

Presentation Abstracts

Rare but Significant Exposures: Treating Corroded Cadmium Plating in a Museum Setting

Arianna Johnston, Objects Conservator; Anne McDonough, MD, MPH, Associate Director Occupational Health Services, Smithsonian Office of Safety, Health and Environmental Management

This presentation will discuss the recent coordination between Smithsonian Office of Safety, Health, and Environmental Management (OSHEM) and the National Air and Space Museum Conservation Unit to treat toxic cadmium corrosion while prioritizing health and safety. While exploring the most expedient treatment methods for 650 pieces of cadmium-plated hardware from a World War II-era bomber, OSHEM was invited to conduct air monitoring as conservators tested two treatment methods. One of these treatment methods measured the concentration of airborne cadmium dust to be above the “action level” for an eight-hour time-weighted average, which initiated a medical surveillance program. This surveillance aimed to identify employees most at risk from chronic exposure to cadmium and to detect and prevent cadmium-induced diseases. While the cadmium dust level detected during the test required further investigation and medical monitoring, it was determined that the frequency of the activity did not require annual medical surveillance. As part of this collaboration, safer treatment methods were chosen for the project, and medical baseline testing is now included as part of the onboarding process for new fellows, interns, and employees. This talk will discuss the best practice use of medical monitoring and surveillance for infrequent activities that may produce action level exposures.

Protecting Life and Property: Structural Behavior and the Post-Disaster Assessment of Buildings

Dean Tills, PE, SE, Senior Structural Engineer III, 1200 Architectural Engineers, PLLC; John Dumsick, PE, Associate, 1200 Architectural Engineers, PLLC

During natural and or man-made disasters, significant forces can be exerted on existing structures. Oftentimes, these forces can cause significant damage to the structure and more so the contents. These situations can push the limits of personal safety and archival storage standards and involve coordination with entities that have differing goals. Understanding and cooperation can go along long way. While many of modern constructions within North America have been designed for the protection of life safety to resist these unique loading scenarios, without special consideration collections can be compromised. In older structures many of the modern design standards are not fully attained and in historic structures often found marginal resilience to these acute forces. Given the wide range of structures which collections are stored and maintained, the presenters will provide the audience with a basic understanding of building disaster behavior and briefly discuss potential scenarios based on past experience. The co-presenters will couple typical post-disaster observations with the structural distress mode/mechanism and provide a summary of building assessment protocols and standards. The potential impacts of temporary shoring and envelope protection will be discussed briefly to provide the audience ideas on planning considerations. The overarching goal of the presentation is to educate conservators, facility managers and other non-building design professionals about the potential indirect impacts a disaster can have on collections.

Lightning Round

A Case Study of a Book of Arsenical Wallpaper

Kendra Greene, MFA, Library Innovation Lab Fellow, Harvard Law School Library

Shadows from the Walls of Death is a book of two pages of text and some 86 pages of arsenical wallpaper, made by the Michigan State Board of Health in 1874 and sent to nearly every library in the state at that time. It was made knowing it would be a dangerous object, and that it would be distributed to a collecting institution. Likely because of that, it was accompanied both by a pamphlet version of the text and a note from the Secretary explaining the hazard posed by the enclosed book and recommending it not be handled by children. Of the original edition of 100 copies, four are known to still exist. These copies are found in library special collections, archives, and a museum--including the most complete copy digitized this Spring by the National Library of Medicine nearby in Bethesda. The four known copies represent a variety of preservation decisions, while raising the question of the fate of the rest of the edition and just what risks we are willing take in stewarding our collections.

