

OPINION DOCUMENT

for Certification of Conservators  
By the AIC Book and Paper Group Certification Task Force

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Book and Paper Group Certification Task Force Members

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GENERAL COMMENTS  
ON THE  
CONSERVATOR CERTIFICATION PROCESS

Suggestions Regarding Development  
of the Certification Process

The Book and Paper Task Force strongly recommends that a Strategic Plan for Implementation of Conservator Certification be created. This must be the first step, prior to creation of a test. The AIC's Certification Development Committee, with the help of several professional consultants, should draft this Strategic Plan.

The Book and Paper Task Force also strongly recommends that there is a transparent process in which the Strategic Plan goes through various iterations and reviews by the Specialty Group Task Force and ultimately the AIC Membership. Giving periodic updates of CDC's activities to the Internal Advisory Group and reporting these in the AIC Newsletter cannot form the basis on which the process will move towards a phase in which the exam designs are being discussed.

This Strategic Plan should cover many subjects, some of which are outlined below. Many of these have been discussed at various stages of the certification process. What is still missing is an official working document and a planned process through which certification can become more tangible. The process to create such a document will involve more participation and membership buy-in.

Need for professional assistance – Utilizing the expertise of professionals will result in a better certification process and protect the AIC from the myriad problems that may arise

- Business manager(s) to create Strategic Plan – Clarify goals, created clear plan of duties and responsibilities, and establish infrastructure
- Legal advice
- Financial advice
- Testing - A professional assessment and evaluation consultant should be hired to help to guide the AIC in test development. We need this help to understand the relative benefits of each type of assessment possible, to write objective, understandable test questions, to develop guidelines for more objective grading of any essay-type questions, to create a valid evaluation tool, and to help to plan revisions and updates of the test. The consultant's suggestions should be shared with the Specialty Groups prior to test development.

Clarify Goals of Certification Process

- We support the idea that there is a core of information that all conservators should share and believe that a rigorous test will help to identify ethical and informed conservators.
- The existence of a certification process will help to educate membership as to the goals of conservation and what their minimum knowledge should be and improve the field.
- Clarify Certification and AIC membership levels
  - The AIC needs to clarify the distinction between certification and PA or Fellow status and the role of AIC vs. the new certifying organization.
  - Consider the addition of a designator of certified status next to the name in the AIC directory.

Create a clear plan of duties and responsibilities including

- Develop the position of Project Manager, a well-respected member of our field, or a related field (possibly a recently retired administrator) who can assist (with grant funding) with development, planning, advising and act as head of the new infrastructure.
- Increased communication with and within AIC during the creation of a certification process
  - Clarification on existing decisions – What is the status of proposed ideas?
  - Need for formalized reviews and iterations
  - Copies of any existing conservator exams or drafts
  - Formal exchange between the specialty groups
- Identify needed committees and their specific charges and communicate these to the Specialty Groups and Membership.
  - Currently CDC Member tasks are only outlined in the 2005 AIC Committee Reports
- Responsibility for communication of recommendations
- Identification and clarification of specific tasks
- Identification of members and committees that will undertake these tasks
- Creation of realistic time estimates for the specific tasks
- Creation of a clear timeline, based on the time estimates
- Create a realistic budget
  - Investigate grants for development of the certification process (NEH, Getty)
  - Establishment of costs for creation of certification process
  - Establishment of costs for maintaining certification process
  - Set fees for regular certification and renewal
- Responsibility for decision making

Suggestions specifically related to the  
Terry Drayman-Weisser article on certification  
published in *AIC News* 27(3): 1, 6-9.

I. Governance

- Creation of a 501C(6) organization
  - General consensus that an organization separate from AIC should be established, however we are not clear on all of the implications of this process.
- Creation of an AIC Certification Committee

II. Administration

- Additional staff will be needed.

III. Application

- Open to AIC members and non-members
- Higher fees for non-members.
- Informing and preparing candidates for the examination
  - AIC Education and Training group should make a study guide with a bibliography, outline of subject areas to be covered on the exam or sample questions for exam candidates. Possibly a practice test or Q&A study session at the annual meeting.
  - Mentor program?

IV. Basic Requirements

- Undergraduate degree or international equivalent.
- Graduate conservation degree (including certificates of advanced study) or equivalent in apprentice training.
- Three years experience or six years full-time total conservation experience.

V. Other Requirements

- Letters of reference
  - Letters are already difficult for non-program trained conservators and those trained outside of the United States.
  - Who is capable of providing letters? Only certified conservators? Only those with PA or Fellow status in the AIC?
  - May not be necessary for those with PA or Fellow status, as they have already done this.
  - Who reviews the letters?

- Signed statement to abide by the AIC Code of Ethics and Guidelines for Practice.
- Sample documentation
  - May not be necessary for those with PA or Fellow status, as some have already done this as part of that application.
  - Who reviews the sample documentation? How is it evaluated?

## VI. Certification Types

All classifications are of general certified conservators (no specialty group certification)

### A. Fast Track

- Generally, the idea of a fast track is disliked. The fast track category may be necessary, but should be as close to the regular process as possible, to have credibility.
  - If there is fast track certification, there must be clearly stated duties or rationale (for example: Must spend at least 40 hours doing practice tests, must spend 20 hours grading exams, must have won life-time achievement award from peers, etc.)
  - If there is fast track certification, any fees could be reduced or waived if these conservators will have duties related to their status.

### B. Regular

- Time frame: Not addressed in article. Candidates will have one year to pass all parts of the certification process. All requirements must be met within one year or the entire process starts over (actually, a year that spans two annual AIC meetings).
- Number of Attempts: Not addressed in article. Three attempts during the one-year period with new exam fees each time?
- Testing site
  - If testing is done on-line, without direct supervision
    - Possible 2-way video monitoring of candidates
    - Concerns about ID of test taker
  - Consider using a separate testing agency as the host site for tests. Established testing sites are available everywhere, throughout the year and they are experienced with the verification of candidate identities.
  - AIC Annual meeting as a main test site
  - Concerns about use of study materials, notes, etc. during the exam
- Revision and updating of exams: Who will revise and update exams? How frequently will that be done?

### C. Renewal

- Time Frame: Done every 5-7 years. Certified conservators who fail to meet renewal requirements during the time frame must begin the certification process over.
- Requirements: Renewal process is based on a point system where already certified conservators earn points by attending approved conferences, workshops, publish papers, participate in professional activities, continuing education, etc. The scheme used by the Project Management Institute (PMI) or the Institute for Paper Conservation (IPC) may be used as an excellent example.

