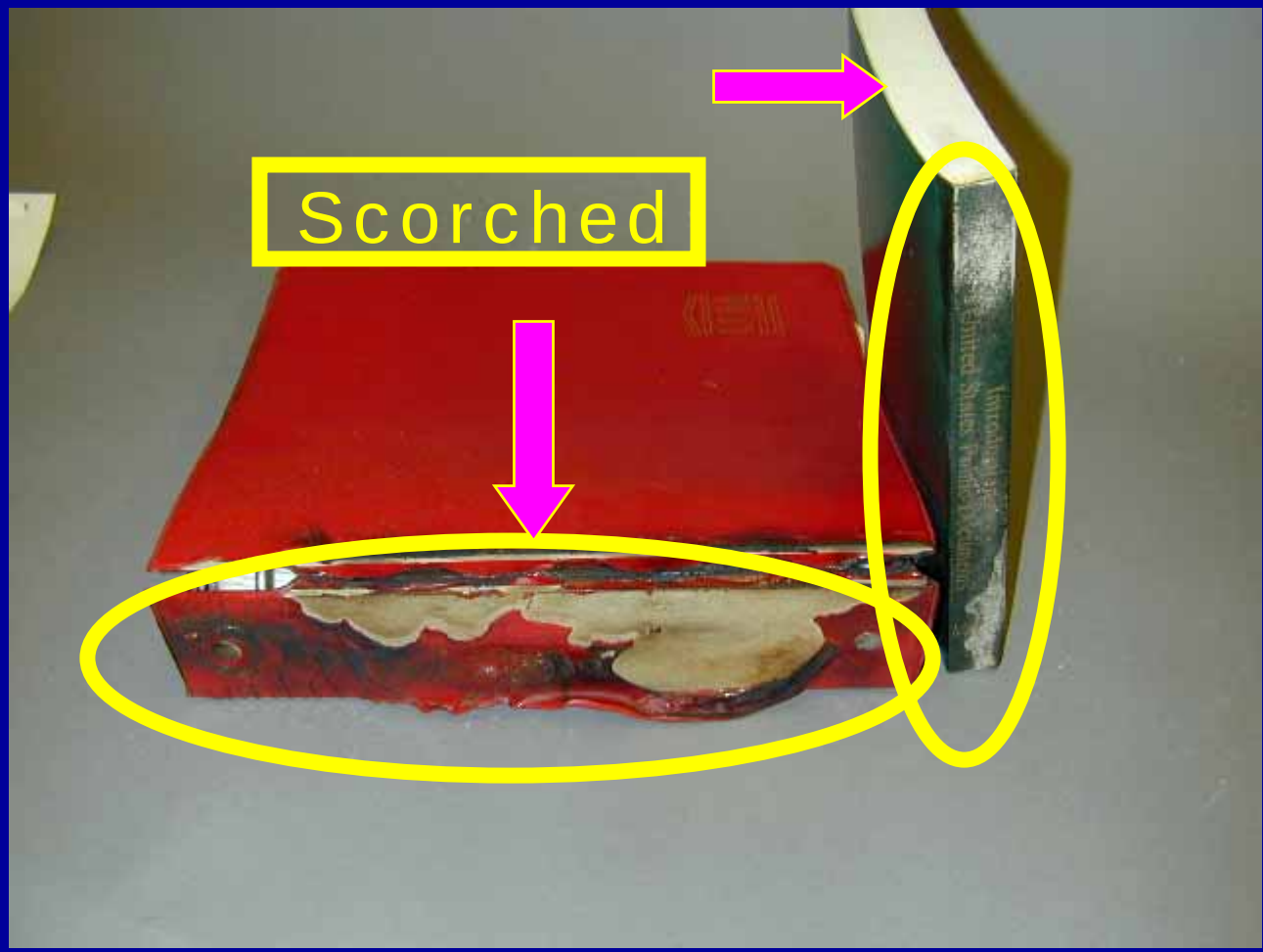
- **Maintain a catalog**
- **Hold annual full or partial inventory**
- **Sign collections in and out**
- **Maintain a location file**
- **Use place cards in storage**

Object Removal Labels

Fire

- **Threatens all objects**
- **Organic items are most vulnerable**
- **Smoke problems, especially to porous items**
- **Infrequent, but results in massive loss and extensive damage**

Fire Damage
Books (Organic Items)



