

Proposal - Dehumidifiers for Collections Spaces

In accordance with best practices and further adjusting to ameliorate the areas of concern noted by AAM during the reaccreditation process, temperature and relative humidity data loggers were purchased and placed throughout the building and complex. These have recorded the fluctuation in temperatures and relative humidity for the past month and a half. This data shows that the temperature and relative humidity are frequently above the best practice limits for our various artifacts.

TEMPERATURE & HUMIDITY SAFE AND RISK ZONES

TEMPERATURE SAFE AND RISK ZONES		RELATIVE HUMIDITY SAFE AND RISK ZONES	
68°F/20°C & Higher	<ul style="list-style-type: none"> High risk for chemical decay for most materials Increase in biological activity in damp conditions 	70% RH & Higher	<ul style="list-style-type: none"> High risk for chemical and mechanical decay High risk for mold growth and biological damage
55-67°F 12-19°C	<ul style="list-style-type: none"> Cool temperatures slow the rate of chemical decay Good for most materials except film and color photographs 	65-70% RH	<ul style="list-style-type: none"> 70% – High risk for mold growth and corrosion 65% > – Increased risk of chemical decay and mechanical damage
40-54°F 12-19°C	<ul style="list-style-type: none"> Cool temperatures slow the rate of chemical decay Good for most materials except film and color photographs 	55-65% RH	<ul style="list-style-type: none"> 60% > – Potential for mechanical damage in vulnerable materials 55% > – Corrosion risk for metals and metal elements
32°F / 0°C Frozen Storage	<ul style="list-style-type: none"> Best for film and color photograph collections Required for degrading acetate and nitrate film 	30-55% RH	<ul style="list-style-type: none"> Generally safe zone for most materials
		30% & Lower	<ul style="list-style-type: none"> Beneficial for chemical decay High risk of shrinkage & brittleness for organic materials Safe for most inorganic materials (metals)



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Currently, we have dehumidifiers of varying types, tank capacity, and capabilities placed in several collections areas. These areas include: Textiles, Center Throughway Storage, Patio Storage, Library/Archives, and Art Storage A. However, even with these running all day, often the relative humidity is well above best practice limits. The HVAC system needs to be looked at to see how the collections areas can be zoned and re-fitted to best maintain the collections. This task already has been budgeted for inclusion with the R.S. Scott Reallocation of Space Proposal previously approved by the Board. R. S. Scott will be working with Air and Energy to create a proposal, ensuring that the Besser Museum HVAC system will better reduce relative humidity and maintain appropriate temperatures within collections and exhibition spaces. This process might take up to three years, if not longer, depending upon funding. We need a stopgap measure to prevent our collections from deterioration, particularly deterioration from overly humid environmental conditions.

It is proposed that we purchase nine (9) of the “[Ivation 70 Pint Energy Star Dehumidifier](#)”. It is a large capacity (4,500 sq. ft.) dehumidifier, with a 2.25-gallon reservoir tank. The tank capacity is important, since the water being withdrawn from the air will be deposited in this receptacle and needs to be large enough to not fill before it can be emptied in the morning. (It should be noted that the collections



Ivation
Ivation 70 Pint Energy Star Dehumidifier, Large Capacity For Spaces Up To 4,500 Sq Ft, Includes Programmable Humidistat, Hose Connector, Auto Shutoff Restart, Timer and Casters
★★★★☆ 204 customer reviews | 72 answered questions
Amazon's Choice for "ivation 70 pint energy star dehumidifier"

