increased demand for services. Many museums responded by reducing their staff sizes through a combination of layoffs, hiring freezes, and replacement of full-time staff members by part-time workers, volunteers, or outside contractors.

HERITAGE PRESERVATION (HP)

CAP Available for Emergency Assessments

For museums that sustained damage to collections or historic structures from Hurricane Sandy, the Conservation Assessment Program (CAP) is available to conduct immediate emergency assessments. To apply for this special, one-time program, museums must be located in a federally declared disaster area, should complete the 2013 CAP application (www.heritagepreservation.org/CAP/application.html), and include a brief description of the damage sustained and status of the museum's operations.

For all 2013 CAP applicants, the deadline has been extended to January 15, 2013!

Collections Courses on the C2C Online Community

The Connecting to Collections Online Community (www.connectingtocollections.org) continues to grow with 1,800 members and an archive of more than 30 webinars. The site includes quick links to authoritative preservation information and an active discussion board. Starting in January 2013, the C2C Online Community will host a new series of free, online collections courses designed to meet the needs of library and historical collections. The Community will also continue to host regularly scheduled webinars with experts in the field. Heritage Preservation moderates the Connecting to Collections Online Community in cooperation with the American Association for State and Local History (AASLH) and with funding from the Institute of Museum and Library Services (IMLS).

Popular ERS App Now Available for Android and BlackBerry

In April 2012, HP, in partnership with the National Center for Preservation Technology and Training (NCPTT), released its Emergency Response and Salvage Wheel as a free app for Apple devices running iOS 5.1 or later. Since its release, the ERS: Emergency Response and Salvage app has been downloaded from the App Store more than 1,680 times. A new version is now available from the App Store that runs on all iOS hardware. In addition, an Android version is now available through Google Play—with a Spanish version coming soon—as well as a BlackBerry version available from the BlackBerry App World. All versions of the app are available free of charge.

New York Community Trust Grant Awarded

Heritage Preservation was awarded $15,000 by the New York Community Trust to assist Hurricane Sandy recovery efforts in coordination with Alliance for Response New York City (AFR NYC). Funding helped purchase critical supplies and equipment to support the collaborative efforts of AFR NYC, AIC-CERT, the Smithsonian Institution, NYC's Department of Cultural Affairs and Materials for the Arts, the New York Regional Association for Conservation (NYRAC), and other organizations and professionals to help hard-hit artists, museums, libraries, archives, and galleries.

New Alliance for Response Forum

Minneapolis–St. Paul will be the site of the next Alliance for Response Kick-Off Forum. The Midwest Art Conservation Center will host the all-day forum on February 1, 2013. The goal of the Alliance for Response initiative is to build bridges between the cultural heritage and emergency response communities before disasters happen. For more information about the Minneapolis–St. Paul Forum and the Alliance for Response initiative, visit www.heritagepreservation.org/afr.

Health & Safety

Hurricane Sandy

For those affected by Hurricane Sandy, information regarding health and safety issues involved in the recovery efforts will be available in the coming weeks on AIC's Wiki site. In the meantime, please visit the New York Committee for Occupational Safety and Health at http://nycosh.org/index.php?page=hurricane-sandy for fact sheets and other information on dealing with mold, asbestos, and other hurricane-related hazards, as well as information about respirator use and links to other resources. Stay safe!

—AIC Health and Safety Committee

Tin-Mercury Amalgam Mirrors

Conservators come in contact with mercury through a variety of sources such as thermometers, scientific instruments, and pigments. Improper handling of historic mercury amalgam mirrors presents another potential risk for elemental mercury exposure. These mirrors were fabricated using a tin-mercury amalgam that releases mercury liquid and vapor as it deteriorates. As a result, the mirrors and frames, as well as storage, work, and exhibition spaces can easily become contaminated, placing anyone who interacts with these objects at risk for mercury exposure.

The use of tin-mercury amalgam was the primary method for producing glass mirrors from the 16th to the early 20th century. In this process, tin foil and liquid mercury were applied to glass; the resulting two-phase amalgam consisted of tin-mercury crystals surrounded by a mercury-rich liquid phase. While this created a highly reflective and decorative surface, the amalgam is inherently unstable and degrades over time. Mercury emissions result from several processes: oxidation of the amalgam, evaporation of the liquid phase, and migration of liquid mercury to the bottom edge of the mirror due to gravity.

