

Climate and Environmental Conditions

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June 14, 2011

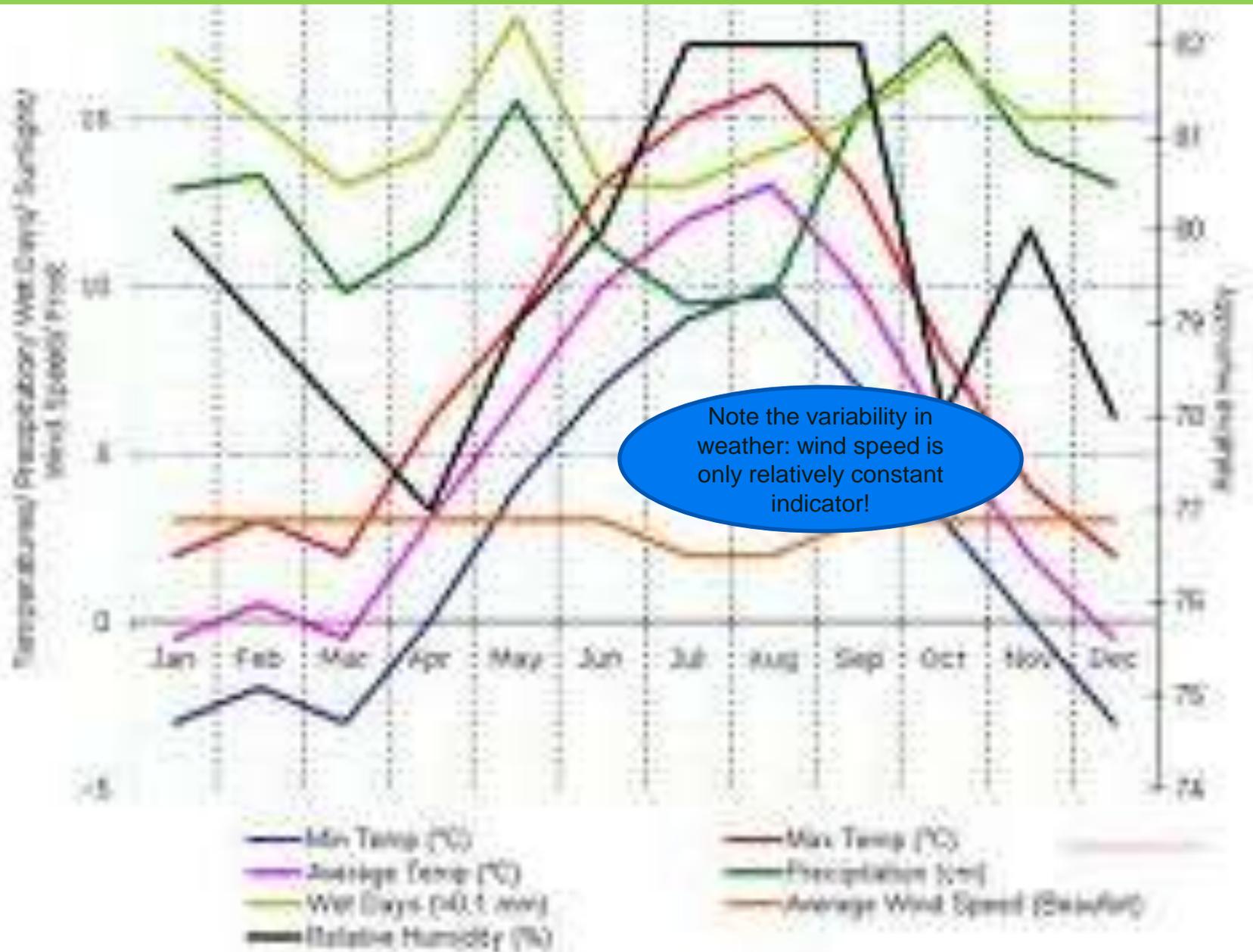
Basic concepts



- ❑ Know your enemies: temperature, humidity, light, VOCs, pests
- ❑ Avoid fluctuations and aim for stable conditions
- ❑ If ideal is out of reach, aim for best possible
- ❑ Be prepared for catastrophic while improving daily conditions

