Packing and Storage of Archaeological Collections

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Packing Freshly Excavated Finds

What to do in the field?

Image courtesy of the Lofkënd Archaeological Project
Packing in the field

• Excavation changes the environmental conditions artifacts are accustomed to. This can cause severe damage and condition changes.

• For most materials, it is often best to keep them stored in similar conditions to how they were buried or slowly acclimatize them to new conditions.
Other things to consider

• Packing in the field is often considered temporary, but this is not always the case and becomes permanent storage
• Don’t place objects in direct sunlight to prevent condensation
• Pack objects of different materials separately
• Don’t fill bags too full
• Don’t put heavy objects on top of light ones
• Make sure objects are well supported if fragile
• Plan ahead, especially if specialized packing is needed
What to do when you find something?

• General principles:
  – If it’s dry: Keep it dry
  – If it’s damp: Slow drying often best (but depends on the material)
  – If it’s wet: Slow drying in some cases good for inorganic materials (like ceramics, glass, stone) but for organic materials (like wood, bone, or composite materials) often best to keep it wet
Storage of freshly excavated ceramics

• If damp or dry:
  – Dry out damp ceramics slowly—look out for crystallization of salts which can damage surface
  – Low fired ceramics are weak when wet. Be careful when handling and drying them out
  – Beware of fluctuations in relative humidity

• If waterlogged/wet:
  – Keep stored in water (deionized or tap) until it can be treated by a conservator
  – Remember that prolonged storage in water can promote biological growth


Photo by: Allison Lewis/Lofkend Archaeological Project
Storage of freshly excavated glass & stone

• If damp or dry:
  – Same as for ceramics
  – For glass, weathered or spalled surfaces react to moisture so controlled humidity 20-40% is best in those cases

• If waterlogged/wet:
  – Same as for ceramics
Storage of freshly excavated metals (ferrous)

• If damp or dry:
  – Store in desiccated environment
  – Latest literature recommends less than 12% humidity for iron
  – Oxygen free environments with desiccant also an option

• If waterlogged/wet:
  – Keep stored in water (deionized or tap) until it can be treated by a conservator. pH of the solution should be above 8 to reduce rate of corrosion (using alkaline like calcium carbonate)
  – Remember that prolonged storage in water can promote biological growth
Storage of freshly excavated metals (non-ferrous)

• If damp or dry:
  – Store in desiccated environment of humidity level less than 35%

• If waterlogged/wet:
  – Same as for iron EXCEPT for lead or other white metals
    • Store in tap or deionized water since carbonate in solution used to raise pH can cause other forms of corrosion

Image courtesy of Lofkend Archaeological Project
Storage of freshly excavated wood

• If damp or dry:
  – Dry out slowly if damp
  – Keep in controlled humidity, around 50%

• If waterlogged/wet:
  – Keep stored in water (deionized or tap) if from freshwater site or in a mix of salt/fresh water if from saline environment until treated
  – Keep in dark and cool place (like fridge) to reduce biological activity

http://nautarch.tamu.edu/CRL/Report14/index.htm
http://users.stlcc.edu/mfuller/Turner-Snodgrass.html
Storage of freshly excavated leather, bone, ivory, tooth & horn

• If damp or dry:
  – Same as for wood

• If waterlogged/wet:
  – Same as for wood

http://www.archaeology.wsu.edu/SquirtCave/SquirtCave.html
Storage of freshly excavated composite materials (organic & metal)

- If damp or dry:
  - Need to find compromise between both materials
    - If organic component is in good condition, store in low humidity (around 30%), but must be dried out slowly

- If waterlogged/wet:
  - Keep stored in water (deionized or tap) until treated
  - Keep in dark and cool place (like fridge) to reduce biological activity

http://www.finds.org.uk/database/search/results/objecttype/unidentified+object/broadperiod/MODERN/
How can we pack objects in the field for transport to the lab?

http://walledcitytaskforce.org/2009/06/26/redan_20/
Examples of how to pack in the field

Pye 1999 Conservation for Archaeologists

Image courtesy of the Lofkënd Archaeological Project
In sealable polythene box

Many bags

PLASTIC BAG FILLED WITH PLASTIC PEANUTS

CRUMPLED TISSUE
Desiccated storage for metals

What do you need?

