CONSERVATION OF ARCHAEOLOGICAL MATERIALS

by Linda Gregonis
Colorado Preservation Office
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INTRODUCTION

Field conservation is the science of treating or stabilizing archaeological materials to prevent further deterioration after the materials are removed from the ground. Because conservation techniques change as new techniques are studied and developed, trained archaeological conservators are becoming an essential part of many archaeological projects. Conservation advice should be considered for all archaeological projects.

Conservators should be consulted at early stages of project planning as they can anticipate many problems of artifact preservation that arise due to the shock of removing finds from the ground, and aggravated by improper handling of material in both field and lab. Conservators can help the archaeologist:

1) remove fragile or deteriorating artifacts from a site with minimal damage;

2) develop a system of care for expected artifacts from field to lab;

3) aid in ordering supplies to adequately handle and store artifacts; and

4) determine the degree and type of conservation treatment needed for specific artifacts.

Several principles guide the work of a good conservator.

1) Conservators try to minimize the amount of treatment given so as to respect the original integrity of the artifact and to alter it as little as possible.

2) Treatments and processes should be reversible whenever possible.

3) Durable, stable materials should be used in the treatment of artifacts.

4) The conservator should be aware of his/her own limitations and should be prepared to consult with other conservators.

5) The treatment of a given artifact should be documented. This documentation should include photographs of the objects' conditions, in situ if possible, and written records on the examination and treatment of the piece.

6) Finally, the treatment chosen should not interfere with later analyses or dating techniques.

Conservators take into consideration three major factors when deciding on the form and extent of artifact stabilization. These factors are:

1) The condition of artifacts when they are retrieved from the field. For example, organic materials probably will be in the worst shape.

2) The significance of a particular specimen. Is the artifact unique? Is the artifact expendable in the long run or will it be used for comparative purposes?

3) The future use of the artifacts. Stabilization procedures may differ depending on whether the artifacts will be subject to analysis, permanent storage, extensive handling, or display.

CAUSES OF DETERIORATION

The causes of artifact deterioration are physical, chemical and biological in nature. Physical deterioration takes place both on and below the ground's surface. On the surface artifacts are subjected to wind and water erosion and abrasion. Below the ground's surface, both organic and inorganic materials are subjected to cracking, crushing, and distortion. The freeze-thaw cycle is especially hard on porous material.

Moisture and temperature fluctuation can effect chemical and biological deterioration. Moisture fluctuation can cause the movement of salts, and higher temperatures can cause faster chemical reactions. Humidity is a critical factor, since a drier climate results in slower chemical reactions while damp conditions often accelerate decomposition of organic materials.

Many dry cave materials are well-preserved because they have not been subjected to physical deterioration. Most of those materials, however, have become dehydrated and have lost their flexibility. When such artifacts are removed from their dry environment and subjected to a changed environment, chemical and biological deterioration may begin.

Chemical deterioration of an artifact is effected by oxygen, moisture, temperature, and the chemistry of the surrounding soil matrix. In areas where precipitation exceeds evaporation, the wetter conditions usually create a more acidic soil. In such soil conditions bone, shell, lime, limestone, and cellulose may be subject to serious deterioration.

In areas such as Colorado, where evaporation often exceeds precipitation, soils tend to be alkaline, although there can be local areas of acidity. Alkaline soils are characterized by high concentrations of salts. These salts, through crystallization processes, cause physical deterioration of porous artifacts. Salts also damage metals. Iron and copper artifacts are especially affected by chloride salts.

The concentration of salts can be effected by human activity. Substances such as flesh and urine create higher concentrations of chloride, while wood ash can build up sodium and potassium salts. Irrigation in arid areas can cause redeposition of salts in areas close to the ground's surface.