Uses of Ionizing Radiation for Tangible Cultural Heritage Conservation

Corneliu C. Ponta, Horia Hulubei National Institute for Physics and Nuclear Engineering (IFIN-HH), Romania; John Havermans (deceased), The Netherlands Organization for Applied Scientific Research, The Netherlands; Pablo A.S. Vasquez, NuclearEnergy Research Institute (IPEN), University of Sao Paulo, Brazil; Laurent Cortella, Atelier de Recherche et de Conservation ARC-Nucléart, France; Quoc Khoi Tran, Atelier de Recherche et de Conservation ARC-Nucléart, France; Sunil Sabharwal, International Atomic Energy Agency (IAEA), Austria; and Valeria Orlandini, Conservator in private practice - Thematic Network MEEP (Metales en el Papel), USA

When a museum, library or archive is facing a mass infection, the biodeteriogenes and their food supply (the organic artifacts) are inseparable. As a consequence, while reacting against microorganisms or insect infestation, the artifact is endangered. A countering mechanism has to be efficient, non-hazardous to the people manipulating it, and safe for the environment. It should be easy to use on a large scale and inexpensive. Classical "surgical instruments", such as those based on gas diffusion (poisonous or depleted in oxygen) are the closest in ideal characteristics. However, their efficiency is under debate and there are safety problems for the applicant, restorer, curator, museum visitor and the environment. This happens because the biodeteriogenes are able to develop defending strategies, such as the resistance of living forms (spores, eggs), which do not interact with the gas. Poisonous gases are absorbed by the artifact during the treatment and continually desorbed for many months afterwards.

Gamma irradiation is an efficient instrument for the preservation of cultural heritage artifacts. Applied in the right conditions it meets practically all the requirements for disinfection and insect eradication. The irradiation of cultural heritage artifacts should be performed in industrial facilities. This technique has been used for 50 years for the sterilization of medical supplies. During this time, reliable equipment and safe working methodologies have been developed. Irradiation disinfection is the method of choice in emergencies and for mass treatments, and is used in many countries. A recent free IAEA book, (<http://www-pub.iaea.org/books/IAEABooks/10937/Uses-of-Ionizing-Radiation-for-Tangible-Cultural-Heritage-Conservation>) has brought together for the first time the basic principles and trends, with application examples from many countries around the world.

Historic Building Conservation: Safety Protocol Onsite and in the Lab

Casey Weisdock, MSc, Architectural Conservator, International Masonry Institute

Architectural Conservation, the conservation of historic buildings and monuments, shares common ground with museum and fine art conservation. The most significant similarity being a commonality of materials and methodology, and therefore material conservation treatments. However, the main differences between the two is often scale, structure and location; architectural conservation being generally site-specific, and treatments taking place in-situ. Working outside of a laboratory setting poses unique challenges in maintaining environmental controls and safe workplace protocol. The architectural conservator is exposed to toxic artist/trades materials, hazardous building materials such as lead and asbestos, as well as general outdoor hazards such as poison ivy, bird guano, and insect pests. Though safety standards for new construction and architectural restoration work have been strengthened, to-date there has been little direct focus and specific standardization of occupational safety protocol for the architectural conservation field. In addition, the liminal role of the architectural conservator has oftentimes produced workplace cultures that approach hazards on historic sites with a cavalier attitude compared to museum conservation and the building trades. This presentation will focus on risks unique to architectural conservation and will provide an overview of educational efforts currently taking place within architectural conservation graduate programs. Technical resources will be shared that have been adapted for professional practice and are applicable to the architectural conservation field at-large.

Understanding Airtight Case Environments at NMAI: An Integrated Approach

Kelly McHugh, National Museum of the American Indian, Supervisory Collections Manager; Cali Martin, NMAI-DC, Collections Manager; Gwénaëlle Kavich, Conservation Scientist, Museum Conservation Institute, Alba Alvarez-Martin, MCI Postdoctoral Fellow; Kim Harmon, Industrial Hygienist, Smithsonian Office of Safety, Health and Environmental Management; Rebecca Kaczkowski, MCI Conservation Scientist

The National Museum of the American Indian opened the exhibition *Americans* in January 2018. The exhibition highlights the deep connections between Americans and American Indians as illustrated through history, pop culture, and the identity of the United States. Three galleries in the exhibition focusing on the historical events of Pocohontas' life, the Trail of Tears, and the Battle of Little Bighorn are used to explore this narrative.