External conditions: seasonal, monthly

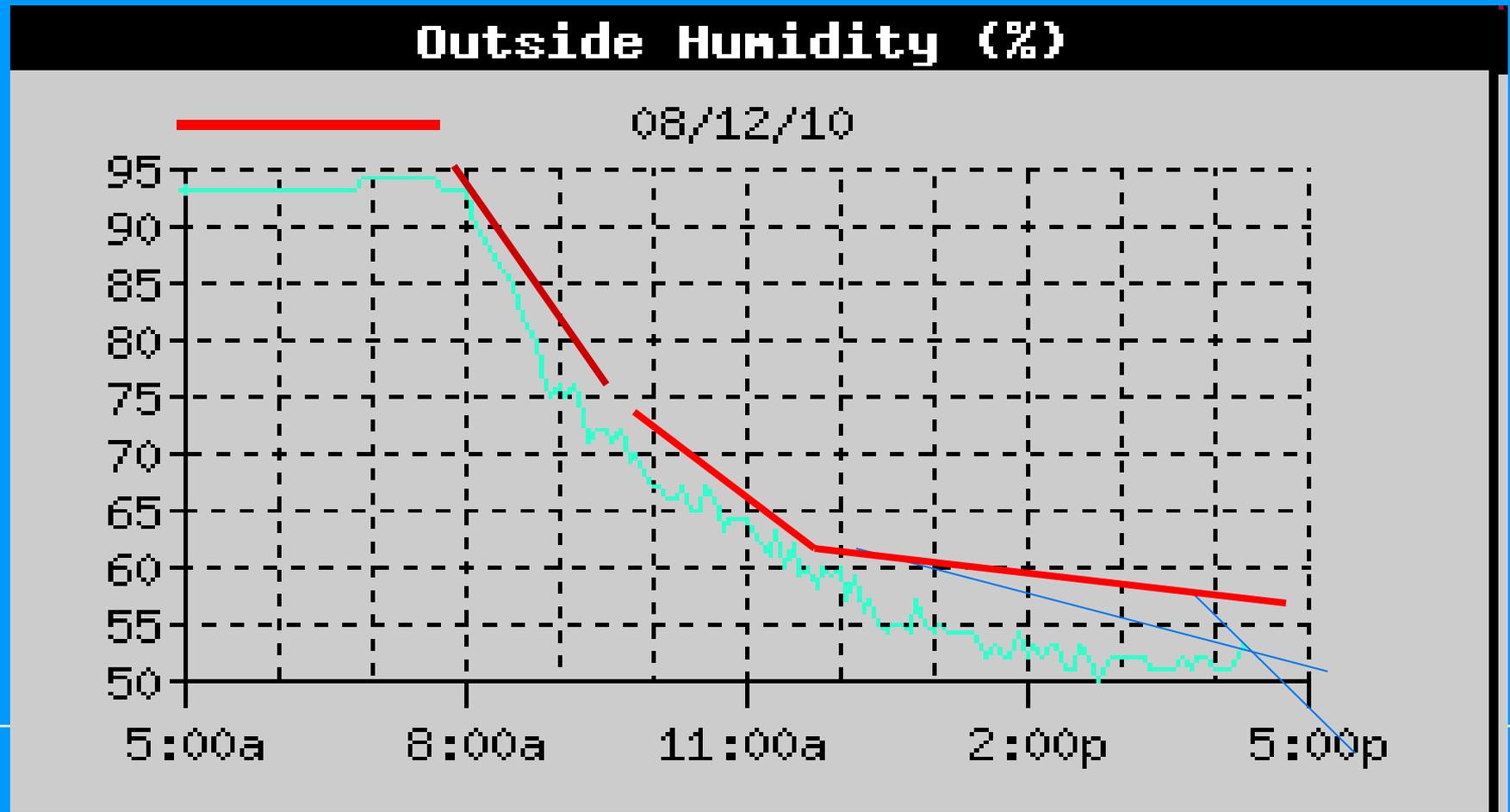
Conditions in Kodiak, AK, graph from <http://www.climatetemp.info/usa/kodiak-alaska.html>





Daily Variation: Juneau humidity

Retrieved from the West Juneau Weather Station at
<http://westjuneau.com/weather/history.htm>



Why monitor?(1)

Consider your goals before investing in monitoring equipment

- Range of conditions?
- Level of accuracy?
- Frequency: constant or snapshot?
- Unoccupied spaces?
- Remote alerts?
- Staff expertise?
- Power source?