Salts cause deterioration of objects in the following manner. Soluble salts move in and out of buried, porous material with fluctuations in temperature and moisture. As an object is drying, salts will crystallize, forming encrustations and flaking or delamination of an object. If that object is subjected to moisture, the salts can go back into solution, and migrate towards a surface of evaporation where they recrystallize and disrupt or coat the surface. The weakening activity of salts will continue after an object is removed from the ground if the environment in which the object is placed is not stable or is inappropriately chosen.

High concentrations of salts can actually preserve objects through fossilization and by retarding biological deterioration. In such instances, desalination in a cleaning or stabilization process may destroy the object.

Biological agents include rodents, termites and other insects, plants, bacteria and fungi. Inorganic remains such as stone, and charred vegetal remains that have been reduced to elemental carbon are the least likely to be affected by biological agents. Inorganic remains can be stained by root or fungus activity.

In addition to physically damaging artifacts and features, biological agents cause chemical deterioration. Fungi and bacteria produce acids and enzymes that decay leather, feathers, wood, and other organics. Micro-organisms require a certain amount of moisture, relatively high temperatures, and a pH balance suitable to that particular organism. Most micro-organisms require oxygen, but there are some types of anaerobic bacteria that thrive under water without it. The presence of copper tends to reduce organic activity. Therefore, preservation of skin, textiles, or wood is more likely when an object has been in contact with copper.

FIELD TREATMENT OF ARTIFACTS

One of the most important facets of planning for artifact conservation is to establish written guidelines for handling unstable artifacts before going to the field. Artifacts handled on an unsystematic basis often can be damaged by the emergency method selected for their handling and transport. Methods used in the field will vary according to the distance from a laboratory, storage conditions, degree of preservation, types of artifacts encountered, and the amount of money available for artifact conservation.

The following are some general guidelines to consider when dealing with artifacts in the field.

1) Try to maintain the temperature and humidity to which the object has become adjusted. Generally, wet things should be kept wet and dry things dry. Some damp objects can be dried slowly, not in direct sunlight. Metals should be dried slowly and packed in a container with a desiccant such as indicating silica gel. Dry objects such as organics and ceramics should not be sealed in plastic bags or boxes because condensation can occur inside. Cushioning materials such as cotton batting also can serve to protect the artifact from the adverse effects of an environmental change inside a container by acting as an environmental buffering material.

2) Artifacts, both whole and fragmentary, should be photographed and mapped in situ before any consolidants are applied and before the object is cleaned and prepared for transport. The relationship of artifact pieces to one another in the ground is important to the accurate reconstruction and preservation of the artifact.

3) Exercise great caution when cleaning an artifact in the field. Some objects are held together by soil, and cleaning such pieces will destroy them. Organic remains on ceramic or stone artifacts may be destroyed by cleaning. Metal corrosion can form a protective coating. Sometimes there is little actual metal left, and the only shape left to the object is the corrosion. In addition, iron and copper corrosion can retain the impression of fabrics and other organics with which they were in contact.

4) Supports should be used under organic materials, even if they appear to be strong. A flat cookie sheet is a useful tool for support. Soil often can be used as a bed to support an object and hold it together during transport.

Lifting supports also may be necessary under objects such as pottery or fragmented stone. The original soil matrix should be considered as a possible lifting support. In extreme cases, plaster bandages (kept out of direct contact with the artifact) and polyurethane foam can be used to provide support for artifacts. Polyurethane foam is toxic and should be used with caution and the proper safety measures. It is helpful to use an easily removable material such as clear plastic wrap or aluminum foil between the artifact and the lifting support.

5) Care should be taken in choosing packing material. Sturdy brown paper bags are suitable for short-term storage of strong materials such as sherds and lithics. They offer no support for more delicate objects. Because brown paper bags are acidic, metals and other acid-sensitive materials should not be packed in them.

Plastic vials used for artifact storage should be padded with acid-free tissue paper or with cotton batting and an acid-free tissue paper liner. Plastic vials have a static build-up that pulls fibrous materials apart if the vial is not appropriately lined. Heavy polyethylene bags and plastic boxes have a similar problem with static build-up.