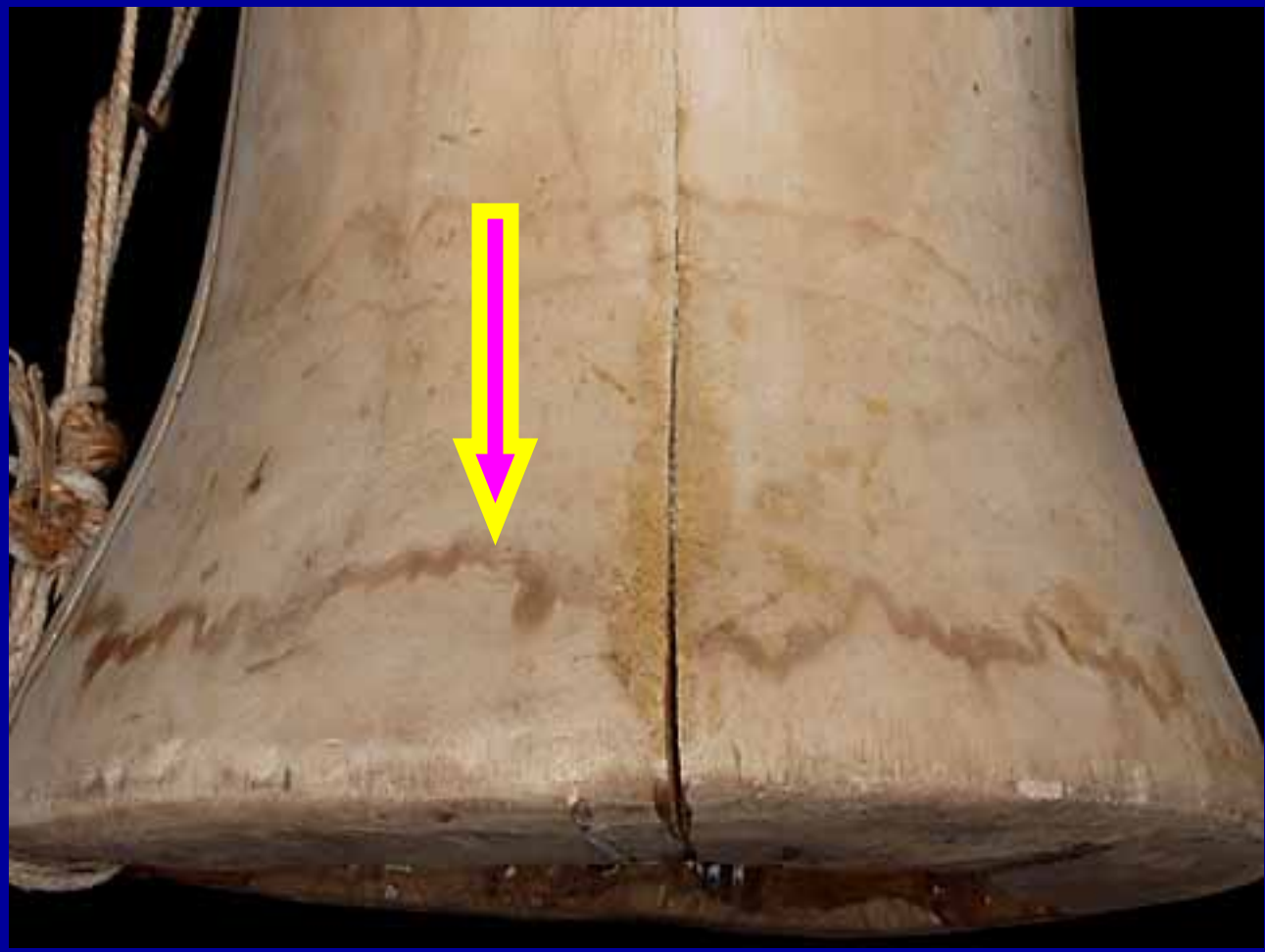
Reducing Fire Risk in Storage

- **Fire suppression and monitors in all storage spaces**
- **No overnight extension cords**
- **Remove flammables from storage**
- **Fire resistant perimeter and cabinets**
- **Separate HVAC**
- **Emergency Preparedness Plan**

