



# Optimizing Preservation and Energy Efficiency Through Systems Review

Presented by

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# Optimizing Preservation and Energy Efficiency Through Systems Review

Information derived from

## **“Methods to Improve Preservation Management in Libraries, Museums and Archives”**

By James Reilly, IPI

Rochester Institute of Technology

# Optimizing Preservation and Energy Efficiency Through Systems Review

## Optimization:

**“A process designed to ensure that each preservation environmental control (HVAC) system continually provides the best environment it is capable of, at the least possible energy use.”**

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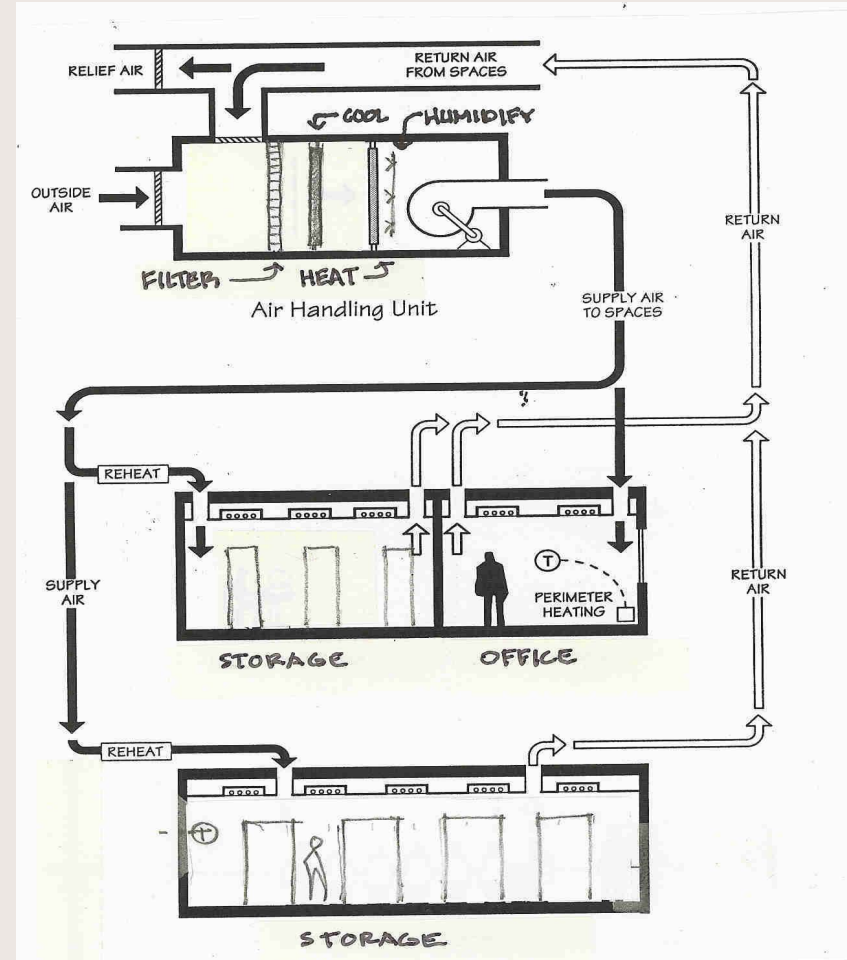
## Research Questions:

- 1. What climate is the existing system capable of delivering on an annual basis?**
- 2. What climate is the existing system actually delivering on an annual basis?**
- 3. Is the system consuming more energy than necessary to deliver the actual climate?**
- 4. What procedures would ensure continual optimal operation?**

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## Research Tasks:

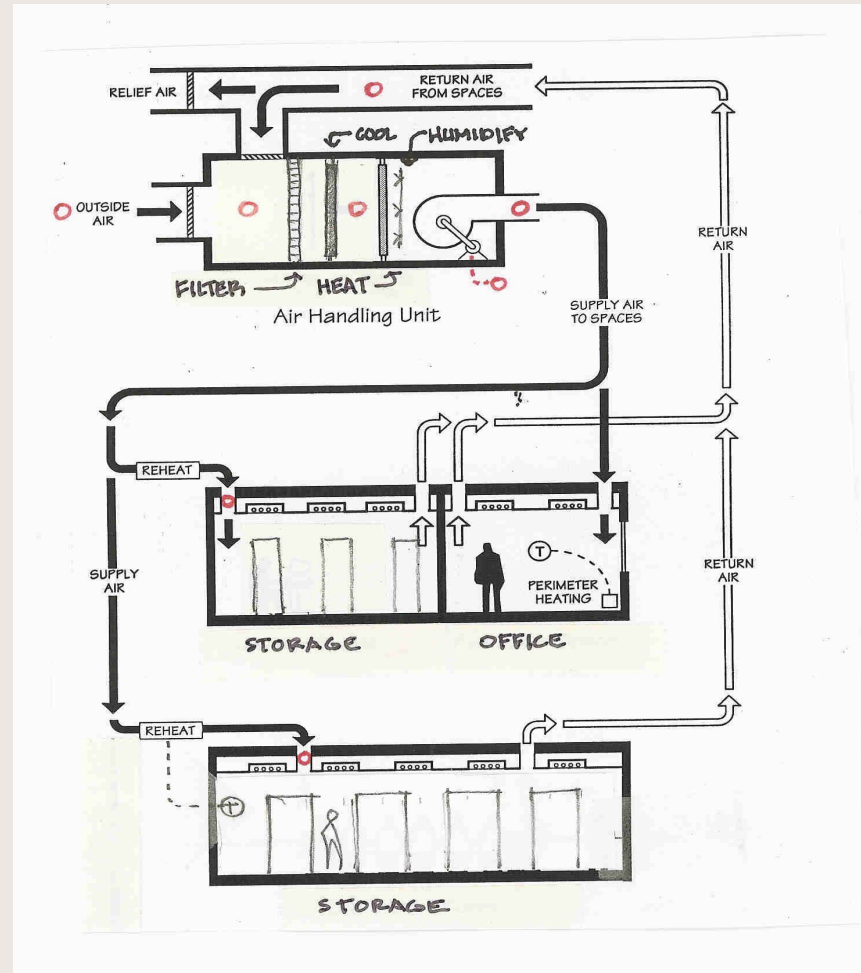
### 1. Document System Configuration



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## Research Tasks:

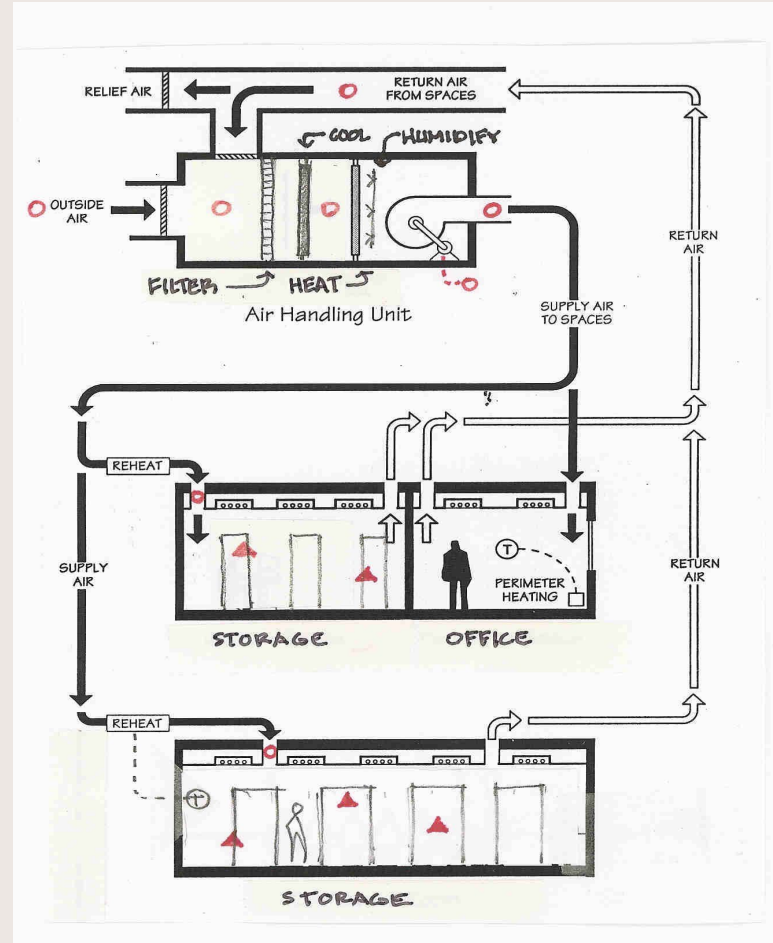
## 2. Measure System Performance



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Research Tasks:

## 3. Measure Collection Climates

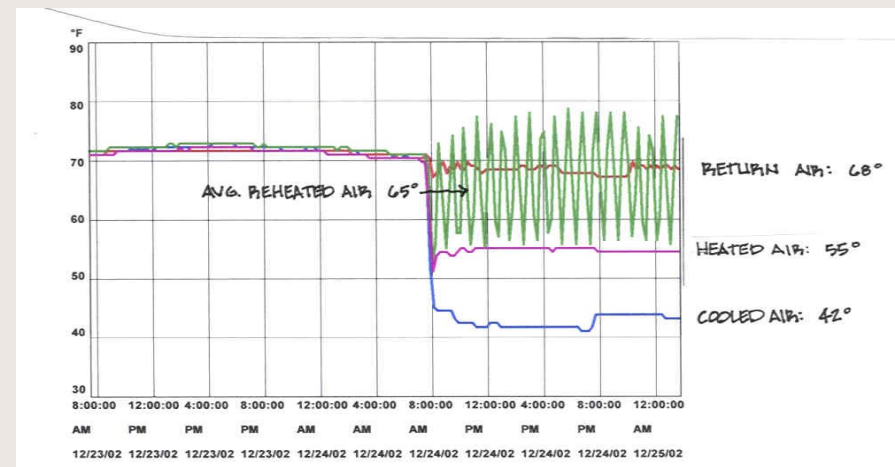
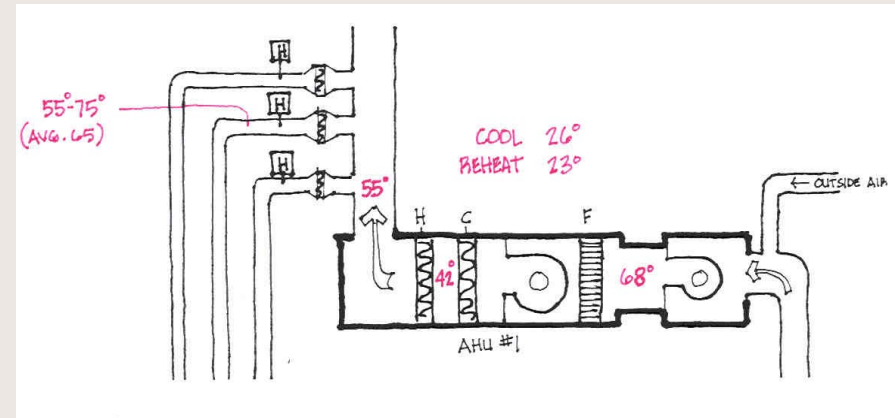




