Honeywell

Honeywell Building Solutions

Energy Audit Report

Energy Performance Contracting Services

Presented To:

Northern Maine Community College

NORTHERN MAINE COMMUNITY COLLEGE

March, 2009

Submitted By:

Jim Lucy

Mike Hastings, PE CEM LEED AP

Honeywell
501 County Road
Westbrook, ME 04092
800/949-2758

Table of Contents

Section Four – Measurement and Verification

Section Five – Appendices





Executive Summary
Section One

1.0 Introduction

Honeywell is pleased to submit our preliminary proposal for comprehensive energy efficiency and HVAC upgrades throughout the Northern Maine Community College campus. The proposal is intended to provide an overview of our recommendations to reduce and contain energy costs throughout the college buildings. In addition, it was developed to outline additional "non-energy saving" improvements designed to provide a more comfortable and healthy learning environment, and to address ongoing deferred maintenance needs.

Background

In order to reduce energy consumption and address deficiencies in its buildings, Northern Maine Community College and Honeywell agreed to explore the potential to use Energy Savings Performance Contracting as a vehicle to reduce energy costs and fund necessary improvements. The philosophy behind this analysis is to identify improvements that can be paid for by utilizing energy and operational savings and Utility Rebates. Our solution provides a means to upgrade your facilities and improve conditions, without any additions to your budget.

The measures identified in this energy audit report fulfill the College's needs by providing needed facility improvements, improved building comfort, and energy and operational cost reductions. Each of the proposed project options maximizes the improvements that can be paid through savings and utility rebates.

In our discussions with College representatives, we identified several primary needs that will be addressed in Honeywell's proposed solutions. The primary needs that we identified are:

- ***Reduce Operating Costs*** - The first priority is to implement a project that makes economic sense for the College by reducing operating costs, and creating a savings/revenue stream that will pay for the project.
- ***Improve the Comfort of the Occupants*** – Some of the current building HVAC systems are not operating properly. Some comfort and ventilation deficiencies exist in the buildings. In some cases, it is due to antiquated equipment, in others it is existing systems not operating properly or not being designed to current building code standards. This proposal provides options to address these issues by updating HVAC equipment, building control systems and maintenance best practices. Additional options can be developed at the request of the College.
- ***Address Aging Equipment*** - Our discussions with College personnel, as well as our physical examination of the facilities, identified a number of the buildings with equipment that are beyond or approaching their useful service life. As outlined in our report and proposal options, Honeywell has developed a comprehensive plan and cost effective payment methods to help the College address these capital needs.

Honeywell would like to extend its sincere thanks to all Northern Maine Community College personnel who assisted with the development of this report.

Baseline Energy History

Honeywell studied and analyzed a two year history of the buildings' electrical, fuel oil, propane and water and sewer consumption. The baseline period selected for the utilities affected by the energy measures included in this report are as follows:

Base Year Period	Electric	Fuel Oil
All Buildings	July 2006 to June 2008	July 2006 to June 2008

Current Utility Rates

Utility information provided by NMCC and the utility providers included consumption data for Electric, Fuel Oil, Water and Sewer. The usage per building was taken directly from the utility billing information. The following is a summary of the utility costs, energy type and units by building that were utilized in our energy savings calculations.

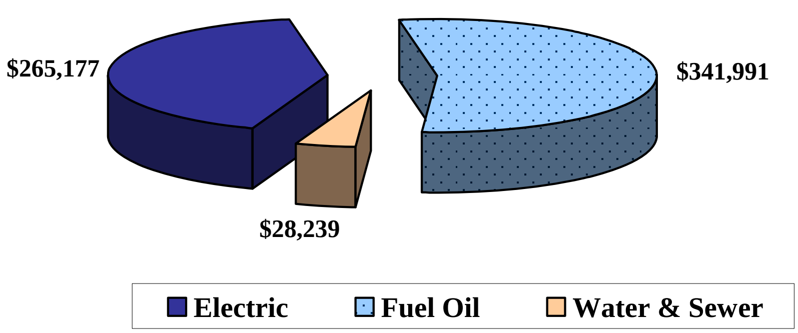
Utility Analysis Period: FY08 vs. FY07

	Current Year (FY08)			Prior Year (FY07)		
	Electric	Fuel Oil	Water & Sewer	Electric	Fuel Oil	Water & Sewer
Utility Costs*	$265,177	$341,991	$28,239	$247,463	$266,912	
Utility Usage (kWh, Gal, Cu.ft.)	1,805,600	120,817	441,100	2,002,800	130,544	
$ Cost/Unit (kWh, Gal, Cu.ft.)	$0.1469	$2.83	$0.06	$0.1236	$2.04	
Electric Demand (kW)	5,206			5,706		

* Costs include energy and demand components, as well as taxes, surcharges, etc.

Note: The above utility data applies to the entire campus. The water & sewer data does not include the fire costs of $3,442 per year.

Actual Cost by Utility - FY08



Utility Rates

Utility information provided included consumption data for electric and #2 fuel oil. The use per building for #2 fuel oil was taken directly from the utility billing information. The fuel oil (No. 2 oil) price used in the analysis was $3.00 per gallon. The actual electric utility cost data averages were used over the Base Year period for each building individually. Future consumption of all utilities was based on averages of the Base Year period consumptions.

Information for this study was primarily obtained during site visits, review of construction drawings, interviews with building personnel, equipment nameplate data, utility data, and equipment measurements. Operating information was obtained from data collected during the survey, data logger results as outlined in the appendix and dialogues with building staff.

Scope of Work Overview

This report describes improvements identified during the energy audit phase to increase energy efficiency, building comfort, and address deficiencies associated with the energy infrastructure in the Northern Maine Community College facilities. Section 3 provides a description of the Energy Conservation Measures (ECMs) and Non-Energy Recommendations (NERs) that have been identified and recommended for implementation.

The various options and associated symbol descriptions are:

- 15-Year
- 15-Year Capital Improvement (includes all measures described in this report)

Measurement and Verification – Guaranteed Performance

Honeywell proposes a cost-effective plan for Measurement and Verification (M&V) to ensure that the guaranteed savings are realized over the contract term. Our proposed approach strikes a balance between the cost of M&V, and the level of information required to substantiate our savings guarantee and performance.

Prior to construction, Honeywell will establish baseline efficiencies and operational parameters. Parameters that are beyond Honeywell's control, such as operating hours, energy rates, and others, will be agreed upon between Honeywell and the College, and stipulated for the term of the contract. After construction is completed, Honeywell will conduct post-installation measurements in accordance with the M&V Plan. Actual savings will then be determined from the baseline measurements, post-installation measurements, and agreed-upon stipulated parameters. In the event that actual savings are less than the guaranteed savings, Honeywell will take steps to identify and implement, at its cost, the necessary improvements to generate sufficient savings, or pay the College the difference between the actual and guaranteed savings. Finally, on an annual basis, Honeywell will conduct site surveys and measurements to confirm that the efficiency and operating conditions for each energy conservation measure are maintained. A more detailed description of our M&V approach is described in Section 4 of this report. A specific cost for the M&V services will be established once a final project scope of work is determined.

Financial Summary

Honeywell's preliminary financial analysis focused on all of the recommended improvements described in Section 3. Consistent with the terms and conditions of the Letter of Intent agreement, Honeywell has developed a 15-year self-funded project option for consideration. We have also developed a 15-year capital improvement option that includes all improvements recommended in Section 3 of this report.

The following financial analysis summarizes the impact on the College's budget, for each of the options on a fiscal year basis over a 20-year period. Several assumptions have been made in putting these projections together. These assumptions include:

- 15-year financing at a fixed 5.25% interest rate, Energy inflation rate of 3.5%
- Debt service payments increase at a fixed 3.5% per year over the finance term
- No significant changes from the energy baseline conditions in each building for hours of operation, equipment use, weather conditions and utility rates
- Maine Public Service rebates in the amount of $12,105

Please note, that the financial summaries do not include costs for the removal or remediation of lead based paint or asbestos containing materials. The removal or remediation of lead based paint and/or asbestos containing materials will be the responsibility of the College, and is separate from all scope descriptions and costs herein. The table below summarizes the financial impacts of implementing Honeywell's recommendations:

15 Year Option:

Project Cost	$861,468
Utility Rebate	$12,105
1st Year Savings	$68,245
1st Year Annual Lease Purchase Payment	$67,796
Cumulative Cash Flow over 15 Years	$74,432
Cumulative Cash Flow over 20 years	$712,530

15 Year Capital Improvement Option:

Project Cost	$5,301,540
Utility Rebate	$12,105
1st Year Savings	$151,016
1st Annual Lease Purchase Payment	$417,221
Cumulative Cash Flow over 15 Years	($4,180,945)
Cumulative Cash Flow over 20 years	($2,384,900)

The following pages provide a financial summary that displays a detailed year by year breakout of the financial impacts of the project options.

15 Year Project

Honeywell

NORTHERN MAINE COMMUNITY COLLEGE PERFORMANCE CONTRACTING PROJECT
20 YEAR PRELIMINARY FINANCIAL ANALYSIS
FINANCIAL INSTRUMENT - 15 YEAR LEASE PURCHASE AGREEMENT

Project Cost
Amount Financed
Interest Rate
Term

Project Cost	**$861,468**		
Amount Financed	**$861,468**	**Inflation Rate**	
Interest Rate	**5.25%**	**Energy**	**3.5%**
Term	**15 Years**	**Project Financing**	**3.5%**

Fiscal Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	TOTAL
Energy Savings	$71,026	$73,512	$76,085	$78,748	$81,504	$84,357	$87,309	$90,365	$93,528	$96,801	$100,189	$103,696	$107,325	$111,082	$114,969	$118,993	$123,158	$127,469	$131,930	$136,548	$2,008,593
Utility Rebate	$12,105																				$12,105
Operational																					
TOTAL UTILITY & OPERATIONAL SAVINGS	**$83,131**	**$73,512**	**$76,085**	**$78,748**	**$81,504**	**$84,357**	**$87,309**	**$90,365**	**$93,528**	**$96,801**	**$100,189**	**$103,696**	**$107,325**	**$111,082**	**$114,969**	**$118,993**	**$123,158**	**$127,469**	**$131,930**	**$136,548**	**$2,020,698**
Project Costs																					
Project Financing	$67,796	$70,169	$72,625	$75,167	$77,797	$80,520	$83,338	$86,255	$89,274	$92,399	$95,633	$98,980	$102,444	$106,030	$109,741						$1,308,168
Measurement & Verification	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD						
Cost to Ventilate	$2,781	$2,878	$2,979	$3,083	$3,191	$3,303	$3,419	$3,538	$3,662	$3,790	$3,923	$4,060	$4,202	$4,349	$4,502	$4,659	$4,822	$4,991	$5,166	$5,346	$78,646
TOTAL COSTS	$67,796	$70,169	$72,625	$75,167	$77,797	$80,520	$83,338	$86,255	$89,274	$92,399	$95,633	$98,980	$102,444	$106,030	$109,741						$1,308,168
NET ANNUAL BUDGET IMPACT	$15,335	$3,343	$3,460	$3,581	$3,707	$3,836	$3,971	$4,110	$4,253	$4,402	$4,556	$4,716	$4,881	$5,052	$5,229	$118,993	$123,158	$127,469	$131,930	$136,548	$712,530
CUMMULATIVE CASH FLOW	$15,335	$18,678	$22,138	$25,720	$29,426	$33,263	$37,233	$41,343	$45,596	$49,999	$54,555	$59,271	$64,152	$69,204	$74,432	$193,425	$316,583	$444,052	$575,982	$712,530	$712,530

15 Year Capital Improvement Option (Full Project)

Honeywell

NORTHERN MAINE COMMUNITY COLLEGE PERFORMANCE CONTRACTING PROJECT
20 YEAR PRELIMINARY FINANCIAL ANALYSIS
FINANCIAL INSTRUMENT - 15 YEAR LEASE PURCHASE AGREEMENT

Project Cost	Project Cost	$5,301,540	
Amount Financed	Amount Financed	$5,301,540	Inflation Rate
Interest Rate	Interest Rate	5.25%	Energy 3.5%
Term	Term	15 Years	Project Financing 3.5%

Fiscal Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	TOTAL
Energy Savings	$199,916	$206,913	$214,155	$221,650	$229,408	$237,437	$245,748	$254,349	$263,251	$272,465	$282,001	$291,871	$302,087	$312,660	$323,603	$334,929	$346,652	$358,784	$371,342	$384,339	$5,653,561
Utility Rebate	$12,105																				$12,105
Operational																					
TOTAL UTILITY & OPERATIONAL SAVINGS	$212,021	$206,913	$214,155	$221,650	$229,408	$237,437	$245,748	$254,349	$263,251	$272,465	$282,001	$291,871	$302,087	$312,660	$323,603	$334,929	$346,652	$358,784	$371,342	$384,339	$5,665,666
Project Costs																					
Project Financing	$417,221	$431,824	$446,938	$462,581	$478,771	$495,528	$512,871	$530,822	$549,401	$568,630	$588,532	$609,130	$630,450	$652,516	$675,354						$8,050,566
Measurement & Verification	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD						
Cost to Ventilate	$48,900	$50,612	$52,383	$54,216	$56,114	$58,078	$60,111	$62,214	$64,392	$66,646	$68,978	$71,393	$73,891	$76,477	$79,154	$81,925	$84,792	$87,760	$90,831	$94,010	$1,382,876
TOTAL COSTS	$417,221	$431,824	$446,938	$462,581	$478,771	$495,528	$512,871	$530,822	$549,401	$568,630	$588,532	$609,130	$630,450	$652,516	$675,354						$8,050,566
NET ANNUAL BUDGET IMPACT	($205,200)	($224,911)	($232,783)	($240,930)	($249,363)	($258,090)	($267,123)	($276,473)	($286,149)	($296,165)	($306,530)	($317,259)	($328,363)	($339,856)	($351,751)	$334,929	$346,652	$358,784	$371,342	$384,339	($2,384,900)
CUMMULATIVE CASH FLOW	($205,200)	($430,111)	($662,894)	($903,824)	($1,153,186)	($1,411,277)	($1,678,400)	($1,954,873)	($2,241,022)	($2,537,187)	($2,843,717)	($3,160,976)	($3,489,339)	($3,829,195)	($4,180,945)	($3,846,016)	($3,499,365)	($3,140,580)	($2,769,239)	($2,384,900)	($2,384,900)

* Utility Rebates - Are projected at this time and subject to final approval.

* Operational Savings - Have not been included in the cash flow.

* Guaranteed Savings Measurement and Verification (M&V) Annual Costs - Poject cash flow currently does not account for annual M&V costs.

Survey Findings
Section Two

2.0 Introduction

Purpose
As part of an energy performance contract, Honeywell has performed an energy audit for Northern Maine Community College. The following report details survey findings and recommendations, along with a summary of energy saving strategies and recommended upgrades as part of a Guaranteed Energy Savings Contract.

Surveys were conducted in the following facilities:

Building	**Square Footage**
Christie Complex	125,541
Mailman Trades Building	44,734
Residential Buildings	68,894
Shop Buildings	15,242
Total	**214,150**

Information for this study was primarily obtained during site visits to the facilities, onsite observations, interviews with facility personnel, equipment nameplate data, available utility data, and equipment measurements. Operating information was obtained from data collected during the survey and dialogues with facility staff.

Baseline Operating Parameters
Following are the facilities and systems operations measured and/or observed during the investigation period. The data summarized will be used in the calculations of the baseline energy consumption and/or demand, and for calculating baseline adjustments for changes in facility operation that occur during the Guarantee Period. Honeywell and Northern Maine Community College agree that the operating parameters specified in this section are representative of equipment operating characteristics during the Base Year specified as the average of the July 2006 to June 2008 utility expenditures. The following data was collected with the assistance of Northern Maine Community College personnel.

NORTHERN MAINE COMMUNITY COLLEGE
EXISTING SCHEDULES & TEMPERATURE SETPOINTS

NMCC - EXISTING SCHEDULES & TEMPERATURE SETPOINTS

Baseline operating parameters are the faciltiy(s) and system(s) operations measured and/or observed before commencement of the Work. The data summarized will be used in the calculations of the baseline energy consumption and/or demand and for calculating baseline adjustments for changes in facility operation that occur during the Guarantee Period.

HONEYWELL and CUSTOMER agree that the operating parameters specified are representative of equipment operating characteristics during the Base Year specified in the Agreement.

The following data was collected with the assistance of the Facilties Manager and various building personnel and data logging equipment.

Results of data logging equipment are attached hereto, and incoporated herein by reference, as Exhibit G2.

			Occupied Schedule					Unoccupied/Holiday & Vacations Schedule (See note #2)					
Equipment Designation	Zone / Area Served	Qty.	Days	Begin	End	Setpoint	OA Intake	Days	Begin	End	Days	On/Off	Setpoint
Christie Complex													
RTU-1	Library	1	M-F	8:00	16:00	70 deg F	50%	M-F	16:00	8:00	S-S	On schedule	60 deg F
RTU-2	Conference Center	1	M-F	6:00	18:00	72 deg F	20%	M-F	18:00	6:00	S-S	Off	66 deg F
RTU-3	Continuing Ed	1	M-F	7:00	16:00	73 deg F	50%	M-F	16:00	7:00	S-S	Off	67 deg F
HV-1	Womens Locker Room	1	M-F	5:00	16:00	72 deg F	10%	M-F	16:00	5:00	S-S	Off	66 deg F
HV-2	Mens Locker Room	1	M-F	5:00	16:00	72 deg F	80%	M-F	16:00	5:00	S-S	Off	66 deg F
AHU-3+4	Gymnasium	2	M-F	6:00	17:00	67 deg F	15%	M-F	17:00	6:00	S-S	Off	62 deg F
HV-4	Learning Center	1	M-F	0:01	14:00	70 deg F	0%	M-F	14:00	0:01	S-S	Off	68 deg F
HV-6	Nursing	1	M-F	7:00	17:30	75 deg F	0%	M-F	17:30	7:00	S-S	Off	65 deg F
HV-7	2nd Floor Offices and Hallway	1	M-F	7:00	21:30	72 deg F	0%	M-F	21:30	7:00	S-S	Off	60 deg F
HV-8	Classrooms 201-203	1	M-F	7:00	21:30	70 deg F	15%	M-F	21:30	7:00	S-S	Off	60 deg F
HV-9	Racketball Court	1	M-F	12:00	12:01	60 deg F	0%	M-F	12:01	12:00	S-S	Off	60 deg F
HV-10	Lecture Hall	1	M-F	6:00	16:30	72 deg F	5%	M-F	16:30	6:00	S-S	Off	66 deg F
HV-110	Room 110	1	M-F	4:00	20:00	70 deg F	0%	M-F	20:00	4:00	S-S	Off	60 deg F
HV-111	Room 111	1	M-F	8:00	16:00	70 deg F	10%	M-F	16:00	8:00	S-S	Off	60 deg F
HV-112	Room 112	1	M-F	6:00	16:00	72 deg F	0%	M-F	16:00	6:00	S-S	Off	66 deg F
TAB-108B	Room 108B	1	M-F	12:00	12:01	72 deg F	5%	M-F	12:01	12:00	S-S	Off	66 deg F
TAB-113	Room 113	1	M-F	7:00	20:00	72 deg F	5%	M-F	20:00	7:00	S-S	Off	66 deg F
TAB-114	Room 114	1	M-F	6:00	20:00	70 deg F	5%	M-F	20:00	6:00	S-S	Off	65 deg F
TAB-115	Room 115	1	M-F	7:00	20:00	72 deg F	5%	M-F	20:00	7:00	S-S	Off	66 deg F
TAB-214	Room 214	1	M-F	6:00	16:00	67 deg F	5%	M-F	16:00	6:00	S-S	Off	60 deg F
HRU-1	Martin Building	1	M-F	0:01	23:59	68 deg F	0%	M-F	23:59	0:01	S-S	Off	65 deg F
UV-1-3	2nd Floor Science Classroom	3	M-F	7:30	16:00	72 deg F	10%	M-F	16:00	7:30	S-S	Off	66 deg F
UV-4	Computer Lab 208	1	M-F	7:00	20:00	72 deg F	0%	M-F	20:00	7:00	S-S	Off	66 deg F
UV-5	Metal Fabrication	1	M-F	6:00	16:30	72 deg F	0%	M-F	16:30	6:00	S-S	Off	66 deg F
TAB-A	Metal Fab Classroom	1	M-F	12:00	12:01	72 deg F	5%	M-F	12:01	12:00	S-S	Off	66 deg F
FC-1-18	Central Offices and Classrooms	18	M-F	7:00	20:00	72 deg F	0%	M-F	20:00	7:00	S-S	Off	66 deg F
FC-19	Student Services Offices	1	M-F	7:00	16:00	72 deg F	15%	M-F	16:00	7:00	S-S	Off	66 deg F
Liebert-1+2	Computer Labs 209+210	2	M-F	7:00	20:00	72 deg F	0%	M-F	20:00	7:00	S-S	Off	66 deg F

NMCC - EXISTING SCHEDULES & TEMPERATURE SETPOINTS

Baseline operating parameters are the facility(s) and system(s) operations measured and/or observed before commencement of the Work. The data summarized will be used in the calculations of the baseline energy consumption and/or demand and for calculating baseline adjustments for changes in facility operation that occur during the Guarantee Period.
HONEYWELL and CUSTOMER agree that the operating parameters specified are representative of equipment operating characteristics during the Base Year specified in the Agreement.
The following data was collected with the assistance of the Facilties Manager and various building personnel and data logging equipment.
Results of data logging equipment are attached hereto, and incoporated herein by reference, as Exhibit G2.

			Occupied Schedule					Unoccupied/Holiday & Vacations Schedule (See note #2)					
Equipment Designation	Zone / Area Served	Qty.	Days	Begin	End	Setpoint	OA Intake	Days	Begin	End	Days	On/Off	Setpoint
Mailman Trades													
UV-1	Diesel Classroom	1	M-F	8:00	12:00	67 deg F	0%	M-F	12:00	8:00	S-S	Off	66 deg F
UV-2+5	Automative Classrooms	2	M-F	8:00	12:00	68 deg F	0%	M-F	12:00	8:00	S-S	Off	62 deg F
UV-3	Plumbing + Heating Classroom	1	M-F	12:00	12:01	68 deg F	0%	M-F	12:01	12:00	S-S	Off	62 deg F
UV-4	Welding Classroom	1	M-F	12:00	12:01	68 deg F	0%	M-F	12:01	12:00	S-S	Off	62 deg F
UV-6+7	Res Const Classrooms	2	M-F	8:00	16:00	68 deg F	0%	M-F	16:00	8:00	S-S	Off	62 deg F
HV-1	Diesel	1	M-F	8:00	16:00	67 deg F	15%	M-F	16:00	8:00	S-S	Off	66 deg F
HV-2	Automative	1	M-F	8:00	16:00	68 deg F	15%	M-F	16:00	8:00	S-S	Off	62 deg F
HV-3	Plumbing + Heating	1	M-F	12:00	12:01	68 deg F	10%	M-F	12:01	12:00	S-S	Off	62 deg F
MAU-1	Welding	1	M-F	12:00	12:01	68 deg F	10%	M-F	12:01	12:00	S-S	Off	62 deg F
UHs	Res Const	2	M-F	5:00	16:00	68 deg F	NA	M-F	16:00	5:00	S-S	Off	62 deg F
Residential													
HV-1	Andrews Common Areas	1	M-F	0:01	23:59	70 deg F	10%	M-F	23:59	0:01	S-S	Off	55 deg F
HV-2	Commons Dining	1	M-F	3:00	21:00	70 deg F	5%	M-F	21:00	3:00	S-S	Off	60 deg F
UV-1	Commons Conference	1	M-F	12:00	12:01	72 deg F	10%	M-F	12:01	12:00	S-S	Off	60 deg F
UV-2	Snow Conference	1	M-F	12:00	12:01	65 deg F	5%	M-F	12:01	12:00	S-S	Off	60 deg F
FT-1	Andrews Hall	1	M-F	0:01	23:59	68 deg F	5%	M-F	23:59	0:01	S-S	Off	55 deg F
FT-2	Aroostook Hall	1	M-F	0:01	23:59	68 deg F	5%	M-F	23:59	0:01	S-S	Off	55 deg F
FT-3	Penobscot Hall	1	M-F	0:01	23:59	68 deg F	5%	M-F	23:59	0:01	S-S	Off	55 deg F
FT-4	Snow Hall	1	M-F	0:01	23:59	68 deg F	5%	M-F	23:59	0:01	S-S	Off	55 deg F
FT-5	Washington Hall	1	M-F	0:01	23:59	68 deg F	5%	M-F	23:59	0:01	S-S	Off	55 deg F
Shops													
FT-1	Autobody	1	M-F	6:00	16:00	68 deg F	10%	M-F	16:00	6:00	S-S	On schedule	52 deg F
Furnace	Maintenance Shop	1	M-F	6:00	16:00	70 deg F	10%	M-F	16:00	6:00	S-S	On schedule	65 deg F
Furnace	Maintenance Garage	1	M-F	6:00	16:00	61 deg F	10%	M-F	16:00	6:00	S-S	On schedule	60 deg F

Notes:
1. An unoccupied cooling setpoint of 90 Degrees F signifies that air conditioning will be disabled during unoccupied mode.
2. Holidays & Vacations: All observed holidays, Christmas Recess, Winter Recess, Spring Recess, Summer Recess.

This Page Intentionally Left Blank

2.1 Christie Complex

Building:

The Christie Complex is made up of several buildings: Edmunds, Martin, Christie, the Gymnasium and Electric Labs, comprising approximately 125,500 square feet. All of these buildings are interconnected by sharing what once were exterior walls. The original portion of Christie is now a two-story office and classroom building which is the central portion of the complex. The Gymnasium and Electrical Labs extend to the north of the complex. The Martin building houses the main administration of the College, as well as some additional classrooms, and is the only 3-story portion of the complex. Edmunds is the newest addition to the complex, adding a large Library Conference Center and Continuing Education offices and classrooms.

2.1.1 General Building and HVAC System Descriptions:

Heating System:

The building is heated by three HB Smith Mills boilers, #2 Fuel Oil, hot water boilers. The boilers are (1) HB Smith 450 Mills 3,350MBH, (2) HB Smith 450 Mills 2,675MBH and (3) HB Smith 350 Mills 1,795MBH. The burners are Power Flame units (1) C3-OHBS-12, (2) C3-OHBS-10 and (3) O2-OB4HBS-9.

The boiler hot water system operates on a hot water reset schedule. Hot water setpoint is 180°F at 10°F outdoor air temperature, and the setpoint is 140°F at 60°F outdoor air temperature. The enabling outdoor air temperature for the boilers is 60°F.

Building Heating Hot Water Pumps

Two hot water pumps serve the complex 10 HP units. Super-E Baldor motors with 91.7% efficiencies drive the pumps with two VFDs controlling the motor speed based on downstream pressure as a demand control.

One heat exchanger provides domestic hot water to the complex. A storage tank provides domestic hot water storage for the complex for a quick on-demand response.

The heating hot water boilers mentioned above send hot water to various air handlers, rooftop units, unit ventilators, fan coils, baseboard units and unit heaters.

RTU-1 Library Air Handler

Women's Locker Room HV Unit

Air Conditioning Systems:

The Edmunds Building is air conditioned through its three rooftop units. There is also scattered air conditioning in computer labs and financial offices.

Ventilation Systems:

The ventilating systems in the building are as follows:

- RTU-1: Modular rooftop air handler that provides fresh air, heating and cooling to the Library.
- RTU-2: Modular rooftop air handler that provides fresh air, heating and cooling to the Conference Center.
- RTU-3: Modular rooftop air handler that provides fresh air, heating and cooling to the Continuing Education offices and classrooms.
- HV-1: Heating and Ventilating unit providing ventilation and heat to the Men's Locker Room.
- HV-2: Heating and Ventilating unit providing ventilation and heat to the Women's Locker Room.
- AHU-3+4: Heating and ventilation units that provide heat, ventilation and air movement for the Gymnasium.
- HV-4: Heating and Ventilating unit providing ventilation and heat to the Learning Center.
- HV-6: Heating and Ventilating unit providing ventilation and heat to the Nursing.
- HV-7: Heating and Ventilating unit providing ventilation and heat to the 2nd floor offices and hallway near Nursing.
- HV-8: Heating and Ventilating unit providing ventilation and heat to the Classrooms 201-203.
- HV-9: Heating and Ventilating unit providing ventilation and heat to the Racquetball Court.
- HV-10: Heating and Ventilating unit providing ventilation and heat to the Lecture Hall.
- HV-110: Heating and Ventilating unit providing ventilation and heat to the Electrical Construction Lab, Room 110.

- HV-111: Heating and Ventilating unit providing ventilation and heat to the Industrial Electrical Lab, Room 111.
- HV-112: Heating and Ventilating unit providing ventilation and heat to the Computer Electronics Lab, Room 112.
- TAB 108B: Terminal Air Balance device providing ventilation to Room 108B.
- TAB 113: Terminal Air Balance device providing ventilation to Room 1113.
- TAB 114: Terminal Air Balance device providing ventilation to Room 114.
- TAB 115: Terminal Air Balance device providing ventilation to Room 115.

Electronics Lab Heating and Ventilating Unit

- TAB 214: Terminal Air Balance device providing ventilation to Room 214.
- HRU-1: Heat Recovery Unit provides ventilation to the whole of Martin building with recovered heat.
- UV-1-3: Unit Ventilators that provide heating and ventilation to the 2nd floor science classrooms.
- UV-4: Unit Ventilator that provides heating and ventilation to the Computer Lab in room 208.
- UV-4: Unit Ventilator that provides heating and ventilation to the Metal Fabrication Lab.
- TAB A: Terminal Air Balance device providing ventilation to the Metal Fabrication Classroom.
- FC-1-18: Fan coil units that were once unit ventilators have had their outside air intakes blocked are now providing heat to the central offices and classrooms of the Christie.
- FC-19: Fan coil unit added with air conditioning to the financial offices on the first floor east side of Christie.
- Liebert-1+2: In the room air conditioning units that provide cooling to rooms 209 and 210.

Old Unit Ventilator Converted to Fan Coil

Most of the heating and ventilating units, as well as the TAB units, are bringing in limited to no ventilation air, where the new RTUs on top of Edmunds are over ventilating the spaces due to control loop issues.

<u>Temperature Control Systems:</u>

Temperature controls are a mixture of various systems throughout the complex. There is some Tridium and Network 8000 for Direct Digital Control (DDC), as well as electronic and pneumatic controls. The building is controlled to an occupancy temperature of 72ºF, and sets the temperature back at night to just above 65ºF. The schedule for occupancy in the complex varies widely with each space. The facilities management team has been aggressive in their schedule of individual spaces, and does a good job of only having the equipment operating in an occupied mode as the rooms are occupied, using class schedules as a guide for classrooms, labs and lecture areas.

2.1.2 Utility Baseline Summary:

Christie Complex - Utility Services

Electric – Electricity is supplied to the campus by Maine Public Service under a Medium Non-Residential rate. The Account No. is 6420-1-6-71010.

No. 2 Fuel Oil – Oil is delivered to an underground fuel oil tank for the building.

Summary of Energy Use – The table below summarizes the historical baseline utility profile for the complex by energy type, usage, and cost. Fuel consumption is based upon the average of the consumption in the two (2) years, with costs based upon current costs per published rate schedules or negotiated costs.

Christie Complex								
	Consumption and Costs				Equivalent Energy		Energy %s	
Utility	Units	Consumption	Cost - $/yr	Unit Cost	MMBTUs /yr	$$/MMBTU	% of Total Cost	% of Total Energy
Electricity	kWh	1,904,200	$256,320	0.13	6,497	$ 39.45	59.9%	44.4%
#2 Fuel Oil	Gallons	58,203	$143,522	2.47	8,148	$ 17.61	33.5%	55.6%
Water / Sewer	kGallons	3,308	$ 28,239	8.54	N/A	N/A	6.6%	N/A
Totals			$ 428,081		14,645		100.0%	100.0%

The baseline for Fuel Oil consumption is based on the average annual usage from July 2006 through June 2008.
The Baseline for Electricity recorded here under Christie Complex represents the baseline for the entire campus.
The baseline for Electrictiy usage is based on the average annual usage from July 2006 through June 2008.
The Baseline for Water / Sewer recorded here under Christie Complex represents the baseline for the entire campus.

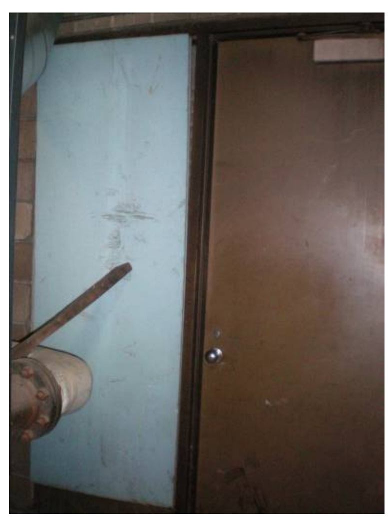
2.2 Mailman Trades

Building:
The Mailman Trades building houses most of the technical trade classes and hands on labs and work areas. The building provides hands on instruction on the repair of diesel engines, as well as standard automobiles. There is also a Residential Construction area that teaches general carpentry skills. The Welding and Plumbing and Heating areas also provide the students with the opportunity to learn a service or construction trade. Classrooms also accompany each of the lab/hands-on spaces for specific instruction. The building is approximately 44,700 square feet. Overhead doors service most of the lab areas.

2.2.1 General Building and HVAC System Descriptions:

Heating System:
The building is heated by a single HB Smith 28 Series 9-section hot water boiler, 1,805MBH with a Carlin Burner and Shor-burn oil heater installed. The boiler is approximately 30-years old and beyond its useful life and in need of replacement.

Existing Hot Water Boiler



Mailman Combustion Air

Three 1.5HP hot water pumps serve the building. They all pump into a header which than distributes to the building.

The boiler has a coil for domestic hot water.

The seven classrooms in the building that provide instructional areas for each of the labs and work areas are heated and ventilated with unit ventilators. Unit ventilators are typically used for classroom type ventilation and heating, since they are capable of providing individual control for each room. The Diesel, Auto Body and Plumbing and Heating Labs and work areas are all served by their own heating and ventilating unit. Each of these units is designed to bring outside ventilation air into the space, as well as heat the space under normal conditions. The Diesel and Automotive areas have supplemental heat in the form of unit heaters due to the frequent opening of the overhead doors.

While the Diesel and Automotive heating and ventilating units are working properly, the Plumbing and Heating heating and ventilating unit has not operated in some time. Most of the heat for this space is provide by a couple of unit heaters and the equipment that is used for instruction in the space. The Welding Shop has a large heat recovery system with an integrated make-air unit and exhaust system. Two coils and piping connect these units where heat is taken from the exhaust stream and pumped to the intake air stream to preheat the fresh air. This unit is extremely noisy and does not operate as advertised for the heat recovery. Smokeeters in this space provide the main means for cleaning the dust and fumes that are frequently produced during the welding classes. Residential Construction is only served by unit heaters and has a dust collection system for the main pieces of equipment.

Air Conditioning Systems:
There is no air conditioning in this building.

Ventilation Systems:
See heating systems as the ventilation systems are described above. Smokeeters are also included in the Diesel and Automotive areas to help control fumes and vehicle exhaust.

Temperature Control Systems:
Controls for the heating and ventilating systems are provided by a mix of old Honeywell system electronic controls. The building is controlled to a low occupancy temperature of 68°F and sets the temperature back at night to just above 60°F. Occupied hours for most of the building is 8:00am to 4:00pm.

2.2.2 Utility Baseline Summary:

Mailman Trades - Utility Services

Electric – Electricity is main metered for the campus. All data and costs can be viewed under the Christie Complex information.

No. 2 Fuel Oil – Oil is delivered to an underground fuel oil tank for the building.

Summary of Energy Use – The table below summarizes the historical baseline utility profile for the building by energy type, usage, and cost. Fuel consumption is based upon the average of the consumption in the two (2) years with costs based upon current costs per published rate schedules or negotiated costs.

Mailman Trades								
	Consumption and Costs				Equivalent Energy		Energy %s	
Utility	Units	Consumption	Cost - $/yr	Unit Cost	MMBTUs /yr	$$/MMBTU	% of Total Cost	% of Total Energy
#2 Fuel Oil	Gallons	13,854	$32,914	3.50	1,940	$ 16.97	100.0%	100.0%
Totals			$ 32,914		1,940		100.0%	100.0%

The baseline for Fuel Oil consumption is based on the average annual usage from July 2006 through June 2008.
The baseline for Electricity is recorded and documented under the Christie Complex and represents the entire campus.
The baseline for Electricity usage is based on the average annual usage from July 2006 through June 2008.
The baseline for Water / Sewer is recorded and documented under the Christie Complex and represents the entire campus.

This Page Intentionally Left Blank

2.3 Residential Buildings

Building:
The Residential Buildings are made up of the Reed Commons building, Andrews Hall, Snow Hall, Aroostook Hall, Penobscot Hall and Washington Hall. The Reed Dining Commons building is the cafeteria for the entire campus. This single-story, stand alone structure houses a kitchen, cafeteria and small conference room. The remaining buildings are housing for the students. These buildings range in size from the large, three-story Andrews Hall with 21,200 square feet and 51 berthing rooms, to the single-story Aroostook Hall with 7,110 square feet and only eight berthing rooms.

Snow Hall

Penobscot Hall

2.3.1 General Building and HVAC System Descriptions:

Heating System:
The boilers for each of the buildings are listed below:

- *Reed Commons*: HB Smith 25Mills 10-Section, 902MBH, with two Taco 1HP Pumps
- *Andrews Hall*: HB Smith 350 Mills 10-Section, 2,045MBH, Powerflame 62-OBwith 1Hp Pump
- *Snow Hall*: HB Smith 19 Series 8-Section, 762MBH, Carelin 702 CRD, with 1.5 Hp Circ Pumps
- *Aroostook Hall*: HB Smith 20Mils 4-Section, 201MBH, Carlin 101CRD, with two ¾ HP Pumps
- *Penobscot Hall*: HB Smith 20Mils 4-Section, 201MBH, Carlin 101CRD, with two ¾ HP Pumps
- *Washington Hall*: HB Smith 20Mils 4-Section, 201MBH, Carlin 101CRD, with two ¾ HP Pumps

Hot Water fintube radiation provides the heat for most of the buildings. Reed Commons also has a heating and ventilating unit, as well as a unit ventilator that can also provide heating.

Domestic hot water is provided by tanks with heat exchangers fed with heating hot water from the boilers. Snow Hall is the exception with an AO Smith COF-200-1000 oil fired hot water heater with a Powerflame CR1-0 burner. And Reed Commons has a Bock Oil water heater.

Existing Commons Hot Water Boiler

Existing Andrews Hall Boiler

Existing Washington Hot Water Boiler

Snow Domestic Hot Water

Air Conditioning Systems:
There is no air conditioning in these buildings.

Ventilation Systems:
Most of the buildings are without ventilation systems, including Aroostook, Penobscot and Washington Hall. The only ventilation in Snow Hall is for the conference room which has a single unit ventilator. Andrews Hall has an existing heating and ventilating unit in the boiler room, which is designed to supply ventilation air to the common spaces of the building. Exhaust fans in the bathrooms are than intended to draw the air from the heating and ventilating unit, in from the common spaces through the living areas. Unfortunately, the unit is completely ineffective and therefore this is receiving no ventilation at this time. Snow Hall has a heating and ventilating unit for the main dining hall and a unit ventilator for the small conference room. Ventilation air is provided to the dining hall and drawn through the kitchen with the exhaust hoods used for cooking.

Temperature Control Systems:

Most of the controls in these buildings are electronic thermostats to control the hot water fintube. There are Network 8000 DDC systems in the boiler rooms of Aroostook, Penobscot and Washington. An old Honeywell system controls the Snow Hall and Reed Commons boiler rooms, and the Tridium control system resides over the Andrews Hall boiler room.

2.3.2 Utility Baseline Summary:

Residential Buildings – Utility Services

Electric – Electricity is main metered for the campus. All data and costs can be viewed under the Christie Complex information.

No. 2 Fuel Oil – Oil is delivered to an underground fuel oil tank for the building.

Summary of Energy Use – The table below summarizes the historical baseline utility profile for the building by energy type, usage, and cost. Fuel consumption is based upon the average of the consumption in the two (2) years with costs based upon current costs per published rate schedules or negotiated costs.

Residential Buildings								
	Consumption and Costs				Equivalent Energy		Energy %s	
Utility	Units	Consumption	Cost - $/yr	Unit Cost	MMBTUs /yr	$$/MMBTU	% of Total Cost	% of Total Energy
#2 Fuel Oil	Gallons	45,767	$108,965	2.38	6,407	$ 17.01	100.0%	100.0%
Totals			$ 108,965		6,407		100.0%	100.0%

The baseline for Fuel Oil consumption is based on the average annual usage from July 2006 through June 2008.
The baseline for Electricity is recorded and documented under the Christie Complex and represents the entire campus.
The baseline for Electrictiy usage is based on the average annual usage from July 2006 through June 2008.
The baseline for Water / Sewer is recorded and documented under the Christie Complex and represents the entire campus.

This Page Intentionally Left Blank

2.4 Shop Buildings

<u>Building</u>:
The Shop Buildings are made up of the Maintenance Shop, the Maintenance Garage and Auto Body Shop. The Maintenance Shop and Garage are 3,348 and 1,936 square feet respectively, and the Auto Body Shop is 8,369 square feet. The Maintenance Shop is the main area for the maintenance personnel for the campus to work out of and contains a meeting area, tools/equipment and storage. The Maintenance Garage is used as a garage to store the larger equipment for the maintenance crew, it also offers a heated space should the equipment require repair in the winter. The Auto Body Shop is a teaching lab for body repair of automobiles.

2.4.1 General Building and HVAC System Descriptions:

<u>Heating System:</u>
The boilers for each of the buildings are listed below:

- *Maintenance Shop*: Williamson Oil fired furnace HBO-245, Becket A/AF
- *Maintenance Garage*: Metromatic Oil fired furnace HB/SU-275, Becket AFG
- *Auto Body*: HB Smith 25 Mills, Carlin burner

Domestic hot water is via small 20-gallon electric hot water heaters.

The Auto Body shop has fintube for the heat while the furnaces provide heat directly through forced hot air for the other two buildings.

Garage Furnace

<u>Air Conditioning Systems:</u>
There is no air-conditioning for any of these buildings.

<u>Ventilation Systems:</u>

None of these buildings have mechanical ventilation. The garage is mainly an unoccupied space and does not require ventilation. The shop has an older system in the attic that no longer operates and the Auto Body shop utilizes a Smokeeter to eliminate odors and fumes from the vehicles.

Ductwork to Auto Body Smokeeter

<u>Temperature Control Systems:</u>

Temperature control for each of these buildings is a single electronic thermostat.

2.4.2 Utility Baseline Summary:

Shop Buildings - Utility Services

<u>Electric</u> – Electricity is main metered for the campus. All data and costs can be viewed under the Christie Complex information.

<u>No. 2 Fuel Oil</u> – Oil is delivered to an underground fuel oil tank for the building.

<u>Summary of Energy Use</u> – The table below summarizes the historical baseline utility profile for the building by energy type, usage, and cost. Fuel consumption is based upon the average of the consumption in the two (2) years with costs based upon current costs per published rate schedules or negotiated costs.

Shop Buildings								
	Consumption and Costs				Equivalent Energy		Energy %s	
Utility	Units	Consumption	Cost - $/yr	Unit Cost	MMBTUs /yr	$$/MMBTU	% of Total Cost	% of Total Energy
#2 Fuel Oil	Gallons	7,086	$17,188	3.50	992	$ 17.33	100.0%	100.0%
Totals			$ 17,188		992		100.0%	100.0%

The baseline for Fuel Oil consumption is based on the average annual usage from July 2006 through June 2008.
The baseline for Electricity is recorded and documented under the Christie Complex and represents the entire campus.
The baseline for Electrictiy usage is based on the average annual usage from July 2006 through June 2008.
The baseline for Water / Sewer is recorded and documented under the Christie Complex and represents the entire campus.

Energy Conservation Measures (ECMs)
Section Three

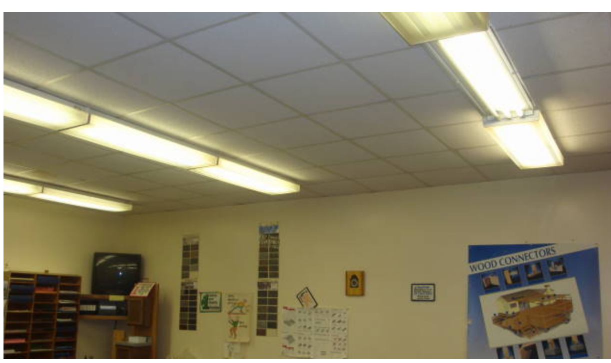
3.0 Recommended Energy Conservation Measures

- Lighting and Lighting Control
- Building Infiltration Reductions
- Controls Upgrades
- Ventilation Upgrades
- Fuel Oil Heaters
- Domestic Hot Water Heat Exchanger Insulation
- Boiler Isolation
- Wood Chip Heating Plant
- Wind Turbine

3.0.1 ECM-1: Lighting and Lighting Control Upgrades

Applicable Buildings: Christie Complex, Mailman Trades, Reed Commons

Existing Conditions:
A lighting survey has been performed to evaluate the need for lighting efficiency upgrades. Many spaces are already T8 fixtures however there is an opportunity to retrofit fixtures at the College.



Existing Lighting Systems

Proposed Upgrades:

The following is a summary of the proposed upgrades by building:

ECM-1: Lighting		
Bldg Option	**15-Year Self-Funded**	**15-Year Capitol Improvements**
Christie Complex	✓	✓
Mailman Trades	✓	✓
Residential Bldgs.	✓	✓
Shop Buildings	N/A	N/A

Christie Complex:

1. 12 - 400 watt Metal Halide High Bay and 52 8 ft 2 lamp HO Fixtures in Gym to 28- 4 lamp T5HO High Bay 2 ft. x 4 ft. fixtures with Wire Guards.
2. 8 – 175 watt Metal Halide recessed fixtures being replaced with, 8 New – 2 lamp 4 ft. Surface Mount Direct/Indirect fixtures with High Performance T8 lamp and HE-H Ballast combination.
3. 62 - 2 lamp F96 T12 HO 8 ft. hood fixtures in Elec. Labs being replaced with, 62 New – 4 lamp 8 ft. High Efficiency Industrial Hood fixtures with wire guards and High Performance T8 lamp and HE-N Ballast combination.
4. 13 – 4 lamp 4 ft. T8 wrap fixtures to new High Efficiency 2 lamp Wrap fixtures with High Performance T8 Lamp and HE-L Ballast Combination.
5. 43 - 2 lamp F96 T12 HO 8 ft. Indirect fixtures being replaced with, 43 New – 2 lamp 8 ft. High Efficiency Direct/Indirect fixtures with High Performance T8 lamp and HE-H Ballast combination.
6. 8 Occupancy Sensors will be installed in Bath Rooms and Locker Rooms.

Mailman Trades:

1. 2 - 400 watt Metal Halide High Bay to 2- 6 lamp T8HO High Bay 2 ft. x 4 ft. fixtures with Wire Guards.
2. 67 - 2 lamp F96 T12 HO 8 ft. hood fixtures in Residential Const. Lab to 32- 4 lamp T5HO High Bay 2 ft. x 4 ft. fixtures with Wire Guards.
3. 21 - 2 lamp F96 T12 HO 8 ft. hood fixtures in Trades Labs being replaced with, 21 New – 4 lamp 8 ft. High Efficiency Industrial Hood fixtures with wire guards and High Performance T8 lamp and HE-N Ballast combination.
4. 95 - 2 lamp F96 T12 HO 8 ft. hood fixtures in Trades Labs being replaced with, 95 New – 4 lamp 8 ft. High Efficiency Industrial Hood fixtures with wire guards and High Performance T8 lamp and HE-H Ballast combination.
5. 48 – 3 lamp 4 ft. T8 wrap fixtures to 24 new High Efficiency 2 lamp Wrap fixtures with High Performance T8 Lamp and HE-H Ballast Combination.
6. 22 – 3 lamp 4 ft. T8 wrap fixtures and 2 – 8 ft. 2 lamp strip fixtures to 17 new High Efficiency 8 ft. 4 lamp Vapor Tight fixtures with High Performance T8 Lamp and HE-L Ballast Combination.
7. 17 Occupancy Sensors will be installed in Class Rooms, Finishing Room and Stock Rooms.

Residential Buildings (Commons):

1. 10– 175 watt Metal Halide recessed fixtures being replaced with, 10 New – 2 lamp 4 ft. Surface Mount Direct/Indirect fixtures with High Performance T8 lamp and HE-H Ballast combination.
2. 8 - 2 lamp F96 T12 HO 8 ft. strip fixtures in soffit being replaced with, 16 New – 1 lamp strip fixture with High Performance T5HO lamp and HE-H Ballast combination.
3. 2 Occupancy Sensors will be installed in Bath Rooms.

Shop Buildings:
1. None Planned.

3.0.2 ECM-2: Building Infiltration Reductions

Applicable Buildings: Campus Wide

Existing Conditions:
A building infiltration survey has been performed to evaluate the need for building insulation and sealing upgrades. Visual inspection and smoke puffers were used to verify the location and severity of air leakage paths in the building envelope. Air leakage is defined as the uncontrolled migration of conditioned air through the building envelope, caused by pressure differences due to wind, chimney (or stack) effect, and mechanical systems. It has been shown to represent the single largest source of heat loss or gain through the building envelope of nearly all types of buildings.

Proposed Upgrades:
The following is a summary of the proposed upgrades by building:

ECM-2: Building Infiltration Reductions		
Bldg Option	**15-Year Self-Funded**	**15-Year Capitol Improvements**
Christie Complex	✓	✓
Mailman Trades	✓	✓
Residential Bldgs.	✓	✓
Shop Buildings		✓

Christie Complex:
1. 26 Single Commercial Doors to be weather-stripped
2. 2 Double Commercial Doors to be weather-stripped
3. 2 Single Commercial Doors to be weather-stripped (sweeps only)
4. 1 Double Commercial Door to be weather-stripped (sweeps only)
5. 4 Over Head Doors to be weather-stripped
6. 21 Roof top Ventilators to be opened, perimeter sealed, dampers lubricated, 132 linear feet
7. 1,186' Roof Wall Joint to be sealed
8. 152'Exterior Caulking at Bulkhead

Mailman Trades:
1. 14 Single Commercial Doors to be weather-stripped
2. 6 Over Head Doors to be weather-stripped
3. 7 Roof top Ventilators to be opened, perimeter sealed, dampers lubricated, 40 linear feet
4. 381'Roof Wall Joint to be sealed

Residential Buildings:
1. 23 Single Commercial Doors to be weather-stripped
2. 5 Double Commercial Doors to be weather-stripped

3. 354'Roof Wall Joint to be sealed
   **Window Replacement Recommended*

Shop Buildings:
1. 10 Single Commercial Doors to be weather-stripped
2. 2 Double Commercial Doors to be weather-stripped
3. 4 Over Head Doors to be weather-stripped

3.0.3 ECM-3: Control Upgrades

Applicable Buildings: Christie Complex, Mailman Trades, Reed Commons, Auto Body

Existing Conditions:

The College is currently utilizing a mixture of control systems, including pneumatic, electronic, Barber-Coleman Network 8000, to Honeywell Tridium DDC systems with a central based front end. In general, the Direct Digital Controls (DDC) front end system covers boilers plants and large air handling units. Occupancy schedules are built into each piece of equipment that is tied into the front end, where generally buildings are occupied by 7 or 8am and unoccupied in the evening. Some areas in the Christie Complex continue to be occupied with evening classes. The residential buildings are considered to be occupied all day, evenings and weekends unless they are specifically vacated. Unitary equipment, such as unit ventilators and fan coils, also are mixed controls where some are controlled centrally and some are not.

Snow Unit Ventilator Control

Outside Air Intake Covered Over

Even though the DDC system shows occupancy schedules and outdoor air intake percentages are built into the controls sequences, our data logging and site observations indicate some systems are not following their control sequences.

- HV-4 serving the Learning Center at the Christie Complex is scheduled to run from 6:00am to 8:30pm, but is actually running from Midnight to 2:30pm.

- The heating and ventilating unit serving the Electrical Construction Lab runs from 4:00am to 8:00pm, instead of its 5:00am to 4:00pm schedule.
- The heat recovery ventilator serving Martin Building runs 24-hours a day, in contrast to its 7am to 8:30pm schedule.

Unfortunately with DDC systems, the front end does not always indicate what is going on with the end pieces of equipment. We found a number of outside air dampers closed that were indicated as open on the DDC system.

- The three heating and ventilating units in the Electrical Labs in the Christie Complex all showed 10% outside air intake on the DDC system, but two were found to be closed tight.
- Heating and ventilating units 4, 6 and 7 at the Christie Complex have their outside dampers closed, but are scheduled for an average of 16% outside air.
- The heat recovery unit that serves Martin is intended to have 100% outside air intake, but due to the heat wheel being plugged, these dampers are also closed.

Also, our recorded data for each piece of equipment indicates not everything is following its prescribed schedules.

<u>Proposed Upgrades:</u>

ECM-3: Control Upgrades		
Bldg Option	**15-Year Self-Funded**	**15-Year Capitol Improvements**
Christie Complex	✓	✓
Mailman Trades	✓	✓
Residential Bldgs.		✓
Shop Buildings		✓

The existing DDC system will be upgraded and will allow the following:

1. Provide closer Time-of-Day control over equipment
2. Better Night Setback
3. Modify scheduled outdoor air intakes to provide appropriate volumes of fresh air.
4. Provide CO_2 control on all air handlers: HV, HVAC, RTU, UV, FC.
5. DDC Controls Upgrade (convert all of the controls for radiation, unit heaters, TAB units, Unit Vents, exhaust fans in normally occupied areas such as classrooms, offices, conf rooms to DDC, but leave storage rooms, toilets, hallways and other normally unoccupied areas as they are currently controlled).
6. Programmable thermostats for the Auto Body and Maintenance Shop.
7. The existing systems on the Tridium DDC control system shall remain on the Tridium system.

Note: The upgrades listed above for equipment proposed to be replaced by ECM-4, Ventilation Upgrades are included in that measure. Upgrades are not currently included if the existing equipment remains. Also, an option to provide control feedback with positive damper and valve positioning can be added to the project if the College desires the additional information.

3.0.4 ECM-4: Ventilation Upgrades

Applicable Buildings: Christie Complex, Mailman Trades, Reed Commons, Auto Body

Existing Conditions:

The Campus lacks ventilation in at least a portion of each of the buildings. The following is a summary by location of the ventilation deficiencies.

1. *Christie Complex*: The vast majority of the Christie Complex has the capabilities to bring in the required outside air. The exceptions to this are all the areas served by TAB (Terminal Air Balance) units and the central offices and classrooms (Business and Finance offices, and rooms 204 through 207). Although the TAB systems are deigned to bring in outside air, they are controlled by a mixed air temperature which limits the amount of outside air brought in on cold days. The central offices and classrooms were at one time ventilated by using unit ventilators. These unit ventilators were converted to non-ventilating fan-coils by having their outside air intakes blocked off.
2. *Mailman Trades*: Out of the five main areas for this building, only two of them have the necessary equipment, that is operational, that can provide the appropriate ventilation. The Diesel and Automotive areas have working air handlers that do provide ventilation. The control of these units for schedule and outdoor air intake shall be modified under the Controls Upgrade measure to match current occupancy schedules. The Residential Construction area has no real ventilation equipment. There is an active dust collection system that will pull air in through the doors and cracks of the building by placing the space under negative pressure, but the use of this system is not specific to occupancy schedules. The Welding Lab has an antiquated make-up air heat recovery system that is rarely used. The Plumbing and Heating Lab has a heating and ventilating unit that has not run for some time. Each of these areas also has classrooms that are served by unit ventilators. The use and operation of this equipment is based on individual teachers need for heat, rendering ineffective as a ventilation system.
3. *Residential Buildings*: Most of the Residential Buildings have no ventilation systems. The two exceptions to that are Reed Commons which is fully ventilated with a heating and ventilating unit and a unit ventilator. The other exception is Andrews Hall which has a central heating and ventilating unit. The Andrews Hall ventilation unit is ineffective at ventilating the central portions of the buildings, largely due to the outside air damper being blocked nearly completely. Site observations also indicated that the Andrews heating and ventilating unit was not capable of moving a significant volume of air.
4. *Shop Buildings*: There is no existing ventilation system in any of the shop buildings.