Humidity Indicator Certified Hygrometer

Get relative humidity and temperature reading at a glance. This hygrometer is certified to be accurate within +/- 3% and indicates the complete range of 0 to 100% humidity. The bimetallic thermometer is accurate to 1/105 of scale and has ... [READ MORE](#)



Hydrion Humidicator Paper

Place a strip of this highly sensitive paper in any room or exhibit case and leave in place. Then compare paper color to the accompanying color chart to determine relative humidity. Change paper every 10 - 14 days of exposure. ... [READ MORE](#)



Hygrocheck Relative Humidity Tester

Hygrocheck uses the advanced Thin Film Polymer Capacitance sensing method to measure humidity and an integrated electronic circuit to perform all relative conversions. A complete measurement range of 10% to 90% RH and 3% accuracy across the entire range, make Hygrocheck ... [READ MORE](#)



Hygrometer

Our smallest true hair hygrometer, this unit has a range of 10% to 100% RH and is accurate to +/- 4%. It is easy to read with a 4" diameter dial. The face and bezel are silver and the case ... [READ MORE](#)



Jumbo Display Thermo-Hygrometer

The large, easy-to-read digital display makes all the difference. Each unit features a F/C switch and min/max memory. Temperature range is 14 to 122 degrees Fahrenheit with a humidity range of 10% to 99% (+/- 5%). Powered by one AAA ... [READ MORE](#)



Maxant Compact Display Case Hygrothermograph

Many of the same high quality features found in the large hygrothermograph have been incorporated into this compact version. Because the human hair humidity sensor is slightly shorter, this unit is recommended for smaller spaces where changes are not as ... [READ MORE](#)

Why monitor?(2)

- Set baseline
- Document known deficiency
- Allows for data-driven response
- Supports argument for need to funders
- Gauges effectiveness of solutions

Consider your resources
(staff and money)

- Automatic vs. staff driven recording



Digital Humidiguide

A glance at this instrument will give you the temperature and relative humidity of your work or storage area. Perfect for checking the air conditioning in a library, for monitoring conditions in a preservation department and at less than 5.5" ... [READ MORE](#)



Digital Psychrometer

Introducing a new digital precision temperature and humidity instrument which features high accuracy and fast response. This hand-held unit requires no twirling or reading of charts and includes a handy pocket clip. Features include data hold, an F/C switch, min/max ... [READ MORE](#)



Display Case Thermohygrometer

A discreet method to constantly monitor relative humidity and temperature in your display case. This compact, easy-to-read meter has excellent relative humidity response characteristics as well as an accurate temperature gauge. The two independent methods of measuring relative humidity assure ... [READ MORE](#)



Min/Max Thermo Hygrometer

Temperature and relative humidity measurements are displayed simultaneously with the Min/Max Thermo hygrometer. LCD Digital thermometer display in C (0 - 50 degrees) or F (32 - 122 degrees) and hygrometer displays in RH from 25% to 95%. A built-in memory ... [READ MORE](#)



Mini-Hygrometer - Digital

This inconspicuous thermohygrometer measures current temperature and humidity, as well as the highest and lowest measurement of each over days, weeks or months. Includes a centigrade/Fahrenheit switch. Ideal for museum cases or cabinets. Includes built-in stand. Operates on AAA battery. ... [READ MORE](#)