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## Research Tasks:

### 4. Analyze the Data Collected





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## Findings:

### *Sub-optimal Condition:*

## **Storage space warmer than necessary**

### *Causes:*

**Inappropriate set point selection**

**Supply air set point increased due to occupant complaint**

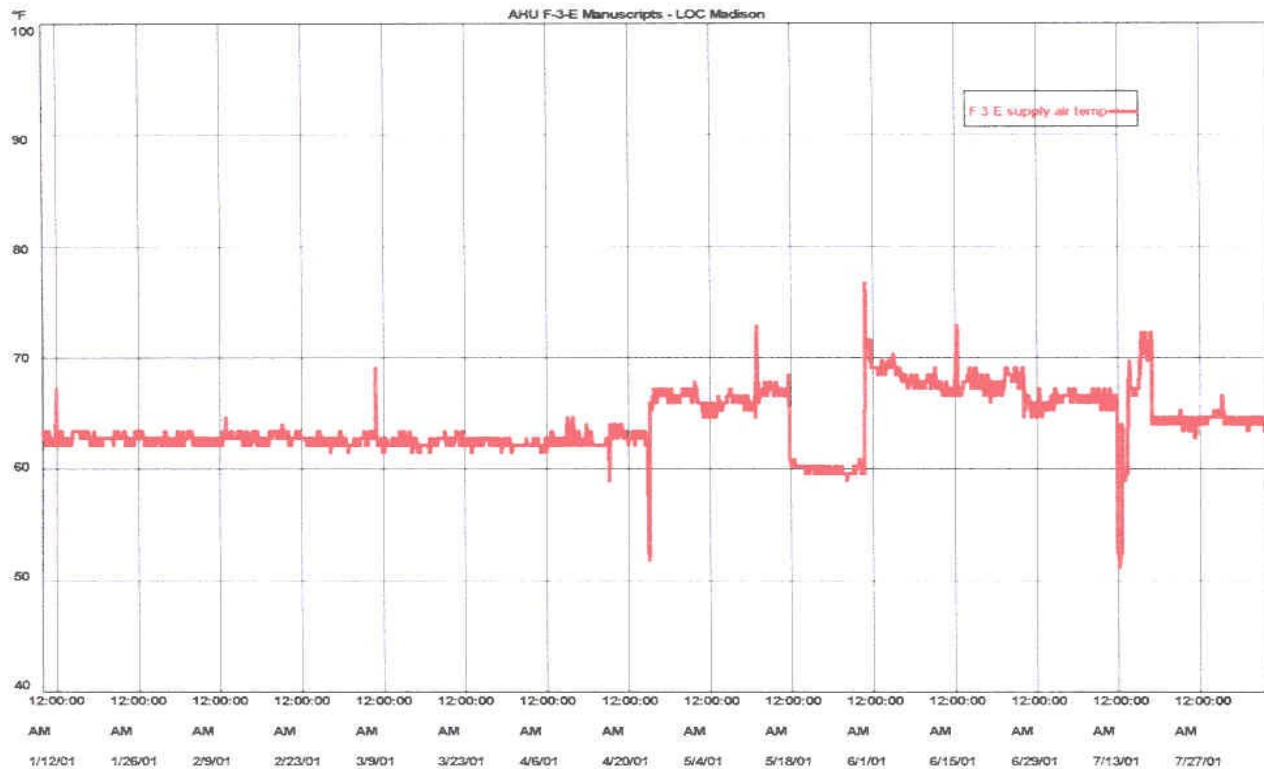
**Supply air set point inexplicably increased**