The minimalistic design of the cases containing Lakota, Northern Cheyenne, and Arapaho warshirts and an eagle feather headdress from the Sicangu Lakota displayed in the Battle of Little Bighorn gallery was achieved through frameless case construction. The cases allow the visitor to feel as though they are standing in the midst of warriors. These cases are described as “airtight” and are marketed as such by the fabricator. One week after the exhibition opening, the cases were opened to address some locking mechanism issues. When opening the cases, they emitted a strong and distinct chemical odor from the interior. This raised immediate concern for the objects. At the request of the collections manager and conservator, exhibition project managers contacted the case fabricators to confirm what case materials were used in order to better understand the potential source of the odor. Concurrently, the collections manager opened the cases weekly to allow for the escape of built up volatile organic compounds in the hopes that the newly constructed cases would sufficiently off-gas. Unfortunately the problem persisted.

The case fabricators were forthcoming with information and were just as keen to understand what was occurring in the case environment; however, there was some dispute as to the source of the odor. Fortunately, conservation scientists at the Smithsonian Institution's Museum Conservation Institute are currently researching the identification of off-gassing. The environment and materials of the cases and exhibition were tested using Solid Phase Micro-Extraction coupled with Gas Chromatography-Mass Spectrometry (SPME-GC-MS). NMAI requested analysis to better understand the source of the odor to assess risk to the objects and to monitor the off-gassing.

Additionally there was concern for the health and safety of the staff working in and around the cases. NMAI contacted SI OSHM to undertake complementary environmental monitoring. An industrial hygienist sampled the case environment for various chemicals including mercury. NMAI understands that collections may have historically been treated with any numbers of pesticides, including those with arsenic or mercury compounds which are harmful to humans.

This presentation will address the methodology used to better understand what was happening in the case environment, the risk to the objects and staff, and will underscore the value of interdisciplinary effort. This integrated approach not only resulted in a more comprehensive understanding of the issue, but it also provided practical solutions used by the exhibition team to rectify the problem, while raising questions about the health and safety of airtight exhibit case construction.

Photocatalytic Abatement of Biofilms and VOCs for Cultural Heritage, Museum Laboratories, Human Health and Safety

Andrew S. Voros Preventive Conservation USA

Museum curated collections present challenges ranging from the sustainable conservation of objects and buildings in outdoor environments to off-gassing of Volatile Organic Compounds (VOC) in research collections, exhibits and laboratories. Exterior structures, sculptures and monuments are subject to biofilms from communities of bacteria, algae and lichens that not only glue inorganic particles to surfaces making them difficult to clean, but which can also damage the surface by penetrating them with root-like structures and mobilizing mineral constituents. Removing these biofilms may be nearly as destructive, while prevention of regrowth has required that chemical or metal residues remain on the surfaces that are at best temporary. Preserved natural science collections present Indoor Air Quality (IAQ) challenges to staff from handling specimens fixed in formalin and preserved in ethanol, while off-gassing VOCs can degrade specimens in cases and collections. An innovative method for creating biostatic, self-cleaning, and air pollution and particulate matter abating surfaces outdoors and passive VOC abating surfaces in labs and collections using photocatalytic applications and light will be presented.

Riding in the Slipstream: Preventive Conservation within the Scope of Occupational Safety and Health

Maruchi Yoshida, Conservator/Safety Engineer, YCONS Yoshida-conservation, Munich; Simon Kirnberger, Safety Engineer, Municipality of Munich; Dr. Habil Zuzana Giertlová, Fire Safety Engineer, Brandschutz Consulting, Munich

Preventive conservation has become an elementary part of collection care and preservation issues. Especially for small and middle-sized museums holistic care and prevention of damages are crucial as budgets and staffs are limited. An emerging subject of the last years is the museum storage which is the backbone of each collection but often the most neglected part of the museum. Improvements of storage conditions usually demand investments in the building construction, in working structures or in decontamination and care measures for large collections. Decisions on financial support however are made on political levels where museums are in competition with other cultural and social issues. As preventive conservation measures do not help politicians to get re-elected or make people swarm to the museum incentives for decision-makers remain low. The most conclusive argument for decision-makers would be law and legal consequences – unfortunately laws for protection of cultural heritage and cultural properties do not help in these issues.

