EXHIBITS AND STORAGE MATERIALS HANDBOOK:
Test Results Index
Materials Glossary

Minnesota Historical Society
2007

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ABOUT THIS HANDBOOK

NEW FEATURES-

- ***Lists of Tested and Reviewed Materials***
- ***Updated Glossary of Materials and Term***
- ***Current Conservation Literature References***

This handbook is intended to serve as a frequently consulted desk reference for exhibits projects managers, exhibits designers and curators, sites managers, and various collections curators whose responsibilities include storage, exhibition, and handling of museum, library and archival collections. It provides a ready source of information on the materials that have been tested and reviewed in the Daniels Objects Conservation Laboratory over the past decade following current conservation guidelines and protocols. Background definition information on generic materials is included. The intent and goal of this handbook is to provide guidance for planning so that preservation of the collections will be maximized.

This handbook addresses those accessioned collection items that belong to the Society and are used in exhibitions at our own facilities or are loaned for exhibition to other institutions. The guidelines introduced here will also apply to collections objects belonging to other institutions that are lent to the Society for exhibition purposes.

The Society also has developed policies for classifying and using other categories of materials such as study and Program Use Materials (PUM) collections. As policies for these items are developed further, they will be distributed as updates to this handbook. The guidelines in this handbook do not apply to study collections, program use materials (PUM, i.e. reproductions, props, and materials or items constructed or acquired for use in exhibits or education programming). Those objects and materials, however, are subject to the quarantine and inspection procedure to insure that insects and other pests are not introduced into the building and collections. Those procedures and protocols are also included in this handbook.

This book must be considered as a work in progress since it will be continually up-dated as new materials are tested and old materials are re-tested and re-evaluated. The binder format will allow for easy up-dates and additions. The index tables, including reviewed materials, are posted as pdf. Files in the “Forms” section on *Fletcher* (MHS Intranet website). There is a searchable database in Microsoft Access that will be updated by conservators as new tests and reviews are completed.

The instructions below will guide you through this manual and the database. Please feel free to contact the Conservation Department with any questions.

Materials Selection/Testing Procedures

1) **Choose** the materials and then **check** the current materials test index and materials review index on the *Fletcher* Intranet website database to see if the material that you want to use is listed. Please do this at least six weeks to two months before you anticipate having to order the material, in case it is not listed (see item 4 below).

2) **If the materials that you have chosen have been previously tested and approved**, then ordering can proceed. **Please inform the Senior Objects Conservator of materials being used in a particular project so that the lab has a record.**

3) **If the materials that you have chosen have not been approved** for the intended use, contact the Objects Conservator to discuss alternatives and options.

4**) If items or materials that are not already included in this handbook are being considered for use**, contact the Objects Conservator **a minimum of six weeks to 2 months in advance of placing an order for the material**. Materials **cannot be approved for use or ordered** until a review is completed. This will ensure that we avoid identifiable hazards.

5**) Emergency situations** will be handled on an individual basis and all options will be considered to expedite exhibits and sites construction projects. Clear and direct communication with the Objects Conservator is required in those situations.

6) **Consult the National Park Service (NPS) publication on Conservation in Exhibits for lists of suppliers of approved products.** Double check with the MHS Objects Conservator before ordering anything that will be inside a case or in contact with collections objects. The publication is available both on CD-ROM and in hard copy in the Exhibits Dept. Check with Conservation Dept. secretary Jean Moberg if you have problems finding the publication.

Acknowledgements

This current work is based on the *Guidelines to Practices and Materials for Use in the Exhibit of Collections of the Minnesota Historical Society* handout that was produced and distributed in 1991 by Robert Herskovitz, Conservation Department, and Marcia Anderson, Museum Collections. The following MHS conservators reviewed that handout and made corrections and additions where needed: Susan Heald*, Kathy Ludwig*, Mary Pound*, and Paul Storch.

The current MHS conservators who reviewed the drafts of this handbook were Sherelyn Ogden, Ann Frisina, and Thomas Braun. Jean Moberg, Conservation administrative assistant, assisted with the production and distribution, and does periodic updates.

(* these individuals are no longer employed at the MHS)

SECTION I

Materials Test Indices

1991-Present

(Posted on *Fletcher* in pdf. Format and listed below)

These lists include materials used in MHC exhibits construction, long-term storage, and new Sites construction and rehabilitation. The tests conducted and protocols used are included in each report on file in the DOCL. Manufacturers information and MSDS information is on file for tested materials in the Daniels Objects Conservation Laboratory (DOCL) and copies are available upon request. Samples of the materials tested are stored in the DOCL and are available for examination upon request.

Approval of a material for use depends on if it has the potential to cause damage to a wide range of collections objects when in close or actual contact and/or in an enclosed space.

It is your responsibility to contact the Senior Objects Conservator when you want to use a material on this list that is not approved. Do not order any unapproved materials before checking with the Senior Objects Conservator.

EXHIBIT MATERIALS APPROVED				
PRODUCT #	**PRODUCT NAME**	**MANUFACTURER**	**DATE**	**USED FOR?**
00-11	Buckram book cloth	N/A	2/17/2000	mound covering
00-12	Removable fabric cubicle	3M	2/24/2000	case construction
00-5	Wheatbord	Isoboard, Inc.	2/1/2000	case contruction
00-6	Flexible gasket materials	McMaster-Carr	2/24/2000	case construction
02-2	Harvest Ply Particle Board	Navy Island Plywood	8/9/2004	case construction
02-7	Duravent polypropylene	Duravent	5/23/2002	storage
02-8	Respond Acoustical Wall	Acoustics First Corporation	5/23/2002	storage
02-8	Wedge polyurethane AFW2	Acoustics First Corporation	5/23/2002	storage
03-10	cotton/polyester/linen fabric	Holly Hunt	12/17/2002	mound covering
03-10	nylon fabric	N/A	12/17/2002	mound covering
03-11	Masterspec Resilient Tile	Masterspec	12/18/2002	exhibits areas
03-11	Ever-Grip Urethane	Dodge-Regupol, Incorporated	12/18/2002	exhibits areas
03-7	Natural Rubber NR 12535	Nott	12/9/2002	exhibit areas
03-8	Aquaseal Matte Flood	Valspar Refinish	12/9/2002	exhibit areas