- Sealable, airtight container
- Desiccating silica gel (self-indicating)
- Humidity indicator strip
Desiccated storage for metals

Image courtesy of the Lofkënd Archaeological Project

Image courtesy of the UCLA/Getty Conservation Program
How to do this on site

- Assemble container with desiccant and humidity strip prior to going out in the field
- Label box clearly—only for storing metals dry
- Keep out of sun

Watkinson and Neal 2001 *First Aid for Finds*

Athenian Agora Excavations, American School of Classical Studies in Athens
Photo by: Siska Genbrugge
Packing damp materials on site

- Can place a damp sponge or foam in a sealable plastic container or polyethylene bag
- Can add some ethanol/alcohol to the water to act as a biocide and prevent mold growth (can be a 50:50 mixture)
- Do not use paper labels inside packaging-write on exterior of bag/container or use Tyvek labels with waterproof ink
Storage of wet materials

• Store submerged in water
• Make sure to refrigerate to help reduce biological growth
• Label bag/container with waterproof ink or use Tyvek label (with waterproof ink)
Storage of small and/or fragile finds

• Make sure fragile material is well supported—use acid free tissue or foam
• Can pack small objects in sealable polyethylene bags—add foam or tissue if needed for support
• Small finds, like seeds and botanical remains can be stored in polyethylene or polypropylene vials
Materials that will be analyzed

- Sample preparation differs with sample material type and technique. Discuss type of analysis to be conducted ahead of time to plan for proper packing.
- Use materials that will not contaminate samples (ex. place samples in glass vials not to contaminate with modern materials).
- Handle materials with gloves or wear other protective equipment to prevent contamination if necessary.

http://uanews.org/node/12176
http://www2.cnrs.fr/en/847.htm
Assemble a field kit

- Include materials needed for packing in a large container or cooler to take with you to the field
- List of suggested items are in your notebook
Storage of Archaeological Collections

How should we store things?

http://research.amnh.org/anthropology/about/management
Factors affecting artifacts post-excavation

• Storage environment
  – Temperature/Relative Humidity
  – Light
  – Pollutants – from environment and poor storage materials
  – Pests

• Humans/Handling

• Disasters
  – Earthquakes!
General RH recommendations

• Majority of materials can be kept at around 50%
• Most important to avoid fluctuations in humidity-this can cause a lot of damage
• Metals should be kept dry
  – Ferrous metals-below 12%
  – Other metals-below 35%
• Humidity should not be too high-can promote mold growth (above 70%)
Protecting against earthquakes

Image courtesy of the Southwest Museum of the American Indian
General storage principles

• Have a stable storage environment with control of environmental factors for specific materials
• Have a stable RH with cool temperatures
• Minimize amount of light directly on collection
• Use only archival materials
• Store objects well supported to minimize handling and damage
What is an archival material?

- Inert and stable materials that have good long term ageing properties.
- Materials do not off-gas or release products that will damage artifacts.
- Term can be used loosely so care should be taken when purchasing materials.
- Be familiar with types of inert materials and purchase materials that have been tested (e.g. Oddy tested) for their long term properties and stability.
<table>
<thead>
<tr>
<th>Material used in the Past</th>
<th>Effect</th>
<th>Archival Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubber bands (to attach labels or hold pieces together)</td>
<td>Poor ageing of rubber band - gets sticky, brittle, break</td>
<td>Cotton tying (twill) tape, Teflon tape, unwaxed Teflon dental floss (like Glide)</td>
</tr>
<tr>
<td>Newspaper (for padding)</td>
<td>Lignin in paper is acidic; newsprint can transfer</td>
<td>Acid-free tissue, bean bags made of Tyvek or unbleached cotton, polyethylene foams (Ethafoam or Volara)</td>
</tr>
<tr>
<td>Bubble wrap (for padding)</td>
<td>Bubbles can deflate over time; can leave impression of bubbles</td>
<td>Same as above; or make sure it is not in direct contact with object</td>
</tr>
<tr>
<td>Packing peanuts</td>
<td>Made of polystyrene; can be unstable and damage/stick to objects</td>
<td>Same as above; or make sure it is not in direct contact with object</td>
</tr>
<tr>
<td>Cotton/toilet paper (for padding)</td>
<td>Can snag on objects leaving fibers; can be acidic</td>
<td>Same as above; or make sure it is not in direct contact with object</td>
</tr>
<tr>
<td>Matchboxes, various types of tins, paper bags (used to hold objects)</td>
<td>Material is acidic and can damage objects</td>
<td>Polyethylene ziplock bags, clear polypropylene or polyethylene boxes or trays</td>
</tr>
<tr>
<td>Cardboard (commercially available)</td>
<td>Material is acidic and can damage objects</td>
<td>Acid-free, lignin-free board, corrugated polyethylene board/boxes</td>
</tr>
<tr>
<td>Wooden cabinets</td>
<td>Can off-gas acidic vapors</td>
<td>Powder coated metal cabinets or sealed wood</td>
</tr>
<tr>
<td>Saran wrap or other plastic wrap (to wrap artifacts)</td>
<td>Made from polyvinyl chloride (PVC) with can off-gas acidic vapors</td>
<td>Polyethylene film</td>
</tr>
</tbody>
</table>
Storage examples - Bagging