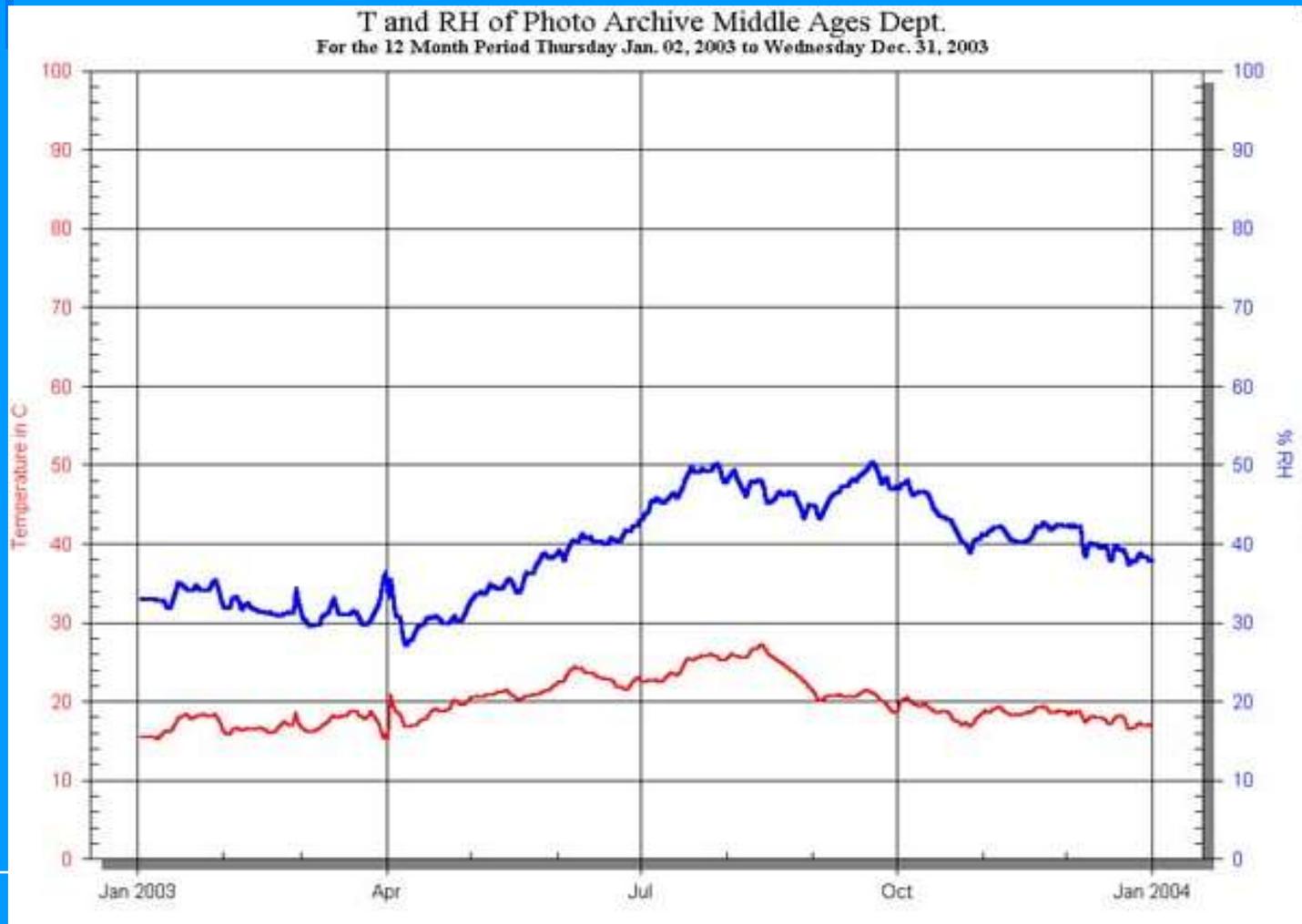


Oakton Data Loggers

In keeping with the demands of museum professionals, we have changed our supplier of data loggers to provide our customers with a superior system of automatically logging temperature and humidity readings, then downloading them to your computer or printer. But ... [READ MORE](#)