	Coat			
03-8	LM10002F polyester weft	LGC America, Inc.	12/9/2002	exhibit areas
03-8	XL100 printing liquid	TechINK	12/9/2002	exhibit areas
04-12	Eco Worx	Shaw	5/6/2004	exhibit areas
06-8	ProMedia Shelving	Russ Bassett	2/16/2006	CD/DVD storage
91-10	Fiberglass/phenolic resin	Danoka Featherboard	7/22/1991	case constructions, mounts
91-11	Cellulose Insulation	International Cellulose	8/27/1991	ceilings
91-12	Carpet: nylon	Milliken	8/27/1991	flooring
91-13	Carpet: nylon	Networkx	8/27/1991	flooring
91-14	Kraft paper/OSB/resin	Bellcomb Wall Systems	8/28/1991	case construction
91-16	Ethylene vinyl acetate foam	Evalite 11206	10/3/1991	padding
91-7	Slide storage cabinet paint	Neumade	5/10/1991	coating
92-10	Fabric: polyethylene	N/A	10/9/1992	mound covering
92-8	Fabric: cotton	N/A	8/12/1992	mound covering
93-1	Particle board	N/A	1/12/1993	case construction
93-13	Medite boards	Medex Corp.	5/17/1993	case construction
93-15	Buckskin	N/A	5/6/1993	mound covering
93-16	Fawn Skin	N/A	7/6/1993	mound covering
93-17	Acrylic Tape	3M Company	7/6/1993	case construction
93-2	Painted Masonite	N/A	2/16/1993	case construction
93-7	Black silk	N/A	1/15/1993	mound covering
93-8	Tan silk	N/A	3/18/1993	mound covering
94-1	Fabric: Timmons Barley,	Timmons	7/6/1993	mound covering
94-10	Vitriturf EPDM rubber	Vitriturf	12/27/1993	exhibit areas
94-11	Aluminized tape	Lineaco	1/26/1994	mounts
94-13	Polyolefin shrink tubing	Benchmark	4/22/1994	mounts
94-3	Various fabrics	N/A	9/1/1993	mound covering
94-4	Vitriturf vulcanized rubber	Vitriturf	9/13/1993	exhibits areas
94-5	Polyethylene crawl tubes	N/A	10/4/1993	exhibits areas
94-9	Maple wood frame	N/A	11/30/1993	mounts
95-11	Panel	Belcomb/Duron	12/6/1994	case construction
95-12	Soft Maple	N/A	12/6/1994	case construction

95-13	Medex primed board	Medex	12/6/1994	case construction
95-15	Latvian birch plywood	N/A	12/20/1994	case construction
95-18	Acrylic sheeting adhesive	Caseway	1/11/1995	case construction
95-19	Acrylic Sheeting adhesive #4	Weld-On	1/11/1995	case construction
95-2	MDF and acrylic primer	Medex	9/25/1994	case construction
95-20	Drawer	Lucite	1/11/1995	case construction
95-21	Acrylic sheet	Lucite	1/11/1995	case construction
95-22	Polyethylene foam with	Voltek	2/14/1995	mounts
95-26	Metal polish	Simichrome	3/17/1995	conservation treatments
95-29	Polyester fabric	N/A	3/28/1995	mound covering
95-3	Carpet Squares	N/A	10/4/1994	exhibit areas
95-30	Coated cardboard tube	Sonotube	3/29/1995	case construction
95-34	Fir and poplar	N/A	5/23/1995	case construction
95-36	Tarnish protection	Microchamber	6/27/1995	case construction
95-7	Wood Fiber boards	Duron	12/6/1994	case construction
95-8	Medite II Wood Fiber boards	Medex	12/6/1994	case construction
96-1	Latex styrofoam coating	Rosco Lab, Inc.	8/4/1995	mannequin construction
96-11	Plastic Box	Newell office Products Co.	3/18/1996	storage
96-5	Food-grade Silicone rubber	Lexington Components, Inc.	9/13/1995	storage
97-11	CastCal P 141 acrylic	N/A	4/11/1997	case construction
97-12	Radley III Cabernet 303	Lee Commercial Carpets	5/1/1997	exhibits areas
97-6	Carpet Tile P/8226	Milliken	12/1/1996	exhibits areas
99-1	Folia High Pressure Laminate	Folia Industries, Inc.	7/13/1998	case construction
N/A	Accolade Interior acrylic	Pratt and Lambert	11/5/1998	exhibits areas
N/A	Acrylic Latex 834 sealant	Tremco	8/28/1995	exhibits areas
N/A	Aqua/Seal	Brulin & Co., Inc.	1/6/1997	case construction
N/A	Beenwood Stays Clear	Benjamin Moore and	9/5/1997	exhibits areas
N/A	Begin cleaning liquid	Misco International, Inc.	3/17/1998	exhibit areas
N/A	Bora-Care insecticide	Nisus Corporation	4/27/2000	sites-limited use