#### Continuing Development Units (CDU) Guidelines

- Definition of CDU: A measurement unit that expresses a basic investment by the certified member into continuing development. It is roughly equivalent to one hour work/study.
- CDUs can be obtained over a number of years beginning after one passes attains full certification.
- A minimum number of CDUs needs to be collected by the end of this period. (PMI requires 60 units in 3 years).

## VII. Evaluation

- Testing process may need to be significantly longer than the 100-200 multiple questions suggested, possibly a series of two or three exams, each lasting about 2 hours.
- Part 1 must be passed before Part 2 can be taken, etc.
- There is much concern about the need for actual objects during the test process, with members of the committee disagreeing as to whether the increased objectivity and uniformity testing conditions of digital images outweighs the tactile information gained by touching an object.
- Grading
  - If questions are multiple choice, then a machine can grade them immediately and objectively
  - If essay questions are used, a committee of at least two graders per test is recommended. Who will graders be? What standard will be established to insure objectivity?
- There is much concern and no consensus on using entirely multiple-choice questions.
  - + Multiple-choice is more objective, faster, and less expensive to grade.
  - Multiple-choice is not able to demonstrate the same level of understanding as essays.
  - Some general topics are at least as essay-worthy as the specialty group topics, which questions the need to break the test into two parts.
- There is much concern about the need for actual objects during the test process, with members of the committee disagreeing as to whether the increased objectivity

- and uniformity testing conditions of digital images outweighs the information gained by directly touching and observing an object.
- There is concern about people inappropriately passing or failing the test. Particularly, there is a desire to confirm that the test is not the sole means of evaluating candidates. There may need to be allowances or special procedures established for testing of people who may have difficulty due to the text-intensive format of the exam (dyslexic or non-native English speakers in particular).

#### VIII. Fees

Fees for the examination component of the certification process – these would need to be established based on the findings of a Strategic Plan.

- Regular Certification Fees- Test costs should not be prohibitively expensive for the candidate (\$100-\$250 per attempt of the exam portion for AIC members, \$500 For non-members). It may be possible to provide scholarship tests or waive fees for some people in need.
- Renewal Fees: \$50.

#### IX. Appeals

Appeals and Removal or Termination of Certification Status

- Appeal process must be established for candidates who feel that they have unfairly failed the certification process or who need time extensions, etc.
- Thought needs to be give to the possible need for a disciplinary process to remove certification from conservators due to lack of compliance with the AIC guidelines for practice and failure to maintain a minimum standard of practice and ethics, despite their having passed tests and met renewal requirements.

OUTLINE OF  
DEFINING THE CONSERVATOR: ESSENTIAL COMPETENCIES  
FOR CERTIFICATION EVALUATION

**Part I: Table of relative emphases of competency areas in general and specialty group exam sections**

BPG Task Force Ranking	Conservation Competency	Suggested Percentage of General Exam Questions	Suggested Percentage of Specialty Group Exam Questions
01	2. Conservation History, Ethic, and Philosophy	20	Percentages not established at this time, but expected to be approximately the opposite ranking of importance compared to General Exam questions.
02	11. Documentation	15	
03	9. Preventive Care	12	
04	6. Health and Safety Policies and Regulations	12	
05	3. Values and Significance	8	
06	5. Access and Use of Cultural Heritage	8	
07	1. Conservation Terminology	8	
08	7. Scientific Principles and Methods	4	
09	10. Examination Methods	4	
10	8. Processes of Deterioration and Change	4	
11	4. History of Technology of Cultural Heritage	4	
12	12. Treatment Methods	1	
	Total	100%	

**Part II: DRAFT** - Lists of subject areas  
to be tested within each competency

**DRAFT**

**1. Conservation Terminology**

<b>Topic</b>	<b>General</b>	<b>BPG</b>
Abrasion	X	X
Accretion	X	X
Acid migration	X	X
Acid-free	X	X
Acidic	X	X
Adhesive	X	X
Alkaline	X	X
Alkaline Reserve	X	X
Archival	X	X
Artificial aging	X	X
Bond	X	X
Brittle	X	X
Burst strength		
Chelating agent	X	X
Chemical Stability		
Cockling	X	X
Cold-flow	X	X
Compensation for loss	X	X
Condition	X	X
Conservation	X	X
Consolidate	X	X
Cosmetic compensation		
Cross linking	X	X
Cultural property	X	X
Deacidification	X	X
Degradation	X	X
Dew point		
Dipole-dipole		
Disaster recovery		
Discoloration	X	X
Documentation	X	X
DOP	X	X
Environmental monitoring		
Equilibrium moisture content	X	X

Ethics	X	X
Examination		
Fastness	X	X
Fixative	X	X
Fluorescence	X	X
Footcandle	X	X
Foxing	X	X
Friable	X	X
Fugitive	X	X
Housing	X	X
Hydrogen bonding		
Hydrolysis	X	X
Ink Corrosion	X	X
Integrated Pest Management		
Lignin-free	X	X
Lining	X	X
Lumen	X	X
Manuscript inks	X	X
Mat	X	X
Matte	X	X
Mechanical stability		
Media	X	X
Mold <ul style="list-style-type: none"> <li>• Hyphae</li> <li>• Mycelia</li> <li>• spore</li> </ul>	X	X
Museum environment		
Neutral	X	X
Offsetting	X	X
Oxidation	X	X
Paper	X	X
Paper size	X	X
Parchment	X	X
PAT	X	X
pH	X	X
Plasticizer	X	X
Porous-pointed pen		
Poultice	X	X
Preservation	X	X
Pressure sensitive tape	X	X
Preventative care		

Psychrometric chart	X	X
Raking light	X	X
Reformat		
Relative humidity	X	X
Restoration	X	X
Reversible	X	X
Solvent	X	X
Stabilization		
Support	X	X
• Primary support		
• Secondary support		
Surface tension		
Synthetic	X	X
Temperature		
Treatment		
Van der Waals		
Vellum	X	X
Viscosity	X	X
VOC	X	X
Volatile	X	X

## 2. Conservation History, Ethics and Philosophy

Topic	General	Specialty Group
<b>AIC Code of Ethics</b> (Principles that guide the practice of conservation professionals)		
- Strive for highest standard	X	
- Have informed respect for cultural property	X	
- Be advocate for preservation of cultural property	X	
- Practice within limits of abilities, education and facilities	X	
- Quality shall not be compromised	X	
- Practice without adversely affecting cultural property	X	
- Document your actions	X	
- Recognize responsibility for preventive conservation	X	
- Respect other professionals	X	
- Contribute to the evolution and growth of the profession	X	
- Promote awareness and understanding	X	
- Minimize personal risk and hazards during practice	X	
- Promote understanding and adherence to the Code of Ethics	X	