Typical problems of storage conditions are overcrowded shelves and aisles, leaking attics, humid basements or mold growth, insect infestation and contamination with chemical preservatives. Considering such situations in museum storages through the eyes of a safety engineer a long list of safety deficits for occupational safety and health can be stated instantly. The description of the risk and subsequently required improvement measures in order to comply with legal standards and technical guidelines are unambiguous. The decision-maker is now addressed as employer who is obliged by law to protect the health of employees and to offer safe and humane workplaces. Occupational safety and health has a high legal status and is connected to sanctions – however this is not primarily the motor to act. But the argumentation for safety and health of employees offers the opportunity to decision-makers to agree to improvement measures on the basis of occupational safety and health.

In various projects safety and health aspects are used to achieve a higher priority at the decision-making bodies. Methods for occupational safety management and tools for risk assessment and evaluation are applied for transparent argumentation and to make decisions easier. The recommendation of improvements and solutions are carefully developed regarding the employees' issues and also preventive conservation requirements. This contribution explains the structure of occupational safety and health and highlights the strategic links to preventive conservation. As case studies actual museum projects are presented to open discussions about further opportunities to develop a structure for improvement processes and to apply group methods to better involve museum teams in improvement processes.

Crime Scene Cleanup: Preserving the Nutshell Studies of Unexplained Death

Ariel O'Connor, AIC PA, Objects Conservator, Smithsonian American Art Museum; Chuck Fry, Industrial Hygienist, Smithsonian Office of Safety, Health, and Environmental Management

Frances Glessner Lee (1878-1962) constructed a series of unusual and exquisitely detailed miniature crime scenes, known as the “Nutshell Studies of Unexplained Death,” to train homicide detectives during the 1930’s to 1960’s. Lee was a criminologist, the first female police captain in the U.S., and a skilled artist who combined science and art to help detectives scientifically approach their crime scenes and search for truth. Each of the nineteen scenes is based on real events and is made using wood, fabric, paper, metals, plastics, glass, ceramic, textiles, and plant fibers. The Nutshells are still used in training seminars today by the Harvard Associates in Police Science, and reside in Baltimore, MD at the Office of the Chief Medical Examiner. After 70 years of continuous use, the materials are warping, cracking, discoloring, and some elements have changed position over time. In a scenario when every change could reinterpret a clue, conservation examination and potential treatment becomes a forensic investigation.

In fall 2017, the Nutshells underwent a major conservation examination and treatment project in preparation for their exhibition at the Smithsonian Renwick Gallery. During this project, hazardous materials were uncovered. This paper will present an overview of the Nutshell Studies and will focus on the asbestos used in the original lighting. The discussion will include identification of the hazardous materials, treatment plan development, exposure assessment, and treatment, highlighting the collaboration between objects conservators and industrial hygienists. This collaborative treatment stabilized the models and allowed for a major rewiring and lighting campaign. This project upgraded the miniature incandescent bulbs to hand-made LED bulbs that imitate the original incandescent spectrum, while minimizing heat, light, and ultimately preserving the Nutshells for future use.