N/A	Bradberry 30 nylon carpet	Beaulieu Residential	6/23/2000	exhibits areas
N/A	Breakthrough 70 series	Vanex, Inc.	7/30/1999	case construction
N/A	Brillianize acrylic sheet	KleenMaster Products	8/9/2000	exhibits areas
N/A	Camger Polyglase 1-146	Camger Chemical Systems,	1/31/1994	case construction
N/A	Chandelier Cleaner/2001	Easy Care Products, Inc.	6/25/2003	chandelier cleaning at sites
N/A	ColorCoat 5600 series acrylic	Rosco Laboratories, Inc.	10/13/2000	exhibits areas
N/A	Coroplast corrugated	Coroplast, Inc.	5/22/2002	storage
N/A	Danspeed-80	Chemcraft Sadolin Finishes	4/13/1992	case construction
N/A	Deveclean 99 graffit cleaner	Devoe ICI High	5/10/2002	preservation treatments
N/A	Devoe Hydrostrip and	Devoe ICI High	5/10/2002	preservation treatment
N/A	Devthane 379UVA Clear	Devoe ICI High	5/10/2002	preservation treatment
N/A	Domo 10 epoxy adhesive	Tenax	9/11/1994	limited use
N/A	Duchesse Satin Paint	Ralph Lauren/ICI Paints	1/6/2003	exhibits areas
N/A	Dura build Premium High	Fiber Glass-Evercoat Co.,	9/17/2001	case construction
N/A	Durabond D-7 Wall Carpet	DAP Inc.	3/31/1993	exhibits areas
N/A	Durabond LC Sheetrock	USG	12/17/1997	exhibits areas
N/A	Durabond sheetrock	USG	12/17/1997	exhibits areas
N/A	Elmer's professional	Elmer's Professional	6/25/1998	case construction
N/A	Enviro Strip #3	ProSoCo, Inc.	4/24/2002	preservation treatment
N/A	Epcon Granite V Resin	ITW Ramset/Red Head	5/19/1999	exhibits areas
N/A	EPK 0151 Resin epoxy	The Dexter Corporation	11/20/1996	preservation treatments
N/A	Faculty Classics L2746 nylon	Lees UK	10/1/1999	exhibits areas
N/A	Fasterfill epoxy concrete	Master Builders, Inc.	5/27/1992	exhibit areas
N/A	Flame retardant resin	Interplastic Corp.	7/15/1999	exhibits areas
N/A	Foster 40-20	Foster Products Corporation	7/26/2002	fungicidal coating for HVAC

N/A	Gardz Drywall Sealer;	William Zinsser and	8/20/2003	exhibits areas
N/A	Glasbac carpet	Interface Americas	11/14/2002	exhibit areas
N/A	Glint fabric	Maharam	5/1/2003	mound covering
N/A	Goof Off	Valspar	2/11/2003	case construction
N/A	Great Glass Cleaner	CCP Industries	8/9/2000	exhibits areas
N/A	Grid-Set Green Glue,	Interface Americas	11/17/2002	exhibits areas
N/A	Guardsman Furniture Polish	Guardsman Products, Inc.	6/14/1993	preservation treatment
N/A	H2O Acrylic Satin Varnish	Masters Products	12/13/1994	exhibits areas
N/A	Hammerite styreneated	Masterchem Industries, Inc.	3/22/2000	exhibit areas
N/A	Hank's Big Stick	Hank's Specialties, Inc.	5/22/2001	exhibit areas
N/A	Hank's Solvent Free Safe Stick	Hank's Specialties, Inc	6/23/2000	exhibit areas
N/A	Heavy Duty Clear Glues	American Chemical, Inc.	2/8/1998	mounts
N/A	Henry 440 latex adhesive	W.W. Henry Co.	11/24/1997	exhibits areas
N/A	Henry Next Generation 130	W.W. Henry Co.	11/24/1997	exhibits areas
N/A	Hostacor H Liquid N	Hoechst Celanese	1/11/1994	preservation treatement
N/A	Hydrostrip 503	Napier International	10/4/2001	preservation treatment
N/A	Jahn 120 marble patching	Jahn Restoration Mortars	8/20/1998	preservation treatment
N/A	Jax Magna-Plate 36	Behnke Lubricants, Inc.	5/13/2002	storage
N/A	Klean-Strip heavy Bodied	W.M. Barr & Co., inc.	1/24/2002	preservation treatment
N/A	Leather Weld adhesive	Tandy Dye Company	4/1/1996	limited use
N/A	Lees unibond wet set	Lees UK	10/1/1999	exhibits areas
N/A	Magma-Quartz epoxy	Belzona Meolecular	12/16/1997	preservation treatments
N/A	Magnum Joint Compound	K.C. Wall Products, Inc.	9/20/2001	case construction
N/A	Magnum Plus Gold M-4099	Para-Chem	8/16/2000	storage
N/A	Majicthane urethane coating	Yenkin-Majestic Paint	2/16/1992	storage
N/A	M-D 400 Subfloor and Deck	Macklanburg-Duncan	8/3/2000	exhibits areas
N/A	Melamine Decorative	Melamine Decorative	3/30/1992	case construction

N/A	Milliken Modular Carpet	Milliken Chemical	3/25/1993	exhibits area
N/A	Milliken P/8489 Rainbow	Milliken Chemical	3/25/1993	exhibits areas
N/A	Miracle Sac O	Icel Developments Ltd.	6/15/1999	preservation treatment
N/A	Mirrolac-WB waterbonre	Devoe Paint	5/3/1995	exhibits areas
N/A	Model-cast casting resins	Sterling Supply Inc.	2/20/2003	reproductions
N/A	Murphy Oil Soap	Colgate-Palmolive Company	6/10/1994	preservation treatment
N/A	Nevr-Dull Magic Wadding	Nevr-dull	5/13/2002	limited use
N/A	New Contender needlebond	Mckee Enterprises	10/21/2001	case construction
N/A	NexStep carpet	Interface Americas	11/14/2002	exhibit areas
N/A	Nochar's Fire Preventer	Nochar, Inc.	6/30/1999	exhibits areas
N/A	Opaque Barrier Film	Allied Signal	1/13/2004	storage
N/A	Orang-Solv neutral all	Mid-States Laboratories, Inc.	2/18/1991	limited use
N/A	Osmose Brand Pressure	Osmose Wood Preserving	5/13/2002	exhibits areas
N/A	Para-Bond 250	Para-Chem, Inc.	9/18/2006	carpet adhesive
N/A	Para-Bond 4099	Para-Chem, Inc.	9/18/2006	carpet adhesive
N/A	Parabond M-4600 Solv-Free	Para-Chem	7/5/2000	exhibit areas
N/A	Parvenu nylon carpet	Beaulieu Residential	6/23/2000	exhibits areas
N/A	Peel Away 7	Dumond Chemicals. Inc.	2/7/2002	preservation treatment
N/A	Peel Away Neutralizer	Dumond Chemicals, Inc.	2/7/2002	preservation treatment
N/A	Perma-Chink Log Home	Perma-Chink systems, Inc.	9/21/1999	exhibit areas
N/A	Pioneer P-19 contact cement	Columbia Cement Co., Inc.	3/25/1993	exhibits areas
N/A	Pitt-Tech High Gloss acrylic	PPG Industries, Inc.	4/27/1995	exhibits areas
N/A	PL-200 Construction	OSI Sealants, Inc.	8/3/2000	case construction
N/A	PL400 Adhesive	OSI Sealants, Inc.	3/21/1992	preservation treatment
N/A	Playtime	Associated Weavers	2/4/2003	exhibit areas
N/A	Power Play 20/26	McKee-Tri-State	8/6/1999	exhibit areas
N/A	Pre-Prime 167	Devoe ICI High	5/10/2002	preservation