Prefabricated cardboard boxes in a variety of sizes, with lids, are preferable to containers made in the field. Common cardboard boxes, however, are not suitable for long-term storage of organic or metallic objects because they are acidic. Acid-free boxes or padding should be used in permanent contact with these sensitive materials. Fibrous or plastic padding materials should be combined with a covering material when used for packing organic and delicate inorganic materials. Cotton batting fibers can become enmeshed in a material to such an extent that the cotton batting and the artifact cannot be separated without damaging the artifact. Surgical wadding with a finished surface reduces the embedding problem, but does not eliminate it. It is best to combine padding material, such as cotton batting, with a smooth covering material, such as acid-free tissue paper.

Foam rubber is good for short-term padding around heavy items. However, foam rubber deteriorates after a time and produces contaminants in the process. Polystyrene and polyvinyl chloride foams can give off chloride and other gases in the process of deterioration, and so may not be suitable for long-term use. The most stable foam product on the market today is a compact polyethylene foam sheeting known as Astro-foam™ or Volara™, available from packing suppliers. It is good for both short- and long-term padding of objects.

6) In some cases, archaeological materials must be consolidated or stabilized before they can be transported. Materials should only be consolidated if they cannot be transported safely without treatment. Consolidation treatment should be reversible as it may have to be undone for future treatment. If in a damp environment, a water emulsion adhesive should be used. Emulsions include Jade and CM Bond M-3 which are suspensions of polyvinyl acetates (PVA) in other liquids. Because emulsions are suspensions of solids in liquids, they have larger molecules and tend to be less penetrating than solvent adhesives. Emulsions are also harder to remove than solvents. (Elmer's brand and similar white glues are not appropriate consolidants.)

Solvent-based resins should be used whenever possible. Solvents generally work the best in dry environments. Solvents commonly used include PVA dissolved in acetone, toluene or alcohol. Because solvents are toxic materials, masks should be worn during application and the area should be well ventilated.

Consolidants should be applied in dilute solutions of between five and ten percent resin in solution, and several applications of the consolidant should be used on an object. Once a solvent-based resin is applied, the object must be dried thoroughly before moving, or the object may be damaged. To avoid rapid drying, an object should be kept in the shade.

The best method of consolidant application is to drip the liquid onto an object with an eye-dropper or pipette. Spraying an object usually does not result in good penetration of the solvent, but is a practical method for large artifacts. An object that does not have a flaky or otherwise unstable surface can be brushed with solvent.

ARCHIVAL CLEANING AND CONSERVATION

Conservators question the need for total cleaning of objects, because sometimes extensive cleaning can cause damage to an artifact or remove historical evidence. Archaeologists should consider preserving untreated samples of all types of material (sherds and lithics included) for future analysis.

Low-fired prehistoric ceramics should be sorted before washing so that unusual or problematic pieces can be removed. Cool water is best for washing ceramics. Detergents and acids should not be used routinely since both can leave residues and acids that can alter ceramic components. If a detergent is required, it should be non-ionic. Orvus WA paste, available from MuseuM Services and Talas, is a recommended detergent. Immersion of ceramics in water prior to cleaning is advised when acids are used. Ceramics should be saturated with water before and after being dropped into a dilute (1-2 percent) acidic solution. Formic and acetic acids are preferable to hydrochloric acid. Ceramics should not be scrubbed with an abrasive instrument.

Bone and shell should not be cleaned with water. Mechanical cleaning of these objects is best, but if liquid is necessary a fifty-fifty mixture of alcohol and water should be used, and used locally on a swab.

Metals should be handled with gloves and should be mechanically cleaned. In many cases, the corrosive shell is all that is left of an object, and chemical cleaning will virtually destroy remnants of shape and size that otherwise can be discerned from the corrosion. The object should be examined for impressions of organic materials prior to cleaning. Copper and iron can preserve impressions of organic material. Cleaning of metals and delicate materials should be left to a professional conservator.