Afternoon Presentation Abstracts

Uncovering the Unknown Hazards in U.S. Navy Collections

Melissa Weissert, Curator, Curator Branch, Naval History and Heritage Command (CB-NHHC); Lea French Davis, Associate Registrar for Acquisitions, CB-NHHC; Tonia Deetz Rock, Collection Manager, CB-NHHC

The artifacts held by the Curator Branch of Naval History and Heritage Command are currently undergoing a 100% process of inventory and re-cataloguing for objects in long term storage as well as on display in museums. In a collection spanning more than two centuries and numbering over 300,000 artifacts, Curator Branch staff encounter a wide range of known and unknown hazards. While advancing the proper care and cataloguing of the collection, curatorial staff address the familiar military artifacts but also encounter artifacts in long term storage and on display in the National Museum of the US Navy that pose a hazard to the staff or the public or even the artifacts themselves. This presentation will focus on mitigating hazards such as lead dust and picric acid found in artifacts on display and stored artifacts such as a WWII Japanese kit of pharmaceuticals and substances not readily identifiable. The identification of these unknown substances and the responsible disposition of them will serve as case studies in working with unexpected discoveries within a larger museum collection.

Health and Safety Matters: Helping Emerging Museum Professionals Help Themselves

Emily England, M.A. candidate, Museum and Exhibition Studies, University of Illinois at Chicago; Joy Erdman, MS, CIH, CSP, Occupational Safety and Health Consultant, Joy Solutions, LLC, VA; Melissa Miller, M.A., Smithsonian National Collections Program Intern

Practice makes perfect when dealing with hazards in museum collections, which places Emerging Museum Professionals' (EMPs) health and safety particularly at risk. Additionally, with the rise of the gig economy, more and more EMPs are finding employment opportunities in the form of temporary, project-based, contract work that generally do not provide safety training, personal protective equipment, medical surveillance, and other safety services afforded to full time employees. This presentation will examine when and where EMPs in collections management-oriented positions are learning how to deal with hazardous materials, and whether or not they are receiving enough training to protect and advocate for themselves in this evolving job market. We will highlight available resources to help collections EMPs find and control their exposure to hazards and provide practical guidelines on assessing contract specifications. Lastly, we will explore methods of building institutional support and leveraging available resources to best help the next generation of museum professionals protect and advocate for themselves, others, and the collections.

Expanding the Collections Information System to Manage Collections Hazards and Plan for the Safety of Staff

Justin Barber, Collections Management Services, National Museum of American History; Joshua Gorman, Head of Collections Management and Chief Registrar, NMAH

In June of 2018, the National Museum of American History completed a multi-year survey of radioactive collections to meet audit requirements set by the Nuclear Regulatory Commission. The tools and strategies developed to complete this project in connection to existing systems such as the Museum's Collections Information System, Mimsy XG, opened possibilities beyond the original scope of that project. By adapting an approach to the survey complimenting broader collections management systems and strategies, the Museum has created a system allowing it to track collection objects with inherent hazardous properties, assess associated hazard risks, expand hazard documentation to communications and facility reporting systems, and provide additional information on safety requirements directly within collections records. This central management of collections data has opened up numerous possibilities for streamlining current processes and informational access related to research, lending, shipping, storage planning, and safety best practices. Furthermore, access to this data through the Museum's primary database presents the opportunity to explore and employ this information in new and exciting ways, such as heat map tracking of hazards through the SI Explorer facility mapping system.

Highlighting the NMAH as a case study, this presentation will demonstrate the possibilities of a forward thinking and unified approach to collections data using readily accessible solutions and adapting them to meet short and long-term goals. The central argument will be that not only are such strategies possible for adapting practical solutions to meet broader planning needs, they are vital in leveraging existing collections data and computer informational systems for ethical management of collections hazards and the safety of museum staff.

Can't Touch This! But You Can Touch That: Safety Assessments of Education Collections

Kelsey Falquero, National Museum of Natural History Collections Program (NMNH-CP); Catharine Hawks, AIC-PA, IIC-Fellow, NMNH-CP; Deborah Hull-Walski, NMNH-CP; Lisa Palmer, NMNH Vertebrate Zoology Collection Management; Kathryn Makos, CIH, NMNH

Q?rius is an interactive learning venue at the Smithsonian National Museum of Natural History (NMNH) designed specifically for a teen audience. The space gives visitors a chance to interact with museum specimens. The Q?rius collections are acquired education collections, belonging to the Office of Education and Outreach (E&O) and managed by the Collections Program. The collections in Q?rius include 6,000 specimens representing the Museum's seven disciplines – Anthropology, Botany, Entomology, Invertebrate Zoology, Mineral Sciences, Paleobiology, and Vertebrate Zoology. Starting in 2013, collections staff began performing safety assessments on specimens before their rehousing and storage in the publicly accessible Collections Zone. Risks assessed include sharpness, ingestibility, radioactivity, flammability, and contaminants (such as arsenic, mercury, and lead, which were historically used in specimen preparation or for pest management). Specimen fragility was also assessed.

