



# **Energy Savings Trial in the Library of Congress Adams Building**

**Conservation<sup>2</sup>:  
NARA 25<sup>th</sup> Annual  
Preservation Conference**

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**Could a planned adjustment to  
HVAC operation result in significant  
energy and cost savings without  
placing collections at risk?**



# WHY?

- Right Thing to Do
- Strategic Thing to Do

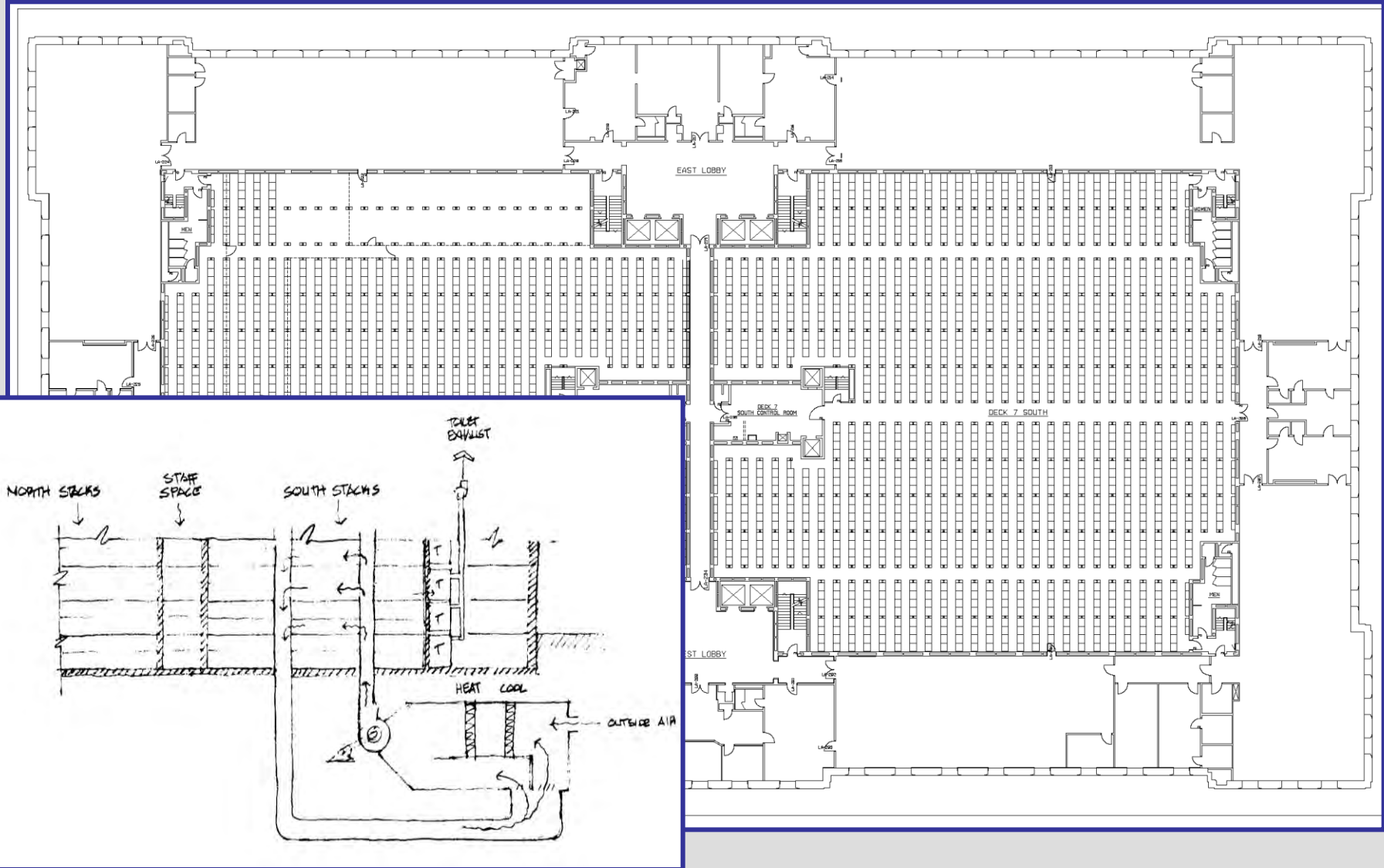
DEW POINT °F	SPACE TEMP 60°F		SPACE TEMP 65°F		SPACE TEMP 70°F	
	%RH	PI	%RH	PI	%RH	PI
43°	54%	65	45%	64	38%	54
44°	56%	61	47%	61	39%	52
45°	58%	58	49%	58	41%	49
46°	60%	55	50%	56	42%	48
47°	62%	52	52%	53	44%	46
48°	65%	48	54%	50	46%	43
49°	67%	46	56%	48	47%	42
50°	70%	42	58%	45	49%	40