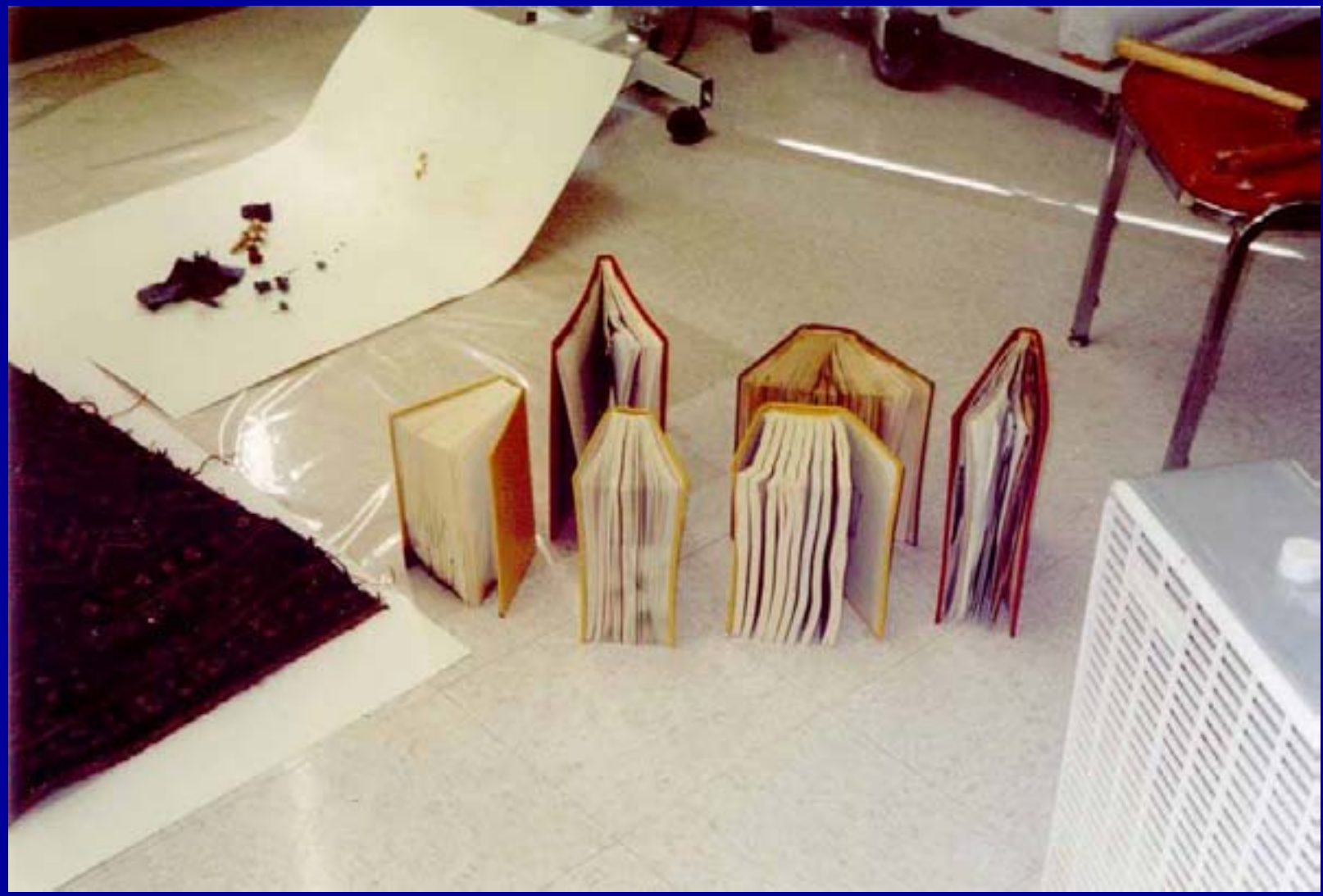
Water

- **Structural Failure: leaking roofs, skylights, water pipes**
- **Catastrophic Event: flooding, fire suppression, sewers**
- **Affects porous organic materials, metals and layered or joined composite materials.**
- **Many items have a soluble portion.**

Porous Object Damaged:
Tide Marks from Water



Wet Books During Recovery



Reducing Water Risk in Storage

- **Items 6 in./10 cm. above floor and from walls.**
- **Water alarms in storage**
- **Inspect after heavy rain or thaw**
- **Water-resistant cabinets**
- **Temporary waterproof covers**