<b>AIC Guidelines for Practice</b> (Additional guiding principles to help in the pursuit of ethical practice)		
<b>- Professional Conduct</b>		
-- Conduct, Practice, Communication	X	
-- Disclosure, Consent, Confidentiality	X	
-- Laws & Regulations, Adverse Commentary, Misconduct	X	
-- Supervision, Education, Consultation	X	
-- Recommendations & References, Conflict of Interest, Related Professional Activities	X	
<b>- Examination and Scientific Investigation</b>		
-- Justification, Scientific Investigation (standards)	X	
-- Sampling & Testing, Interpretation	X	
<b>- Preventive Conservation</b>		
-- Importance of preventive conservation	X	
<b>- Treatment</b>		
-- Suitability	X	
-- Materials and methods	X	
-- Compensation for Loss (incl. reversibility)	X	
<b>- Documentation</b>		
-- Documentation	X	
--- Examination, Treatment Plan, Treatment	X	
--Preservation of Documentation	X	
<b>- Emergency Situations</b>		
-- Strict adherence to code should be strived for but might not be possible.	X	
<b><u>AIC Commentaries to Guidelines</u></b> (Intended to amplify the guidelines)		
- Defined in rationale, minimum practice, recommended practice, and special practice (if applicable)		
<b>Philosophy</b>		
Reversibility Limits of reversibility	X	
<b>History of Conservation</b>		
Conservation organizations		
Professional literature (Body of work) Increased body of literature: books, periodicals, journals, internet, DistList, BPG Catalog, Paper Conservation Catalog, etc.)		
○ <a href="http://aic.stanford.edu/about/coredocs/">http://aic.stanford.edu/about/coredocs/</a>		
○ <a href="#">Code of Ethics and Guidelines for Practice</a>		

<ul style="list-style-type: none"> <li>○ <a href="#">Commentaries to the Code of Ethics</a></li> <li>○ <a href="#">Defining the Conservator: Essential Competencies</a></li> <li>○ <a href="#">Requisite Competencies for Conservation</a></li> <li>○ <a href="#">Technicians and Collection Care Specialists</a></li> </ul> <p><a href="#">Position Paper on Conservation and Preservation in Collecting Institutions</a></p>		
<p>Trends</p> <ul style="list-style-type: none"> <li>○ Consideration of artist’s intent, both in terms of final disposition, surface finish (original optical intent), housing, etc.</li> <li>○ Validity of the artist’s intent, to the extent it can be discerned, taking precedent over the conservators desire for longevity of the work. (for ex., dilemma of the difference between interpretation of old master techniques and materials and those of contemporary artists; we are less willing to make decisions about “acceptable deterioration” in modern works than we are in interpreting Old Master varnishes. See A. Albano: Art in Transition, AIC Preprints, 1988). Trends are also towards:             <ul style="list-style-type: none"> <li>○ greater investigation into artist’s techniques and materials</li> <li>○ acceptance of signs of age; greater willingness to accept such changes and/or perceived alterations</li> <li>○ greater understanding of the nature of deterioration and the artist’s recognition of his works’ vulnerability</li> <li>○ acknowledging technical and material experimentation by 20<sup>th</sup> century artists</li> <li>○ greater understanding of the consequences of our own conservation practices</li> <li>○ examining works in terms of cultural context; understanding that usage/ function is an integral part of an object’s authenticity</li> <li>○ insuring that information on and surrounding an artifact is retained and investigated</li> <li>○ taking a more interdisciplinary approach to the investigation of an artifact and its potential preservation</li> </ul> </li> </ul>		
<p>Development of Conservation Science</p>		
<p>Delineation between restoration and conservation</p> <p>Trend towards less treatment/minimal intervention and better housing, etc.; fabrication of facsimiles</p>		

Professional literature (Body of work)  
 HYPERLINK "<http://aic.stanford.edu/about/coredocs/>"

<http://aic.stanford.edu/about/coredocs/>

HYPERLINK "http://aic.stanford.edu/about/coredocs/coe/index.html" [Code of Ethics and Guidelines for Practice](http://aic.stanford.edu/about/coredocs/coe/index.html)

HYPERLINK "http://aic.stanford.edu/about/coredocs/coe/comment.html" [Commentaries to the Code of Ethics](http://aic.stanford.edu/about/coredocs/coe/comment.html)

HYPERLINK "http://aic.stanford.edu/about/coredocs/definingcon.pdf" \t "\_blank" [Defining the Conservator: Essential Competencies](http://aic.stanford.edu/about/coredocs/definingcon.pdf)

HYPERLINK "http://aic.stanford.edu/about/coredocs/competencies.pdf" \t "\_blank" [Requisite Competencies for Conservation Technicians and Collection Care Specialists](http://aic.stanford.edu/about/coredocs/competencies.pdf)

HYPERLINK "http://aic.stanford.edu/about/coredocs/positionpaper.html" [Position Paper on Conservation and Preservation in Collecting Institutions](http://aic.stanford.edu/about/coredocs/positionpaper.html)

### 3. Values and significance of cultural heritage

Topic	General	Specialty Group
Object's original use as context		
Alteration of original structure or format for preservation purpose		
Ethical considerations of restoration		
Limits of compensation for loss		
Conservator's obligation to artist intent		
Conservator's responsibility to owner's wishes		
Conservator's responsibility to stakeholders who are not the owner		
Values and significance of cultural heritage Aesthetic value <ul style="list-style-type: none"> <li>• Use as art</li> </ul> Cultural Economic <ul style="list-style-type: none"> <li>• Evidence of trade patterns (cochineal shows trade with the New World)</li> <li>• Difference in standards of luxury (leather covered books were common, now a luxury)</li> </ul> Historical <ul style="list-style-type: none"> <li>• Association or previous ownership by a famous person</li> </ul> Political <ul style="list-style-type: none"> <li>• Documents of freedom are highly valued as a symbol</li> </ul> Religious Scientific Social		