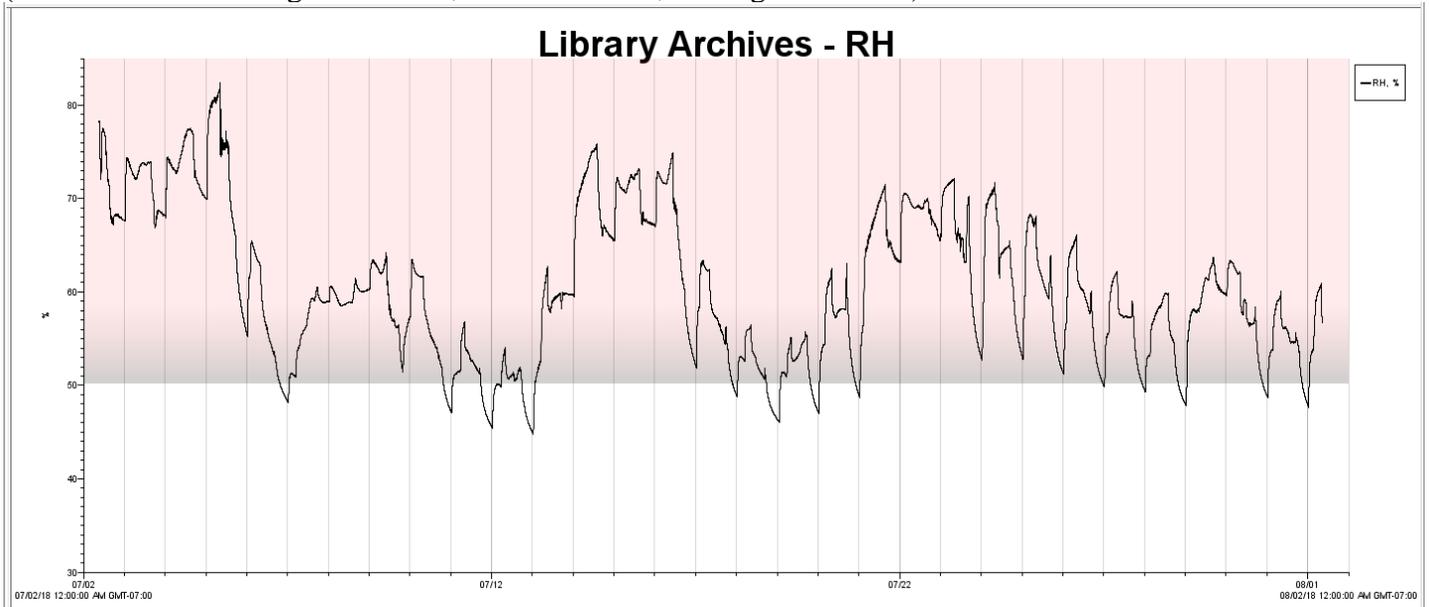
Price: \$259.99 & FREE Shipping. Details
prime | Try Fast, Free Shipping

In Stock.
Want it Wednesday, Aug. 8? Order within 21 hrs 38 mins and choose One-Day Shipping at checkout. Details
Business Seller | Sold by DBROTH and Fulfilled by Amazon. Gift-wrap available.

- Keeps Spaces Up to 4500 Sq. Ft. Cool & Comfortable by Removing 70 Pints of Moisture/Day
- Powerful Dehumidifier Prevents Mold, Mildew, Dust, Allergens & Odors for Healthy Air
- Low Maintenance & Easy Operation; Simply Plug-In, Select Settings & Empty 2.25 Gallon Reservoir
- Bright LED Display Indicates Humidistat & Setting, Fan Speed, Timer, Filter Alert & More
- Highlights Include Eco-Efficiency (ENERGY STAR Certified), Casters, Auto-Defrost, & Auto-Restart