High quality, non-commercial glues should be used when reconstructing artifacts. Duco and Elmer's glue deteriorate, and become discolored and brittle with age.

One of the best glues for low-fire ceramics is a nitro-cellulose glue called HMG. Although not permanent, this treatment is reversible. HMG is available from MuseuM Services. Other high-quality synthetic resin glues such as PVA and Acryloid (or Paraloid) B-72 are preferable to inorganic, irreversible glues such as epoxies and "superglues."

When restoring an artifact, the restoration should be sympathetic to, but distinguishable from, the original. Plaster or putty used to fill holes in a ceramic piece, for instance, should be shaded to blend with, but not necessarily match, the background color of the piece. Surface designs or missing handles, etc. should not be restored if there is not clear evidence to support the restorations. The reversibility of the material used is of prime importance.

General Conservation Bibliography

AATA On-Line
2013 **Abstracts of International Conservation Literature.** [a free searchable database on the preservation and conservation of material culture; http://aata.getty.edu/Home]

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1987 **In Situ Archaeological Conservation: Proceedings of Meetings April 6–13, 1986, Mexico**. J. Paul Getty Trust, Century City, California.

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1979 **Handbook for Museum Collection Storage**. UNESCO, Division of Cultural Heritage, Paris, France.

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1985 **Preserving Field Records: Archival Techniques for Archaeologists and Anthropologists.** University Museum Publications. University of Pennsylvania Press, Philadelphia.

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1972 **The Conservation of Antiquities and Works of Art.** 2nd ed. Oxford University Press, London, UK.

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2004 **The Archaeologist's Manual for Conservation: A Guide to Non-Toxic, Minimal Intervention Artifact Stabilization**. Kluwer Academic/Plenum Publishers, New York.

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1992 **Caring for Your Collections.** National Institute for the Conservation of Cultural Property. Harry N. Abrams, Inc., New York.

Sease, Catherine
1994 **A Conservation Manual for the Field Archaeologist.** 3rd ed. UCLA Cotsen Institute of Archaeology, Archaeological Research Tools #4, Los Angeles, California.

Singley, Katherine R.

1981a Caring for Artifacts After Excavation: Some Advice for Archaeologists. **Historical Archaeology** 15(1):35–48.

1981b CASH: Conservation of Artifacts, Storage and Handling. Paper presented at the annual meeting of the Society for Historic Archaeology, New Orleans, Louisiana.

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1992 **Manual of Curatorship: A Guide to Museum Practice.** 2nd ed. Butterworth-Heinemann, Woburn, Massachusetts.

Thomson, Garry

1986 **The Museum Environment.** 2nd ed. Butterworth-Heinemann, Woburn, Massachusetts.

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1997 **International Perspectives on Textile Conservation.** Archetype Publications, London, UK.

U.N.E.S.C.O.

1975 **The Conservation of Cultural Property.** Museums and Monuments series #XI. UNESCO Press, Paris, France.

1981 **"Appropriate Technologies" in the Conservation of Cultural Property.** Technical Handbooks for Museums and Monuments No 7. UNESCO Press, Paris, France.

Watkinson, David

1998 **First Aid for Finds**. 3rd ed. Rescue Publication No. 1. Archaeology Section of the United Kingdom Institute for Conservation, with the Museum of London, London, UK.

Williams, Stephen L., Renè Laubach, and Hugh H. Genoways

1977 **A Guide to the Management of Recent Mammal Collections**. Carnegie Museum of Natural History, Special Publication No. 4. Pittsburgh, Pennsylvania.