<p>Use</p> <ul style="list-style-type: none"> <li>• Evidence of original use and previous uses</li> <li>• Current use</li> <li>• Anticipated use</li> </ul>		
<p>Role of research and conservation in preservation of cultural heritage values and significance.</p>		
<p>Role of values in devising preservation and conservation plans, strategies and treatments.</p>		
<p>Conservation implications</p> <ul style="list-style-type: none"> <li>• Treatment materials: Prohibitions of certain materials for use during treatment (example: only Kosher products may be used in the treatment of Torah and other Jewish manuscripts, no animal products in treatment of Buddhist materials)</li> <li>• Exhibit of materials may be disrespectful to culture or may be possible only under certain conditions (“Peace pipes” may be displayed with bowl disconnected from staff).</li> <li>• Selection of conservator: Some materials may, for religious reasons, only be handled by men, etc.</li> </ul>		

**4. History of Technology of Cultural Heritage**

<b>Topic</b>	<b>General</b>	<b>BPG</b>
Paper fiber/furnish -- familiarity with paper furnish historic and modern; impact furnish on treatment decisions; characteristics of handmade and machine made papers.		
Print Process identification		
Printed artifact structure -- surface preparations -- before and after making a print or printing a page; plate marks and impressions; chin colle.		
Media identification -- including component parts (binders, carriers, pigment, dye); interaction of media and substrate; compensation for loss.		
Leather -- fiber structure, tannage (historic and modern, including taw), leather testing and analytical characterization, leather graining, animal identification, leather dyeing and coloring, leather finishes, dressing, oiling, obsolete leather treatments.		
Parchment -- vellum, membrane, uterine, manufacture, surface		

preparations; history of repair techniques.		
Mounts -- historic and modern mounts, mats, and frames; document/manuscript mounts; albums and portfolios; history of repair lining and encapsulation (includes silking, lamination, etc.) techniques.		
<p>Binding components</p> <ul style="list-style-type: none"> <li>• Textblock</li> <li>• Endsheets</li> <li>• Leaf connection</li> <li>• Endbands</li> <li>• Edge treatment</li> <li>• Spine shaping and lining</li> <li>• Board connection</li> <li>• Covering materials</li> <li>• Decoration (inlays, onlays, stamping, tooling, clasps, fasteners, furniture)</li> </ul>		
General nature of metals		
General nature of organic animal products		
General nature of organic vegetable products		
<p>History of binding styles: Case binding</p> <ul style="list-style-type: none"> <li>• Context</li> <li>• Materials</li> <li>• Components</li> <li>• Techniques</li> </ul>		
<p>History of binding styles: Laced case structures</p> <ul style="list-style-type: none"> <li>• Context</li> <li>• Materials</li> <li>• Components</li> <li>• Techniques</li> </ul>		
<p>History of binding styles: Laced on boards</p> <ul style="list-style-type: none"> <li>• Context</li> <li>• Materials</li> <li>• Components</li> <li>• Techniques</li> </ul>		
<p>History of binding styles: Other bindings (spiral, mechanical, etc.)</p> <ul style="list-style-type: none"> <li>• Context</li> <li>• Materials</li> <li>• Components</li> <li>• Techniques</li> </ul>		
<p>History of binding styles: Sewn on boards</p> <ul style="list-style-type: none"> <li>• Context</li> <li>• Materials</li> </ul>		

<ul style="list-style-type: none"> <li>• Components</li> <li>• Techniques</li> </ul>		
Materials manufacture and deterioration: Adhesives (glues, pastes, synthetic, consolidates)		
Materials manufacture and deterioration: Binding materials (thread, adhesives (covered in adhesives), wood, paper based boards, leather, cloth, metals)		
Materials manufacture and deterioration: Media (Pigments and inks, binders, printing techniques, hand application techniques)		
Materials manufacture and deterioration: Paper <ul style="list-style-type: none"> <li>• Laid v. wove</li> <li>• Pulp preparation</li> <li>• Hand v. machine</li> <li>• Fiber content</li> <li>• Sizing</li> <li>• Coatings</li> <li>• Eastern v. Western traditions</li> </ul>		
Materials manufacture and deterioration: Parchment/vellum		
Materials manufacture and deterioration: protopapers (amatl and bark papers, papyrus, pith, palm leaf) For simplicity, could these be included under the paper heading? They are so rarely encountered I wouldn't think we could afford the space to treat the subject separately.		
Printing Techniques: Intaglio <ul style="list-style-type: none"> <li>• Types of intaglio printing</li> <li>• Process</li> <li>• Identifying characteristics</li> </ul>		
Printing Techniques: Planographic <ul style="list-style-type: none"> <li>• Types of planographic printing</li> <li>• Process</li> <li>• Identifying characteristics</li> </ul>		
Printing Techniques: Relief <ul style="list-style-type: none"> <li>• Types of relief printing</li> <li>• Process</li> <li>• Identifying characteristics</li> <li>•</li> </ul>		
Printing Techniques: Serigraphic <ul style="list-style-type: none"> <li>• Types of serigraphy</li> <li>• Process</li> <li>• Identifying characteristics</li> </ul>		

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Time-dependent media or conceptual art

## 5. Access and Use of Cultural Heritage

Topic	General	BPG
Access	X	X
Anticipated increase in future usage	X	X
Context of Use: By readers, researchers (handling, context of use) <ul style="list-style-type: none"> <li>Mitigating damage during use (i.e. book cradles or mats)</li> <li>Transport with in the building</li> <li>Safety of object during photocopying or creation of surrogates</li> </ul>	X	X
Context of Use: Exhibits <ul style="list-style-type: none"> <li>Mounts</li> <li>Environment</li> <li>Light</li> <li>Duration</li> <li>Cases</li> <li>Transit containers</li> </ul>	X	X
Creation of surrogates/duplicates, facsimiles, models, reformatting,	X	X
De-accession policy	X	X
Defining “rare”	X	X
Digitization for web	X	X
Environment for storage (temperature, relative humidity, gaseous and particulate pollutants, light, common pests, storage furniture, storage housing, evaluation of environment)	X	X
Establishing guidelines and procedures for publicity needs and access for those with disabilities.	X	X
Ownership marks	X	X
Security (ownership marks)	X	X
Value judgment (associative, monetary, research, exhibition, teaching)	X	X

Conservation of access documents (card catalogs, digital catalogues) and peripheral and related context documents (acquisition information)