Proposed Upgrades:

The following is a summary of the proposed upgrades by building:

ECM-4: Ventilation Upgrades		
Bldg Option	**15-Year Self-Funded**	**15-Year Capitol Improvements**
Christie Complex-1.a		✓
Christie Complex-1.b		✓
Mailman Trades-2.a		✓
Mailman Trades-2.b		✓
Mailman Trades-2.c		✓

Table continued on following page.

ECM-4: Ventilation Upgrades		
Bldg Option	**15-Year Self-Funded**	**15-Year Capitol Improvements**
Residential Bldgs-3.a		✓
Shop Buildings-4.a		✓
Shop Buildings-4.b		✓

1. *Christie Complex*: Replace the unit ventilators with new unit ventilators and open the outside air intakes for the central offices and classrooms. Replace the existing TAB units with fan coils. The fan coils shall be piped with hot water to provide tempering of the outside air. The fan coils shall also recirculate some air to the space. (It should be noted that the heating water distribution system will need to be modified to ensure required heating water is reaching all the new equipment. Modification will include piping and pumping upgrades to the hot water distribution system).
2. *Mailman Trades*: Provide a new heating and ventilating unit for each of the Residential Construction, Welding Lab and Plumbing and Heating Lab areas. Heating and ventilating units shall be sized to provide primary ventilation, as well as make-up air to the spaces to replace their exhausted air. Additionally, provide a fume collection system for the Welding Lab. Replace the classroom unit ventilators (seven).
3. *Residential Buildings*: Provide Venmar Solo 2.0, or equivalent, heat recovery ventilators for the following Residential Buildings: Aroostook Hall, Penobscot Hall, Snow Hall and Washington Hall (Andrews Hall has been excluded from this plan due to its upcoming renovation).
4. *Shop Buildings*: Provide Venmar Solo 2.0, or equivalent, heat recovery ventilators in the Maintenance Shop and the Auto Body buildings. Add an exhaust fan to the maintenance garage to ensure proper removal of fumes.

3.0.5 ECM-5: Fuel Oil Heaters

Applicable Buildings: Christie Complex, Residential Buildings (except Commons and Penobscot), Shop Buildings

Existing Conditions:
The existing boilers use #2 oil as a fuel source.

Proposed Upgrades:

ECM-5: Fuel Oil Heaters		
Bldg Option	**15-Year Self-Funded**	**15-Year Capitol Improvements**
Christie Complex	✓	✓
Mailman Trades	N/A	N/A
Residential Bldgs.	✓	✓
Shop Buildings		

1. Provide combustion oil heaters (Shor-Burn) for the existing boilers. Three oil heaters for the Christie Complex and four oil heaters for the Residential buildings. The combustion oil heaters will increase boiler system efficiency by providing a cleaner and more complete burning of oil, and decreasing the build-up of soot on the boiler walls.

Snow Oil Heater

3.0.7 ECM-6: Domestic Hot Water Heater Exchanger Insulation

Applicable Buildings: Christie Complex

Existing Conditions:

The domestic hot water heat exchanger (DHW Hx) in the boiler room of the Christie Complex is uninsulated.

Proposed Upgrades:

ECM-7: Hx Insulation		
Bldg Option	**15-Year Self-Funded**	**15-Year Capitol Improvements**
Christie Complex	✓	✓

1. Insulate the bare heat exchanger in the boiler room of Christie Complex to current ASHRAE standards.

3.0.8 ECM-7: Boiler Isolation Valves

Applicable Buildings: Christie Complex

Existing Conditions:
The existing boilers have no automatic isolation valves to stop flow through a boiler if it is in stand-by mode.

Proposed Upgrades:

ECM-8: Boiler Isolation Valves		
Bldg Option	**15-Year Self-Funded**	**15-Year Capitol Improvements**
Christie Complex	✓	✓
Mailman Trades	N/A	N/A
Residential Bldgs.	N/A	N/A
Shop Buildings	N/A	N/A

1. As part of a potential expansion of the DDC controls system, this recommendation would provide three-position isolation valves in the return lines of the boilers. It would provide DDC controls to close the valve when a boiler is not needed for building heat. This will prevent water from flowing through the lag boiler and decreasing system supply water temperature.

   It will also allow the lag boilers to be maintained at a lower temperature when it is not needed for building heat, thereby decreasing stand-by losses through the surfaces of the boiler and through the boiler breeching.

3.0.9 ECM-8: Wind Turbine

Applicable Buildings: College Campus

Existing Conditions:
There are a number of wind turbines operating or being built in the area. The available wind data indicates that the NMCC campus would be a good candidate for a wind turbine installation.

Proposed Upgrades:
Honeywell suggests continuing to study the wind turbine opportunity. The preliminary study for wind will:

- Analyze supplied wind data and provide a Wind Resource Assessment
- Determine the most appropriate location for the turbine
- Initial Community Impact Assessments such as visual, sound and shadow flicker
- Identifying specific permitting requirements.

3.0.10 ECM-9: Wood Chip Heating Plant

Applicable Buildings: Christie Complex and Mailman Trades

Existing Conditions:
The existing boiler plants for the Christie Complex and Mailman Trades buildings utilize #2 fuel oil as their fuel sources. When comparing the price and associated heat output of an oil boiler plant to that of a Wood Chip Heating Plant, the use of wood chips is nearly one quarter the cost of oil.

Proposed Upgrades:

ECM-10: Wood Chip Heating Plant		
Bldg Option	**15-Year Self-Funded**	**15-Year Capitol Improvements**
Christie Complex		✓
Mailman Trades		✓
Residential Bldgs.	N/A	N/A
Shop Buildings	N/A	N/A

Provide a new wood chip heating plant (a single boiler with approximately 5MMBH capacity) to supply heating water for the building. The boiler plant will be housed in and around the Mailman Trades boiler room. The existing space in the boiler room and addition will house a wood chip heating plant, a wood chip storage bin, heating water pumps and auxiliary equipment for the wood chip heating plant. The storage bin section of the building will be approximately 20x30 feet, and the boiler section will be approximately 24x30 feet and 20-feet tall. The painted metal stack will be approximately 30 to 40 feet tall. A combination of piping interior to the Mailman Trades and underground piping (Extru-Therm by Perma-pipe or equivalent) will be run from the wood chip heating plant to the existing Christie Complex boiler room, and new valves and controls will be provided to allow the wood chip heating plant to be the primary boiler, and the oil boilers in the Christie Complex will be auxiliary boilers. The wood chip heating plant will be sized for slightly less than full capacity, so that the dual fuel boilers can be utilized during peak heating periods, which will allow for turn-over of the oil in the oil tanks (oil should not sit for long periods of time for fear of contamination from the growth of organisms) as well as exercising the oil boilers.

The benefits of a new wood chip heating plant include: reduced energy costs, local fuel supply, renewable fuel source, third fuel option, as well as existing infrastructure re-use.

- There is a drastic cost reduction in the use of wood chips versus fuel oil. As fuel oil pricing continues to fluctuate, the price of wood chips should remain relatively steady.
- Wood chips are acquired locally from Maine, rather than purchasing oil from overseas.
- Wood chips are a renewable source of fuel. Trees continue to grow while our fuel oil sources only continue to diminish.
- A second fuel option gives the College with the maximum flexibility in how to heat their buildings, as well as setting themselves in a very strong negotiating position for their other fuel sources.
- The wood boiler will continue to provide benefit to the College long after the payback period has ended.

Due to the unpredictability of today's fuel markets, Honeywell cannot warranty or guarantee either expressed or in writing, the cost of fuel or the difference between the cost of fuels. The savings for this measure are based solely on the cost difference of the fuel rates that have been agreed upon by the College. There is also variability in the heat content of the wood chips. The heat content is dependant on the type of wood, amount of bark and moisture content of the wood. Our calculations have assumed 45% moisture content and standard chips. The heat content of the chips will need to be verified during design from the anticipated supplier.

This Page Intentionally Left Blank

3.1 Non-Energy Recommendations (NERs)

3.1.1 NER-1: Aging and Past Useful Life Equipment Replacement

Applicable Buildings: Campus Wide

Existing Conditions:
There are various pieces of equipment throughout the Campus that are past their useful life and are becoming cumbersome and costly to maintain.

Christie Complex:
1. Heating and Ventilating units HV-1, 2, 4, 6, 7, 8 are approaching the end of their useful life.

Mailman Trades:
1. The existing boiler in the Mailman Trades Building is at the end of its useful life. It continues to operate, however the boiler jacket is falling off and the overall system efficiency is dropping.
2. Exhaust fans in each of the lab / shop areas.
3. Relief vents in each of the lab / shop areas are not operational. Dampers are either disconnected or no longer operating.

Residential Buildings:
1. The existing domestic Hot Water System in Snow Hall has become unreliable and is leaking from the heat exchanger.

Shop Buildings:
1. The smokeeter in the Auto Body shop is aging and will need replacement in the near future.
2. The Furnace in the Maintenance Shop is passed its useful life.
3. The Furnace in the Maintenance Garage is passed its useful life.

Proposed Upgrades:
The following is a summary of the proposed upgrades by building:

NER-2: Aging and Past Useful Life Equipment Replacement		
Bldg Option	**15-Year Self-Funded**	**15-Year Capitol Improvements**
Christie Complex-1.a		
Mailman Trades-2.a	✓	✓
Mailman Trades-2.b		✓
Mailman Trades-2.c		✓
Residential Bldgs-3.a	✓	✓
Shop Buildings-4.a		✓
Shop Buildings-4.b		✓
Shop Buildings-4.c		✓

Christie Complex:
1. **NOT INCLUDED:** It is recommended to NMCC by Honeywell that HV-1, 2, 4, 6, 7, 8 in Christie Complex be scheduled and budgeted for replacement over the next few years.

Mailman Trades:

1. Replace the existing Mailman Trades boiler. Ensure boiler is properly sized to accommodate required ventilation levels. Evaluate the opportunity to install two boilers versus one.
2. Replace the existing exhaust fans in each of the lab/shop areas.
3. Replace the existing relief vents in each of the lab/shop areas.

Residential Buildings:

1. Redesign and replace the existing domestic hot water system in Snow Hall to match the other residential halls for hot water design (provide a tank with integral heat exchanger, equivalent to Turbomax 109A).

Shop Buildings:

1. Replace the existing smokeeter in the Auto Body shop in kind.
2. Replace the existing furnace in the Maintenance Shop in kind.
3. Replace the existing furnace in the Maintenance Garage in kind.

3.1.2 NER-2: Modify/Upgrade Combustion Air Control

Applicable Buildings: Campus-Wide

Existing Conditions:

All of the boiler rooms have issues with their combustion air. Most of the issues are due to the openings being blocked off due to problems related to freezing.

Many of the louvers are physically blocked with wood, metal or insulation. Some damper actuators have been disconnected. Adequate air is required to combust the fuel for a clean and efficient operation.

Commons' Combustion Air without Linkage

Proposed Upgrades:

NER-2: Modify / Upgrade Combustion Air Control		
Bldg Option	**15-Year Self-Funded**	**15-Year Capitol Improvements**
Christie Complex	✓	✓
Mailman Trades	✓	✓
Residential Bldgs.	✓	✓
Shop Buildings	✓	✓

Upgrade the combustion air damper controls by replacing actuators and tightening linkages. Also, add unit heaters at the point of entrance to provide some heating of the air intake.

3.1.3 NER-3: Improve Heating Water Distribution

Applicable Buildings: Christie Complex

Existing Conditions:
The existing heating hot water distribution system is not currently capable of providing sufficient heating water flow to the north end of the building. The College has been unable to adequately ventilate the spaces north of the Gymnasium due to the inability to heat the incoming air. Upgrades to the ventilation systems in this area will require this recommendation be completed to maintain a comfortable and code compliant environment.

Proposed Upgrades:

NER-4: Improve Heating Water Distribution		
Bldg Option	**15-Year Self-Funded**	**15-Year Capitol Improvements**
Christie Complex		✓

Provide modification to the piping and pumping of the heating hot water system. Evaluate the entire system for flow capabilities. Add balancing valves as needed and balance the entire system.

3.1.4 NER-4: Repair/Modify Boiler/Furnace Exhaust in Plumbing and Heating

Applicable Buildings: Mailman Trades

Existing Conditions:
There are multiple boilers and furnaces that are tied into the same chimney and breeching system. The system has been added to with induced draft fans, but continues to be problematic for the equipment operation. The manner in which this equipment is vented is a clear violation of both NFPA 31 and NFPA 211.

Proposed Upgrades:

NER-4: Repair / modify boiler /furnace exhaust in Plumbing and Heating		
Bldg Option	**15-Year Self-Funded**	**15-Year Capitol Improvements**
Mailman Trades	✓	✓

Redesign and repipe the existing equipment for all draft requirements and in accordance with all applicable codes, make additional flue vents as needed to accommodate the existing equipment.

Mock Boilers and Furnaces Flue Gas Exhaust Pipe

3.1.5 NER-5: Replace Welding Lab Dust Collection and Make-up Air System

Applicable Buildings: Mailman Trades

Existing Conditions:

The Welding Lab has a mixture of heating and air quality equipment serving the space. The heating is provided, primarily, from unit heaters. An existing make-up and exhaust system with an integral heat recovery component is in poor condition, and runs loudly enough to make it difficult for the class to function, as well as pose a hazard. The exhaust system has ducted exhaust to each station which collects the fumes and delivers them to the outdoors. A glycol coil with the exhaust unit recovers heat from the exhaust stream and pumps the glycol to a preheat coil in the make-up air unit. Both the exhaust and make-up air units produce a substantial amount of noise while operating, and are therefore, rarely turned on. Additionally, smokeeters within the space provide some cleaning of the air. The smokeeters take in the welding fumes from the general air and through a filter clean the space air. These systems are a good first step and provide some relief of the toxic air, but they do not provide a clean classroom environment.

Proposed Upgrades:

NER-2: Modify / Upgrade Combustion Air Control		
Bldg Option	**15-Year Self-Funded**	**15-Year Capitol Improvements**
Mailman Trades		✓

Install a dust/fume collection system. United Air Specialists SFC Pulse-Jet Cartridge Dust Collector, or equivalent, at 11.5"wc installed outside on a concrete pad and ducted inside. Six inch duct drops to each welding station with magnetic retractable arms. Fan silencer and air safety filters to allow the air to be recirculated back to the space.

This Page Intentionally Left Blank

3.2 Reviewed and Not Recommended (RNRs)

3.2.1 RNR-1: Dust Collector Variable Frequency Speed Drive (VFD)

Applicable Buildings: Mailman Trades - Residential Construction

Existing Conditions:
The existing dust collector for the Residential Construction in the Mailman Trades Building runs at a constant speed, regardless of the number of devices that are being used that produce dust. Existing dampers in the exhaust system allow operators to open and close each station as needed.

Proposed Upgrades:
Install a VFD to serve the dust collector. Modulate speed of the dust collector fan to maintain a constant system negative pressure to insure proper capture velocity from each piece of equipment.

Not Recommended:
The economics to this measure were not beneficial to the College and other benefits, such as fan and motor increased longevity, do not outweigh the lack of economic benefit.

Residential Construction Dust Collector

3.2.2 RNR-2: HRU Demand Control Ventilation

Applicable Buildings: Martin Building as part of the Christie Complex

Existing Conditions:
The existing heat recovery unit (HRU) ventilates the Martin building. They ventilate only with tempered air (70-75ºF air temperature). Space heat is primary provided through the locally controlled baseboard heat in each of the classrooms.

<u>Proposed Upgrades:</u>
Install VFDs on each of the fans within the HRU unit and control dampers to each of the branches supplying each area. These dampers will be controlled by CO_2 levels in each area. This will allow the overall intake of outside air to be reduced to only what is specifically required for each classroom.

<u>Not Recommended:</u>
The economics to this measure were not beneficial to the college and other benefits, such as fan and motor increased longevity, do not outweigh the lack of economic benefit.

3.2.3 RNR-3: Geothermal Heat Pumps

Applicable Buildings: Central Offices and Classrooms for Christie

<u>Existing Conditions:</u>
The central offices and classrooms were at one time ventilated by using unit ventilators. These unit ventilators were converted to non-ventilating fan-coils, by having their outside air intakes blanked off.

<u>Proposed Upgrades:</u>
Replace the blocked unit ventilators with new geothermal heat pumps and open the outside air intakes for the central offices and classrooms.

<u>Not Recommended:</u>
The economics to this measure were not beneficial to the college and other benefits, such as added air conditioning, do not outweigh the lack of economic benefit.

Measurement and Verification

Section Four

4.0 Overview

Baseline and Measurement & Verification (M&V) of Guaranteed Savings

The Measurement and Verification (M&V) Plan will identify the methodology to be used to capture and quantify the changes in performance and operational parameters. Parameter changes may be measured, calculated via a spreadsheet, or stipulated. The values of the performance and operational parameters are needed to calculate energy savings associated with ECM implementation.

Honeywell utilizes M&V methodologies established by the Department of Energy's Federal Energy Management Program (FEMP). A brief description of each methodology is provided below.

- **Option A** is the preferred method for establishing an energy baseline, when it is determined that savings calculations will be achieved from the direct result of reductions in energy performance parameters, and the ECM is a constant load within the facility/building. Option A allows for spot measurement, use of empirical data, or performance parameter stipulation to assess baseline consumption. If performance parameters can be directly measured neither continuous metering nor modeling will be required.
- **Option B** is the preferred method for establishing energy baselines, when it is determined that energy savings will be the result of reductions in energy performance parameters, but the equipment/end-use device affected by an ECM is not a constant load within the facility/building. Option B requires spot measurement, short-term metering, or data logging to assess baseline consumption.
- **Option C** is the preferred method for establishing an energy baseline, when savings calculations make it necessary to measure the interactive affects between variable load ECMs, to determine the impact of the interactive affects of several ECMs on energy savings. This option would typically be used if metered data were available. Option C requires verification of actual performance via whole-facility or main-meter measurement.
- **Option D** is the preferred method for establishing an energy baseline, when savings calculations will deem it necessary to measure the interactive effects between variable load ECMs, to determine the impact of the interactive affects of several ECMs on energy savings. Option D requires verification of actual performance via whole-building/facility analysis using a recognized computerized analysis simulation such as Carrier HAP, Trane TRACE or DOE2.1e or BIN method spreadsheet.

<u>Data Gathering and Quality Control</u>

Honeywell will assign a Measurement & Verification Specialist for the project site. This individual is responsible for defining and verifying the baseline, as well as conducting post-installation and regular interval M&V activities. The M&V Specialist will work in close concert with the Performance Contracting Engineer (PCE), the project installation team, and the College to ensure that accurate information is obtained.

The Project Manager will help ensure performance compliance, and will be responsible for proper installation, operation, and maintenance of the ECMs in accordance with design and contractual parameters. This includes ensuring that verification data is accurately collected and analyzed, and that measuring equipment is calibrated in accordance with prescribed standards.

The following table depicts the recommended M&V for the ECMs included in this audit report. Prior to the execution of a performance contracting agreement, the College and Honeywell will agree upon which M&V approach makes the most sense for the College. Pricing for annual M&V services is currently excluded from the proposal options included in this report, and will be subject to the final scope of work and final M&V method selected.

M&V Options for Selected ECMs – Preliminary

ECM Technology Category	ECM ID	ECM Description	Pre-Installation Option Used	Post-Installation Option Used	Ongoing Option Used
ECM #1 Lighting Systems Improvements	1	Efficiency Improvements and Controls	A (Elec)	A (Elec)	A (Elec)
ECM #2 Building Infiltration Reductions	2	Air Sealing; Insulation	C (Fuel Oil)	C (Fuel Oil)	C (Fuel Oil)
ECM #3 Energy Management Control System Improvements	3	Replace Building Controller; Control Valves; Ftr Control in Offices, Corridor; Computer Room Control; Upgrade Schedules and Setbacks	A (Elec) C (Fuel Oil)	A (Elec) C (Fuel Oil)	A (Elec) C (Fuel Oil)
ECM #4 Ventilation Upgrades	4	Add or Increase Ventilation	A (Elec) C (Fuel Oil)	A (Elec) C (Fuel Oil)	A (Elec) C (Fuel Oil)
ECM #5 DHW Heat Exchanger Insulation	5	Insulate Existing Uninsulated Domestic Hot Water Heat Exchanger	C (Fuel Oil)	C (Fuel Oil)	C (Fuel Oil)
ECM #6 Oil Heaters	6	Add Pre-Heaters for the Oil to the Boilers	A (Elec) C (Fuel Oil)	A (Elec) C (Fuel Oil)	A (Elec) C (Fuel Oil)
ECM #7 Boiler Isolation	7	Add Control Valves to Isolate the Unused Boiler from the System	C (Fuel Oil)	C (Fuel Oil)	C (Fuel Oil)
ECM #8 Wind Turbine	8	Install Wind Turbine(s) on campus to replace purchased electricity with on-site generated electricity	A (Elec)	A (Elec)	A (Elec)

ECM Technology Category	ECM ID	ECM Description	Pre-Installation Option Used	Post-Installation Option Used	Ongoing Option Used
ECM #9 Wood Boiler	9	Install a Wood Boiler Plant to Serve Two Building in Lieu of Burning Oil	A (Elec) C (Fuel Oil)	A (Elec) C (Fuel Oil)	A (Elec) C (Fuel Oil)

This Page Intentionally Left Blank

4.1 ECM Specific M&V Plan Samples

4.1.1 Lighting Systems Improvements, ECM 1 ❖ Wind Turbine, ECM 8

Honeywell recommends the use of the FEMP Option A protocol for these ECMs. Option A provides a reasonable and cost effective method of conducting measurement and verification (M&V).

M&V Methodology for ECM Technology Categories

ECM Technology Category	FEMP Method	Parameter Type	Parameter	Project Phase		
				Baseline	Post-Installation	Regular Interval
Lighting Improvements Wind Turbine	A (Electric)	Performance	Fixture, PC wattage	One-time measurement of representative fixture wattage	One-time measurement of representative fixture wattage	Utility Regression & annual review and walk-through
		Operational	Annual operating hours & times	Based on interview & Logger data and submetered data	Utility Regression	Utility Regression & annual review and walk-through

<u>Approach for Establishing Baseline</u>
Honeywell used the steps listed below to establish the baseline for this ECM.

1. Developed the baseline technology inventory based upon visual inspection.
2. Determined the baseline and proposed wattages based on industry accepted Independent Testing Laboratory (ITL) reports, as well as a cross section of manufacturers' data.
3. Established the hours of operation through interviews with facility personnel.
4. Developed a spreadsheet model of the lighting systems and computers with the above information and the current electric rate schedule.
5. Measure the baseline wattages prior to construction and adjust, if needed, as proposed in Step 6 below.
6. The sampling plan will involve dividing the population of fixtures into groups. Assignment of a fixture to a group will be determined by fixture type. For each fixture group with more than 10 fixtures, Honeywell will measure a minimum of three fixtures to determine the power consumption of the fixture prior to and after the lighting retrofit. If the measured fixture power consumption has a variance of 5% or more within a group, Honeywell will then measure a minimum of 5 fixtures in that group, discard the highest and lowest measured values, and average the remaining 3 measurements to determine average fixture power consumption. Energy savings will be determined by using the average of the three fixture measurements.

Approach for Establishing Actual Energy Usage

After the retrofit is complete, Honeywell will measure the equipment performance for the required new equipment using the same approach as outlined for the baseline. A Fluke 39 meter, or equivalent, will be used for measurements.

4.1.2 Building Infiltration Reductions, ECM 2 ❖ Heat Exchanger Insulation, ECM 5 ❖ Boiler Isolation, ECM 7

Honeywell recommends the use of the FEMP Option C protocol for this ECM. Option C provides the most reasonable and cost effective method of conducting measurement and verification (M&V).

M&V Methodology for ECM Technology Categories

ECM Technology Category	FEMP Method	Parameter Type	Parameter	Project Phase		
				Baseline	Post-Installation	Regular Interval
Building Infiltration Reductions Heat Exchanger Insulation Boiler Isolation	C (Fuel Oil)	Performance	Infiltration/ Insulation Condition	Energy Modeling	Utility Regression	Monitored with annual review and walk-through
		Operational	Annual operating hours & times/ Valves operational	Stipulated based on interview data	Utility Regression	Stipulated

Approach for Establishing Baseline

Honeywell used the steps listed below to establish the baseline for this ECM.

1. Develop the baseline technology inventory, as shown in the Appendix Section, based upon visual inspection and smoke puffers and existing window specifications.
2. Determine the baseline and proposed heat flow rates based on industry calculations.
3. Establish the hours of operation through interviews with NMCC personnel.
4. Develop a working model of the systems with the above information and the current rate schedule.

Approach for Establishing Actual Energy Usage

After the retrofit is complete, Honeywell will monitor the utility regression of the new equipment installed.

Annual M&V Activities

Honeywell's M&V Specialist will conduct an annual review of replacement equipment and an annual walk-through of the facility. This will insure the energy savings guarantee is met or exceeded. Observations from the annual review and walk-through will be documented and will accompany the annual energy savings report to the College throughout the term of the contract.

4.1.3 Energy Management Control System Improvements, ECM 3 ❖ Ventilation Upgrades, ECM 4 ❖ Oil Heaters, ECM 6 ❖ Wood Boiler Plant, ECM 9

Honeywell recommends the use of the FEMP Option C protocol for this ECM, unless esteemed baseline can be measured. Option A provides a reasonable and cost effective method of conducting measurement and verification (M&V).

M&V Methodology for ECM Technology Categories

ECM Technology Category	FEMP Method	Parameter Type	Parameter	Project Phase		
				Baseline	Post-Installation	Regular Interval
Controls Ventilation Upgrades Oil Heaters Wood Boiler (Fuel Oil & Electric)	A (Electric)	Performance	Equipment kW	Stipulated based on meter data and equip. data	One-time measurement of equip. wattage	Monitored with annual walk-through
		Operational	Annual operating hours & times	Stipulated based on survey and meter data	Utility Regression	Monitored with annual walk-through
	C (Fuel Oil)	Performance	Temperature Trend Data	Stipulated based on survey and logger data	Utility Regression	Monitored with annual walk-through
		Operational	Annual operating hours & times	Stipulated based on survey and logger data	Utility Regression	Monitored with annual walk-through

<u>Approach for Establishing Baseline</u>

Savings were calculated using spreadsheet energy calculations. The spreadsheets utilize calculations based on ASHRAE (American Society of Heating, Refrigeration and Air-Conditioning Engineers) Modified Bin Temperature Method based methodology using hourly bin weather data for the Concord area.

The following process was used to model each building with spreadsheets:

1. Loads were estimated or measured for each system for each temperature bin
2. The operating efficiency of the equipment was calculated using the collected data and field measured by steady state combustion efficiency testing.
3. Hours of operation were determined for each load..
4. Energy consumption is the product of load and hours of operation divided by efficiency
5. Energy and cost savings results were then aggregated and compared to baseline measurements, if available.

<u>Approach for Establishing Actual Energy Usage</u>

After the retrofit has been installed, Honeywell will monitor the utility usage for both electricity and fuel oil on an annual basis.

<u>Annual M&V Activities</u>

After the retrofit has been installed, Honeywell's M&V specialist will conduct an annual walk-through of the facility to verify the condition and operation of the equipment. This will include a visual check of the equipment with the goal of identifying and reporting/correcting any potential energy wasting situations. Items that will be visually checked include air flow around and through equipment, and general condition of equipment. Observations from the annual walk-through will be documented and will accompany the annual energy savings report.

Appendices
Section Five

Appendix A – Lighting Room by Room Detail

Appendix B – Temperature Logger Data

Appendix C – On-Time Logger Data

Appendix D – Preliminary Utility Analysis

Appendix E – Energy Calculations

Appendix A
Lighting Room by Room Detail

The Lighting Room-by-Room data is the projected scope of work on a room-by-room basis. The room-by-room data is a detailed list of how each area can be modified to save energy. The improvements listed in these data sheets determine whether the change is in operational hours or in the power consumed by each lighting fixture. Hours of operation are changed if a lighting control method is added. Energy consumed is changed if a physical modification of the fixture, ballasts or lamps is scheduled.

Lighting Audit Report

Christie Complex

Project ID **209**

#	Location		Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
1	**Gym**		**New Fixture**							
	Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	52	227	1200	1180.40	11.804	9787.20	8.16
	Proposed	N4T5HOWG	2 - 2 Lamp T5HO Electronic Ballasts and 4 FP54T5HO Lamps	16	228	1200	364.80	3.648	✓	
2	**Gym**		**New Fixture**							
	Existing	400MHB	400 Watt Metal Halide High Bay Fixture with 400 Watt MH Watt Lamp	12	460	400	184.00	5.52	1113.60	2.78
	Proposed	N4T5HOWG	2 - 2 Lamp T5HO Electronic Ballasts and 4 FP54T5HO Lamps	12	228	400	91.20	2.736	✓	
3	**Mens Locker room**		**No Change**							
	Existing	43PT8	3 Lamp Electronic Ballast and 3 FO32T8 Lamps	3	88	3600	79.20	0.264	422.40	0.00
	Proposed	X43T8	Existing 3 Lamp Electronic Ballast and 3 FO32 T8 Lamps	3	88	2000	44.00	0.264	✓	
4	**Mens Locker room**		**Install PIR Occ. Control**							
	Existing	Switching	Existing switching controls	0	0	0	0.00	0	0.00	0.00
	Proposed	OCC-CM-PDT10	Ceiling Mount Occupancy Sensor Dual Technology	1	0	0	0.00	0	✓	
5	**Womens Locker Room**		**No Change**							
	Existing	43PT8	3 Lamp Electronic Ballast and 3 FO32T8 Lamps	3	88	3600	79.20	0.264	422.40	0.00
	Proposed	X43T8	Existing 3 Lamp Electronic Ballast and 3 FO32 T8 Lamps	3	88	2000	44.00	0.264	✓	
6	**Womens Locker Room**		**Install PIR Occ. Control**							
	Existing	Switching	Existing switching controls	0	0	0	0.00	0	0.00	0.00
	Proposed	OCC-CM-PDT10	Ceiling Mount Occupancy Sensor Dual Technology	1	0	0	0.00	0	✓	

7 **Location:** **Gym Hall** — **No Change**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	2UT8	2 Lamp Electronic Ballast and 2 FBO32T8 Lamps	5	60	3600	90.00	0.3	480.00	0.00
Proposed	X2UT8	Existing 2 Lamp Electronic Ballast and 2 FBO32T8 Lamps	5	60	2000	50.00	0.3	☑	

8 **Location:** **Gym Hall** — **Daylight Controls**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	Switching	Existing switching controls	0	0	0	0.00	0	0.00	0.00
Proposed	OCC-CMPC	Ceiling Mount Daylight Harvesting Sensor	1	0	0	0.00	0	☑	

9 **Location:** **Elec. Const. Lab 110** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	4	227	300	22.70	0.908	184.80	0.62
Proposed	N82HSPI	2 Lamp Quicktronic HE H Ballast and 2 FO32T8/841/XPS/ECO	4	73	300	7.30	0.292	☑	

10 **Location:** **Elec. Const. Lab 110** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	22	227	1710	711.65	4.994	4476.78	2.62
Proposed	N44HENNCI	4 Lamp Quicktronic HE N Ballast and 4 FO32T8/841 XPS/ECO	22	108	1710	338.58	2.376	☑	

11 **Location:** **Industrial Elec. Lab 111** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	20	227	1710	646.95	4.54	4069.80	2.38
Proposed	N44HENNCI	4 Lamp Quicktronic HE N Ballast and 4 FO32T8/841 XPS/ECO	20	108	1710	307.80	2.16	☑	

12 **Location:** **Industrial Elec. Lab 111** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	8	227	300	45.40	1.816	369.60	1.23
Proposed	N82HSPI	2 Lamp Quicktronic HE H Ballast and 2 FO32T8/841/XPS/ECO	8	73	300	14.60	0.584	☑	

13 **Location:** **Computer Elec. Lab 112** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	20	227	1710	646.95	4.54	4069.80	2.38
Proposed	N44HENNCI	4 Lamp Quicktronic HE N Ballast and 4 FO32T8/841 XPS/ECO	20	108	1710	307.80	2.16	☑	

14 Location: Baths by Gym

Install PIR Occ. Control

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	Switching	Existing switching controls	0	0	0	0.00	0	0.00	0.00
Proposed	OCC-WSD-V	Wall Switch Occupancy Sensor w / Vandal Lens	2	0	0	0.00	0	☑	

15 Location: Baths by Gym

No Change

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	44T8	4 Lamp Electronic Ballast and 4 FO32 T8 Lamps	2	114	3600	68.40	0.228	410.40	0.00
Proposed	X44T8	Existing 4 Lamp Electronic Ballast and 4 FO32 T8 Lamps	2	114	1800	34.20	0.228	☑	

16 Location: Baths by Main Lobby

No Change

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	42TT8	2 Lamp Electronic Ballast and 2-FO32T8 Lamps	4	60	3600	72.00	0.24	384.00	0.00
Proposed	X42T8	Existing 2 Lamp Electronic Ballast and 2 FO32 T8 Lamps	4	60	2000	40.00	0.24	☑	

17 Location: Baths by Main Lobby

Install PIR Occ. Control

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	Switching	Existing switching controls	0	0	0	0.00	0	0.00	0.00
Proposed	OCC-CM10	Ceiling Mount Occupancy Sensor	2	0	0	0.00	0	☑	

18 Location: Main Lobby

New Fixture

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	175WMH	1- 175 watt Metal Halide 120v. Ballast and 1- 175 watt Metal Halide Lamp.	8	205	3600	492.00	1.64	3801.60	1.06
Proposed	N42HEHSDI	2 Lamp Quicktronic HE-H Ballast and 2 FO32T8/841 XPS/ECO	8	73	3600	175.20	0.584	☑	

19 Location: Baths by Conference Room

Install PIR Occ. Control

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	Switching	Existing switching controls	0	0	0	0.00	0	0.00	0.00
Proposed	OCC-CM10	Ceiling Mount Occupancy Sensor	2	0	0	0.00	0	☑	

20 Location: Baths by Conference Room

No Change

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	42TT8	2 Lamp Electronic Ballast and 2-FO32T8 Lamps	4	60	3600	72.00	0.24	384.00	0.00
Proposed	X42T8	Existing 2 Lamp Electronic Ballast and 2 FO32 T8 Lamps	4	60	2000	40.00	0.24	☑	

21 Location: Hall by 207

	Model	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	1	227	1710	32.35	0.227	263.34	0.15
Proposed	N82HSPI	2 Lamp Quicktronic HE H Ballast and 2 FO32T8/841/XPS/ECO	1	73	1710	10.40	0.073	☑	

New Fixture

22 Location: Room 207

	Model	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	6	227	1710	194.09	1.362	1580.04	0.92
Proposed	N82HSPI	2 Lamp Quicktronic HE H Ballast and 2 FO32T8/841/XPS/ECO	6	73	1710	62.42	0.438	☑	

New Fixture

23 Location: Room 205

	Model	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	9	227	1710	291.13	2.043	2370.06	1.39
Proposed	N82HSPI	2 Lamp Quicktronic HE H Ballast and 2 FO32T8/841/XPS/ECO	9	73	1710	93.62	0.657	☑	

New Fixture

24 Location: Room 204

	Model	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	9	227	1710	291.13	2.043	2370.06	1.39
Proposed	N82HSPI	2 Lamp Quicktronic HE H Ballast and 2 FO32T8/841/XPS/ECO	9	73	1710	93.62	0.657	☑	

New Fixture

25 Location: Room 206

	Model	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	6	227	1710	194.09	1.362	1580.04	0.92
Proposed	N82HSPI	2 Lamp Quicktronic HE H Ballast and 2 FO32T8/841/XPS/ECO	6	73	1710	62.42	0.438	☑	

New Fixture

26 Location: Office

	Model	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	44WT8	4 Lamp Electronic Balast and 4-FO32 T8 Lamps	13	114	1400	172.90	1.482	1201.20	0.86
Proposed	N42HEW	2 Lamp Quicktronic HEL Ballast and 2 FO32T8/841 XPS/ECO	13	48	1400	72.80	0.624	☑	

New Fixture

Lighting Audit Report

Mailman Trades Building

Project ID **210**

#	Location		Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
1	**Location: Residential Construction Lab**		**New Fixture**							
	Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	67	227	1710	2167.28	15.209	13531.23	7.91
	Proposed	N4T5HOWG	2 - 2 Lamp T5HO Electronic Ballasts and 4 FP54T5HO Lamps	32	228	1710	1039.68	7.296	☑	
2	**Location: Stock Room**		**New Fixture**							
	Existing	82SEE	2 Lamp EE Magnetic Ballast and F96T12EE Lamps	2	123	1710	35.06	0.246	268.66	0.06
	Proposed	N44HEVT	4 Lamp Quicktronic HE L Ballast and 4 FO32T8/841 XPS/ECO	2	95	800	12.67	0.19	☑	
3	**Location: Stock Room**		**Install PIR Occ. Control**							
	Existing	Switching	Existing switching controls	0	0	0	0.00	0	0.00	0.00
	Proposed	OCC-CMRB-9	PIR Fixture Mount Occupancy Sensor	1	0	0	0.00	0	☑	
4	**Location: Stock Room**		**New Fixture**							
	Existing	42SMT8	2 Lamp Electronic Ballast and 2-FO32T8 Lamps	8	60	1710	68.40	0.48	516.80	0.10
	Proposed	N44HEVT	4 Lamp Quicktronic HE L Ballast and 4 FO32T8/841 XPS/ECO	4	95	800	25.33	0.38	☑	
5	**Location: Finishing Room**		**New Fixture**							
	Existing	43T8LPT	3 Lamp Low Power Electronic Ballast and 3-FO32 T8 Lamps	14	76	1710	151.62	1.064	983.44	0.02
	Proposed	N44HEVT	4 Lamp Quicktronic HE L Ballast and 4 FO32T8/841 XPS/ECO	11	95	800	69.67	1.045	☑	
6	**Location: Finishing Room**		**Install PIR Occ. Control**							
	Existing	Switching	Existing switching controls	0	0	0	0.00	0	0.00	0.00
	Proposed	OCC-CMRB-9	PIR Fixture Mount Occupancy Sensor	2	0	0	0.00	0	☑	

Honeywell

7 **Location:** **Classroom** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	43T8LPT	3 Lamp Low Power Electronic Ballast and 3-FO32 T8 Lamps	12	76	1710	129.96	0.912	1121.52	0.47
Proposed	N41HEHTDRW	2 Lamp Electronic HE ISH Ballast and 2 FO32/841/XPS/ECO T8 Lamps	6	73	1000	36.50	0.438	☑	

8 **Location:** **Classroom** — **Install PIR Occ. Control**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	Switching	Existing switching controls	0	0	0	0.00	0	0.00	0.00
Proposed	OCC-CMRB-9	PIR Fixture Mount Occupancy Sensor	1	0	0	0.00	0	☑	

9 **Location:** **Plumbing & Heating Lab** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	16	227	1710	517.56	3.632	1716.84	1.00
Proposed	N44HEHNCI	4 Lamp Quicktronic HE H Ballast and 4 FO32T8/841 XPS/ECO	18	146	1710	374.49	2.628	☑	

10 **Location:** **Classroom** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	43T8LPT	3 Lamp Low Power Electronic Ballast and 3-FO32 T8 Lamps	12	76	1710	129.96	0.912	1121.52	0.47
Proposed	N41HEHTDRW	2 Lamp Electronic HE ISH Ballast and 2 FO32/841/XPS/ECO T8 Lamps	6	73	1000	36.50	0.438	☑	

11 **Location:** **Classroom** — **Install PIR Occ. Control**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	Switching	Existing switching controls	0	0	0	0.00	0	0.00	0.00
Proposed	OCC-CMRB-9	PIR Fixture Mount Occupancy Sensor	1	0	0	0.00	0	☑	

12 **Location:** **Automotive Technology Lab** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	35	227	1710	1132.16	7.945	4847.85	2.84
Proposed	N44HEHNCI	4 Lamp Quicktronic HE H Ballast and 4 FO32T8/841 XPS/ECO	35	146	1710	728.18	5.11	☑	

13 **Location:** **Automotive Technology Lab** — **Install PIR Occ. Control**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	Switching	Existing switching controls	0	0	0	0.00	0	0.00	0.00
Proposed	OCC-CMRB-9	PIR Fixture Mount Occupancy Sensor	6	0	0	0.00	0	☑	

14 **Location:** **Automotive Technology Lab** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	18	227	1710	582.26	4.086	4459.86	2.14
Proposed	N44HENNCI	4 Lamp Quicktronic HE N Ballast and 4 FO32T8/841 XPS/ECO	18	108	1300	210.60	1.944	☑	

15 **Location:** **Stock/ Core Storage** — **Install PIR Occ. Control**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	Switching	Existing switching controls	0	0	0	0.00	0	0.00	0.00
Proposed	OCC-CMRB-9	PIR Fixture Mount Occupancy Sensor	3	0	0	0.00	0	☑	

16 **Location:** **Stock/ Core Storage** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	8	227	1710	258.78	1.816	2170.96	0.65
Proposed	N44HEHNCI	4 Lamp Quicktronic HE H Ballast and 4 FO32T8/841 XPS/ECO	8	146	800	77.87	1.168	☑	

17 **Location:** **Parts Room** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	1	227	1710	32.35	0.227	138.51	0.08
Proposed	N44HEHNCI	4 Lamp Quicktronic HE H Ballast and 4 FO32T8/841 XPS/ECO	1	146	1710	20.81	0.146	☑	

18 **Location:** **Classroom** — **Install PIR Occ. Control**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	Switching	Existing switching controls	0	0	0	0.00	0	0.00	0.00
Proposed	OCC-CMRB-9	PIR Fixture Mount Occupancy Sensor	1	0	0	0.00	0	☑	

19 **Location:** **Classroom** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	43T8LPT	3 Lamp Low Power Electronic Ballast and 3-FO32 T8 Lamps	12	76	1710	129.96	0.912	1103.52	0.46
Proposed	N41HEHT3RW	3 Lamp Electronic HE ISH Ballast ans 3 FO32/841/XPS/ECO T8 Lamps	4	114	1000	38.00	0.456	☑	

20 **Location:** **Diesel / Hydraulics Tech. Lab** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	30	227	1710	970.43	6.81	4155.30	2.43
Proposed	N44HEHNCI	4 Lamp Quicktronic HE H Ballast and 4 FO32T8/841 XPS/ECO	30	146	1710	624.15	4.38	☑	

21 **Location:** **Diesel / Hydraulics Tech. Lab** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	400MHB	400 Watt Metal Halide High Bay Fixture with 400 Watt MH Watt Lamp	2	460	1710	131.10	0.92	824.22	0.48
Proposed	N6T8HOWG	6 Lamp T8HL Electronic Ballasts and 6 FO32T8/850/XPS Lamps	2	219	1710	62.42	0.438	☑	

22 **Location:** **Parts Room** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	3	227	1710	97.04	0.681	415.53	0.24
Proposed	N44HEHNCI	4 Lamp Quicktronic HE H Ballast and 4 FO32T8/841 XPS/ECO	3	146	1710	62.42	0.438	☑	

23 **Location:** **Classroom** — **Install PIR Occ. Control**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	Switching	Existing switching controls	0	0	0	0.00	0	0.00	0.00
Proposed	OCC-CMRB-9	PIR Fixture Mount Occupancy Sensor	1	0	0	0.00	0	☑	

24 **Location:** **Classroom** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	43T8LPT	3 Lamp Low Power Electronic Ballast and 3-FO32 T8 Lamps	12	76	1710	129.96	0.912	1103.52	0.46
Proposed	N41HEHT3RW	3 Lamp Electronic HE ISH Ballast ans 3 FO32/841/XPS/ECO T8 Lamps	4	114	1000	38.00	0.456	☑	

25 **Location:** **Loft** — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	3	227	1710	97.04	0.681	1067.31	0.36
Proposed	N44HENNCI	4 Lamp Quicktronic HE N Ballast and 4 FO32T8/841 XPS/ECO	3	108	300	8.10	0.324	☑	

26 **Location:** **Loft** — **Install PIR Occ. Control**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	Switching	Existing switching controls	0	0	0	0.00	0	0.00	0.00
Proposed	OCC-CMRB-9	PIR Fixture Mount Occupancy Sensor	1	0	0	0.00	0	☑	

Lighting Audit Report

Reed Dining Commons

Project ID **211**

1 Location: Dining Area — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	175WMH	1- 175 watt Metal Halide 120v. Ballast and 1-175 watt Metal Halide Lamp.	10	205	4200	717.50	2.05	5544.00	1.32
Proposed	N42HEHSDI	2 Lamp Quicktronic HE-H Ballast and 2 FO32T8/841 XPS/ECO	10	73	4200	255.50	0.73	☑	

2 Location: Dining Area — **New Fixture**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	82HOH	2 Lamp Magnetic High Output Ballast and 2 F96T12/HO/EE Lamps	8	227	4200	635.60	1.816	3729.60	0.89
Proposed	N1T5HOS	1- Lamp T5HO Electronic Ballasts and 1 FP54T5HO Lamps	16	58	4200	324.80	0.928	☑	

3 Location: Baths — **Install PIR Occ. Control**

	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	Switching	Existing switching controls	0	0	0	0.00	0	0.00	0.00
Proposed	OCC-CM10	Ceiling Mount Occupancy Sensor	2	0	0	0.00	0	☑	

4 Location: Baths — **No Change**

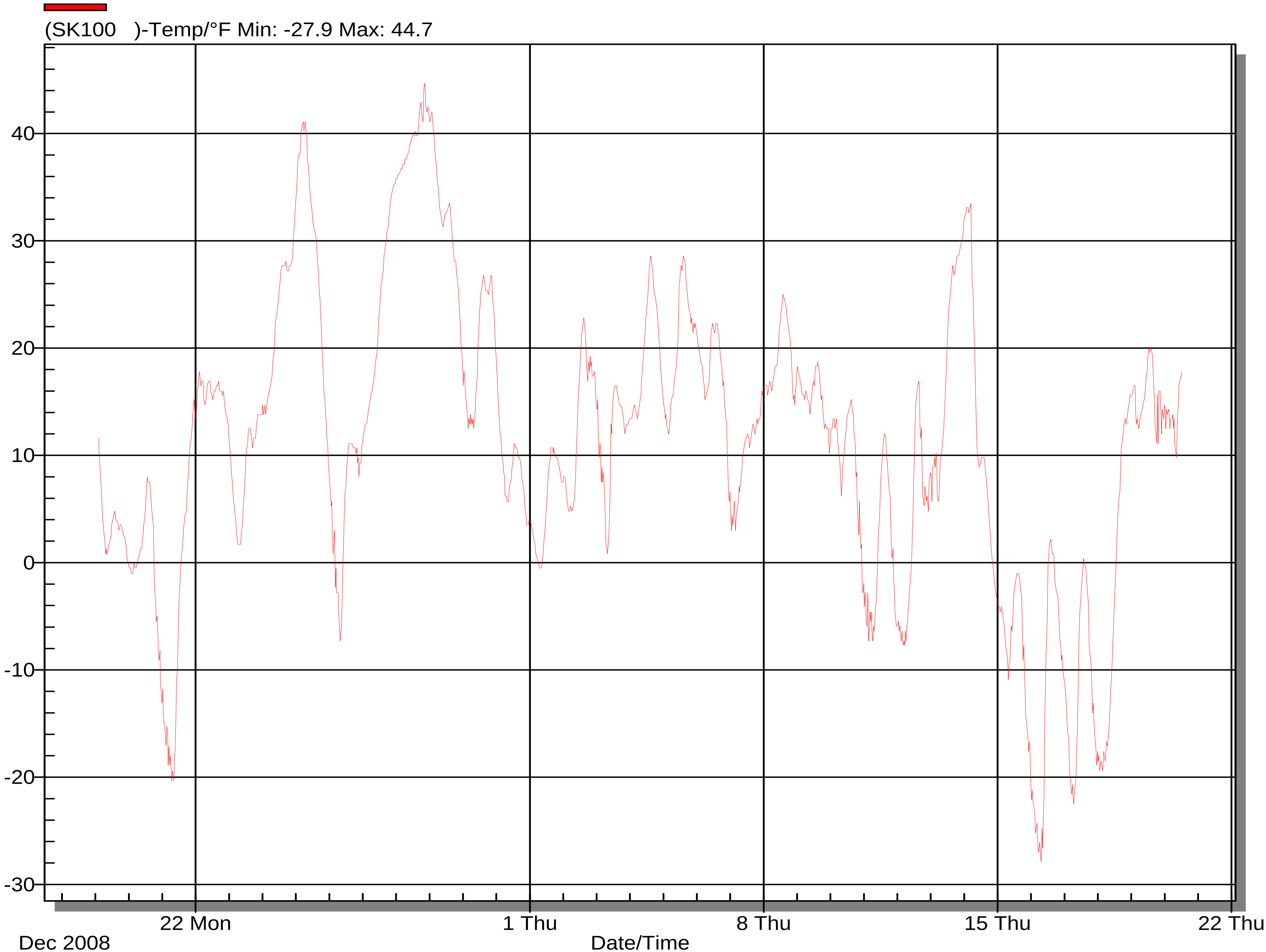
	Code	Description	# of Fixtures	Average Watts	Usage (ann.)	KWH (tot/m)	KW (total)	KWH Saved (tot/ann)	KW Saved (total)
Existing	42TT8	2 Lamp Electronic Ballast and 2-FO32T8 Lamps	6	60	2500	75.00	0.36	468.00	0.00
Proposed	X42T8	Existing 2 Lamp Electronic Ballast and 2 FO32 T8 Lamps	6	60	1200	36.00	0.36	☑	

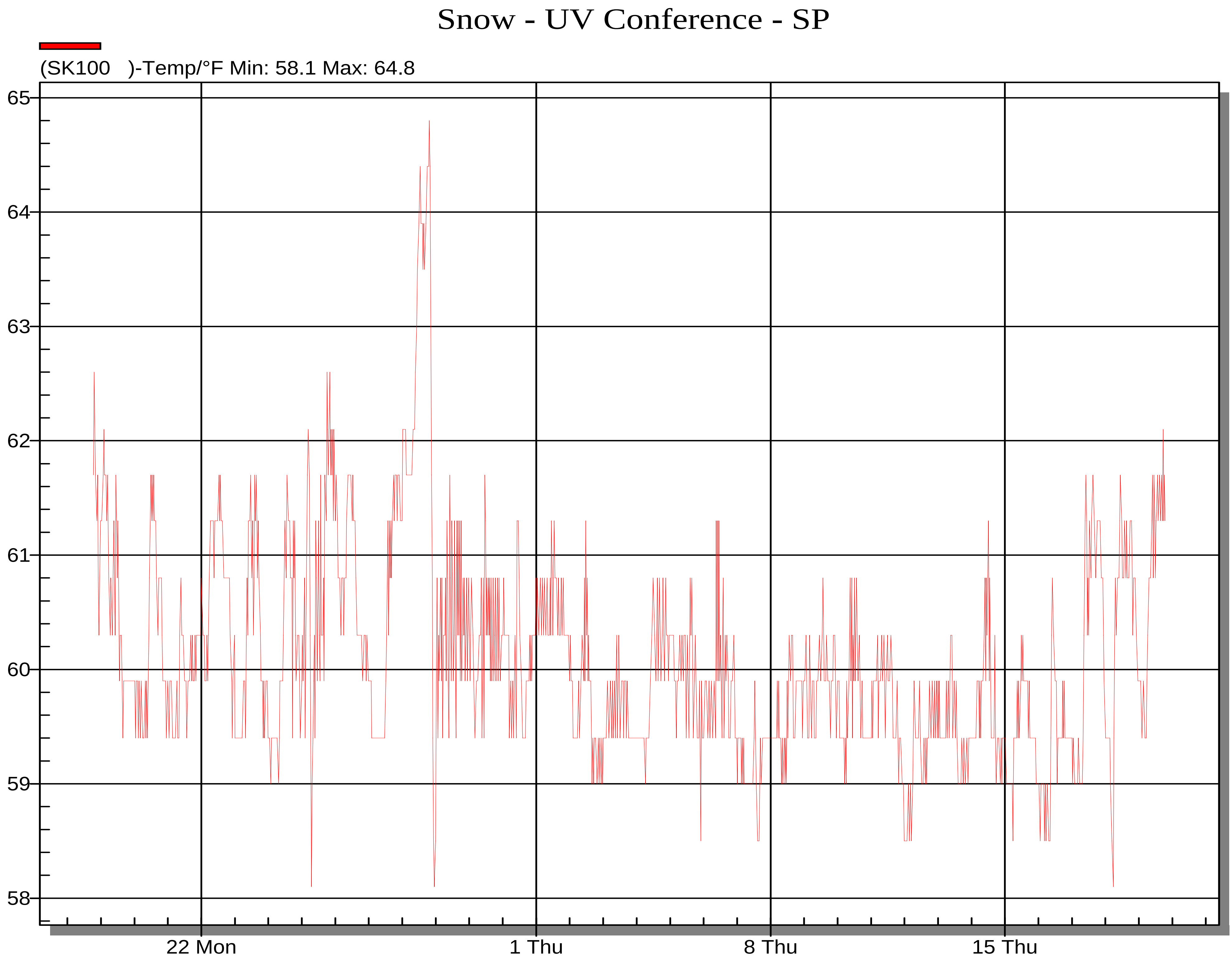
Honeywell

Appendix B
Temperature Logger Data

The temperature logger data shows the temperature of the location the logger was in and during the logging period. The temperature logger data that is taken in rooms helps determine existing occupied and unoccupied temperatures. Other temperature logs, such as mixed air (MA) loggers, help determine how the equipment is operating and how much outside air that equipment is bringing in. These values are listed in the Existing Equipment Schedules and Setpoints in the report. The logger data is not always taken as an absolute to determining the setpoints, setback and percent outside air. Onsite observations, on-time logger data and the energy balance of the building also influence these values used for the energy calculations. All of the data is used to interpret the equipment's operating parameters.