**Winter control schedules operating in summer**

**Reheat coil malfunctions**

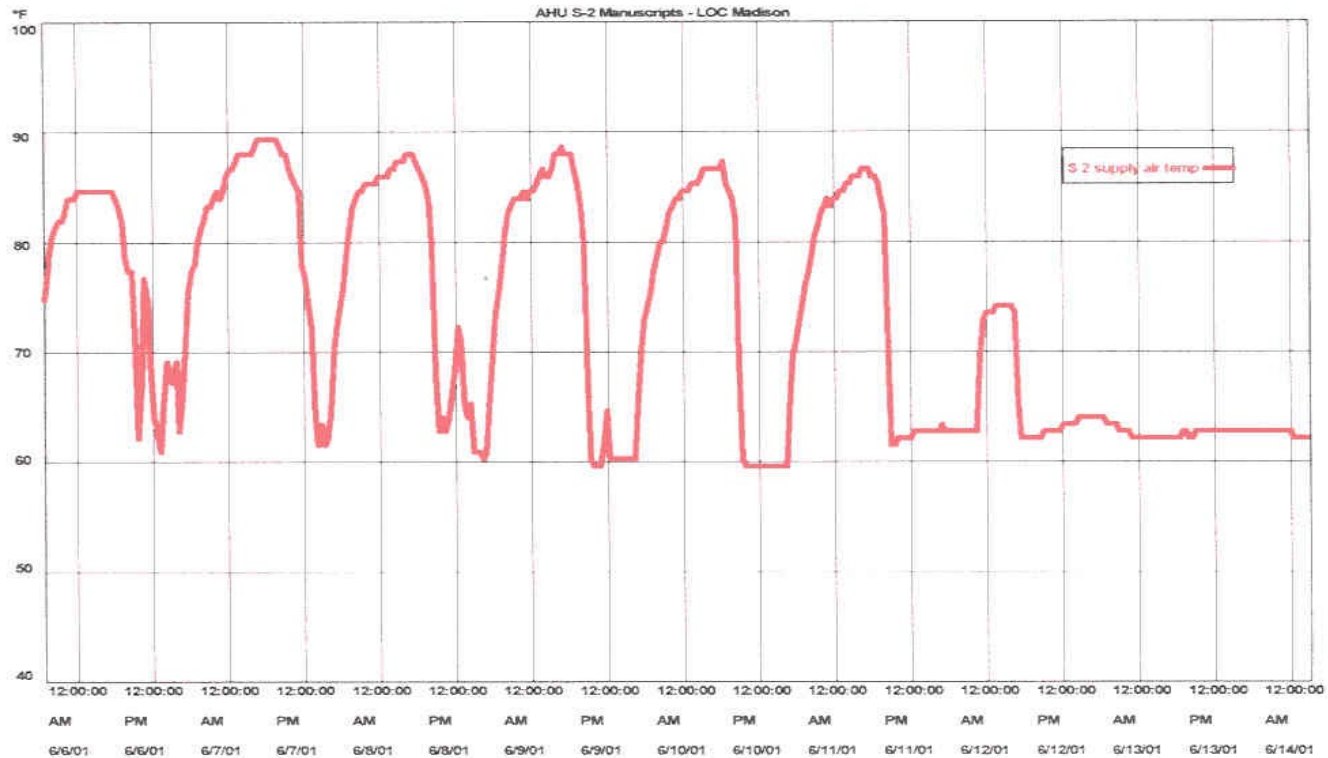
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## Unexplained Set Point Changes



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## Winter Control Schedule in Summer



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Findings:

*Sub-optimal Condition:*

**Storage space more humid than necessary**

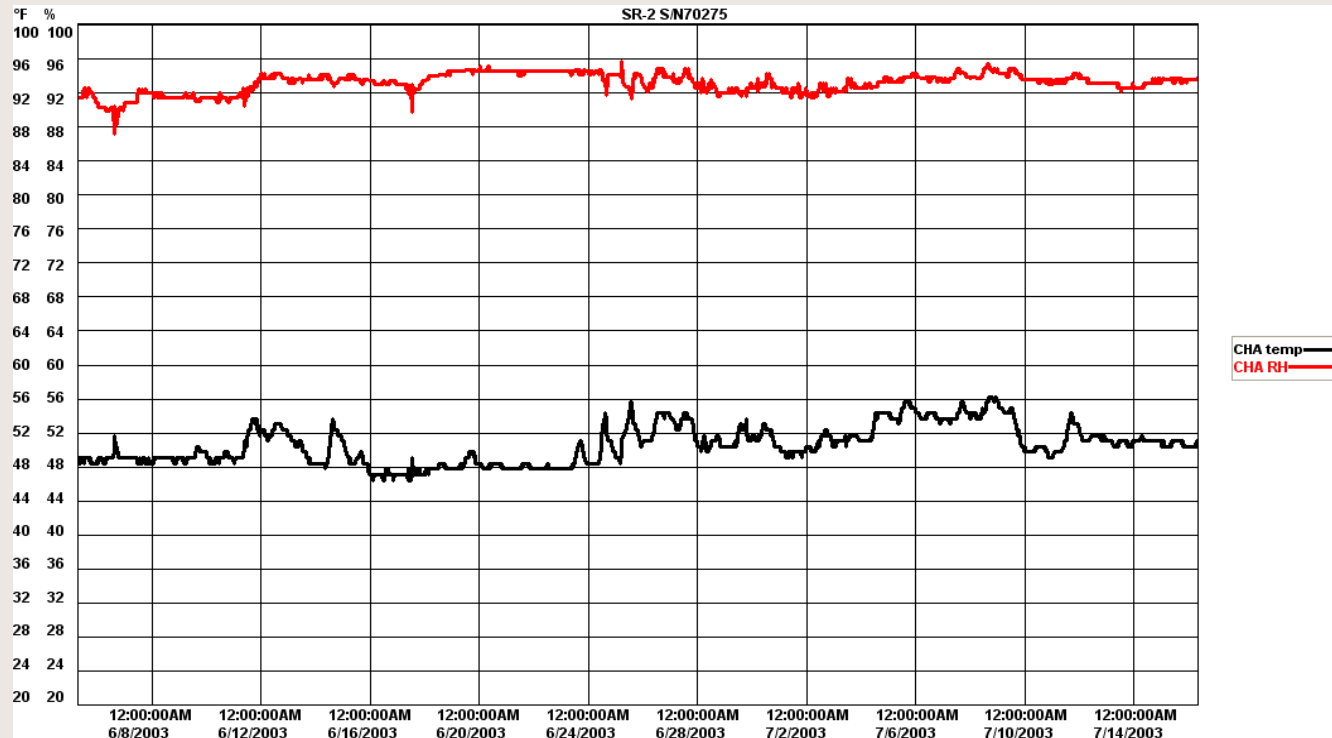
*Causes:*

Malfunctions in chilling system, resulting in elevated dew point temperature

Insufficient reheating

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## Malfunction in chilling system



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## Findings:

### *Sub-optimal Condition:*

## **Storage spaces drier than necessary**

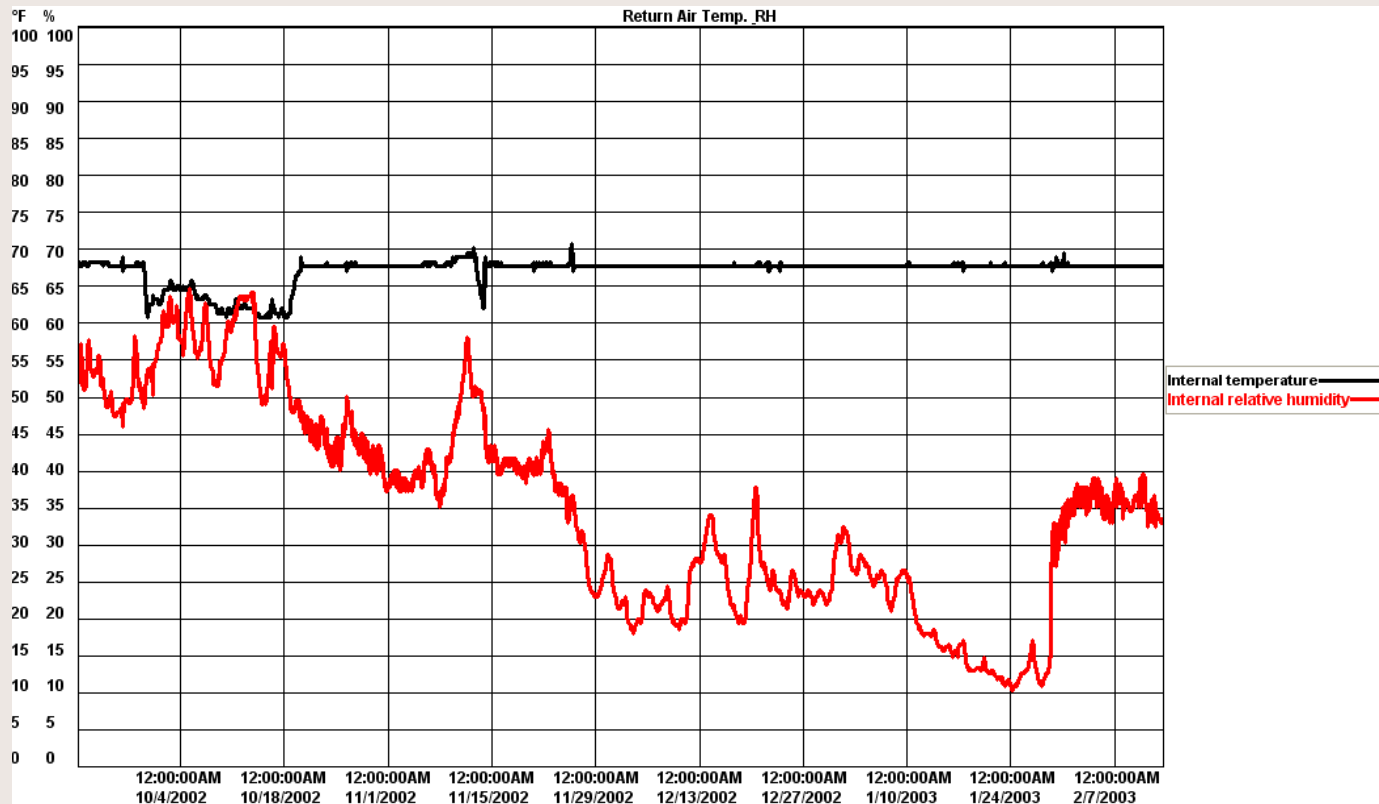
### *Causes:*

Insufficient maintenance of humidifier

Humidifier disabled

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## Storage Space Drier than Necessary





