

Presentation by Mark McCormick-Goodhart at:

The 14th Annual National Archives
and Records Administration Preservation
Conference:
Alternative Archival Facilities

March 25, 1999
Washington, DC



The Cold Storage of Photographic Collections Using Conventional Freezer Technology

Mark McCormick-Goodhart
Old Town Editions, Inc.
Alexandria, Virginia

Henry Wilhelm
Wilhelm Imaging Research, Inc.
Grinnell, Iowa



www.oldtowneditions.com
www.wilhelm-research.com

Advantages of Freezer Storage

- 1) Sub-zero temperature storage (-4°F or -20°C) is the highest standard of care.
- 2) Maximum chemical stability is achieved without irreversible change to physical properties.
- 3) Significantly reduced moisture content in cold air makes passive climate control effective.
 - a) control is possible at item, box, and cabinet level.
 - b) passive control imparts water and smoke resistance and allows the use of dry-pipe sprinkler systems.

Advantages of Freezer Storage

4). Significant energy cost savings .

5). Lower construction costs.



6). Local refrigeration contractors can install and service conventional freezers.



Disadvantages of Freezer Storage

- 1) Low temperature restricts access.
- 2) Thermal warm-up procedures must be used to ensure safe retrieval and guard against moisture condensation.



Methods of Passive Climate Control

1) The FICA system.

High vapor barrier packaging system
developed by the Swedish Film Institute



2) CMI package design.

Freezer Kit available from:
Metal Edge Inc., Commerce, California
800-862-2228 or 213-721-7800

3) The sealed cabinet method.

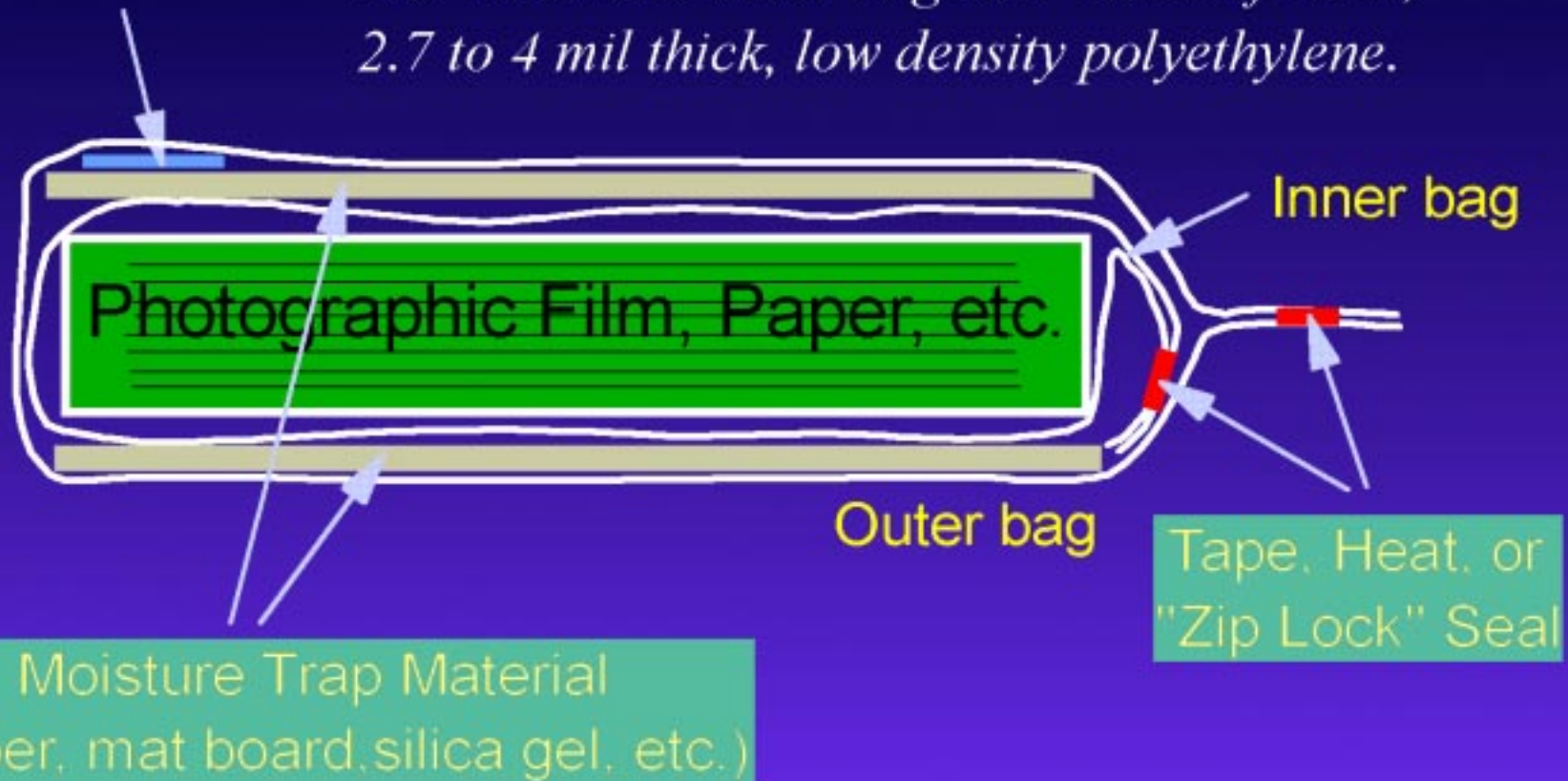
New cold storage research underway at
Wilhelm Imaging Research, Inc., Grinnell, Iowa