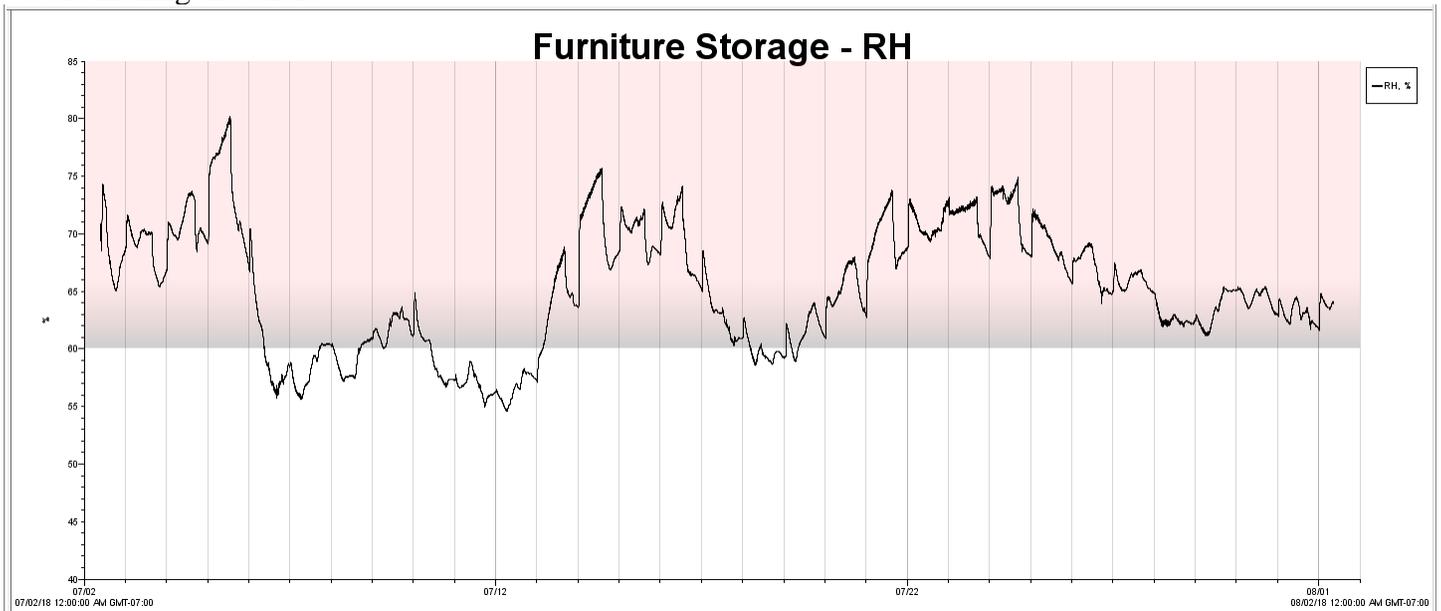
storage areas do not have drains, so a continuous drain from the dehumidifier into a drain is not possible.)

The nine locations for the new dehumidifiers include a second dehumidifier being placed in the library. Currently, there is one dehumidifier in the library, but it cannot remove enough moisture from the air to keep the books, documents, and photographs safe. Best practice, set by the National Archives and Records Administration, known as Directive 1571, indicates that most archival materials should be set to $35\% \pm 5\%$, however paper can be at a RH of $45\% \pm 5\%$. As you can see from the July 2018 readings, there are brief dips into the acceptable range, but, it is often too moist in this room for the contents, with a high of 82% and an average of 60%. Two new high capacity dehumidifiers will be placed in the library and the current dehumidifier will be relocated to the Curator's Office, which is a smaller space that also contains documents, photos, etc. (Curator's Office – High: 83.173%; Low: 56.140%; Average: 69.151%)