## 6. Health and Safety Policies and Regulations





FTIR XRF UV/Vis SEM/EDX PIXE (?) <ul style="list-style-type: none"> <li>• Chromatographic Techniques           <ul style="list-style-type: none"> <li>Thin-Layer</li> <li>HPLC</li> <li>GC/MS</li> <li>Ion Exchange</li> </ul> </li> <li>• Infrared radiography</li> <li>• Ultraviolet light examination</li> </ul>	X	X
Mechanical Testing <ul style="list-style-type: none"> <li>• Tensile strength</li> <li>• Shear strength</li> <li>• Peel strength</li> <li>• Compressive strength</li> </ul>	X X X X	X X X X
Accelerated Aging – Techniques, Limitations <ul style="list-style-type: none"> <li>• Weather-o-meter –                humidity cycling vs humid./ temp./heat cycling; standards?</li> <li>• other?</li> </ul>	X	X
Tests for housing, storage and display materials <ul style="list-style-type: none"> <li>• Oddy test</li> <li>• Photographic Activity Test</li> </ul>	X X	X X
Critical Reading of Scientific Article - identify sources of error, limits of interpretation, etc.		X

## 8. Process of Deterioration and Change

Topic	General	BPG
<ul style="list-style-type: none"> <li>• Extent, location and severity of damage (function of object)</li> <li>• Source of Deterioration - External           <ul style="list-style-type: none"> <li>▪ Environment</li> <li>▪ Use</li> <li>▪ Previous repairs</li> </ul> </li> <li>• Source of Deterioration – Inherent Vice (the natural degradation of organic and synthetic materials)           <ul style="list-style-type: none"> <li>▪ Support</li> <li>▪ Media</li> </ul> </li> </ul>	X	

<ul style="list-style-type: none"> <li>▪ Previous repairs</li> <li>• Source of Deterioration - Other</li> <li>• Type of Deterioration – Biological             <ul style="list-style-type: none"> <li>○ Bacterial</li> <li>○ Fungal</li> <li>○ Pests (insects, rodents)</li> </ul> </li> <li>• Type of Deterioration – Chemical             <ul style="list-style-type: none"> <li>○ Oxidative processes</li> <li>○ Hydrolysis processes</li> <li>○ Photo-synthetic processes</li> </ul> </li> <li>• Type of Deterioration – Mechanical             <ul style="list-style-type: none"> <li>○ Use related</li> <li>○ Willful destruction</li> <li>○ Foreign/newly added materials</li> <li>○</li> </ul> </li> <li>• Effects of Deterioration             <ul style="list-style-type: none"> <li>○ Change in appearance (staining, fading, darkening, fluorescing, color change, etc.)</li> <li>○ Loss of physical integrity</li> <li>○ Loss of information</li> <li>○ Catalytic effects (internal, external)</li> <li>○ Loss of access</li> </ul> </li> </ul>		
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**9. Preventive Care**

<b>Topic</b>	<b>General</b>	<b>Specialty Group</b>
Emergency preparedness. Planning Prevention Response Recovery		X X X X x
Environment – Light Monitoring equipment and methods Establishing acceptable conditions		X X X
Environment – Pollutants Particulate Monitoring equipment and methods Reduction of particulate pollutants Gaseous (Volatile Organic Compounds) Monitoring equipment Reduction of gaseous pollutants		X X X X X X X
Environment – Relative Humidity Monitoring equipment and methods Establishing acceptable conditions Mitigation of problems		X X X X
Environment – Temperature Monitoring equipment and methods Establishing acceptable conditions Mitigation of problems		X X X X

Integrated Pest management Creating an environment unfavorable to pest development and growth (cool temperature, low humidity, reducing food/liquid sources, reducing breeding areas) Extermination of existing pests Reducing the likelihood that new pests will be introduced (seal perimeter of building, inspect incoming materials) Identification of pest type and distribution (setting traps to identify pests, their relative numbers, and location)		X X X X X
Micro environment (furniture, housing, mount)		X
Procedures for handling and maintenance procedures for storage, exhibition, packing, transport, and use		X

## 10. Examination Methods

Topic	General	BPG
Sampling (covered in scientific analysis?)	X	X
Purpose <ul style="list-style-type: none"> <li>To determine the original materials of the object and the characteristics of these materials</li> <li>To determine the history of the object based on the evidence of it's physical condition</li> </ul>	X	X
Factors to Consider <ul style="list-style-type: none"> <li>Safety of object during examination</li> <li>Information about the materials manufacture and condition of the support</li> <li>Information about materials, structure and condition of surface media and possibly internal media layers</li> <li>Accessibility of expertise</li> <li>Accessibility of equipment</li> </ul>	X	X
Methods of Examination - Direct observation	X	X
Methods of Examination - Examination using Illumination – visible range <ul style="list-style-type: none"> <li>Light sources <ul style="list-style-type: none"> <li>Natural light/daylight</li> <li>Artificial lights <ul style="list-style-type: none"> <li>Tungsten Incandescent</li> <li>Tungsten Halogen/Quartz Halogen and fiber optics</li> <li>Fluorescent</li> <li>Mixed incandescent/fluorescent</li> <li>Limited wavelength sources</li> </ul> </li> </ul> </li> <li>Varying the angle of illumination</li> </ul>	X	X

<ul style="list-style-type: none"> <li>○ Normal</li> <li>○ Raking</li> <li>○ Transmitted</li> <li>• Magnified observation</li> </ul>		
Methods of Examination - Examination using radiation outside the visible range <ul style="list-style-type: none"> <li>• Ultraviolet</li> <li>• Infrared</li> <li>• Beta-rays</li> <li>• X-rays</li> <li>• Other</li> </ul>	X	X
Methods of Examination – Other		
1. Systematic procedures required to investigate structure, materials and physical state of cultural heritage.		
2. Identification of causes of change and deterioration <ul style="list-style-type: none"> <li>○ Inherent or internal/normal changes</li> <li>○ Accelerated deterioration</li> <li>○ Slowed deterioration</li> </ul>		
Seeking expert advise		

## Bibliography

AIC BPG Paper Conservation Catalog

**11. Documentation**

<b>Topic</b>	<b>General</b>	<b>BPG</b>
Level of Documentation <ul style="list-style-type: none"> <li>• Single item</li> <li>• Small batch</li> <li>• Mass treatment</li> </ul>	X	X
01 Purpose of documentation* (“written record should be made any time that cultural property is examined, analyzed, sampled, treated, altered, and or damage and when cultural property is temporarily under the care or study of the conservation professional...All written and graphic components should be clearly labeled to identify them as part of the record”)	X	X
02 Author of conservation documentation*	X	
03 Date of conservation documentation*	X	
04 Item Identification*	X	X