## WHERE?

- Surrounded by Tempered Space
- Dedicated Air Handler
- Space for Storage Only
- Timed Lighting Control
- Well Studied Area



# The LIBRARY of CONGRESS PRESERVATION





## HOW

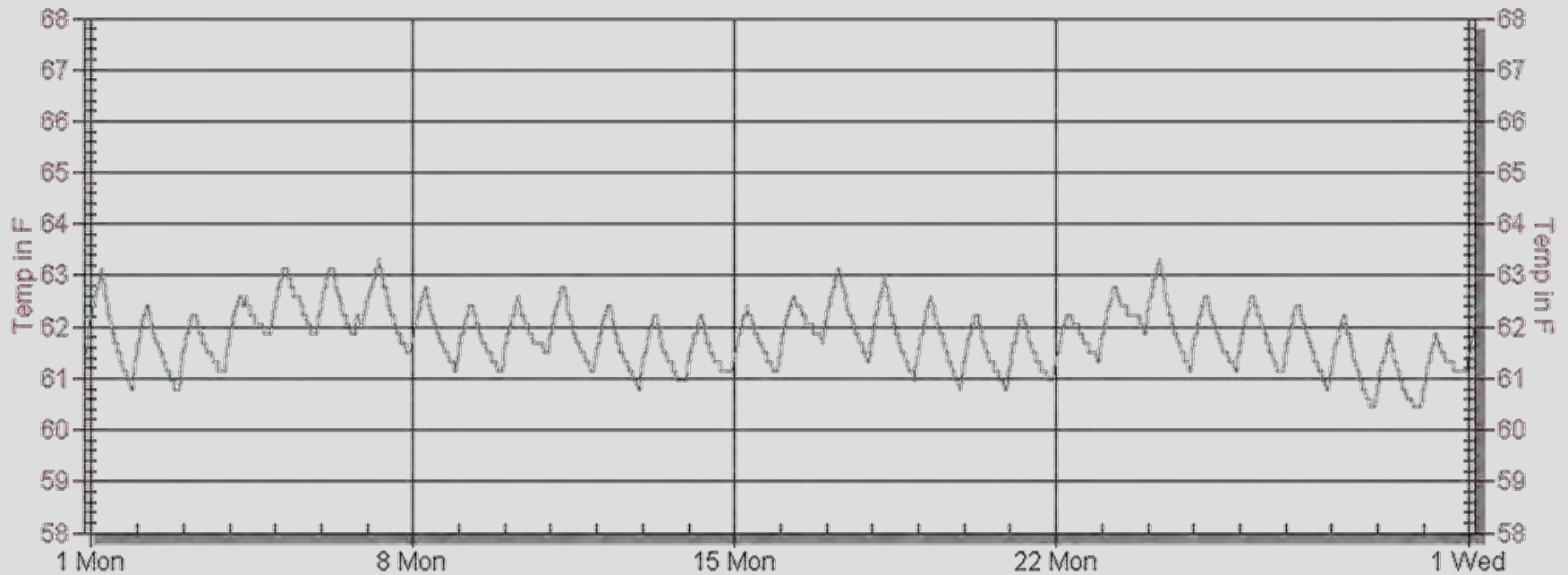
- **7.5 Hours / Night Automated HVAC Shutdown**
- **Initial One Month Trial, January 2010**
- **After Evaluation Nightly Shutdown Continued March 2010**
- **Full Sunday Shutdown Started December, 2010**
- ❖ **North Side Trial Started December 2010**

## RESULTS

- **1.5 F Temperature Gain/Night**
- **3.5 F Temperature Gain with Sunday**
- **Little RH Effect Due to Shutdown**
- **Variable Changes to Preservation Index /  
Time Weighted Preservation Index**
- **31 - 41% Potential Energy / Cost Savings**