Pests

- **Insects**
- **Vermin**
- **Mold (related to relative humidity)**
- **Mainly organic materials threatened (food sources or barrier)**
- **Damage can be extensive**

Insect Damage

Mouse Damage

Reducing Pest Damage in Storage

- **Regularly clean, inspect and monitor**
- **No clutter, food, plants or old cardboard**
- **Quarantine incoming material**
- **Elevated, insect-resistant cabinets**
- **Integrated Pest Management Plan (IPM)**

Monitor with Sticky Trap

Contaminants

- **Gases: pollutants, external or internal**
- **Liquids: plasticizers, grease, oil**
- **Solids: dust, salt, incompatible materials**
- **Usually disfiguring, not usually completely destructive.**

Acidic Gases from Poor Storage Materials

Crystals on fossil

Sulfur Gas from Rubber Band

Corroded Silver

Reducing Contaminants in Storage

- **Block vapors with barrier coatings or films**
- **Absorb or dilute fumes**
- **Dust covers**
- **95-99% dust filtration on HVAC**
- **Clean area with HEPA or ULPA vacuum**
- **No smoking in building**
- **Segregate collection**

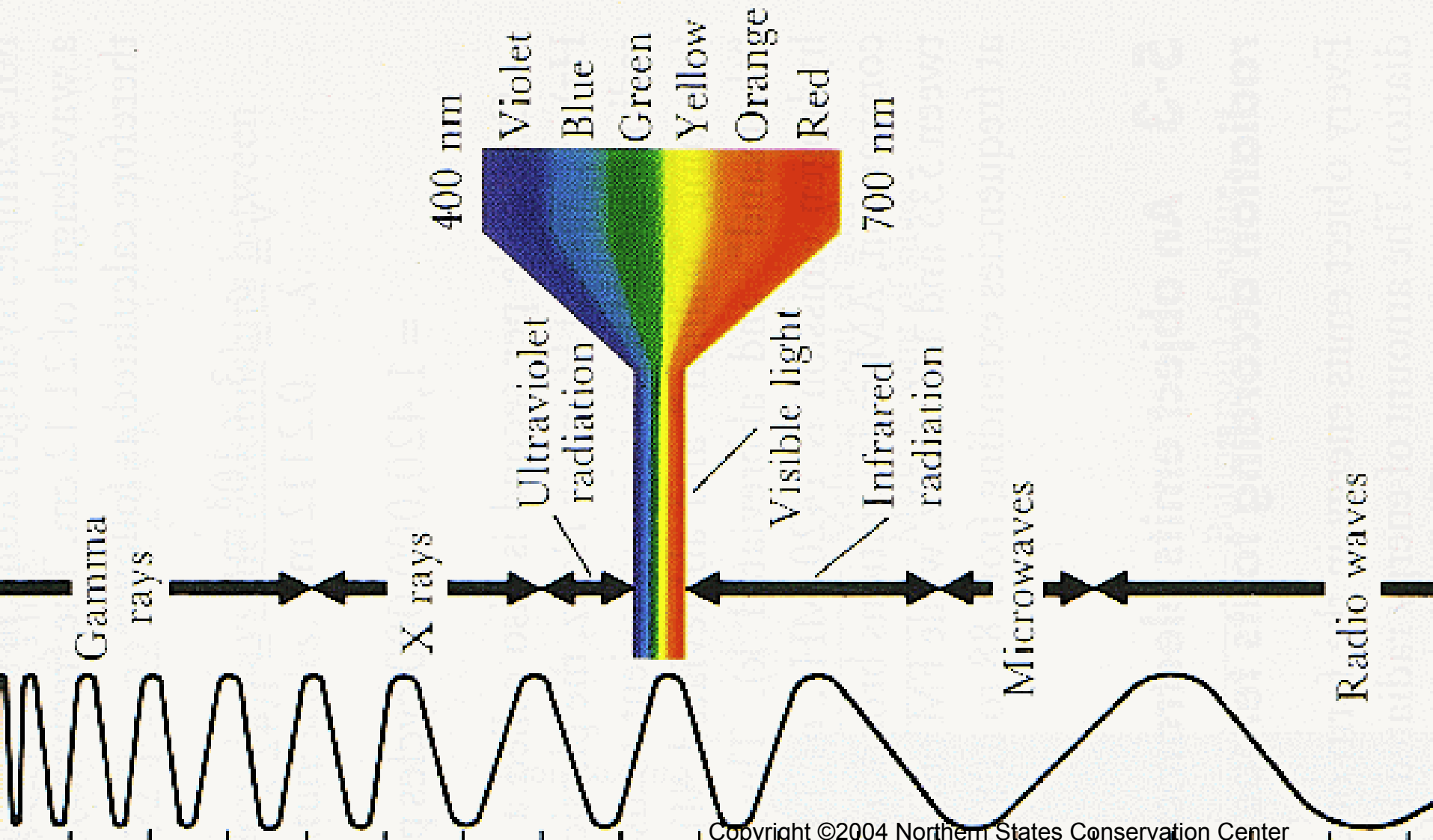
Block Acids with Marvelseal

(a polyaluminum laminate)