The goal of these assessments was to minimize risks to our visitors and to our collections. The safety assessments allow collections staff to make housing recommendations that would ensure the safety of NMNH's visitors and the preservation of E&O's collections in a publicly accessible storage space. The hazard posed by an object was evaluated against questions of risk: can it be handled or displayed without restriction, restricted to docent-assisted handling, restricted to handling via an enclosure only, or returned to collections? The team implemented rankings by using color-coded labels, similar to the universal traffic stoplight system, to indicate whether the public can handle specimens directly (green), handle with assistance from a trained volunteer (yellow), or view only through barriers (red).

Mission Possible: Safety First. Emergency Response for Cultural Heritage Institutions in Puerto Rico & USVI.

Nora S. Lockshin, PA-AIC, Smithsonian Institution Archives; Stacy Bowe, Smithsonian Cultural Rescue Initiative; Rebecca Kennedy, Curae Collections Care LLC; Katharine C. Wagner, Smithsonian Institution Libraries

In 2017-18, the Smithsonian Institution (SI), co-sponsor with FEMA of the Heritage Emergency National Task Force, together with the National Archives and Records Administration, the National Park Service, and Disaster Surge Capacity Force staff from the National Aeronautics and Space Administration, assisted cultural heritage professionals with the recovery of Puerto Rico's and the US Virgin Islands' valuable collections held in the public trust by museums, libraries, and archives. As part of a FEMA Mission Assignment under Emergency Support Function #11 of the National Response Framework, led by the Department of the Interior (DOI), teams were assembled to conduct damage assessments and on-site training to staff at several of the island's cultural institutions.

In so doing, the teams needed to balance addressing both the health and safety needs of the team members and those of the cultural heritage workers responsible for the priceless collections themselves. In order to achieve this blend, occupational safety and travel medicine for the SI staff was provided by SI Facilities' Office of Safety, Health and Environmental Management. In response to a request to provide support for the local workers facing potentially both acute and chronic exposures, the DOI was able to bring in a partner from the Centers for Disease Control Health Hazard Evaluation Program to educate

staff of affected Puerto Rican institutions, and improve the travel teams' communication and training in voluntary use of personal protective equipment, regulations, and standards for worker protection.

The speakers will focus on resources that are available for cultural professionals to prepare themselves and others to respond and recover collections both safely and effectively, how these tools have been further integrated into Smithsonian initiatives and will share some expected and unexpected risks they have encountered in disaster response, recovery, mitigation and preparedness training in the tropical region.

Lighting and the Challenge of Prescriptive Standards

Scott Rosenfeld, Lighting Designer, Smithsonian American Art Museum

The paradox of museum lighting is that the same spectral energy that allows us to enjoy exhibits may also damage the exhibits. This talk will demonstrate how museum lighting designers balance the competing criteria to provide exhibits that are safe for visitors to navigate while preserving light sensitive colors. Information will include an explanation of the following concepts:

- Common lighting metrics.
- How to assess optical energy.
- How to accommodate visitors with a range of visual acuity.
- How performance-based standards often produce better results than prescriptive standards.

The presentation will feature an array of visual examples from the Smithsonian American Art Museum and Renwick Gallery. Learning objectives: 1) Explain basic lighting metrics, 2) Explain preservation standards for light sensitive materials, (3) Demonstrate lighting techniques that balance the safety needs of the collection and the visitor.