	Penetrating			treatment
N/A	Pro-VOV-555	Roman Adhesives, Inc.	4/24/2006	Wallpaper/mural attachment
N/A	Pure Strength	Rust-Oleum Corporation	4/8/1994	limited use
N/A	Quick-Cure T-88 epoxy resin	System-Three Resins, Inc.	12/13/2000	preservation treatment
N/A	Quick-Cure T-88 resins	System Three Resins, Inc.	12/13/2000	case construction
N/A	Quik Fill 340 stone cleaner	Airkem Professional Products	10/9/1997	preservation treatment
N/A	Ralph Lauren Duchesse	Polo Ralph Lauren L.P.	8/13/1999	exhibits areas
N/A	Scotch Brand No. 924	3M Company	4/12/1996	limited use
N/A	Shineline Emulsifier Plus	Spartan Chemical Company	3/17/1998	maintenance
N/A	Sign-Foam II RPU2000	Sign-Arts Products, Corp.	1/20/2001	limited use
N/A	Sikadur 32 epoxy adhesive	Sika Corporation	1/13/1997	storage
N/A	Silicone 832 Mult-Surface	DOW Chemical Corporation	2/3/1997	case construction
N/A	Sisal Coir- olefin carpet	Southwind Carpet Mills, Inc.	6/23/2000	exhibit areas
N/A	Smooth Cast 70D	Smooth-on	2/20/2003	reproductions
N/A	Sonocrete Epogel epoxy	ChemRex, Inc.	11/14/1996	preservation treatment
N/A	TACC acoustical tile	TACC International	8/4/2000	case construction
N/A	Takeoff 2000 Liquid paint and	Takeoff Inc.	4/26/2001	preservation treatment
N/A	Takeoff Green	Takeoff Inc.	4/26/2001	preservation treatment
N/A	Tannit tanning solution	Rockmount Industries, Inc.	4/1/1996	limited use
N/A	Tarkett Optima sheet vinyl	Tarkett Inc.	6/30/2000	exhibits areas
N/A	Titebond HiPURformer Kit	Franklin International	2/7/2003	case construction
N/A	Titebond Original Wood Glue	Franklin International	12/15/2000	preservation treatment
N/A	Trifluoromethane fire	Du Pont Chemicals	3/5/1998	exhibit areas
N/A	Varathane 2000 Clear Gloss	RPM Wood Finishes Group	6/5/2001	case construction
N/A	Vulkem 45 urethane	Mameco International, Inc.	1/27/1998	storage
N/A	Walton/Marmoleum linoleum	Forbo Industries, Inc.	8/1/2000	storage

N/A	Water-based epoxy resin	ICI Paints	5/13/2002	storage
N/A	Worthington 7305 Autumn	Porter	4/25/2001	exhibit areas

EXHIBIT MATERIALS FAILED				
PRODUCT #	**PRODUCT NAME**	**MANUFACTURER**	**DATE**	**USED FOR?**
00-7	Flexible gasket rod 8694K	American National Rubber	2/24/2000	case construction
00-9	Silicone Adhesive #687	Dow Corning Corp.	1/27/2000	case construction
01-06	Museum Putty, Museum	Trevco	2/8/2001	mounts
01-15	Duron/Durex/Presdwood	Masonite Corp.	2/7/2001	case construction
02-8	Alphaflex Ceiling Banner	Acoustics First Corporation	5/23/2002	storage
02-8	Clear vinyl barrier	Acoustics First Corporation	5/23/2002	storage
02-8	Cloudscape AFCB FL PVC	Acoustics First Corporation	5/23/2002	storage
02-8	Composite Foam ABF1-T	Acoustics First Corporation	5/23/2002	storage
02-8	Fireflex wedge polyurethane	Acoustics First Corporation	5/23/2002	storage
02-8	Pyramid polyurethane foam	Acoustics First Corporation	5/23/2002	storage
02-8	Sound Channels SC-2 PVC	Acoustics First Corporation	5/23/2002	storage
02-8	Vinyl barrier 1/8" AFBARR	Acoustics First Corporation	5/23/2002	storage
02-9	Polyether foam H90X	Carpenter Co.	5/24/2002	storage
02-9	Polyether foam R65E	Carpenter Co.	5/24/2002	storage
02-9	Polyethylene foam (green)	Carpenter Co.	5/24/2002	storage
02-9	Polyethylene foam (white)	Carpenter Co.	5/24/2002	storage
02-9	Polyethylene foam ABL 170	Carpenter Co.	5/24/2002	storage
02-9	Polyurethane foam S82R-1	Wm. T. Burnett & Co., Inc.	5/24/2002	storage
03-6	Johsonite Rubber wall base	Johnsonite	12/9/2002	exhibit areas
03-7	Neoprene Rubber	Nott	12/9/2002	exhibit areas
07-17	Bollywood textile	KnollTextiles	1/17/2007	mound covering
91-20	Carpet:nylon/PVC	Interface Moresque	10/10/1991	flooring