Critical Moisture Indicator (CMI) Package Design for Freezer Storage

Cobaltous Chloride
Humidity Indicator

*The inner and outer bags are made of clear,
2.7 to 4 mil thick, low density polyethylene.*



In the Metal Edge Freezer kit, a drop-front style conservation box is also located between the inner and outer bag. It gives a professional appearance and adds to the moisture trap performance.

Metal Edge, Inc.

THE SAFE CARE® IMAGE ARCHIVE FREEZER KIT



SAFE CARE® IMAGE ARCHIVE FREEZER KIT

Cat.#	Dimensions	5 boxes/Kit	
		Kits	Price
FK10131	13" x 10" x 1 1/2"	1	\$57.75
		5	55.65
		10	53.51
		20	51.45
		100	48.30

See Polypropylene storage pages on Pg.16.

Designed to preserve photographic slides, negatives, and prints in beautiful condition for centuries, the kit is based on research conducted at one of America's foremost preservation institutions. Photographic images will last up to several hundred times longer in freezer storage than at room temperature. No other preservation method can achieve this high standard of collection care. Freezer storage is safe, cost effective, and practical with the Image Archive Freezer Kit.

Each kit contains all materials to make 5 freezer-ready packages. The package is designed to hold polypropylene letter-file size storage pages (see pg. 16) in a variety of image formats. One package will store 25 to 30 pages of 35 mm slides, negatives, prints, or transparencies. Each package will warm safely to room temperature and be ready for access in approximately 3 hours.

Any conventional freezer operating at -18 to -22°C (0°F to -8°F) is suitable. Manual defrost or frost-free "reach-in" freezers that are sold in the home appliance market are appropriate for small collections. *Flammable materials storage" or "explosion proof" freezers are recommended for storage of nitrate base film. Large capacity "walk-in" freezers are widely available and operate with an auto defrost cycle. Mini walk-in freezers can also be purchased.

Photographic material is best stored for long term preservation in a cold and dry (low relative humidity) environment. The freezer provides the cold, and the SafeCare Image Archive Freezer Kit controls the relative humidity. Call for additional information.

