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CONSERVATION AND CARCINOGENS: REMOVING ASBESTOS FROM 28,000 GLASS-PLATE STEREOGRAPHS (or HOW TO MOVE YOUR ASBESTOS)

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The following is a progress report on a curatorial and conservation challenge which I have been facing for several years. It does not propose new conservation theories or techniques nor does it critique existing methodology, but it recounts an adventure in neutralizing a hazardous condition which frustrated and hindered the systematic care, preservation, and conservation of a photographic collection. And it has a happy ending, which should provide hope for others with collections which develop a similar affliction.

The Underwood & Underwood Glass Stereograph Collection (ca. 1895-1920) was acquired by the Smithsonian in 1966 and was accessioned by the Division of Photographic History. It was immediately sent to the Smithsonian Institution's warehouse complex in suburban Silver Hill, Maryland, and was stored there for years without systematic inspection, cataloging, or rehousing. In 1983, this untapped collection was transferred to the Museum's new Archives Center as one of its primary photographic holdings. I accompanied this and two other large collections from Photographic History and became the new unit's photographic archivist. As such, I therefore assumed the task of organizing the inspection, cleaning, rehousing, and cataloging of the 28,000 Underwood & Underwood glass plates (including original negatives, copy negatives, and interpositives). At first I thought that my major problem would involve simply capturing data such as numbers and captions from the original brittle, deteriorating paper envelopes before they crumbled in the course of handling. This would be a straightforward proposition requiring time and care, but no exotic techniques. Imagine my chagrin, therefore, when we found that the collection bore not only fifty or sixty years' worth of dust and grime, but asbestos fibers as well. The open drawers of plates had become victims of falling asbestos insulation.

To place this problem in context, I must explain that for a number of years prior to this, there had been a growing awareness of asbestos insulation and its dangers at Silver Hill, but this was only part of a broader challenge. The Smithsonian Institution has fought an aggravating, multi-faceted asbestos removal problem on several fronts from a variety of causes, including airborne asbestos resulting from accidents in the course of interior demolition by contractors on remodeling and reconstruction projects, as well as exposed asbestos insulation in older buildings, such as those at Silver Hill.

It was gradually realized that the Underwood & Underwood plates had become part of a major contamination problem due to the sprayed asbestos insulation which occasionally fell on the

floors and collections below. In April 1979 the staff of my Museum was urged to wear respirators and protective clothing in these storage buildings and it was noted that objects stored there had to be vacuumed before leaving Silver Hill. The urging became progressively more urgent until personnel were required to wear protective gear. The renowned Smithsonian inventory project, which so captivated Life and People magazines, necessitated the use of protective masks and clothing by project personnel working in the affected buildings. One building, identified as "No. 18," served as the headquarters for such operations; it had been thoroughly cleaned and renovated, and its insulation was encapsulated. In late 1982, the Underwood & Underwood collection and another large group of negatives were vacuumed and moved into Building 18 from their original storage areas in contaminated Building No. 17. The degree of residual contamination, if any, was at first considered minimal or even negligible, and I proceeded to clean and rehouse the material. However, an alarmed industrial hygienist observing this activity in its early stages instituted tests which determined that the movement of these glass plates and the attendant cleaning activity were circulating asbestos, and that the airborne fibers clearly were dangerous to human health and threatened to recontaminate the cleaned, renovated building. Other artifacts housed in the area were suspected of contributing to this difficulty as well, and indeed, in 1983 Building 18 was declared contaminated--again.

It should be understood that the facility and its contents were not considered grossly contaminated. Objects stored there had received preliminary cleaning and had been thought safe. Asbestos levels had been substantially reduced and apparently met the legal requirements of the Occupational Safety and Health Administration (OSHA). The Smithsonian, however, uses the far more stringent standards recommended by the National Institute of Occupational Safety and Health (NIOSH) and measured levels in many areas exceeded these guidelines. Our "contamination index" standards therefore mandate the following:

Less than 10 fibers/liter	-- cleaning not required
10 to 20 fibers/liter	-- cleaning may be required
21 to 100 fibers/liter	-- cleaning is required
More than 100 fibers/liter (gross contamination)	-- cleaning is mandatory

Tests of cleaned Underwood & Underwood plates in 1984 had yielded average results of 2.46 (essentially uncontaminated). However, this level may have been achieved at the price of recontaminating the ambient air. Tests taken from the tops of uncleaned collection drawers in October 1986, for example, produced results ranging from 18.4 to 93.3.