91-25	Acetate emulsion S-385	H.B. Fuller Company	10/15/1991	adhesive
91-26	Fabric:	N/A	10/21/1991	mound covering
91-27	Fabric: wool/polyester	N/A	10/21/1991	mound covering
91-9	Carpet: wool/PVC	Tretford	6/17/1993	flooring
92-9	Fabric: wool	N/A	10/11/1992	mound covering
93-14	Leather	N/A	4/15/1993	mound covering
94-2	Epoxy	West Systems	9/2/1993	case construction
94-6	Silicone tubing	N/A	11/8/1993	mounts
95-10	Veneer core birch ply	N/A	12/6/1994	case construction
95-23	Wall finishing compound	USG Wall systems	3/6/1995	exhibits areas
95-28	Jax Magnaplate 600	Behnke Lubricants Inc.	8/1/1995	storage
95-28	Silicone gasket S-529	Lextington Components, Inc.	8/1/1995	storage
95-9	Appleply plywood	Appleply	12/6/1994	case construction
96-4	Insulation grade PE foam	Astro-Valcour, Inc.	9/1/1995	case construction
96-8	Silk fabric	N/A	2/8/1996	mound covering
96-9	S2S Hardboard paneling	ABTco, Inc.	2/21/1996	case construction
97-1	Silk fabric	N/A	7/12/1996	mound covering
98-3	Pellon non-woven fabric	Freudenberg Nonwoven	9/11/1997	mound covering
98-4	Silk fabric	N/A	10/13/1997	mound covering
N/A	3M Super 77 Spray Adhesive	3M Company	2/11/1993	limited use
N/A	AGS 2/AGS 60	Graffiti Solutions, Inc.	8/23/2001	preservation treatment
N/A	Calcium chloride flakes	DOW Chemical Company	6/8/1996	sites maintenance
N/A	Gatorfoam FR	International Paper	10/22/2001	case construction
N/A	Gray Ardex Feather Finish	Ardex Inc.	6/23/2000	exhibits areas
N/A	Hardwood plywood urea	Columbia Forest Products,	2/2/1993	case construction
N/A	Iddings Deep Colors-casein	Rosco Laboratories	1/30/1992	exhibits areas
N/A	Kotton Klenser Protective	Graco Sales, Inc.	6/13/2000	preservation treatment
N/A	Maki paraffinized pellets	Lipha Chemicals	1/10/2002	pest control
N/A	M-Pro 7 gun cleaners	Pantheon Chemical	6/29/2004	object treatment
N/A	Para-Bond 250	Para-Chem, Inc.	9/18/2006	carpet adhesive

N/A	ProForm Ready Mix Joint	National Gypsum Company	7/8/2005	exhibits areas
N/A	Scott's Liquid Gold Wood	Scott's Liquid Gold, Inc.	7/11/1994	limited use
N/A	Sintra plastic sheeting	Alucobond Technologies, Inc.	3/19/1997	case construction
N/A	Stripex-L Wood Stain	Napier Envrionmental	8/28/2001	preservation treatment
N/A	Thorobond PVAc adhesive	Thoro System Products, Inc.	12/17/1997	exhibits areas
N/A	USG Plaster Bonder PVAc	USG	12/17/1997	exhibits areas
N/A	Vinyl Composition Tile	Mannington Resilient Floors	6/23/2000	exhibits areas
N/A	Weldwood Plastic Resin Glue	Beechum Home	12/13/2000	preservation treatments

SECTION II
MATERIALS GLOSSARY

These sections are meant for quick reference only and are not exhaustive treatments of these very complex topics. Please contact the conservators if you need further explanations or have questions that are not answered below.

I. GENERAL DEFINITIONS: ENVIRONMENTAL FACTORS

Temperature & Relative Humidity

1. The set points of 70 +/- 2 degrees Fahrenheit and 45% +/-5% relative humidity are used to accommodate materials in Museum Collections storage and in the Exhibits galleries.
2. Collections in the Audio-Visual and photographic materials vaults have different set-points and tolerances.
3. Metals are kept below 35% relative humidity to reduce the formation of corrosion, while ivory, horn, tortoise shell and many organic materials are best kept at 50%-55% to keep them from drying and cracking. These items will be displayed in microenvironment vitrines.

Temperature and RH Measurement

1. The conservation departments uses ***electronic data loggers*** to monitor storage areas and galleries.
2. A data logger is a small box, approximately the size of a deck of cards, that contains temperature and humidity sensing devices, a microchip, and a 10 year battery.
3. This self-contained device takes readings constantly and stores the data on the microchip. The data is downloaded weekly into a PC using proprietary software.
4. The Senior Objects Conservator distributes graphs depicting the temperature and humidity over time in storage areas and galleries. The graphs include statistical analyses of the data. When required, the device is used to compare conditions inside and outside of an exhibit case and record environmental conditions over time.
5. The comparisons are useful in problem solving or ensuring that satisfactory conditions are being maintained at all times.

Microclimates

1. A ***microclimate*** is an area within a larger unit that can be controlled to a specific relative humidity level.
2. Consult the senior objects conservator for development and testing of microclimates to be used in exhibits projects.

Light/Electromagnetic Radiation

1. Heat (infra-red radiation) is generated by incandescent light filaments and from fluorescent ballasts and power sources.
2. The types of light sources selected and their placement (i.e. distance, interior vs. exterior) will affect relative humidity and temperature as well as the levels of ultraviolet (UV) radiation and visible illumination.
3. These factors must all be considered during the design process so that the desired display effect is achieved while also safeguarding the pieces on exhibit.
4. As light strikes a surface, part of it is reflected and part is absorbed. The light that is reflected is what enables us to see an object. The absorbed component contributes to the deterioration of artifacts as that energy is what drives chemical reactions. These photochemical reactions are the cause of embrittlement, darkening, yellowing, and fading in paper, textiles, and other organic materials.