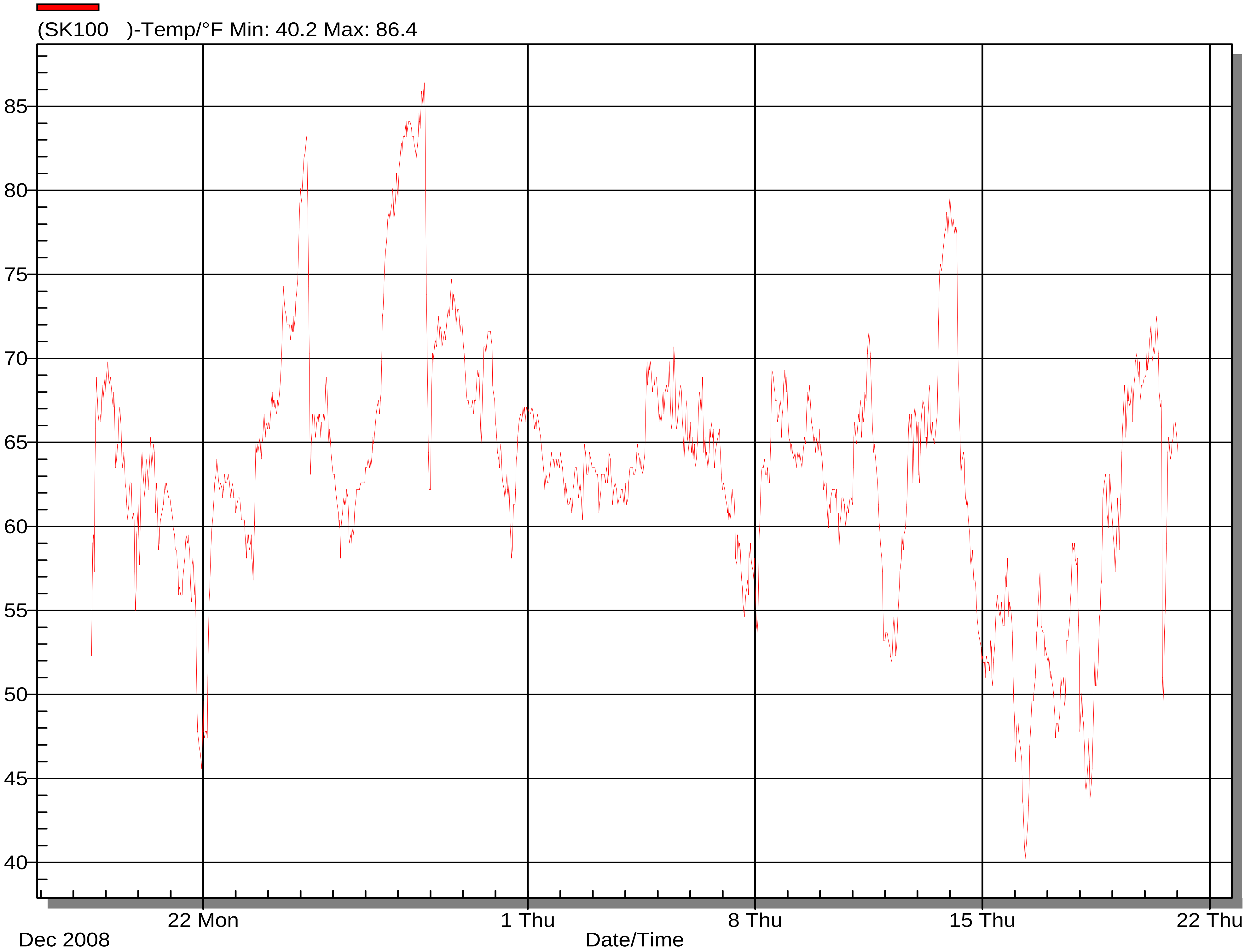
Andrews - HV - MA



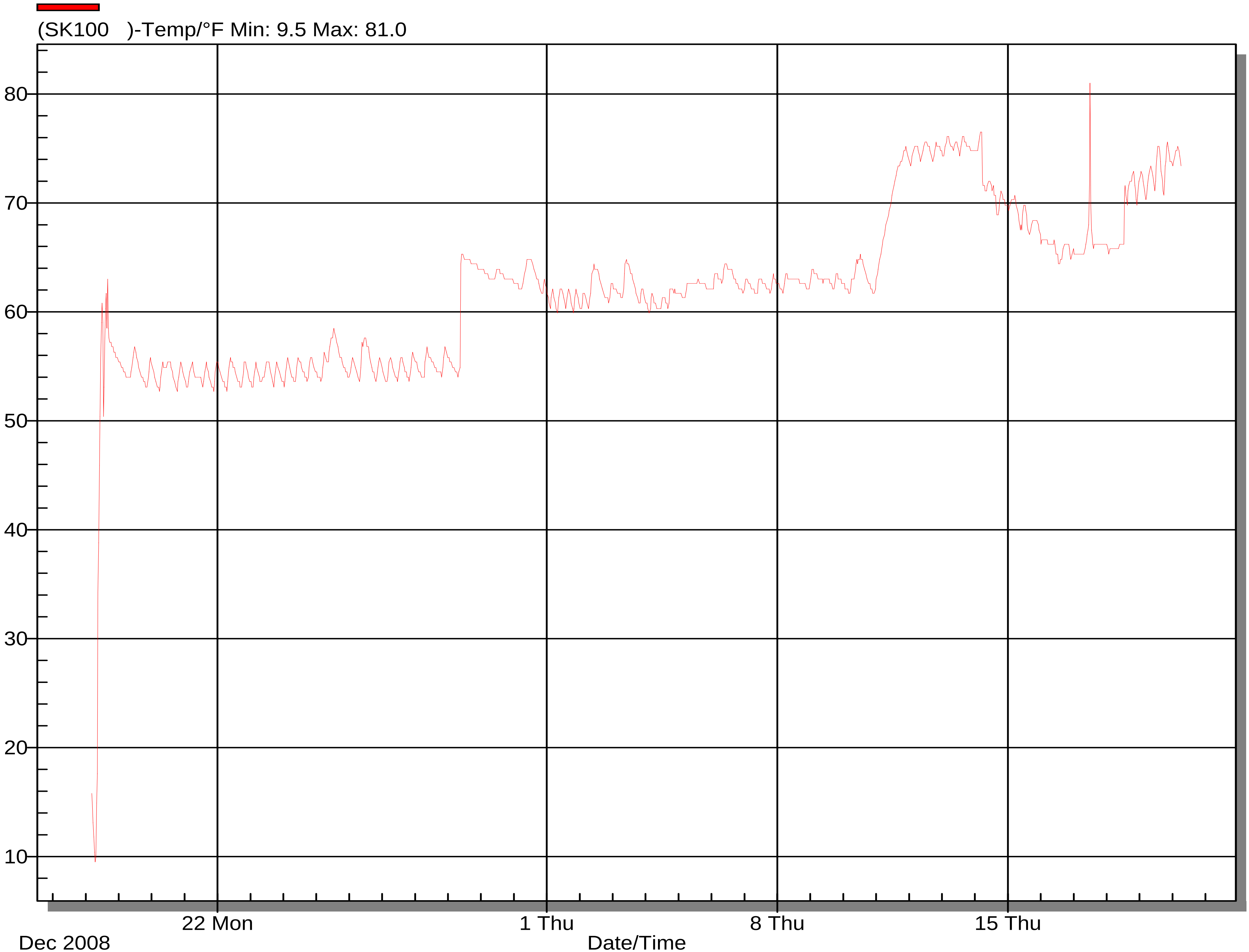


Snow - UV Conference - SP
(SK100)-Temp/°F Min: 58.1 Max: 64.8
65
64
63
62
61
60
59
58
22 Mon
1 Thu
8 Thu
15 Thu
Dec 2008
Date/Time

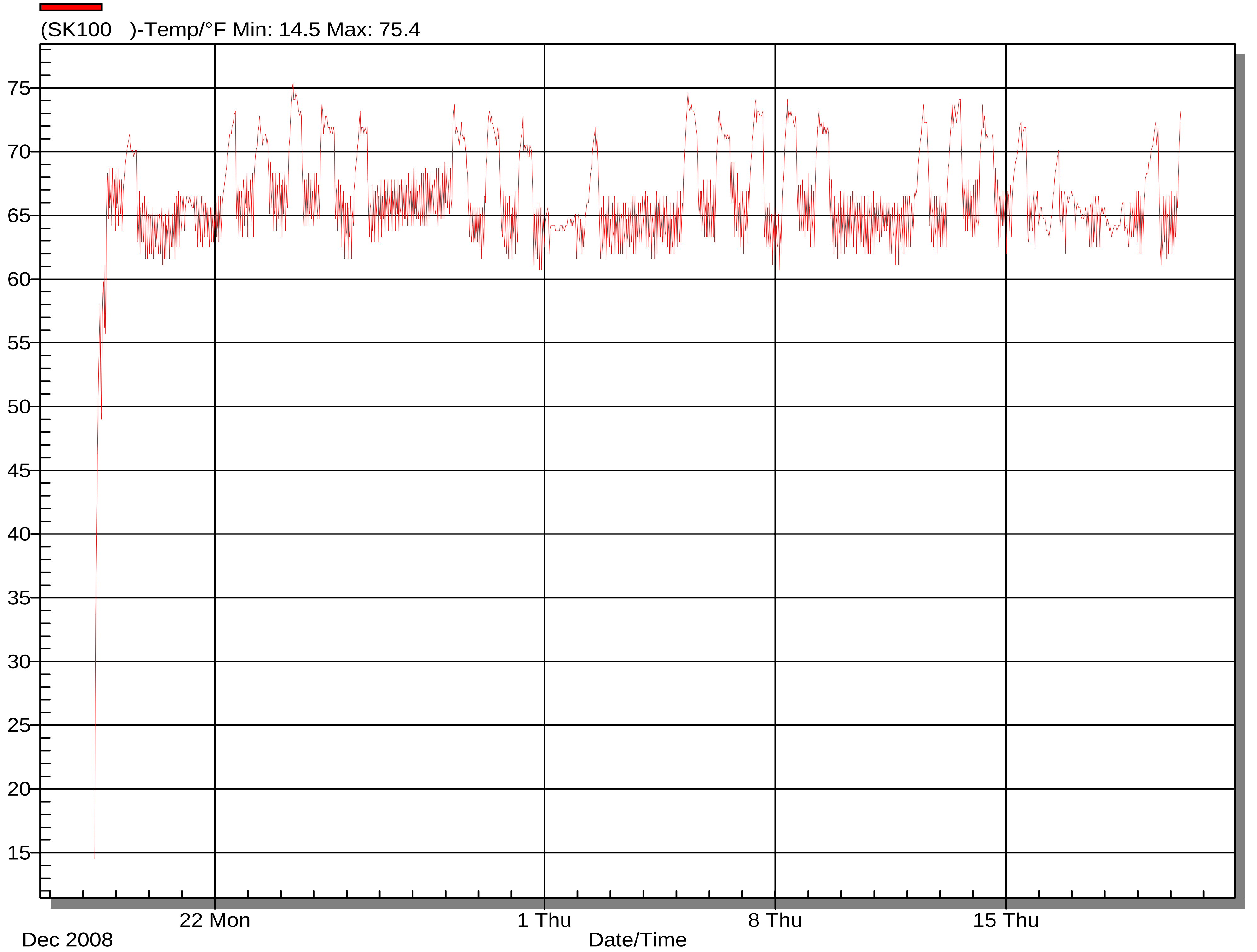
Snow - UV Conference - MA



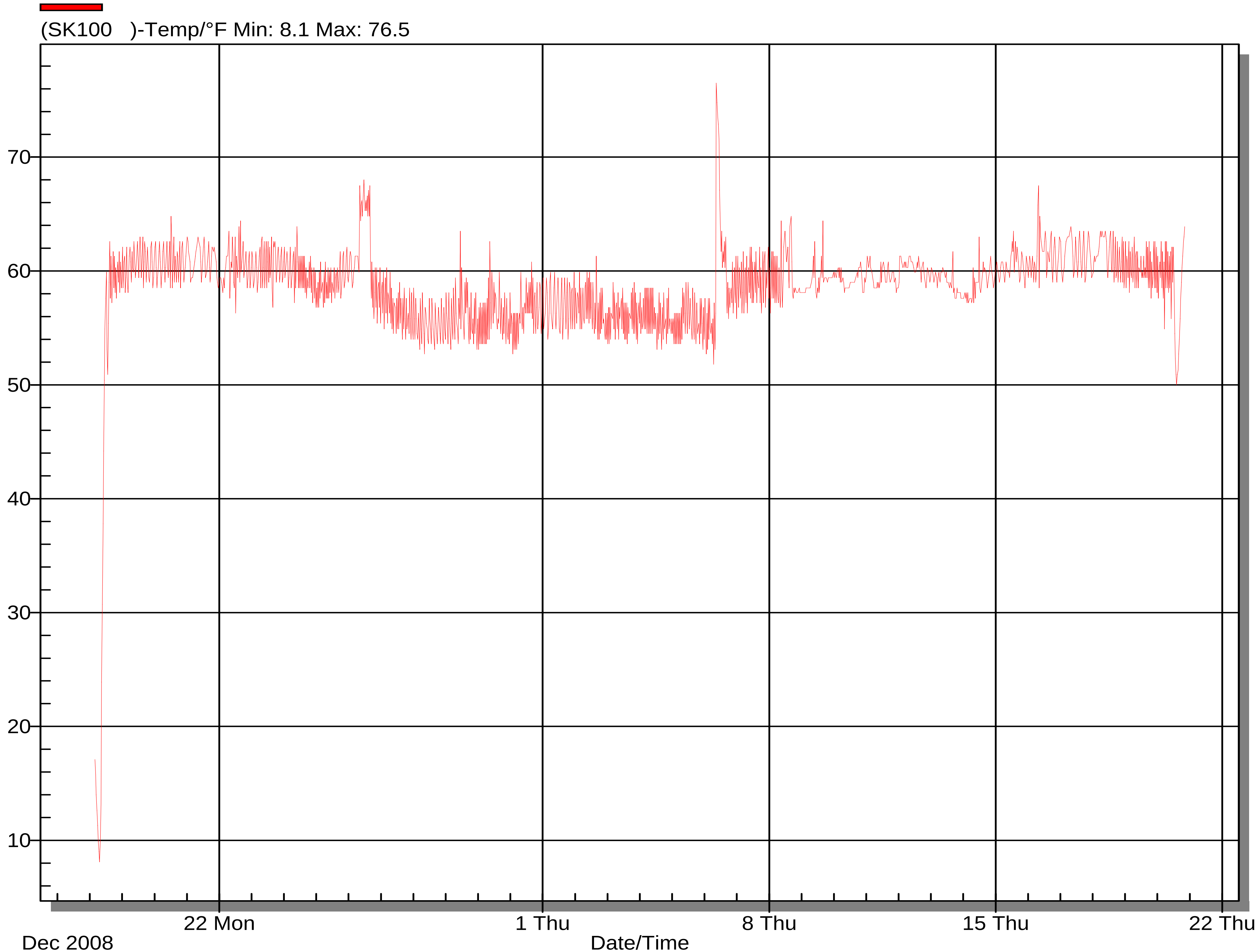
Penobscot Hall - SP



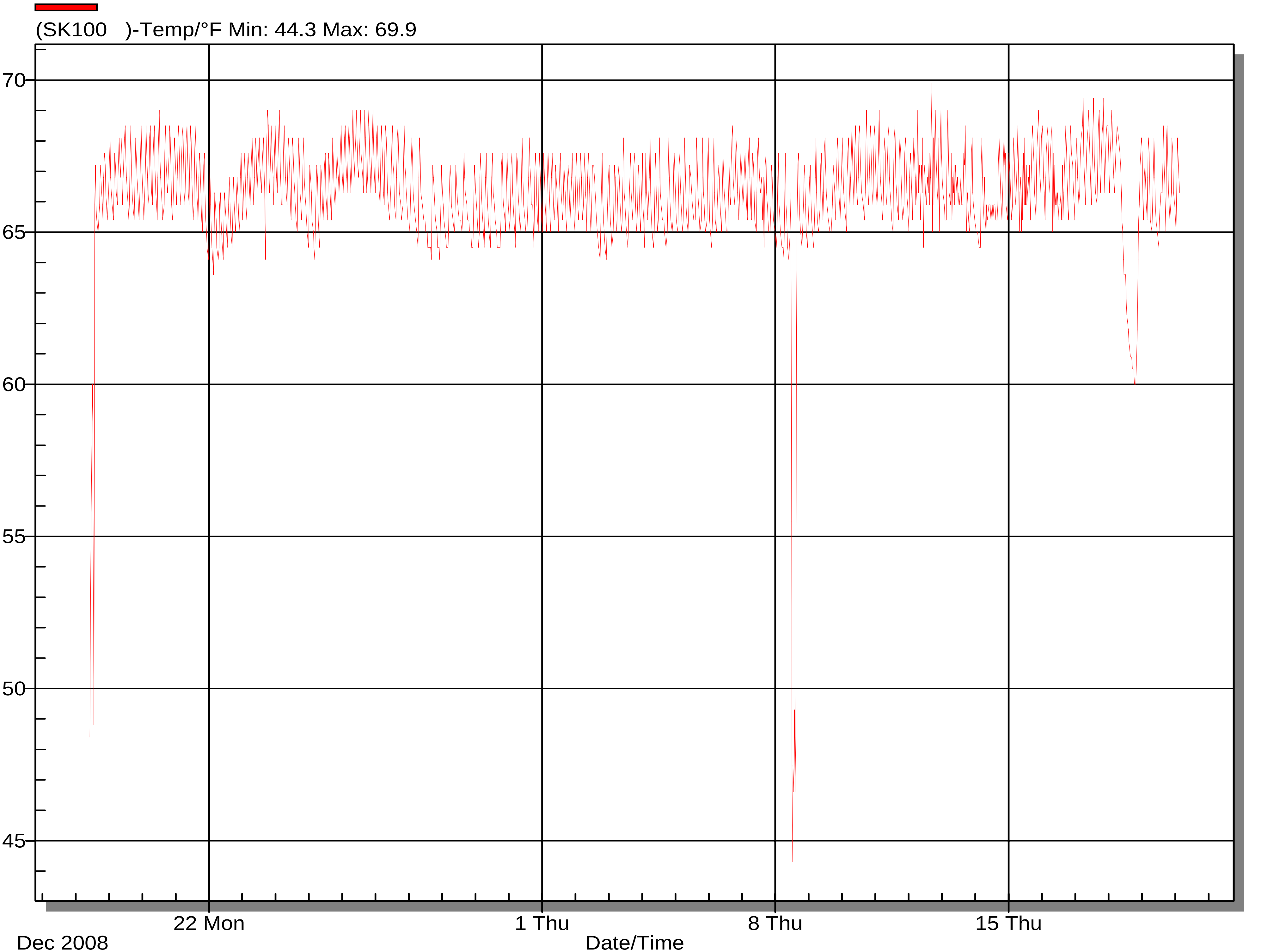
Maintenance Shop - SP

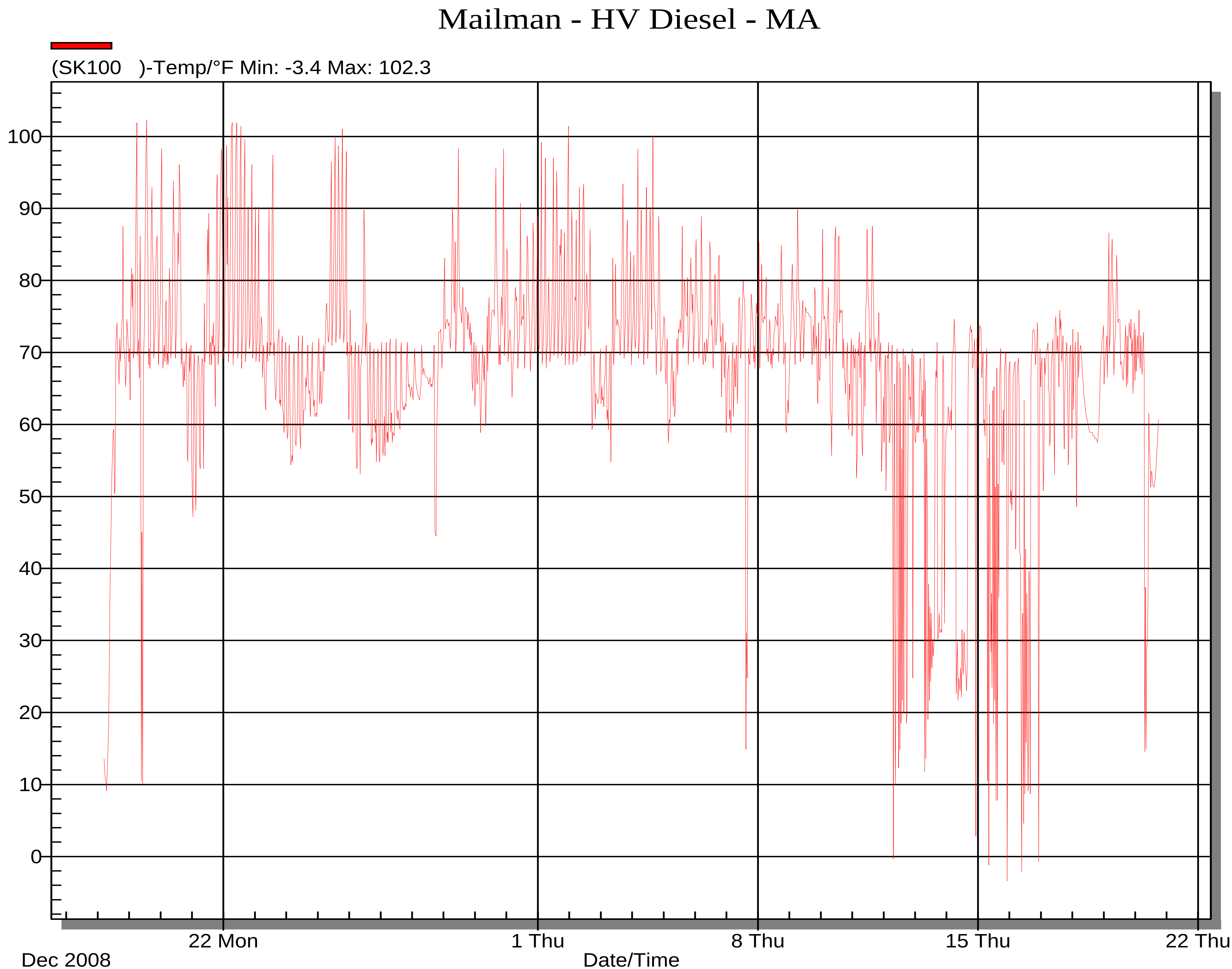


Maintenance Garage - SP

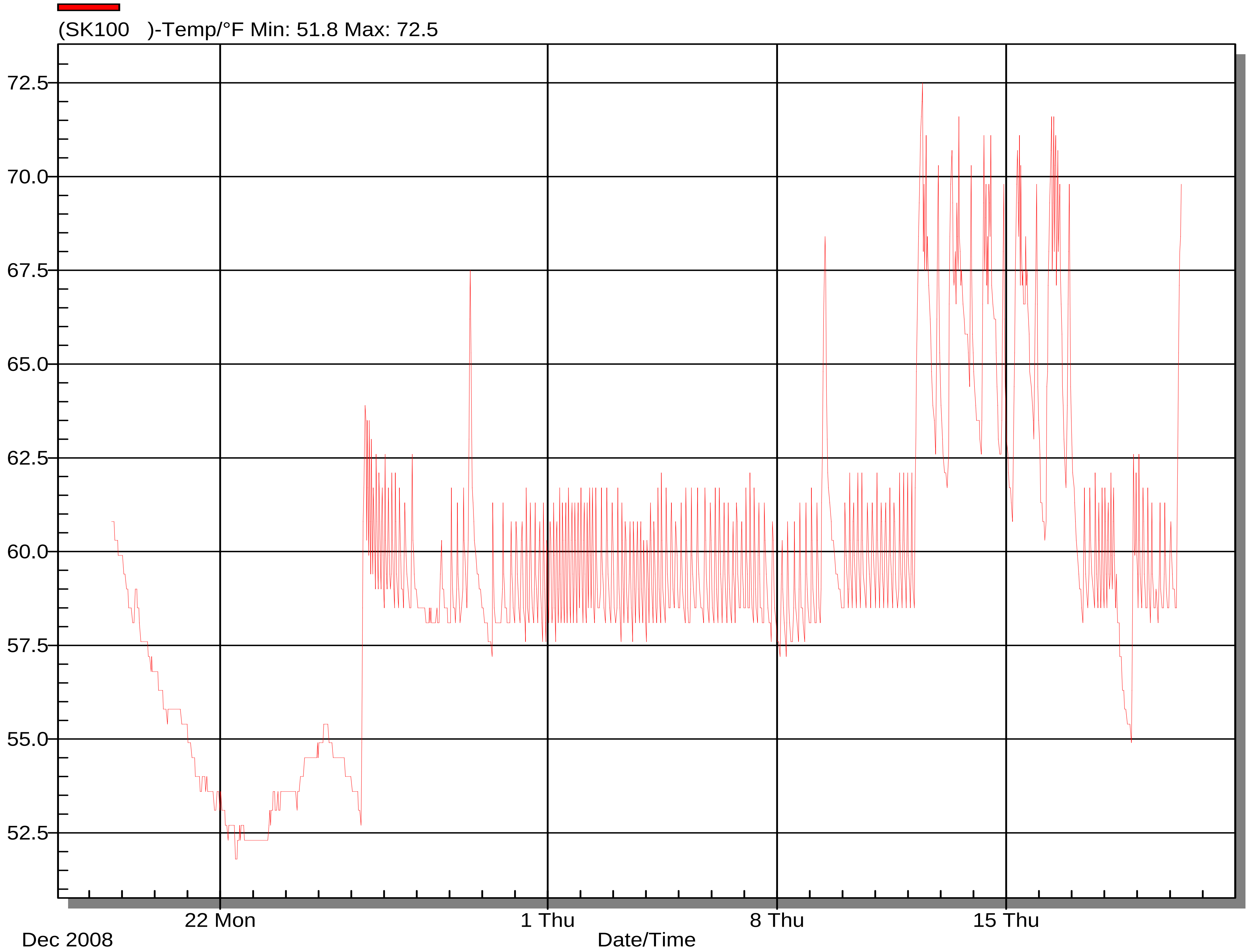


Mailman - HV Diesel - SP

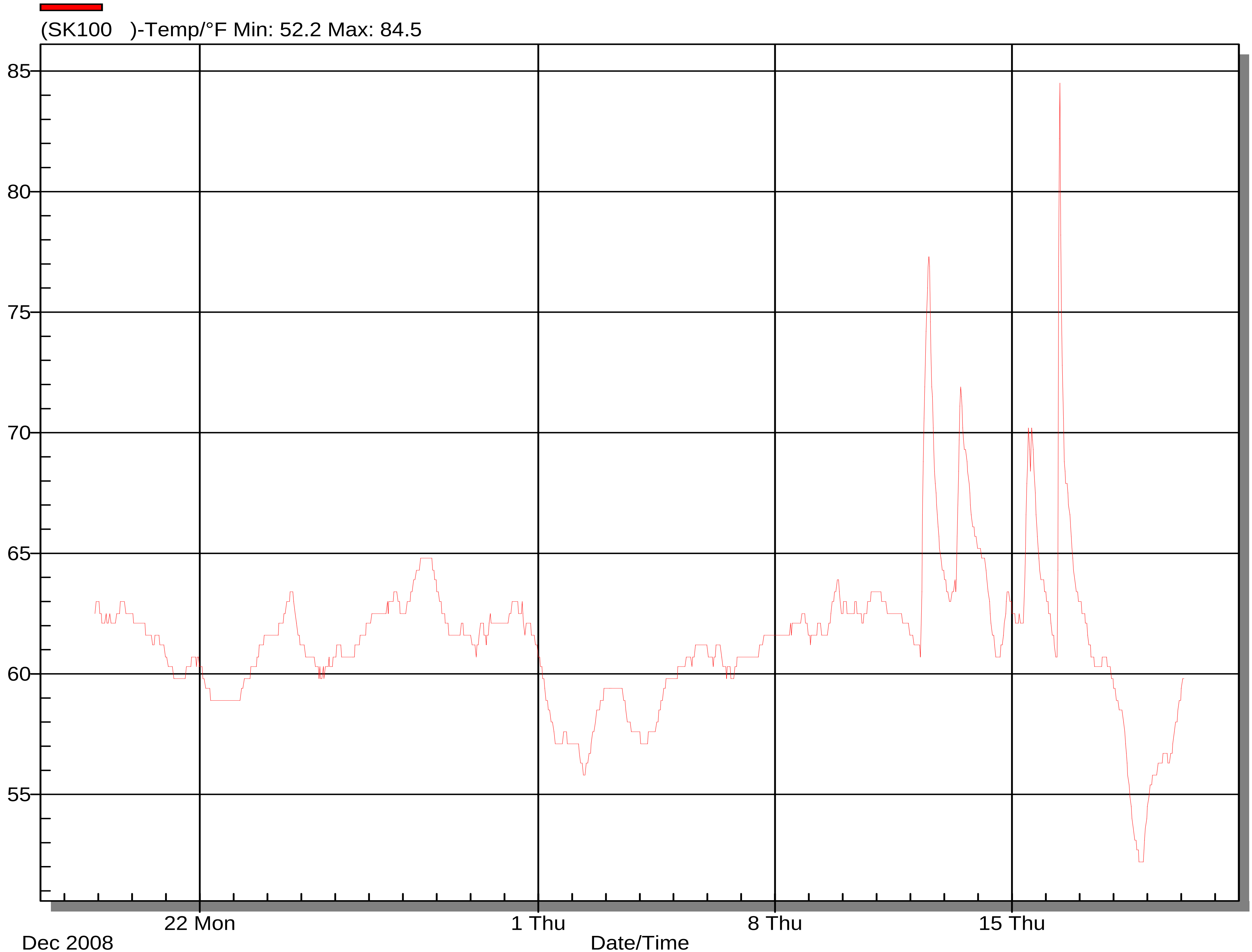


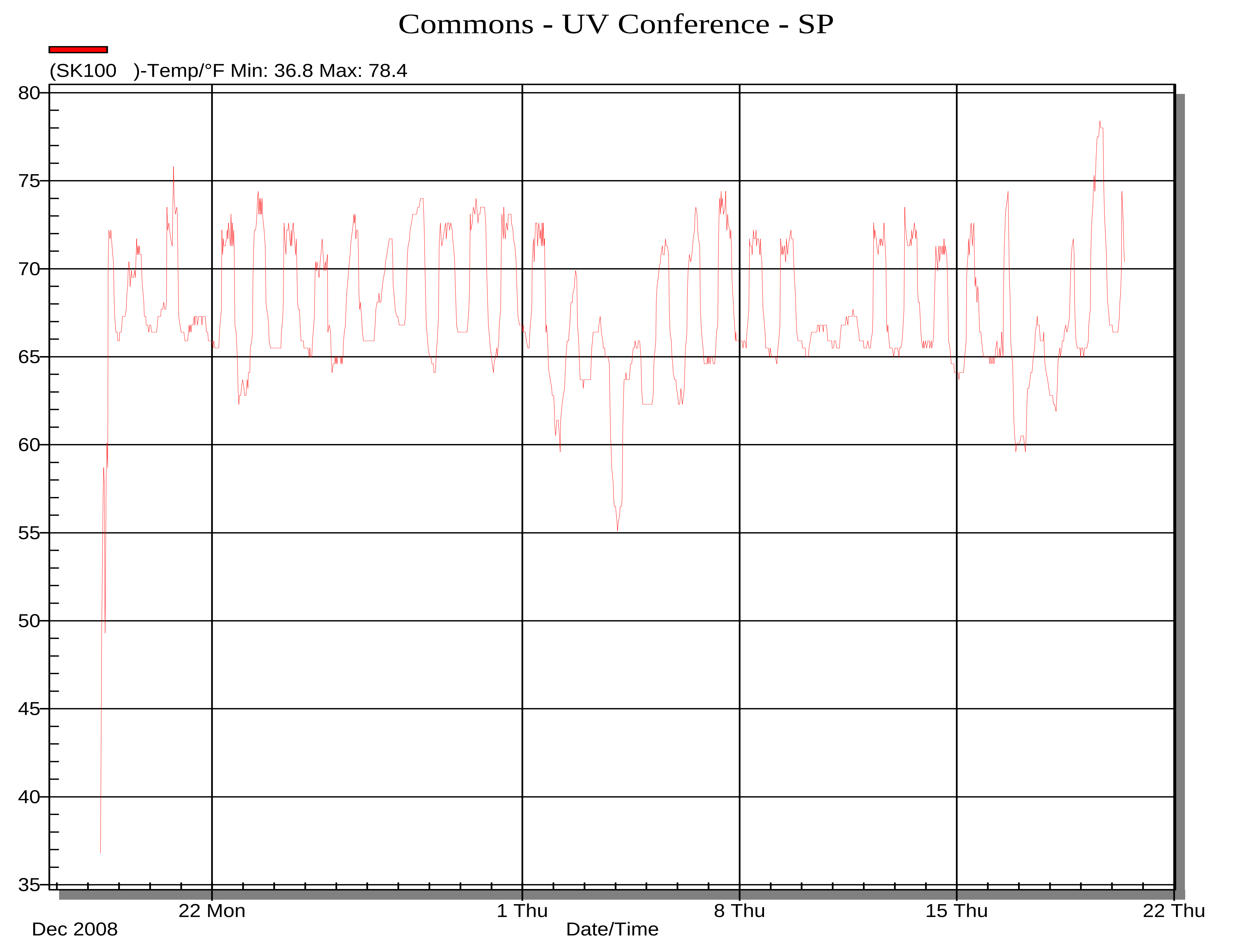

Mailman - HV Diesel - MA
(SK100)-Temp/°F Min: -3.4 Max: 102.3
100
90
80
70
60
50
40
30
20
10
0
22 Mon
1 Thu
8 Thu
15 Thu
22 Thu
Dec 2008
Date/Time

Mailman - HV Auto - Sp

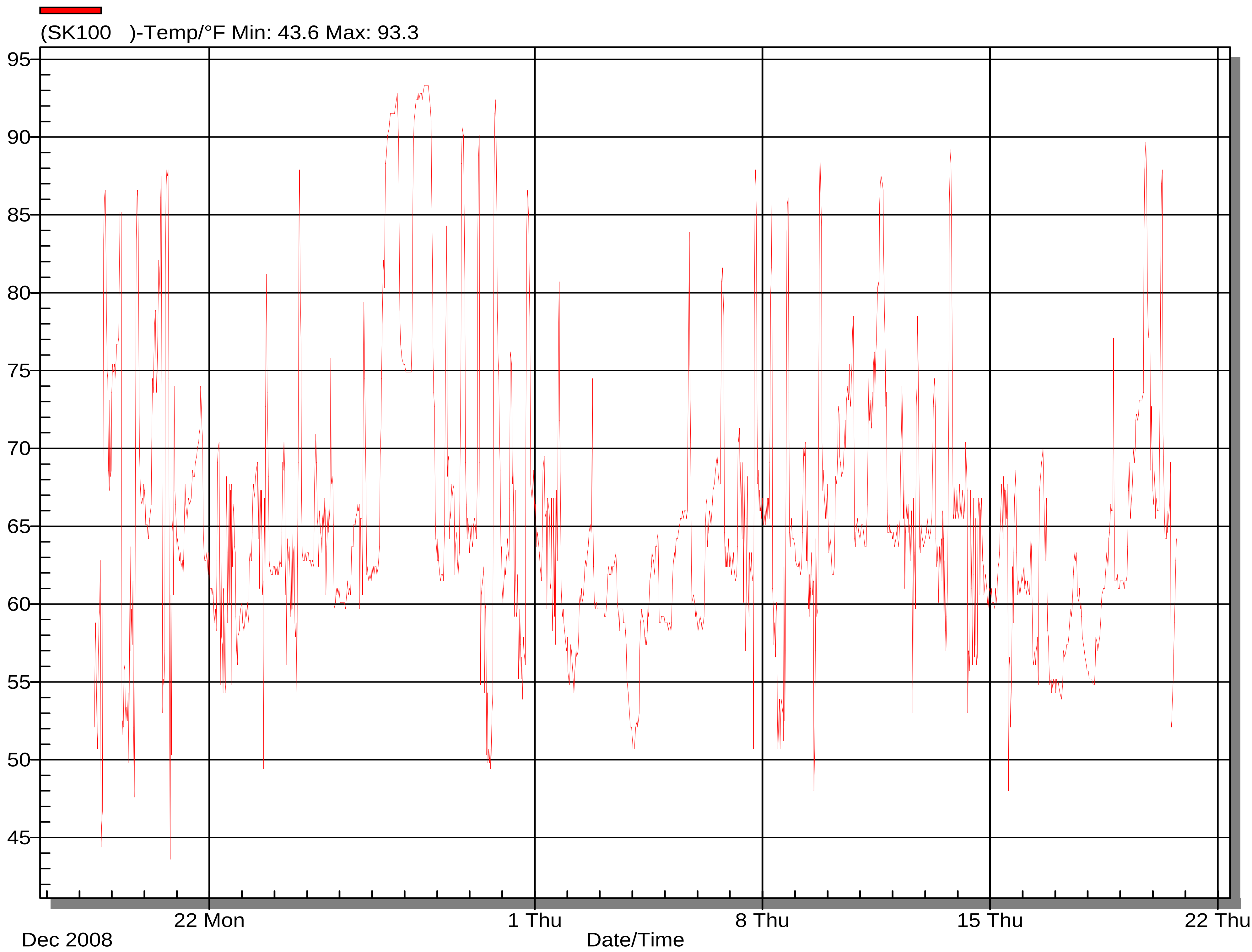


Mailman - Plumbing - SP

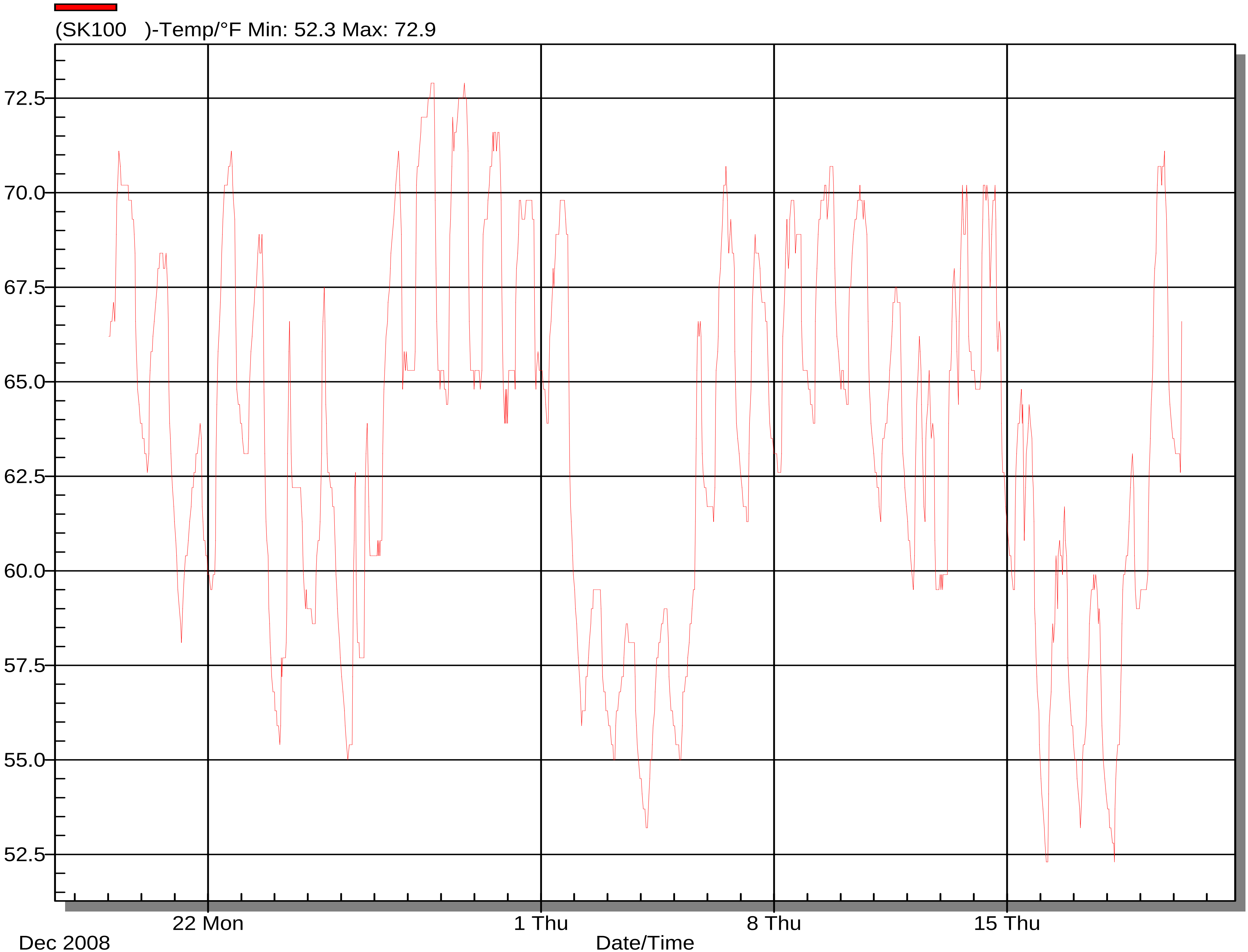



Commons - UV Conference - SP
(SK100)-Temp/°F Min: 36.8 Max: 78.4
80
75
70
65
60
55
50
45
40
35
22 Mon
1 Thu
8 Thu
15 Thu
22 Thu
Dec 2008
Date/Time

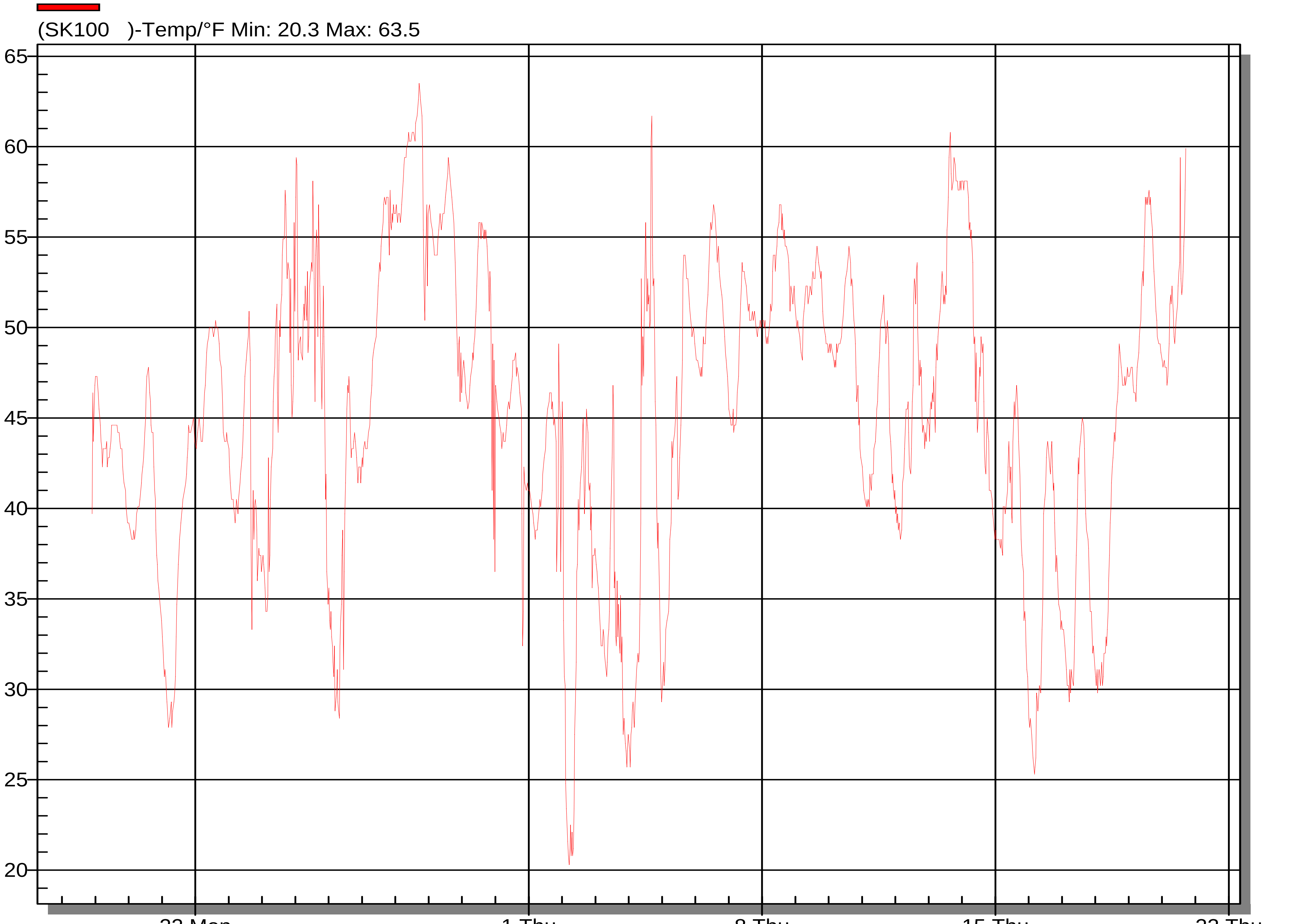
Commons - UV Conference - MA



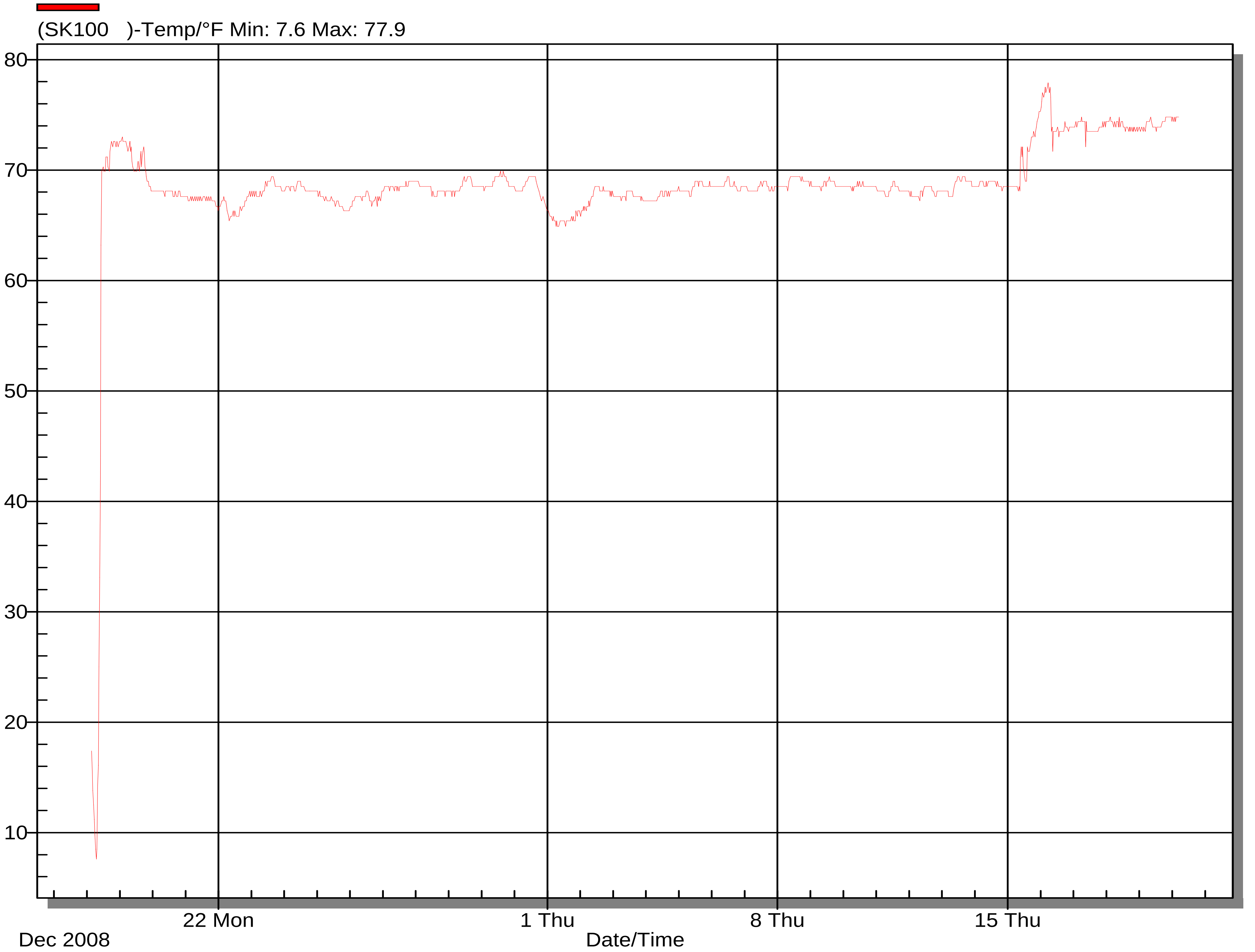
Commons - HV Dining - SP

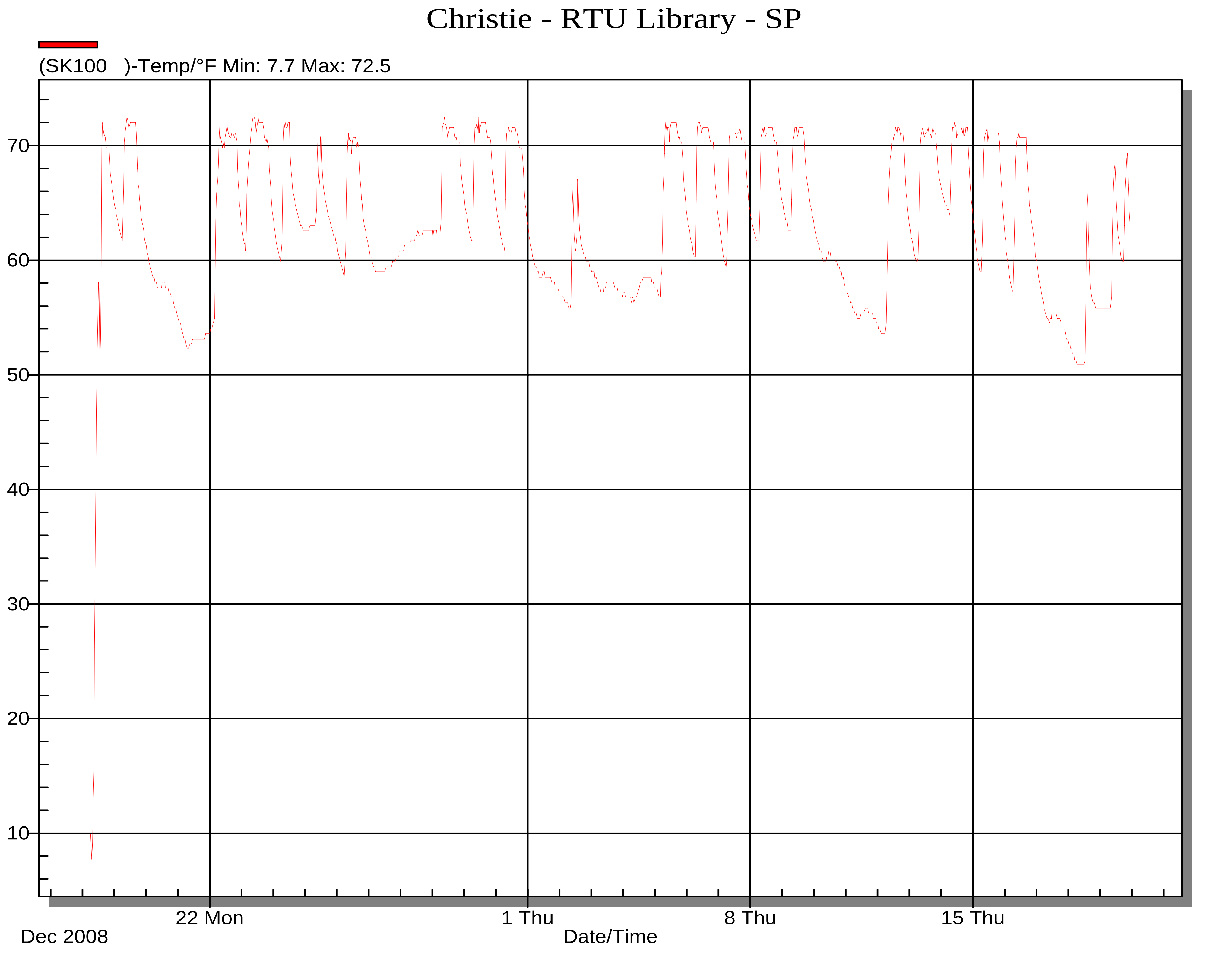


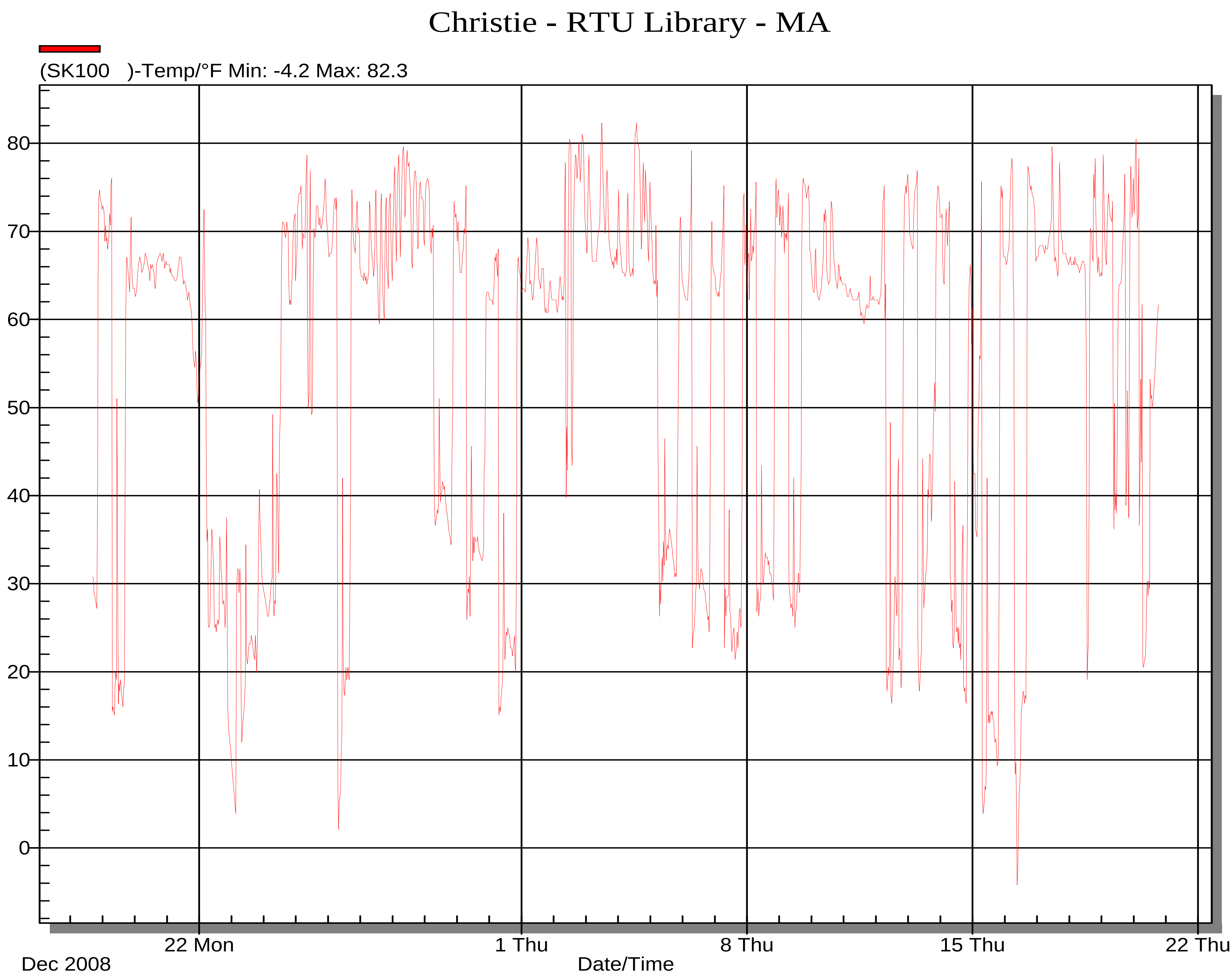
Commons - HV Dining - MA



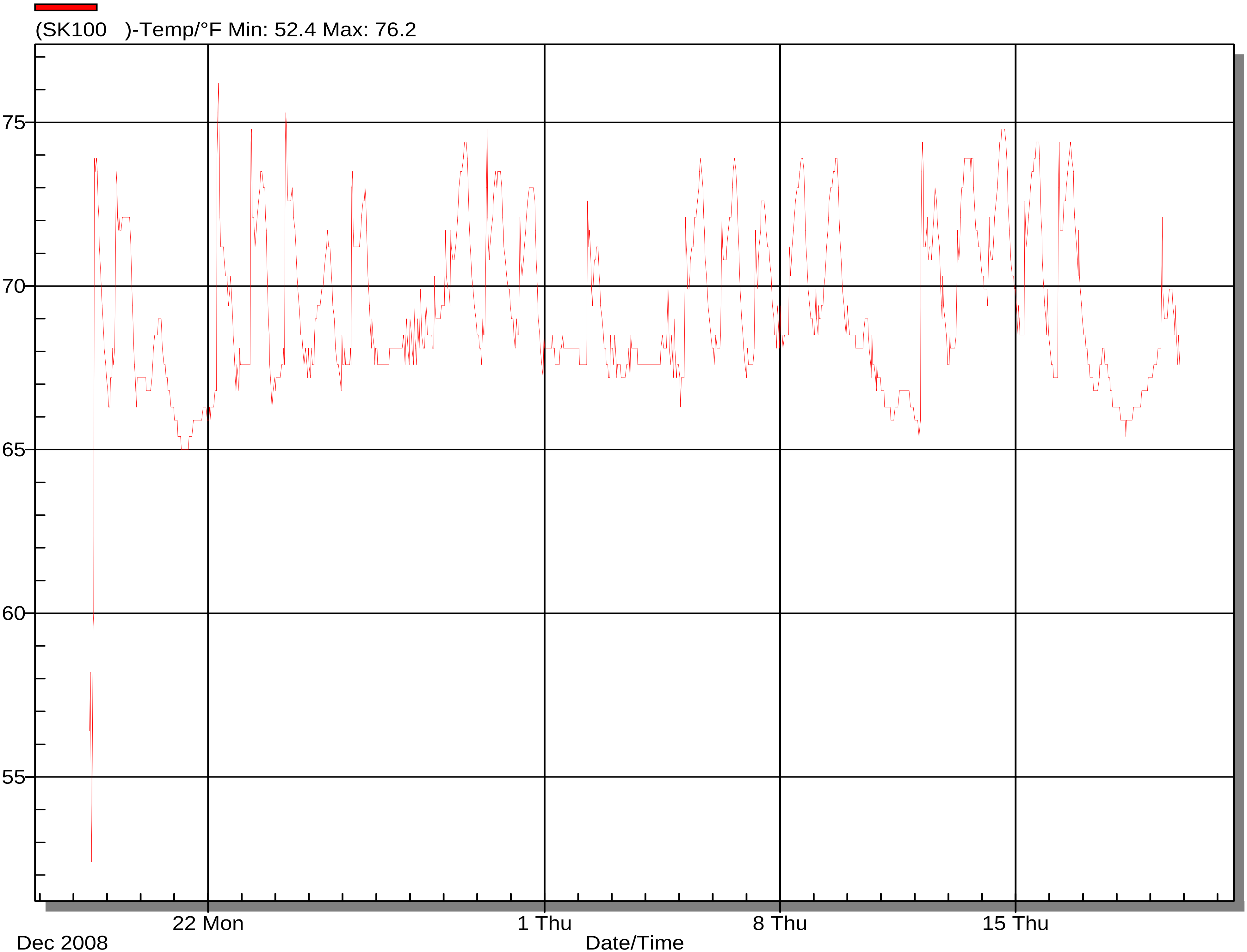
Chrsitie - HRU - SP



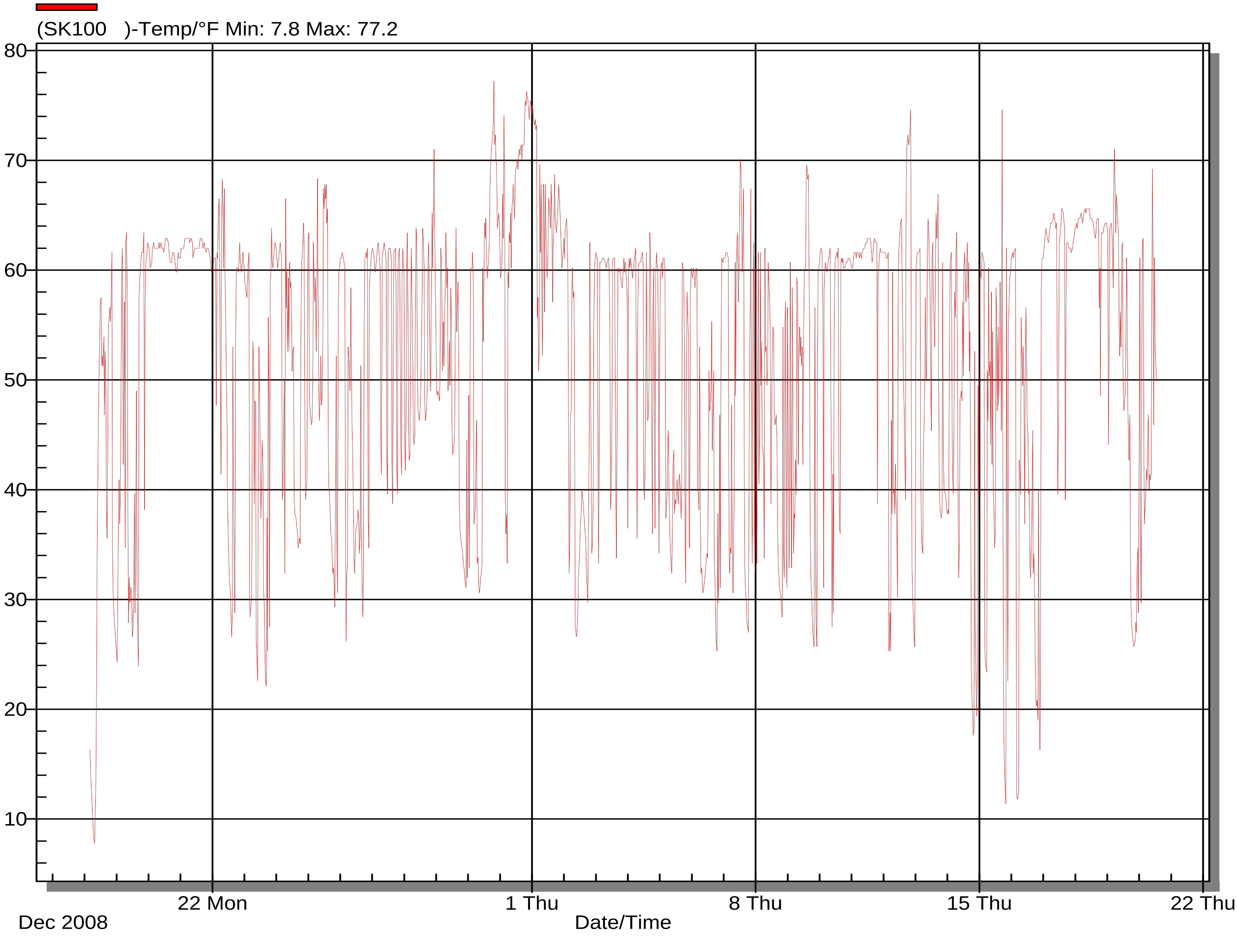

Christie - RTU Library - SP
(SK100)-Temp/°F Min: 7.7 Max: 72.5
70
60
50
40
30
20
10
22 Mon
1 Thu
8 Thu
15 Thu
Dec 2008
Date/Time