Mercury exposure from amalgam mirrors can be mitigated by identifying mirrors containing mercury; responsible exhibition, storage, and handling; following safety protocols when cleaning up mercury spills; and proper recycling and disposal of mercury-contaminated products.

Identification

Distinguishing mercury-containing mirrors from silvered mirrors can be difficult. If the mirror was produced before the early 20th century, it is likely a mercury amalgam mirror. Silvering, the other predominant historic mirroring technique, involves the deposition of silver on the glass. While silvering was developed in the mid-19th century, it did not completely replace the amalgam process until the

20th century. Unfortunately, most mercury mirrors are only identified once mercury droplets are discovered along the bottom of the frame or on floors and baseboards. Occasionally, beads of liquid mercury are also visible from the front of the mirror, which can be observed migrating under the glass.

There are several additional ways to identify an amalgam mirror if liquid mercury is not visible. Scientific testing, such as X-ray fluorescence (XRF), can easily confirm the presence of mercury. However, if these methods are not accessible, mercury and silver mirrors can be distinguished by subtle differences in color and reflectivity. Mercury mirrors reflect less light and have a bluish appearance, while silver mirrors look more yellow. This effect can be enhanced by placing a thin piece of paper over the mirror, which will appear paler and brighter over the silver mirror (Hadsund 1993).

The condition of mercury mirrors can be deceptive; they may seem to be in good condition even if they are actively deteriorating and releasing mercury. Look for surfaces that exhibit small points of light, which create a glittering, rather than reflective, surface. The lower section of the mirror may be more heavily deteriorated with numerous small holes. These holes may only be visible when the object is backlit and are rarely visible during normal use. Corrosion begins as small dark patches that create a dark and cloudy appearance. More severe corrosion manifests as grey layers or as grey, yellow-brown, and/or white concentric bands resulting from oxidation of the tin.

While these visual characteristics may help in identification, it is safest to assume that mercury is present in any mirror produced prior to the latter half of the 20th century, unless otherwise documented or proven by scientific methods, and therefore should be handled appropriately.

Handling

Handle mirrors that contain or may contain mercury with extreme caution. Always wear disposable personal protective equipment (PPE) including rubber, nitrile, or latex gloves as well as protective clothing and eyewear. Work in well-ventilated, cool areas. If workspaces cannot be properly ventilated, only use respirators with cartridges that are approved for use with mercury vapor (these will have a special "end of service life indicator" to warn the user of potential mercury vapor breakthrough). Work surfaces should be covered with a disposable material. Examine storage and exhibition areas for liquid mercury, which can collect on floors and be easily distributed by foot traffic. Regularly train staff on proper handling and spill response measures (see next section).

The Occupational Safety and Health Administration (OSHA) guidelines limit mercury vapor exposure to 0.1 mg/M3 of air. However, this level does not reflect current toxicological literature on mercury health effects. The more current and conservative occupational exposure level is 0.025 mg/ M3 as an 8-hour time-weighted average, established by the American Conference of Governmental Industrial Hygienists (ACGIH 2012). Although studies measuring mercury vapor emissions in gallery spaces (Hadsund 1993; Swan 2010) and lab conditions (Torge, et al. 2010) have demonstrated that the amount of mercury vapor released from undisturbed historic mirrors is below recommended safety guidelines, take precaution when moving, handling, or dismantling mirrors. Warm or poorly ventilated indoor spaces and agitation of liquid mercury increases the risk of exposure to mercury vapor.

