

**"Exhibit Case Nuts and Bolts"**  
**Exhibit Materials Spreadsheet**

<b>Materials</b>	<b>Harmful Materials</b>	<b>Why</b>	<b>Safe Materials/Examples</b>	<b>Product Source</b>
<b>Wood</b>	Oak Sweet Chestnut Douglas Fir Yellow Pine Red Mahogany Teak Western Red Cedar Cork	Acetic and Formic Acids; Organic Peroxides These Acids are either corrosive by direct contact or by effects of oxidization. These materials can tarnish metals and damage objects containing protein such as leather, fur, and wool.	Well seasoned, air dried spruce, mahogany, walnut, basswood, poplar, balsa sealed with Formica® Exterior grade plywood with phenol formaldehyde or non-formaldehyde emitting glue High-density or medium-density boards using formaldehyde-free adhesive; e.g., Resincore I; Medite II; Medex Appleply ®	<b>Allegheny Plywood Company</b> 15657 Brookpark Road Brookpark, OH 44142 800-747-1058 www.alleghenyplywood.com
<b>Wood-Bonded Products</b>	Masonite Chip Board Particle Board Interior Plywoods Bonded with Urea Formadehyde C Grade Plywoods	Formic Acid from Adhesives; Acetic and Formic Acids and Peroxides from Wood <b>These Acids are either corrosive by direct contact or by effects of oxidization.</b>	Well seasoned, air dried spruce, mahogany, walnut, basswood, poplar, balsa Exterior grade plywood with phenol formaldehyde or non-formaldehyde emitting glue High-density or medium-density boards using formaldehyde-free adhesive; e.g., Resincore I; Medite II; Medex	<b>Allegheny Plywood Company</b> 15657 Brookpark Road Brookpark, OH 44142 800-747-1058 www.alleghenyplywood.com

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<b>Paper</b>	Unrefined Wood Pulp Papers and Cardboards	Organic Acids, Peroxide, Sulfur <b>Risk of Acid Migration by direct contact with object.</b>	Acid Free pH Unbuffered (Neutral) paper products (for use with photographs and protein based materials such as silk, wool, semi-tanned skins, leathers) Acid-Free Buffered (Alkaline Reserve) papers (for most other materials)	<b>Conservation Resources International, LLC</b> 5532 Port Royal Road Springfield, VA 22151 800-634-6932 <a href="http://www.conservationresources.com">www.conservationresources.com</a> <b>Gaylord Bros.</b> PO Box 4901 Syracuse, NY 13221-4901 1-800-962-9580 <a href="http://www.gaylordmart.com">www.gaylordmart.com</a> <b>University Products Inc.</b> 517 Main Street Holyoke, MA 01040 800-628-1912 <a href="http://www.archivalsuppliers.com">www.archivalsuppliers.com</a>
<b>Plastics</b>	Polyvinyl Chloride Polyvinylidene Chloride Bubble Wrap Cellulose Nitrate Cellulose Acetate, Cellulose Diacetate, Cellulose Triacetate (Most Stable in Group) Rubber (vulcanized natural or synthetic)	Hydrogen Chloride and Plasticizers Polyvinyl Chloride used in Adhesive Nitric Acid Variable-Acetate Group can evolve Acetic Acid Rubber is not a stable material and can perish under adverse conditions and stick to other objects over time.	Polyacrylonites: e.g., Plexiglas, Lucite Polyethylene: Non-Chemically Polymerized Polypropylene in sheet corrugated form Polycarbonates Polystyrenes: variable Polyester: variable- e.g., Mylar D which is polyethylene terephthalate Teflon (PTFE) Tape Cloroplast	<b>Conservation Resources International, LLC</b> 5532 Port Royal Road Springfield, VA 22151 800-634-6932 <a href="http://www.conservationresources.com">www.conservationresources.com</a> <b>University Products Inc.</b> 517 Main Street Holyoke, MA 01040 800-628-1912 <a href="http://www.archivalsuppliers.com">www.archivalsuppliers.com</a>