<ul style="list-style-type: none"> <li>• Accession number, call number, registration number or other identifiers</li> <li>• Owner/custodian</li> <li>• Artist/maker/origin</li> <li>• Title/subject/scientific classification</li> <li>• Place of manufacture</li> <li>• Dimensions</li> <li>• Marks/labels/inscriptions</li> <li>• Date or period of creation</li> <li>• Record of any accompanying pictorial documentation or fragments</li> <li>• Context (artistic, historical, social, cultural and scientific)</li> </ul>		
<p>05 Description Report (including notation of accessory materials or extraneous attachments like linings, boxes, mounts, original housings)</p> <ul style="list-style-type: none"> <li>• Object <ul style="list-style-type: none"> <li>○ Support</li> <li>○ Media</li> <li>○ Surface coating</li> <li>○ Binding</li> </ul> </li> <li>• Attachments <ul style="list-style-type: none"> <li>○ Mount used</li> <li>○ Lining</li> <li>○ Fasteners</li> <li>○ Seals</li> <li>○ Seals, Ribbons, etc.</li> <li>○ Other</li> </ul> </li> <li>• Housing <ul style="list-style-type: none"> <li>○ Mat/backing material</li> <li>○ Stretcher/strainer</li> <li>○ Frame/glazing/ hanging hardware</li> <li>○ Inscriptions or labels on backing materials or frame</li> <li>○ Box-type container</li> </ul> </li> </ul>	X	X
<p>06 Condition Report (including evidence of past treatment and housing)</p> <ul style="list-style-type: none"> <li>• Source of change in condition <ul style="list-style-type: none"> <li>○ Internal – Inherent Vice <ul style="list-style-type: none"> <li>▪ Inherent vice of one component</li> <li>▪ One original component contributing to change in another component</li> </ul> </li> <li>○ External <ul style="list-style-type: none"> <li>▪ Biological (mold, insects, rodents)</li> <li>▪ Chemical or environmental (acid migration, light damage)</li> </ul> </li> </ul> </li> </ul>	X	X

<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>▪ Mechanical (scissors, fasteners)</li> <li>▪ Use or wear (fingerprints, added inscriptions)</li> <li>▪ Other</li> </ul> </li> <li>• Type of change in condition             <ul style="list-style-type: none"> <li>○ Presence of foreign substances                 <ul style="list-style-type: none"> <li>▪ Biological (spores, frass, flyspecks)</li> <li>▪ Dirt</li> <li>▪ Use Related (bookmarks, food)</li> <li>▪ Previous treatment (tapes and adhesives, previous mends, previous retouching)</li> <li>▪ Other</li> </ul> </li> <li>○ Change in appearance and discoloration                 <ul style="list-style-type: none"> <li>▪ Darkening or yellowing                     <ul style="list-style-type: none"> <li>• Overall darkening of paper or surface coating</li> <li>• Localized staining from mold, tidelines, media, fingerprints</li> </ul> </li> <li>▪ Fading</li> <li>▪ Foxing</li> <li>▪ Color shift</li> <li>▪ Blanching/opacity</li> <li>▪ Other</li> </ul> </li> <li>○ Structural change                 <ul style="list-style-type: none"> <li>▪ Flexibility (brittleness or hardness)</li> <li>▪ Tears, loose or lost parts                     <ul style="list-style-type: none"> <li>• Of support (trimmed edges, tears)</li> <li>• Of media (friable, flaking media)</li> </ul> </li> <li>▪ Surface disturbances such as abrasions and scratches</li> <li>▪ Planar distortions (folds, embossments, cockling)</li> <li>▪ Loss of sizing</li> <li>▪ Other</li> </ul> </li> </ul> </li> <li>• Location of change in condition</li> <li>• Extent or severity of change in condition (function of object)</li> </ul>		
<p>07 Testing and analysis</p> <ul style="list-style-type: none"> <li>• Objectives of testing and analysis             <ul style="list-style-type: none"> <li>○ Identify support and media</li> <li>○ Identify sensitivity of support and media to prospective treatment materials</li> <li>○ Identify the level of risk of alteration to the integrity of the object and projected results</li> <li>○ Identify adhesives</li> </ul> </li> </ul>	X	X

<ul style="list-style-type: none"> <li>○ Identify causes of staining and discoloration</li> <li>• Types of Tests <ul style="list-style-type: none"> <li>○ Procedure</li> <li>○ Observations</li> </ul> </li> <li>• Location of Test</li> <li>• Interpretation of Results</li> </ul>		
08 Treatment Proposal <ul style="list-style-type: none"> <li>• Rationale</li> <li>• Recommended treatment/treatment options/no treatment indicated</li> <li>• Risks/precautions/benefits</li> <li>• Time and cost estimate</li> </ul>	X	X
09 Written approval of proposed treatment by curator or custodian	X	X
10 Treatment <ul style="list-style-type: none"> <li>• Description of methods, materials and techniques</li> <li>• Results of treatment</li> <li>• Predicted stability of treated state</li> <li>• Any variation from proposed treatment</li> <li>• Further recommendations</li> </ul>	X	X
11 Associated records (should be sited or included in the record)	X	X
13 Special Practices – Certain circumstances may affect the extent or form of documentation, including disaster response, impending destruction, emergency treatment, minor remedial treatment, mass treatment, collection assessments and surveys and preventative care/cyclical maintenance.	X	X
12 Pictorial Documentation <ul style="list-style-type: none"> <li>• Pictorial Documentation – Drawings/graphic (with size scales as appropriate)</li> <li>• Digital (with size and color scales)</li> <li>• Photographic (with size, grey and color scales, light direction indicator)</li> <li>• Other</li> </ul>	X	X
14 Preservation of documentation. <ul style="list-style-type: none"> <li>• Consideration of permanence of the written record or report</li> <li>• Consideration of off-site storage of multiple copies of documentation</li> <li>• Special considerations of computer storage (computer compatibility, dissemination, space, access, etc.)</li> <li>• Access to documentation</li> </ul>	X	X

\*These items are outlined in the AIC Commentary 24: Documentation as Minimum Accepted Practice and must appear on all documentation.

## Bibliography for Documentation

AIC Code of Ethics and Guidelines for Practice.

AIC BPG Paper Conservation Catalog, Chapter 5: Written Documentation.