Types of Light Sources

1. Incandescent is the preferred type of light due to its generally lower UV output and greater flexibility in controlling levels of illumination

2. Filtered tungsten light has been shown to have low or no UV output. If the color, beam spread, and throw characteristics of low voltage lights are desired, they can be used with adequate planning.

Light Measurement

1. MHS has several instruments to measure light. Contact the conservation department in order to borrow them for measurements.

Light Sensitivity

1. Collections fall into three groups:
   - sensitive
   - moderately sensitive
   - insensitive to light.

(Adapted from Thomson's The Museum Environment (1987, 2nd Edition))

The light levels are maximums for objects on exhibit for more than three months, although some may be limited to 3 months or even less. Objects with multiple materials should be lit using the requirements of their most sensitive component material.

Light Levels	Sensitive	Moderately Sensitive	Insensitive
	50 Lux	100 Lux	200 Lux
	150,000 Lux/hours	300,000 Lux/hours	450,000 Lux/hours
	Paper	Oil Paintings	Unpainted:
	Textiles	Wood	Ceramics
	Watercolors	Parchment	Glass
	Dyed Leather	Rawhide	Metal
	Feathers	Fur	Stone
	Photographs	Bone	
	Some plastics	Ivory	
	Rubber	Horn	
	Prints	Painted:	
	Pastels	Ceramics	
	Drawings	Glass	
		Metal	
		Stone	

Ultraviolet Light

1. Ultraviolet light is measured in units of microwatts (µW) per lumen.
2. The Crawford UV meters will indicate whether the level exceeds the currently accepted standard of 10 µW/lumen.

Lux/hours

1. Permissible levels of light vary from one type of material to another. Visible light is measured in units of Lux, footcandles, or lumens. (One footcandle is equivalent to approximately 10 Lux.) Lux is used by the conservation department in measurements and calculations.
2. The higher the light level in an exhibit the shorter the duration of exposure to limit the total damage.
3. The Textile Conservator monitors and calculates the Lux hour totals for items on exhibition and reports to the Rotations Committee.

Air-borne Contaminants

1. These consist of dust, sulphur oxides, nitrogen oxides, ozone, formaldehyde, peroxides and other chemicals which come from a variety of sources.
2. The History Center has a chemical air filtration system in collections storage areas, not in the exhibit spaces.
3. The best means of control is to limit the introduction of problem contaminants.
4. The materials used in the fabrication of exhibits including walls, platforms, floor and wall coverings and finishes, cases, exhibit furniture, and mounts must conform to established standards of stability in manufacture and preparation.

II. MATERIALS DEFINITIONS:

Acrylic

1. Acrylic sheeting and tubing is manufactured by several firms and is available under various trade names: Plexiglas and Lucite.
2. It can be used for glazing in cases as well as the construction of case furniture, custom mounts, labels, etc.
3. Scratch resistant versions of acrylic sheeting (Lucite, SAR; Plexiglas) are available but at significantly higher cost. This may be preferable to untreated acrylics in instances where a case is to be located in a heavy traffic area for an extended period of time.
4. Acrylics can also incorporate a UV absorbing material . This material has a slight yellow tint due to the UV absorbing resin incorporated into the following products (e.g. Plexiglas UF-1 and UF-3).
5. The UV filtered products by Cyro are clear (OP-2, etc.).
6. Acrylic tubes are available in a variety of sizes to filter the UV emission from fluorescent bulbs. The seamless hard tubes (McGill Protect-O-Sleeve; Light Impressions have a slight yellow cast (as does the sheet material).
7. Polyester sleeves (for fluorescent bulbs) and film (applied to windows) are available with a gray tint which acts as a neutral density filter to reduce the amount of visible light reaching an artifact. Sheets or pieces of film can be laid over the lens of a fluorescent fixture or on the top of an exhibit case. It is not necessary to bond the film to the g
glass/plastic lens surface in order for it to be effective.

Adhesives

1. Adhesives are sticky substances that hold items to a substrate. They are proprietary products and must be submitted for review before use in exhibits production.

Unacceptable:

Polyvinyl acetates (PVAc) adhesives will give off acetic acid over time and other deterioration products that will harm object materials.

Cellulose nitrates (celluloid, nitrocellulose, pyroxlin) will yellow and give off acidic deterioration products that will harm object materials.

Silicone sealing and gasketing compound,s the most common of which cure by releasing acetic acid and other compounds that will harm object materials.

Acceptable:

Acrylic double-stick pressure sensitive adhesive tape such as 3M-415 or equivalent is stable over time.

BEVA-371 is acceptable for mounting fabrics on mounds.

Carpenters glue such as Elmer's or Tite-Bone are acceptable for case construction.

EVA hot glue sticks are acceptable in limited applications.

Barriers

1. Used to prevent migration of acids, dyes, and fumes from construction materials.
2. *MarvelSeal 360* is a laminate film of aluminum, polyester and polyethylene
3. *Camger 1-146* is a water-borne polyurethane coating that is used to seal wood-based products. A barrier layer is used to prevent migration of acids, dyes, fumes from solvents or adhesives, etc.
4. If the support is painted it is acceptable to use a less impermeable polyester (Mylar) barrier. Acrylic lacquers or acrylic resins in solvent (such as B-72 in toluene) can be used to seal metal

Board Materials

1. Fome-core and like products consist of a layer of polystyrene foam (Styrofoam) between two layers of paper board.
2. The acid free foam core products are recommended for museum use. The composition of the core varies by brand, with some being better than others.
3. Gatorboard, a product similar to Fome-core in construction, produces heavy tarnish on silver within 48 hours. If use of this product is anticipated the proposal needs to be discussed with conservation staff.

Contact Cement

1. Contact cements are used for applying plastic laminate to surfaces.
2. Two types of contact cements available are water-base and solvent-base.
3. If the casework is completed and is permitted an off-gassing period of 4 weeks before enclosing exhibit materials then the solvent-base type may be used safely.
4. If there is a need for lamination close to the exhibit opening, then the water-base cement must be used.