Conservation Periodicals: The International Institute for Conservation of Historic and Artistic Works (IIC) & its affiliated institutions publish several conservation periodicals: "Art and Archaeology Technical Abstracts" (IIC, London & New York); "Bulletin" of the American Group (IIC, New York); "The Conservator" of the United Kingdom Group (IIC, London); "Studies in Conservation" of the International Group (IIC, London); and "Technology and Conservation" (Technology Organization, Inc., Boston). Also Notable: "Field Notes" for archaeological conservation, compiled by the Conservation Division of the Dept. of National Parks and Historic Sites, Ottawa, Canada. **The web site** http://www.cci-icc.gc.ca/resources-ressources/ccinotesicc/ index-eng.aspx also has links to download very useful articles.

SOME BASIC SUPPLIES FOR THE CONSERVATION AND CARE OF ARTIFACTS IN THE FIELD AND LAB

TOOLS AND PACKING MATERIALS	SUPPLIER
Soft and stiff brushes of various sizes	Art suppliers
Dental tools, dissecting needle or pin vise, and needle	Scientific supply companies
Fine pointed forceps	Scientific supply companies, college bookstores
Rubber squeeze bulb blower	Drug stores
Magnifying head loop, magnifier lamp or microscope	Scientific supply companies
Hand-held water mister	Garden suppliers, hardware stores
Eye-dropper or pipette with squeeze top	Scientific supply companies
Q-tip swabs or wood swab stick and cotton wool	Drug stores, grocery stores
Acid-free tissue paper	Talas, University Products, etc.
Microfoam, compact polyethylene foam sheeting	Conservation Resources Intl.
Cotton or synthetic batting	Drug stores, scientific supply cos.
Polyethylene plastic sheeting and bags	Hardware stores, etc.
Various size cardboard and plastic containers, some with lids	Packing suppliers
Sturdy, flat metal cookie sheet	Household suppliers

CHEMICALS AND ADHESIVES	
Polyvinyl acetate resin, grade AYAC or AYAF	Conservator's Emporium
Polyvinyl acetate emulsion, Jade 403, Jade 711, Jade R	Conservation Resources Intl., Talas
Acryloid B–72 resin	Conservator's Emporium, Talas
HMG nitrocellulose glue	Conservator's Emporium
Igepal Ca–630, Orvus WA paste (non-ionic detergents)	Conservator's Emporium, Talas
Lysol spray (non-foaming fungicide), Dowicide A (antimicrobial), or Quaternary Ammonia	Grocery stores, hardware stores, Dow Chemical Co.
Silica gel, indicating kind 6–16 mesh	Scientific supply companies
Distilled water	Drug, grocery, or hardware stores
Acetone, laboratory grade	Scientific supply cos., hardware stores
Ethyl alcohol	Conservator's Emporium
Thymol crystals, fungicide	Conservator's Emporium, Talas

Appendix: Proprietary Materials Cited in Texts

From: 1987 *In-Situ Archeological Conservation. Proceedings of Meetings April 6–13, 1986, Mexico*. Miguel Angel Corzo, Conference Coordinator and Henry W. M. Hodges, Senior Editor. Institute Nacional de Anthropologia y Historia de Mexico & Getty Conservation Institute.