Mercury vapor levels can be measured by using special passive dosimeter badges (laboratory analysis often included) or with indicator/detection cards that can be purchased through laboratory safety suppliers. More expensive analytical instruments are also available; however it may be more appropriate to contract with an environmental monitoring company to monitor mercury emissions. One source is the American Industrial Hygiene Association's Consultant Listing (www.aiha.org). Since mercury liquid and vapor control is a major issue in most municipalities, especially in school systems, monitoring and guidance may also be available through local public health departments upon request. A valuable and free resource for small to medium-sized businesses is the OSHA On-Site Consultation Service, offering advice (separate from enforcement) through offices in every state. (www.osha.gov/dcsp/smallbusiness/consult.html)

Clean-up and Disposal of Elemental Mercury

Small liquid mercury spills can be safely handled using appropriate precautions. Ventilate contaminated areas and wear protective equipment. Never use a broom or vacuum to collect liquid mercury, unless it is a specially designed mercury recovery vacuum. Commercial mercury spill kits, sponges and powders that sequester

MERCURY SUPPLIES

Mercury specific detection and spill products are available through most laboratory supply companies such as Grainger Industrial Supply and Fisher Scientific. Customer service representatives will be able to assist with finding the appropriate supplies for your needs. Some of the most useful products are:

Mercury vapor badges and cards: Passive dosimeter badges contain adsorbent cartridges that are sent to laboratories to quantify exposure levels, while vapor indicator cards and badges contain special papers that change color in the presence of mercury.

Mercury indicator powder: Indicator powder changes color in the presence of mercury and can identify mercury residues.

Mercury spill kits: Kits contain everything needed to clean up small spills including personal protective equipment (PPE), cleaning supplies, and collection containers.

Mercury recovery vacuum: Vacuums safely collect mercury, mercury vapors, and mercury-contaminated particulates with specially adapted filters and collection containers.

Mercury vapor respirator cartridges: Cartridges will have a special "end of service life indicator" to warn the user of potential mercury vapor breakthrough.

Mercury amalgamation powder: Adsorbent powder converts elemental mercury into an amalgam, preventing mercury vapor emissions. Powder can be safely collected into appropriate disposable containers.

Mercury amalgamation sponge: Adsorbent sponges collect and convert elemental mercury into an amalgam, preventing mercury vapor emissions.

Mercury containers/jars: Polyethylene containers that use sponges to collect and contain liquid mercury. Some containers only collect the liquid mercury and others use adsorbent sponges to collect the mercury as an amalgam.

Mercury vapor powders and sprays: Powdered sorbents, such as iodized activated carbon, and commercial sprays reduce and suppress mercury vapors.

and contain the liquid should be used for collection. Sprays, powders, and papers are also produced for controlling mercury vapor levels. If spill kits are not available, gently collect beads of mercury into sealed containers using disposable materials. Never pour liquid mercury down the drain. Dispose of clothing and any absorbent materials that have come in contact with mercury and do not launder contaminated material in a washing machine. Be particularly aware of tracking liquid mercury on shoes. All contaminated items should be placed in sealed containers, clearly labeled and disposed of according to state, local, and institutional regulations.

Many civic and government agencies offer collection and exchange programs for mercury and mercury-containing devices as part of an ongoing awareness to provide proper disposal for hazardous materials. For information about these programs, contact local officials to find out when and where a collection will be held. Resources such as Earth911.com can provide information about local collection programs.

Health Risks of Elemental Mercury Exposure

Elemental mercury primarily causes health effects when it is inhaled as a vapor. After exposure to liquid mercury, less than 1% of the total amount is absorbed through ingestion or dermal contact, while 80% of inhaled mercury vapor is absorbed by the respiratory tract and retained in the kidneys and brain (WHO 2000). Symptoms of high levels of mercury exposure can occur within hours and include respiratory distress, tremors, emotional changes, insomnia, neuromuscular changes, headaches, disturbances in sensations, nausea, vomiting, diarrhea, and changes in cognitive function. Chronic exposure may result in more severe kidney, respiratory, and cognitive effects. Individuals concerned about their exposure to mercury should consult their physician within three days of exposure for testing and treatment.

Preventative Conservation

The degradation of the amalgam can be retarded by taking preventative steps, such as maintaining low and constant temperatures and relative humidity. In addition, mirrors should be displayed and stored in their original orientation; changing the orientation (e.g. laying a wall mirror on its back) will alter the equilibrium and promote further deterioration. Mirrors should also be checked regularly to ensure they are free of particulates such as dust and spider webs that can retain moisture.