**12. Treatment Methods**

Topic	General	BPG
<p>Backing removal</p> <ul style="list-style-type: none"> <li>• Reasons for removing a backing</li> <li>• Factors to consider (historical context, inscriptions, other options)</li> <li>• Risks – general (stress to media, risk of tearing)</li> <li>• Techniques               <ul style="list-style-type: none"> <li>○ aqueous                   <ul style="list-style-type: none"> <li>○ risks – tidelines, media solubility, etc.</li> <li>○ treatment variations</li> </ul> </li> <li>○ non-aqueous                   <ul style="list-style-type: none"> <li>○ risks</li> <li>○ treatment variations</li> </ul> </li> <li>○ heat based                   <ul style="list-style-type: none"> <li>○ risks</li> </ul> </li> <li>○ mechanical (dry)</li> <li>○ enzymes                   <ul style="list-style-type: none"> <li>○ selection of enzyme                       <ul style="list-style-type: none"> <li>▪ spots tests</li> <li>▪ purity and source of enzyme</li> </ul> </li> <li>○ preparation</li> <li>○ control and inactivation</li> <li>○ specific risks</li> </ul> </li> </ul> </li> </ul>		X
<p>Bleaching</p> <ul style="list-style-type: none"> <li>• Purpose and Misuse</li> <li>• Factors to Consider: paper composition, previous treatments, visual effects, etc</li> <li>• Risks – paper: color reversion, loss of strength, loss of size media: color loss, color change, binder weakening other: alteration of aesthetic, other damages visible</li> <li>• Pre-treatment: washing</li> <li>• Oxidative Bleaching – for each bleach listed, include methods , choosing stock solutions (chemical grade, concentration, additives), stabilization of solution, specific risks, advantages and disadvantages, safety.</li> </ul>		

<ul style="list-style-type: none"> <li>• Light Bleaching: natural and artificial light source</li> <li>• Hydrogen Peroxide</li> </ul> <p>Less Common or Historically used methods:</p> <ul style="list-style-type: none"> <li>• Chlorine Dioxide</li> <li>• Hypochlorites</li> <li>• Chloramine-T</li> <li>• Potassium Permanganate</li> </ul> <p>Reducing Bleaches -</p> <ul style="list-style-type: none"> <li>• Sodium Borohydride</li> </ul> <p>Application methods (include advantages, risks, etc.)</p> <ul style="list-style-type: none"> <li>○ overall: immersion, floating, blotter, spray, vapor</li> <li>○ local application: poultice, brush, vapor</li> </ul>		
<p>Cosmetic compensation (inpainting?)</p> <ul style="list-style-type: none"> <li>• Purpose and misuse: visual integration vs. value-based incentive</li> <li>• Ethics: reversibility, detection, artist's intent</li> <li>• Materials: pastel, watercolor, dry pigment, pencil, etc.</li> <li>• Methods: brush, air brush, mouth atomizer,</li> </ul>		
<p>Deacidification</p> <ul style="list-style-type: none"> <li>• Purpose</li> <li>• Factors to consider: (storage environment, use,</li> <li>• Risks (general):</li> <li>• Deacidification agents (include questions on chemical formulas, solution preparation, advantages and disadvantages of each method, specific risks)             <ul style="list-style-type: none"> <li>○ Aqueous or partially aqueous solutions                 <ul style="list-style-type: none"> <li>○ Calcium Bicarbonate</li> <li>○ Magnesium Bicarbonate</li> <li>○ others?</li> </ul> </li> <li>○ Non-Aqueous                 <ul style="list-style-type: none"> <li>○ barium hydroxide</li> <li>○ Bookkeeper?</li> <li>○ others?</li> </ul> </li> </ul> </li> </ul> <p>Application methods</p> <ul style="list-style-type: none"> <li>○ immersion</li> <li>○ brush</li> <li>○ spray</li> </ul>		
<p>Drying and Flattening</p> <ul style="list-style-type: none"> <li>• Purpose</li> <li>• Risks (flattening paper texture, changing dimensions, flattening or other physical stress on media, change in</li> </ul>		

<p>surface gloss, etc.)</p> <ul style="list-style-type: none"> <li>• Factors to consider (influence of paper texture on aesthetic,</li> <li>• local techniques (blotter, desiccated blotter, hot air, tacking iron, etc.)</li> <li>• overall techniques (stretch drying on Dacron or screen, blotter and/or felt and weight, air drying, suction table, etc. - Include specific risks for each)</li> </ul> <p>Parchment/Vellum</p>		
<p>Filling losses</p> <ul style="list-style-type: none"> <li>• Purpose</li> <li>• Factors to consider</li> <li>• materials             <ul style="list-style-type: none"> <li>○ antique papers</li> <li>○ contemporary, tested papers (acid free, lignin free)</li> </ul> </li> <li>• methods             <ul style="list-style-type: none"> <li>○ Paper:                 <ul style="list-style-type: none"> <li>○ pulp fills (hand applied and leaf casting?)</li> <li>○ inserts – Asian and western papers, heat set tissues</li> <li>○ toning fills (materials, application techniques)</li> </ul> </li> </ul> </li> </ul> <p>Parchment/Vellum</p>		
<p>Matting/Hinging</p> <ul style="list-style-type: none"> <li>• Hinging             <ul style="list-style-type: none"> <li>○ purpose</li> <li>○ other options (cornering, etc.)</li> <li>○ risks/factors to consider (storage environment, travel, etc.)</li> <li>○ material selection</li> <li>○ variations</li> </ul> </li> <li>• Matting             <ul style="list-style-type: none"> <li>○ purpose</li> <li>○ factors to consider (intended use, storage environment, etc., travel) and risks</li> <li>○ material selection</li> <li>○ variations</li> </ul> </li> </ul>		
<p>Hinge, tape and adhesive removal</p> <ul style="list-style-type: none"> <li>• Purpose</li> <li>• Risks (general)</li> <li>• Ethical considerations (artist's intent, etc.</li> <li>• solvent safety</li> </ul>		