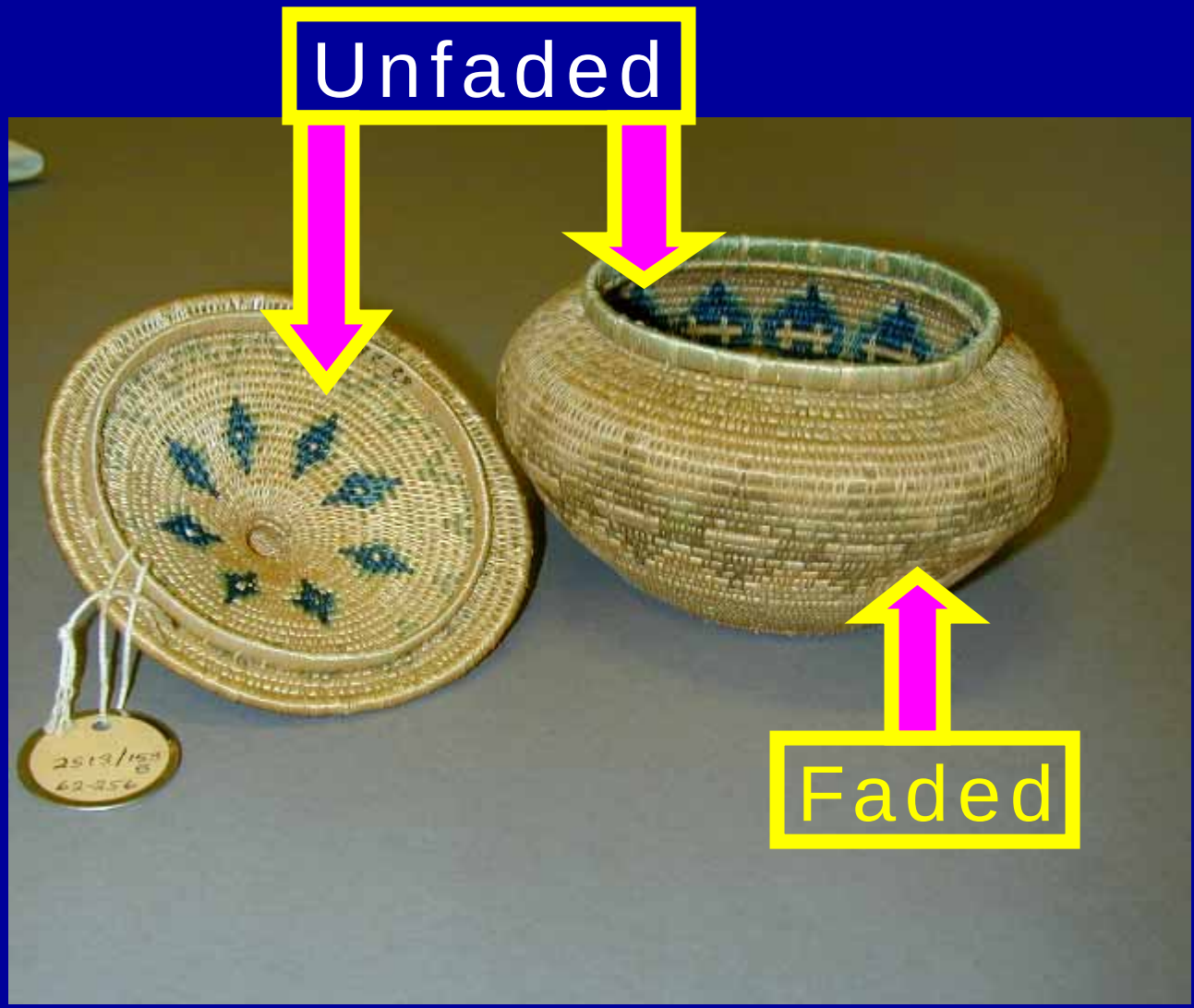
Radiation

- **Ultraviolet Radiation: disintegration and discoloration, invisible**
- **Visible Light: fading**
- **Infrared: heat (temperature)**
- **Affects the relevance of, or the interest in, an object.**
- **Can reduce value**
- **Cannot be repaired or reversed**

Electromagnetic Spectrum



Light Damage



Reducing Radiation in Storage

- **Block all daylight**
- **Task lighting and zoned area lighting**
- **UV filtration on all lights**
- **Monitor with blue wool standards or dataloggers**
- **Cover shelving with blackout fabric**

Light Monitoring

Blue wool fade card

Light meter

Incorrect Temperature

- **Too high: accelerates chemical deterioration**
- **Too low: makes some materials brittle**
- **Fluctuating: causes fractures and delamination**

Fluctuating Temperature
Cracks in Stone

- **Caused by uneven bearing weight, thermal stresses, dissimilar materials**

Temperature Too High

Melted Sugar Cone

Reducing Incorrect Temperature in Storage

- **Avoid fluctuating T areas (heat sources, vents, windows, attics)**
- **Insulate with a vapor barrier in ceiling, floor and walls**
- **Install reliable HVAC**
- **No external walls**
- **Monitor with hygrothermographs or dataloggers**
- **Insulated storage cabinets**

Monitoring Storage Environment

Hygrothermograph

Incorrect Relative Humidity

- **Damp (over 65%): Mold growth**
- **Above or below a critical value: metal corrosion, mineral deterioration, glass damage**
- **0-30%: Slow chemical deterioration, such as metal corrosion, may stop at 0**
- **Fluctuating: Organic materials swell or shrink causing fractures, crushing, or delamination.**