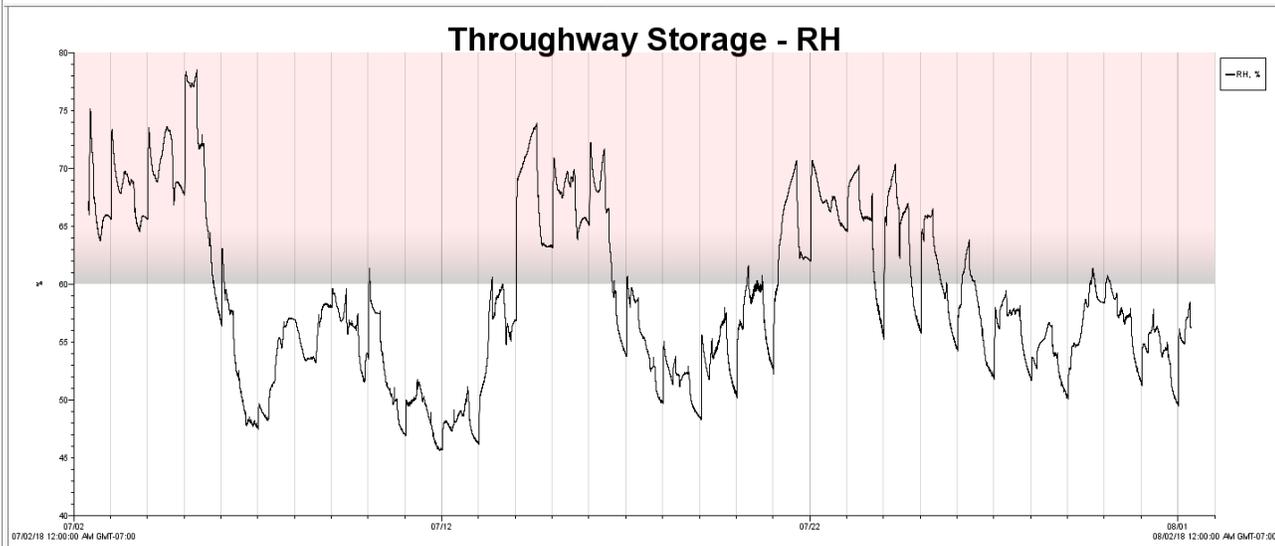


Library/Archives - High: 82.367% Low: 44.775% Average: 60.386%

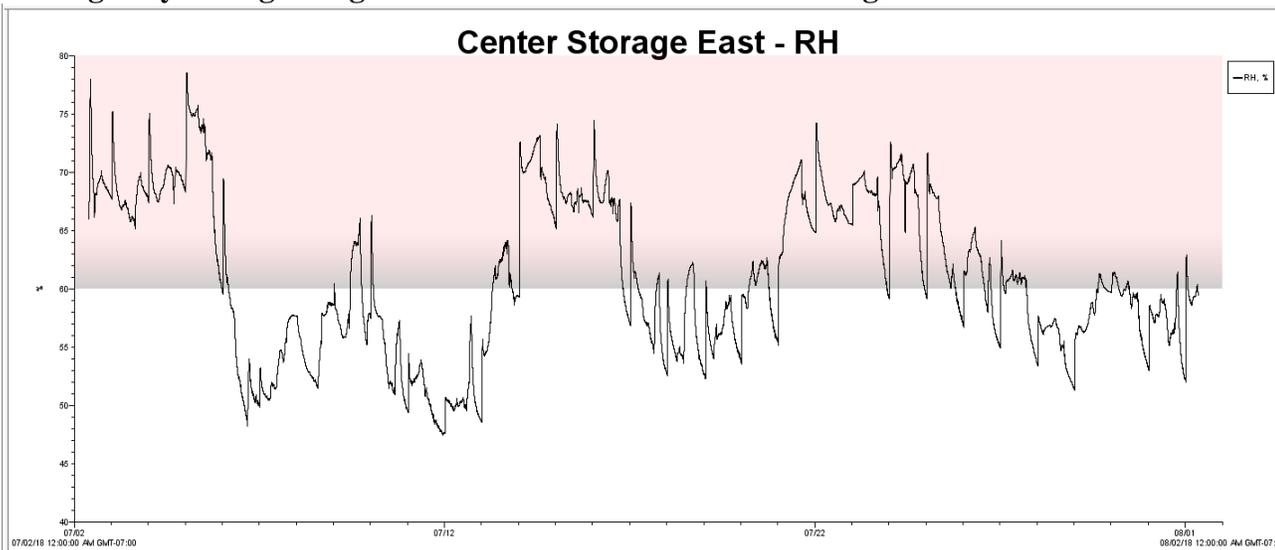
Furniture storage does not currently have a dehumidifier. During the month of July, it recorded a high of 80% relative humidity, a low of 54%, and averaged at 65%. To adhere to best practices, the relative humidity should never be above 55%. This might not be easily enforcable, even