Christie - RTU Library - MA
(SK100)-Temp/°F Min: -4.2 Max: 82.3
80
70
60
50
40
30
20
10
0
22 Mon
1 Thu
8 Thu
15 Thu
22 Thu
Dec 2008
Date/Time

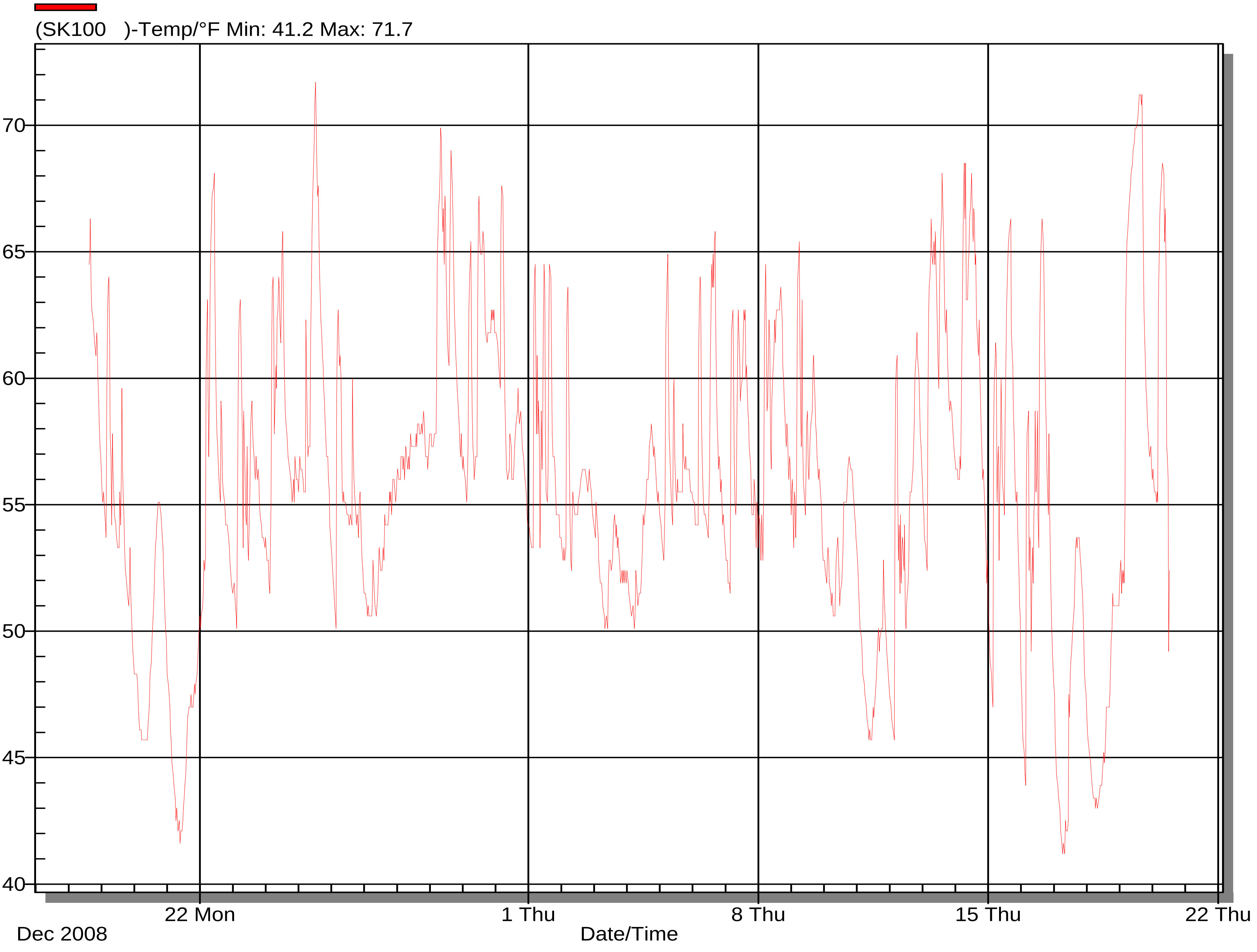
Christie - RTU Continuing Ed - SP



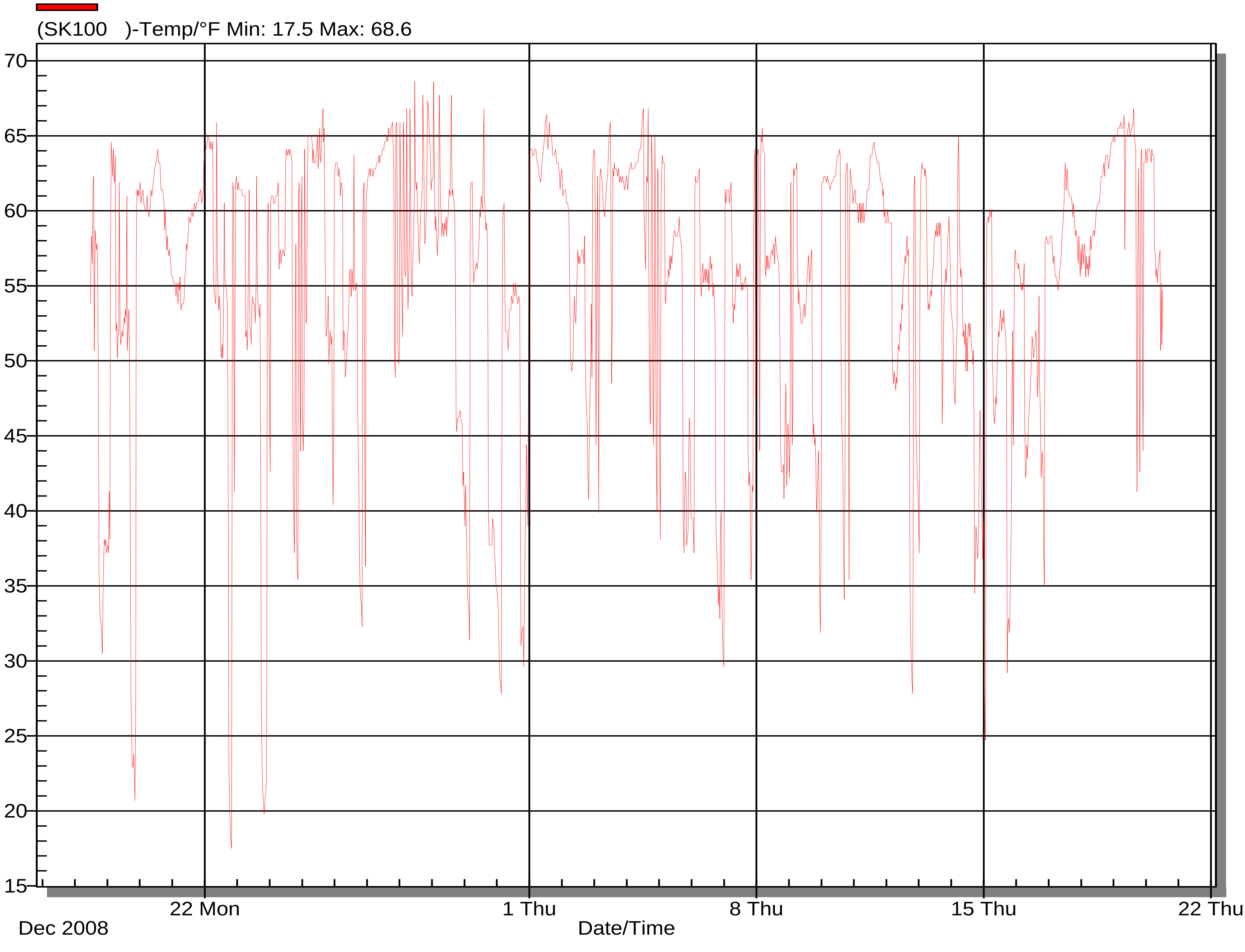
Christie - RTU Continuing Ed - MA



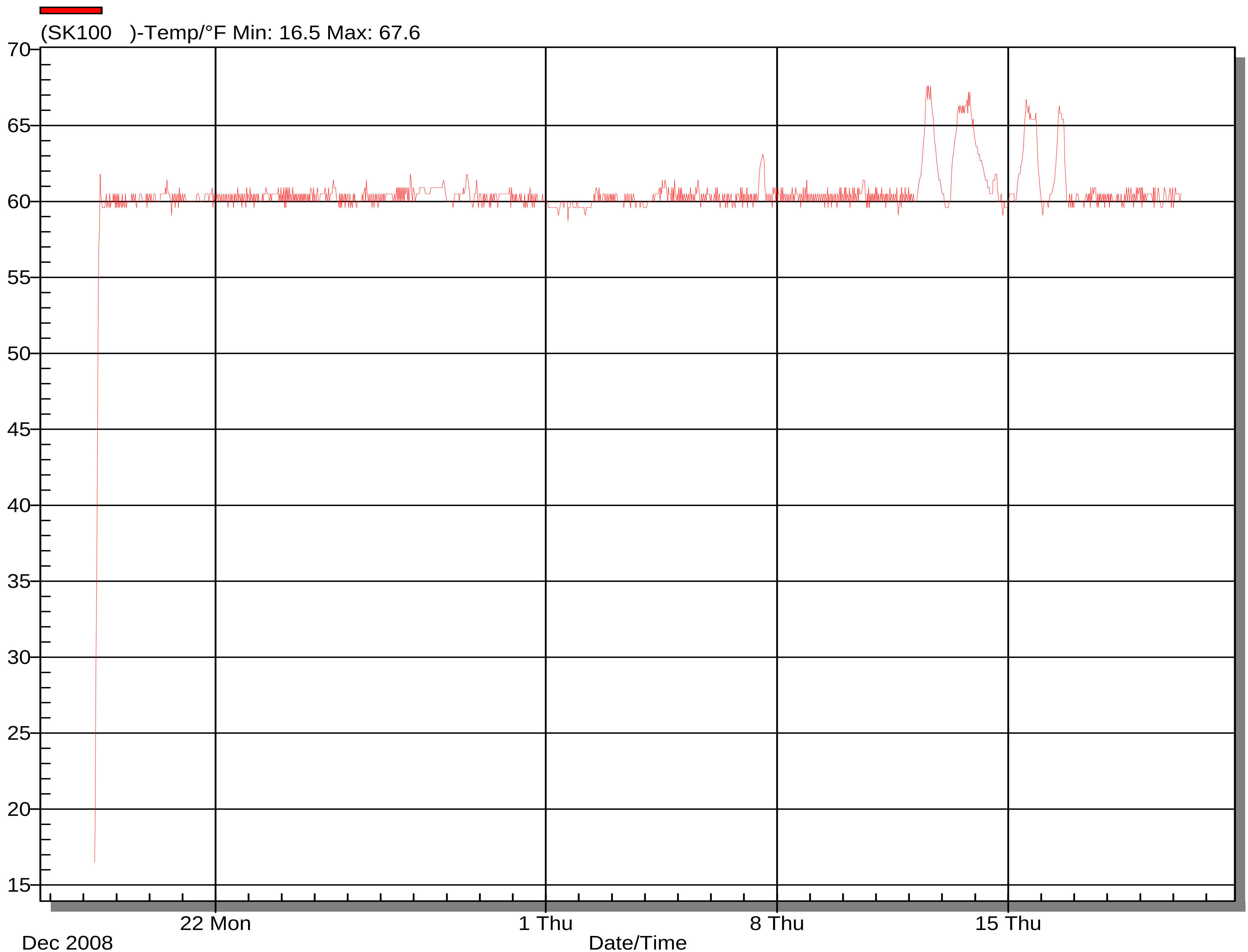
Christie - RTU Conference Room - SP



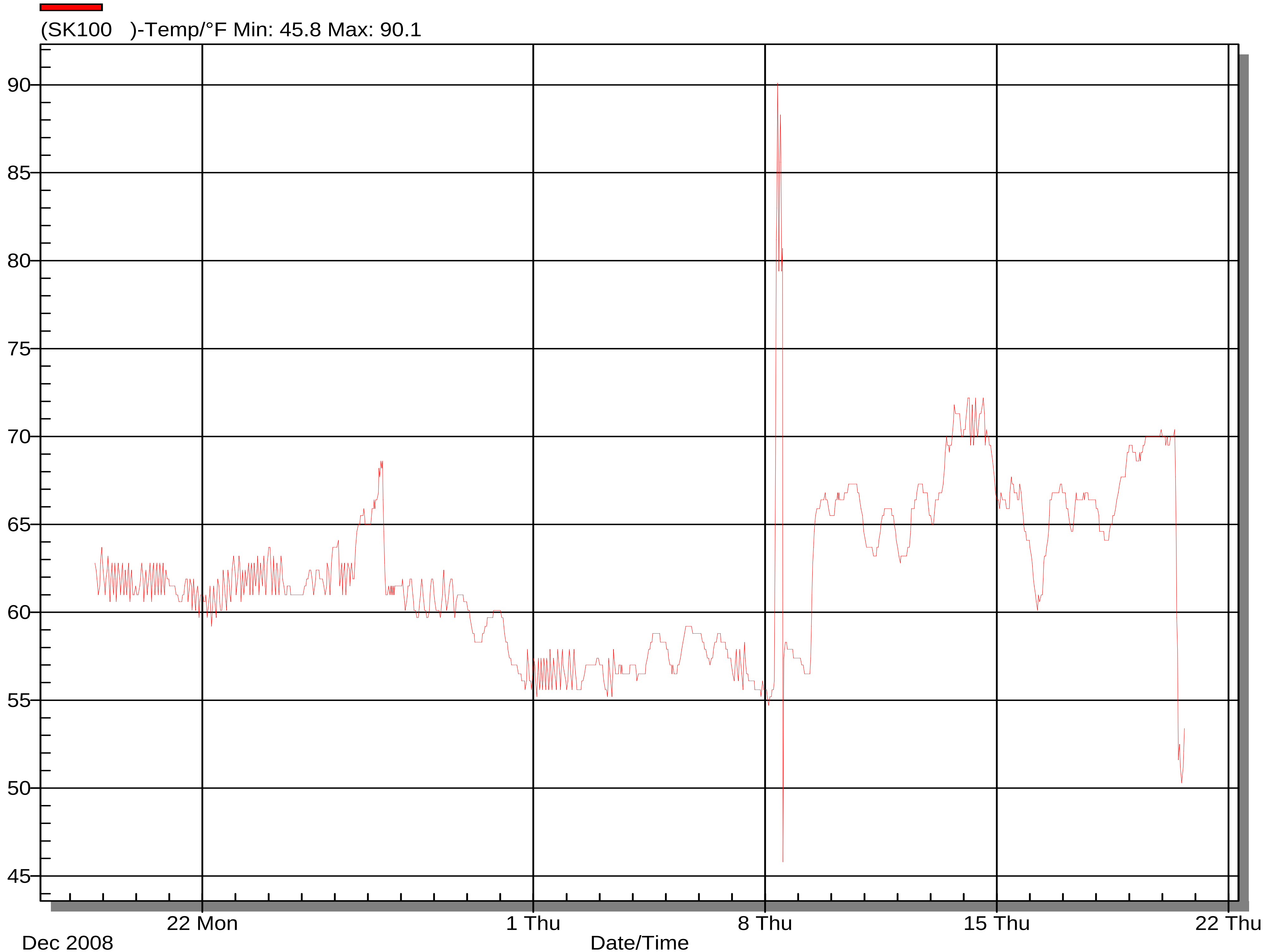
Christie - RTU Conference Room - MA



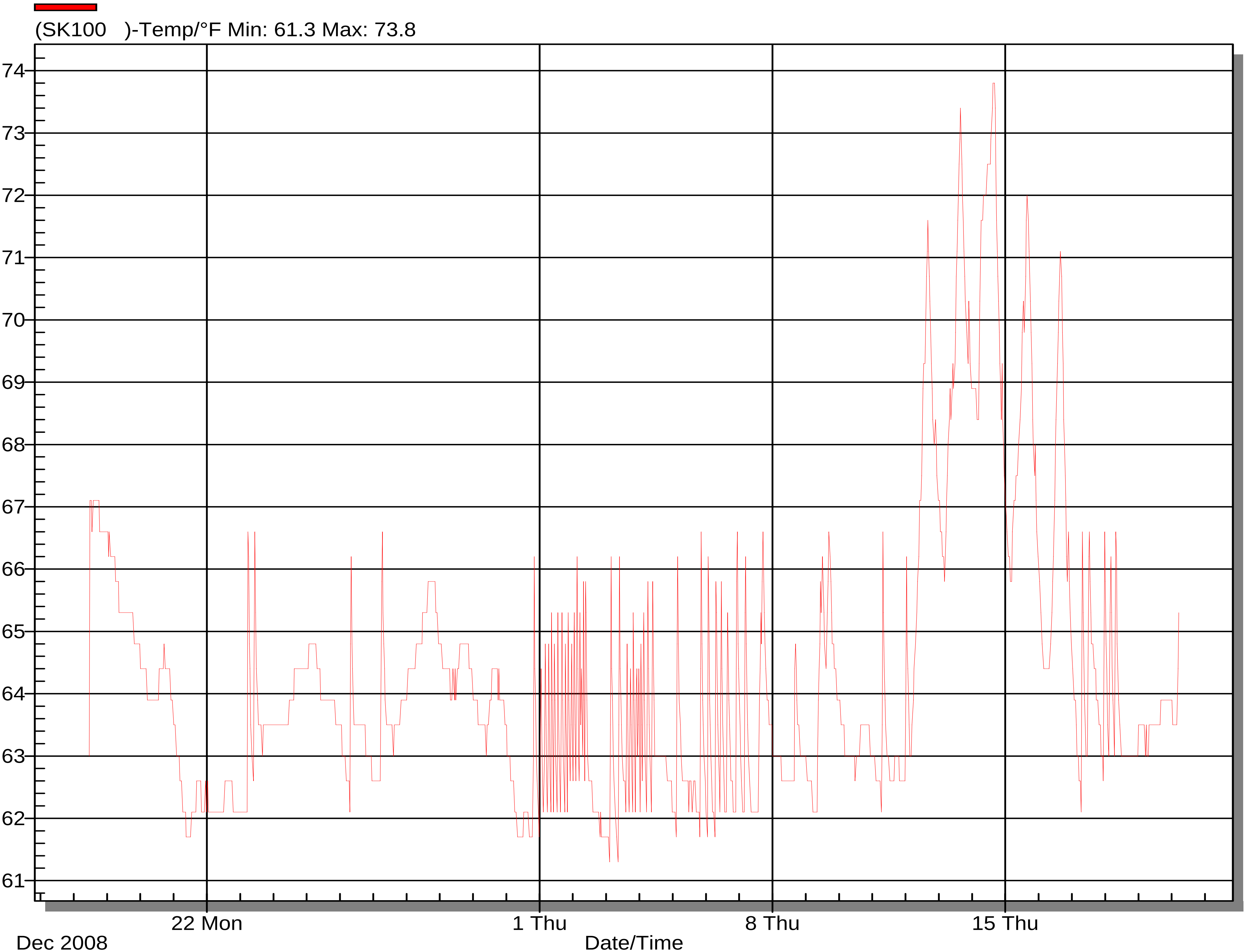
Christie - Rm 214 - SP



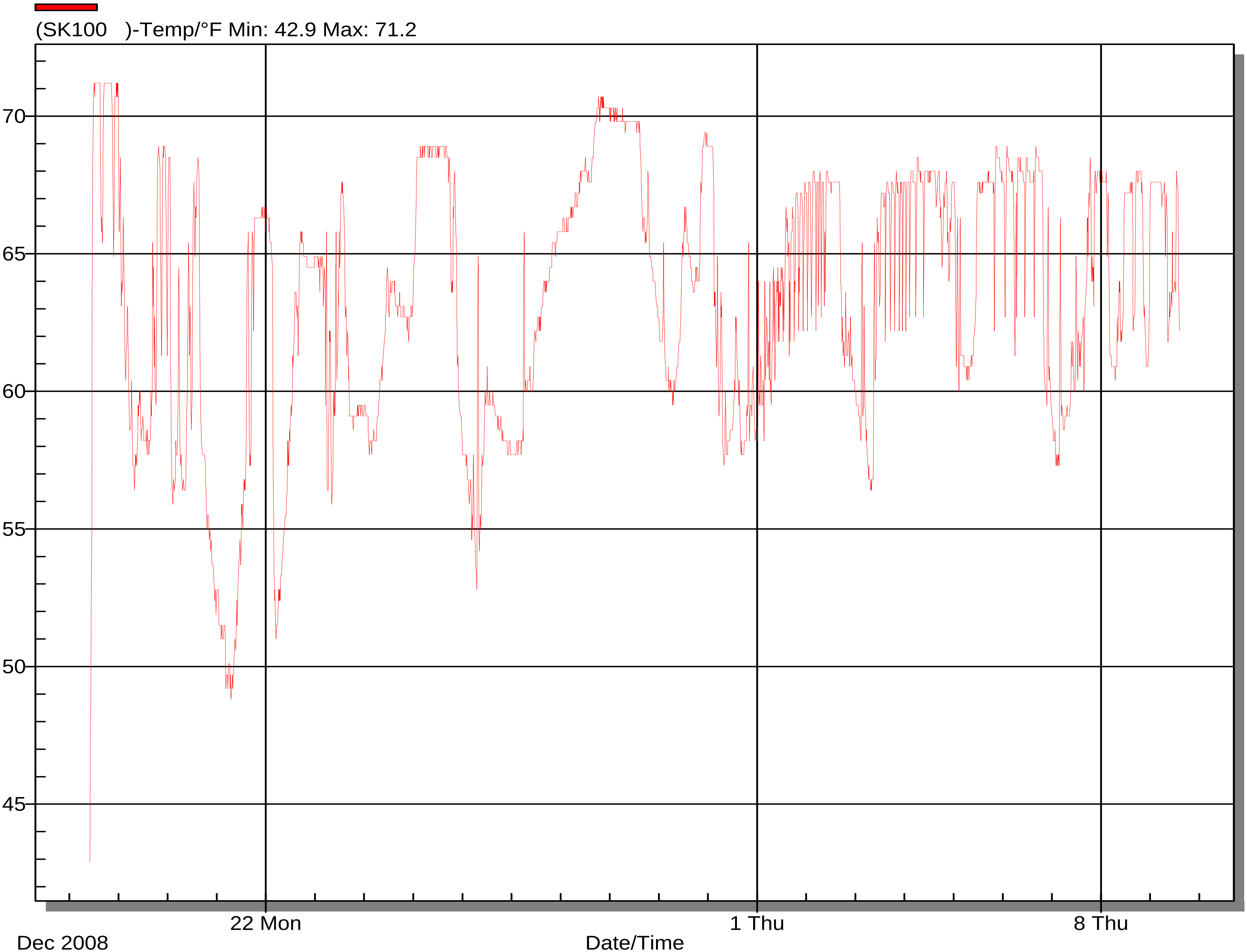
Christie - Rm 114 - SP



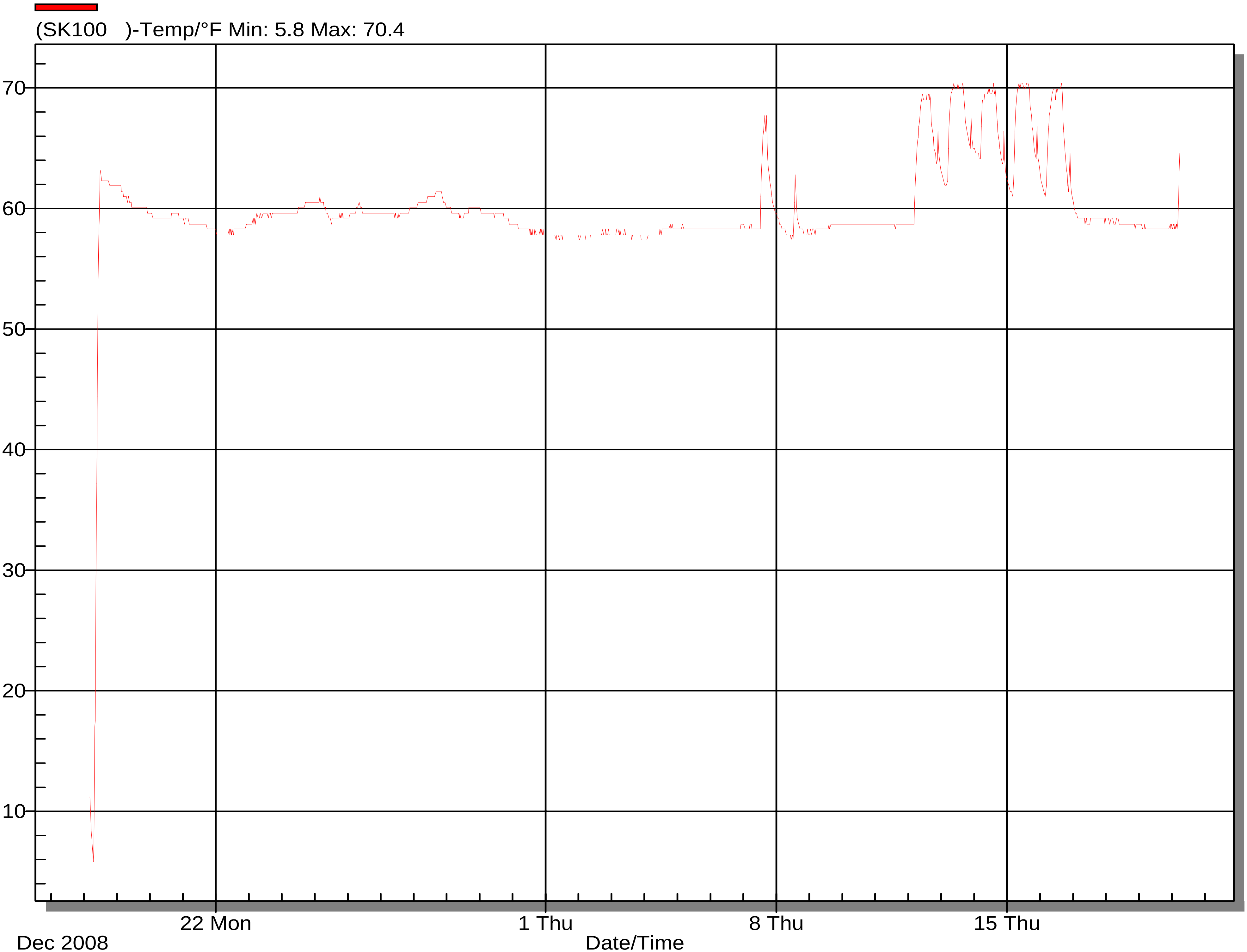
Christie - HV Rm 111 - SP



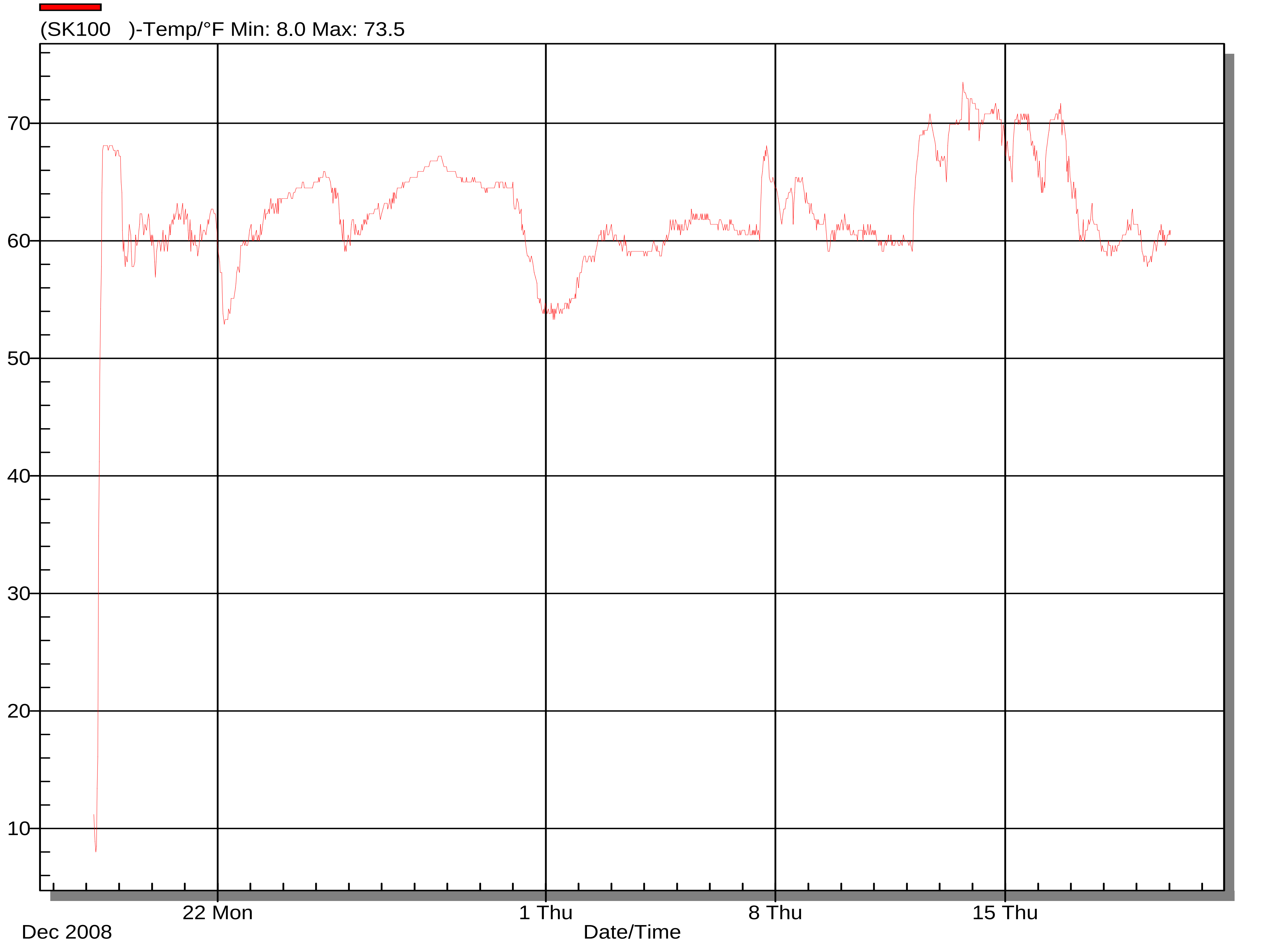
Christie - HV Rm 111 - MA



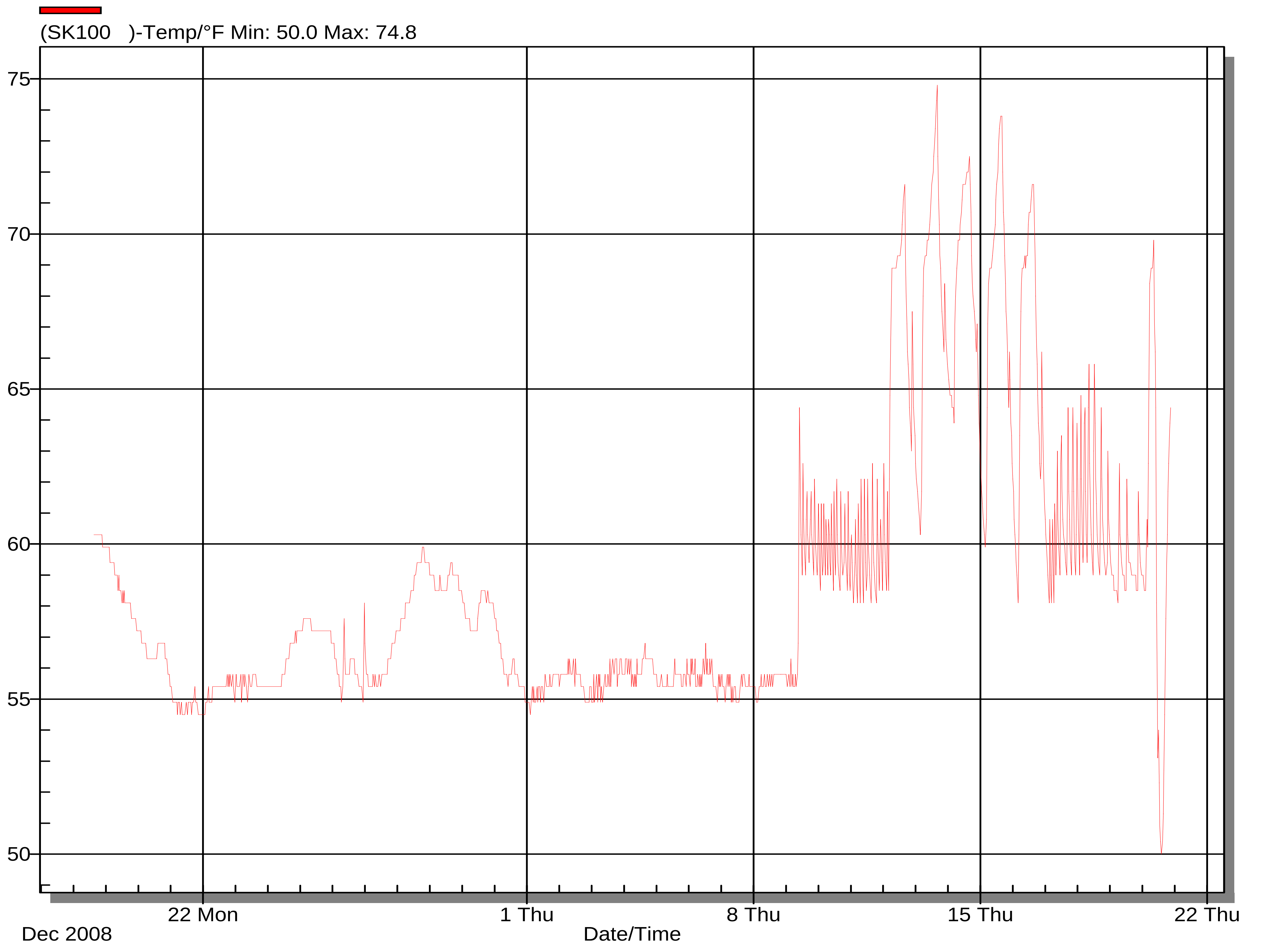
Christie - HV Rm 110 - SP

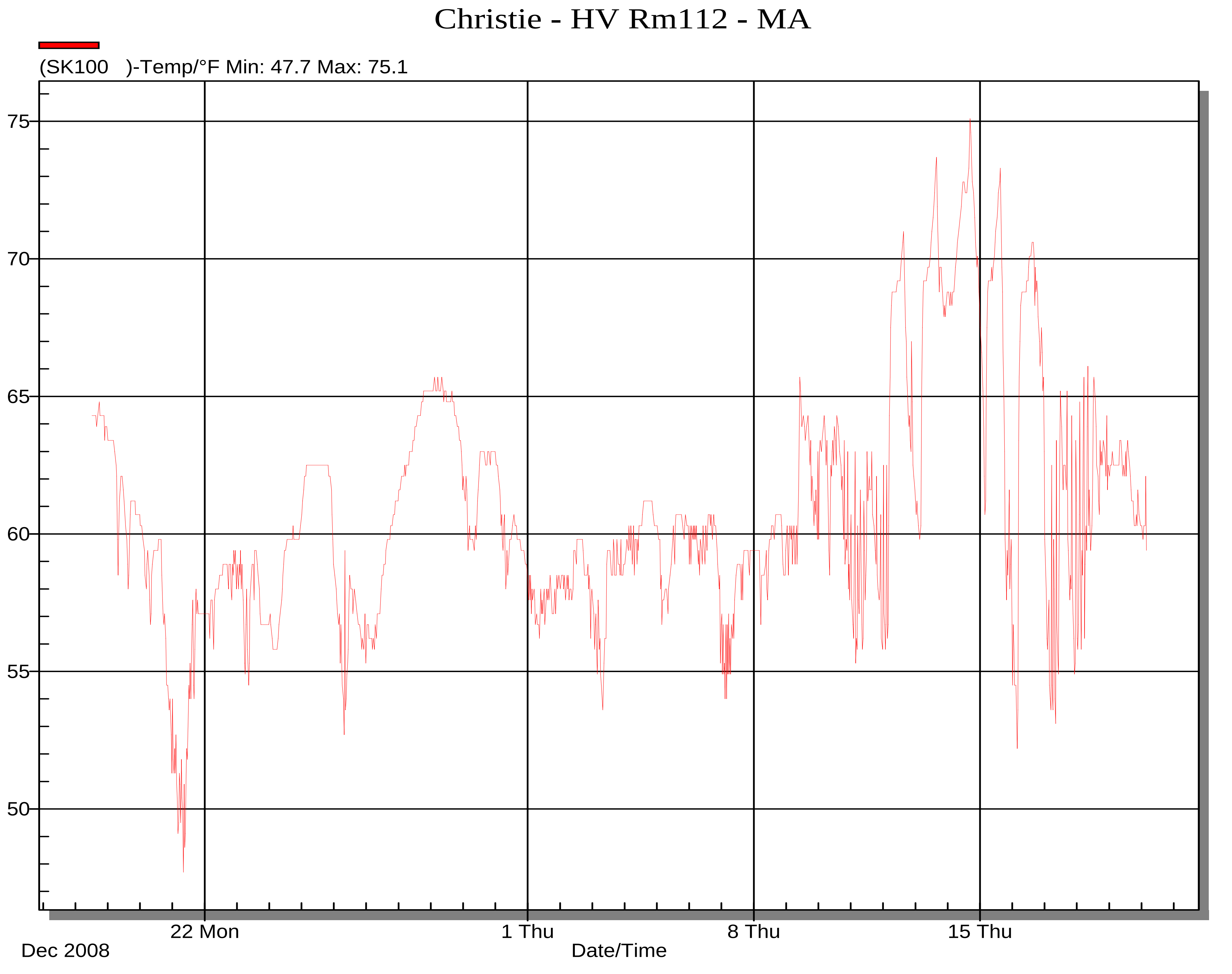


Christie - HV Rm 110 - MA



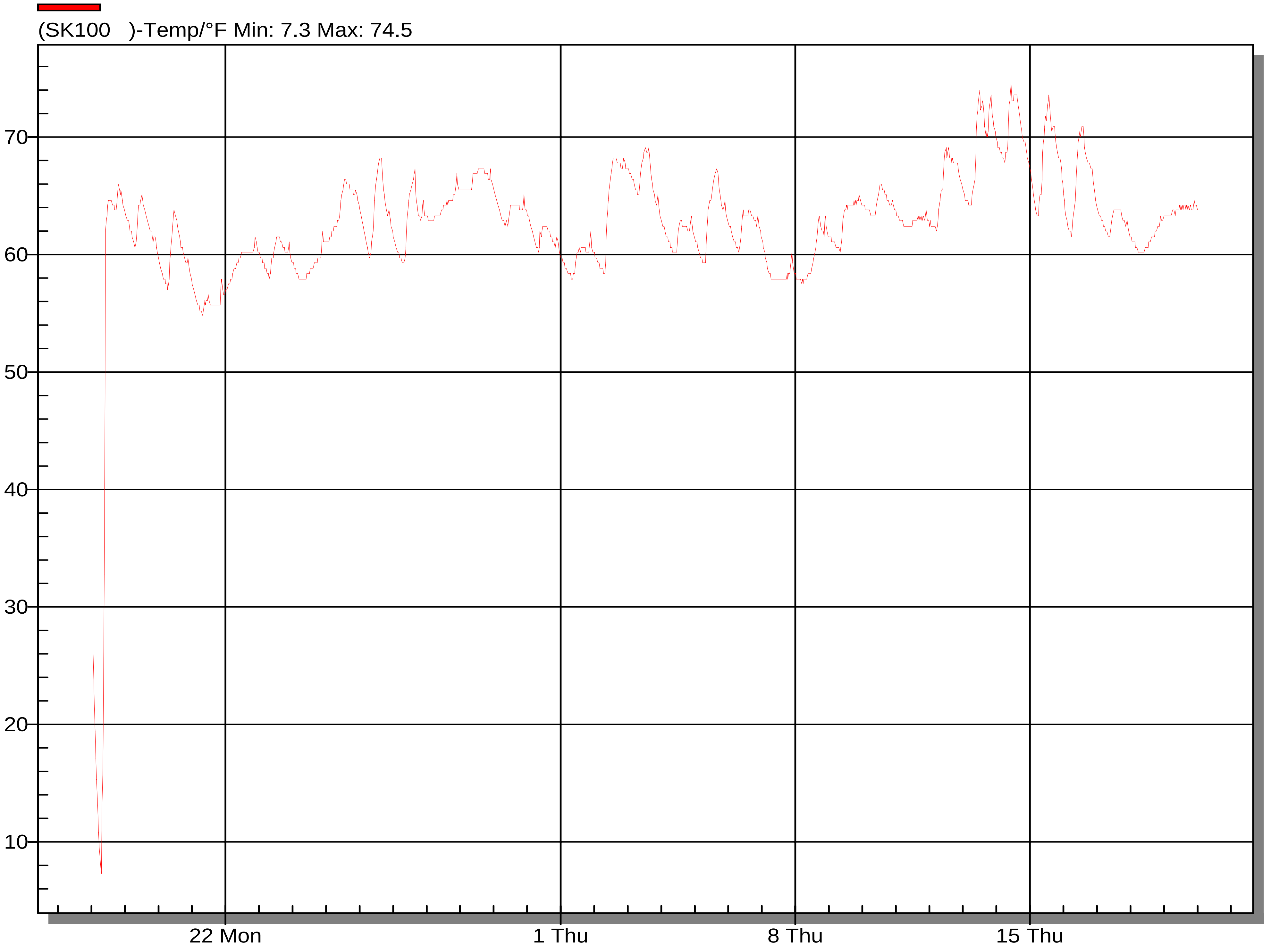
Christie - HV Rm112 - SP



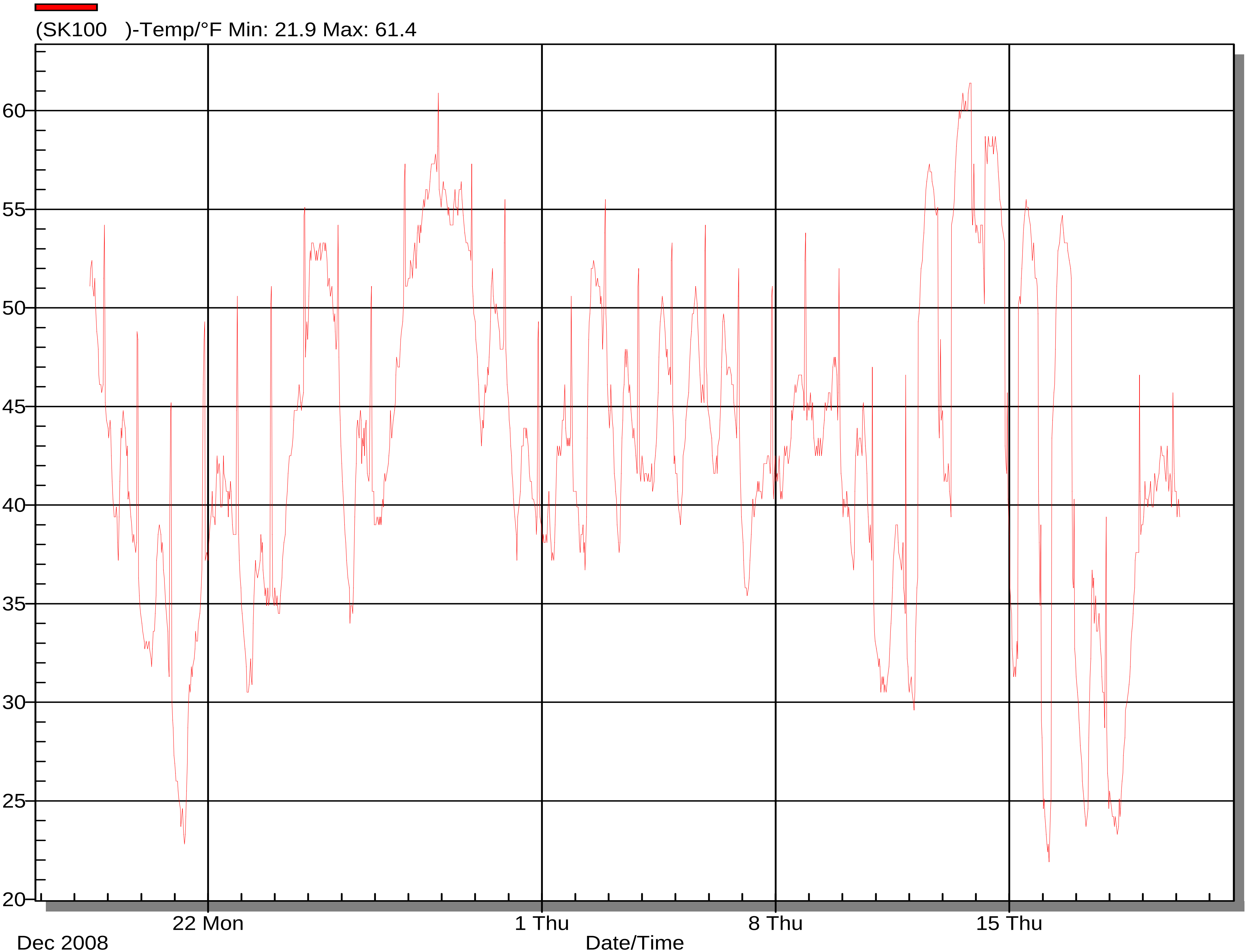


Christie - HV Rm112 - MA
(SK100)-Temp/°F Min: 47.7 Max: 75.1
75
70
65
60
55
50
22 Mon
1 Thu
8 Thu
15 Thu
Dec 2008
Date/Time