The question which emerged, therefore, was: How do you clean, catalog, and conserve a carcinogen-contaminated collection? The answer? Carefully! Although obviously I love photographs or I wouldn't be in this business, I deem human health

and safety (especially mine) more important than photographic art, artifacts, or documents. The hazards of asbestos exposure have been known for some years--asbestosis and other respiratory diseases among asbestos workers have been documented since the 1930s. But a more insidious problem has been identified: this useful substance, when free, airborne, and respirable, can cause lung cancer years after exposure--in fact, some say, even a single asbestos fiber can trigger a malignancy. Although there is by no means unanimity about the risks even among experts, some of whom are still crying, "Overreaction!", most agree that asbestos is pretty nasty stuff.

It appeared that more stringent and complicated techniques had to be developed to clean and rehouse the collection, as well as to remove the asbestos safely. Several alternatives presented themselves and were attempted. Initially, the registrarial staff stationed in the National Museum of American History's Silver Hill buildings were enlisted to help because they were accustomed to handling and cleaning contaminated collections while wearing full protective clothing and respirators. Logistical problems involving the preparation of new, clean envelopes while viewing and subsequently handling the dirty, contaminated sleeves were examined, and various options for an assembly-line arrangement were suggested.

Because the Underwood & Underwood contamination problem represented only a small portion of the Smithsonian's total asbestos removal program, as described above, the Silver Hill staff was unable to devote much time to the glass plates beyond initial experimentation and the vague promise of "support." Insufficient funding made the hiring of special project personnel merely a fond dream, and we were reluctant to ask volunteers to suit up in the uncomfortable protective garb in order to assist us in the tedious task. Due to my personal history of respiratory difficulty (asthma) the Smithsonian health unit would not certify me to work with asbestos-contaminated items while wearing a respirator in order to participate in or directly oversee the project. I had mixed feelings about this prohibition.

It was clear that the next avenue to explore would be a method not requiring protective gear and respirators--viz., an insulated hazardous-materials-handling enclosure which could be operated safely from the exterior. An extremely crude box, approximately nine feet long, was built of lumber and plexiglas, sealed with caulk and tape, and equipped with three sets of rubber gloves at the front and a Nilfisk asbestos vacuum cleaner at the rear. One operator could perform the various "clean" and "dirty" procedures in sequence at the three different stations of the compartmented box, or two to three operators could form a production line. After overcoming initial difficulties in handling the envelopes, plates, and cleaning brush with the clumsy gloves, skills were acquired which made the asbestos-removal/rehousing project more rapid than had been thought possible: we could handle, on the average, one plate per minute. During each day's work a fatigue factor inexorably

slowed the process, however, since the non-ergonomic design of the box rendered its use an extremely uncomfortable and tedious prospect. No matter, we thought: the box was merely a prototype which could be improved by the construction of a streamlined, better designed model.

While we concerned ourselves with devising the most efficient techniques of asbestos removal on an individual-item basis, we realized that the methods proposed were suitable only for plates in good condition. As these methods all involved direct contact between emulsion and brushes, however gently applied, to dislodge dust and propel it into the nozzle of a vacuum cleaner at distances of perhaps two to four inches, plates with loose, peeling emulsion could not be handled in this manner. Either the brush contact or the suction--or the combination thereof--might destroy loose emulsion. This represented a dilemma which I intended to present to AIC/PMG members for brainstorming: How could asbestos be removed from damaged or deteriorating emulsion without causing further damage or losses--to render such plates safe to handle for the necessary conservation work? Until answers could be found, we set aside plates of questionable condition. Luckily, the majority of the images in the collection are in comparatively good condition, exhibiting only the slight edge frilling common to many glass plates, silvering and staining in areas which had been in contact with the glued seams of the original enclosures, occasional breakage, etc. But here and there are examples of severe emulsion degradation, especially peeling, which clearly could not survive brushing and vacuuming. The worst of these are plates bound in sandwiches of glass and acetate, wherein long-term contact between the acetate overlay and gelatin emulsion apparently has caused cracking, peeling, and many instances of emulsion adhering to the acetate and pulling away from the glass support. If such plates could not withstand cleaning, the only apparent solution seemed to be permanent encapsulation--sealing in appropriate transparent plastic enclosures. Similarly, in the case of asbestos-contaminated textile objects of extreme fragility, cleaning may be obviated and encapsulation may be the only way to preserve the object for study under safe conditions.