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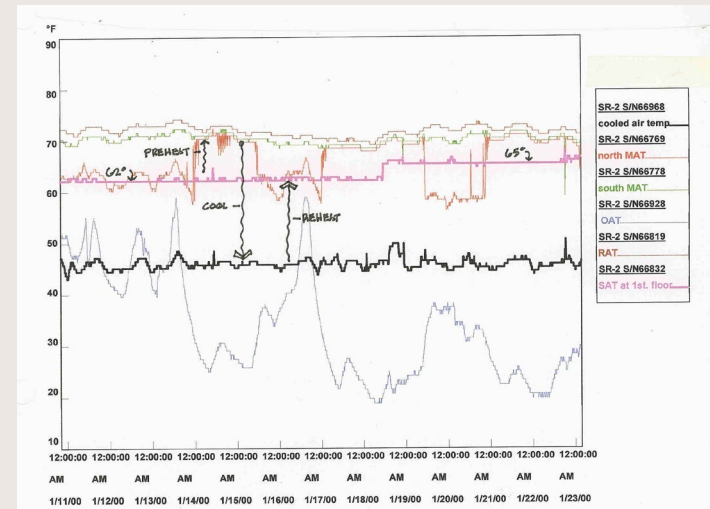
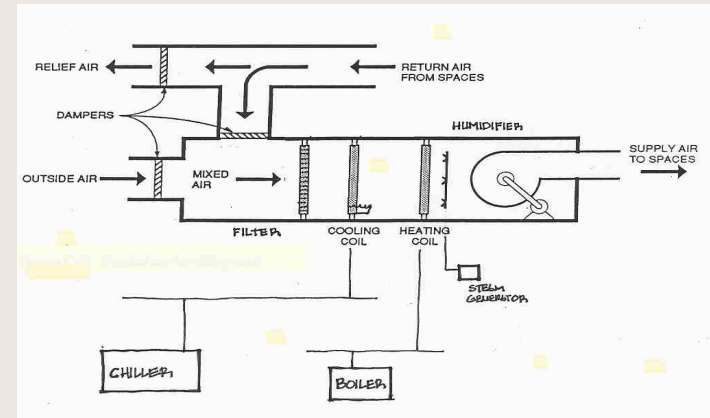
## Findings:

### *Sub-optimal energy performance:*

- **Unnecessary sub-cooling and reheating**
- **Excess preheating of outside air**
- **Underutilization of variable speed drives on supply fans**
- **Unnecessary operation of space lighting**

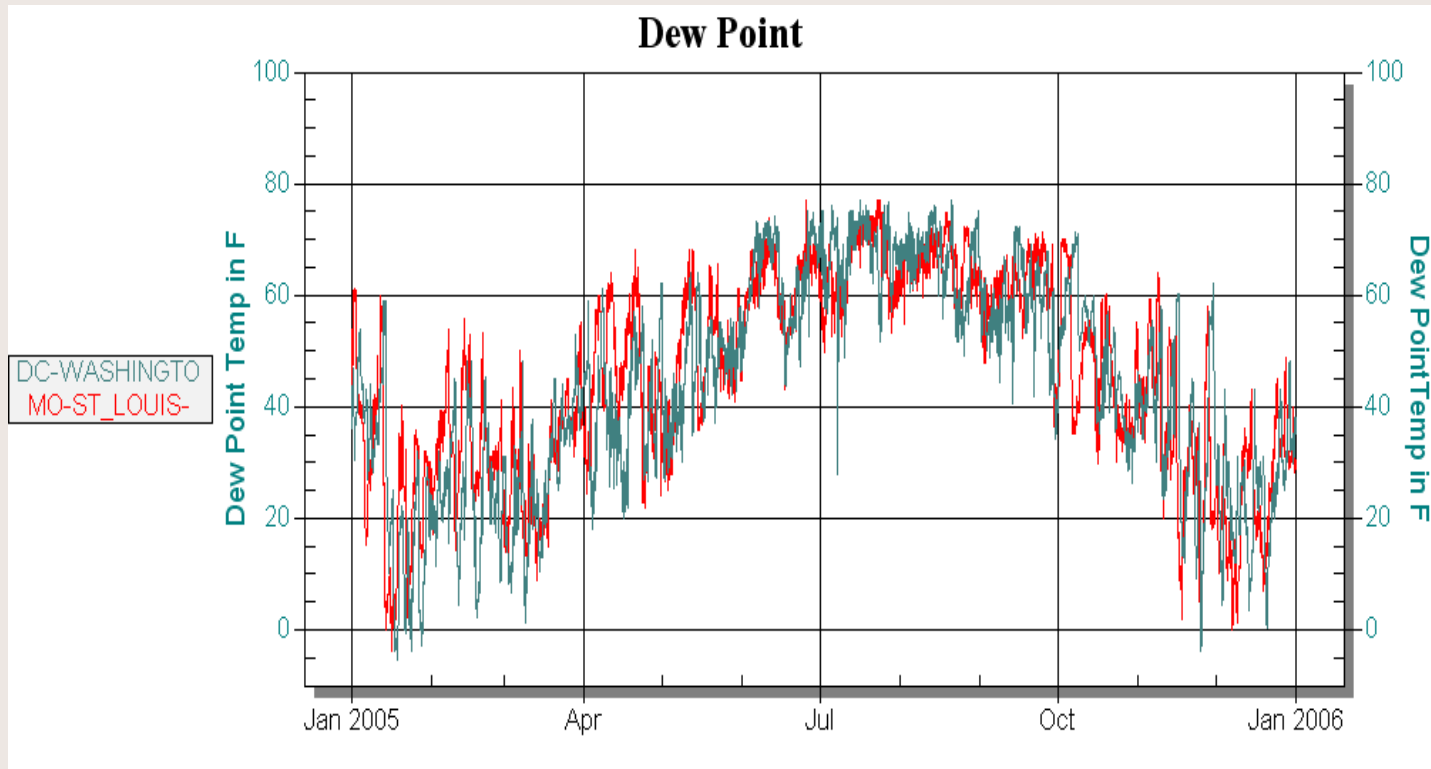
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## Unnecessary Sub-Cooling and Reheating