Friction Mount

1. A covering of muslin, cotton or flannel can be used to provide some friction in order to give support to a textile or leather object.
2. An example would be a flat textile displayed open on an inclined plane (also called a slant board).
3. Additional fabric materials that can be used for this range from linen, velvet and felt to synthetics which include:
   DuPont microfoam
   Cross-linked polyethylene foams (Minicel and Volara by Voltek Corp.) which offer a smoother surface.
   Dow Ethafoam 220 (thicknesses up to 2") may be useful.
   Spun-bonded polyester felt.

Cyanoacrylate

1. Cyanoacrylate adhesive ("super" glues) can be used to bond non-porous materials to each other for exhibit construction.
2. Some newer versions are thicker and can be used with porous materials as well. Complete curing time is roughly 3-7 days. This adhesive should never be used on an artifact.

Drywall Mud

1. There are several types of drywall mud available.

Unacceptable:	**Acceptable:**
Polyvinylacetate (PVAc)	Acrylic emulsion-based adhesives.
Polyvinyl chloride (PVC)	

Dyes

1. Dyes for fabrics may be **unacceptable**:
   Lack of water-fastness
   Lack of light-fastness.

2. Some natural dyes and early synthetic dyes are extremely light sensitive, though these dyes are generally not used on commercially available fabrics:
   Bright neon colors are also very light-sensitive.
   Home dying methods are generally unreliable and produce non-uniform results.
3. Commercial vat dying is preferred where both dye, mordant, and procedure can be specified.

Dyes, Direct

1. Red direct dyes on cotton fabrics are notorious for bleeding in water (e.g. HVAC duct leak or roof penetration) and these should be avoided.
2. Specialized firms exist that will dye fabrics to match colors from a provided sample and will do so using proper materials and procedures.

Dyes, Disperse

1. Some disperse dyes on cellulose acetate fabrics are prone to "fume" or "gas" fading from atmospheric nitrogen oxides (car exhaust):
   Blues will shift to red or pink.
   Green will shift to brown.
2. Disperse dyes on other synthetics, such as polyester, have good light and water fastness.

Epoxy

1. Two part epoxy, either as a liquid or a putty, can be used to build mounts or for exhibit furniture construction as long as it is mixed properly for correct curing.
2. Curing periods range from one day to as much as four weeks depending on epoxy type used.
3. This or other adhesives should never be used to mount an artifact.

Films/Sealers

1. MarvelSeal 360 is a brand name for a proprietary product that consists of a layer of aluminum foil sandwiched between layers of polyester and/or polyethylene.
2. Corrosion Intercept is a polyethylene film impregnated with colloidal copper. It can be used as a gaseous pollution scavenger in cases that contain silver objects.

Gaskets

1. Cases that are not hermetically sealed require gasketing to reduce the number of air exchanges per day.
2. Consult the *NPS Conservation in Exhibits Manual* (section 3:3 pg 4) for a detailed discussion of this topic.
3. All gasketing materials that are being considered for use must be tested by Conservation before being ordered.
4. It has been found that materials may be called one thing in the industrial supply catalogs, but are actually another product.

Unacceptable:	**Acceptable:**
Non-food grade silicone rubbers	Post-cured food-grade silicone rubbers (dimethyl silicone)
Sulfur-vulcanized neoprene rubbers	Cellular silicone sponge (poly-dimethyl siloxane, PDMS)
PVC-containing elastomers	Neoprene rubbers (non-sulfur vulcanized)
Polyurethane foams	Ethylene propylene diene monomer (EPDM)
Unknown pressure-sensitive adhesive backings	Ethylene vinyl acetate (EVA)

Glass, Filtering

1. Glass doesn't scratch as easily as acrylic sheeting but has several disadvantages.
2. It is heavy, easily broken and has only limited UV filtering properties.

3. There are several types of glass which eliminate or reduce glare; these also offer only limited UV filtering properties. There are films available which can be applied to glass to produce an effective UV filter (polyester film).

Monofilament

1. *Polyester monofilament* (fish line) is acceptable for suspending and attaching items.
2. The thickness (pound test) of the monofilament and weight of the object should be considered. Because attachment location of the filament is based on weight and consideration of object balance, some objects cannot be suspended.

Unacceptable:

Nylon monofilament- it stretches and is light sensitive.
Tygon tubing- it is PVC and releases acidic VOC's.

Padding

1. Padding of mounts and forms can be done with a variety of materials depending upon the shape or configuration of support structure, weight of objects or materials.

Padding/Batting

1. Products such as polyester fiberfill, or quilt batting are frequently used for padding out and for making mounts and mannequins.
2. There are several methods of manufacturing polyester batting:
3. Bonded fibers are held together with an adhesive or resin. These should be avoided as the resin may contain potentially damaging components.
4."Needlepunch" felts contain no adhesives or resins; long randomly oriented fibers are mechanically entangled.
5. Spun-bonded types are randomly oriented synthetic fibers bonded with heat and pressure and contain no adhesives
or resins. Spun-bonded products include:

Remay
Tyvek (DuPont)
Cerex (Monsanto).

6. Cotton batting can also be used; it is a natural humidity buffer, but may tend to loose its loft with time
7. Polyester fiberfil (such as purchased in fabric stores for quilt batting) is generally preferable to cotton batting due to its resiliency and inert nature. Generally, when polyester fiberfil is used it should be covered with twice washed unbleached cotton muslin.
8.Buffered and unbuffered acid free tissue is another option for padding. It has less resiliency or crush resistance than fiberfil and can also lose its shape due to humidity fluctuations.

Paint

1. In selecting paints, avoid volatile organic compounds (VOC's).
2. The film forming resin component of the paint should be a stable, inert material. For our purposes there are two basic categories of paint: water based (latex) and solvent based (oil-based enamels).

Unacceptable:

Poly-vinyl acetate (PVAc) should not be part of the formulation.