PROPRIETARY NAME	FUNCTION	MAJOR CHEMICAL COMPOSITION
Acritex	Adhesive	Acrylic emulsion
Acryloid B-72*	Consolidant/Adhesive	Acrylic resin
Araldite	Adhesive	Epoxy resin
Bromacil	Biocide	Bromobutyl methyluracil
Calgon	Water softener	Sodium hexametaphosphate
Cetavlon	Biocide	Cetyl trimethyl ammonium bromide
CM Bond M3	Consolidant	Polyvinyl acetate emulsion
Colmadur BV	Adhesive	Epoxy resin
Coroplast	Storage	Polypropylene copolymer
Crystic release agent	Release agent	Silicone mixture
Crystic resin 405	Castings	Polyester resin
Curasol AR	Adhesive	Polyvinyl alcohol
Diuron	Biocide	Dichlorophenyl dimethylurea
Duco cement	Adhesive	Cellulose nitrate solution
Endurol	Adhesive	Polyvinyl alcohol
Igepal Ca-630	Surfactant	Octylphenoxy poly(ethyleneoxy)-ethanol, branched
Mowital B60H	Consolidant	Polyvinyl acetate
Mowilith (various grades)	Adhesive	Polyvinyl acetate emulsions
Multex	Adhesive	Acrylic emulsion
Orvus WA	Detergent	Sodium lauryl sulfate
Paraloid B-72	Consolidant	Acrylic copolymer
PEG-4000	Consolidant	Polyethylene glycol
Primal AC-33	Consolidant/Adhesive	Acrylic copolymer emulsion
Resistol 850	Adhesive	Polyvinyl alcohol
Rhoplex AC-33	Consolidant/	Acrylic copolymer emulsion
Saran Wrap	Buffer/separator	Polyvinylidene chloride
Simoniz wax	Polish	Silicone – wax mixture
Teflon	Non-stick coating	Polytetrafluoroethylene (PTFE)
Tyvek	Storage	Spun polyethylene paper
UHU	Adhesive	Polyvinyl acetate solution
Wacker's 190L	Water repellant	Silicone resin
Wacker's OH	Consolidant	Tetraethyl orthosilicate
Zapon	Lacquer	Acrylic solution

*Also known as Paraloid B-72

MAJOR SUPPLIERS OF CONSERVATION GRADE MATERIALS

Associated Bag Co.
400 W. Boden St.
Milwaukee, WI 53207-7120
800-926-6100
www.associatedbag.com

— various zipper top bags, et al.; catalogue & samples available

Conservation Resources International
5532 Port Royal Road
Springfield, VA 22151
703-321-7730
800-634-6932
www.conservationresources.com

— offers a variety of tools, resins, etc.; catalogue & price list available

Demco, Inc.
P. O. Box 7488
Madison, WI 53707
800-356-1200
800-245-1329 (fax)
800-558-3899 (service)
www.demco.com

— formerly Highsmith Inc.; storage supplies

G. T. Bag Co.
79-A Mitchell Blvd.
San Rafael, CA 94903
800-735-3950
888-546-2411 (fax)
www.gtbag.com

— zip lock and other plastic bags; bubble pack; packaging materials

Hollinger Metal Edge, Inc.
9401 Northeast Dr.
P. O. Box 8360
Fredericksburg, VA 22408
800-634-0491
800-947-8814 (fax)
www.hollingermetaledge.com

— acid-free boxes and papers; catalogue & price list available

Light Impressions Corp.
2340 Brighton Henrietta Town Line Road
Rochester, NY 14623
800-975-6429
800-828-5539 (fax)
www.lightimpressionsdirect.com

— various conservation and storage supplies; catalogue & price list

MuseuM Services Corp.
385 Bridgepoint Dr.
South St. Paul, MN 55075-2466
651-450-8954
651-554-9217 (fax)
www.museumservicescorporation.com

— formerly Conservator's Emporium; various conservation supplies incl. cleansers, consolidants, safety gear, etc.

TALAS – Technical Library Service
330 Morgan Ave.
Brooklyn, NY 11211
212-219-0770
212-219-0735 (fax)
www.talas-nyc.com

— conservation, preservation and restoration supplies; catalogue & price list available

Thermo Scientific
NNICS@thermofisher.com
800-625-4327
www.thermoscientific.com/en/home.html

— formerly Fisher Scientific; gloves & other safety equipment; catalogue available

University Products, Inc.
517 Main St.
Holyoke, MA 01041
800-628-1912
800-532-9281 (fax)
www.universityproducts.com

— a range of paper products; catalogue and paper samples available

CONSERVATION RESOURCES

American Institute for the Conservation of Historic and Artistic Works (AIC)
1156 15th St. NW, Suite 320
Washington, D.C. 20005
202-452-9545
202-452-9328 (fax)
www.conservation-us.org

Anasazi Heritage Center (archaeological materials)
27501 Highway 184
Dolores, CO 81323
970-882-5600
970-882-7035 (fax)
www.blm.gov/co/st/en/fo/ahc.html