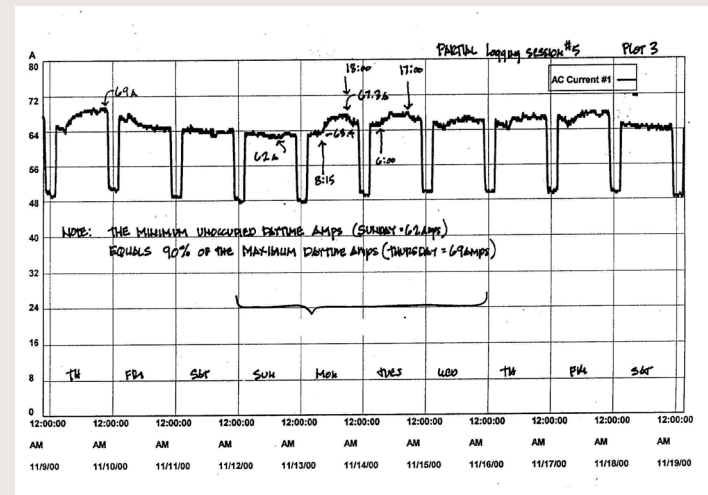
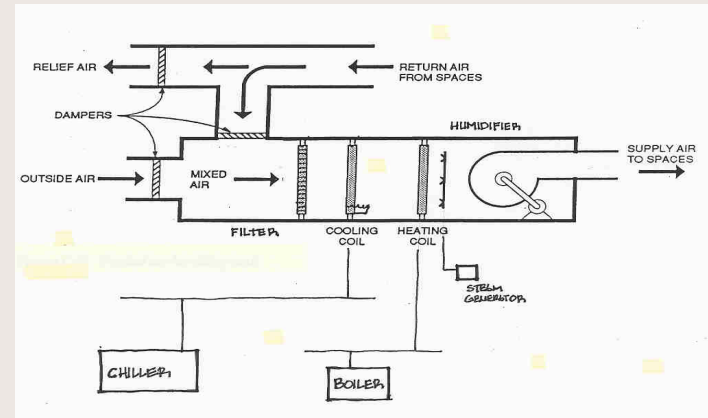
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## Outside Air Dew Points



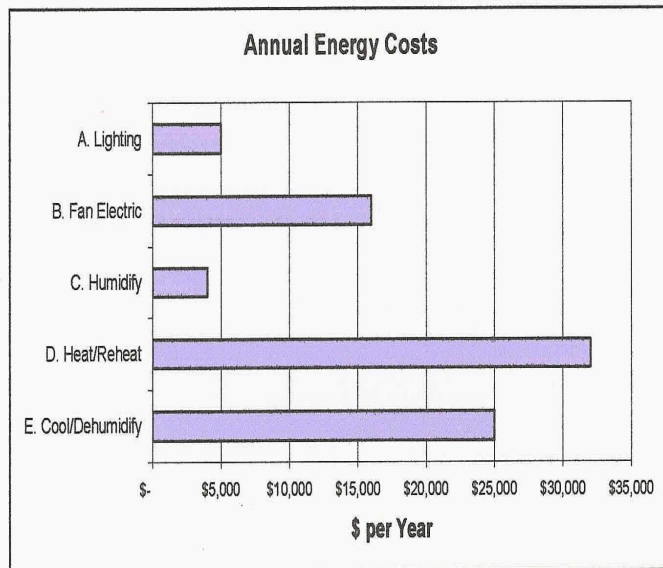
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## Underutilized Variable Speed Drive