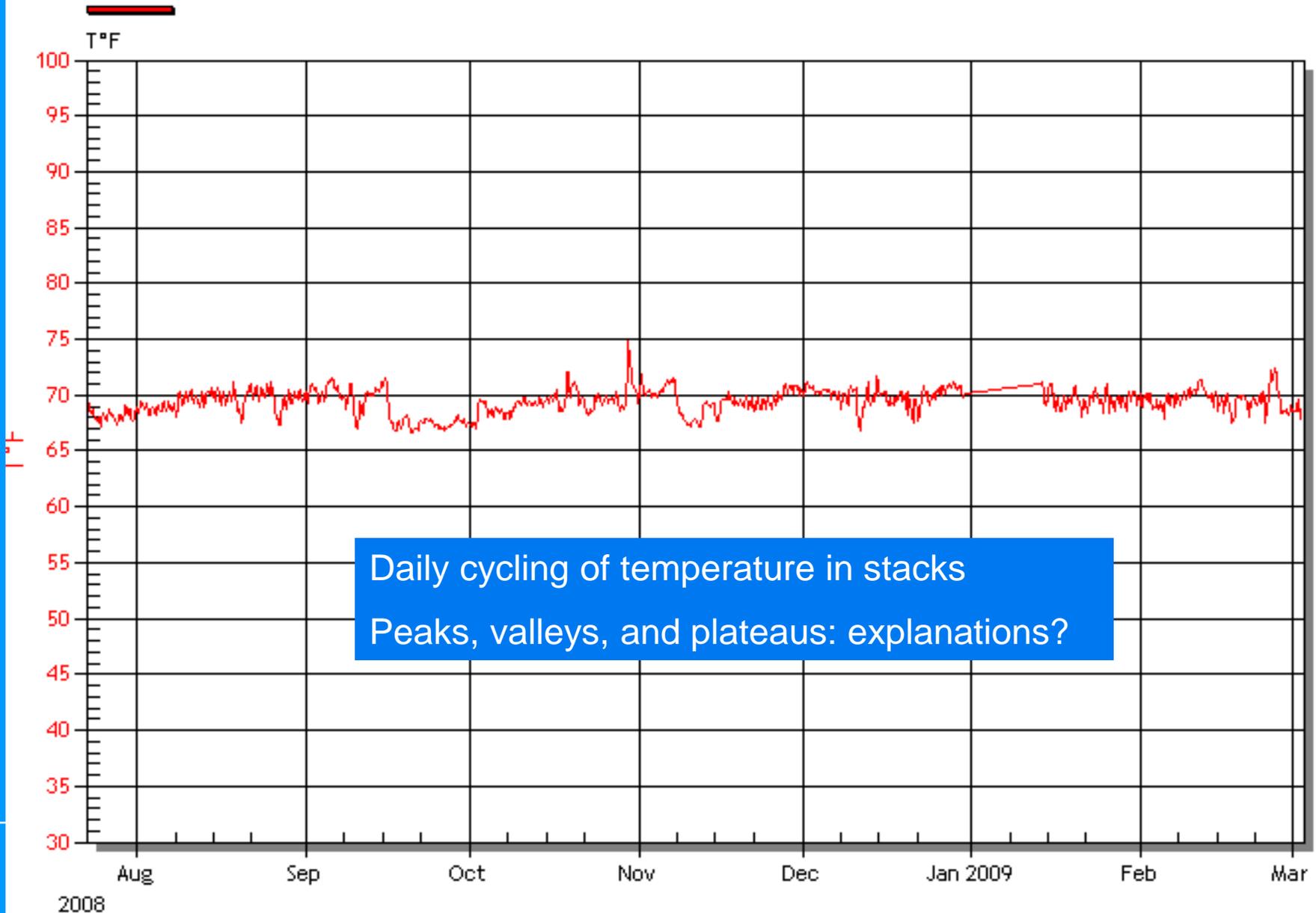
Monitoring with a data logger

See "How to Design a Climatically Stable Museum" from the Institute of Conservation Physics at <http://www.conservationphysics.org/tenerife/bufferedmusdesign.php>



T°F of Stacks Test 7M

2008-07-22 - 2009-03-02





- ❑ Deterioration rate doubles with each increase of 18 degrees F
- ❑ High humidity: mold, pests
- ❑ Extremely low humidity: embrittlement, desiccation
- ❑ Every fluctuation represents a contraction or expansion, especially damaging to multi-strata collections (film = base + emulsion) which expand and contract at different rates



Separation of emulsion from base on a lacquer audio disk

Image from University of Indiana Bloomington
http://research.indiana.edu/resources/media_preservation/slideshow/index.html



Thermohygrometer, Digital



Tiny accurate digital thermohygrometer is the perfect size for display cases

Features:

- Measures temperature, humidity and current highest and lowest values of both (MIN/MAX function)
- Accuracy is +/- 1 degree C (1.8 F)
- Ranges within -10 C to +50 C (14F to 122F)
- Relative humidity within 25% to 95%
- Includes Centigrade/Fahrenheit switch and built-in stand

Description:

Place in museum cases, cabinets or stacks. Unit operates on a LR44 watch battery, included.