Preventative measures can also be employed to limit mercury exposure. Mirrors containing mercury should be clearly labeled. Consider replacing severely degraded mirrors with stable modern mirrors, if possible. Covering the back of the mirror serves to both protect the amalgam and contain mercury; however, mirrors should not be completely sealed to prevent build up of mercury vapor and because slow evaporation of the mercury is necessary for curing the amalgam. To protect the back of the mirror while allowing for air circulation, Hadsund recommends sealing the junction between the glass and the frame with soft felt, attaching a piece of paper or closely woven textile across the back of the frame, and reattaching the original mirror backing (Hadsund 1993: 14). Another method of containment employed by Colonial Williamsburg involves partially or completely lining the backs of mirrors with Mylar, which allows for continuous monitoring. For temporary storage, the lower halves of mirrors can be bagged with polyethylene to prevent leakage

Don't forget! For your protection, OSHA requires your respirator to be fit tested **annually**. And if you are a member of AIC-CERT, it is **mandatory** that your fit testing is up-to-date. See you at our workshop in Indianapolis!

—AIC Health and Safety Committee

Additional Reading (all web links accessed 8/2012):

Agency for Toxic Substances and Disease Registry (ATSDR), Centers for Disease Control. 2010. "Mercury and Your Health." www.atsdr.cdc.gov/mercury/

American Conference of Governmental Industrial Hygienists (ACGIH). 2012. Threshold Limits Values and Biological Exposure Indices. Cincinnati, OH.

Earth911. 2012. http://earth911.com/

Environmental Protection Agency (EPA). 2012. "Mercury Releases and Spills." www.epa.gov/mercury/spills/index.htm

Environmental Protection Agency (EPA). 2012. "Elemental Mercury Effects." www.epa.gov/mercury/effects.htm#elem

Hadsund, P. 1993. "The Tin-Mercury Mirror: Its Manufacturing Technique and Deterioration Process." Studies in Conservation, 38(1): 3–16.

Occupational Safety and Health Administration (OSHA), United States Department of Labor. "Occupational Safety and Health Guideline for Mercury Vapor." www.osha.gov/SLTC/healthguidelines/mercuryvapor/recognition.html/

Payne de Chavez, K. 2010. "Historic Mercury Amalgam Mirrors: History, Safety and Preservation." Art Conservation, Spring 2010: 23–26.

Podsiki, C. 2008. "Heavy Metals, their Salts, and Other Compounds: A Quick Reference Guide from AIC and the Health & Safety Committee." AIC News, November 2008: Special Insert.

Swan, C. 2010. "Mercury: the Problem with 18th-century Looking Glasses." In C. Hawks, et. al. (eds), Health & Safety for Museum Professionals. New York: Society for the Preservation of Natural History Collections, 516.

Torge, M., et. al. 2010. "Mercury Emissions from Historical Tin Amalgam Mirrors." In H. Roemich (ed), Glass & Ceramics Conservation 2010, Papers presented at the Interim Meeting of the ICOM-CC Glass & Ceramics Working Group, October 3–6, 2010, Corning, New York: ICOM Committee for Conservation in association with the Corning Museum of Glass, 156–163.

World Health Organization (WHO). 2000. "Chapter 6.9: Mercury." In Air Quality Guidelines - Second Edition, Copenhagen, Denmark: WHO Regional Office for Europe.

and vapor build-up (Swan 2010). Experimental methods that use backing layers that can absorb mercury vapor are also currently being investigated (Torge et al. 2010).

While the degradation of tin-mercury amalgam is inevitable and cannot be reversed, taking these preventative measures and safety precautions allows for the safe exhibition, storage, and handling of these historic objects.

—Kerith Koss Schrager, AIC Health and Safety Committee, kerith.koss [at] gmail__com

People

The University of Michigan (U-M) Library is delighted to announce the first Cathleen A. Baker Fellows in Paper Conservation. **Lauren Calcote** and **Aisha Wahab** started their fellowships in early September and will remain in residence with the U-M Library Conservation Lab through August 2013.