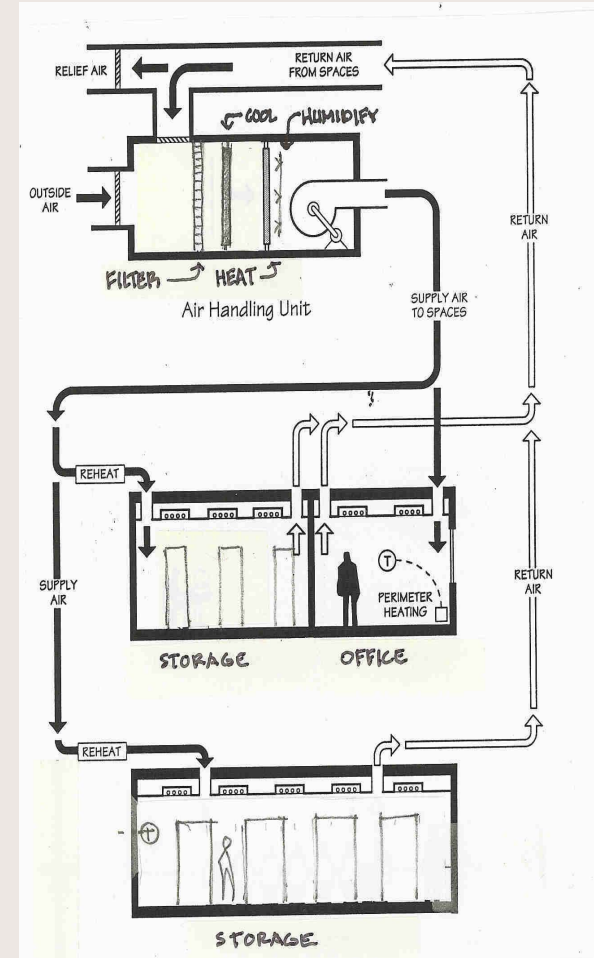


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## Energy Costs Savings Opportunities

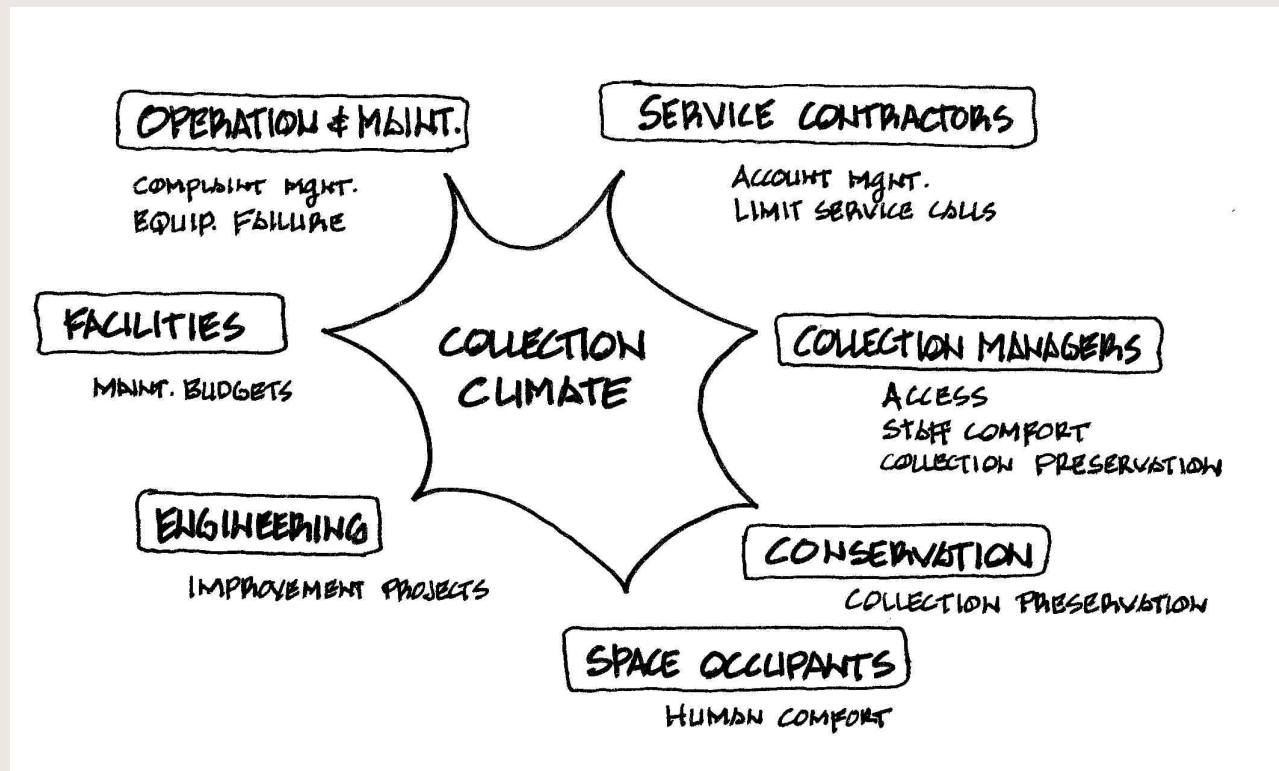


	Typical Operation	Optimal Operation
A. Lighting	\$ 5,000	\$ 4,000
B. Fan Electric	\$ 16,000	\$ 12,000
C. Humidify	\$ 4,000	\$ 4,000
D. Heat/Reheat	\$ 32,000	\$ 22,000
E. Cool/Dehumidify	\$ 25,000	\$ 17,000
<b>Total</b>	<b>\$ 82,000</b>	<b>\$ 59,000</b>



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## People Who Affect Collection Climates



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## Recommendation:

### **Form a Preservation Environment Management Team**

#### **Responsible for:**

- 1. Documenting Systems' Configuration & Capabilities**
- 2. Negotiating Climate Goals**
- 3. Measuring Actual Performance**
- 4. Quickly Correcting Sub-Optimal Performance**