Art Conservation Department
Buffalo State University of New York
Rockwell Hall 230
1300 Elmwood Ave.
Buffalo, NY 14222-1095
716-878-5025
http://artconservation.buffalostate.edu/

Art Conservation Department
303 Old College
University of Delaware
Newark, DE 19716-2515
302-831-3489
www.artcons.udel.edu

Jeanne Brako (textiles & objects)
Curator of Collections and Public Programs
Center of Southwest Studies
Fort Lewis College
1000 Rim Dr.
Durango, CO 81301-3999
970-382-6980
brako_j@fortlewis.edu

Branch of Conservation Laboratories (artifact conservation)
Division of Museum Services
Harpers Ferry Center
National Park Service
67 Mather Place
Harpers Ferry, WV 25425
304-535-5050
www.nps.gov/hfc/products/cons/index.cfm

Colorado Art Restoration Services (books, canvas, objects, paper, photography, textiles)
9797 W. Colfax Ave.
Lakewood, CO 80215
303-237-7623
www.coloradoartrestoration.com

Conservation Center for Art & Historic Artifacts
264 S. 23rd St.
Philadelphia, PA 19103
215-545-0613
www.ccaha.org

J. Claire Dean (rock art conservation)
Dean & Associates Conservation Services
3438 NE 62nd Ave.
Portland, OR 97213-3953
503-331-1972
clairedean@aol.com

Getty Conservation Institute (classes and workshops)
1200 Getty Center Dr., Suite 700
Los Angeles, CA 90049-1684
310-440-7325
www.getty.edu/conservation/about/index.html

Johannes Loubser (rock art conservation)
Stratum Unlimited, LLC
10011 Carrington Lane
Alpharetta, Georgia 30022
770-619-9964
jloubser@stratumunlimited.com
www.stratumunlimited.com

Maryland Archaeological Conservation Laboratory (iron, copper alloy, white metals, ceramic, glass, wood, bone, and leather)
Jefferson Patterson Park and Museum
10515 Mackall Road
St. Leonard, MD 20685
410-586-8550
www.jefpat.org/mac_lab.html

Nancy Odegaard (archaeological materials)
Preservation Division
Arizona State Museum
University of Arizona
P. O. Box 210026
Tucson, AZ 85721-0026
520-621-6314
www.statemuseum.arizona.edu

Bettina Raphael (archaeological materials)
611 Cortez St.
Santa Fe, NM 87501
505-988-2487

Constance Silver (rock art conservation)
Preservar, Inc.
15 Forest St.
Brattleboro, VT 05301-2847
917-403-5378
c.s.silver@att.net

Smithsonian Museum Conservation Institute (diverse museum collection items and related materials)
Museum Support Center
4210 Silver Hill Road
Suitland, Maryland, 20746
301-238-1240
MCIweb@si.edu
www.si.edu/mci/

Jude Southward (archaeological materials)
Department of Conservation Chair
Denver Museum of Nature & Science
2001 Colorado Blvd.
Denver, CO 80205
303-370-6496
jude.southward@dmns.org

WAAC Resource File (Western Association for Art Conservation)
% Denise Migdail, WAAC Secretary
Conservation Department
Asian Art Museum
200 Larkin St.
San Francisco, CA 94102
415-581-3544
secretary@waac-us.org

Western Center for the Conservation of Fine Arts (paintings)
1225 Santa Fe Dr.
Denver, CO 80204-3545
303-573-1973
www.wccfa.com

An excellent Internet resource with extensive information and links:

Conservation OnLine (CoOL)
cool.conservation-us.org/waac/index.html

Useful Information also can be found on this web site:

Part V. Field Treatment of Artifacts. Pp. 13–24 in Archaeological Research Center Repository Guide, South Dakota State Historical Society. On-line at http://history.sd.gov/archaeology/downloads/repository_guide.pdf