Fluctuating Relative Humidity

Gourd Cracked

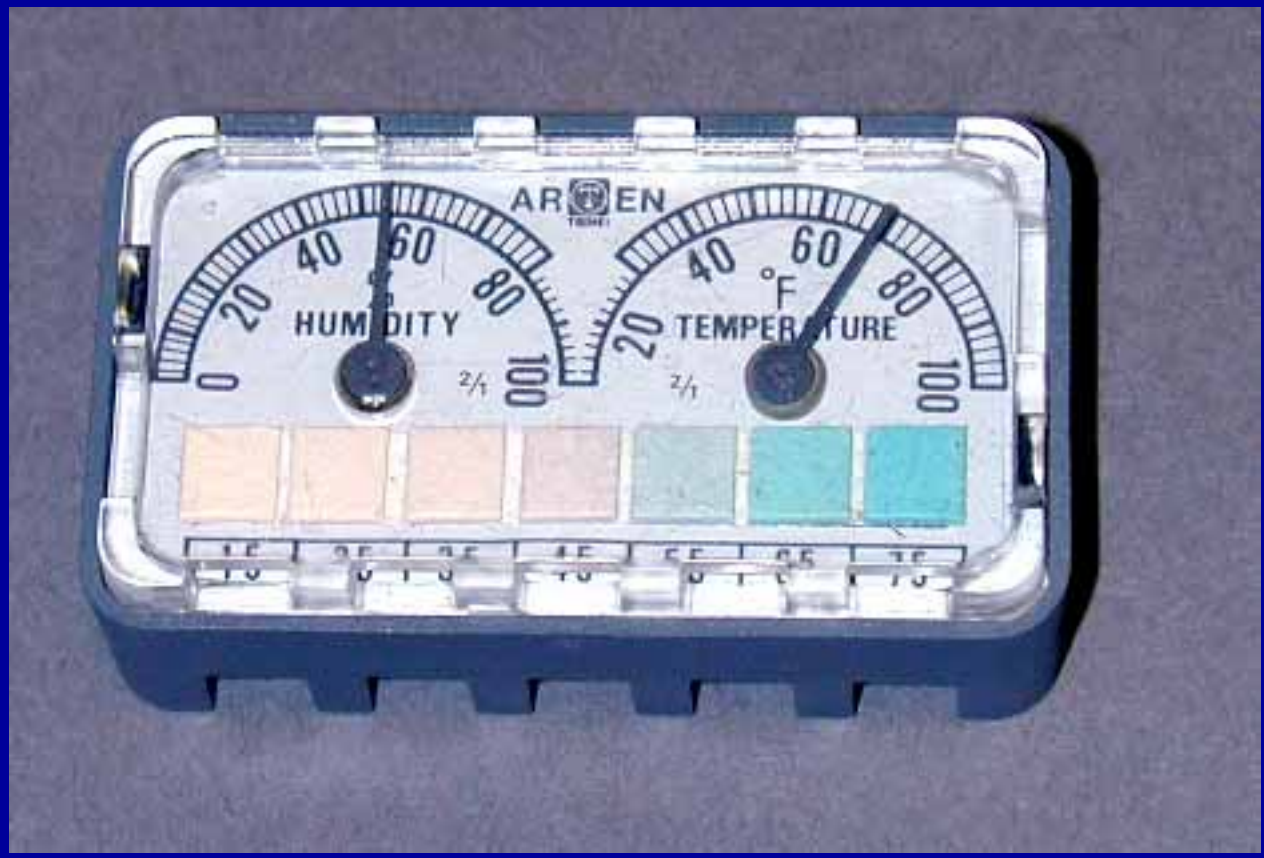
Relative Humidity Too High

Iron Corrosion

Reducing Incorrect Relative Humidity in Storage

- **Storage in center of buildings**
- **Airtight cabinets for sensitive collections**
- **Use humidity buffers in enclosed spaces (silica gel or organic material)**
- **Continuous vapor barriers in all perimeter walls, floor and ceiling**
- **Monitor the environment**

Arten Monitor for Relative Humidity and Temperature



Controlling Each Agent of Deterioration

- **Avoid**
- **Block**
- **Detect / Monitor**
- **Respond**
- **Recover / Treat**

Avoid

- **Can this agent of deterioration be avoided?**
  - **Move items away from problem areas (example: move away from windows).**
  - **Build so problems don't exist (example: no windows in building)**

Block

- **Can this agent of deterioration be blocked?**
  - **Cover problem area (example: shades on windows).**

Detect / Monitor

- **What agents of deterioration are potential problems?**
  - **Detect problems early**
  - **Determine severity of problem**
  - **Monitor effectiveness of a response**

Respond

- **What is the appropriate response?**
  - **Type of response: Use CCI chart for solutions depending on extent of problem.**
  - **Level of response: One infected object vs. the entire collection.**

Recovery / Treat

- **Ensure problem causing damage is eliminated**
- **Conservation treatment: stabilize or restore item**

Risk Assessment vs. Condition Assessment

- **A risk assessment predicts future problems.**
- **A collection condition survey reports on the damage that has happened.**