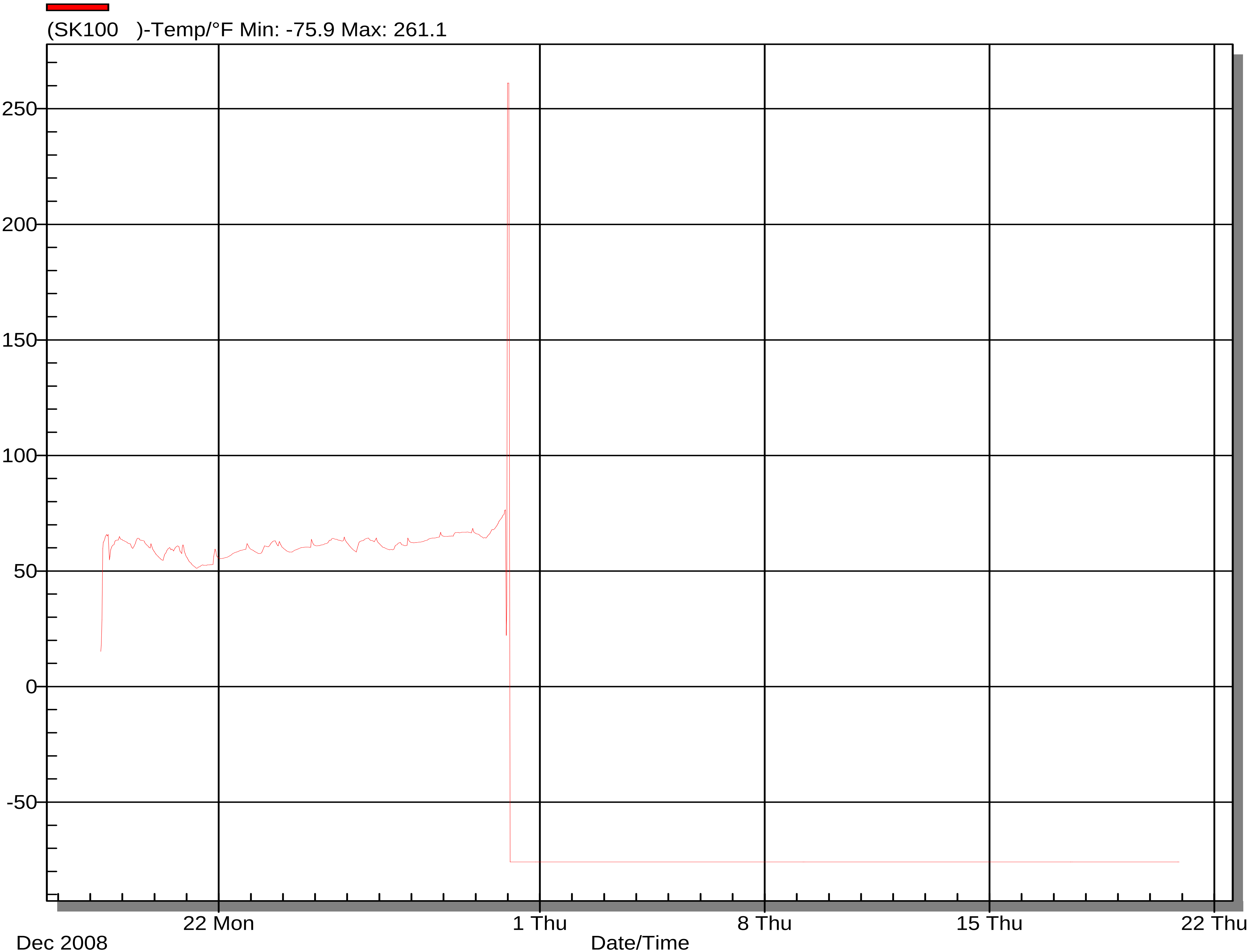
Christie - HV-8 - SP



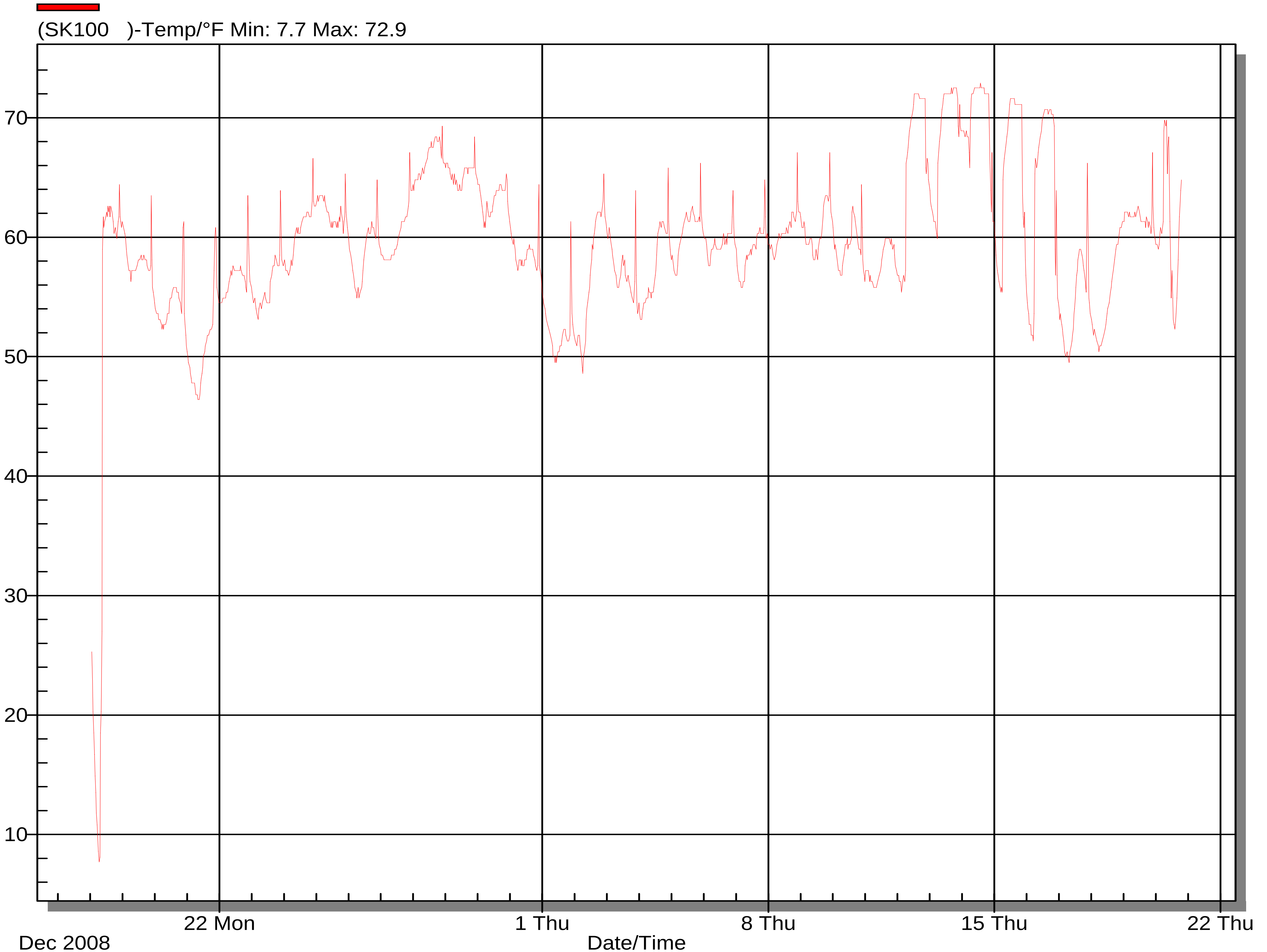
Christie - HV-8 - MA



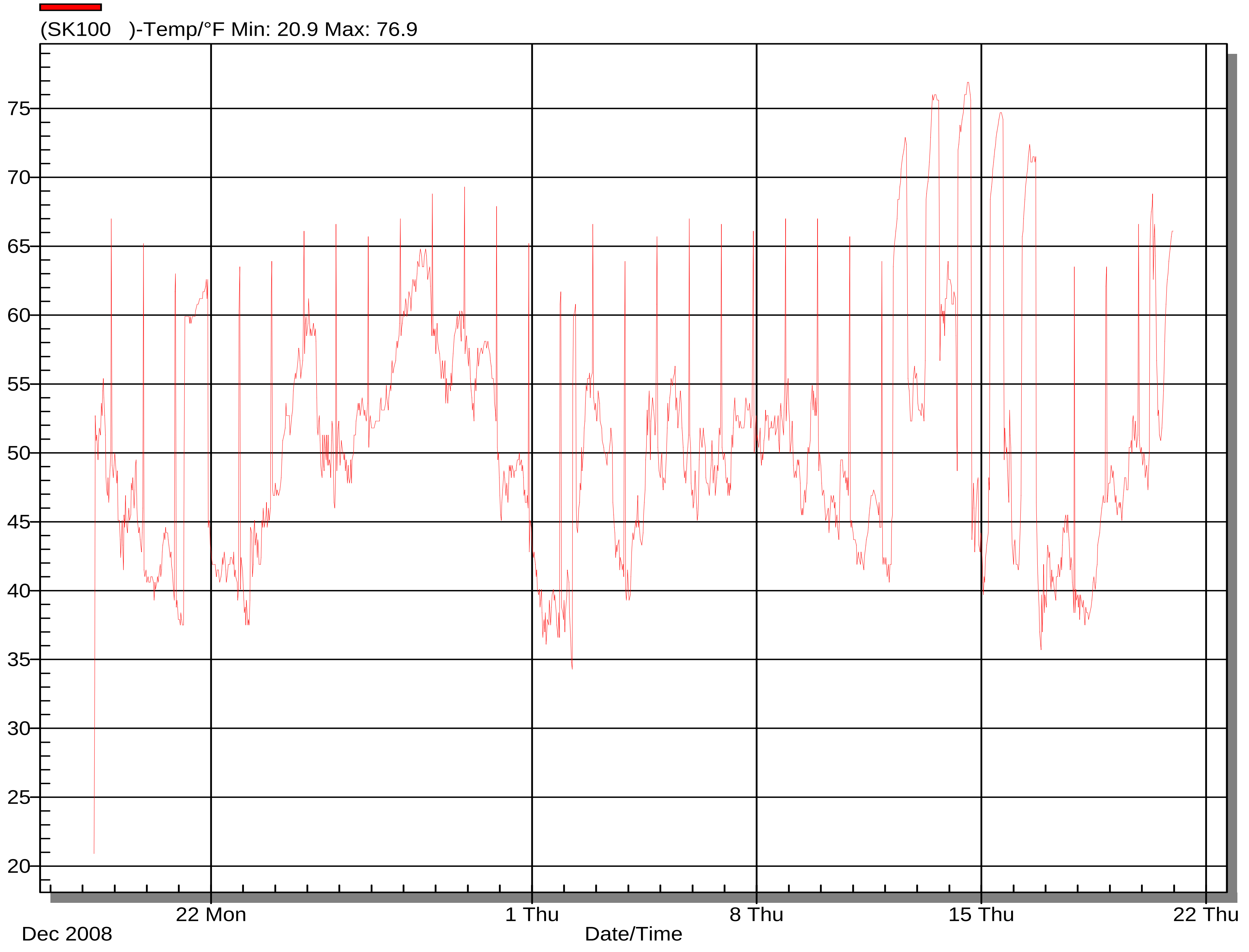
Christie - HV-7 - SP



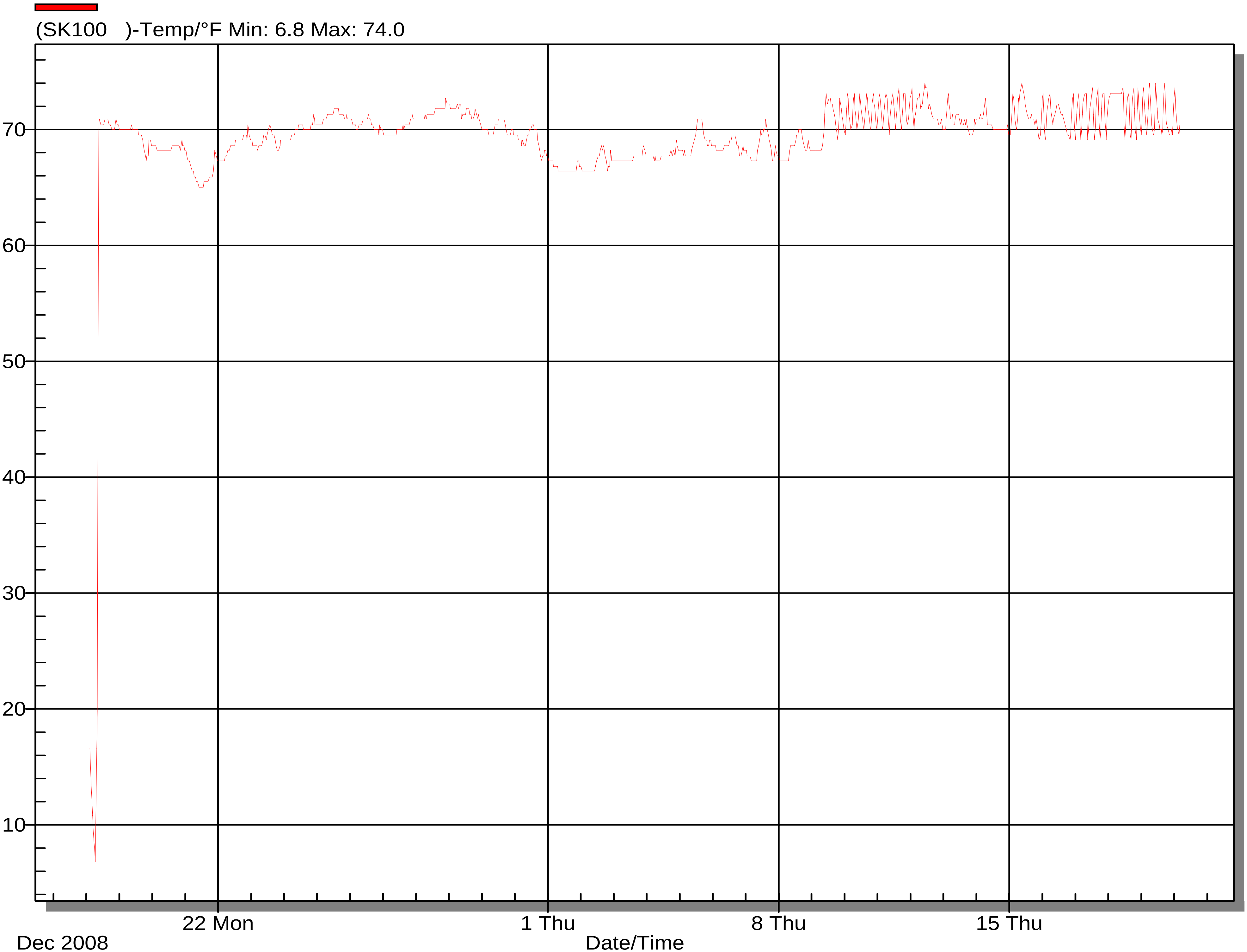
Christie - HV-7 - MA



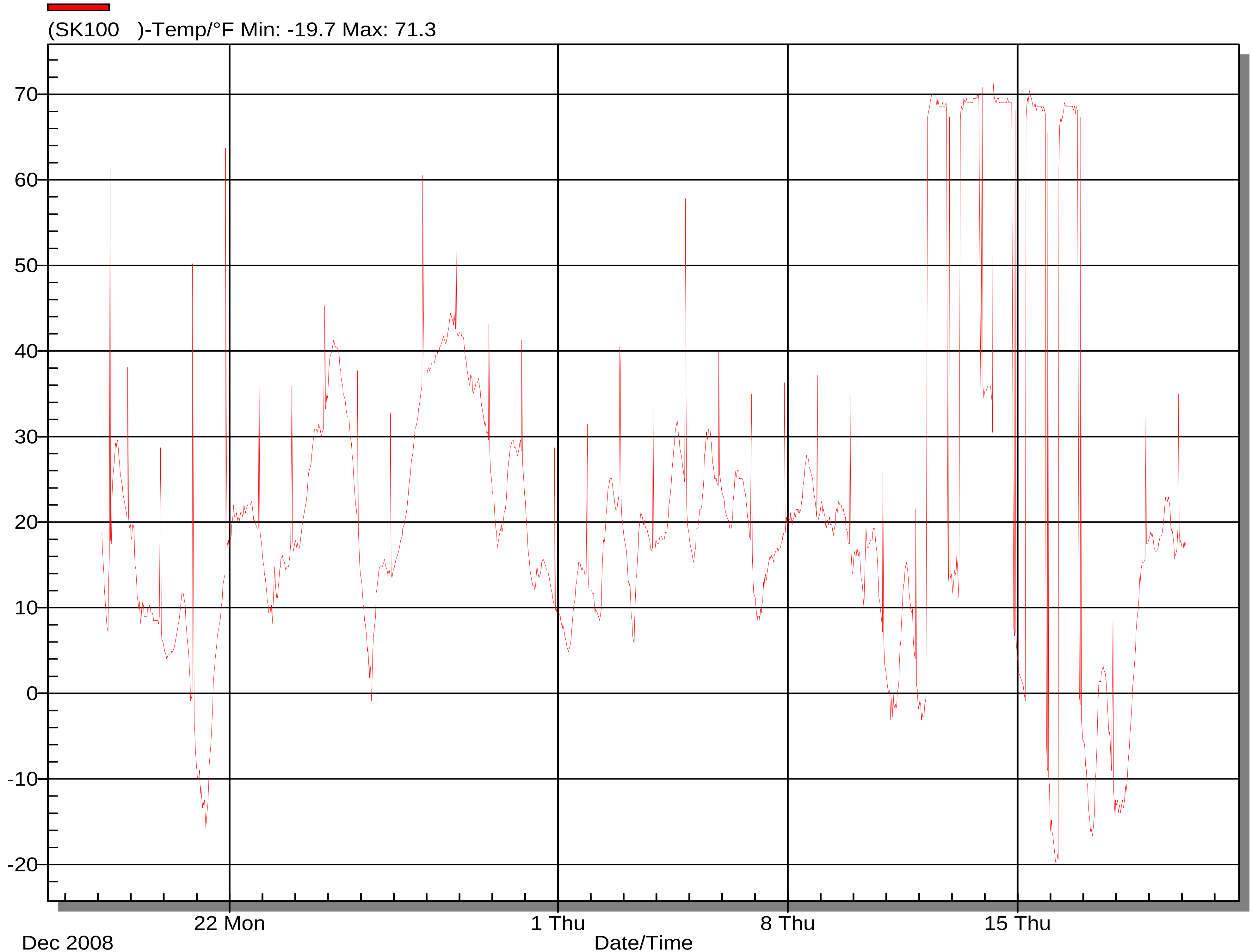
Christie - HV-6 - MA



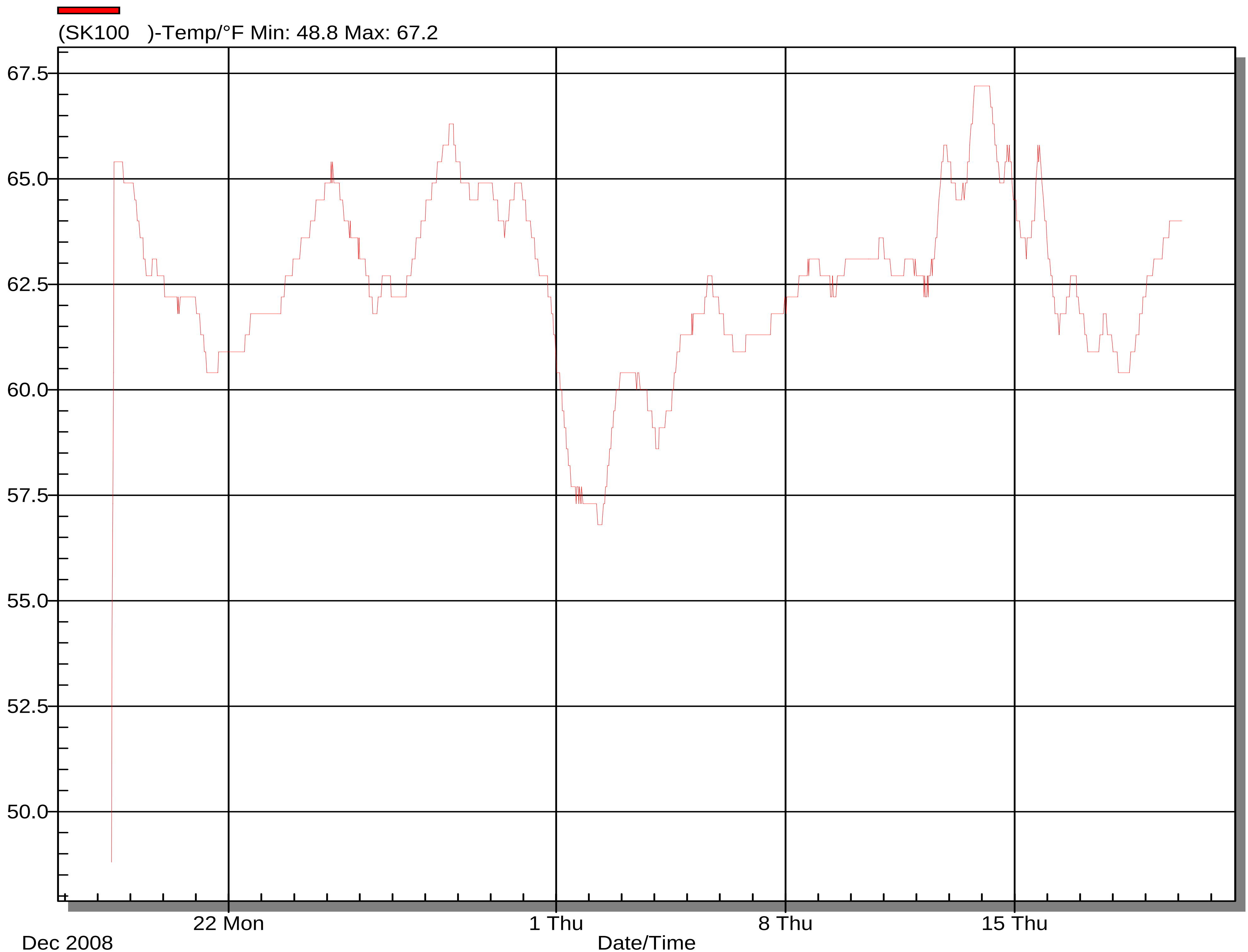
Christie - HV-4 - SP



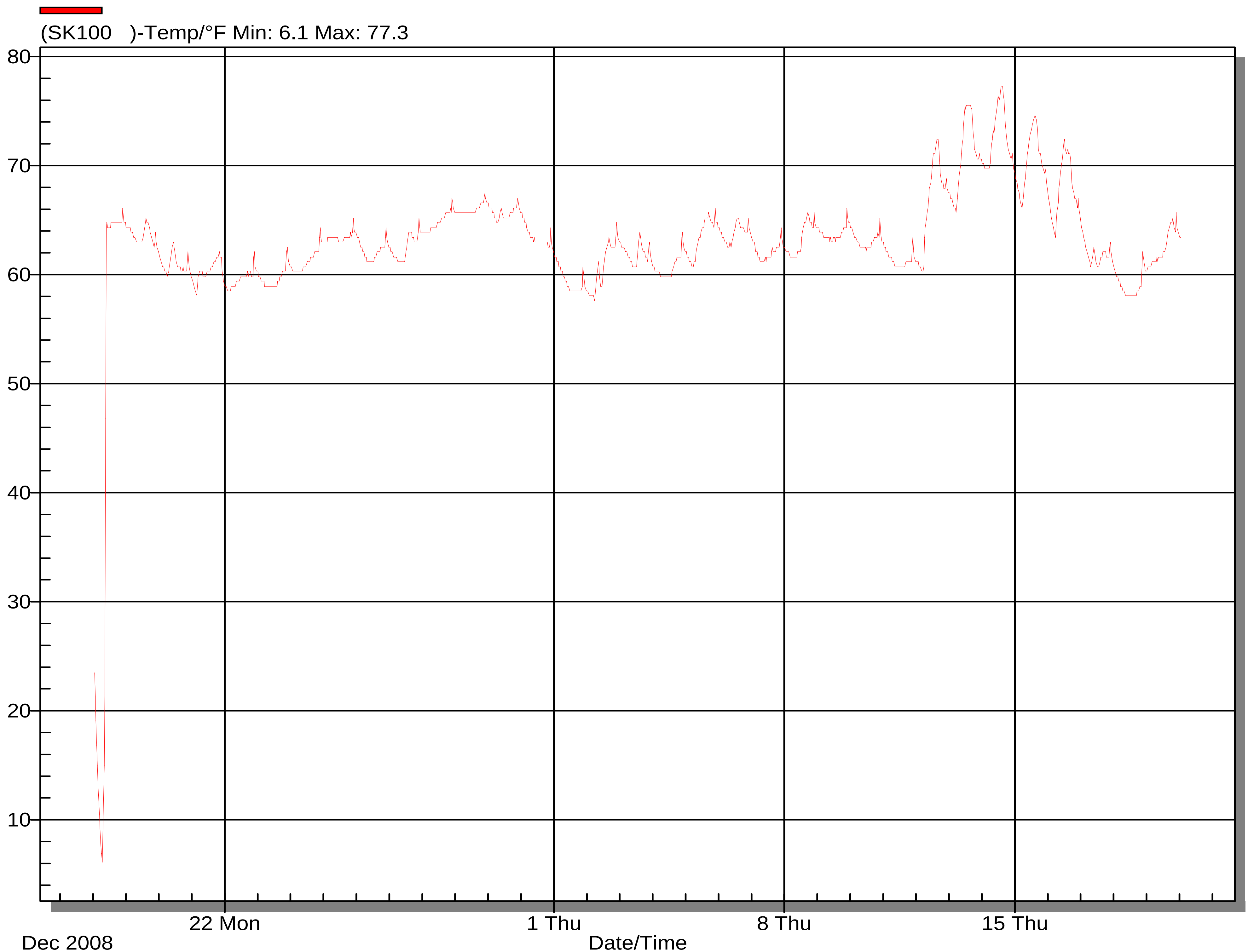
Christie - HV-4 - MA



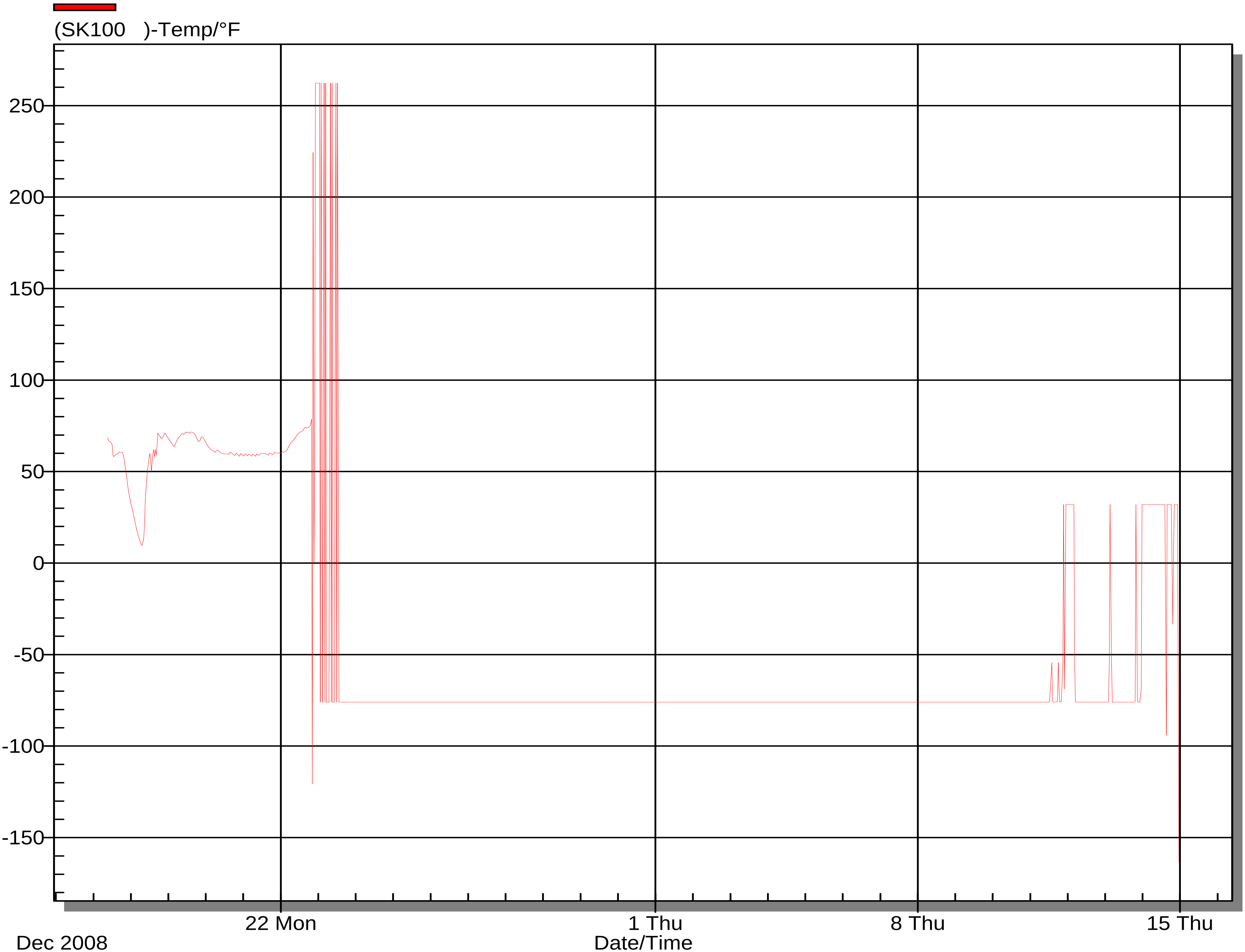
Christie - Gym - SP



Chrisite - HV-6 - SP

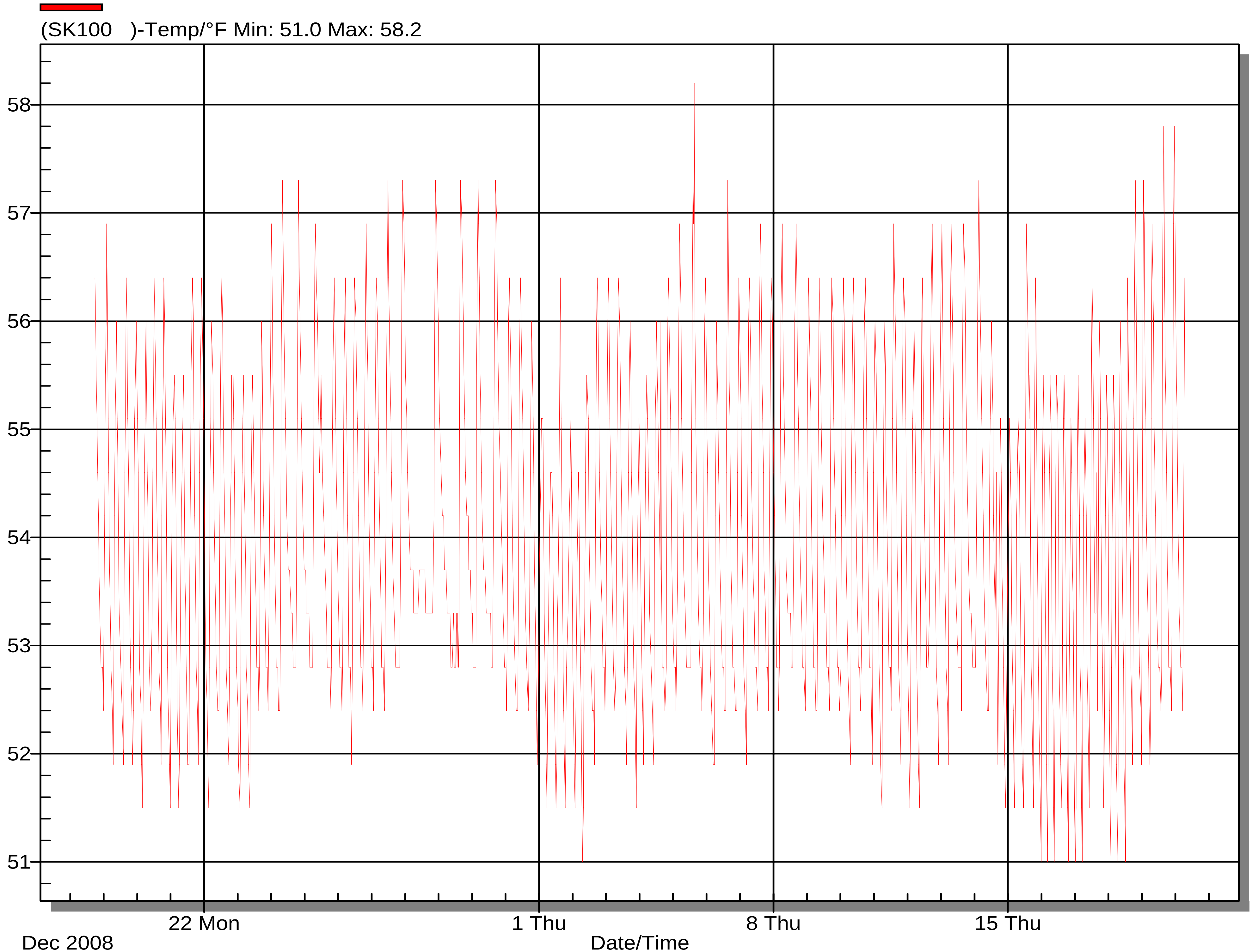


Auto body - SP

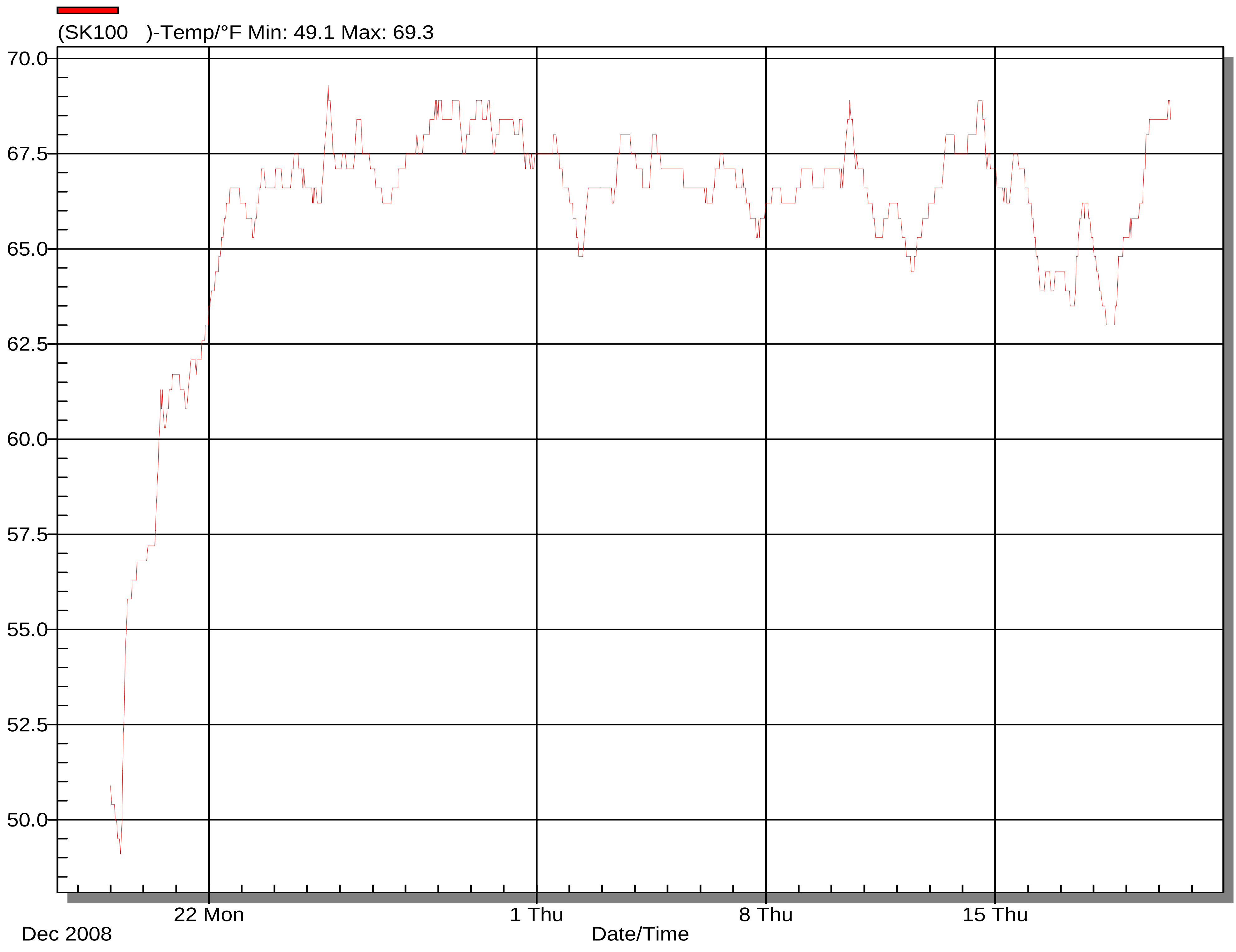


(SK100)-Temp/°F
250
200
150
100
50
0
-50
-100
-150
22 Mon
1 Thu
8 Thu
15 Thu
Dec 2008
Date/Time

Aroostook - SP



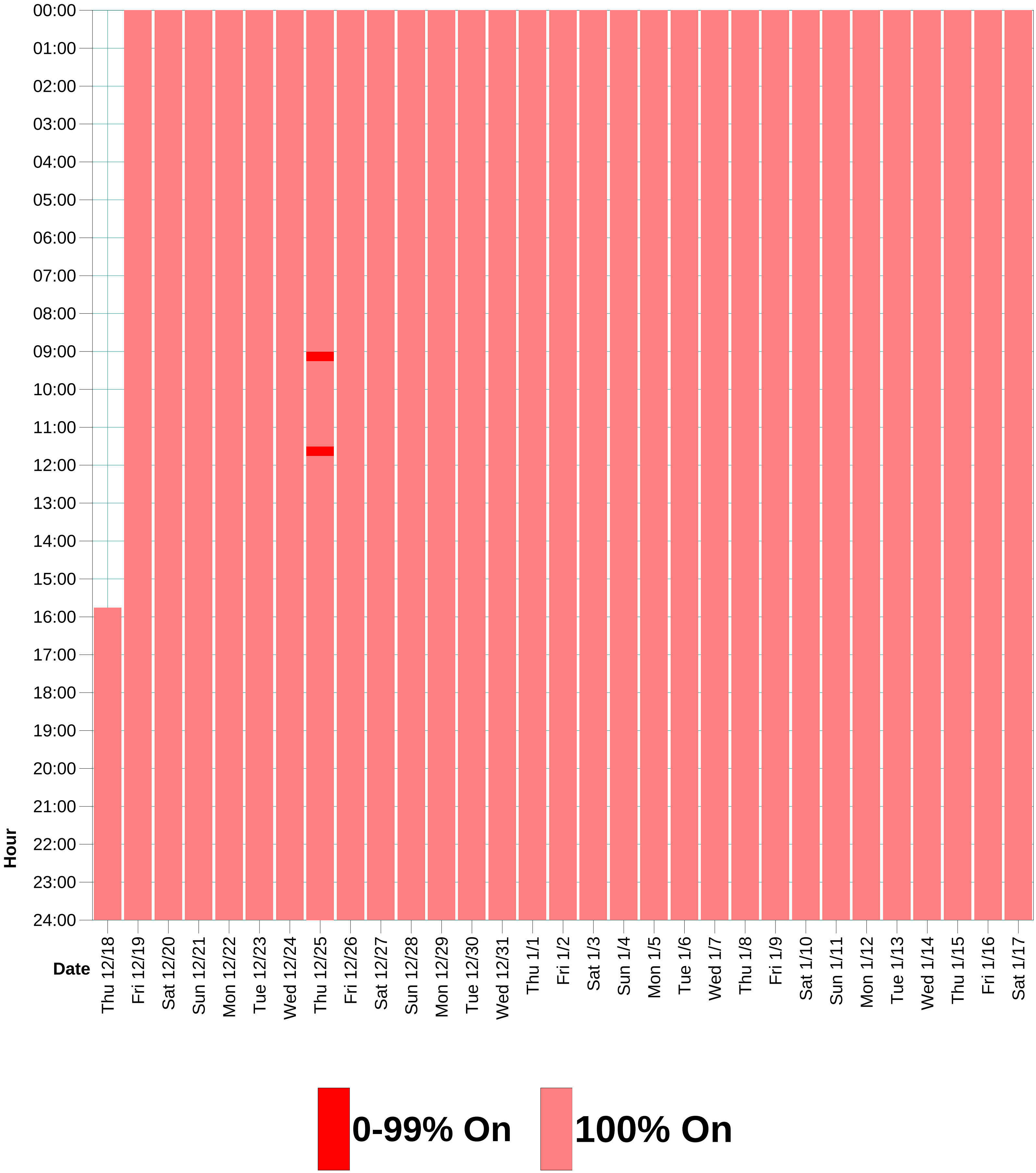
Washington Hall - SP



Appendix C
On-Time Logger Data

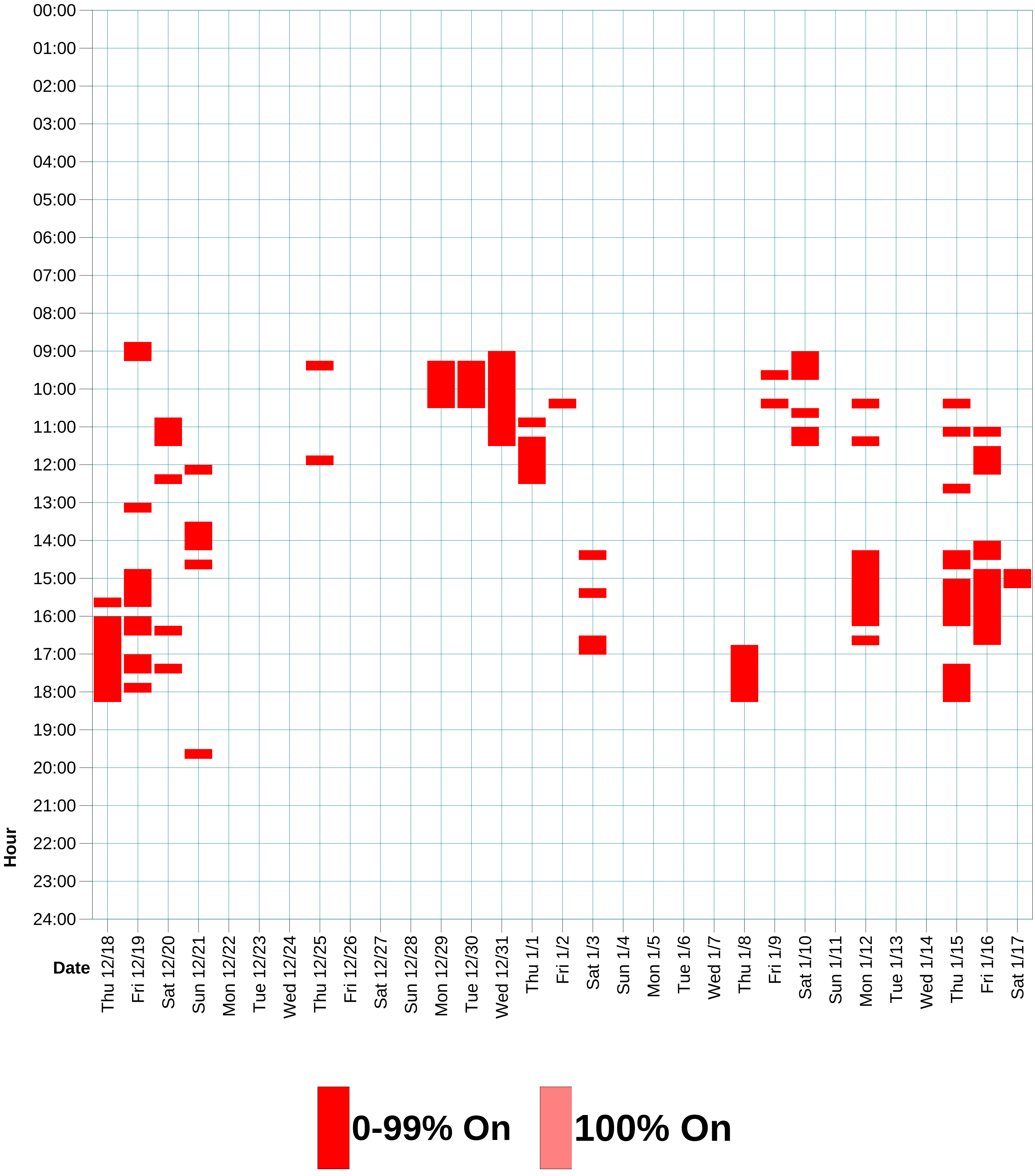
The On-Time logger data shows when equipment was running during the logging period. The red indicates that the equipment was on at the time. The On-Time logger data helps to determine the schedule, hours of operation, of the equipment. These schedules are listed in the Existing Equipment Schedules and Setpoints in the report. The logger data is not always taken as an absolute to determining the schedule, on-site observations, temperature logger data and the energy balance of the building also influence the schedules used for the energy calculations. All of the data is used to interpret the equipment's schedule.

Andrews - HV

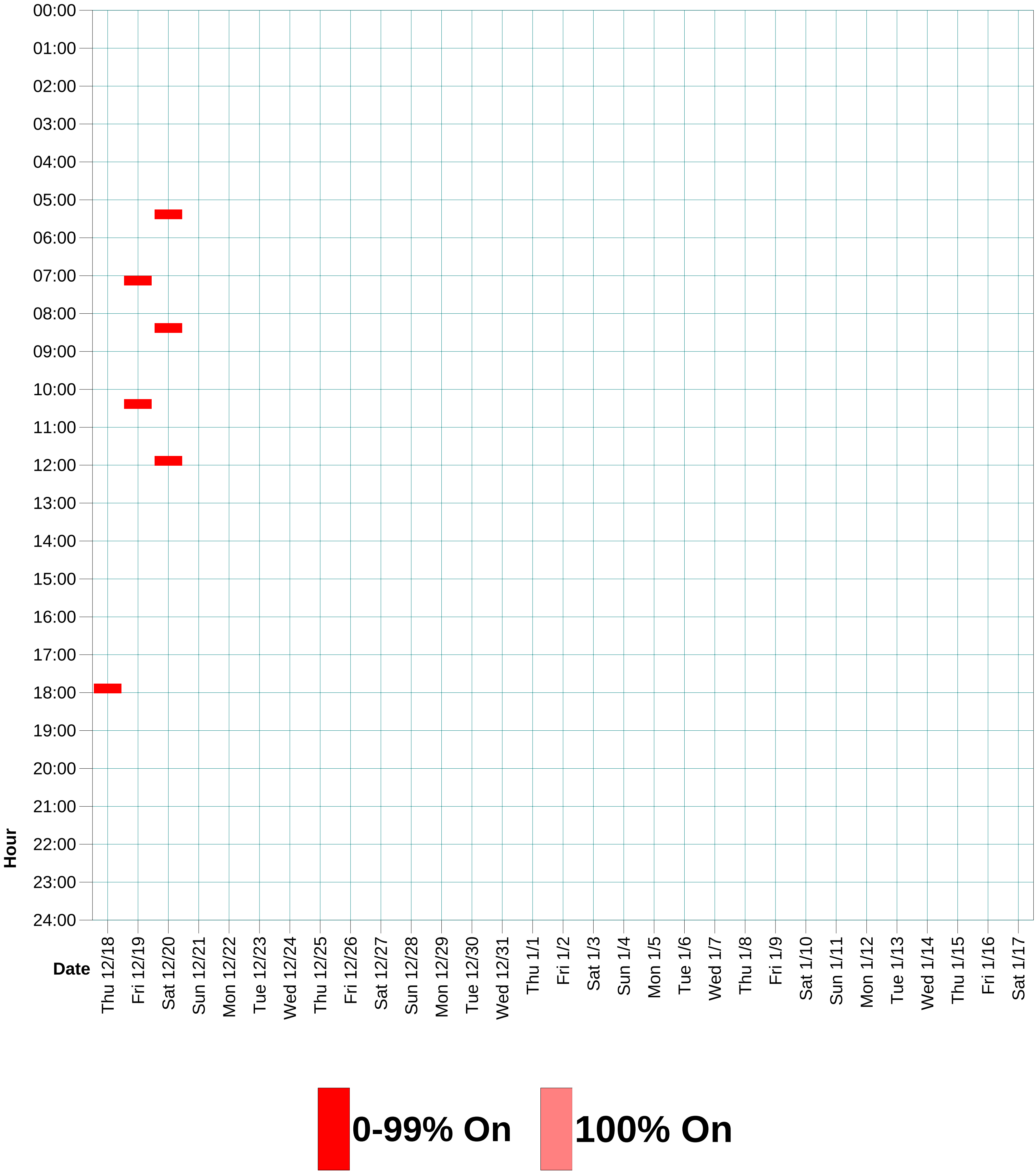


Hour
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
24:00
Date
Thu 12/18
Fri 12/19
Sat 12/20
Sun 12/21
Mon 12/22
Tue 12/23
Wed 12/24
Thu 12/25
Fri 12/26
Sat 12/27
Sun 12/28
Mon 12/29
Tue 12/30
Wed 12/31
Thu 1/1
Fri 1/2
Sat 1/3
Sun 1/4
Mon 1/5
Tue 1/6
Wed 1/7
Thu 1/8
Fri 1/9
Sat 1/10
Sun 1/11
Mon 1/12
Tue 1/13
Wed 1/14
Thu 1/15
Fri 1/16
Sat 1/17
0-99% On
100% On

Dust Collector



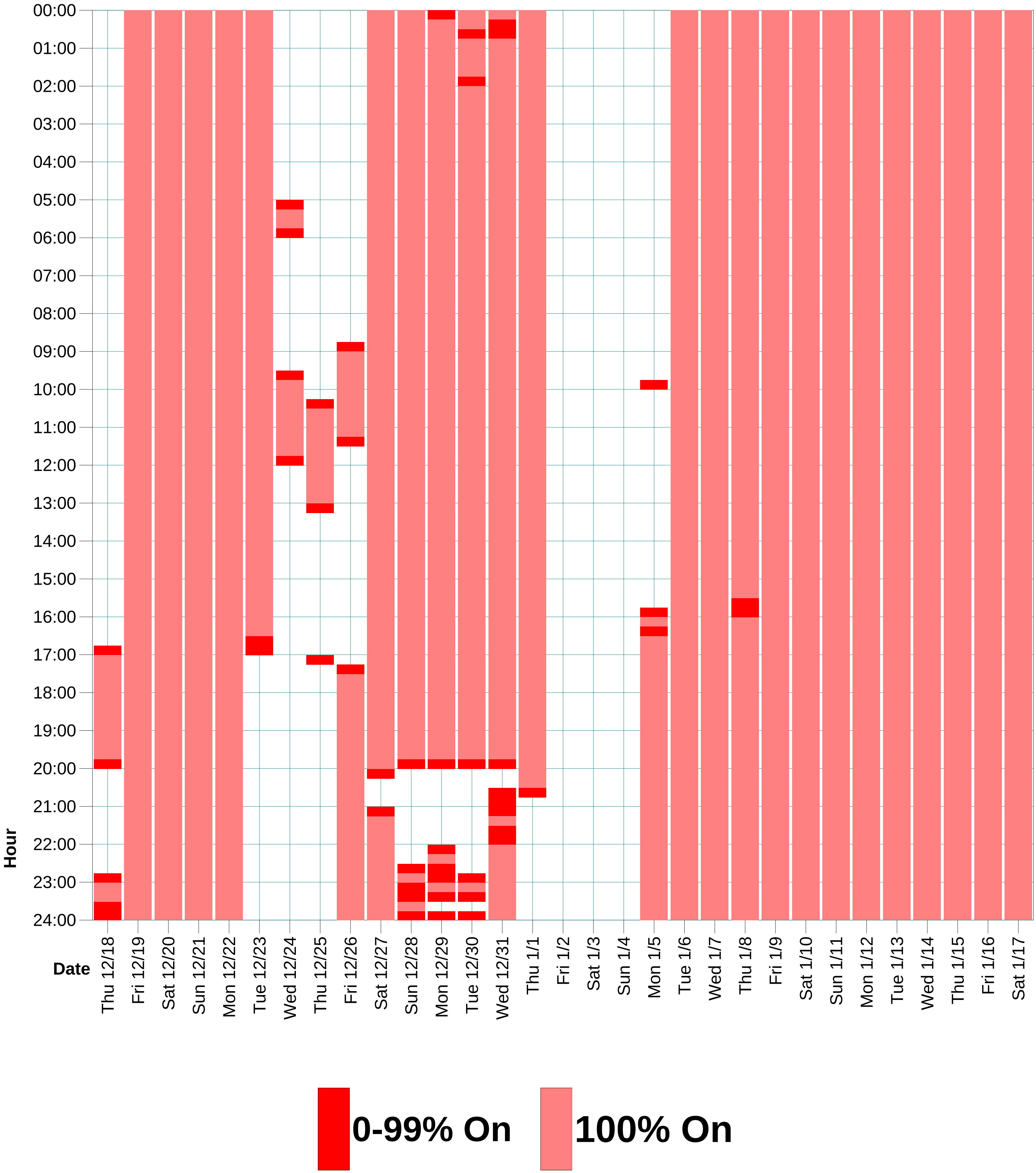
HV Diesel


Hour
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
24:00
Date
Thu 12/18
Fri 12/19
Sat 12/20
Sun 12/21
Mon 12/22
Tue 12/23
Wed 12/24
Thu 12/25
Fri 12/26
Sat 12/27
Sun 12/28
Mon 12/29
Tue 12/30
Wed 12/31
Thu 1/1
Fri 1/2
Sat 1/3
Sun 1/4
Mon 1/5
Tue 1/6
Wed 1/7
Thu 1/8
Fri 1/9
Sat 1/10
Sun 1/11
Mon 1/12
Tue 1/13
Wed 1/14
Thu 1/15
Fri 1/16
Sat 1/17
0-99% On
100% On

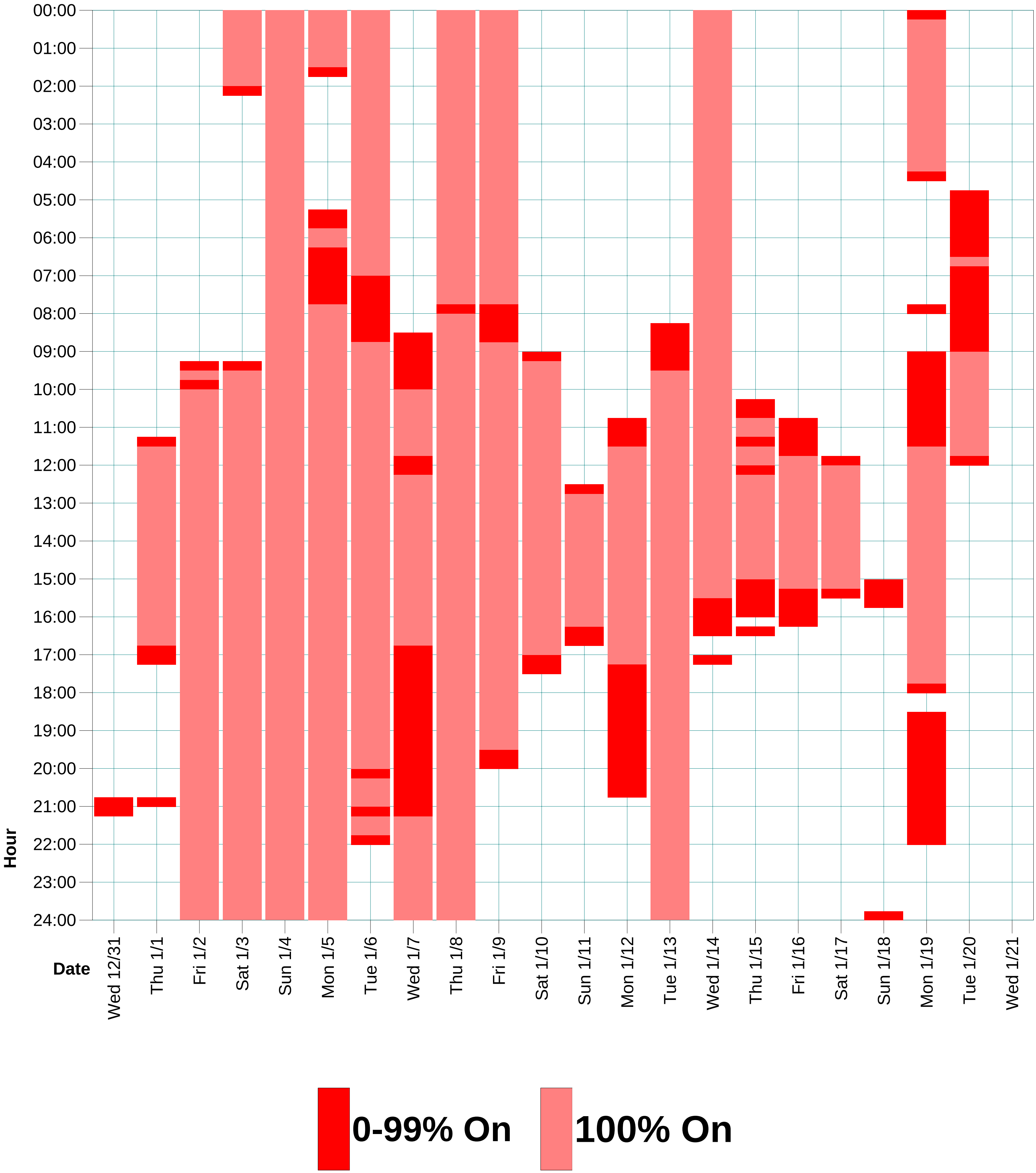
HV Auto

Hour
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
24:00
Date
Thu 12/18
Fri 12/19
Sat 12/20
Sun 12/21
Mon 12/22
Tue 12/23
Wed 12/24
Thu 12/25
Fri 12/26
Sat 12/27
Sun 12/28
Mon 12/29
Tue 12/30
Wed 12/31
Thu 1/1
Fri 1/2
Sat 1/3
Sun 1/4
Mon 1/5
Tue 1/6
Wed 1/7
Thu 1/8
Fri 1/9
Sat 1/10
Sun 1/11
Mon 1/12
Tue 1/13
Wed 1/14
Thu 1/15
Fri 1/16
Sat 1/17
0-99% On
100% On