with dehumidifiers, but, we need to show that we are making the effort.



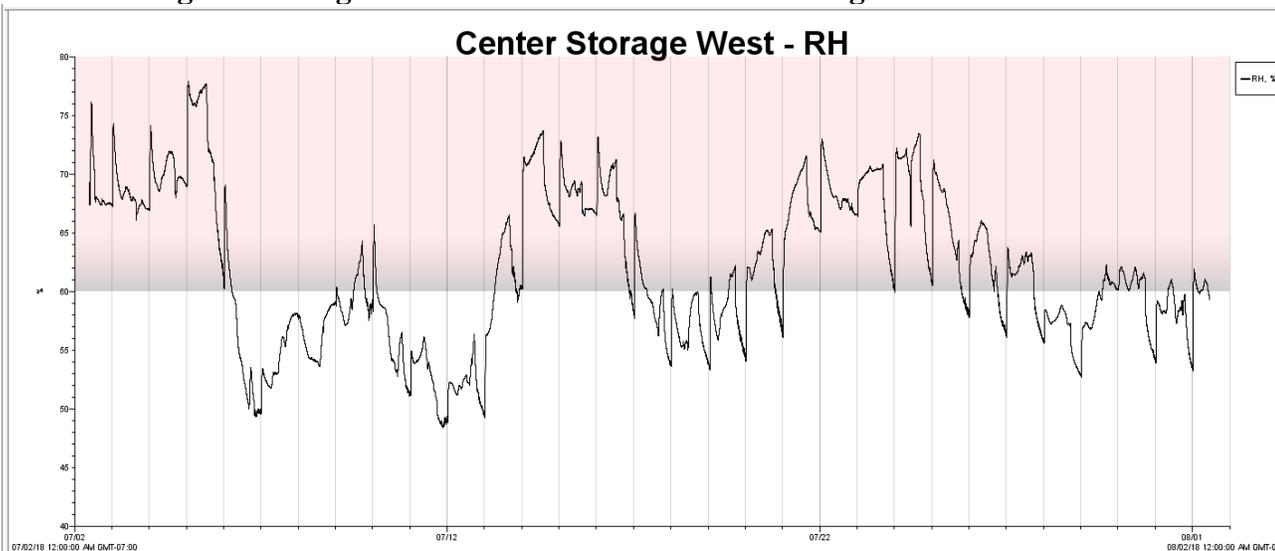
Currently, Center Storage East and West are dependent upon the dehumidifier located in the Throughway Storage to remove enough moisture from the air. As, you can see, it has not been particularly effective to have this single dehumidifier maintain such a large space. One each should be added to Center East and West.