Sealed Cabinet Method



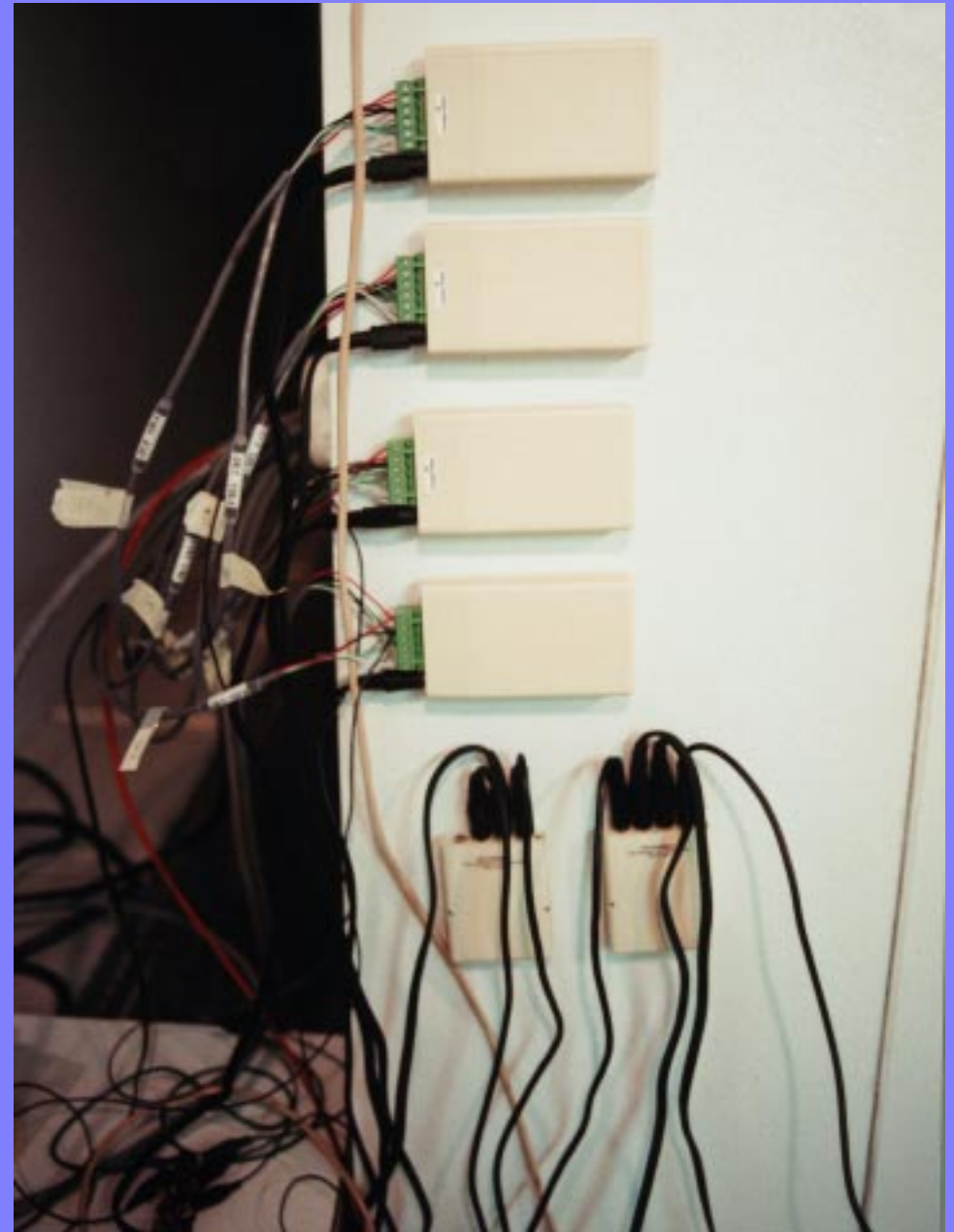




Safety door: Opens from inside even when locked