Common HV Dine

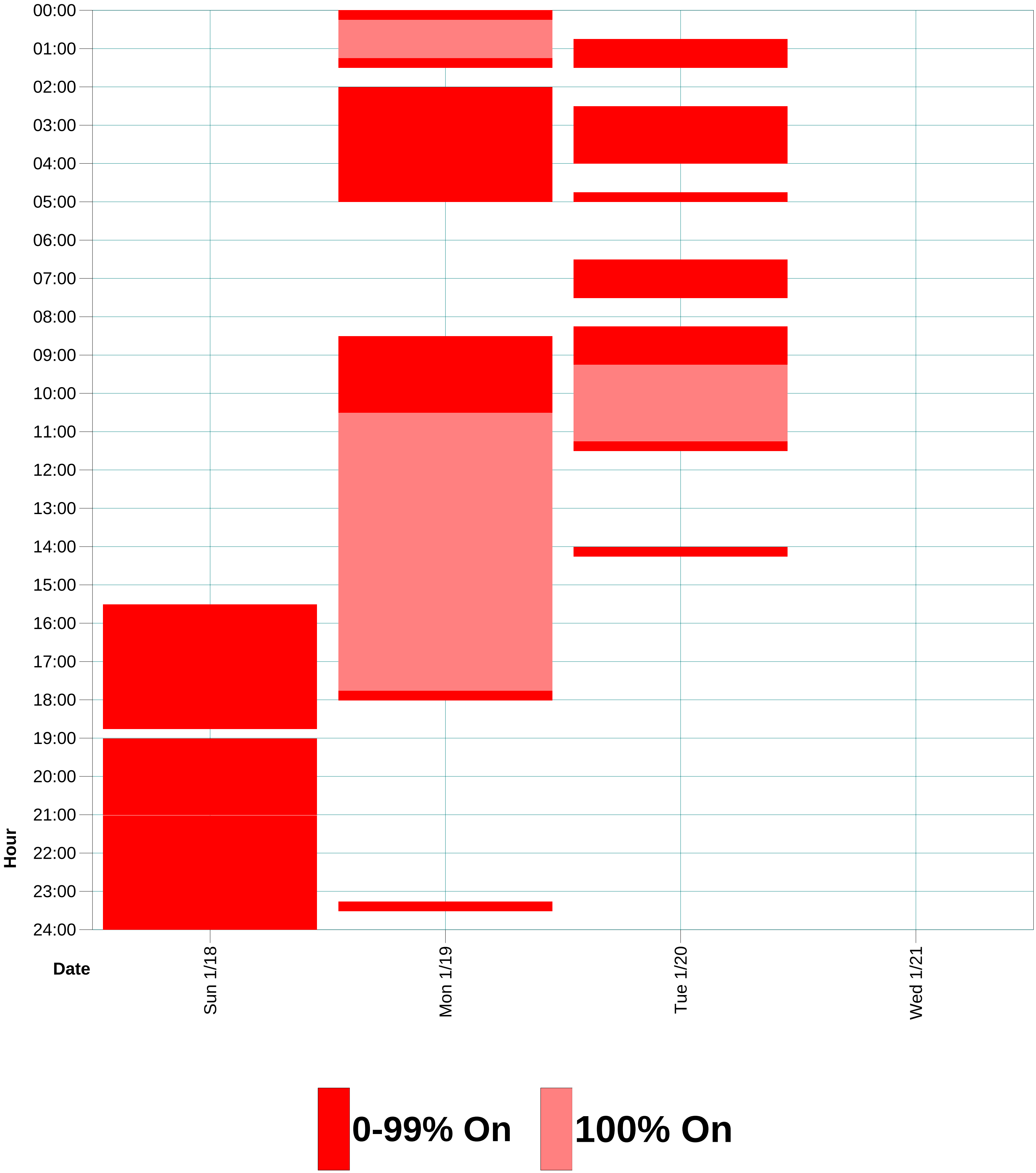


RTU Library

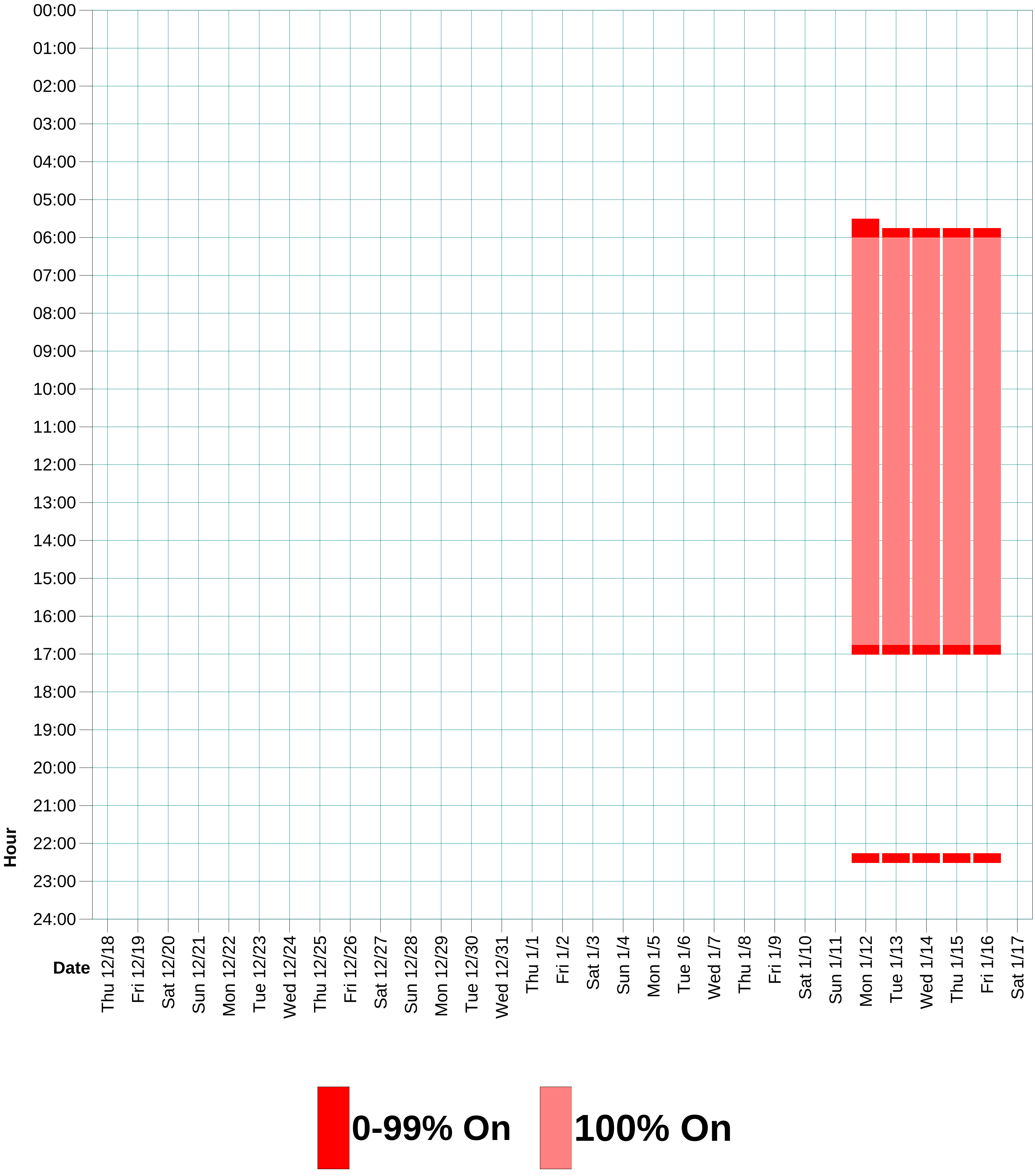


Hour
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
24:00
Date
Wed 12/31
Thu 1/1
Fri 1/2
Sat 1/3
Sun 1/4
Mon 1/5
Tue 1/6
Wed 1/7
Thu 1/8
Fri 1/9
Sat 1/10
Sun 1/11
Mon 1/12
Tue 1/13
Wed 1/14
Thu 1/15
Fri 1/16
Sat 1/17
Sun 1/18
Mon 1/19
Tue 1/20
Wed 1/21
0-99% On
100% On

RTU Conference

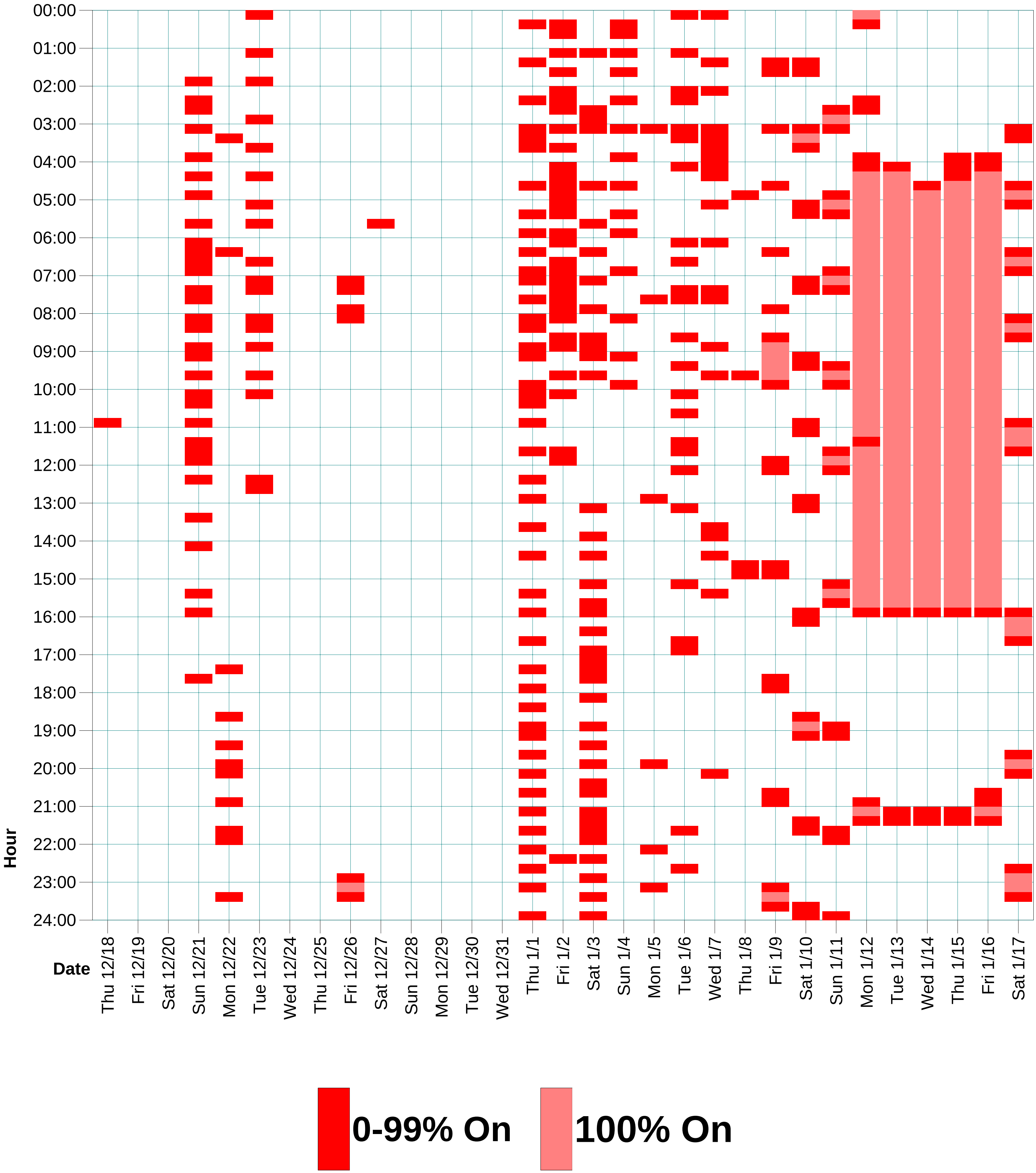


HV Gym



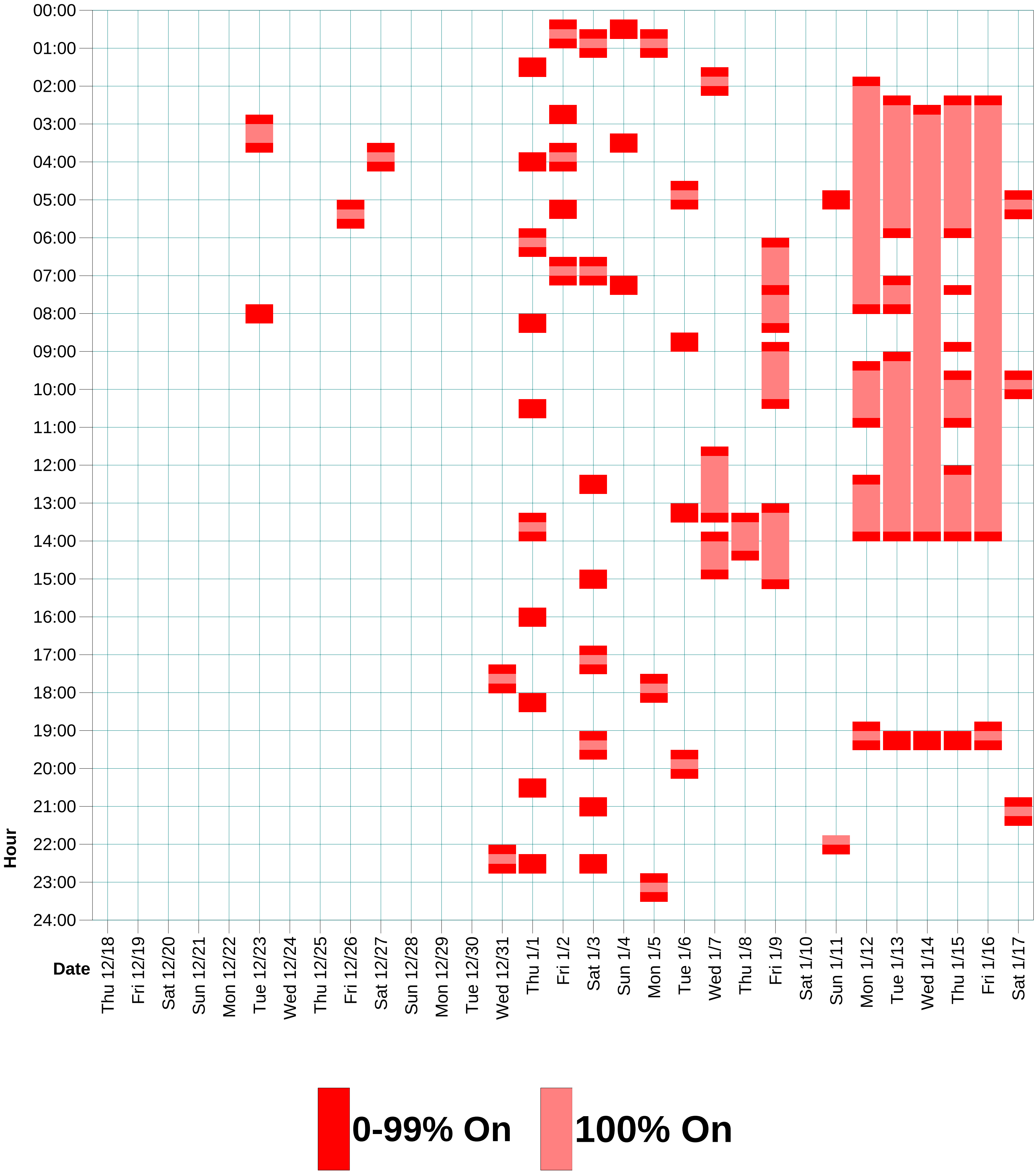
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
24:00
Hour
Date
Thu 12/18
Fri 12/19
Sat 12/20
Sun 12/21
Mon 12/22
Tue 12/23
Wed 12/24
Thu 12/25
Fri 12/26
Sat 12/27
Sun 12/28
Mon 12/29
Tue 12/30
Wed 12/31
Thu 1/1
Fri 1/2
Sat 1/3
Sun 1/4
Mon 1/5
Tue 1/6
Wed 1/7
Thu 1/8
Fri 1/9
Sat 1/10
Sun 1/11
Mon 1/12
Tue 1/13
Wed 1/14
Thu 1/15
Fri 1/16
Sat 1/17
0-99% On
100% On

HV Room 112



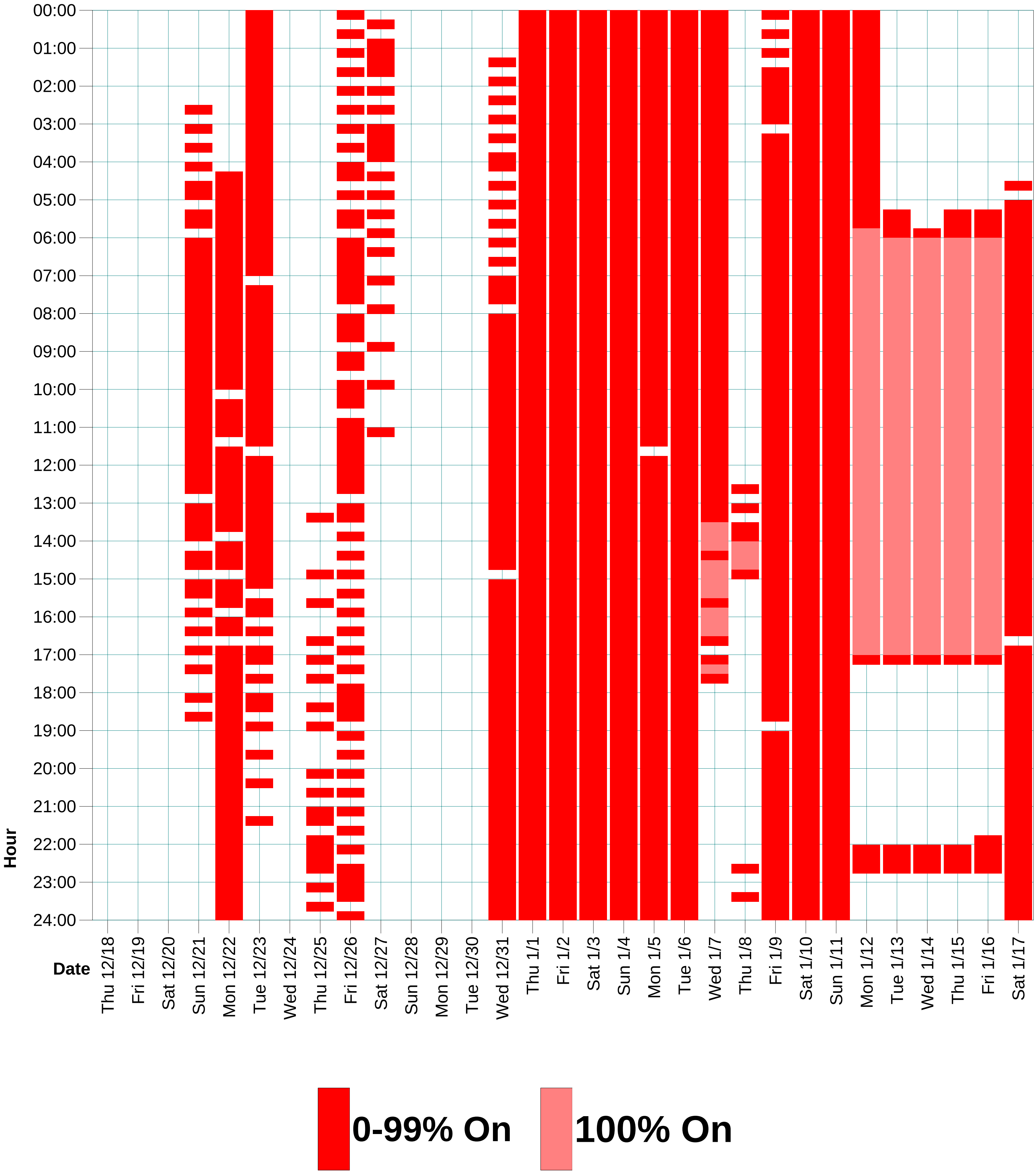
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
24:00
Hour
Date
Thu 12/18
Fri 12/19
Sat 12/20
Sun 12/21
Mon 12/22
Tue 12/23
Wed 12/24
Thu 12/25
Fri 12/26
Sat 12/27
Sun 12/28
Mon 12/29
Tue 12/30
Wed 12/31
Thu 1/1
Fri 1/2
Sat 1/3
Sun 1/4
Mon 1/5
Tue 1/6
Wed 1/7
Thu 1/8
Fri 1/9
Sat 1/10
Sun 1/11
Mon 1/12
Tue 1/13
Wed 1/14
Thu 1/15
Fri 1/16
Sat 1/17
0-99% On
100% On

HV Room 111



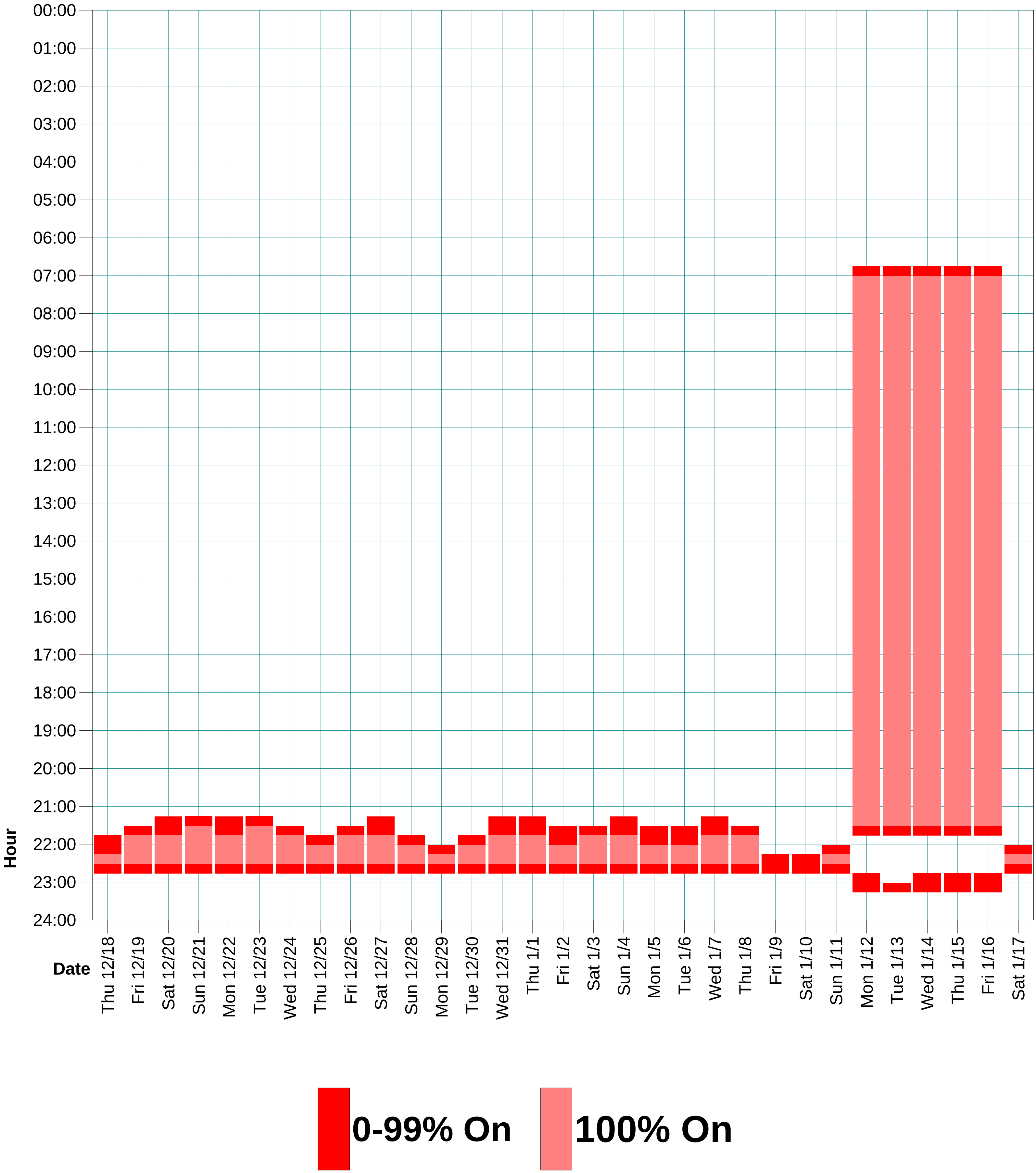
Hour
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
24:00
Date
Thu 12/18
Fri 12/19
Sat 12/20
Sun 12/21
Mon 12/22
Tue 12/23
Wed 12/24
Thu 12/25
Fri 12/26
Sat 12/27
Sun 12/28
Mon 12/29
Tue 12/30
Wed 12/31
Thu 1/1
Fri 1/2
Sat 1/3
Sun 1/4
Mon 1/5
Tue 1/6
Wed 1/7
Thu 1/8
Fri 1/9
Sat 1/10
Sun 1/11
Mon 1/12
Tue 1/13
Wed 1/14
Thu 1/15
Fri 1/16
Sat 1/17
0-99% On
100% On

HV Room 110

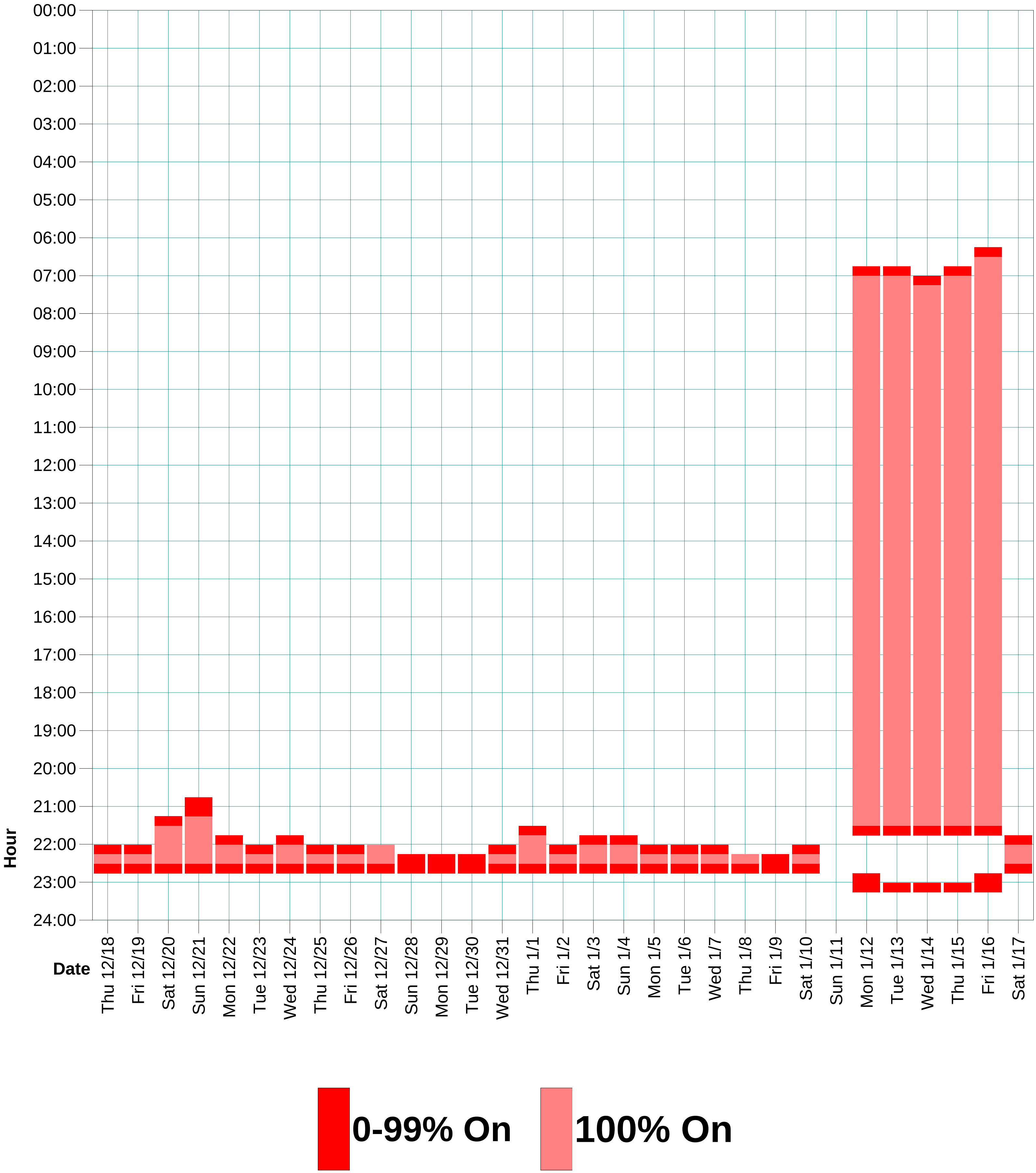


Hour
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
24:00
Date
Thu 12/18
Fri 12/19
Sat 12/20
Sun 12/21
Mon 12/22
Tue 12/23
Wed 12/24
Thu 12/25
Fri 12/26
Sat 12/27
Sun 12/28
Mon 12/29
Tue 12/30
Wed 12/31
Thu 1/1
Fri 1/2
Sat 1/3
Sun 1/4
Mon 1/5
Tue 1/6
Wed 1/7
Thu 1/8
Fri 1/9
Sat 1/10
Sun 1/11
Mon 1/12
Tue 1/13
Wed 1/14
Thu 1/15
Fri 1/16
Sat 1/17
0-99% On
100% On

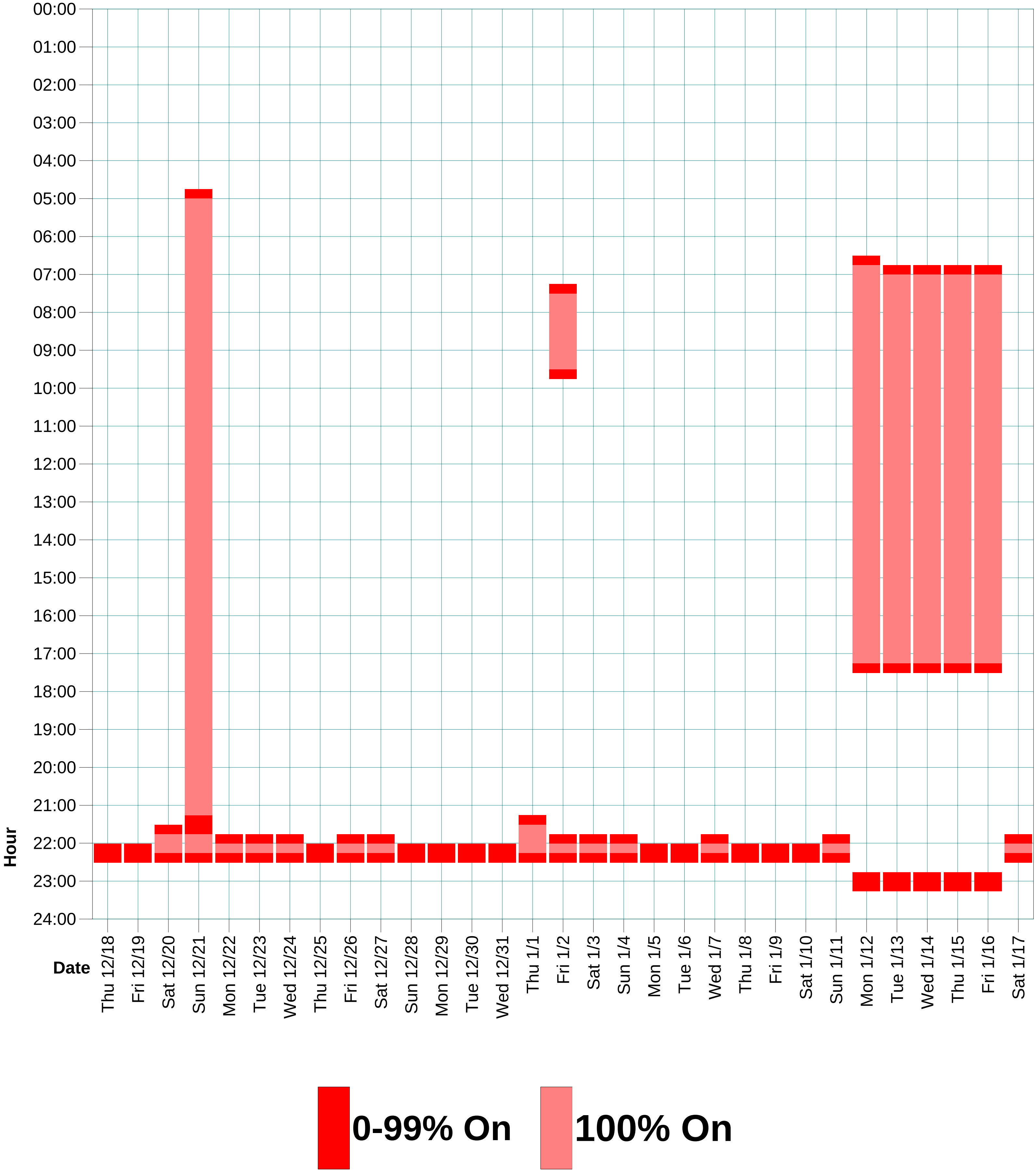
Christie - HV-8



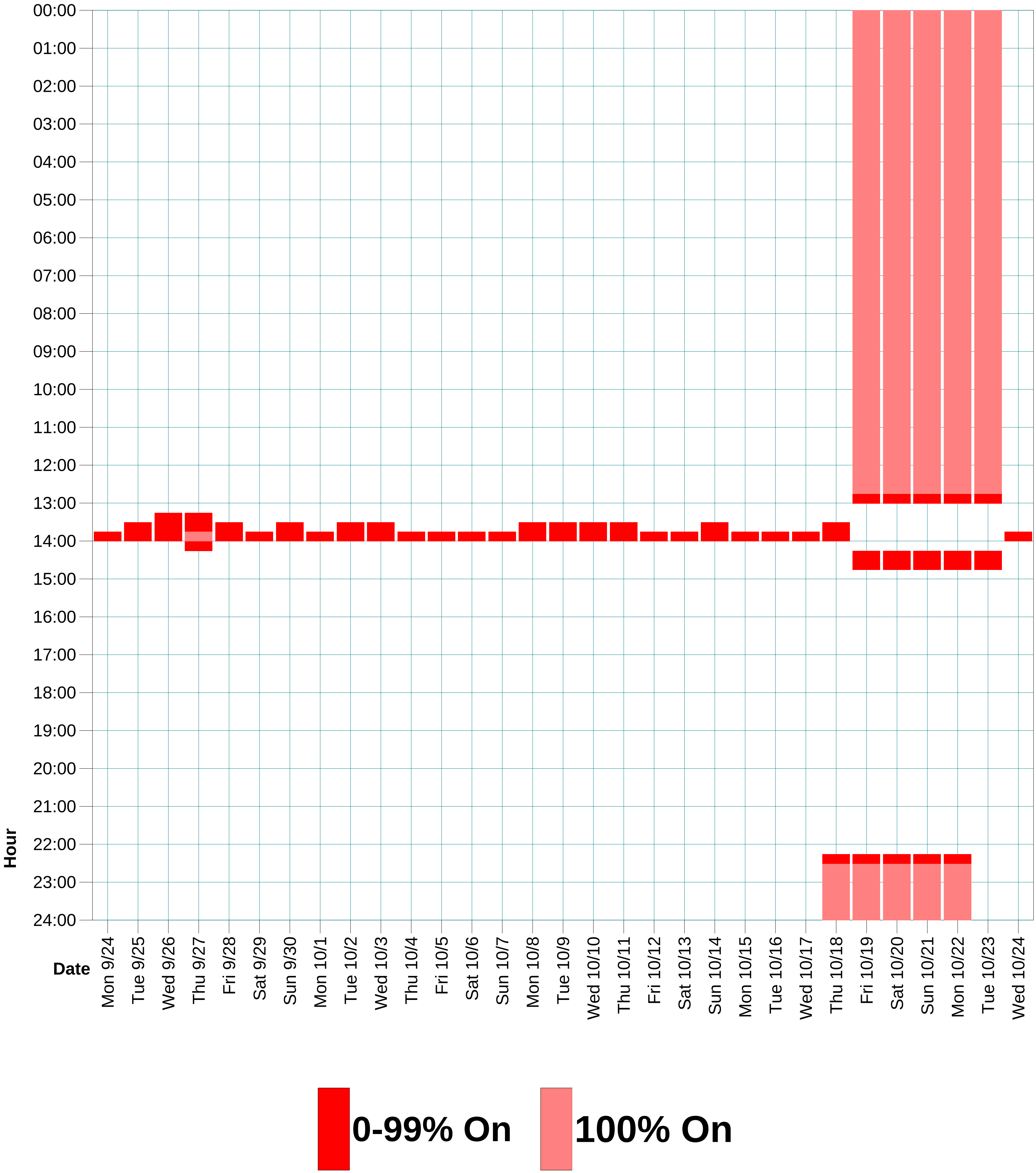
Christie - HV-7



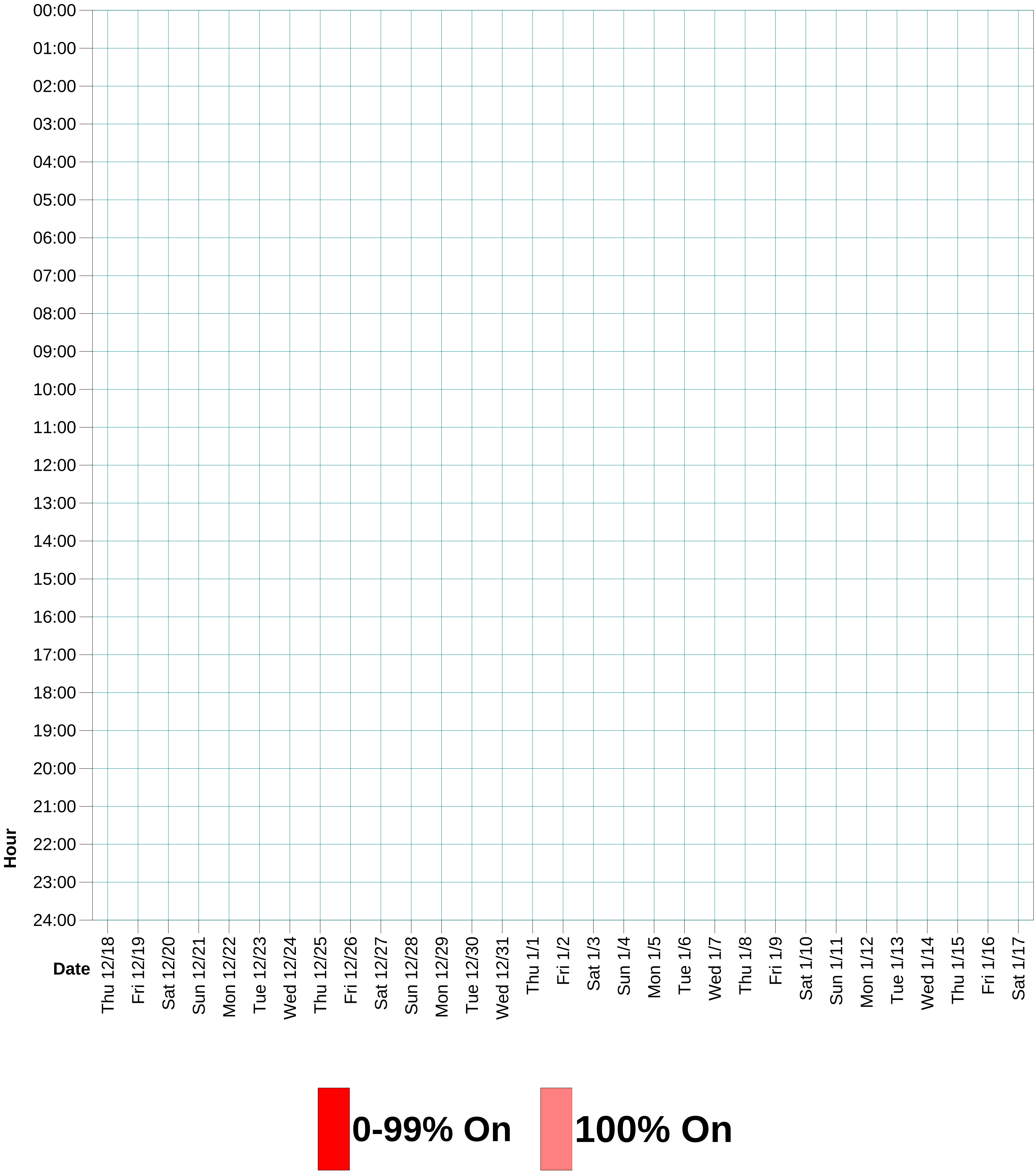
Christie - HV-6



Christie - HV-4



Snow UV Conf.


Hour
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
24:00
Date
Thu 12/18
Fri 12/19
Sat 12/20
Sun 12/21
Mon 12/22
Tue 12/23
Wed 12/24
Thu 12/25
Fri 12/26
Sat 12/27
Sun 12/28
Mon 12/29
Tue 12/30
Wed 12/31
Thu 1/1
Fri 1/2
Sat 1/3
Sun 1/4
Mon 1/5
Tue 1/6
Wed 1/7
Thu 1/8
Fri 1/9
Sat 1/10
Sun 1/11
Mon 1/12
Tue 1/13
Wed 1/14
Thu 1/15
Fri 1/16
Sat 1/17
0-99% On
100% On

Appendix D
Preliminary Utility Analysis

As part of the development of the energy baseline, Honeywell prepared a preliminary utility analysis (PUA). This analysis provides information related to the distribution of energy use against standard models for schools, and benchmarks the energy usage of the buildings against similar ones in the same geographic area.

Honeywell

Honeywell Energy Analysis Team (HEAT)

Preliminary Utility Analysis

Northern Maine Community College
Presque Isle, ME

Helping customers manage energy resources to improve financial performance

Historical Summary

Northern Maine Community College
Utility Analysis Period: FY08 vs. FY07

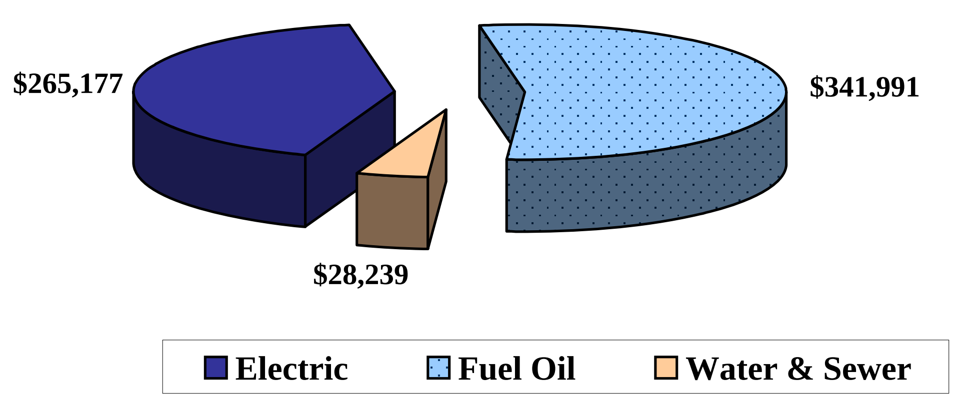
	Current Year (FY08)			Prior Year (FY07)		
	Electric	**Fuel Oil**	**Water & Sewer**	**Electric**	**Fuel Oil**	**Water & Sewer**
Utility Costs*	$265,177	$341,991	$28,239	$247,463	$266,912	
Utility Usage (kWh, Gal, Cu.ft.)	1,805,600	120,817	441,100	2,002,800	130,544	
$ Cost/Unit (kWh, Gal, Cu.ft.)	$0.1469	$2.83	$0.06	$0.1236	$2.04	
Electric Demand (kW)	5,206			5,706		
FY08 vs. FY07	**Electric**	**Fuel Oil**	**Water & Sewer**			
Change in Cost	7%	28%				
Change in Usage	-10%	-7%				
Change in $ Cost/Unit	19%	38%				
Change in Electric Demand	-9%					

Optimum use of facility will keep usage down and help reduce costs

* Costs include energy and demand components, as well as taxes, surcharges, etc.

Note: The above utility data applies to the entire campus. The water & sewer data does not include the fire costs of $3,442 per year.

Actual Cost by Utility - FY08



Energy Benchmarking

The calculation of EUI (Energy Use Intensity) is shown below. EUI, expressed in kBtu/sf, is normalized for floor area, the most dominant influence on energy use in most buildings. Its use usually provides a good approximation of how your building's energy performance compares to others. Site EUI indicates the rate at which energy is used at your building (the point of use). Source EUI indicates the rate at which energy is used at the generation sources serving your building (the point of source) and indicates the societal energy penalty due to your building The lower the EUI, the higher the rating, indicating that the building is more efficient than other buildings. The greater the EUI, the lower the rating, indicating that there is an opportunity for higher potential benefits from operational improvements.

To compare the buildings shown below to each other, and to determine the ranking of the buildings from having the most to the least opportunity for demand-side improvements from a financial perspective, please see the Site EUI ranking below.

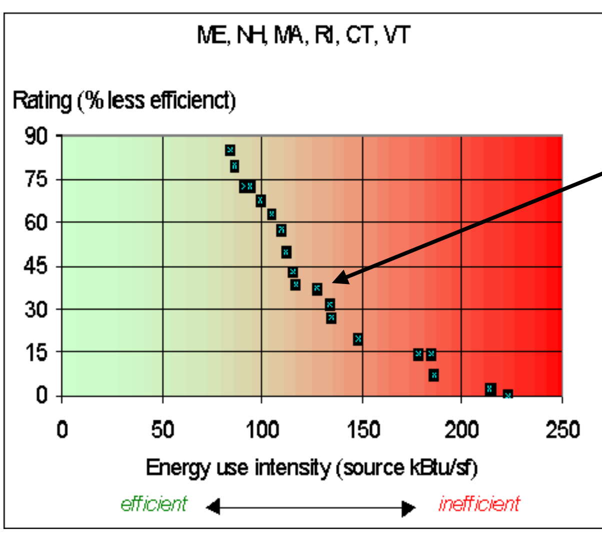
The Source EUI below has been applied to a Department of Energy statistical model from the Oak Ridge National Laboratory web site, http://eber.ed.ornl.gov/benchmark. The Department of Energy has estimated energy use and cost reductions for building source EUI ratings (percentiles) in the table below. Please see the DOE Regional Source EUI Comparison graph below to rate your building in relation to the regional distribution of similar type buildings. (Note: The Source EUI includes the inefficiencies of electrical generation and transmission. A reduction in 'electrical' source EUI includes a benefit in terms of reduction of air pollution emissions and green house gases, and is thus an indicator of societal benefit.)

Source EUI Rating for your Building	Energy use and cost reduction potential (%)	Walk-thru energy assessment recommended?
above 60%	below 25%	No
40 to 60%	20 to 35%	Maybe
20 to 40%	35 to 50%	Yes
Below 20%	above 50%	Definitely

Rating from the most efficient to the least efficient - 2006 consumption

Site EUI Rank	Building	Annual Total Electrical Use (kWh)	Annual Total Non-Electrical Fuel Use (Gals)	Building Campus (sq-ft)	Site EUI Rating	Source EUI: Annual Total Source Energy Use per Sq-Ft (kBtu/sf)	Rating (Regional Source EUI Comparison)
1	Northern Maine CC	1,805,600	120,817	292,052	**79**	**121**	**0.36**

Educational Facilities

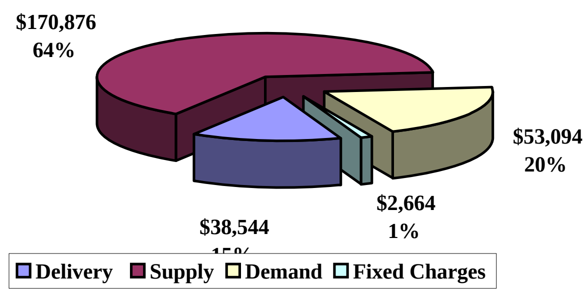


Source EUI	Est Regional Rating	Building
121	36%	Northern Maine CC

Source: Oak Ridge National Laboratory web site, http://eber.ed.ornl.gov/benchmark

Utility Analysis - Electric

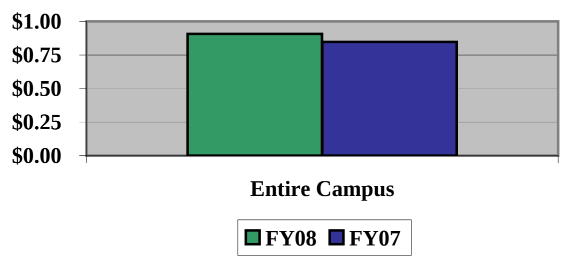
Components of Your FY08 Electric Cost



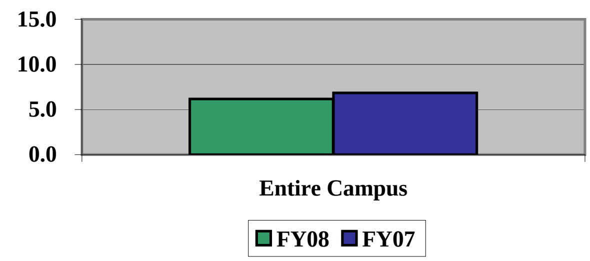
Your facility's kWh usage charges are a significant percentage of total electric cost. This presents a great opportunity to achieve substantial energy savings by reducing electric usage with energy-efficient equipment retrofits.

Square Footage Analysis

Cost Per Sq. Ft.



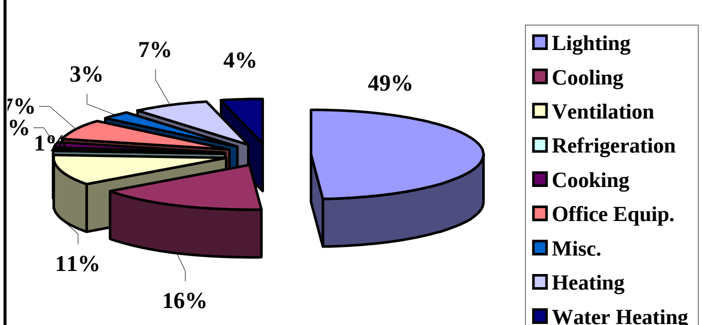
Usage (kWh) Per Sq. Ft.



Cost per square foot has increased over the past year while usage per square foot has decreased.

Sources of Electric Consumption

Typical End Use Allocation *



Typical Allocation Applied to Your Electric Cost**

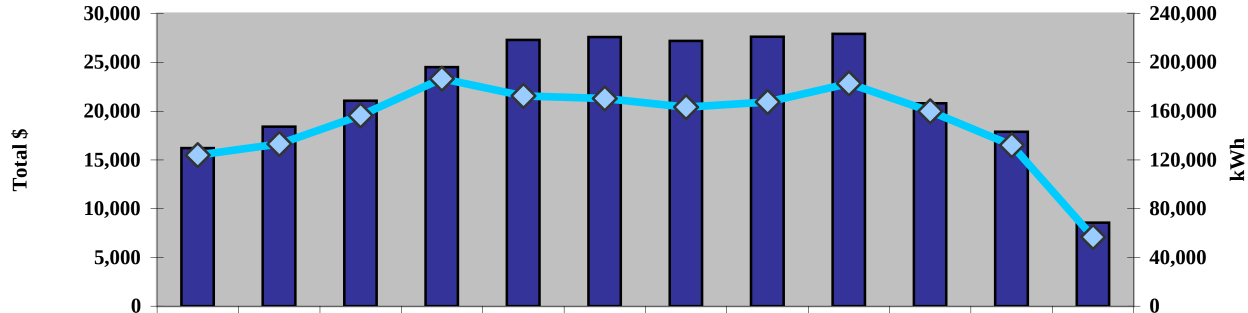
Lighting	$129,937
Cooling	$42,428
Ventilation	$29,169
Refrigeration	$2,652
Cooking	$5,304
Office Equip.	$18,562
Misc.	$7,955
Heating	$18,562
Water Heating	$10,607
Your FY08 Total Cost	**$265,177**

**This allocation is generic and is not a representation of the actual end use in your buildings included in this report.

*Source: Nashville Gas Commercial Benchmark Data by Business Segment and Climate Zone

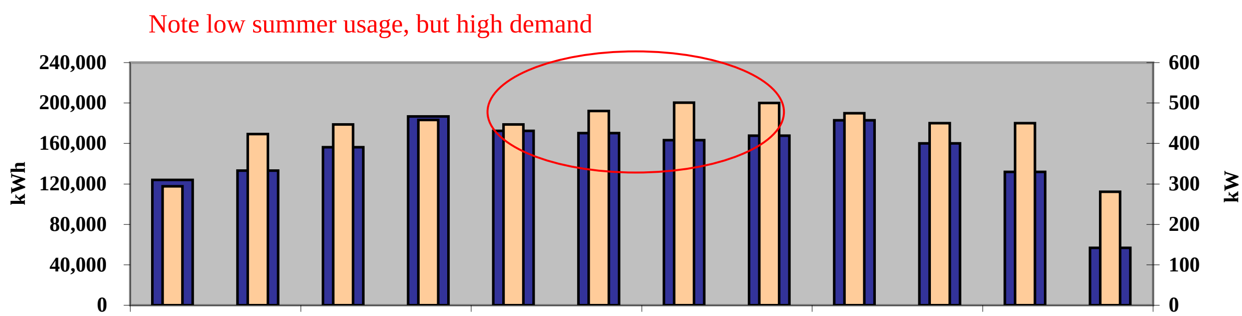
Monthly Trend By Utility

Electric Cost-to-Usage



	Jan-06	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06
Cost	16,222	18,413	21,081	24,512	27,308	27,600	27,197	27,651	27,938	20,810	17,880	8,563
kWh	124,000	133,200	156,400	186,800	172,400	170,400	163,200	167,600	182,800	160,000	132,000	56,800

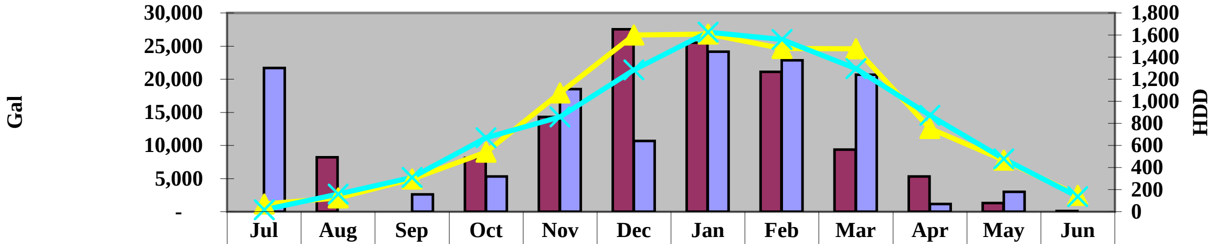
Electric Usage & Demand



	Jan-06	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06
kWh	124,000	133,200	156,400	186,800	172,400	170,400	163,200	167,600	182,800	160,000	132,000	56,800
kW	294	423	447	458	447	480	501	500	475	450	450	280

Utility Analysis - Fuel Oil

Your Fuel Oil Deliveries and Heating Degree Days



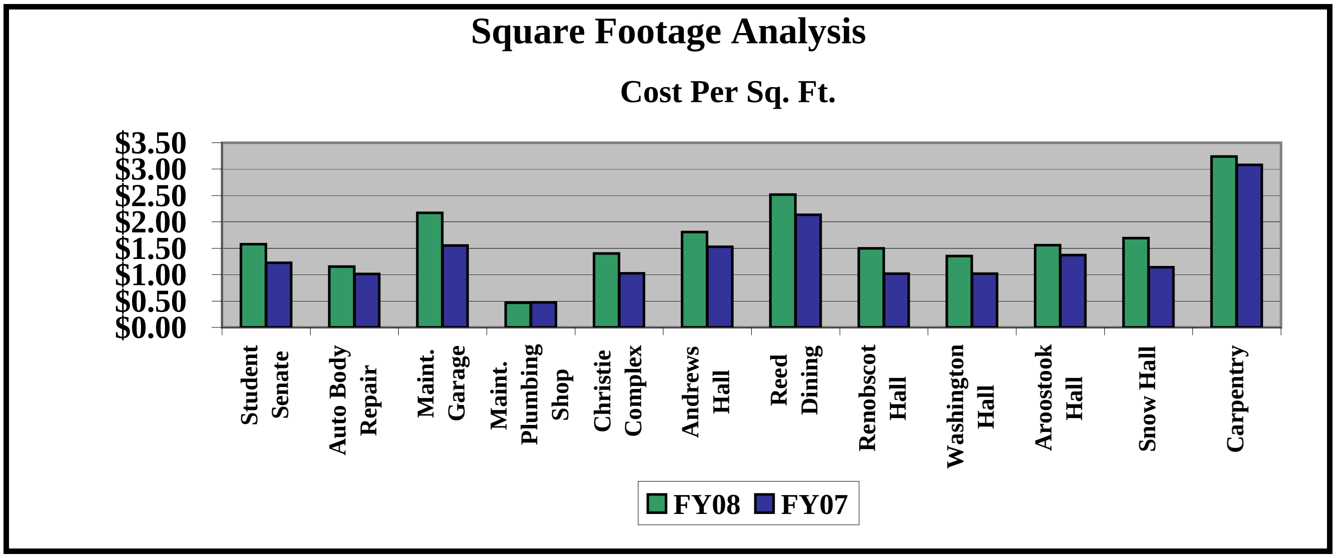
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Gal - FY08	-	8,192	-	8,129	14,281	27,520	25,516	21,100	9,379	5,300	1,300	100
Gal - FY07	21,671	0	2,596	5,300	18,519	10,661	24,133	22,849	20,662	1,151	3,001	0
HDD - FY08	70	125	297	541	1,076	1,601	1,608	1,479	1,475	755	468	149
HDD - FY07	17	159	310	670	859	1,284	1,627	1,560	1,296	872	478	136

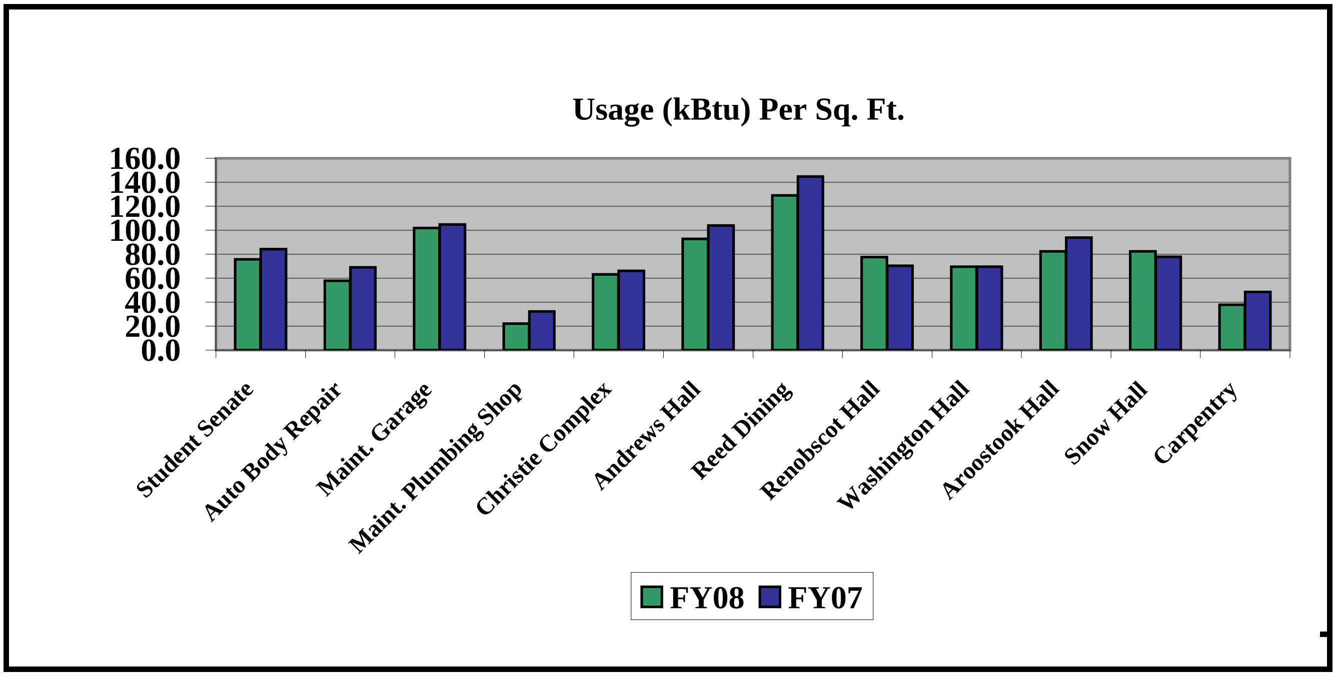
Note: Deliveries are distributed over the year in relation to heating degree days.