Instructions:

To display maximum/minimum values:

- Press the MAX/MIN button once to show the highest values since the unit was last re-set.
- Press the MAX/MIN button twice to show the lowest values since the unit was last re-set.
- Press the same button again to return to the current values.

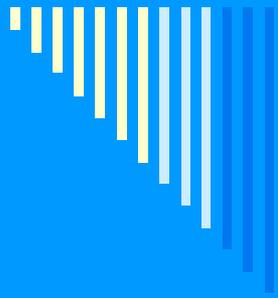
Dimensions:

1 1/2H x 2 1/2W x 1/2"D



No.	Description	Lbs.	Price Each		Qty
			1	6+	
WW-1546	Digital Hygrometer 1 1/2H x 2 1/2W x 1/2"D	0.5	\$29.59	\$26.25	

[Add To Cart](#)



ANSI/ISO standards

Paper / General

Max 70F / 30-50% RH

B&W silver gelatin film

Max 70F / 20-30% RH

Color film

36F / 20-30% RH

27F / 20-40% RH

14F / 20-50% RH

Magnetic tape

68F / 20-30% RH

59F / 20-40% RH

50F / 20-50% RH

The best
stable
environment
you can
maintain with
minimal
fluctuations



“one of these things is not like the others...”

- ❑ Can like materials be segregated? Store film and paper separately
 - ❑ Do collections and staff share a space? Staff comfort is a consideration
 - ❑ Is off site storage of less used collections less expensive than remediation in current building?
 - ❑ Stand alone vs. systemic solutions: a dehumidifier, a freezer, or an HVAC system?
-



“Low cost / no cost improvements in climate control” from NEDCC

- ❑ **Keep winter heat low:** If overheating occurs, don't allow windows to be opened — demand that the heat be turned down. Open windows and leaky doors allow outside air in, and allow desirable winter humidity to escape. Keep a few sweaters and blankets for staff or visitors who feel cold with the temperature around 65°F, and explain why you're keeping things cool. A small exhibit of damaged paper may help convince visitors.
- ❑ **Seal windows:** Use plastic sheets and tape to seal windows on the inside in winter. In storage areas, line windows with aluminum foil, and seal them more completely with gypsum wallboard and plastic. The foil will reflect sun away to reduce heat in summer, and will also keep light out of the storage areas.
- ❑ **Keep outside doors and windows closed:** Weatherstrip doors, and make sure doors and windows stay closed to prevent exchange of unconditioned outside air. Test seals; if a strip of paper waves in the breeze when it's held up to a crack, the seal isn't tight.
- ❑ **Block radiant heat from radiators:** If you can't move collections well away from radiators in storage or exhibit spaces, cover wallboard with reflective foil and position this barrier between radiators and collections to protect objects from "line-of-sight" heat transmission.
- ❑ **Keep equipment at one level 24 hours a day:** Don't change settings on climate equipment for nights or weekends, since damaging humidity fluctuations usually result. This includes both heat and window air conditioners. Be sure humidifiers or dehumidifiers are on, and that they're always adequately filled (or emptied) to maintain steady conditions. Choose a lower constant humidifier setting to prevent it from running out of water, or raise the constant RH setting on your dehumidifier so it will not overflow or shut off from too much water. (Of course this does not apply to equipment with piped water supplies or drains.) While improving the stability of conditions 24 hours a day usually requires little or no capital investment, using the equipment you have continuously almost always increases annual energy costs. Keep in mind that some of the most acute short-term damage to collections is caused by discontinuous operation of climate control equipment.
- ❑ **Separate collections that need special conditions:** Use available spaces the best way: Look at the available storage areas. Can you modify your use of space to suit the collections better? Are some spaces more stable than others? Do some materials in your collections (like parchment or vellum) need different conditions from others? Can these be segregated into groups with similar needs? This may reduce the need for new or improved conservation environments.