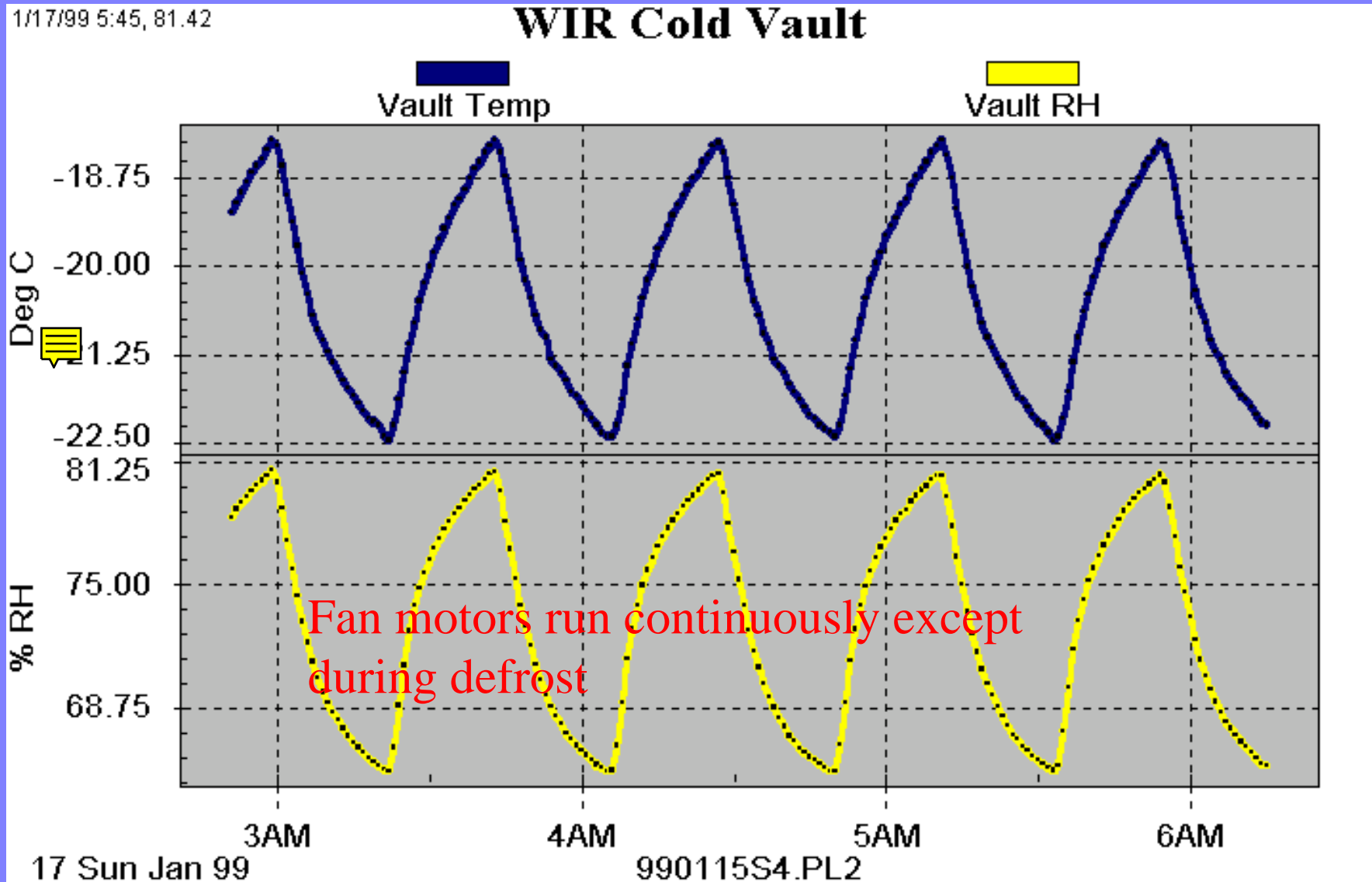
Humidial RH Indicator Plug



Data loggers with multiplex wiring for