## NIGHTLY RISE F

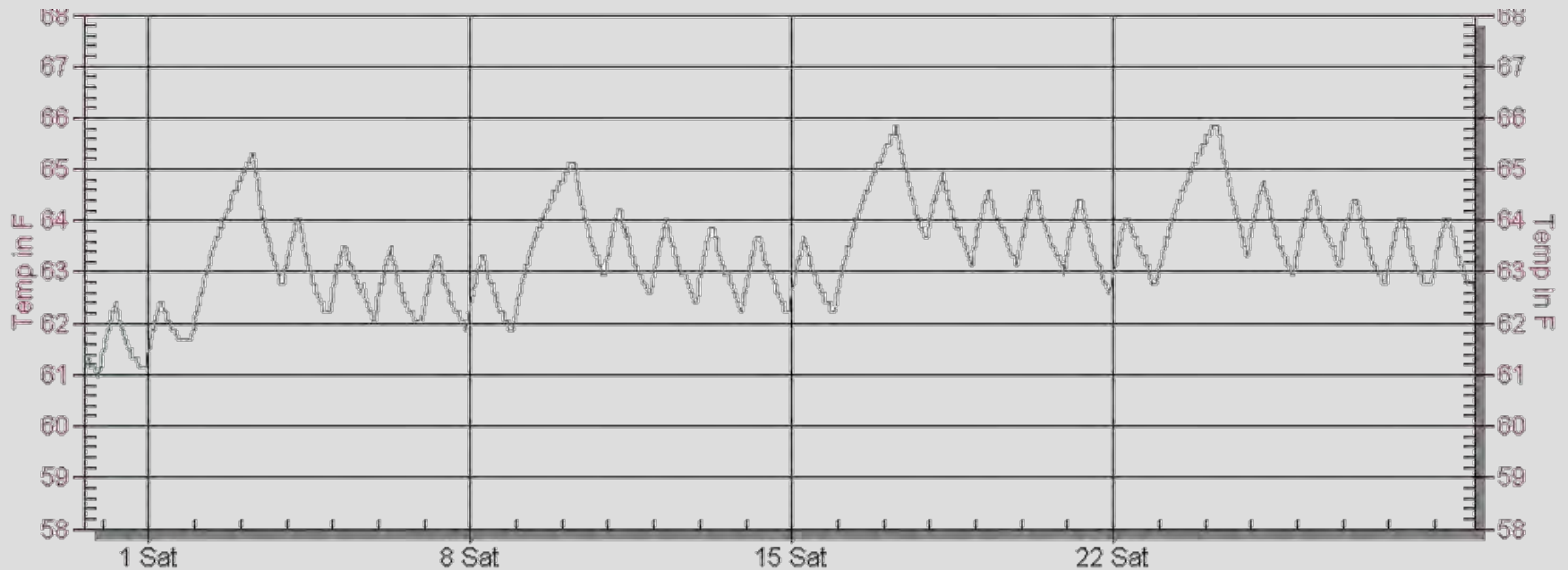


**November 2010**

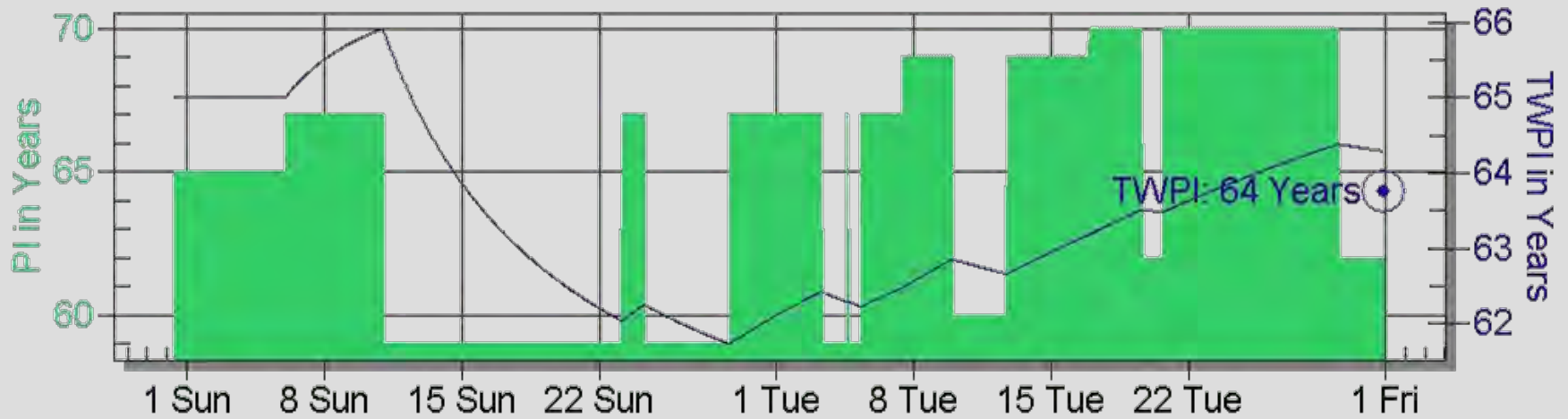




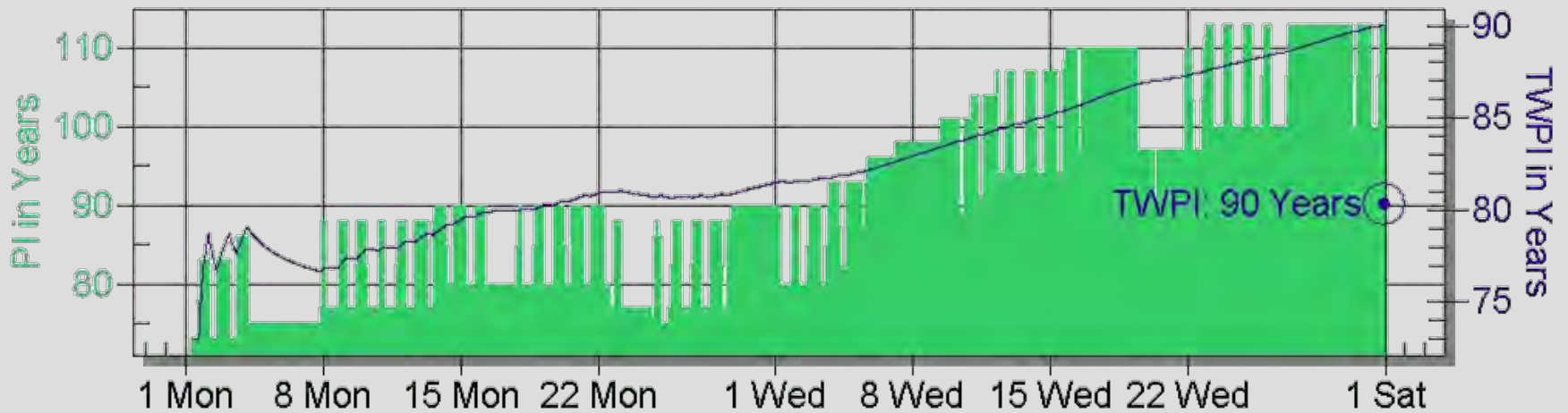