Light: a bushel of flashlights

- Any exposure to light is damaging to dyes, inks, fibers (all reactive)
- Especially damaging to iron based inks and photographic media
- Ultra Violet light (UV): sun, tungsten-halogen, quarts, florescent emit highest levels of UV energy
- Intensity x duration = damage
- Goal is lowest intensity for briefest duration
- Incandescent is best
- UV filters (have lifespan, must be replaced)
- We see cosmetic, but damage is structural
- Damage is cumulative
- Visibility: what is the social cost of low light?

Filters, Light, UV Fluorescent, Tube Sleeve Design



Protects valuables from damaging light by filtering out 96 - 98% of UV light

All light, especially invisible ultraviolet (UV) light, accelerates the deterioration of and other organic materials. Fluorescent fixtures give off significant amounts of decrease damage, place these 3mil filters on all of your fluorescent light tubes.

Filters fit perfectly on T-12 type bulbs. Just wrap the UV filter around standard 4 tubes simply cut it in half or use two for 96" tubes.

Replace filters every 10 years for maximum efficiency.

10 per package.

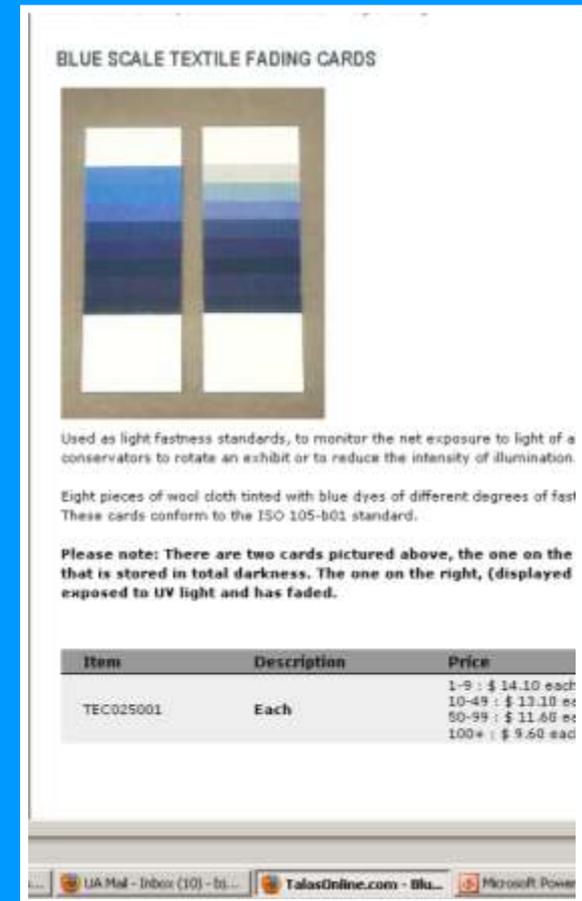
Overall Dimension: 46"L

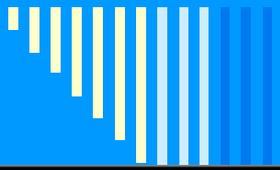
Note: Temperature of the bulb and fixture should not exceed 300 degrees.

No.	Description	Lbs.	Price Per PKG-10
WW-T12	Fluorescent Light Filter Pk: Of 10	0.4	\$67.55

Monitoring of light levels

- ❑ High tech: Blue wool light fading standards
 - ❑ ISO (International Standards Institute)
 - ❑ A light meter
 - ❑ A 35mm camera with a built in meter (NEDCC)
 - ❑ UV meters (expensive (\$3000+))
- The art of compromise
- ❑ In storage, in use, in exhibition
 - ❑ Reasons to monitor: data driven argument, assess remediation, condition reports





Other hazards

National Park Service Museum Management Program
Conserve O Grams at
http://www.nps.gov/museum/publications/conserveogram/cons_toc.html

Museum Management Program

National Park Service
U.S. Department of the Interior



EXHIBITS | PUBLICATIONS | FOR TEACHERS | COLLECTIONS



Conserve O Grams

What are Conserve O Grams?

They are short, focused leaflets about caring for museum objects, published in loose-leaf format. New topics are added as needed and out-of-date issues are revised or deleted. Semiannual supplements will be issued for an indeterminate period.