Throughway Storage - High: 78.467% Low: 45.544% Average: 58.869%

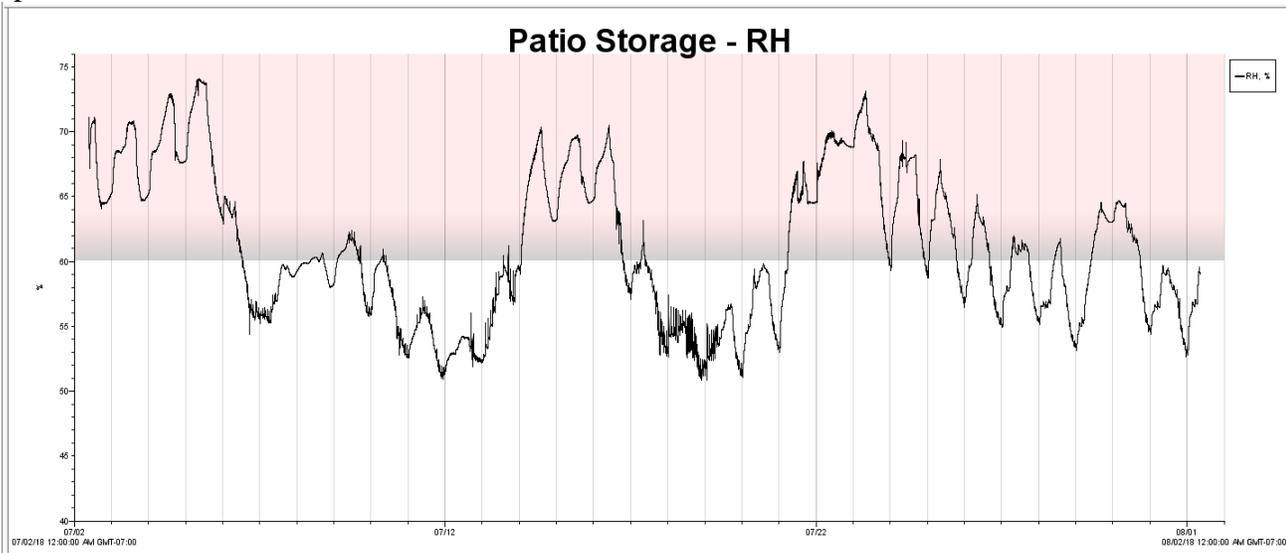


Center Storage East - High: 78.491% Low: 47.430% Average: 60.926%



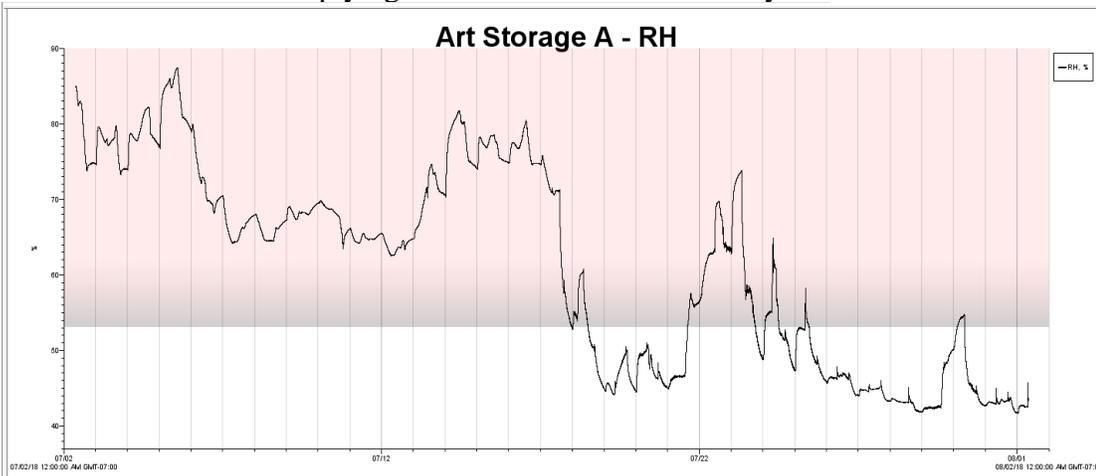
Center Storage West - High: 77.911% Low: 48.376% Average: 61.939%

Patio Storage, currently has a dehumidifier, but, it also is attempting to maintain a larger space with a medium capacity unit. A new unit will be located in this area in addition to the medium capacity unit already in the space.



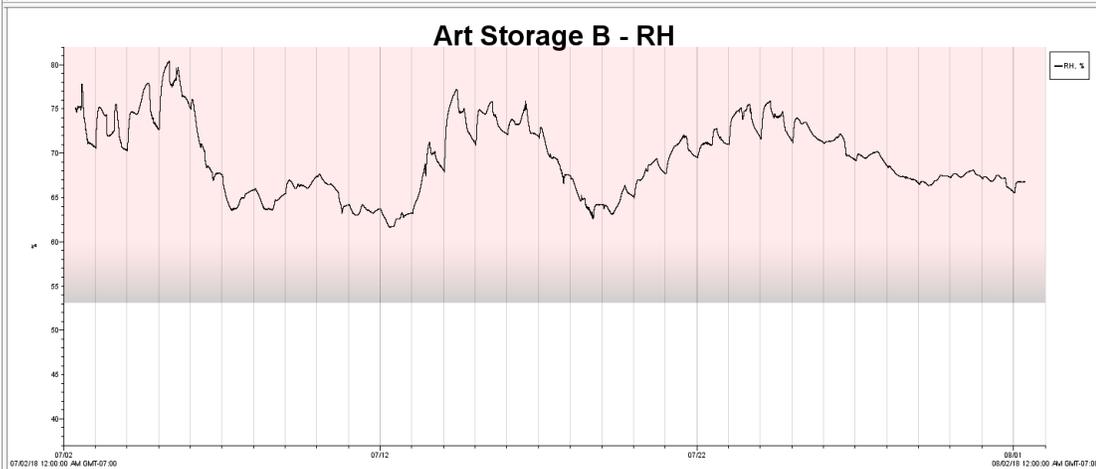
Patio Storage - High: 74.091% Low: 50.861% Average: 61.023%

Art Storage B needs a dehumidifier. A low capacity dehumidifying unit was found on the premises part way through the month and placed in Art Storage A. Except during the weekend, when I was away and unavailable to empty the units, the unit found was able to maintain humidity levels to Smithsonian accepted standards. (The Smithsonian standards for art storage and display indicate a maximum relative humidity of $45\% \pm 8\%$.) A new unit is proposed for Art Storage B. Additionally, now that we have a full-time planetarium instructor, he will take on the burden of emptying the dehumidifiers twice daily over the weekend.