## RISE WITH SUNDAY F



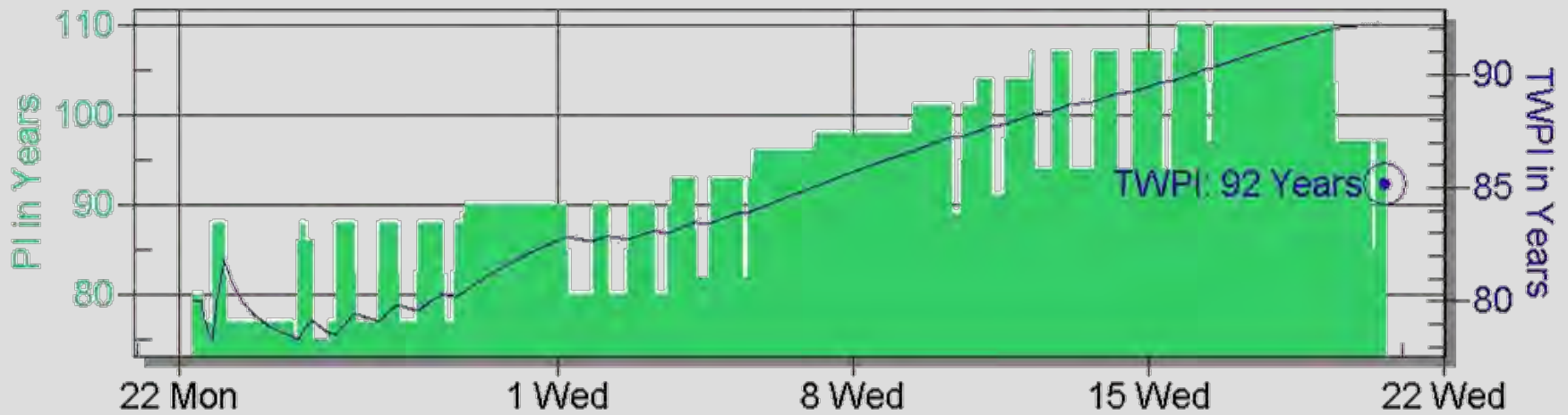
**December 2011**



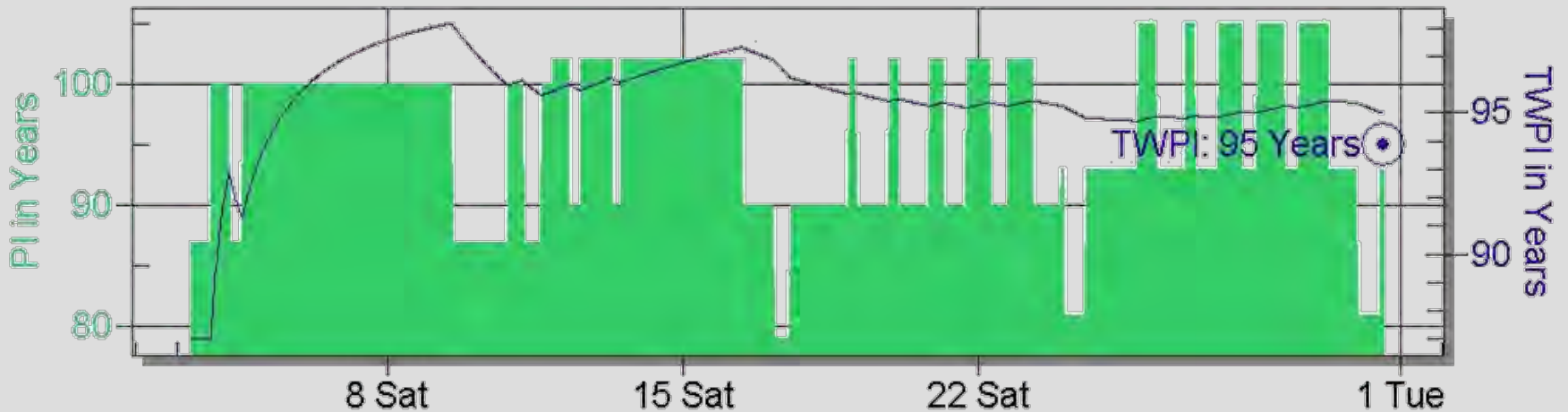
