DISASTER SALVAGE TEAM

Working Towards Saving Cultural Collections

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NEWS LETTER

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POLLUTANTS IN MUSEUMS

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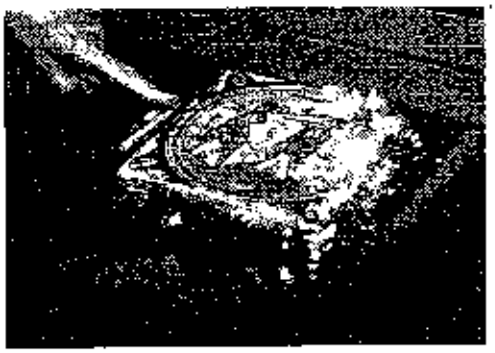
POLLUTANTS IN MUSEUMS

WRITTEN BY CECILY M. GRZYWACZ AND JAMES R. DRUZIK FOR GCI NEWSLETTER

It has long been recognised that exposure to atmospheric pollutants constitutes a risk to museum collections. Outdoor pollutants produced by fossil fuels can damage paintings, textiles, and other works of art. Indoor pollutants generated by building materials can corrode metal objects as well as other items.

To help institutions reduce these threats to their collections, the Institute began researching the problem of pollutants in 1985. The first two years of research focused on outdoor pollutants including nitrogen oxides, ozone and other photochemical oxidants, sulphur dioxide, and particles. In 1987 research expanded to include indoor generated pollutants - specifically, formaldehyde, acetaldehyde, and formic and acetic acids. At the same time, the emphasis of research shifted from the macroenvironment (gallery and storage spaces) to the microenvironment (display cases and storage cabinets), where most of the damage from these indoor pollutants occurs.



Of increasing concern for collections in urban environments is the soiling of exposed surfaces, such as, textiles, which cannot be cleaned safely or without difficulty. Internal combustion engines produce very small particles of nearly pure carbon, which cause extensive soiling. Part of the GCI research was aimed at determining how long it took for soiling to be visually apparent. Research found that perceptible soiling on vertical surfaces could occur as quickly as within 0.3 years within a historic house in Los Angeles with natural ventilation - or take as long as 18 years in a modern art museum equipped with mechanical particulate filtration. Knowledge of the time it takes for soiling to become visible allows collection managers to plan their preventive conservation strategy.

Institute researchers made use of recent technological advances in order to detect the low levels of pollutants found in museum environments (i.e., one molecule of pollutant in one billion molecules of air). A series of simultaneous indoor and outdoor measurements was taken at a variety of museums; the data provided a foundation for further research on the potential damage of pollutants and ways to mitigate that damage.

Studies were carried out to determine the damage gaseous pollutants cause to various types of museum objects. Certain photochemical oxidant pollutants proved detrimental to a number of organic colorants. In addition, various materials were exposed to formaldehyde to measure their sensitivity to the pollutant. These studies confirmed that metals - and to a lesser degree shells - were susceptible to formaldehyde. Yet glass and ceramic glaze were not affected after 100 days of exposure. Recognising the limited resources of many museums, researchers studied passive sampling devices that would allow museums to conduct their own surveys with minimal cost and expertise. Through testing, a number of commercially available, relatively low - cost products were identified that met the criteria for museum environment. This work has enabled many institutions to conduct economical pollutant surveys of their storage and display areas.

Also investigated were mitigation methodologies to reduce significant indoor concentrations of pollutants. Those methods that proved effective used active filtration, passive protection, and combinations of procedures that worked along with the building's ventilation system. The solutions are as simple as placing a tray of absorbent material in a display case to absorb damaging pollutants or as thorough as identifying and isolating the offensive material from the display or storage space.

The large body of information amassed from this work has been detailed in numerous GCI publications and reports.

OBJECTS COLLECTIONS

Much of what we call cultural heritage falls into the category of objects and collections. For that reason, the conservation of objects and collections has been a focus of GCI research and training from the Institute's earliest days. Traditionally found in museums, the artifacts and works of art that compose collections are often referred to as *movable cultural property* because they have been removed from their original context - as opposed to *immovable cultural property* such as archaeological sites and historic structures.

In some instances, collections of movable cultural property concentrate on a particular type of object or highlight a diversity of cultures and time periods. In either case, they provide an important perspective on humanity's cultural development. Collections contain works of art such as paintings, drawings , sculpture; functional objects including ethnographic materials and every day household items; or natural history samples ranging from birds and mammals to botanical and geological specimens. They typically encompass a wide spectrum of natural and man made materials - materials that present a variety of preservation challenges.

Although we understand the composition and behaviour of many materials found in museum collections, numerous questions remain. For instance, while extensive research has been carried out on the conservation of paintings on canvas, identification of some artists' materials has proved a challenge. One difficulty has been accurately identifying the binding substances that have been mixed with pigments to create particular paints. Through its scientific research, the GCI has developed and refined a number of techniques to identify specific binding media. Another problem related to paint conservation has been the lack of a satisfactory means for consolidating flaking paint surfaces on ethnographic objects without altering their appearance or authenticity. Working with ethnographic conservators, the Institute initiated an investigation of the problem that ultimately led to

Taken from an article written by Janet Bridgland for GCI newsletter

several publications, a training course, and the development of a low-cost kit for identifying organic materials in paint. Materials and methods research at the Institute has also included the evaluation of various protective coatings used on museum objects.

- Maintaining a stable museum environment helps limit the deterioration of objects, which is why the GCI advocates preventive conservation, which involves stabilizing entire collections by eliminating or modifying conditions that foster deterioration. It encompasses an understanding of such things as the effects of a museums heating, ventilation, and air-conditioning systems on the stability of objects; the permeability of the building itself to outdoor pollutants; and display and handling practices. For the care of collections, preventive conservation is the most effective use of limited conservation resources.

- The GCI has conducted wide-ranging research on the museum environment - from energy conservation and climate control to pollution monitoring and mitigation - to support preventative conservation efforts. The results of this work have been communicated to the field through publications and preventive conservation courses. In some instances, scientific work in one direction has led to developments in another. For example, GCI research into oxygen-free storage cases for the Royal Egyptian Mummy Collection led to the testing of a safe and effective means of pest eradication for museum objects.

- External natural forces can also endanger collections. Collections in flood plains or hurricane paths may be water damaged beyond repair. Those in earthquake-prone areas can be reduced to rubble in seconds if they are not properly secured. From its inception the Institute has been concerned with disaster preparedness, and among its first research efforts was a series of studies to analyse and develop techniques for protecting museum objects during earthquakes.

- In studying and developing solutions to the conservation problems of objects and collections, the GCI has sought to employ new and often sophisticated technology - such as the electron microscope - in its investigations. At the same time the Institute remains cognizant of the limited resources most institutions have available for conservation needs. Therefore, as part of their research, Institute staff have worked on low-tech. and particle methods for dealing with conservation problems.

- *The GCI's philosophy in setting priorities regarding objects and collections is consistent with its overall approach to the broad range of conservation issues. Projects are selected according to the urgency of an existing conservation problem, its importance to the conservation field as a whole, and the absence of past or current research on a given topic. The Institutes work continues in such areas as the analysis of artists' materials and the issues of the museum environment - as does the dissemination of its findings through publications and courses.*