<ul style="list-style-type: none"> <li>• Types of attachments (under each type discuss components (elastomer, plasticizer, tackifier, carrier, etc.), evaluating the level of degradation (inductive stage, cross-linking), methods for characterizing tapes (spot tests, UV, etc.)             <ul style="list-style-type: none"> <li>○ pressure-sensitive tapes and attachments                 <ul style="list-style-type: none"> <li>acrylic based</li> <li>rubber based</li> </ul> </li> <li>○ water-activated tapes and attachments                 <ul style="list-style-type: none"> <li>gum</li> <li>starch</li> <li>composites and other</li> </ul> </li> <li>○ proteinaceous</li> </ul> </li> <li>• Treatment options             <ul style="list-style-type: none"> <li>○ dry techniques: scraping, eraser, specific risks</li> <li>○ heat (also freezing?), specific risks</li> <li>○ wet techniques: immersion, suction table, poultice, steam, humidification, specific risks</li> <li>○ enzymes: types, grades, risks, techniques</li> <li>○ non-aqueous solvents: choosing a solvent, solvent characteristics/ miscibility/ toxicity, suction table, poultice, vapor chambers, immersion, risks to object, safety equipment?</li> </ul> </li> </ul>		
<p>Humidification</p> <p>Paper:</p> <ul style="list-style-type: none"> <li>○ purpose</li> <li>○ risks</li> <li>○ local methods (Gore-Tex, poultice, brush, spray, ultrasonic mister or nebulizer)</li> <li>○ overall methods (passive or tray humidification, spray, Gore-Tex,</li> </ul> <p>Parchment/Vellum:</p>		
<p>Leather Consolidation/ Dressing</p>		
<p>Lining and Facing</p> <ul style="list-style-type: none"> <li>○ purpose</li> <li>○ factors to consider (alteration of sheet character, obscuring information, other options, etc.)</li> <li>○ material selection</li> <li>○ lining variations (stretch lining advantages and disadvantages, nap bond lining, others.....)</li> </ul>		
<p>Mold Removal</p>		

<p>General:</p> <ul style="list-style-type: none"> <li>• mold structure and food sources</li> <li>• environmental factors for growth</li> <li>• effect on substrate (staining, weakening of paper)</li> <li>• health hazards and safety equipment</li> <li>• characterization of dormant vs. active mold</li> </ul> <p>Treatment</p> <ul style="list-style-type: none"> <li>• Dry methods (kneaded eraser, HEPA vacuuming, electrostatically charged brush, tweezers,)</li> <li>• Inactivation             <ul style="list-style-type: none"> <li>non-aqueous solvent</li> <li>freezing</li> <li>anoxic environment</li> <li>fumigation (historic use)</li> </ul> </li> <li>• Stain reduction (or is this better treated elsewhere?)             <ul style="list-style-type: none"> <li>enzymes, bleach</li> </ul> </li> </ul>		
<p>Rebacking</p>		
<p>Media Consolidation</p> <ul style="list-style-type: none"> <li>• purpose</li> <li>• risks</li> <li>• materials (include effectiveness, aging properties, preparation, etc.)             <ul style="list-style-type: none"> <li>○ cellulose ethers                 <ul style="list-style-type: none"> <li>▪ mc (various viscosities)</li> <li>▪ Klucel-G</li> <li>▪ etc.</li> </ul> </li> <li>○ proteinaceous                 <ul style="list-style-type: none"> <li>○ gelatin</li> <li>○ isinglass</li> <li>○ parchment size</li> </ul> </li> <li>○ starches                 <ul style="list-style-type: none"> <li>○ funori</li> </ul> </li> <li>○ gums</li> </ul> </li> <li>• application             <ul style="list-style-type: none"> <li>○ spray</li> <li>○ nebulizer</li> <li>○ ultrasonic mister</li> <li>○ brush</li> </ul> </li> </ul>		
<p>Mending</p> <ul style="list-style-type: none"> <li>• purpose</li> <li>• materials</li> </ul>		

<ul style="list-style-type: none"> <li>• paste and tissue application variations</li> <li>• heat – set tissue prep. and application</li> <li>• remoistenable tissue prep. and application</li> </ul> <p>Paper: Parchment/Vellum</p>		
<p>Resewing</p>		
<p>Sizing/resizing</p> <ul style="list-style-type: none"> <li>• purpose</li> <li>• evaluating original sizing agent and its breakdown</li> <li>• factors to consider: original size used, regeneration through washing, artifact handling and housing, appearance,</li> <li>• ethical considerations</li> <li>• risks</li> <li>• original sizing agents and application (include in part 4?)             <ul style="list-style-type: none"> <li>○ gelatin: tub sizing and</li> <li>○ alum-rosin</li> <li>○ starch</li> <li>○ synthetic</li> </ul> </li> <li>• original sizing methods             <ul style="list-style-type: none"> <li>○ tub sizing</li> <li>○ internal sizing</li> </ul> </li> <li>• resizing agents (for each type include composition, characteristics, preparation, aging properties, )             <ul style="list-style-type: none"> <li>○ cellulose ethers</li> <li>○ proteinaceous</li> <li>○ other</li> </ul> </li> <li>• application: purpose, advantages and disadvantages             <ul style="list-style-type: none"> <li>○ spray</li> <li>○ brush</li> <li>○ immersion</li> </ul> </li> </ul>		
<p>Surface Cleaning</p> <ul style="list-style-type: none"> <li>• Purpose</li> <li>• Risks: fiber disturbance, changes in surface gloss, eraser residue,</li> <li>• Ethical considerations: artist's intent, loss of historic information, impact on analysis, etc.</li> <li>• Techniques             <ul style="list-style-type: none"> <li>○ Erasers                 <ul style="list-style-type: none"> <li>- composition: plasticizers, abrasives, sulphur,</li> <li>- types available and selection criteria</li> <li>-analyses of eraser components and residue?</li> </ul> </li> <li>○ brushes</li> </ul> </li> </ul>		

<ul style="list-style-type: none"> <li>○ scalpel, tweezers</li> <li>○ vacuum</li> <li>○ blowers, pressurized air</li> </ul>		
<p>Washing</p> <ul style="list-style-type: none"> <li>• purpose</li> <li>• risks: to media; to paper: dimensional change, surface changes, tonal shifts, tidelines, gaping tears, etc.</li> <li>• preparing object for washing (dry cleaning, humidifying)</li> <li>• water chemistry, purity, pH</li> <li>• water additives             <ul style="list-style-type: none"> <li>○ wetting agents</li> <li>○ chelators</li> <li>○ alkaline agents                 <ul style="list-style-type: none"> <li>○ calcium hydroxide – to replace ionic salts</li> <li>○ ammonium hydroxide – to raise pH</li> </ul> </li> <li>○ acidifying agents?                 <ul style="list-style-type: none"> <li>○ acetic acid</li> </ul> </li> </ul> </li> <li>• water filtration/purification systems</li> <li>• treatment variations (discuss application &amp; purpose, risks)             <ul style="list-style-type: none"> <li>○ immersion</li> <li>○ float washing/screen washing</li> <li>○ blotter washing/felt washing</li> <li>○ suction table washing</li> <li>○ other</li> </ul> </li> <li>•</li> </ul>		
<p>Other</p>		