**Two months pre shutdown: Nov 1 – Dec 31, 2009**



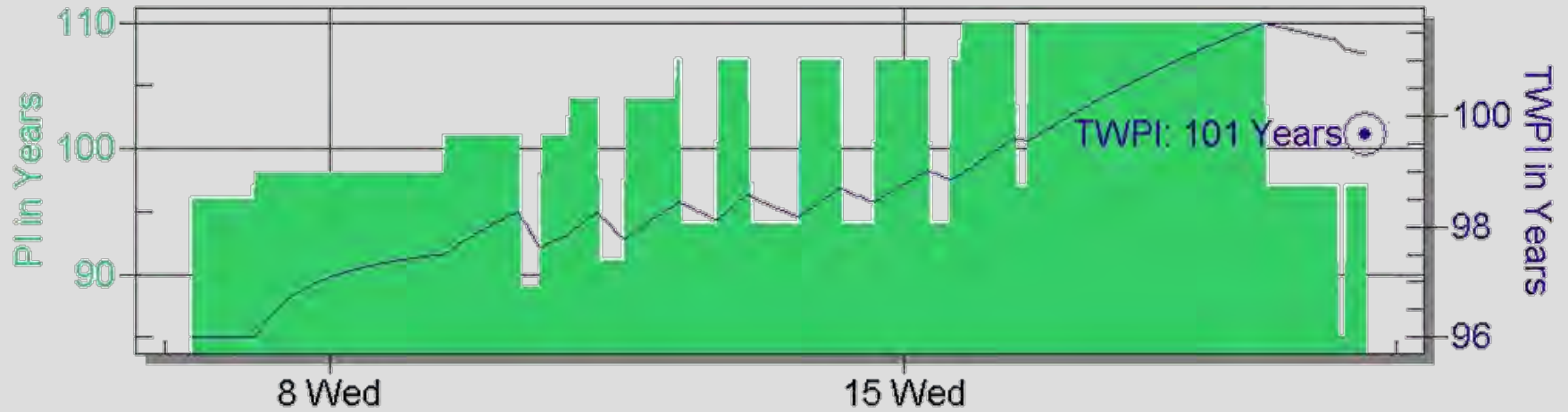
**Two months during shutdown: Nov 1 – Dec 31, 2010**