FY08 Gal/HDD = 12.5 **FY07 Gal/HDD = 14.1**

In the graph and calculation of gallons per Heating Degree Day (HDD) above, it appears that oil was used more efficiently for heating in FY08 than in FY07.

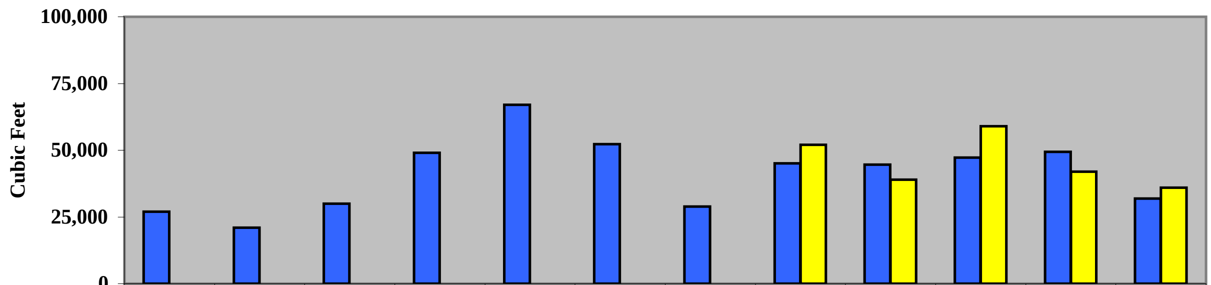
Utility Analysis - Fuel Oil





Utility Analysis - Water and Sewer

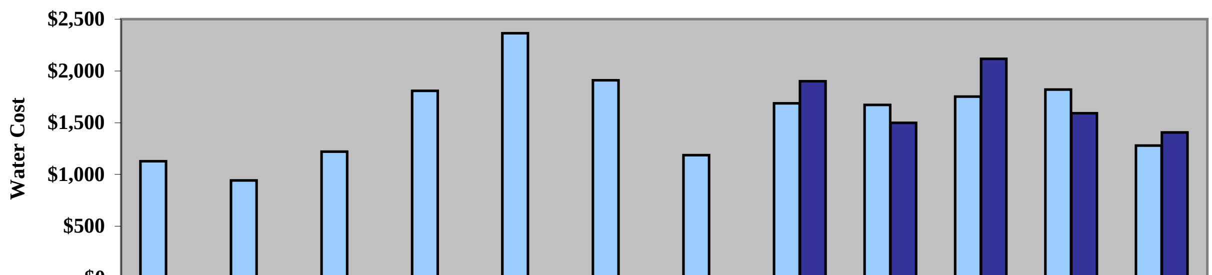
Total Water Usage



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
FY08	27,000	21,000	30,000	49,000	67,000	52,300	28,900	45,100	44,600	47,200	49,400	31,900
FY07								52,000	39,000	59,000	42,000	36000

Water and sewer cost is approximately $28,000 per year.

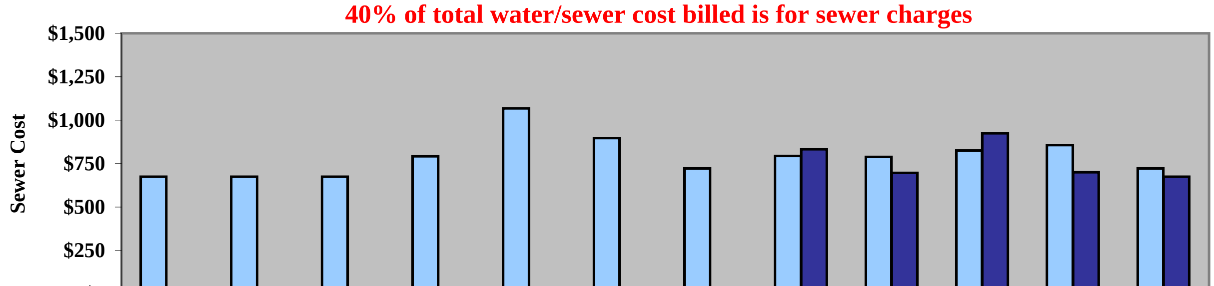
Total Water Cost



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
FY08	$1,126	$941	$1,219	$1,806	$2,362	$1,908	$1,185	$1,686	$1,670	$1,751	$1,819	$1,278
FY07								1,899	1,497	2,115	1,590	1,405

Total Sewer Cost

40% of total water/sewer cost billed is for sewer charges



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
FY08	$674	$674	$674	$793	$1,067	897.16	722.5	794.92	787.82	824.74	855.98	722.5
FY07								832.15	696.75	924.55	700.15	673.75

Appendix E
Energy Calculations

The attachment indicates the specific parameters and variables used in each of our energy calculations to determine the various costs and savings to the utilities affected by the proposed changes. The calculations is the culmination of the on-time logger data, the temperature logger data, lighting room-by-rooms, building infiltration inspections, on-site heating equipment inspections, personnel interviews and personal knowledge of the Performance Contracting Engineer. The majority of inputs to the calculations can be reviewed in the Existing and Proposed Temperature and Equipment Schedules. These schedules must be approved by the College prior to project implementation to ensure their accuracy and concurrence of all parties, as to the current and future operation of the equipment.

NMCC - EXISTING SCHEDULES & TEMPERATURE SETPOINTS

Baseline operating parameters are the faciltiy(s) and system(s) operations measured and/or observed before commencement of the Work. The data summarized will be used in the calculations of the baseline energy consumption and/or demand and for calculating baseline adjustments for changes in facility operation that occur during the Guarantee Period.

HONEYWELL and CUSTOMER agree that the operating parameters specified are representative of equipment operating characteristics during the Base Year specified in the Agreement.

The following data was collected with the assistance of the Facilties Manager and various building personnel and data logging equipment.

Results of data logging equipment are attached hereto, and incoporated herein by reference, as Exhibit G2.

			Occupied Schedule					Unoccupied/Holiday & Vacations Schedule (See note #2)					
Equipment Designation	Zone / Area Served	Qty.	Days	Begin	End	Setpoint	OA Intake	Days	Begin	End	Days	On/Off	Setpoint
Mailman Trades													
UV-1	Diesel Classroom	1	M-F	8:00	12:00	67 deg F	0%	M-F	12:00	8:00	S-S	Off	66 deg F
UV-2+5	Automative Classrooms	2	M-F	8:00	12:00	68 deg F	0%	M-F	12:00	8:00	S-S	Off	62 deg F
UV-3	Plumbing + Heating Classroom	1	M-F	12:00	12:01	68 deg F	0%	M-F	12:01	12:00	S-S	Off	62 deg F
UV-4	Welding Classroom	1	M-F	12:00	12:01	68 deg F	0%	M-F	12:01	12:00	S-S	Off	62 deg F
UV-6+7	Res Const Classrooms	2	M-F	8:00	16:00	68 deg F	0%	M-F	16:00	8:00	S-S	Off	62 deg F
HV-1	Diesel	1	M-F	8:00	16:00	67 deg F	15%	M-F	16:00	8:00	S-S	Off	66 deg F
HV-2	Automative	1	M-F	8:00	16:00	68 deg F	15%	M-F	16:00	8:00	S-S	Off	62 deg F
HV-3	Plumbing + Heating	1	M-F	12:00	12:01	68 deg F	10%	M-F	12:01	12:00	S-S	Off	62 deg F
MAU-1	Welding	1	M-F	12:00	12:01	68 deg F	10%	M-F	12:01	12:00	S-S	Off	62 deg F
UHs	Res Const	2	M-F	5:00	16:00	68 deg F	NA	M-F	16:00	5:00	S-S	Off	62 deg F
Residential													
HV-1	Andrews Common Areas	1	M-F	0:01	23:59	70 deg F	10%	M-F	23:59	0:01	S-S	Off	55 deg F
HV-2	Commons Dining	1	M-F	3:00	21:00	70 deg F	5%	M-F	21:00	3:00	S-S	Off	60 deg F
UV-1	Commons Conference	1	M-F	12:00	12:01	72 deg F	10%	M-F	12:01	12:00	S-S	Off	60 deg F
UV-2	Snow Conference	1	M-F	12:00	12:01	65 deg F	5%	M-F	12:01	12:00	S-S	Off	60 deg F
FT-1	Andrews Hall	1	M-F	0:01	23:59	68 deg F	5%	M-F	23:59	0:01	S-S	Off	55 deg F
FT-2	Aroostook Hall	1	M-F	0:01	23:59	68 deg F	5%	M-F	23:59	0:01	S-S	Off	55 deg F
FT-3	Penobscot Hall	1	M-F	0:01	23:59	68 deg F	5%	M-F	23:59	0:01	S-S	Off	55 deg F
FT-4	Snow Hall	1	M-F	0:01	23:59	68 deg F	5%	M-F	23:59	0:01	S-S	Off	55 deg F
FT-5	Washington Hall	1	M-F	0:01	23:59	68 deg F	5%	M-F	23:59	0:01	S-S	Off	55 deg F
Shops													
FT-1	Autobody	1	M-F	6:00	16:00	68 deg F	10%	M-F	16:00	6:00	S-S	On schedule	52 deg F
Furnace	Maintenance Shop	1	M-F	6:00	16:00	70 deg F	10%	M-F	16:00	6:00	S-S	On schedule	65 deg F
Furnace	Maintenance Garage	1	M-F	6:00	16:00	61 deg F	10%	M-F	16:00	6:00	S-S	On schedule	60 deg F

Notes:
1. An unoccupied cooling setpoint of 90 Degrees F signifies that air conditioning will be disabled during unoccupied mode.
2. Holidays & Vacations: All observed holidays, Christmas Recess, Winter Recess, Spring Recess, Summer Recess.

NMCC Representative: ______________________

Honeywell: ______________________

Date: ______________________

NMCC - PROPOSED SCHEDULES & TEMPERATURE SETPOINTS

Proposed operating parameters are the faciltiy(s) and system(s) after commencement of the Work. The data summarized will be used in the calculations of the post-retrofit energy consumption and/or demand. HONEYWELL and CUSTOMER agree that the proposed operating parameters specified are representative of equipment operating characteristics during the Guarantee Year specified in the Agreement.

			Occupied Schedule					Unoccupied/Holiday & Vacations Schedule (See note #2)					
Equipment Designation	Zone / Area Served	Qty.	Days	Begin	End	Setpoint	OA Intake	Days	Begin	End	Days	On/Off	Setpoint
Christie Complex													
RTU-1	Library	1	M-F	8:00	20:00	70 deg F	10%	M-F	20:00	8:00	S-S	On schedule	60 deg F
RTU-2	Conference Center	1	M-F	9:00	18:00	72 deg F	20%	M-F	18:00	9:00	S-S	Off	66 deg F
RTU-3	Continuing Ed	1	M-F	7:00	16:00	73 deg F	15%	M-F	16:00	7:00	S-S	Off	67 deg F
HV-1	Womens Locker Room	1	M-F	5:00	16:00	72 deg F	30%	M-F	16:00	5:00	S-S	Off	66 deg F
HV-2	Mens Locker Room	1	M-F	5:00	16:00	72 deg F	30%	M-F	16:00	5:00	S-S	Off	66 deg F
AHU-3+4	Gymnasium	2	M-F	6:00	17:00	67 deg F	15%	M-F	17:00	6:00	S-S	Off	62 deg F
HV-4	Learning Center	1	M-F	8:00	18:00	70 deg F	10%	M-F	18:00	8:00	S-S	Off	60 deg F
HV-6	Nursing	1	M-F	7:00	16:00	75 deg F	30%	M-F	16:00	7:00	S-S	Off	60 deg F
HV-7	2nd Floor Offices and Hallway	1	M-F	7:00	16:00	72 deg F	10%	M-F	16:00	7:00	S-S	Off	60 deg F
HV-8	Classrooms 201-203	1	M-F	7:00	21:30	70 deg F	30%	M-F	21:30	7:00	S-S	Off	60 deg F
HV-9	Racketball Court	1	M-F	12:00	12:01	60 deg F	0%	M-F	12:01	12:00	S-S	Off	60 deg F
HV-10	Lecture Hall	1	M-F	6:00	16:30	72 deg F	35%	M-F	16:30	6:00	S-S	Off	60 deg F
HV-110	Room 110	1	M-F	8:00	16:00	70 deg F	10%	M-F	16:00	8:00	S-S	Off	60 deg F
HV-111	Room 111	1	M-F	8:00	16:00	70 deg F	10%	M-F	16:00	8:00	S-S	Off	60 deg F
HV-112	Room 112	1	M-F	8:00	16:00	72 deg F	10%	M-F	16:00	8:00	S-S	Off	60 deg F
FC-108B	Room 108B	1	M-F	8:00	16:00	72 deg F	80%	M-F	16:00	8:00	S-S	Off	60 deg F
FC-113	Room 113	1	M-F	8:00	16:00	72 deg F	80%	M-F	16:00	8:00	S-S	Off	60 deg F
FC-114	Room 114	1	M-F	8:00	16:00	70 deg F	80%	M-F	16:00	8:00	S-S	Off	60 deg F
FC-115	Room 115	1	M-F	8:00	16:00	72 deg F	80%	M-F	16:00	8:00	S-S	Off	60 deg F
FC-214	Room 214	1	M-F	8:00	16:00	67 deg F	80%	M-F	16:00	8:00	S-S	Off	60 deg F
HRU-1	Martin Building	1	M-F	7:00	16:00	68 deg F	100%	M-F	16:00	7:00	S-S	Off	60 deg F
UV-1-3	2nd Floor Science Classrooms	3	M-F	7:30	16:00	72 deg F	30%	M-F	16:00	7:30	S-S	Off	60 deg F
UV-4	Computer Lab 208	1	M-F	7:00	20:00	72 deg F	30%	M-F	20:00	7:00	S-S	Off	60 deg F
UV-5	Metal Fabrication	1	M-F	6:00	16:30	72 deg F	30%	M-F	16:30	6:00	S-S	Off	60 deg F
FC-A	Metal Fab Classroom	1	M-F	6:00	16:30	72 deg F	80%	M-F	16:30	6:00	S-S	Off	60 deg F
UV-1-18	Central Offices and Classrooms	18	M-F	7:00	20:00	72 deg F	30%	M-F	20:00	7:00	S-S	Off	60 deg F
FC-19	Student Services Offices	1	M-F	7:00	16:00	72 deg F	30%	M-F	16:00	7:00	S-S	Off	60 deg F
Liebert-1+2	Computer Labs 209+210	2	M-F	7:00	20:00	72 deg F	80%	M-F	20:00	7:00	S-S	Off	60 deg F

NMCC - PROPOSED SCHEDULES & TEMPERATURE SETPOINTS

Proposed operating parameters are the faciltiy(s) and system(s) after commencement of the Work. The data summarized will be used in the calculations of the post-retrofit energy consumption and/or demand. HONEYWELL and CUSTOMER agree that the proposed operating parameters specified are representative of equipment operating characteristics during the Guarantee Year specified in the Agreement.

			Occupied Schedule					Unoccupied/Holiday & Vacations Schedule (See note #2)					
Equipment Designation	Zone / Area Served	Qty.	Days	Begin	End	Setpoint	OA Intake	Days	Begin	End	Days	On/Off	Setpoint
Mailman Trades													
UV-1	Diesel Classroom	1	M-F	8:00	16:00	67 deg F	30%	M-F	16:00	8:00	S-S	Off	62 deg F
UV-2+5	Automative Classrooms	2	M-F	8:00	16:00	68 deg F	30%	M-F	16:00	8:00	S-S	Off	62 deg F
UV-3	Plumbing + Heating Classroom	1	M-F	8:00	16:00	68 deg F	30%	M-F	16:00	8:00	S-S	Off	62 deg F
UV-4	Welding Classroom	1	M-F	8:00	16:00	68 deg F	30%	M-F	16:00	8:00	S-S	Off	62 deg F
UV-6+7	Res Const Classrooms	2	M-F	8:00	16:00	68 deg F	30%	M-F	16:00	8:00	S-S	Off	62 deg F
HV-1	Diesel	1	M-F	8:00	16:00	67 deg F	30%	M-F	16:00	8:00	S-S	Off	62 deg F
HV-2	Automative	1	M-F	8:00	16:00	68 deg F	30%	M-F	16:00	8:00	S-S	Off	62 deg F
HV-3	Plumbing + Heating	1	M-F	8:00	16:00	68 deg F	30%	M-F	16:00	8:00	S-S	Off	62 deg F
HV-4	Welding	1	M-F	8:00	16:00	68 deg F	50%	M-F	16:00	8:00	S-S	Off	62 deg F
HV-5	Res Const	2	M-F	8:00	16:00	68 deg F	15%	M-F	16:00	8:00	S-S	Off	62 deg F
Residential													
HV-1	Andrews Common Areas	1	M-F	0:01	23:59	70 deg F	30%	M-F	23:59	0:01	S-S	Off	55 deg F
HV-2	Commons Dining	1	M-F	10:00	21:00	70 deg F	15%	M-F	21:00	10:00	S-S	Off	60 deg F
UV-1	Commons Conference	1	M-F	12:00	12:30	72 deg F	30%	M-F	12:30	12:00	S-S	Off	60 deg F
UV-2	Snow Conference	1	M-F	12:00	12:30	65 deg F	30%	M-F	12:30	12:00	S-S	Off	60 deg F
HRU-1	Andrews Hall	1	M-F	0:01	23:59	68 deg F	10%	M-F	23:59	0:01	S-S	Off	55 deg F
HRU-2	Aroostook Hall	1	M-F	0:01	23:59	68 deg F	10%	M-F	23:59	0:01	S-S	Off	55 deg F
HRU-3	Penobscot Hall	1	M-F	0:01	23:59	68 deg F	10%	M-F	23:59	0:01	S-S	Off	55 deg F
HRU-4	Snow Hall	1	M-F	0:01	23:59	68 deg F	10%	M-F	23:59	0:01	S-S	Off	55 deg F
HRU-5	Washington Hall	1	M-F	0:01	23:59	68 deg F	10%	M-F	23:59	0:01	S-S	Off	55 deg F
Shops													
HRU-1	Autobody	1	M-F	6:00	16:00	68 deg F	20%	M-F	16:00	6:00	S-S	On schedule	52 deg F
HRU-2	Maintenance Shop	1	M-F	6:00	16:00	70 deg F	10%	M-F	16:00	6:00	S-S	On schedule	60 deg F
Furnace	Maintenance Garage	1	M-F	6:00	16:00	61 deg F	10%	M-F	16:00	6:00	S-S	On schedule	60 deg F

Notes:
1. An unoccupied cooling setpoint of 90 Degrees F signifies that air conditioning will be disabled during unoccupied mode.
2. Holidays & Vacations: All observed holidays, Christmas Recess, Winter Recess, Spring Recess, Summer Recess.

School Representative: ______________________
Honeywell: ______________________
Date: ______________________

NMCC - EXISTING SCHEDULES & TEMPERATURE SETPOINTS

Baseline operating parameters are the faciltiy(s) and system(s) operations measured and/or observed before commencement of the Work. The data summarized will be used in the calculations of the baseline energy consumption and/or demand and for calculating baseline adjustments for changes in facility operation that occur during the Guarantee Period.

HONEYWELL and CUSTOMER agree that the operating parameters specified are representative of equipment operating characteristics during the Base Year specified in the Agreement.

The following data was collected with the assistance of the Facilties Manager and various building personnel and data logging equipment.

Results of data logging equipment are attached hereto, and incoporated herein by reference, as Exhibit G2.

			Occupied Schedule					Unoccupied/Holiday & Vacations Schedule (See note #2)					
Equipment Designation	Zone / Area Served	Qty.	Days	Begin	End	Setpoint	OA Intake	Days	Begin	End	Days	On/Off	Setpoint
Christie Complex													
RTU-1	Library	1	M-F	8:00	16:00	70 deg F	50%	M-F	16:00	8:00	S-S	On schedule	60 deg F
RTU-2	Conference Center	1	M-F	6:00	18:00	72 deg F	20%	M-F	18:00	6:00	S-S	Off	66 deg F
RTU-3	Continuing Ed	1	M-F	7:00	16:00	73 deg F	50%	M-F	16:00	7:00	S-S	Off	67 deg F
HV-1	Womens Locker Room	1	M-F	5:00	16:00	72 deg F	10%	M-F	16:00	5:00	S-S	Off	66 deg F
HV-2	Mens Locker Room	1	M-F	5:00	16:00	72 deg F	80%	M-F	16:00	5:00	S-S	Off	66 deg F
AHU-3+4	Gymnasium	2	M-F	6:00	17:00	67 deg F	15%	M-F	17:00	6:00	S-S	Off	62 deg F
HV-4	Learning Center	1	M-F	0:01	14:00	70 deg F	0%	M-F	14:00	0:01	S-S	Off	68 deg F
HV-6	Nursing	1	M-F	7:00	17:30	75 deg F	0%	M-F	17:30	7:00	S-S	Off	65 deg F
HV-7	2nd Floor Offices and Hallway	1	M-F	7:00	21:30	72 deg F	0%	M-F	21:30	7:00	S-S	Off	60 deg F
HV-8	Classrooms 201-203	1	M-F	7:00	21:30	70 deg F	15%	M-F	21:30	7:00	S-S	Off	60 deg F
HV-9	Racketball Court	1	M-F	12:00	12:01	60 deg F	0%	M-F	12:01	12:00	S-S	Off	60 deg F
HV-10	Lecture Hall	1	M-F	6:00	16:30	72 deg F	5%	M-F	16:30	6:00	S-S	Off	66 deg F
HV-110	Room 110	1	M-F	4:00	20:00	70 deg F	0%	M-F	20:00	4:00	S-S	Off	60 deg F
HV-111	Room 111	1	M-F	8:00	16:00	70 deg F	10%	M-F	16:00	8:00	S-S	Off	60 deg F
HV-112	Room 112	1	M-F	6:00	16:00	72 deg F	0%	M-F	16:00	6:00	S-S	Off	66 deg F
TAB-108B	Room 108B	1	M-F	12:00	12:01	72 deg F	5%	M-F	12:01	12:00	S-S	Off	66 deg F
TAB-113	Room 113	1	M-F	7:00	20:00	72 deg F	5%	M-F	20:00	7:00	S-S	Off	66 deg F
TAB-114	Room 114	1	M-F	6:00	20:00	70 deg F	5%	M-F	20:00	6:00	S-S	Off	65 deg F
TAB-115	Room 115	1	M-F	7:00	20:00	72 deg F	5%	M-F	20:00	7:00	S-S	Off	66 deg F
TAB-214	Room 214	1	M-F	6:00	16:00	67 deg F	5%	M-F	16:00	6:00	S-S	Off	60 deg F
HRU-1	Martin Building	1	M-F	0:01	23:59	68 deg F	0%	M-F	23:59	0:01	S-S	Off	65 deg F
UV-1-3	2nd Floor Science Classroom	3	M-F	7:30	16:00	72 deg F	10%	M-F	16:00	7:30	S-S	Off	66 deg F
UV-4	Computer Lab 208	1	M-F	7:00	20:00	72 deg F	0%	M-F	20:00	7:00	S-S	Off	66 deg F
UV-5	Metal Fabrication	1	M-F	6:00	16:30	72 deg F	0%	M-F	16:30	6:00	S-S	Off	66 deg F
TAB-A	Metal Fab Classroom	1	M-F	12:00	12:01	72 deg F	5%	M-F	12:01	12:00	S-S	Off	66 deg F
FC-1-18	Central Offices and Classrooms	18	M-F	7:00	20:00	72 deg F	0%	M-F	20:00	7:00	S-S	Off	66 deg F
FC-19	Student Services Offices	1	M-F	7:00	16:00	72 deg F	15%	M-F	16:00	7:00	S-S	Off	66 deg F
Liebert-1+2	Computer Labs 209+210	2	M-F	7:00	20:00	72 deg F	0%	M-F	20:00	7:00	S-S	Off	66 deg F

BUILDING ROLL-UP

JOB:	**NMCC**
	Total Project ECM Roll-Up
DATE:	**3/27/2009**

BUILDING TOTALS	**ECMs** Lighting	Envelope Sealing	Night Setback	Controls	Ventilation	Oil Heaters	DHW - Hx Insulation	Boiler Isolation	Wood Boiler	**Total Project**
ANNUAL ENERGY SAVINGS										
OUTPUT Calculated Mbtu Saved		661	637	1752	(2142)		7	28	6940	7,882
Gauranteed MMBtu Saved		661	594	1540	(2142)		7	28	6940	7,627
MECHANICAL KWH Saved		0		0	43733	(6027)			(67425)	(42,006)
MECHANICAL KW Saved		0		0	31	0			(185)	(220)
OIL GALLON Saved BEFORE oil heater		5635	5055	13128	(18227)		59	236	59011	64,896
OIL GALLON Saved w/ oil heater						4532				4,532
WOOD TONS Saved		0	0	0	0		0	0	(1047)	(1,047)
NATURAL GAS THERMS Saved		0	0	0	0		0	0	0	0
Water & Sewer GALLONS Saved										0
LIGHTING KWH Saved	111900									111,900
LIGHTING KW Saved	443									443
										0
MECHANICAL KWH Savings $$$		0		0	5475	(755)			(8442)	($5,259)
MECHANICAL KW Savings $$$		0		0	305	0			(1841)	($1,536)
OIL Savings $$$		16904	15165	39385	(54681)	13595	176	708	177032	$208,284
WOOD Savings $$$		0	0	0	0		0	0	(62833)	($62,833)
NATURAL GAS Savings $$$		0	0	0	0		0	0	0	$0
WATER & SEWER Savings $$$										$0
LIGHTING KWH Savings $$$	14010									$14,010
LIGHTING KW Savings $$$	2403									$2,403
TOTAL ENERGY SAVINGS $$$	$16,413	$16,904	$15,165	$39,385	($48,900)	$12,840	$176	$708	$103,917	$155,069
ANNUAL OPERATIONAL SAVINGS										0
										0
ECM OPERATIONAL Savings $$$		0	0	0	0	0	0	0	0	0
LIGHTING Operational Savings $$$	0									0
TOTAL OPERATIONAL SAVINGS $$$	$0	$0	$0	$0	$0	$0	$0	$0	$0	0

BUILDING ROLL-UP

PROJECT: NMCC
Energy Retrofit Project
DATE: 3/27/2009

Total Project Square Footage=	**254,411**

BUILDING TOTALS		Buildings Christie Complex	Mailman Trades	Residential Buildings	Shop Buildings	**Energy Retrofit Project** Roll-Up Total
	ANNUAL ENERGY SAVINGS					
0%	**Safety Factor Applied**	0	0	0	0	
OUTPUT	Calculated Mbtu Saved	7,792	(301)	336	55	7,882
	Gauranteed MMBtu Saved	7,580	(331)	329	49	7,627
	MECHANICAL KWH Saved	(26,606)	(9,379)	(2,025)	(3,996)	(42,006)
	MECHANICAL KW Saved	(154)	(61)	0	(4)	(220)
	OIL GALLON Saved BEFORE oil heater	64,458	(2,815)	2,829	425	64,896
	OIL GALLON Saved by oil heater	2,638	0	1,522	372	4,532
	WOOD TONSSaved	(1,047)	0	0	0	(1,047)
	NATURAL GAS THERMS Saved	0	0	0	0	0
	Water & Sewer GALLONS Saved	0	0	0	0	
	LIGHTING KWH Saved	35,767	35,592	8,767	31,774	111,900
	LIGHTING KW Saved	242	182	20	0	443
			0	0		
	MECHANICAL KWH Savings $$$	($3,331)	($1,174)	($253)	($500)	($5,259)
	MECHANICAL KW Savings $$$	($1,536)	$0	$0	$0	($1,536)
	OIL Savings $$$	$201,286	($8,445)	$13,054	$2,388	$208,284
	WOOD Savings $$$	($62,833)	$0	$0	$0	($62,833)
	NATURAL GAS Savings $$$	$0	$0	$0	$0	$0
	WATER & SEWER Savings $$$	$0	$0	$0	$0	$0
	LIGHTING KWH Savings $$$	$4,478	$4,456	$1,098	$3,978	$14,010
	LIGHTING KW Savings $$$	$2,403	$0	$0	$0	$2,403
	TOTAL ENERGY SAVINGS $$$	$140,467	($5,163)	$13,898	$5,866	$155,069
	ANNUAL OPERATIONAL SAVINGS	$0	$0	$0	$0	
			$0	$0		
	ECM OPERATIONAL Savings $$$	$0	$0	$0	$0	$0
	LIGHTING Operational Savings $$$	$0	$0	$0	$0	$0
	TOTAL OPERATIONAL SAVINGS $$$	$0	$0	$0	$0	$0

% Dollars Saved Per Year			
% of Elect. $ Saved	3.3%	$ Elec (Baseline)	$292,652
% of Oil $ Saved	55.2%	$ Oil (Baseline)	$377,050
% of LP Gas $ Saved	0.0%	$ LP Gas (Baseline)	$0
% of Natural Gas $ Saved	#DIV/0!	ıtural Gas (Baseline)	$0
% of Water/Sewer $ Saved	0.0%	ter/Sewer (Baseline)	$0
		$ Total (Baseline)	$669,701

% Units Saved Per Year			
% of Elect. KW Saved	4.1%	Elec KW (Baseline)	5,456
% of Elect. KWH Saved	3.7%	Elec KWH (Baseline)	1,904,200
% of Oil GALLONS Saved	55.2%	GALLONS (Baseline)	125,683
% of L.P. Gas GALLONS Saved	0.0%	GALLONS (Baseline)	0
% of Natural Gas THERMS Saved	#DIV/0!	THERMS (Baseline)	0
% of Water & Sewer GALLONS Saved	0.0%	GALLONS (Baseline)	0

Square Foot Analysis	Pre Retrofit	Post Retrofit
Elec $/Sq Ft/Yr	$1.15	$1.11
Oil $/Sq Ft/Yr	$1.48	$0.66
LP Gas $/Sq Ft/Yr	$0.00	$0.25
Natural Gas $/Sq Ft/Yr	$0.00	$0.00
Water & Sewer $/Sq Ft/Yr	$0.00	$0.00
Total Utility Cost $/Sq Ft/Yr	**$2.63**	**$2.02**
Elec KW/Sq Ft/Yr	0.0214	0.0206
Elec KWH/Sq Ft/Yr	7.48	7.21
Oil GALLONS/Sq Ft/Yr	0.49	0.22
LP Gas GALLONS/Sq Ft/Yr	0.00	0.00
Natural Gas THERMS/Sq Ft/Yr	0.00	0.00
Water & Sewer GALLONS/Sq Ft/Yr	0.00	0.00

BUILDING ROLL-UP

JOB:	NMCC
BUILDING:	Christie Complex
DATE:	3/27/2009

Building Square Footage =	125,541

BUILDING TOTALS	ECMs Lighting	Envelope Sealing	Night Setback	CO2 Controls	Ventilation	Motors Drives	Oil Heaters	DHW - Hx Insulation	Boiler Isolation	Wood Boiler	Christie Complex Roll-Up Total
ANNUAL ENERGY SAVINGS											
20% **Safety Factor Applied**	N	N	N	Y	N	N	N	N	N	N	
OUTPUT Calculated MMBtu Saved		348	421	1,059	(1,010)			7	28	6,940	7,792
Gauranteed MMBtu Saved		348	421	847	(1,010)			7	28	6,940	7,580
MECHANICAL KWH Saved		0		0	43,733	594	(3,508)			(67,425)	(26,606)
MECHANICAL KW Saved		0		0	31	0	0			(185)	(154)
OIL GALLON Saved BEFORE oil heater		2,961	3,580	7,202	(8,590)			59	236	59,011	64,458
OIL GALLON Saved by oil heater							2,638				2,638
WOOD TONS Saved		0	0	0	0			0	0	(1,047)	(1,047)
NATURAL GAS THERMS Saved		0	0	0	0			0	0	0	0
Water & Sewer GALLONS Saved											0
LIGHTING KWH Saved	35,767										35,767
LIGHTING KW Saved	242										242
MECHANICAL KWH Savings $$$		$0		$0	$5,475	$74	($439)			($8,442)	($3,331)
MECHANICAL KW Savings $$$		$0		$0	$305	$0	$0			($1,841)	($1,536)
OIL Savings $$$		$8,882	$10,741	$21,605	($25,771)		$7,913	$176	$708	$177,032	$201,286
WOOD Savings $$$		$0	$0	$0	$0			$0	$0	($62,833)	($62,833)
NATURAL GAS Savings $$$		$0	$0	$0	$0			$0	$0	$0	$0
WATER & SEWER Savings $$$											$0
LIGHTING KWH Savings $$$	$4,478										$4,478
LIGHTING KW Savings $$$	$2,403										$2,403
TOTAL ENERGY SAVINGS $$$	$6,881	$8,882	$10,741	$21,605	($19,990)	$74	$7,474	$176	$708	$103,917	**$140,467**
ANNUAL OPERATIONAL SAVINGS											
ECM OPERATIONAL Savings $$$		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
LIGHTING Operational Savings $$$	$0										$0
TOTAL OPERATIONAL SAVINGS $$$	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
INCLUDE ECM ?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

% Dollars Saved Per Year			
% of Elect. $ Saved	0.7%	$ Elec (Baseline)	$292,652
% of Oil $ Saved	115.3%	$ Oil (Baseline)	$174,608
% of LP Gas $ Saved	0.0%	$ LP Gas (Baseline)	$0
% of Natural Gas $ Saved	0.0%	$ Natural Gas (Baseline)	$0
% of Water/Sewer $ Saved	0.0%	$ Water/Sewer (Baseline)	$0
		$ Total (Baseline)	$467,260

% Units Saved Per Year			
% of Elect. KW Saved	1.6%	Elec KW (Baseline)	5,456
% of Elect. KWH Saved	0.5%	Elec KWH (Baseline)	1,904,200
% of Oil GALLONS Saved	115.3%	Oil GALLONS (Baseline)	58,203
% of L.P. Gas GALLONS Saved	0.0%	L.P. Gas GALLONS (Baseline)	0
% of Natural Gas THERMS Saved	#DIV/0!	Natural Gas THERMS (Baseline)	0
% of Water & Sewer GALLONS Saved	0.0%	Water & Sewer GALLONS (Baseline)	0

Square Foot Analysis	Pre Retrofit	Post Retrofit
Elec $/Sq Ft/Yr	$2.33	$2.32
Oil $/Sq Ft/Yr	$1.39	($0.21)
Wood $/Sq Ft/Yr	$0.00	$0.50
Natural Gas $/Sq Ft/Yr	$0.00	$0.00
Water & Sewer $/Sq Ft/Yr	$0.00	$0.00
Total Utility Cost $/Sq Ft/Yr	**$3.72**	**$2.60**
Elec KW/Sq Ft/Yr	0.0435	0.0428
Elec KWH/Sq Ft/Yr	15.17	15.09
Oil GALLONS/Sq Ft/Yr	0.46	(0.07)
Wood TONS/Sq Ft/Yr	0.00	0.01
Natural Gas THERMS/Sq Ft/Yr	0.00	0.00
Water & Sewer GALLONS/Sq Ft/Yr	0.00	0.00

UTILITY DATA SHEET

JOB:	NMCC
BUILDING:	Christie Complex
DATE:	3/27/2009

Meter: Electric

Read Date	kWh	kWh Delivery	kWh Supply	Total kWh Charges	$/kWh	Delivery kWh Rate	Supply kWh Rate	kW	Demand Charge	$/kW	Total Charges
7/31/2006	120,800	$1,671.00	$7,045.22	$8,716.22	$ 0.07215	$ 0.01383	$ 0.05832	484	$3,836.00	$7.93	$12,552.22
8/31/2006	119,200	$1,659.00	$6,929.22	$5,129.97	$ 0.04304	$ 0.01392	$ 0.05813	304	$2,386.00	$7.85	$7,515.97
9/30/2006	161,200	$2,244.00	$9,369.22	$4,665.80	$ 0.02894	$ 0.01392	$ 0.05812	438	$3,438.00	$7.85	$8,103.80
10/31/2006	197,200	$2,745.00	$11,461.22	$5,110.62	$ 0.02592	$ 0.01392	$ 0.05812	469	$3,683.00	$7.85	$8,793.62
11/30/2006	186,000	$5,424.00	$10,809.22	$2,388.28	$ 0.01284	$ 0.02916	$ 0.05811	493	$5,879.00	$11.92	$8,267.28
12/31/2006	182,400	$5,319.00	$10,600.22	$2,778.82	$ 0.01523	$ 0.02916	$ 0.05812	514	$6,127.00	$11.92	$8,905.82
1/31/2007	195,600	$5,703.50	$17,065.83	$2,679.94	$ 0.01370	$ 0.02916	$ 0.08725	540	$6,436.80	$11.92	$9,116.74
2/28/2007	179,600	$5,236.96	$16,007.80	$2,445.59	$ 0.01362	$ 0.02916	$ 0.08913	540	$6,432.03	$11.92	$8,877.62
3/31/2007	200,800	$5,855.13	$17,896.72	$2,700.24	$ 0.01345	$ 0.02916	$ 0.08913	510	$6,083.97	$11.92	$8,784.21
4/30/2007	175,600	$2,444.18	$15,651.40	$5,252.91	$ 0.02991	$ 0.01392	$ 0.08913	474	$3,717.76	$7.85	$8,970.67
5/31/2007	164,800	$2,293.85	$14,689.12	$4,460.68	$ 0.02707	$ 0.01392	$ 0.08913	470	$3,689.50	$7.85	$8,150.18
6/30/2007	119,600	$1,664.71	$10,661.80	$5,516.77	$ 0.04613	$ 0.01392	$ 0.08915	470	$3,689.50	$7.85	$9,206.27
2006-7 Total	2,002,800			$51,846	$ 0.02589	$ -	$ -	5705.6	$55,398.56	$9.71	$107,244
7/31/2007	124,000	$1,750.16	$11,824.16	$13,574.32	$ 0.10947	$ 0.01411	$ 0.09536	294	$2,442.00	$8.31	$16,016.32
8/31/2007	133,200	$1,880.65	$12,726.43	$14,607.08	$ 0.10966	$ 0.01412	$ 0.09554	423	$3,517.70	$8.32	$18,124.78
9/30/2007	156,400	$2,208.21	$14,942.03	$17,150.24	$ 0.10966	$ 0.01412	$ 0.09554	447	$3,720.70	$8.32	$20,870.94
10/31/2007	186,800	$2,637.43	$17,845.23	$20,482.66	$ 0.10965	$ 0.01412	$ 0.09553	458	$3,810.56	$8.32	$24,293.22
11/30/2007	172,400	$5,061.49	$16,470.03	$21,531.52	$ 0.12489	$ 0.02936	$ 0.09553	447	$5,540.81	$12.39	$27,072.33
12/31/2007	170,400	$5,002.77	$16,399.99	$21,402.76	$ 0.12560	$ 0.02936	$ 0.09624	480	$5,947.20	$12.39	$27,349.96
1/31/2008	163,200	$4,791.39	$15,917.95	$20,709.34	$ 0.12690	$ 0.02936	$ 0.09754	501	$6,209.87	$12.39	$26,919.21
2/29/2008	167,600	$4,920.57	$16,346.95	$21,267.52	$ 0.12689	$ 0.02936	$ 0.09754	500	$6,190.04	$12.39	$27,457.56
3/31/2008	182,800	$5,366.83	$16,548.92	$21,915.75	$ 0.11989	$ 0.02936	$ 0.09053	475	$5,887.73	$12.39	$27,803.48
4/30/2008	160,000	$2,259.04	$14,589.39	$16,848.43	$ 0.10530	$ 0.01412	$ 0.09118	450	$3,747.33	$8.32	$20,595.76
5/31/2008	132,000	$1,863.71	$12,068.39	$13,932.10	$ 0.10555	$ 0.01412	$ 0.09143	450	$3,747.33	$8.32	$17,679.43
6/30/2008	56,800	$801.96	$5,196.24	$5,998.20	$ 0.10560	$ 0.01412	$ 0.09148	280	$2,332.26	$8.32	$8,330.46
2007-8 Total	1,805,600			$209,420	$ 0.11598	$ -	$ -	5206.2	$53,093.53	$10.20	$262,513

Utility: Oil

Meter: Oil #2

Date	HDD	Gal	Cost	$/Gal
Jul-06	17	6,000.00	$12,869.20	2.14
Aug-06	159	0.00	$0.00	0.00
Sep-06	310	400.40	$763.80	1.91
Oct-06	670	3,000.00	$5,424.00	1.81
Nov-06	859	8,602.80	$15,842.90	1.84
Dec-06	1284	5,000.00	$10,398.00	2.08
Jan-07	1627	11,800.00	$24,539.28	2.08
Feb-07	1560	11,401.20	$23,709.94	2.08
Mar-07	1296	10,300.70	$21,421.34	2.08
Apr-07	872	0.00	$0.00	0.00
May-07	478	3,000.90	$6,279.89	2.09
Jun-07	136	0.00	$0.00	0.00
Yearly Totals	9268	59506.00	$121,248.35	2.04

Date	HDD	Gal	Cost	$/Gal
Jul-07	70	0.00	$0.00	$0.00
Aug-07	125	2,000.00	$4,531.40	$2.27
Sep-07	297	0.00	$0.00	$0.00
Oct-07	541	6,401.00	$16,306.23	$2.55
Nov-07	1076	6,022.00	$17,276.79	$2.87
Dec-07	1601	10,992.00	$30,501.28	$2.77
Jan-08	1608	10,290.00	$29,239.72	$2.84
Feb-08	1479	8,052.00	$22,892.73	$2.84
Mar-08	1475	7,142.00	$23,812.17	$3.33
Apr-08	755	5,000.10	$17,749.65	$3.55
May-08	468	1,000.00	$3,485.10	$3.49
Jun-08	149	0.00	$0.00	$0.00
Yearly Totals	9644	56,899.1	$ 165,795	$2.91

2006-07 Total Gallons **59,506**

2007-08 Total Gallons **56,899**

2006-08 Average T | **9,456** | **58,203** | **$143,522** | **$2.47**

2007-08 Lock-In $3.00 / Gallon

FUEL SHEET

	Heating Fuel			Kitchen Fuel	
	Fuel Oil	Gas	Propane	Gas	Propane
	Y	N	N	N	N

JOB:	NMCC
BUILDING:	Christie Complex
DATE:	3/27/2009
Base Yr:	07/06 to 06/08
	(Month/Year to Month/Year)

Heating Fuel Adjustment			
BASE YR DEG DAYS	AVE YEAR DEG DAYS	BASE YR GALLONS	AVERAGE EXPECTED GALLONS
9,456	9659	58,203	59,428

FUEL INFORMATION

	SQUARE FEET	BASE YR BOILER EFFIC	TYPE FUEL	BASE YR GAL	BASE YR COST	$ GAL	BTU/ UNIT	$/PER mmBTU
Adj Base Line	125,541	0.84	2	58,203	$174,608	$3.00	140,000	$25.51
Adjustment		0.84	2	58,203	$31,086	$0.53	140,000	$4.54
Base Year		0.84	2	58,203	$143,522	$2.47	140,000	$20.97

Note: Adjustment is to achieve estimated 2009 lock-in rate of $2.70/Gallon

ELECTRIC INFORMATION

	POWER METER-#	Annual KWH Used (KWH)	Annual KWH Cost ($)	Cost/ KWH ($)	BTU/ UNIT (BTU)	$/PER mmBTU ($)	Annual Demand (KW)	Annual KW Cost ($)	Cost/ KW ($)	SUNDRY CHARGES ($)	TOTAL ELEC Cost ($)
Adj Base Line	0	1,904,200	$238,406	$0.1252	3,413	$36.68	5,456	$54,246	$9.94	$0	$ 292,652
Adjustment		0	$107,773	$0.0566	3,413	$16.58	0	$0	$0.00	$0.00	$107,772.96
Base Year	Total	1,904,200	$130,633	$0.0686	3,413	$20.10	5,456	$54,246	$9.94	$0	$ 184,879
	Off Peak	0	$0	$0.00	3,413	$0.00	0	$0	$0.00	$0.00	
	Outside Lights	0	$0	$0.00	3,413	$0.00	0	$0	$0.00	$0.00	
	Main	1,904,200	$130,633	$0.0686	3,413	$20.10	5,456	$54,246	$9.94	$0	

Note: Adjustment is to achieve current 10-01-08 rate

N/GAS INFORMATION

	Boiler Effic	N/GAS THERMS	N/GAS COST	N/GAS $/THRM	BTU/ UNIT	$/PER mmBTU
Adj Base Line	0.87	0	$0	$0.00	100,000	$0.00
Adjustment	0.87	0	$0	$0.00	100,000	
Base Year	0.87	0	$0	$0.00	100,000	$0.00

PROPANE INFORMATION

	Boiler Effic	PROPANE GALLONS	PROPANE COST	COST/ GALLON	BTU/ UNIT	$/PER mmBTU
Adj Base Line	0.85	0	$0	$1.57	91,000	$0.00
Adjustment	0.85	0	$0	$0.00		
Base Year	0.85	0	$0	$0.00	91,000	$0.00

WOOD CHIP INFORMATION

	Boiler Effic	Wood Chip Tons	Wood Chip Cost/Ton	Wood Chip BTU/LB	$/PER mmBTU
Adj Base Line	0.73	1,232	$60	4,600	$0.00
Adjustment	0.73	0	$0	4,600	
Base Year	0.73	1,232	$60	4,600	$0.00

mmBTU Conversion

Energy	Energy Abrev.	Units	BTUs	mmBTUs
Electricity	kwh	kWh	3,413	0.003413
Natural Gas	Therm	Therm	100,000	0.1
	CCF	CCF	103,000	0.103
	MCF	MCF	1,030,000	1.03
Energy	**Abrev.**	**Units**	**BTUs**	**mmBTUs**
#2 Fuel	2	GAL	140,000	0.14
#4 Fuel	4	GAL	145,600	0.1456
#6 Fuel	6	GAL	153,600	0.1536
Coal	Coal	TON	24,000,000	24
Nat Gas	Gas	THERM	100,000	0.1
Propane	Prop	GAL	91,000	0.091
Steam	Stm	LBS	1,150	0.00115
		kLBS	1,150,000	1.15

	High	*Low*	*Average*
#2 Fuel	*141800*	*137000*	*139400*
#4 Fuel	*148100*	*143100*	*145600*
#6 Fuel	*155900*	*151300*	*153600*

LIGHTING SUMMARY

JOB:	NMCC
BUILDING:	Christie Complex
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	**Units Saved**
LIGHTING KWH Saved	**35,767**
ANNUAL LIGHTING KW Saved	**241.7**
LIGHTING OPERATIONAL Savings $$$	**$0**

	Building Totals	
Information provided by lighting subcontractor	Lighting Base kW/Month	**45.8**
	Lighting Base kWh/Year	**66,798**
	Lighting kW Saved/Month	**26.9**
	Months/Year kw Saved	**9.0**
	Lighting kW Saved/YEAR	**241.7**
Calculated by lighting vender	Lighting kWh Saved/Year	**39,741**
	Reduction of run hours %	**10%**
Calculated by us	Lighting kWh Saved/Year	**35,767**

Sealing, Weatherstripping, Caulking, Windows & Doors

JOB:	NMCC
BUILDING:	Christie Complex
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	**Units Saved**
MECHANICAL KWH Saved	
MECHANICAL KW Saved	
MMBtu Saved BEFORE oil heater	**348**
ECM OPERATIONAL Savings $$$	

Infiltration

% CFM Used	75%
Existing CFM	1,854
MMBtu Savings	348

Insulation

Area	0
Existing 'U' Value	0.2
Proposed 'U' Value	0.0264
Difference	0.1736
Annual Degree Days	9,659
MMBtu Savings	**0**

Work to be completed	No. of Units	Perimeter (ft)	Crackage (in)	Conversion to feet		Product
Exit Doors	30	20	1/32	1/12	=	1.5625
RTV's	21	132	1/6	1/12	=	1.833333
Roof/ Wall Joint	1	1186	1/6	1/12	=	16.47222
Exterior Caulking	1	152	1/8	1/12	=	1.583333
OH Door	4	140	1/6	1/12	=	1.944444
Door Sweeps Only	4	3	1/16	1/12	=	0.015625
					Total =	23.41146

Infiltration Savings

Total Crack Area (SF)	Average Wind Speed (MPH)	Average Wind Speed (FPM)	Windward Diversity (%)	Infiltration Savings (CFM)
A	B	C = B x 5280 / 60	D	E = A x C x D
23.41	1.8	158.4	50%	1854.188

NIGHT SETBACK SAVINGS CALCULATIONS

JOB:	NMCC
BUILDING:	Christie Complex
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	0
MECHANICAL KW Saved	0
MMBtu Saved BEFORE oil heater	421
ECM OPERATIONAL Savings $$$	$0.00

Zone Schedule

Unit Designation	Zone / Area Served	Qty.	Wall Area	Floor/Roof Area	Coefficient of Heat Transfer, Wall 0.10-0.30	%, Windows	Coefficient of Heat Transfer, Windows 0.25-0.50	Below Heated Space	Coefficient of Heat Transfer, Roof 0.04-0.20	Existing Occupied Temperature	Existing Unoccupied Temperature	Proposed Occupied Temperature	Proposed Unoccupied Temperature	Existing Occupied Begin	Existing Occupied End	Proposed Occupied Begin	Proposed Occupied End	Fuel (O or P)	Savings MMBtu/Yr/unit	Oil MMBtu/Yr 421	Gas or Propane MMBtu/Yr 0
RTU-1	Library	1	3,300	10,000	0.16	35%	0.35	N	0.08	70	60	70	60	8:00	16:00	8:00	20:00	O	(20)	(20)	0
RTU-2	Conference Cente	1	2,500	5,200	0.16	5%	0.35	N	0.08	72	66	72	66	6:00	18:00	9:00	18:00	O	5	5	0
RTU-3	Continuing Ed	1	4,000	6,400	0.16	20%	0.35	Y	0.08	73	67	73	67	7:00	16:00	7:00	16:00	O	0	0	0
HV-1	Womens Locker Room	1	0	2,400	0.16	0%	0.35	Y	0.08	72	66	72	66	5:00	16:00	5:00	16:00	O	0	0	0
HV-2	Mens Locker Room	1	0	2,400	0.16	0%	0.35	Y	0.08	72	66	72	66	5:00	16:00	5:00	16:00	O	0	0	0
AHU-3+4	Gymnasium	2	9,000	10,000	0.16	0%	0.35	N	0.08	67	62	67	62	6:00	17:00	6:00	17:00	O	0	0	0
HV-4	Learning Cente	1	2,000	7,000	0.16	30%	0.35	Y	0.08	70	68	70	60	0:01	14:00	8:00	18:00	O	59	59	0
HV-6	Nursing	1	500	2,500	0.16	0%	0.35	N	0.08	75	65	75	60	7:00	17:30	7:00	16:00	O	8	8	0
HV-7	2nd Floor Offices and Hallway	1	720	1,000	0.16	35%	0.35	N	0.08	72	60	72	60	7:00	21:30	7:00	16:00	O	5	5	0
HV-8	Classrooms 201-203	1	1,800	4,000	0.16	35%	0.35	N	0.08	70	60	70	60	7:00	21:30	7:00	21:30	O	0	0	0
HV-9	Racketball Cour	1	1,800	2,000	0.16	0%	0.35	N	0.08	60	60	60	60	12:00	12:01	12:00	12:01	O	0	0	0
HV-10	Lecture Hall	1	600	2,000	0.16	0%	0.35	Y	0.08	72	66	72	60	6:00	16:30	6:00	16:30	O	3	3	0
HV-110	Room 110	1	1,200	5,300	0.16	10%	0.35	N	0.08	70	60	70	60	4:00	20:00	8:00	16:00	O	17	17	0
HV-111	Room 111	1	1,200	5,300	0.16	10%	0.35	N	0.08	70	60	70	60	8:00	16:00	8:00	16:00	O	0	0	0
HV-112	Room 112	1	3,300	5,300	0.16	10%	0.35	N	0.08	72	66	72	60	6:00	16:00	8:00	16:00	O	37	37	0
TAB-108B	Room 108B	1	1,000	1,500	0.16	35%	0.35	Y	0.08	72	66	72	60	12:00	12:01	8:00	16:00	O	25	25	0
TAB-113	Room 113	1	400	800	0.16	15%	0.35	N	0.08	72	66	72	60	7:00	20:00	8:00	16:00	O	6	6	0
TAB-114	Room 114	1	400	800	0.16	15%	0.35	N	0.08	70	65	70	60	6:00	20:00	8:00	16:00	O	5	5	0
TAB-115	Room 115	1	720	800	0.16	15%	0.35	N	0.08	72	66	72	60	7:00	20:00	8:00	16:00	O	8	8	0
TAB-214	Room 214	1	1,100	2,000	0.16	20%	0.35	N	0.08	67	60	67	60	6:00	16:00	8:00	16:00	O	2	2	0
HRU-1	Martin Building	1	12,500	6,600	0.16	35%	0.35	Y	0.08	68	65	68	60	0:01	23:59	7:00	16:00	O	112	112	0
UV-1-3	2nd Floor Science Classrooms	3	720	1,600	0.16	35%	0.35	N	0.08	72	66	72	60	7:30	16:00	7:30	16:00	O	9	27	0
UV-4	Computer Lab 208	1	720	1,600	0.16	20%	0.35	N	0.08	72	66	72	60	7:00	20:00	7:00	20:00	O	6	6	0
UV-5	Metal Fabrication	1	3,500	9,300	0.16	35%	0.35	N	0.08	72	66	72	60	6:00	16:30	6:00	16:30	O	41	41	0
TAB-A	Metal Fab Classroom	1	1,000	1,200	0.16	20%	0.35	N	0.08	72	66	72	60	12:00	12:01	6:00	16:30	O	29	29	0
FC-1-18	Central Offices and Classrooms	18	400	800	0.16	35%	0.35	Y	0.08	72	66	72	60	7:00	20:00	7:00	20:00	O	2	36	0
Liebert-1+2	Computer Labs 209+210	2	400	800	0.16	30%	0.35	N	0.08	72	66	72	60	7:00	16:00	7:00	16:00	O	4	9	0

Notes:
1. Coefficients of Heat Transfer are estimated by age, condition and construction of the building.
2. Weather bin data has been used to calculate deltaTxhours. The formula to determine deltaTxhours uses the existing and proposed schedules to determine fractions of the weather bins to be used in the deltaTxhour calculation. See note 3.
3. The deltaTxhours generated by the bin analysis is used in the following formula to determine MMBTU/yr. U.Coefficient of Heat TransferxAreaxdeltaTxhours=BTU. The hours are over a years period and the result is converted to millions of BTUs.
4. Areas of floors, walls, windows and roofs are estimated from drawings and onsite inspections.