Rene de la Rie has recently stepped down from his position at the National Gallery of Art and moved back to Europe. He will initially be based at the University of Amsterdam, but also plans to spend time in Paris while affiliated with the Centre de recherche sur la conservation des collections (CRCC—www.crcc.cnrs.fr). He can be reached at: E. René de la Rie Herengracht 310 E 1016CD, Amsterdam, Netherlands +31.20.770.9466 Mobile +31.6.30.16.22.90

Barton Ross, AIA, AICP, LEED AP was recently awarded the Charles E. Beveridge Fellowship to study at the Frederick Law Olmsted National Historic Site in Brookline, Massachusetts. As the first ever recipient of the award, his research will focus on the Olmsted Firm's design legacy in Montclair, NJ, where the firm executed at least 22 projects in the early 20th century. Mr. Ross is currently the historic preservation consultant for the Township of Montclair.

Serena Urry is pleased to announce that she has joined the Cincinnati Art Museum as Chief Conservator. Contact her at the Cincinnati Art Museum, 953 Eden Park Drive, Cincinnati, OH 45202. Phone: (513) 639-2905. Email: serena.urry [at] cincyart__org.

David West announces the launch of materialswise, a consulting practice based in Sydney, Australia, providing specialist advice to building owners, designers and contractors on the performance of building materials (especially stone, ceramics and glass), forensic investigation of failures, and management of associated risks. David will continue as a Director of International Conservation Services, Australia's largest privately-owned fine arts conservation business.

In Memoriam

Catherine E. Anderson (1960–2012)

Catherine Anderson was born in Spring Valley, Illinois, to Donald and Nancy Anderson. She was a 1978 graduate of St. Bede Academy and of Illinois Valley Community College (1980), where she was inducted into the Hall of Fame. She completed a BFA at Illinois State University and received an MA in Art and Architectural History from the University of Illinois at Urbana-Champaign. Her pre-program conservation training in Chicago included apprenticeships in both paintings at Spring Grove and at the Pomeranz Institute of Fine Art Conservation, and in paper at the Graphic Conservation Company.

One of the most accomplished and promising students in the 1990 Winterthur University of Delaware Program in Art Conservation (WUDPAC), Catherine possessed enormous artistic talent and impressive skills. She showed an intrinsic knack for keeping everything in perspective and encouraging others with her endearing sense of humor, distinctive voice, and infectious laugh. Unique in that she could have majored in any specialty, Catherine chose Objects, and continued to develop her interest in historical buildings and preservation by pursuing summer internships at the Shelburne and Biltmore. She familiarized herself with architectural issues at a time when few art conservators were conversant in the importance and nuances of working with architects and engineers. Catherine served her third-year internship with Meg Craft of Art Conservation and Technical Services in Baltimore, MD; worked at the Isabella Stuart Gardner Museum in Boston; and completed a postgraduate year at the National Museum of American History, Smithsonian Institution, where she identified and established conservation guidelines for several major collections of architectural materials in the Midwest and Northeast.

Catherine then returned to Chicago to work on several projects at the Field Museum of Natural History. She undertook supervision of the documentation, reconstruction and exhibition of a Maori Meeting House (Ruatepupuke II), working side-by-side with the Maori curator and interns and travelling to New Zealand, where she was warmly welcomed and highly honored by tribal leaders—an experience she would later recall with deep appreciation and gratification. She also participated in a major re-housing project and assisted Catherine Sease in fostering an institution-wide preventive conservation program.

As her knowledge and experience with historical architecture and diverse collections broadened and deepened, Catherine moved towards preventive conservation. She became Supervisor of the Preventative Conservation Program in the Department of Conservation at Colonial Williamsburg Foundation (CWF), where she served for eleven years. Under her leadership the program expanded, as the department moved to new facilities in the Bruton Heights Collections and Conservation Building.

Catherine's contributions to the preservation of CWF's vast collections and architecture were grounded in her deep caring, strong knowledge, and years of experience. Her dedication to preservation and her desire to help others in a "team effort" were obvious in how she worked and interacted with colleagues. Her commitment was exemplified by her assistance with the Carolina Room, where she generously shared her talents and those of her staff in deinstalling the hundreds of interconnecting segments, and pitching in on the cleaning phase when her other responsibilities permitted. Notable CWF projects in which she was involved include environmental research and practice, reinterpreting the Wetherburn's Tavern, the closing of the Governor's Palace, and creating standards for fabricating fake food. Interacting effectively and congenially with the Foundation's HVAC and building engineers, Catherine was well known as a hard-working and deeply involved manager of her collections maintenance team.