remote access by modem



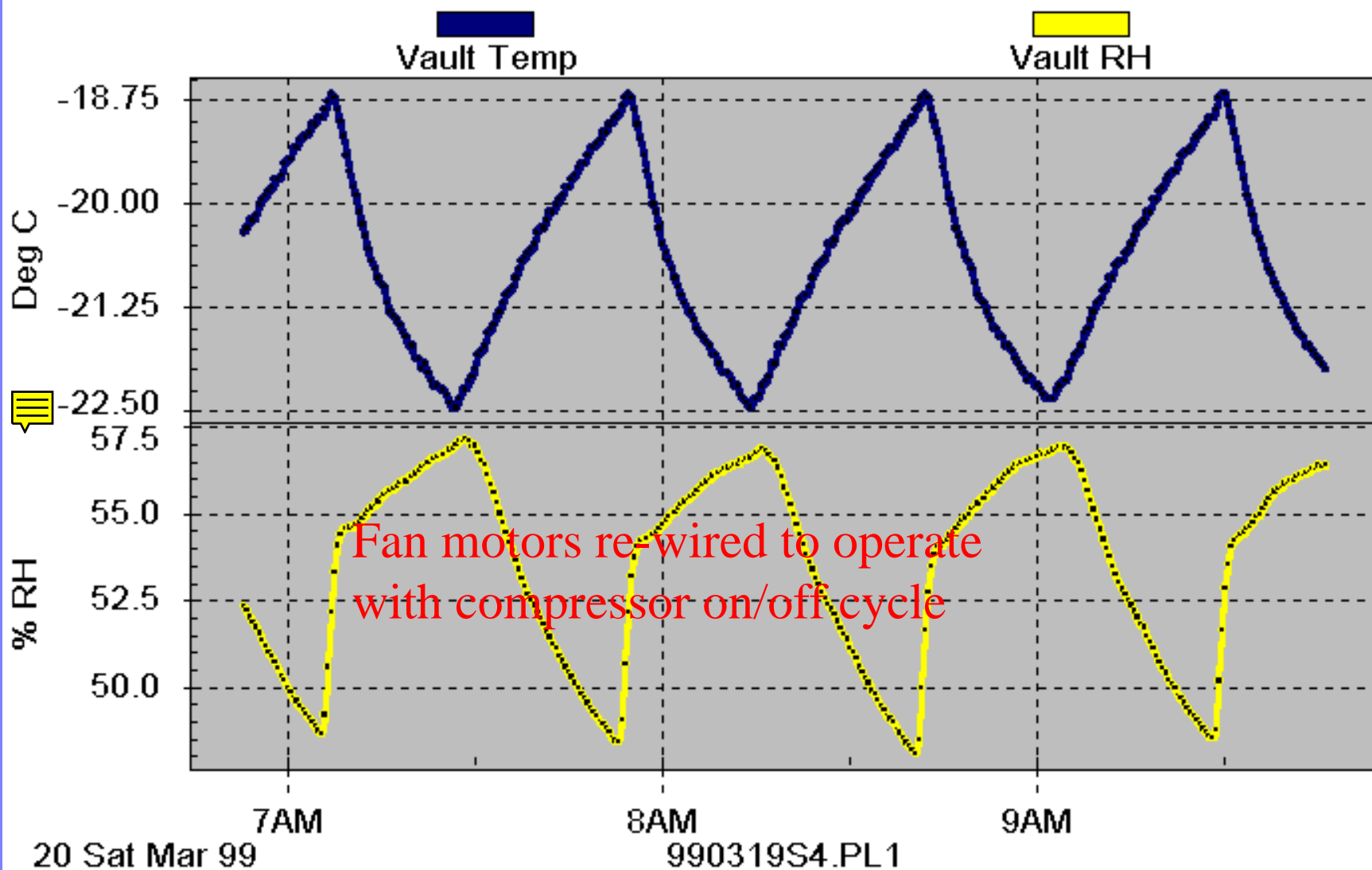
Conventional Walk-in Food Freezer Environment