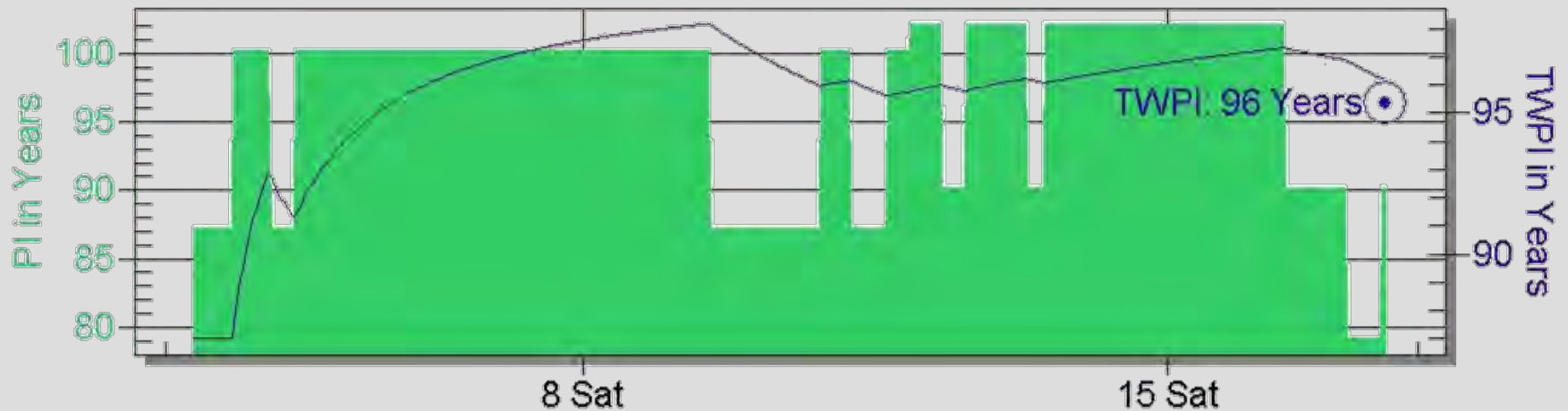
**One Month Pre-Sunday: Nov - Dec, 2010**



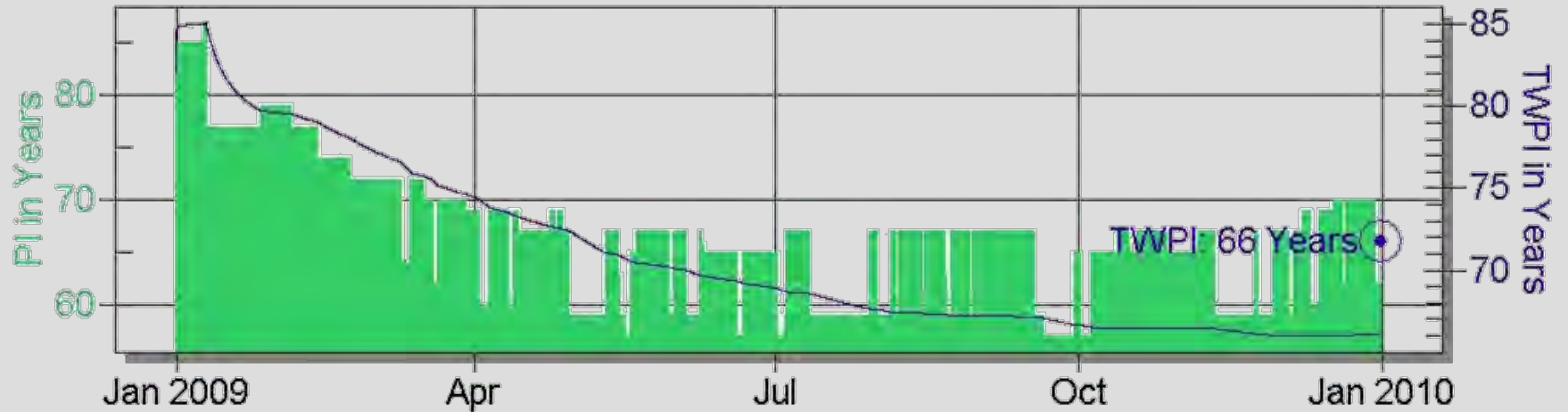
**One Month with Sunday: January , 2011**