[Click here to view the current selection of Conserve O Grams.](#)

Who will benefit by reading Conserve O Grams?

- o Both experienced and inexperienced museum staff responsible for the care and use of museum collections.



Furnishings & storage units

- Easy to clean surfaces that do not hold mold or dust
 - Light colors that show dirt
 - Stable finishes: baked powder coated enamel
 - Impermeable to light, dust
-

Enclosures: “if it smells like a beach ball...”

Volatile Organic Compounds (VOCs)

- ❑ Off-gassing

Atmospheric contaminants:

- ❑ Ash, air pollution, loading docks
- ❑ Archival quality enclosures protect from airborne particulates



Disaster planning

- Have a plan
- Monitor trouble spots
- Gather a disaster kit

Flood levels in Hughes, on the Koyukuk River



Disaster kit

- ❑ Plastic sheeting
- ❑ Absorbent material: paper towels, old towels
- ❑ Interleaving: blotter, clean newsprint
- ❑ Labeling: pens, labels,
- ❑ Enclosing: plastic bags, crates
- ❑ Air circulation: fans
- ❑ Light: batteries, flashlights, extension cords
- ❑ Wet Vac, dehumidifier, pump, large garbage bins, buckets, brooms
- ❑ Safety: first aid kit, plastic gloves and boots, face masks, goggles
- ❑ Documentation: disposable camera, temp/hydrometer
- ❑ Collection priorities: salvage list





PLAN AHEAD! Emergency Planning Template from the Northeast Document Conservation Center

http://www.nedcc.org/resources/leaflets/3Emergency_Management/04DisasterPlanWorksheet.php

The value of NEDCC's Preservation Leaflet series cannot be overstated. In an age when bells and whistles get all the attention, these leaflets are concise, authoritative, and clearly written, with a minimum of jargon. I never hesitate to share these valuable tools with novice and professional alike."

John H. Slate
Dallas Municipal Archives



NORTHEAST DOCUMENT CONSERVATION CENTER

- Introduction
- Preservation Leaflets
- Resources for Private and Family Collections
- Suppliers List
- Preservation Toolkits
- Publications
- Web Resources

RESOURCES

► PRESERVATION LEAFLETS

[Click here](#) to view a full list of available leaflets

EMERGENCY MANAGEMENT

3.4 Worksheet for Outlining a Disaster Plan

Karen E. Brown

Field Service Representative
Northeast Document Conservation Center

A. Institutional Information

Name of institution _____

Date of completion _____

Date of next update of this form/plan _____

List all locations where this plan is on file (on and off premises)

Staff members to be called in case of disaster:

Position	Name	Home Phone	Specific Responsi in Case of Disast
Chief Administrator	_____	_____	_____
Disaster Recovery Team Leader	_____	_____	_____
Person in charge of building maintenance	_____	_____	_____
Cataloger/	_____	_____	_____

Enter search word/phrase

[Search](#)

In-house disaster recovery team members:

NAME	HOME PHONE
_____	_____
_____	_____
_____	_____
_____	_____

Who on the staff has a copy of this plan and is familiar with its contents?

_____	_____
_____	_____
_____	_____
_____	_____

B. Services Needed in an Emergency

Service	Company and/or Name of Contact	Phone #
In-house Security	_____	_____
Fire Department	_____	_____
Police or Sheriff	_____	_____
Ambulance	_____	_____
Civil Defense	_____	_____
Professional Advisor/Conservator	_____	_____
Insurance Company	_____	_____
Freezer	_____	_____
Freeze-dry Service	_____	_____
Document Recovery/Salvage	_____	_____
Computer Records Recovery/Salvage	_____	_____
Microfilm Recovery/Salvage	_____	_____
Videotape Recovery/Salvage	_____	_____
Computer Emergency	_____	_____
Legal Advisor	_____	_____
Electrician	_____	_____
Plumber	_____	_____
Carpenter	_____	_____
Estimator	_____	_____
Pestigation Service	_____	_____
Locksmith	_____	_____
Utility Companies	_____	_____
Electric	_____	_____
Gas	_____	_____
Telephone	_____	_____



Whom to contact for further information:

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Alaska State Archives