Appendix I

Preservation Recommendations for Historic Glass Astronomical Plates

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Glass astronomical plates are very similar to glass plate negatives in material composition, deterioration, and preservation. Most plates are comprised of soda-lime-silica glass coated with a gelatin emulsion in which silver image particles have been developed. Plates were commonly annotated on the glass side with black or colored inks. Based on the physical and chemical properties of these historic objects, the following is recommended:

Storage and Handling

- Use unpowdered nitrile gloves and handle the plates by the edges. Do not use cotton gloves because the plates will be too slippery to handle safely. Fingerprints left by ungloved hands can permanently etch into the emulsion or the glass.

- Broken plates should be protected on the emulsion side with a piece of borosilicate glass cut to the same size. A second piece of glass can be placed directly next to the broken glass, but this is rarely needed. Borosilicate glass is chemically more stable than soda-lime-silica glass. It is very difficult to cut so should be purchased pre-cut to standard or custom sizes. Secure the support glass to the plate by binding all edges with an appropriate, archival, self-adhering tape. The chosen tape should be easy to work with and have passed the Photographic Activity Test (PAT), which ensures that it will not cause fading or staining of the silver image over time. Commercial tapes can change formulas without notification from the manufacturer. For ease of handling when binding broken plates, clean bare hands can be used with great care, in lieu of gloves.

- Poor quality enclosures can cause fading or staining of the photographic image. Differential fading is highly possible and would be nearly impossible to detect on astronomical plates, leading to inaccurate analysis. The latest international standard for photograph enclosures[1] recommends buffered enclosures that pass the Photographic Activity Test; archival suppliers will indicate which products pass the PAT. This standard applies to both the envelopes used for each plate as well as to storage boxes, if used.

- Stacked plates will crack under their own weight. Store plates vertically.

- Environmental pollutants can fade or stain the image. As with poor quality enclosures, differential fading is possible. Warm environments, particularly with high or fluctuating humidity, can speed the deterioration process or even cause the emulsion to separate from the glass. The latest international standard for storage of glass plate negatives[2] recommends a maximum temperature of 18°C and a relative humidity range of 30-40%.

Preparation of Plates for Scanning

- NEVER clean plates that have flaking emulsion; handle these emulsion side up only.

- For plates in good condition, the first type of dusting to try is using an air bulb dust blower. This is gentle enough to use on either the glass or emulsion side. Do not use canned air because it contains accelerants which can damage the emulsion. If the air bulb is not sufficient, try dusting with a soft brush on the glass or emulsion side. Wash the brush nightly. Use extreme caution when dusting emulsion side as grit can cause scratches.

- For plates in good condition, the GLASS SIDE can be wiped with a soft, lint-free cloth or disposable wipe. Commercial glass cleaners are to be avoided as they contain ammonia and other chemicals that can fade the silver image. If some moisture is needed, try blowing on it like when cleaning eyeglasses then rub with soft cloth ("huff and buff").

- If more cleaning is necessary, try a water/ethanol solution on the GLASS SIDE only. Do not use moisture or solutions on emulsion side. Gelatin emulsion is very sensitive to water and can easily swell with moisture; therefore try to use the least proportion of water in the solution as workable (probably 40:60 water/ethanol) and use the smallest amount of liquid for cleaning. Ideally, the solution would be dropped or sprayed onto the lint-free cloth and not applied directly to the glass.

- As part of the scanning workflow, the institution may desire the removal of the historic annotations. If that is so, high quality photographic documentation should be taken before cleaning and removal of the annotations. In fact, the American Institute for Conservation standards for practice specifically states that photographic documentation is the minimal standard of practice for "those aspects that may be altered by the treatment."[3]

- If ink annotations must be removed, the conservation recommendation is to clean the glass with a water/ethanol solution as described above. Razor blades can be

carefully used, but do pose a risk for scratching the glass. Wire brushes are not recommended because the risk of scratching the plate is high.

Notes on Contributors

Brenda Bernier is the James Needham Chief Conservator and Head of Weissman Preservation Center, Harvard Library, where she oversees the preservation of rare books, works on paper, and photographs. Brenda holds a M.S. in photograph conservation from the University of Delaware. She has written and presented extensively on the care of photographic collections.

Elena Bulat is a photograph conservator at the Weissman Preservation Center, Harvard Library. She is a graduate of the Advanced Residency Program in Photograph Conservation at the George Eastman Museum. Her current research is on refining analytical techniques to identify coatings on photographs in order to inform preservation strategies and to deepen art historical understanding of early photography.

Notes

1. ISO 18902:2013

2. ISO 18918:2000

3. http://www.conservation-us.org/about-us/core-documents/commentaries-to-the-guidelines-for-practice/25#.VKyHpivF-EU