**Two week December 2010**



**Two week January 2011**



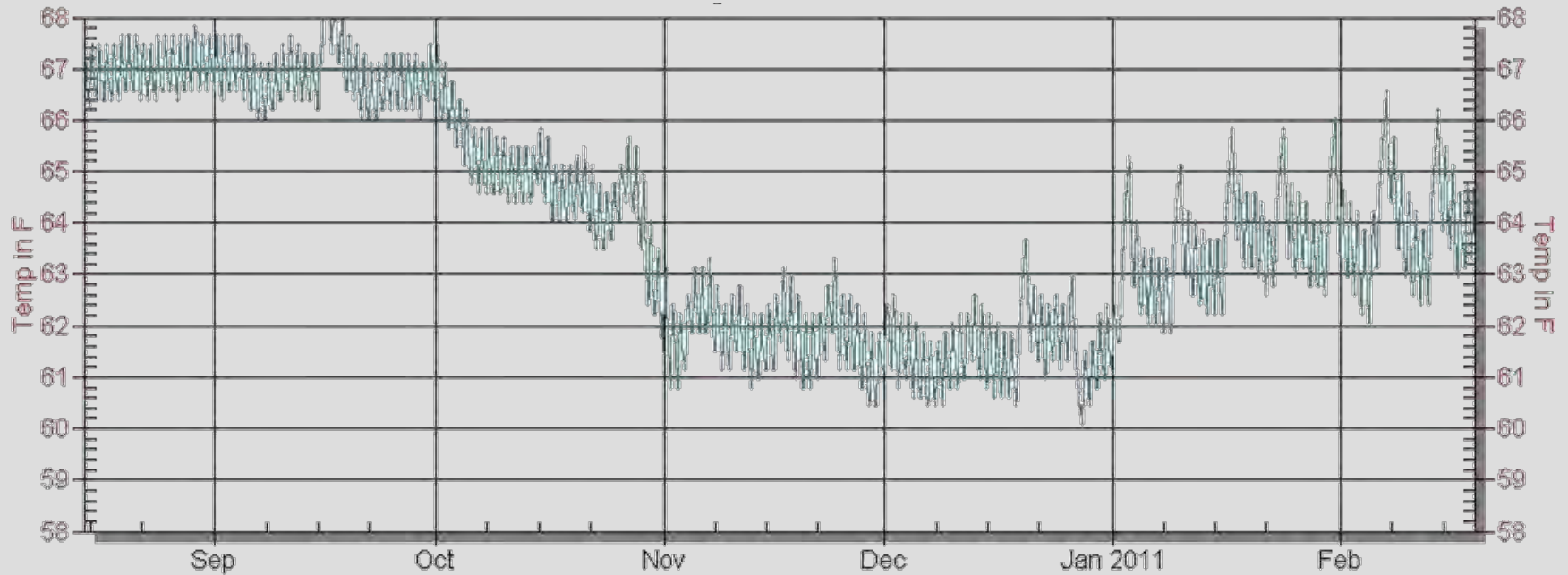
**One year pre-trial: 2009**



**One year during trial: 2010**

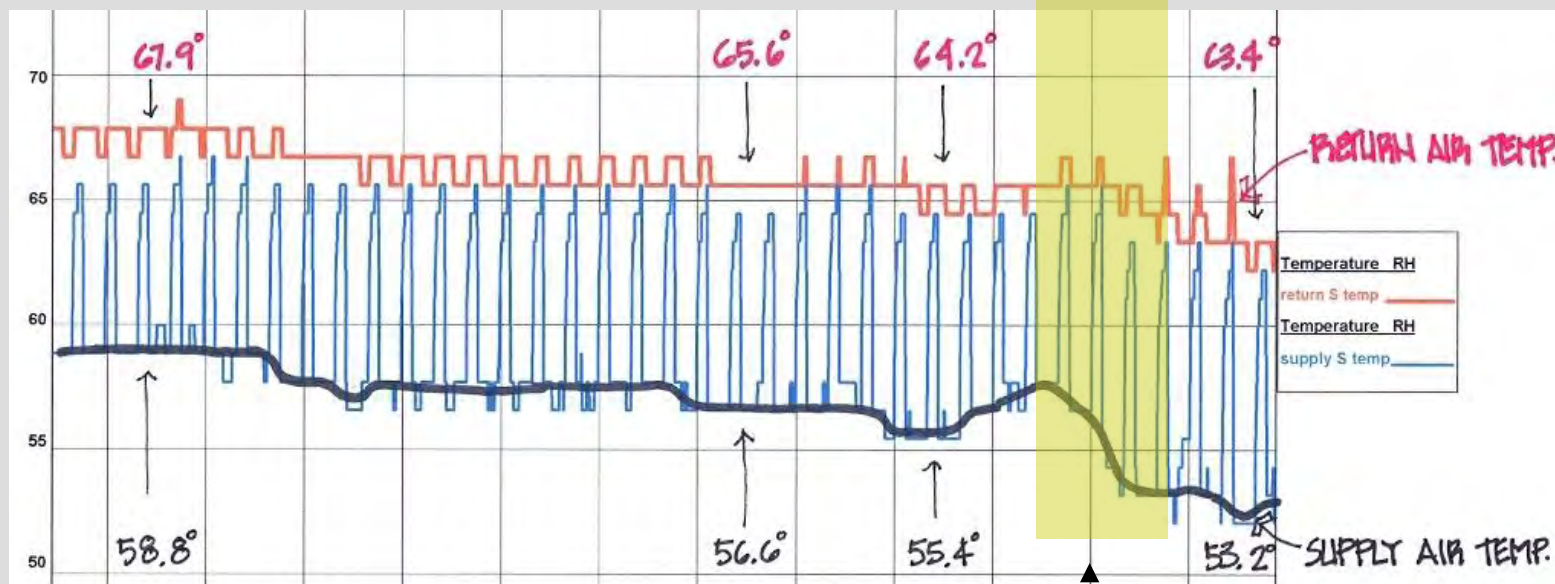
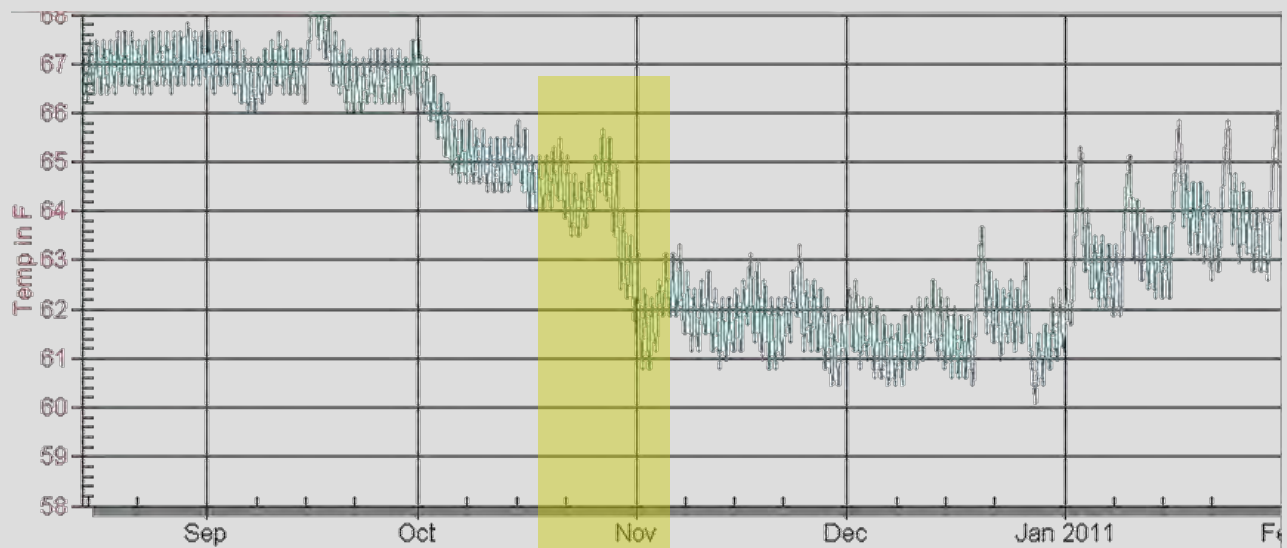


## 6 MONTH FLUCTUATION F



**August 2010 – February 2011**

# The LIBRARY of CONGRESS PRESERVATION



Oct. 28



## Annual Dollar / Energy Savings

Constant Operation	One Unit	X 2 = Adams North and South Units
Cooling \$	110,000	222,000
Heating \$	98,000	196,000
Fan \$	25,650	51,300
Total	\$ 233,650	\$ 467,300
<b>31% Savings from Nightly Shutdown</b>	<b>\$ 72,431</b>	<b>\$ 144,863</b>
<b>41% Savings from Nightly Shutdown + Sunday</b>	<b>\$ 97,797</b>	<b>\$ 195,594</b>





## CONCLUSIONS

- **Nightly Increase Does Not Result in Significant Preservation Risk**
- **Additional Hours off Sunday Possibly Acceptable During Months with  $RH \leq 35\%$**
- **Control of Supply Air Temperature is Critical to Ensure Acceptable Preservation Index**
- **Control of Summer Dew Point is Critical to Ensure Acceptable Preservation Index**

## NEXT STEPS

- **Work with Air Conditioning Shop to Limit Supply Air Fluctuations**
- **Work with Air Conditioning Shop to Limit Summer Dew Point Close to Chilled Water Temp**
- **Investigate Any Potential Sources of Heat During Shutdown Hours**
- **Determine Appropriate Schedule for Shutdown**



# Acknowledgements

## Architect of the Capitol

- Superintendent's Office, Library Buildings and Grounds

## Herzog / Wheeler Associates

## Image Permanence Institute

## Library of Congress

- Facility Operations, Facility Services
- Library Services
- Preservation Directorate
  - Benjamin Bahlmann