Image courtesy of the Southwest Museum of the American Indian
Storage examples—Cavity packing

Image courtesy of the Lofkënd Archaeological Project

Image courtesy of the UCLA/ Getty Conservation Program

Image courtesy of the Lofkënd Archaeological Project
Storage examples - Palettes

Image courtesy of the UCLA/ Getty Conservation Program

Image courtesy of the Southwest Museum of the American Indian
Storage examples-Trays

Image courtesy of the Southwest Museum of the American Indian

http://collections.paleo.amnh.org/assets/amnh_rehousing_for_storage_final.ppt
Storage examples-Portfolio/Folders

Images courtesy of the UCLA/Getty Conservation Program
UCLA 63
Textile, South America

Front  Back

Images courtesy of the UCLA/Getty Conservation Program
Storage examples-Pot Rings & wedges

Image courtesy of the UCLA/Getty Conservation Program

Image courtesy of the Southwest Museum of the American Indian
Storage & Packing Materials

What can I use?
1. Polyethylene Terephthalate (Moderately stable)
2. High Density Polyethylene (Very stable)
3. Polyvinyl Chloride (Unstable)
4. Low Density Polyethylene (Very stable)
5. Polypropylene (Moderately stable)
6. Polystyrene (Sometimes stable)
Plastics

• Bags
  – Polyethylene ziplock
  – 2mil or thicker
• Sheet
  – Polyethylene
  – 2mil or thicker
• Containers
  – Polyethylene or polypropylene
  – Clear
  – With a lid
Materials-Foam

- Ethafoam-low density polyethylene foam (closed cell)
- Volara-polyethylene foam (closed cell) with a smooth surface
Materials-Paper & Board

• Needs to be acid-free and lignin free
  – Archival blue board
  – Acid free tissue

• Can get buffered or unbuffered

• Coroplast-Polyethylene/polypropylene corrugated board
Buffered vs. Unbuffered

• Buffered tissue or board has an alkaline added to it (usually calcium carbonate) added to it to raise the pH above neutral (ph neutral=7)
• Unbuffered is pH neutral
• General rule is:
  – Natural fiber material and synthetics-use buffered
  – Animal fibers-use unbuffered
  – Mixed materials and some prints/photos-use unbuffered
  – Materials for DNA analysis-use unbuffered
  – Unknown materials-use unbuffered
Materials-Barriers/Liners/Sheets

- Mylar-polyester film

- Marvelseal 360-aluminum foil sandwiched between nylon and polyethylene
  - Has been used to seal wood to prevent off-gassing
  - Is heat sealable with heat spatula or iron
Materials-Barriers/Liners/Sheets

- **Tyvek (Soft structure-Type 1443R or 14M)-spunbonded oleofin fabric**
  - Can use as liner or to make bags
  - Can be washed and sewn

- **Teflon-polytetrafluoroethylene (PTFE)**
  - Can be used as a liner or to wrap material
Materials-Microenvironments

- Desiccating silica gel
  - Use to create very dry storage environments
- Conditioned silica gel
  - Can be used to create storage environments at specific RH levels
  - Can condition yourself or buy them already conditioned
Materials-Tapes, Ties & Glues

- Unbleached cotton twill tape
- Teflon tape
- Tyvek tape
- Velcro
- Double sided tape-3M #415
- Low melt ethylene vinyl acetate (EVA) glue-3M #3792 Low Melt adhesive
- Hot melt EVA glue-Bostik Thermogrip # 6363
Materials-Padding/Support

- Acid free tissue
- Tri-backer rod
- Extruded circular polyethylene foam
- Pillows-Tyvek, HDPE trash liners, Stockinette unbleached cotton fabric
  - Can be filled with polyester batting, resin pellets (polypropylene, sand (playground sand), lead or zinc coated stainless steel shot
List of supplies and suppliers are in your notebook!

Thank you for your attention!

Questions?