Risk Assessment

- **Predicts what damage will occur**
- **Predicts the amount of loss**

- **Museums must weigh risk versus other resource spending**

Risk Assessment Tools

- **Rob Waller's Risk Assessment Protocol (Canadian Museum of Nature)**
- **CALIPR**
- **CCI Framework for Preservation Chart**

Risk Assessment Benefits

- **Documents the real risks to the collection.**
- **Organizes the risks into a manageable form.**
- **Helps set priorities.**
- **Provides mitigation strategies.**
- **Provides documentation and data for funding priorities.**

Preservation Planning

Step 1: Gather information

- **survey reports**
- **risk assessment**
- **environmental monitoring**

Step 2: Prioritize recommendations

- **Impact**
- **Feasibility**
- **Urgency**

Step 3: Write the Plan

Plan Contents

Introduction:

- **Mission statement**
- **Summary of preservation history**
- **Future preservation**

Five Broad Goals: These never change and cannot be reached

Objectives: Reachable

Action Items: Tasks

Sample Goal Statement

Goal 1: Improve storage for the long-term preservation and access of the collection.

Objective 1: Reorganize storage to improve access and comply with the Americans with Disabilities Act

Action 1: Measure the storage area.

Action 2: Measure storage furniture and draw into plan, allowing space for wheelchair access…

Developing an Emergency Preparedness Plan

Emergency Preparedness Planning

Step 1: Gather information/research

- **published literature**
- **sample plans**
- **local and regional plans**

Step 2: Analyze risks

Step 3: Gather detailed information

Step 4: Staying prepared

Emergency or Disaster?