As the cleanup of Building 18 proceeded, including the careful wet-cleaning of many objects stored there, the comparatively slow pace of the Underwood & Underwood decontamination/cleaning/rehousing project was creating problems for the Silver Hill site manager and his staff, who had to satisfy the broad objective of re-establishing and maintaining an asbestos-free environment in Building 18, which serves as their headquarters. With mounting concern, they viewed the glass plates sitting in their disintegrating, acidic envelopes in 240 grimy wooden boxes, threatening to send clouds of microscopic carcinogens into the air if someone happened to sneeze in their direction or otherwise disturbed them.

Industrial hygienists' theories about the behavior of asbestos fibers suggested that it might be worthwhile to try

another vacuuming of the tops of the plates and drawers. Before-and-after wipe tests of plate surfaces were encouraging. It appeared that after such cleaning, plate surface wipe tests yielded acceptable asbestos fiber counts--appreciably lower than those from wipe tests conducted on unvacuumed plates. Continued experimentation and testing corroborated these results. Not only were our original notions about the presumed inadequacy of this procedure shown to be false, but my personal fears that such vacuuming would destroy the tops of old envelopes and suck up identification numbers seem to have been groundless.

Using air sampling equipment with a 25mm filter and a flow rate of four liters per minute, the test procedures simulated respirable levels by agitating (brushing) the surfaces of the plates. An actual count of the number of fibers deposited on the surface was made through electron microscopy by a certified outside laboratory. Our contamination index guidelines require the cleaning of items which have a count of 100 per liter or more, as previously described.

The test results indicate the risks of disturbing an asbestos-contaminated collection. Before handling such suspect material its outside surfaces should be thoroughly vacuumed with an approved, specially-filtered machine. In the case of our collection, the success of our method of vacuuming the tops of the drawers suggests that as the asbestos fell on this material, it tended to remain in position and did not migrate onto the surfaces of the envelopes or plates. Rather, handling tended to disturb the asbestos lying on the top edges of the vertically arranged plates and caused it to fall upon other surfaces. The act of brushing dirt and dust off these surfaces, now laden with asbestos fibers following the movement of the plates within their containers, would then disperse fibers into the air, recontaminating other envelope and plate surfaces in the collection, as well as recontaminating the building and elevating levels of respirable asbestos. Ironically, it began to appear that the original solution to the problem of asbestos "abatement" for this collection--simply vacuuming the tops of the open drawers--was in fact the safest and most efficient. We assume that the original (1982) vacuuming operation simply was not thorough enough.

With the asbestos hazard removed, we are now able to inspect and rehouse the collection under normal conditions, without protective suits and respirators, boxes with rubber gloves, or isolation booths connected to vacuum cleaners. But we also are free to investigate damaged photographs and to pursue the possibilities of repairs and conservation treatments without handling restrictions or encumbrances, and, most importantly, without endangering anyone's health.

The asbestos testing procedures, which can be described more fully to anyone desiring additional information, were performed most conscientiously and expertly by Patrick Ladden, the Museum's Silver Hill site manager, and his staff, with the advice and collaboration of industrial hygienist John Pate.

Mr. Ladden's predecessor, Keith Boi, was similarly helpful at earlier stages of the work. They and their staffs deserve special thanks for exceptional assistance in this project. Members of the Museum's Division of Conservation, Ann Craddock, Lynne Gilliland, and Carolyn Long, provided helpful advice.