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<p align="center"><b>Paints and Varnishes</b></p>	<p>Oil  Oil Modified (Alkyd, Tung Oil, Tall Oil, In Mineral Spirits, Oleo-Resinous)  Latex (Styrene butadiene, Polyvinyl Acetates, Vinyl Acrylic Emulsions with Lithopone Pigment)  Polyurethanes  Oil Based  Latex</p>	<p>Fatty Acids, Sulfur, Hydrogen Peroxide, Aldehydes  Ammonia, Hydrogen Sulfide  Variable, Formic Acid, Organic Acids, Fatty Acids  Organic Acids can act as a catalyst with metals and if allowed to continue loss of surface detail and disintegration will follow.</p>	<p>Require aeration/thorough curing and isolation from direct contact with display objects  Acrylic Latex: test each brand and color before use; aerate cases at least three to four weeks before object installation  Shellac: aerate case at three weeks before object installation (non-bleached only)  Two-part epoxy resins; 100% solid precisely mixed; aerate at least three weeks</p>	<p>ICI Dulux Paints  Lifemaster Series  925 Euclid Ave.  Cleveland, Ohio 44145  800-984-5444  www.duluxpaints.com  Sherwin Williams  ProMar and HealthSpec Series  10 Jefferson Crossing  Charles Town, WV 25414  304-728-8722  www.sherwin-williams.com</p>
<p align="center"><b>Adhesives</b></p>	<p>Protein-Based Glues (Animal)  Rubber-Based or Plasterized  Cellulose Nitrate  Polyvinyl Acetates (Especially Low Molecular Weight)  Urea Formaldehyde  Adhesives</p>	<p>Sulfur  Nitric Acid  Acetic Acid  Formic Acid  Adhesives may become acidic and stain object as well as leaving residue and discoloration.</p>	<p><b>Require aeration /thorough curing</b>  <b>Acrylic Polymer Solutions (e.g., Acryloid B-72)</b>  <b>Wheat Starch Pastes</b>  <b>Methyl Cellulose</b>  <b>Polyvinyl Acetate Emulsions, Neutral pH adhesive; may evolve acetates and acidic acids-</b>  <b>aerate case thoroughly before object installation</b>  <b>Double sided Archival tape; e.g. 3M 415</b>  <b>Hot-melt Adhesives: e.g., Thermogrop 6330, Evo-Stik 7702</b></p>	<p>Gaylord Bros.  PO Box 4901  Syracuse, NY 13221-4901  1-800-962-9580  www.gaylordmart.com  University Products Inc.  517 Main Street  Holyoke, MA 01040  800-628-1912  www.archivalsuppliers.com  Conservator's Emporium  385 Bridgepoint Drive  South Saint Paul, MN 55075-2466  800-672-1107  www.museumservicescorporation.com  Conservation Resources International, LLC  5532 Port Royal Road  Springfield, VA 22151  800-634-6932  www.conservationresources.com</p>

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<b>Foams</b>	Polyurethane Low Molecular Weight Sponges Polyesters (generic term; variable; may be under-cured)	Organic Acids; Acetates  <b>Organic Acids can act as a catalyst with metals and if allowed to continue loss of surface detail and disintegration will follow.</b>	Polyethylene: e.g., Volara type A Plastazote Ethafoam	Conservation Resources International, LLC 5532 Port Royal Road Springfield, VA 22151 800-634-6932 www.conservationresources.com University Products Inc. 517 Main Street Holyoke, MA 01040 800-628-1912 www.universityproducts.com
<b>Fibers</b>	Wool, Animal Fur, Semi-Tanned Skins and Leather Nylon 6 and Nylon 66 Permanent Press and Crease-Resistant Fabrics Flame-Resistant Fabrics Pest Proofing Fabrics Dyed with Sulfur Dyes	Sulfur Formaldehyde Formaldehyde can cause decay on leather and make it brittle. Woollen textiles contain sulphur compounds and can tarnish metals. Carpets can accumulate dust and house insects.	Vegetable fiber cloths: cotton, linen; wash with hot water before use Polyesters Acrylics	Test Fabrics P.O. Box 26 415 Delaware Ave. West Pittston, PA 18643 570-603-0432 www.testfabrics.com Talas 20 West 20th Street 5th Floor New York, NY 10011 212-219-0770 www.talasonline.com Benchmark P.O. Box 214 Rosemont, NJ 08556 609-997-1191
<b>Caulking</b>			<b>Requires aeration/thorough curing</b> Silicon-based sealants without ammonia, such as RTV (Room Temperature Vulcanized)	<b>Novagard Solutions™</b> 5109 Hamilton Avenue Cleveland, Ohio 44114 216-881-8111 www.novagard.com

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<b>Mechanical Fastening Methods</b>			Monel alloy staples and pins; sleeve pin mounts with inert tubing	<b>McMaster-Carr</b> 200 Aurora Industrial Pkwy. Aurora, Ohio 44202
<b>Misc. Exhibit Resources</b>			Microclimate Exhibit Resources for protection of artifacts	Microclimate Technologies International 1550 South Gateway Road Units 309-318 Mississauga, ON L4W 5G5 Canada <a href="http://www.microclimate.ca">www.microclimate.ca</a>
<b>Metals</b>	Baked enamel metals	This process involves alkyd resin paint, urea or thermosetting polymers like melamine formaldehyde. These materials continue to evolve acids over time and are harmful to artifacts.	<b>Steel or Aluminum with Powder Coat is preferred.</b> Aluminum Honeycomb Panels, ie Hexcel <sup>®</sup> , Aerolam <sup>®</sup> , or Dibond <sup>®</sup> Alucobond <sup>®</sup>	Ciba-Geigy Composite Materials 10910 Talbert Avenue Fountain Valley, CA 92708 800-442-9964 The Metalworking Group 9070 Pippin Road Cincinnati, OH 45251 513-521-4114 <a href="http://www.metalworkinggroup.com">www.metalworkinggroup.com</a>