- Disaster: beyond local capability (catastrophic floods, earthquakes, wildfires…)
- Emergency: within local capability (pipe leaks, wet basements…)

When Disaster Strikes...

48 hours to stabilize your site….

Response Priorities

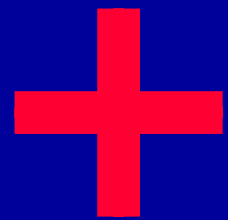
- Human Health & Safety First
  - Make sure all staff and visitors are out of the building and safe
- Artifacts Second

Within 24 hours...

- Establish a command center
- Begin phone calls
  - Call five lead people first
- Assign press liaison
- Start recovery center
- Verify finances
- Secure the site
- Begin documenting

Call...

- 911 (or local emergency number)
- Red Cross
- Conservator
- Insurance
- Volunteers/Staff call list
- Construction Company
- Security Services



Within 48 hours...

- Stabilize building & artifacts before mold starts
  - freeze
  - air dry: fast/slow
- Begin recovery process...

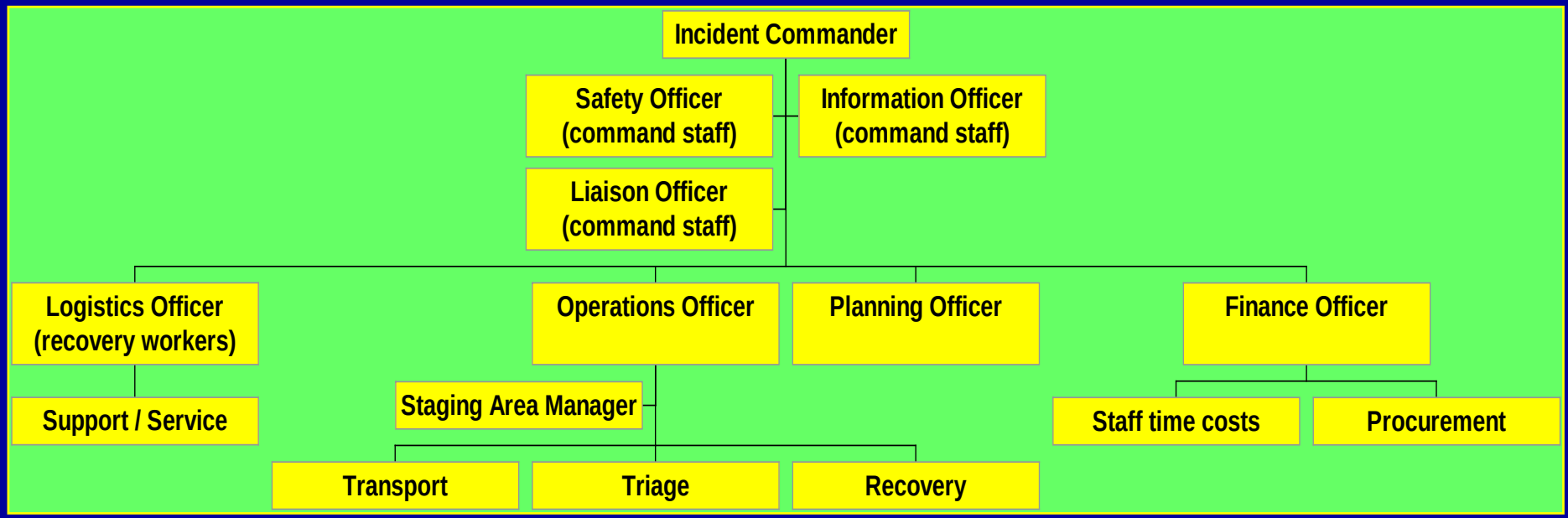
Provide for Workers

- Keep everyone informed
- Provide protective clothing
- Medical attention if necessary
- Breaks every 90 minutes
- Maintain morale
- Lots of food

Salvage Operations

- Instruct recovery teams on handling procedures
- Inventory retrieved objects
- Salvage everything

Incident Command Structure



The rest of your life ... Recovery

- Contractors repair and restore structures
- Conservators repair and restore artifacts
- Fund-raising to continue repairs / improvements
- Revise emergency response procedures

Good Luck!