Wilhelm Imaging Research Modification to Walk-In Food Freezer

3/20/99 9:48, 54.99

WIR Cold Vault

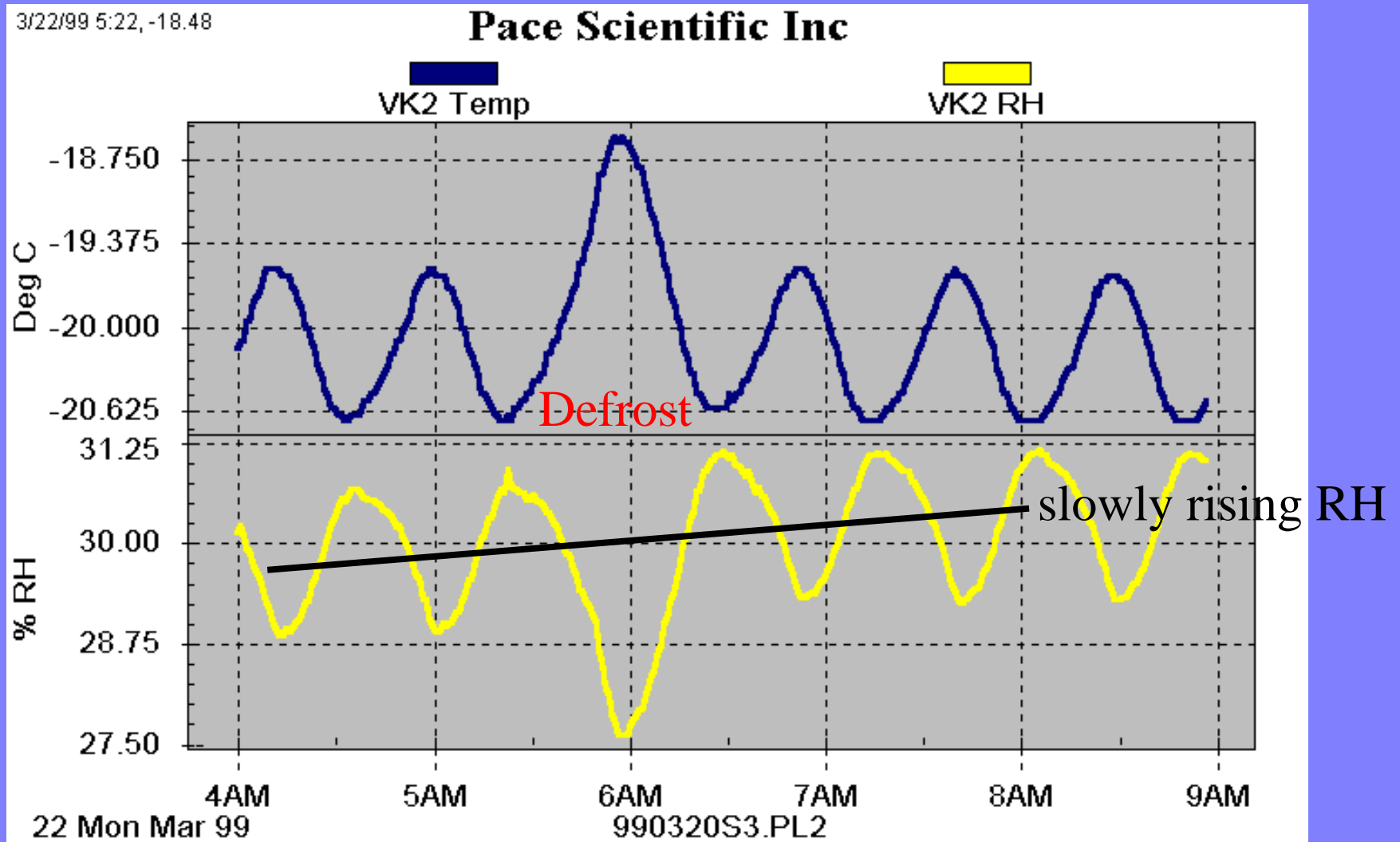


Fan motors re-wired to operate
with compressor on/off cycle

20 Sat Mar 99

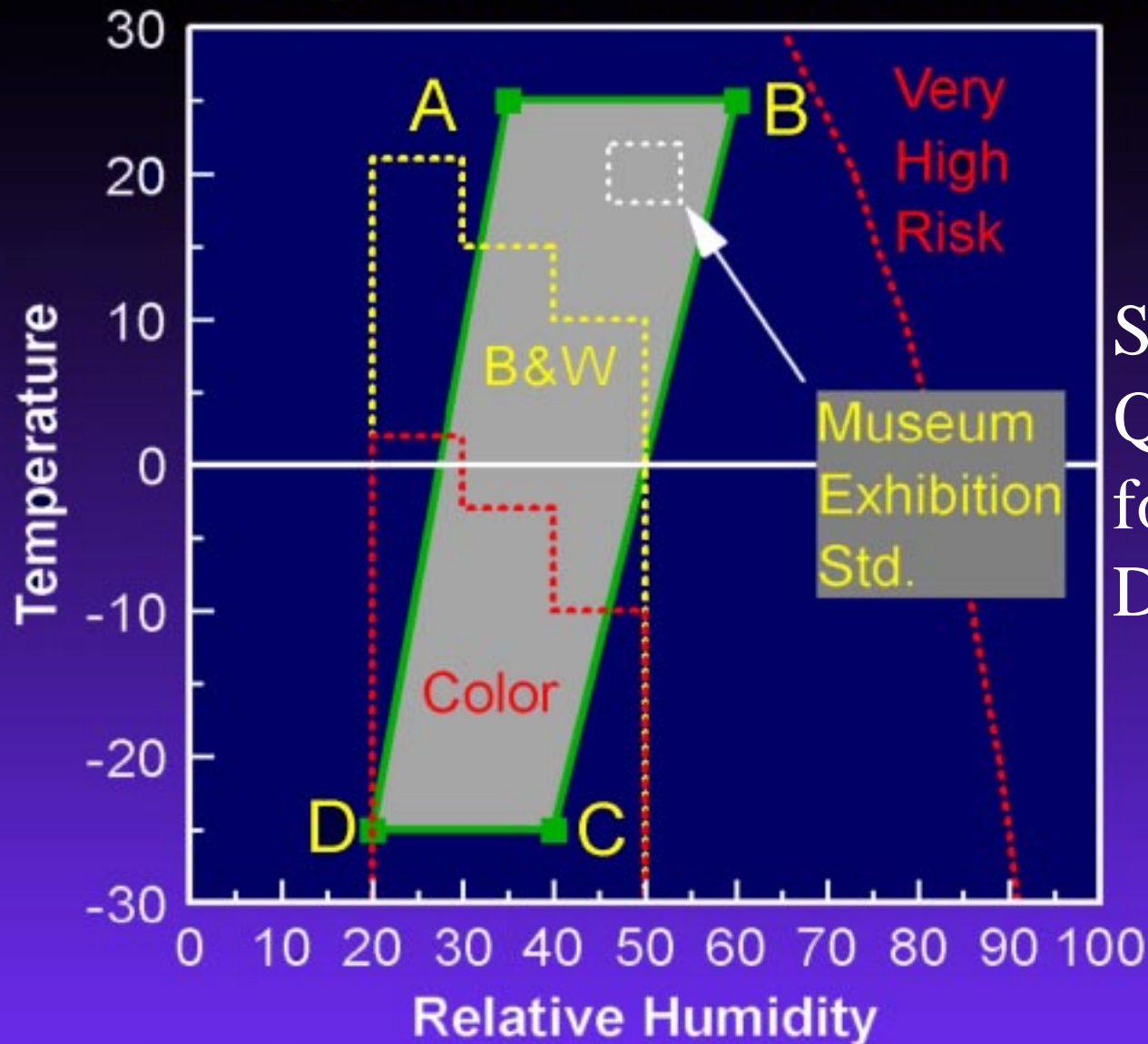
990319S4.PL1

Sealed Cabinet Environment Containing No Photo Materials During Moisture Permeability Test



RH and temperature cycling reduced by cabinet

McCormick-Goodhart Recommendations Compared to ANSI Film Std.



Stay within
Quadrant ABCD
for storage and
Display

Note: see suggested reading on environmental recommendations at end of this PDF document.



Acknowledgements:

Henry, Carol, and Charlie Wilhelm

Smithsonian Center for Materials
Research and Education, Smith-
sonian Institution

Delta Designs, Inc., Topeka, KA

Viking Metal Cabinet Co., Chicago,
IL

Steel Fixtures Manufacturing Co.,
Topeka, Ka

Metal Edge, Inc., Commerce, CA

Suggested Reading:

About the FICA system-

R. Goos and H. Bloman, "An Inexpensive Method for the Preservation and Long-term Storage of Color Film", **J. SMPTE**, **92**, 1314-1316, 1983.

About Cold Storage and Image Permanence-

H. Wilhelm and C. Brower, contributing author, **The Permanence and Care of Color Photographs: Traditional and Digital Color Prints, Color Negatives, Slides, and Motion Pictures**. Preservation Publishing Co., Grinnell, Iowa, 1993. Available for \$39.95 + shipping from Light Impressions Corporation: www.lightimpressionsdirect.com

About Environmental Recommendations-

M. H. McCormick-Goodhart, "The Allowable Temperature and Relative Humidity Range for the Safe Use and Storage of Photographic Materials," **Journal of the Society of Archivists**, Vol 17, No. 1, United Kingdom, 1996.

M. H. McCormick-Goodhart, "Temperature and Relative Humidity Recommendations for the Safe Use and Storage of Photographic Materials," **Final Program and Advance Printing of Paper Summaries, IS&T's 49th Annual Conference**, The Society for Imaging Science and Technology, Springfield, VA, 1996.