Art Storage A

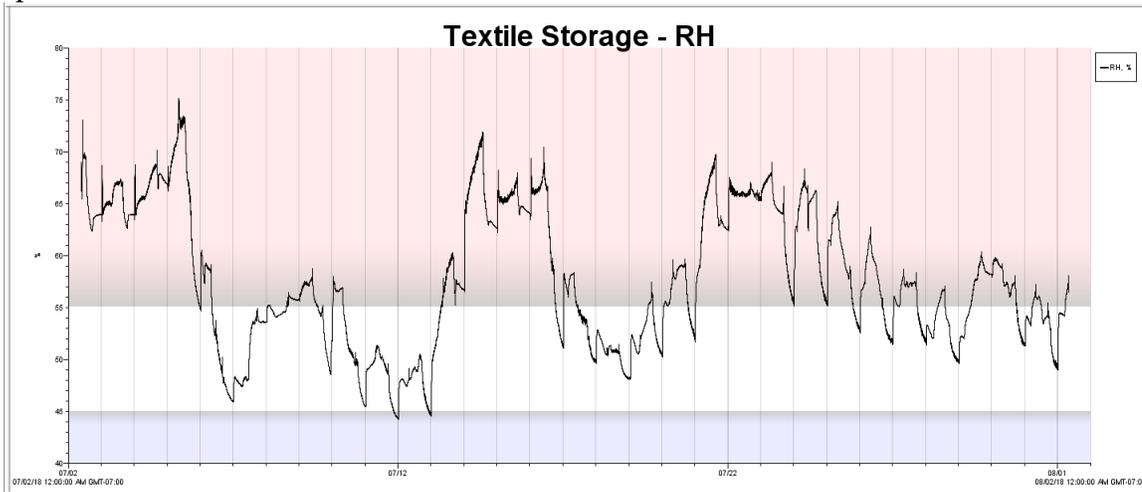
**High: 87.390%;
Low: 41.681%;
Average: 61.175%**



Art Storage B

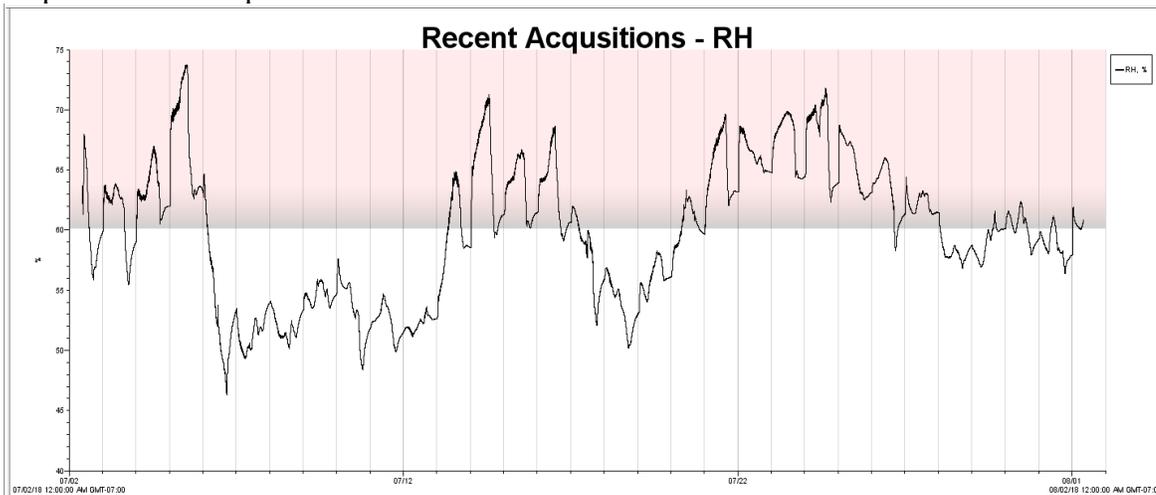
**High: 80.426%;
Low: 61.627%;
Average: 69.388%**

Textile Storage has a high relative humidity, due in part to the placement within the building and the ductwork and/or pipes near the ceiling. The low-capacity unit currently allocated to that space cannot remove enough moisture from the air. Textile fibers are hygroscopic, so they retain and lose moisture easily, causing dimensional change and mechanical stress, which leads to breakage. Relative humidity should remain as close to 50% as possible. (Low relative humidity (under 35%) can embrittle textiles.) It is important to place a new, high-capacity unit in the space to prevent fungus, mold, and mildew from developing on the textiles. Lower humidity also reduces insect activity, a reduction which is important for maintaining the textiles. The unit currently in Textile Storage would be moved to Anthropology Storage, which is a smaller space containing predominantly archeological specimens that do not require a high-capacity dehumidifier, but do require the space to be dehumidified.



Textile Storage
High: 75.092
Low: 44.226
Average: 57.668

The Recent Acquisitions space is in an HVAC zoned area, which is why the relative humidity readings are lower than in some storage locations. However, the space would benefit from a dehumidification unit to assist in the removal of the excess moisture from the air. A high-capacity unit like the ones being proposed should help maintain the space.



Recent Acq.
High: 73.785
Low: 46.320
Average: 59.815

The dehumidifiers cost \$259.99 each from Amazon.com. Nine of the units would be \$2339.91.