Paints incorporating biocides such as formaldehyde should not be used.

Pigments containing sulfur compounds
Vinyl-toluated alkyds
Long chain drying oils (alkyds)

Acceptable:

acrylic
polyester
2-part epoxy

3.Whichever paint is used, sufficient drying time is a critical part of the exhibit production scheduling.
4.There are a number of technical tests to identify the curing level. See the Objects Conservator for further details.
5.Depending on the environment, humidity, etc., this process may take 4-6 weeks for water or solvent based paints.
6.Touch-up painting after artifacts are installed should be avoided when possible as it is a hazard to the artifacts by reintroducing harmful vapors.

Paper and Board

1.Paper and board materials of permanent quality are acid and lignin free and contain a buffering agent to give them an alkaline reserve.
2.Acid free paper and board should also be used as supports for padding and barriers, for most artifact enclosures and for exhibit mounts.
3.Most paper artifacts are safe in contact with permanent quality paper except photographic materials and blueprints. 4. Cotton and linen textiles are also safe to be in contact with buffered paper or board.

Paper: pH Neutral, Lignin-free, non-buffered

1. The following materials should not be stored in or in contact with buffered paper:
   Silk
   Wool
   >pH 7.0 sensistive materials
   All photographic materials.

Pins and Staples

1. *Monel* or *stainless steel* pins and staples are preferred due to their resistance to corrosion.
2. Pins are sometimes used for creating miniature mounting supports or for attaching a covering to a mount or a case wall by textile conservators, but they are often not secure enough for long term exhibition. Contact the MHS textile conservator for further details.

Plastic & Rubber tubing

1. PVC-based plastics and most rubber materials are unstable.
2. Polyethylene plastic tubing is stable and readily available. It is clear and comes in a variety of diameters and wall thicknesses. Available from scientific and surgical supply companies, this material is frequently used to cushion artifacts from metal mounts.

Plastic Laminates

1. Plastic laminates (Formica, Nevamar) are an acceptable finish for interior case finishes, case furniture and exteriors.
2. They act as a barrier to reduce, but not eliminate, the volatile acid emissions of the wood core or framework case, panel, pedestal, etc.
3. In order to be an effective barrier all surfaces (whether visible or not) with air access to the objects must be covered

Polyester Film (Mylar-D)

1. Mylar-D or equivalent needs to be used as a barrier or protective layer between paper, textile or other organic objects and painted, rough or unfinished surfaces.
2. Enclosing a paper document between two layers of Mylar is called *encapsulation*, and is a technique which affords the paper significant protection from damage resulting from handling.

PVAc

1. Polyvinyl acetate (PVAc) resin-based adhesives or paints are generally not recommended.
2.The acetate component degrades through time resulting in the generation of acetic acid, a substance which speeds the deterioration of metals such as lead, zinc and copper alloys.

Silicone

1. Silicone adhesives require 2 - 4 weeks for off-gassing and should not be used where they may come in contact artifacts. (Example: Construction of a glass vitrine without use of wood or extruded metal framing.)
2.The silicone adhesives are very difficult to remove from object surfaces and mechanical damage may result.

UnAcceptable:	**Acceptable:**
Acetoxy-curing silicone (acetic acid off-gassing)	Methoxy-curing silicone (methanol off-gassing)

Starch Paste

1. Wheat or rice starch paste is recommended for paper or cardboard supports or cradle construction.
2. Contact the MHS book and paper conservation lab for further details.

Tape

1. Tape will never be applied directly to a collection object.

Textiles

1. Textiles are used in exhibits for a variety of functions.
2. A fabric may be used as a lining for an exhibit case, cover case furniture (cubes, etc.), a backdrop, reproduction clothing, or as a separation between a support and an object.
3. In all situations where a textile will be in contact with an artifact or will be in a closed space such as a case or vitrine, several characteristics must be reviewed including fibers, finishes, sizings and dyes.
3. **Fabrics for use in exhibits will be tested by the Conservation Department before use.**
4. The fiber content of a textile must be known before being purchased.

Unacceptable:	**Acceptable:**
Wool	cotton
Nylon	polyester- woven and felted
Jute	polyester/cotton blend
	silk
	linen
	hemp
	rayon

5. Cotton and linen are the most widely used natural fabrics in exhibits.
6. Other cellulosic fabrics are rayon (or viscose), ramie, and hemp.

Varnish

1.Varnish, shellacs, and other sealants contain solvents similar to solvent based paints.
2. The same drying time and rule of thumb for paint cure applies here.
3. Some of these coatings contain formaldehyde and therefore should be avoided.
4. The MSDS that you obtain when you ask for information on these materials from the distributor or manufacturer will indicate the presence or absence of formaldehyde, etc.

Wax

1. Certain kinds of synthetic, low-melting point waxes may be used by conservators

on some artifacts to keep them from moving, creeping or being jostled out position.

2. Exhibits fabricators will not apply wax to any collections object, unless directed to do so by a conservator.

Wood and Wood Products

1. Wood and wood products are an integral component of museum exhibitry.
2. Certain woods are particularly high in volatile organic acid content and should be avoided.

Unacceptable:	**Acceptable:**
Oak	Aspen
sweet chestnut	Poplar
birch	Pine
Teak	sweet gum
Douglas Fir	eastern hemlock
Western red cedar	

1. Sheet products such as *particle board, medium density fiberboard* (MDF), *plywood, masonite, wafer board* and *oriented strand board* (OSB) are commonly used for storage shelving and for case and panel construction.
2. In the past, particle board and interior plywood generally incorporated a problematic *urea-formaldehyde adhesive*. *Phenol-formaldehyde adhesives* are ten times more stable. Plywood and other sheet goods that are *American Plywood Association (APA) stamped as Exterior Grade OSB and MDF* sheet products can be counted on to be free from the harmful urea-formaldehyde based adhesive.

Acceptable:
Medex
Medite II
Danoka Featherboard
Wheatboard
Iso-Bord
Bellcomb

SECTION III.

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