New Ventilation Energy Cost

JOB:	NMCC
BUILDING:	Christie Complex
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	43,733
MECHANICAL KW Saved	31
MMBtu Saved BEFORE oil heater	(1010)
ECM OPERATIONAL Savings $$$	$0.00

Equipment Schedule

Unit Designation	Zone / Area Served	Qty.	Fan (N or E)	HP/ Unit	Fan kW Reading	Existing CFM OA/Unit	Proposed CFM OA/Unit	A/C (Y or N or E)	A/C Peak kW	% Eff. ERVs	Occupied Begin	Proposed Occupied End	Occupied Temp	Proposed Hrs/Yr	Fuel (O or P)	MMBtu/Yr/unit	Oil MMBtu/Yr	Gas or Propane MMBtu/Yr	kW Usage/Yr	KWH Usage/Yr
																	1010	0	(31)	(43,733)
RTU-1	Library	1	E	20.00	6.95	6,000	1,200	Y	-26.57	0%	8:00	20:00	70.0	2,040	O	(410)	(410)	0	(27)	(34,190)
RTU-2	Conference Center	1	E	9.50	2.94	1,200	1,200	Y	0.00	0%	9:00	18:00	72.0	1,530	O	(52)	(52)	0	0	(6,616)
RTU-3	Continuing Ed	1	E	20.00	7.54	3,750	1,125	Y	-14.53	0%	7:00	16:00	73.0	1,530	O	(320)	(320)	0	(15)	(16,579)
HV-1	Womens Locker Room	1	E	1.00	0.61	300	900	N	0.00	0%	5:00	16:00	72.0	1,870	O	90	90	0	0	0
HV-2	Mens Locker Room	1	E	1.00	0.61	2,400	900	N	0.00	0%	5:00	16:00	72.0	1,870	O	(224)	(224)	0	0	0
AHU-3+4	Gymnasium	2	E	4.00	2.46	750	750	N	0.00	0%	6:00	17:00	67.0	1,870	O	0	0	0	0	0
HV-4	Learning Center	1	E	5.00	2.43	0	400	N	0.00	0%	8:00	18:00	70.0	1,700	O	51	51	0	0	0
HV-6	Nursing	1	E	1.00	1.64	0	750	N	0.00	0%	7:00	16:00	75.0	1,530	O	96	96	0	0	0
HV-7	2nd Floor Offices and Hallway	1	E	1.00	1.67	0	120	N	0.00	0%	7:00	16:00	72.0	1,530	O	14	14	0	0	0
HV-8	Classrooms 201-203	1	E	1.50	1.02	450	900	N	0.00	0%	7:00	21:30	70.0	2,465	O	85	85	0	0	0
HV-9	Racketball Court	1	E	1.00	0.61	0	0	N	0.00	0%	12:00	12:01	60.0	3	O	0	0	0	0	0
HV-10	Lecture Hall	1	E	1.00	0.61	100	700	Y	3.32	0%	6:00	16:30	72.0	1,785	O	85	85	0	3	3,876
HV-110	Room 110	1	E	5.00	2.60	0	500	N	0.00	0%	8:00	16:00	70.0	1,360	O	50	50	0	0	0
HV-111	Room 111	1	E	5.00	3.50	500	500	N	0.00	0%	8:00	16:00	70.0	1,360	O	0	0	0	0	0
HV-112	Room 112	1	E	5.00	2.60	0	500	N	0.00	0%	8:00	16:00	72.0	1,360	O	52	52	0	0	0
FC-108B	Room 108B	1	E	0.05	0.03	20	320	N	0.00	0%	8:00	16:00	72.0	1,360	O	33	33	0	0	0
FC-113	Room 113	1	E	0.05	0.03	20	320	N	0.00	0%	8:00	16:00	72.0	1,360	O	30	30	0	0	0
FC-114	Room 114	1	E	0.05	0.03	20	320	N	0.00	0%	8:00	16:00	70.0	1,360	O	28	28	0	0	0
FC-115	Room 115	1	E	0.05	0.03	20	320	N	0.00	0%	8:00	16:00	72.0	1,360	O	30	30	0	0	0
FC-214	Room 214	1	E	0.05	0.03	40	640	N	0.00	0%	8:00	16:00	67.0	1,360	O	54	54	0	0	0
HRU-1	Martin Building	1	E	20.00	13.65	0	5,000	N	0.00	50%	7:00	16:00	68.0	1,530	O	269	269	0	0	0
UV-1-3	2nd Floor Science Classrooms	3	E	0.25	0.15	125	375	N	0.00	0%	7:30	16:00	72.0	1,445	O	28	84	0	0	0
UV-4	Computer Lab 208	1	E	0.25	0.15	0	300	N	0.00	0%	7:00	20:00	72.0	2,210	O	53	53	0	0	0
UV-5	Metal Fabrication	1	E	0.25	0.15	0	450	N	0.00	0%	6:00	16:30	72.0	1,785	O	64	64	0	0	0
FC-A	Metal Fab Classroom	1	E	0.05	0.03	20	320	N	0.00	0%	6:00	16:30	72.0	1,785	O	45	45	0	0	0
UV-1-18	Central Offices and Classrooms	18	E	0.25	0.15	0	225	N	0.00	0%	7:00	20:00	72.0	2,210	O	40	715	0	0	0
FC-19	Student Services Offices	1	E	0.25	0.15	750	1,500	N	0.00	0%	7:00	16:00	72.0	1,530	O	89	89	0	0	0
Liebert-1+2	Computer Labs 209+210	2	E	0.25	0.15	0	640	Y	3.54	0%	7:00	20:00	72.0	2,210	0	113	0	0	7	9,775

Notes:

1. Ventilation run hours are based on the new proposed schedules. They are based on a 34 week school heating cycle per year.
2. Weather bin data has been used to calculate deltaTxhours. The formula to determine deltaTxhours uses the existing and proposed schedules to determine fractions of the weather bins to be used in the deltaTxhour calculation. See note 3.
3. The deltaTxhours generated by the bin analysis is used in the following formulat to determine MMBTU/yr. CFMx1.08xdeltaTxhours=BTU. The hours are over a years period and the result is converted to millions of BTUs. A delta is calculated between existing and proposed cfm.
4. There are 193 M-F calendar days during the school year, inclusive of holidays.
5. If the equipment is existing and the fan is greater than 3Hp, kW readings are instantaneous during site visit and are assumed to be representative of the systems operation including post project implementation. If the equipment is existing and the fan is less than 3Hp, kW readings are calculated based on an assumed 70% loading and 85% efficiency. If the equipment is new, kW readings are calculated based on an assumed 70% loading and 85% efficiency.
6. Cooling COP is assumed to be 1.

VENTILATION CONTROLS

JOB:	NMCC
BUILDING:	Christie Complex
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	0
MECHANICAL KW Saved	0
MMBtu Saved BEFORE oil heater	1059
ECM OPERATIONAL Savings $$$	$0.00

% Run Hours	% Outside Air
40%	100%
20%	75%
20%	50%
20%	25%
70.0%	Weighted average % Ventilation

Equipment Schedule

Unit Designation	Zone / Area Served	Qty.	CFM OA/Unit	% Eff. ERVs	Weighted Average Percent CFM OA	Occupied Begin	Proposed Occupied End	Occupied Temp	Proposed Hrs/Yr	Fuel (O or P)	MMBtu/Yr	Oil MMBtu/Yr	Gas or Propane MMBtu/Yr
												1059	0
RTU-1	Library	1	1,200	0%	50%	8:00	20:00	70.0	2,040	O	92	92	0
RTU-2	Conference Center	1	1,200	0%	50%	9:00	18:00	72.0	1,530	O	72	72	0
RTU-3	Continuing Ed	1	1,125	0%	70%	7:00	16:00	73.0	1,530	O	41	41	0
HV-1	Womens Locker Room	1	900	0%	50%	5:00	16:00	72.0	1,870	O	67	67	0
HV-2	Mens Locker Room	1	900	0%	50%	5:00	16:00	72.0	1,870	O	67	67	0
AHU-3+4	Gymnasium	2	750	0%	50%	6:00	17:00	67.0	1,870	O	49	98	0
HV-4	Learning Center	1	400	0%	90%	8:00	18:00	70.0	1,700	O	5	5	0
HV-6	Nursing	1	750	0%	70%	7:00	16:00	75.0	1,530	O	29	29	0
HV-7	2nd Floor Offices and Hallway	1	120	0%	70%	7:00	16:00	72.0	1,530	O	4	4	0
HV-8	Classrooms 201-203	1	900	0%	70%	7:00	21:30	70.0	2,465	O	51	51	0
HV-9	Racketball Court	1	0	0%	70%	12:00	12:01	60.0	3	O	0	0	0
HV-10	Lecture Hall	1	700	0%	70%	6:00	16:30	72.0	1,785	O	30	30	0
HV-110	Room 110	1	500	0%	70%	8:00	16:00	70.0	1,360	O	15	15	0
HV-111	Room 111	1	500	0%	70%	8:00	16:00	70.0	1,360	O	15	15	0
HV-112	Room 112	1	500	0%	70%	8:00	16:00	72.0	1,360	O	16	16	0
FC-108B	Room 108B	1	320	0%	70%	8:00	16:00	72.0	1,360	O	10	10	0
FC-113	Room 113	1	320	0%	70%	8:00	16:00	72.0	1,360	O	10	10	0
FC-114	Room 114	1	320	0%	70%	8:00	16:00	70.0	1,360	O	10	10	0
FC-115	Room 115	1	320	0%	70%	8:00	16:00	72.0	1,360	O	10	10	0
FC-214	Room 214	1	640	0%	70%	8:00	16:00	67.0	1,360	O	18	18	0
HRU-1	Martin Building	1	5,000	50%	70%	7:00	16:00	68.0	1,530	O	81	81	0
UV-1-3	2nd Floor Science Classrooms	3	375	0%	70%	7:30	16:00	72.0	1,445	O	13	38	0
UV-4	Computer Lab 208	1	300	0%	70%	7:00	20:00	72.0	2,210	O	16	16	0
UV-5	Metal Fabrication	1	450	0%	70%	6:00	16:30	72.0	1,785	O	19	19	0
FC-A	Metal Fab Classroom	1	320	0%	70%	6:00	16:30	72.0	1,785	O	14	14	0
UV-1-18	Central Offices and Classrooms	18	225	0%	70%	7:00	20:00	72.0	2,210	O	12	215	0
FC-19	Student Services Offices	1	1,500	0%	90%	7:00	16:00	72.0	1,530	O	18	18	0
Liebert-1+2	Computer Labs 209+210	2	640	0%	70%	7:00	20:00	72.0	2,210	0	34	0	0

Notes:
1. Ventilation run hours are based on the new proposed schedules. They are based on a 34 week school heating cycle per year.
2. Weather bin data has been used to calculate deltaTxhours. The formula to determine deltaTxhours uses the proposed schedules to determine fractions of the weather bins to be used in the deltaTxhour calculation. See note 3.
3. The deltaTxhours generated by the bin analysis is used in the following formula to determine MMBTU/yr. %OAxCFMx1.08xdeltaTxhours=BTU. The hours are over a years period and the result is converted to millions of BTUs.

ENERGY EFFICIENT MOTOR & VSD SAVINGS CALCULATIONS

JOB:	NMCC
BUILDING:	Christie Complex
DATE:	03/27/09

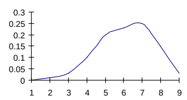
ANNUAL ENERGY SAVINGS	**Units Saved**
MECHANICAL KWH Saved	**594**
MECHANICAL KW Saved	**0.0**
ECM OPERATIONAL Savings $$$	

MOTOR CALCULATIONS

	LOCATION	Boiler Room	Boiler Room
	MOTOR EXISTING CONDITION		
	EQPT TYPE	**Pump**	**Pump**
	EQPT#	**HWP-1**	**HWP-2**
	H.P.	**1.00**	**0.00**
	ACT.H.P.	**?**	**?**
	RATED AMPS.	**?**	**?**
	AMPS 1	**?**	**?**
	AMPS 2	**?**	**?**
	KW	**?**	**?**
	KVAR	**?**	**?**
	KVA	**?**	**?**
	PF %	**?**	**?**
	VOLTS	**230**	**230**
ASSUMPTIONS	**0.746**		
1. kW was measured for one pump and applied to the others.	Existing	Pump	Pump
2. Only one pump runs at a time.	HP	**1.00**	**0.00**
	Run Hours	**2,856**	**2,856**
	Load Factor	**0.84**	**0.84**
	Motor Eff.	**0.92**	**0.92**
	kWh	1,945	0
	KW	0.7	0.0
	Proposed		
	HP	**1.0**	**0.0**
	Run Hours	**2,856**	**2,856**
	Load Factor	0.84	0.84
	Motor Eff.	0.920	0.920
	kWh	1,945	0
	KW	0.7	0.0

	Motor kWh Saved	0	0
Monthly kw X six months = annual kw	Monthly Motor KW saved	0.0	0.0
	Annual kw saved	0.0	0.0

SPEED DRIVE CALCULATIONS



DUTY CYCLE X		
0.2	0	0
0.3	0.01	0.01
0.4	0.03	0.03
0.5	0.1	0.1
0.6	0.2	0.2
0.7	0.23	0.23
0.8	0.25	0.25
0.9	0.15	0.15
1	0.03	0.03
1.1	1	1
	1	1
KWH (new motor		
0.2	0	0
0.3	11	0
0.4	33	0
0.5	101	0
0.6	179	0
0.7	166	0
0.8	126	0
0.9	41	0
1	2	0

KWH USED WITH SPEED DRIVE =	1,286	0
KWH USED W/O SPEED DRIVE =	1,945	0
VSD kWh SAVINGS =	**659**	**0**
VSD to be installed? Y or N:	Y	Y

	MOTOR INPUT X		
This is the power the motor would use at part loads with NO speed drive	0.2	0.57	0.57
	0.3	0.67	0.67
	0.4	0.71	0.71
	0.5	0.72	0.72
	0.6	0.75	0.75
	0.7	0.8	0.8
	0.8	0.88	0.88
	0.9	0.99	0.99
	1	1.2	1.2

	VFD INPUT X		
This is the power the motor would use at part loads with a VFD.	0.2	0.09	0.09
	0.3	0.11	0.11
	0.4	0.14	0.14
	0.5	0.2	0.2
	0.6	0.29	0.29
	0.7	0.43	0.43
	0.8	0.62	0.62
	0.9	0.85	0.85
	1	1.16	1.16
		3.89	3.89

Standard duty cycle distribution	0
	0.01
	0.03
	0.1
	0.2
	0.23
	0.25
	0.15
	0.03
	1
	0
	0.05
	0.16
	0.23
	0.23
	0.2
	0.09
	0.03
	0.01

PIPE INSULATION ENERGY SAVINGS CAL

JOB:	**NMCC**
BUILDING:	**Christie Complex**
DATE:	**3/27/2009**

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	
MECHANICAL KW Saved	
MMBtu Saved BEFORE oil heater	7
ECM OPERATIONAL Savings $$$	

Insert data in pink cells only!

PIPE INSULATING SAVINGS CALCULATIONS

Pipe Size	Lin. Ft.	140 Degree Pipe BTU Loss Per Ft./Per HR Bare Pipe	Total BTU Loss Per Ft./Per HR	Ins. Thickness	140 degree BTU Loss Per Ft./Per HR	Total BTU Loss Per Ft./Per HR W/Inslaton	BTU/HR Difference
1/2"	0.00	46	0	1/2"-1"	9	0	0
3/4"	0.00	56	0	1/2"-1"	9	0	0
1"	0.00	67	0	1/2"-1"	9	0	0
1-1/4"	0.00	77	0	1"	9	0	0
1-1/2"	0.00	94	0	1"	10	0	0
2"	0.00	113	0	1"-1-1/2"	12	0	0
2-1/2"	0.00	133	0	1-1/2"	15	0	0
3"	0.00	158	0	1-1/2"	20	0	0
3-1/2"	0.00	187	0	1-1/2"	28	0	0
4"	0.00	245	0	1-1/2"	40	0	0
5	0.00	285	0	1-1/2"	58	0	0
6	6.00	330	1,980	1-1/2"	79	474	1,506
8	0.00	415	0	1-1/2"	97	0	0
10	0.00	605	0	1-1/2"	120	0	0
TOTAL	**6**		**1,980**			**474**	**1,506**

70 deg. ambient temp. and 140 deg. pipe temp.

BTU'S/HR SAVED	HOURS RUN-TIME	SAFETY FACTOR	MMBtu SAVED
1,506	5712	20%	**6.9**

Boiler Isolation

JOB:	NMCC
BUILDING:	Christie Complex
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	**Units Saved**
MECHANICAL KWH Saved	
MECHANICAL KW Saved	
MMBtu Saved BEFORE oil heater	**28**
ECM OPERATIONAL Savings $$$	

Savings from reduced flue losses

Additional O/A	100%
Existing CFM	75
BTU/Deg/CFM/hr	1.08
DEG/DIF.=	60
BTU/HR	4,860
Hours/Day	**24**
Days/ Year	**238**
Total Hours / Year	5,712
MMBtu Savings	**28**

Notes;
1. These Calculations do not reflect the additional jacket losses that will also be saved with the installation of an isolation
2. These calculations assume a 75 cfm leak loss of air through the boiler's stack system.

Oil and NG To Wood Conversion

JOB:	NMCC
BUILDING:	Christie Complex
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	(67,425)
MECHANICAL KW Saved	(185)
Oil MMBtu Saved BEFORE oil heater	6940
Nat Gas MMBTU Saved	0
Annual Tons Wood Chip Usage	1047
ECM OPERATIONAL Savings $$$	
Safety factor/Allowance For Some Oil Use	85%

Baseline Oil Gallons =	72,056	Gallons/Yr
Oil Gallons Saved By Other ECM's	2,632	Gallons/Yr
Net Baseline Oil Gallons	69,424	Gallons/Yr
Convert Oil Gal/Yr to MMBTU/Yr Input	9,719	MMBTU/Yr Oil Input
Convert Oil MMBTU/Yr Input to MMBTU/Yr Output	**8,164**	MMBTU/Yr Oil Output
Convert MMBTU/Yr Output To MMBTU/Yr Wood Chip Input	11,184	MMBTU/Yr Wood Chip Input
Convert MMBTU/Yr Wood Chip Input To Tons/Yr	1,216	Tons/Yr Wood Chips
Baseline Natural Gas Therms =	0	Therms/Yr
Therms Saved By Other ECM's	0	Therms/Yr
Net Baseline Therms	0	Therms/Yr
Convert Therms/Yr to MMBTU/Yr Input	0	MMBTU/Yr Oil Input
Convert Gas MMBTU/Yr Input to MMBTU/Yr Output	**0**	MMBTU/Yr Oil Output
Convert MMBTU/Yr Output To MMBTU/Yr Wood Chip Input	0	MMBTU/Yr Wood Chip Input
Convert MMBTU/Yr Wood Chip Input To Tons/Yr	0	Tons/Yr Wood Chips

Annual Oil Savings =	**69,424**	Gallons/Yr
Annual Natural Gas Savings	**0**	Therms/Yr
Annual Wood Chip Usage =	**1,232**	Tons/Year

PIPE LOSS CALCULATIONS

Pipe Size	Lin. Ft.	Ins. Thickness	200 degree BTU Loss Per Ft./Per HR	Total BTU Loss Per Ft./Per HR W/Inslaton
1/2"	0.00	1/2"-1"	19.9287	0
3/4"	0.00	1/2"-1"	19.9287	0
1"	0.00	1/2"-1"	20	0
1-1/4"	0.00	1"	20	0
1-1/2"	0.00	1"	22	0
2"	0.00	1"-1-1/2"	19	0
2-1/2"	0.00	2"	25	0
3"	0.00	2"	33	0
3-1/2"	0.00	2"	47	0
4"	0.00	2"	66	0
5	0.00	3"	64	0
6	200.00	3"	87	17,493
8	0.00	3"	107	0
10	0.00	3"	132.858	0
TOTAL	200			17,493

45 deg. ambient temp. and 200 deg. pipe temp.

BTU'S/HR SAVED	HOURS RUN-TIME	SAFETY FACTOR	MMBtu
17,493	5712	10%	**109.9**

MOTOR LIST

Motor Function	HP Rating	Voltage	Phase	Use	Amps	KW Demand	KWH
Traveling auger	5	480	3	Intermittent	6.2	3.3	4761
Travel motor	0.33	480	3	Intermittent	0.8	0.2	331
Belt conveyor	2	480	3	Intermittent	2.6	1.4	1970
Metering auger	0.5	90	DC	Continuous	5.5	0.4	2005
Stoker auger	1	480	3	Continuous	1.83	0.7	4010
Overfire air	1.5	480	3	Continuous	2.3	1.0	5911
Underfire air #1	0.33	480	3	Continuous	0.8	0.2	1323
Underfire air #2	0.33	480	3	Continuous	0.8	0.2	1323
Underfire air #3	0.33	480	3	Continuous	0.8	0.2	1323
Underfire air #4	0.33	480	3	Continuous	0.8	0.2	1323
Induced draft fan	15	480	3	Continuous	17.5	7.2	41237
Air compressor	5	480	3	Intermittent	6.2	3.3	1904
Total Electric						18.5	67425

Notes:
Boiler run hours are based on 24 HRS/Day x 7 Days/Wk x 34 Wks/Yr = 5712
Intermittent equipment was given a 25% run time factor.
ID Fan was given a 60% load factor
Air compressor was given a 10% run time factor.

Manufacturer's Specifications:

	Count	HP	Hours	Speed	Efficiency		KWH	KW	
ID	1	24.975	8760	50%	96%		21,251	18.63135	75
Hydraulic	1	9.99	2920	100%	94%		23,150	7.45254	30
Metering	1	1.665	8760	50%	91%		1,495	1.24209	5
Elev	1	2.331	4380	100%	91%		8,370	1.738926	7
Feed	2	0.4995	8760	100%	88%		7,419	0.745254	1.5
Ash	1	0.999	4380	30%	88%		100	0.745254	3
Splitter	1	0.333	8760	100%	88%		2,473	0.248418	1
Receiving	1	0.999	4380	100%	88%		3,709	0.745254	3
		41.7915					67,967	31.54909	

OIL HEATER SAVINGS CALCULATIONS

JOB:	NMCC
BUILDING:	Christie Complex
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	(3,508)
MECHANICAL KW Saved	
GALLONS OIL SAVED WITH oil heater	2,638
ECM OPERATIONAL Savings $$$	

Location:	Christie Complex
Boiler:	Primary
Base Gallons consumed	58,203
Total gallons saved BEFORE heater	5,447
Net base gallons	52,756
Oil heater savings=5% of net gals	5.0%
Gallons Saved	2,638
kWh to Heat Oil @ 70 watt/gal	3508

BUILDING ROLL-UP

JOB: NMCC
BUILDING: Mailman Trades
DATE: 3/27/2009

Building Square Footage = **44,734**

BUILDING TOTALS		Lighting	Envelope Sealing	Night Setback	CO2 Controls	Ventilation	Motors Drives	Mailman Trades Roll-Up Total
	ANNUAL ENERGY SAVINGS							
20%	**Safety Factor Applied**	N	N	Y	N	N	N	
OUTPUT	Calculated MMBtu Saved		168	150	352	(972)		(301)
	Gauranteed MMBtu Saved		168	120	352	(972)		(331)
	MECHANICAL KWH Saved		0		0	0	(9,379)	(9,379)
	MECHANICAL KW Saved		0		0	0	(61)	(61)
	OIL GALLON Saved BEFORE oil heater		1,430	1,022	2,996	(8,262)		(2,815)
	OIL GALLON Saved by oil heater							0
	PROPANE GALLON Saved		0	0	0	0		0
	NATURAL GAS THERMS Saved		0	0	0	0		0
	Water & Sewer GALLONS Saved							0
	LIGHTING KWH Saved	35,592						35,592
	LIGHTING KW Saved	182						182
	MECHANICAL KWH Savings $$$		$0		$0	$0	($1,174)	($1,174)
	MECHANICAL KW Savings $$$		$0		$0	$0	$0	$0
	OIL Savings $$$		$4,289	$3,066	$8,987	($24,787)		($8,445)
	PROPANE Savings $$$		$0	$0	$0	$0		$0
	NATURAL GAS Savings $$$		$0	$0	$0	$0		$0
	WATER & SEWER Savings $$$							$0
	LIGHTING KWH Savings $$$	$4,456						$4,456
	LIGHTING KW Savings $$$	$0						$0
	TOTAL ENERGY SAVINGS $$$	$4,456	$4,289	$3,066	$8,987	($24,787)	($1,174)	**($5,163)**
	ANNUAL OPERATIONAL SAVINGS							
	ECM OPERATIONAL Savings $$$		$0	$0	$0	$0	$0	$0
	LIGHTING Operational Savings $$$	$0						$0
	TOTAL OPERATIONAL SAVINGS $$$	$0	$0	$0	$0	$0	$0	**$0**
	INCLUDE ECM ?	Y	Y	Y	Y	Y	Y	

% Dollars Saved Per Year			
% of Elect. $ Saved	0.0%	$ Elec (Baseline)	$0
% of Oil $ Saved	-20.3%	$ Oil (Baseline)	$41,561
% of LP Gas $ Saved	0.0%	$ LP Gas (Baseline)	$0
% of Natural Gas $ Saved	0.0%	$ Natural Gas (Baseline)	$0
% of Water/Sewer $ Saved	0.0%	$ Water/Sewer (Baseline)	$0
		$ Total (Baseline)	$41,561

% Units Saved Per Year			
% of Elect. KW Saved	#DIV/0!	Elec KW (Baseline)	0
% of Elect. KWH Saved	#DIV/0!	Elec KWH (Baseline)	0
% of Oil GALLONS Saved	-20.3%	Oil GALLONS (Baseline)	13,854
% of L.P. Gas GALLONS Saved	0.0%	L.P. Gas GALLONS (Baseline)	0
% of Natural Gas THERMS Saved	0.0%	Natural Gas THERMS (Baseline)	0
% of Water & Sewer GALLONS Saved	0.0%	Water & Sewer GALLONS (Baseline)	0

Square Foot Analysis	Pre Retrofit	Post Retrofit
Elec $/Sq Ft/Yr	$0.00	($0.07)
Oil $/Sq Ft/Yr	$0.93	$1.12
LP Gas $/Sq Ft/Yr	$0.00	$0.00
Natural Gas $/Sq Ft/Yr	$0.00	$0.00
Water & Sewer $/Sq Ft/Yr	$0.00	$0.00
Total Utility Cost $/Sq Ft/Yr	**$0.93**	**$1.04**
Elec KW/Sq Ft/Yr	0.0000	(0.0027)
Elec KWH/Sq Ft/Yr	0.00	(0.59)
Oil GALLONS/Sq Ft/Yr	0.31	0.37
LP Gas GALLONS/Sq Ft/Yr	0.00	0.00
Natural Gas THERMS/Sq Ft/Yr	0.00	0.00
Water & Sewer GALLONS/Sq Ft/Yr	0.00	0.00

UTILITY DATA SHEET

JOB:	NMCC
BUILDING:	Mailman Trades
DATE:	3/27/2009

Meter: Electric

The campus is m	kWh	kWh Delivery	kWh Supply	Total kWh Charges	$/kWh	Delivery kWh Rate	Supply kWh Rate	kW	Demand Charge	$/kW	Total Charges
07/25/07											
08/24/07											
09/26/07											
10/24/07	The campus is main metered only. See Christie Complex Utility Data for the electrical usage for the campus.										
11/27/07											
12/26/07											
01/24/08											
02/22/08											
03/24/08											
04/23/08											
05/22/08											
06/23/08											
2007-8 Total											

Utility: Oil

Meter: WES Oil #2

Date	HDD	Gal	Cost	$/Gal	Date	HDD	Gal	Cost	$/Gal
Jul-06	17	4,500.00	$9,683.15	2.15	Jul-07	70	0.00	$0.00	$0.00
Aug-06	159	0.00	$0.00	0.00	Aug-07	125	0.00	$0.00	$0.00
Sep-06	310	0.00	$0.00	0.00	Sep-07	297	0.00	$0.00	$0.00
Oct-06	670	499.90	$903.82	1.81	Oct-07	541	0.00	$0.00	$0.00
Nov-06	859	2,100.10	$3,864.97	1.84	Nov-07	1076	2,033.00	$5,974.99	$2.94
Dec-06	1284	1,200.20	$2,495.94	2.08	Dec-07	1601	4,012.00	$10,797.45	$2.69
Jan-07	1627	2,600.70	$5,408.42	2.08	Jan-08	1608	3,537.00	$9,736.33	$2.75
Feb-07	1560	3,477.10	$7,230.98	2.08	Feb-08	1479	2,547.00	$7,234.93	$2.84
Mar-07	1296	1,200.50	$2,496.56	2.08	Mar-08	1475	0.00	$0.00	$0.00
Apr-07	872	0.00	$0.00	0.00	Apr-08	755	0.00	$0.00	$0.00
May-07	478	0.00	$0.00	0.00	May-08	468	0.00	$0.00	$0.00
Jun-07	136	0.00	$0.00	0.00	Jun-08	149	0.00	$0.00	$0.00
Yearly Totals	9268	15578.50	$32,083.84	2.06	Yearly Totals	9644	12,129.0	$ 33,744	$2.78
2006-07 Total Gallons		15,579			2007-08 Total Gallons		12,129		
2004-06 Average	9,456	13,854	$32,914	$2.38					

2007-08 Lock-In $3.00 / Gallon

FUEL SHEET

Insert data in pink cells only!

JOB:	NMCC
BUILDING:	Mailman Trades
DATE:	3/27/2009
Base Yr:	07/06 to 06/08
	(Month/Year to Month/Year)

	Heating Fuel		Kitchen Fuel	
Fuel Oil	**Gas**	**Propane**	**Gas**	**Propane**
Y	N	N	N	N

Heating Fuel Adjustment

BASE YR DEG DAYS	AVE YEAR DEG DAYS	BASE YR GALLONS	AVERAGE EXPECTED GALLONS
9,456	9659	13,854	14,145

FUEL INFORMATION

	SQUARE FEET	BASE YR BOILER EFFIC	TYPE FUEL	BASE YR GAL	BASE YR COST	$ GAL	BTU/ UNIT	$/PER mmBTU
Adj Base Line	44,734	0.84	2	13,854	$41,561	$3.00	140,000	$25.51
Adjustment		0.84	2	13,854	$8,647	$0.62	140,000	$5.31
Base Year		0.84	2	13,854	$32,914	$2.38	140,000	$20.20

Note: Adjustment is to achieve current 2007 lock-in rate of $2.23/Gallon

ELECTRIC INFORMATION

	POWER METER-#	Annual KWH Used (KWH)	Annual KWH Cost ($)	Cost/ KWH ($)	BTU/ UNIT (BTU)	$/PER mmBTU ($)	Annual Demand (KW)	Annual KW Cost ($)	Cost/ KW ($)	SUNDRY CHARGES ($)	TOTAL ELEC Cost ($)
Adj Base Line	0	0	$0	$0.1252	3,413	$36.68	0	$0	$0.00	$0	$ -
Adjustment		0	$0	$0.1252	3,413	$36.68	0	$0	$0.00	$0.00	$0.00
Base Year	Total	0	$0	$0.0000	3,413	$0.00	0	$0	$0.00	$0	$ -
	Off Peak	0	$0	$0.00	3,413	$0.00	0	$0	$0.00	$0.00	
	Outside Lights	0	$0	$0.00	3,413	$0.00	0	$0	$0.00	$0.00	
	Main	0	$0	$0.0000	3,413	$0.00	0	$0	$0.00	$0	

Note: Campus is main metered only. See Christie Complex Utility and Fuel Sheets for data.

N/GAS INFORMATION

	Boiler Effic	N/GAS THERMS	N/GAS COST	N/GAS $/THRM	BTU/ UNIT	$/PER mmBTU
Adj Base Line	0.85	0	$0	$0.00	100,000	$0.00
Adjustment	0.85	0	$0	$0.00	100,000	
Base Year	0.85	0	$0	$0.00	100,000	$0.00

PROPANE INFORMATION

	Boiler Effic	PROPANE GALLONS	PROPANE COST	COST/ GALLON	BTU/ UNIT	$/PER mmBTU
Adj Base Line	0.85	0	$0	$1.57	91,000	$0.00
Adjustment	0.85	0	$0	$0.00		
Base Year	0.85	0	$0	$0.00	91,000	$0.00

mmBTU Conversion

Energy	Energy Abrev.	Units	BTUs	mmBTUs
Electricity	kwh	kWh	3,413	0.003413
Natural Gas	Therm	Therm	100,000	0.1
	CCF	CCF	103,000	0.103
	MCF	MCF	1,030,000	1.03
Energy	**Abrev.**	**Units**	**BTUs**	**mmBTUs**
#2 Fuel	2	GAL	140,000	0.14
#4 Fuel	4	GAL	145,600	0.1456
#6 Fuel	6	GAL	153,600	0.1536
Coal	Coal	TON	24,000,000	24
Nat Gas	Gas	THERM	100,000	0.1
Propane	Prop	GAL	91,000	0.091
Steam	Stm	LBS	1,150	0.00115
		kLBS	1,150,000	1.15

	High	*Low*	*Average*
#2 Fuel	*141800*	*137000*	*139400*
#4 Fuel	*148100*	*143100*	*145600*
#6 Fuel	*155900*	*151300*	*153600*

LIGHTING SUMMARY

JOB:	NMCC
BUILDING:	Mailman Trades
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	**Units Saved**
LIGHTING KWH Saved	**35,592**
ANNUAL LIGHTING KW Saved	**181.5**
LIGHTING OPERATIONAL Savings $$$	**$0**

	Building Totals	
Information provided by lighting subcontractor	Lighting Base kW/Month	47.5
	Lighting Base kWh/Year	81,131
	Lighting kW Saved/Month	20.2
	Months/Year kw Saved	9.0
	Lighting kW Saved/YEAR	**181.5**
Calculated by lighting vender	Lighting kWh Saved/Year	39,547
	Reduction of run hours %	10%
Calculated by us	Lighting kWh Saved/Year	**35,592**

Sealing, Weatherstripping, Caulking, Windows & Doors

JOB:	NMCC
BUILDING:	Mailman Trades
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	**Units Saved**
MECHANICAL KWH Saved	
MECHANICAL KW Saved	
MMBtu Saved BEFORE oil heater	**168**
ECM OPERATIONAL Savings $$$	

Infiltration

% CFM Used	75%
Existing CFM	895
MMBtu Savings	168

Insulation

Area	0
Existing 'U' Value	0.2
Proposed 'U' Value	0.0264
Difference	0.1736
Annual Degree Days	7,327
MMBtu Savings	**0**

Work to be completed	No. of Units	Perimeter (ft)	Crackage (in)	Conversion to feet		Product
Exit Doors	14	20	1/16	1/12	=	1.458333
RTV's	7	40	1/6	1/12	=	0.555556
Roof/ Wall Joint	1	381	1/6	1/12	=	5.291667
OH Door	6	288	1/6	1/12	=	4
Sweeps only (Doors)	-	0	1/16	1/12	=	0
					Total =	11.30556

Infiltration Savings

Total Crack Area (SF)	Average Wind Speed (MPH)	Average Wind Speed (FPM)	Windward Diversity (%)	Infiltration Savings (CFM)
A	B	C = B x 5280 / 60	D	E = A x C x D
11.31	1.8	158.4	50%	895.400

NIGHT SETBACK SAVINGS CALCULATIONS

JOB:	NMCC
BUILDING:	Christie Complex
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	0
MECHANICAL KW Saved	0
MMBtu Saved BEFORE oil heater	150
ECM OPERATIONAL Savings $$$	$0.00

									Zone Schedule	Existing		Proposed		Existing		Proposed		Fuel	Savings	Oil	Gas or Propane
Unit Designation	Zone / Area Served	Qty.	Wall Area	Floor/Roof Area	Coefficient of Heat Transfer, Wall 0.10-0.30	%, Windows	Coefficient of Heat Transfer, Windows 0.25-0.50	Below Heated Space	Coefficient of Heat Transfer, Roof 0.04-0.20	Occupied Temperature	Unoccupied Temperature	Occupied Temperature	Unoccupied Temperature	Occupied Begin	Occupied End	Occupied Begin	Occupied End	(O or P)	MMBtu/Yr/ unit	MMBtu/Yr 150	MMBtu/Yr 0
UV-1	Diesel Classroom	1	160	750	0.10	15%	0.35	N	0.08	67	66	67	62	8:00	12:00	8:00	16:00	O	9	9	0
UV-2+5	Automative Classrooms	2	160	750	0.10	15%	0.35	N	0.08	68	62	68	62	8:00	12:00	8:00	16:00	O	6	12	0
UV-3	Plumbing + Heating Classroom	1	160	750	0.10	15%	0.35	N	0.08	68	62	68	62	12:00	12:01	8:00	16:00	O	6	6	0
UV-4	Welding Classroom	1	1,900	750	0.10	15%	0.35	Y	0.08	68	62	68	62	12:00	12:01	8:00	16:00	O	18	18	0
UV-6+7	Res Const Classrooms	2	650	750	0.10	0%	0.35	N	0.08	68	62	68	62	8:00	16:00	8:00	16:00	O	0	0	0
HV-1	Diesel	1	3,500	6,500	0.10	5%	0.35	N	0.12	67	66	67	62	8:00	16:00	8:00	16:00	O	25	25	0
HV-2	Automative	1	4,500	8,000	0.10	5%	0.35	N	0.08	68	62	68	62	8:00	16:00	8:00	16:00	O	0	0	0
HV-3	Plumbing + Heating	1	3,500	4,500	0.10	0%	0.35	N	0.08	68	62	68	62	12:00	12:01	8:00	16:00	O	48	48	0
MAU-1	Welding	1	2,800	4,500	0.10	0%	0.35	Y	0.08	68	62	68	62	12:00	12:01	8:00	16:00	O	19	19	0
UHs	Res Const	2	2,800	10,000	0.10	5%	0.35	N	0.08	68	62	68	62	5:00	16:00	8:00	16:00	O	7	14	0

Notes:
1. Coefficients of Heat Transfer are estimated by age, condition and construction of the building.
2. Weather bin data has been used to calculate deltaTxhours. The formula to determine deltaTxhours uses the existing and proposed schedules to determine fractions of the weather bins to be used in the deltaTxhour calculation. See note 3.
3. The deltaTxhours generated by the bin analysis is used in the following formula to determine MMBTU/yr. U.Coefficient of Heat TransferxAreaxdeltaTxhours=BTU. The hours are over a years period and the result is converted to millions of BTUs.
4. Areas of floors, walls, windows and roofs are estimated from drawings and onsite inspections.

New Ventilation Energy Cost

JOB:	NMCC
BUILDING:	Mailman Trades
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	0
MECHANICAL KW Saved	0
MMBtu Saved BEFORE oil heater	(972)
ECM OPERATIONAL Savings $$$	$0.00

Equipment Schedule

Unit Designation	Zone / Area Served	Qty	Fan (N or E)	HP/ Unit	Fan kW Reading	Existing CFM OA/Unit	Proposed CFM OA/Unit	A/C (Y or N or E)	A/C Peak kW	% Eff. ERVs	Occupied Begin	Proposed Occupied End	Occupied Temp	Proposed Hrs/Yr	Fuel (O or P)	MMBtu/Yr/ unit	Oil MMBtu/Yr	Gas or Propane MMBtu/Yr	kW Usage/ Yr	KWH Usage/Yr
																	972	0	0	0
UV-1	Diesel Classroom	1	E	0.25	0.15	0	225	N	0.00	0%	8:00	16:00	67.0	1,360	O	21	21	0	0	0
UV-2+5	Automative Classrooms	2	E	0.25	0.15	0	225	N	0.00	0%	8:00	16:00	68.0	1,360	O	21	42	0	0	0
UV-3	Plumbing + Heating Classroom	1	E	0.25	0.15	0	225	N	0.00	0%	8:00	16:00	68.0	1,360	O	21	21	0	0	0
UV-4	Welding Classroom	1	E	0.25	0.15	0	225	N	0.00	0%	8:00	16:00	68.0	1,360	O	21	21	0	0	0
UV-6+7	Res Const Classrooms	2	E	0.25	0.15	0	225	N	0.00	0%	8:00	16:00	68.0	1,360	O	21	42	0	0	0
HV-1	Diesel	1	E	5.00	2.96	975	1,950	N	0.00	0%	8:00	16:00	67.0	1,360	O	89	89	0	0	0
HV-2	Automative	1	E	5.00	3.42	1,200	2,400	N	0.00	0%	8:00	16:00	68.0	1,360	O	113	113	0	0	0
HV-3	Plumbing + Heating	1	E	4.00	2.46	450	1,350	N	0.00	0%	8:00	16:00	68.0	1,360	O	127	127	0	0	0
HV-4	Welding	1	E	10.00	6.14	450	2,250	N	0.00	0%	8:00	16:00	68.0	1,360	O	212	212	0	0	0
HV-5	Res Const	2	E	0.05	0.03	0	1,500	N	0.00	0%	8:00	16:00	68.0	1,360	O	141	283	0	0	0

Notes:
1. Ventilation run hours are based on the new proposed schedules. They are based on a 34 week school heating cycle per year.
2. Weather bin data has been used to calculate deltaTxhours. The formula to determine deltaTxhours uses the existing and proposed schedules to determine fractions of the weather bins to be used in the deltaTxhour calculation. See note 3.
3. The deltaTxhours generated by the bin analysis is used in the following formulat to determine MMBTU/yr. CFMx1.08xdeltaTxhours=BTU. The hours are over a years period and the result is converted to millions of BTUs. A delta is calculated between existing and proposed cfm.
4. There are 193 M-F calendar days during the school year, inclusive of holidays.
5. If the equipment is existing and the fan is greater than 3Hp, kW readings are instantaneous during site visit and are assumed to be representative of the systems operation including post project implementation. If the equipment is existing and the fan is less than 3Hp, kW readings are calculated based on an assumed 70% loading and 85% efficiency. If the equipment is new, kW readings are calculated based on an assumed 70% loading and 85% efficiency.
6. Cooling COP is assumed to be 1.

VENTILATION CONTROLS

JOB:	NMCC
BUILDING:	Mailman Trades
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	0
MECHANICAL KW Saved	0
MMBtu Saved BEFORE oil heater	352
ECM OPERATIONAL Savings $$$	$0.00

% Run Hours	% Outside Air
40%	100%
20%	75%
20%	50%
20%	25%
70.0%	Weighted average % Ventilation

Equipment Schedule

Unit Designation	Zone / Area Served	Qty.	CFM OA/Unit	% Eff. ERVs	Weighted Average Percent CFM OA	Occupied Begin	Proposed Occupied End	Occupied Temp	Proposed Hrs/Yr	Fuel (O or P)	MMBtu/Yr	Oil MMBtu/Yr	Gas or Propane MMBtu/Yr
												352	0
UV-1	Diesel Classroom	1	225	0%	70%	8:00	16:00	67.0	1,360	O	6	6	0
UV-2+5	Automative Classrooms	2	225	0%	70%	8:00	16:00	68.0	1,360	O	6	13	0
UV-3	Plumbing + Heating Classroom	1	225	0%	70%	8:00	16:00	68.0	1,360	O	6	6	0
UV-4	Welding Classroom	1	225	0%	70%	8:00	16:00	68.0	1,360	O	6	6	0
UV-6+7	Res Const Classrooms	2	225	0%	70%	8:00	16:00	68.0	1,360	O	6	13	0
HV-1	Diesel	1	1,950	0%	70%	8:00	16:00	67.0	1,360	O	54	54	0
HV-2	Automative	1	2,400	0%	70%	8:00	16:00	68.0	1,360	O	68	68	0
HV-3	Plumbing + Heating	1	1,350	0%	70%	8:00	16:00	68.0	1,360	O	38	38	0
HV-4	Welding	1	2,250	0%	70%	8:00	16:00	68.0	1,360	O	64	64	0
HV-5	Res Const	2	1,500	0%	70%	8:00	16:00	68.0	1,360	O	42	85	0

Notes:

1. Ventilation run hours are based on the new proposed schedules. They are based on a 34 week school heating cycle per year.
2. Weather bin data has been used to calculate deltaTxhours. The formula to determine deltaTxhours uses the proposed schedules to determine fractions of the weather bins to be used in the deltaTxhour calculation. See note 3.
3. The deltaTxhours generated by the bin analysis is used in the following formula to determine MMBTU/yr. %OAxCFMx1.08xdeltaTxhours=BTU. The hours are over a years period and the result is converted to millions of BTUs.

ENERGY EFFICIENT MOTOR & VSD SAVINGS CALCULATIONS

JOB:	NMCC
BUILDING:	Mailman Trades
DATE:	03/27/09

ANNUAL ENERGY SAVINGS	**Units Saved**
MECHANICAL KWH Saved	**(9,379)**
MECHANICAL KW Saved	**(61.3)**
ECM OPERATIONAL Savings $$$	

MOTOR CALCULATIONS

LOCATION	Welding Dust Collecto
MOTOR EXISTING CONDITION	
EQPT TYPE	**Fan**
EQPT#	**DC-1**
H.P.	**0.00**
ACT.H.P.	**?**
RATED AMPS.	**?**
AMPS 1	**?**
AMPS 2	**?**
KW	**?**
KVAR	**?**
KVA	**?**
PF %	**?**
VOLTS	**230**

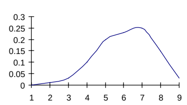
ASSUMPTIONS
1. kW was measured for one pump and applied to the others.
2. Only one pump runs at a time.

0.746	
Existing	Fan
HP	**0.00**
Run Hours	**5,712**
Load Factor	**0.84**
Motor Eff.	**0.92**
kWh	0
KW	0.0
Proposed	
HP	**15.0**
Run Hours	**1,020**
Load Factor	0.84
Motor Eff.	0.920
kWh	10,421
KW	10.2

Monthly kw X six months = annual kw

Motor kWh Saved	(10421)
Monthly Motor KW saved	(10.2)
Annual kw saved	(61.3)

SPEED DRIVE CALCULATIONS



DUTY CYCLE X	
0.2	0
0.3	0.01
0.4	0.03
0.5	0.1
0.6	0.2
0.7	0.23
0.8	0.25
0.9	0.15
1	0.03
1.1	1
	1

KWH (new motor	
0.2	0
0.3	58
0.4	178
0.5	542
0.6	959
0.7	887
0.8	677
0.9	219
1	13

KWH USED WITH SPEED DRIVE =	10,421
KWH USED W/O SPEED DRIVE =	10,421
VSD kWh SAVINGS =	**0**
VSD to be installed? Y or N:	**N**

This is the power the motor would use at part loads with NO speed drive

MOTOR INPUT X	
0.2	0.57
0.3	0.67
0.4	0.71
0.5	0.72
0.6	0.75
0.7	0.8
0.8	0.88
0.9	0.99
1	1.2

This is the power the motor would use at part loads with a VFD.

VFD INPUT X	
0.2	0.09
0.3	0.11
0.4	0.14
0.5	0.2
0.6	0.29
0.7	0.43
0.8	0.62
0.9	0.85
1	1.16
	3.89

Standard duty cycle distribution

0
0.01
0.03
0.1
0.2
0.23
0.25
0.15
0.03
1
0
0.05
0.16
0.23
0.23
0.2
0.09
0.03
0.01

OIL HEATER SAVINGS CALCULATIONS

JOB:	NMCC
BUILDING:	Mailman Trades
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	(1,108)
MECHANICAL KW Saved	
GALLONS OIL SAVED WITH oil heater	833
ECM OPERATIONAL Savings $$$	

Location: Boiler:	Mailman Trades Primary
Base Gallons consumed	13,854
Total gallons saved BEFORE heater	-2,815
Net base gallons	16,669
Oil heater savings=5% of net gals	5.0%
Gallons Saved	833
kWh to Heat Oil @ 70 watt/gal	1108

BUILDING ROLL-UP

JOB: NMCC
BUILDING: Commons and Residential Buildings
DATE: 3/27/2009

Building Square Footage = **68,894**

BUILDING TOTALS		ECMs Lighting	Envelope Sealing	Night Setback	CO2 Controls	Ventilation	Oil Heaters	Commons and Residential Roll-Up Total
	ANNUAL ENERGY SAVINGS							
20%	**Safety Factor Applied**	N	N	Y	N	N	N	
OUTPUT	Calculated MMBtu Saved		106	38	291	(99)		336
	Gauranteed MMBtu Saved		106	31	291	(99)		329
	MECHANICAL KWH Saved		0		0	0	(2,025)	(2,025)
	MECHANICAL KW Saved		0		0	0	0	0
	OIL GALLON Saved BEFORE oil heater		912	264	2,505	(852)		2,829
	OIL GALLON Saved by oil heater						1,522	1,522
	PROPANE GALLON Saved		0	0	0	0		0
	NATURAL GAS THERMS Saved		0	0	0	0		0
	Water & Sewer GALLONS Saved							0
	LIGHTING KWH Saved	8,767						8,767
	LIGHTING KW Saved	20						20
	MECHANICAL KWH Savings $$$		$0		$0	$0	($253)	($253)
	MECHANICAL KW Savings $$$		$0		$0	$0	$0	$0
	OIL Savings $$$		$2,736	$792	$7,515	($2,556)	$4,567	$13,054
	PROPANE Savings $$$		$0	$0	$0	$0		$0
	NATURAL GAS Savings $$$		$0	$0	$0	$0		$0
	WATER & SEWER Savings $$$							$0
	LIGHTING KWH Savings $$$	$1,098						$1,098
	LIGHTING KW Savings $$$	$0						$0
	TOTAL ENERGY SAVINGS $$$	$1,098	$2,736	$792	$7,515	($2,556)	$4,313	**$13,898**
	ANNUAL OPERATIONAL SAVINGS							
	ECM OPERATIONAL Savings $$$		$0	$0	$0	$0	$0	$0
	LIGHTING Operational Savings $$$	$0						$0
	TOTAL OPERATIONAL SAVINGS $$$	$0	$0	$0	$0	$0	$0	**$0**
	INCLUDE ECM ?	Y	Y	Y	Y	Y	Y	

% Dollars Saved Per Year			
% of Elect. $ Saved	0.0%	$ Elec (Baseline)	$0
% of Oil $ Saved	9.5%	$ Oil (Baseline)	$137,309
% of LP Gas $ Saved	0.0%	$ LP Gas (Baseline)	$0
% of Natural Gas $ Saved	0.0%	$ Natural Gas (Baseline)	$0
% of Water/Sewer $ Saved	0.0%	$ Water/Sewer (Baseline)	$0
		$ Total (Baseline)	$137,309

% Units Saved Per Year			
% of Elect. KW Saved	#DIV/0!	Elec KW (Baseline)	0
% of Elect. KWH Saved	#DIV/0!	Elec KWH (Baseline)	0
% of Oil GALLONS Saved	9.5%	Oil GALLONS (Baseline)	45,770
% of L.P. Gas GALLONS Saved	0.0%	L.P. Gas GALLONS (Baseline)	0
% of Natural Gas THERMS Saved	0.0%	Natural Gas THERMS (Baseline)	0
% of Water & Sewer GALLONS Saved	0.0%	Water & Sewer GALLONS (Baseline)	0

Square Foot Analysis	Pre Retrofit	Post Retrofit
Elec $/Sq Ft/Yr	$0.00	($0.01)
Oil $/Sq Ft/Yr	$1.99	$1.80
LP Gas $/Sq Ft/Yr	$0.00	$0.00
Natural Gas $/Sq Ft/Yr	$0.00	$0.00
Water & Sewer $/Sq Ft/Yr	$0.00	$0.00
Total Utility Cost $/Sq Ft/Yr	**$1.99**	**$1.79**
Elec KW/Sq Ft/Yr	0.0000	(0.0003)
Elec KWH/Sq Ft/Yr	0.00	(0.10)
Oil GALLONS/Sq Ft/Yr	0.66	0.60
LP Gas GALLONS/Sq Ft/Yr	0.00	0.00
Natural Gas THERMS/Sq Ft/Yr	0.00	0.00
Water & Sewer GALLONS/Sq Ft/Yr	0.00	0.00

UTILITY DATA SHEET

JOB:	NMCC
BUILDING:	Commons and Residential Buildin
DATE:	3/27/2009

Meter: Electric

The campus is mair	kWh	kWh Delivery	kWh Supply	Total kWh Charges	$/kWh	Delivery kWh Rate	Supply kWh Rate	kW	Demand Charge	$/kW	Total Charges
07/25/07											
08/24/07											
09/26/07											
10/24/07											
11/27/07											
12/26/07											
01/24/08											
02/22/08											
03/24/08											
04/23/08											
05/22/08											
06/23/08											
2007-8 Total											

The campus is main metered only. See Christie Complex Utility Data for the electrical usage for the campus.

Utility: Oil

Meter: WES Oil #2

Date	HDD	Gal	Cost	$/Gal	Date	HDD	Gal	Cost	$/Gal
Jul-06	17	10,371.00	$22,397.95	2.16	Jul-07	70	0.00	$0.00	$0.00
Aug-06	159	0.00	$0.00	0.00	Aug-07	125	6,191.90	$13,733.10	$2.22
Sep-06	310	2,027.00	$3,866.72	1.91	Sep-07	297	0.00	$0.00	$0.00
Oct-06	670	1,600.10	$2,892.98	1.81	Oct-07	541	1,525.00	$3,882.19	$2.55
Nov-06	859	6,680.40	$12,323.07	1.84	Nov-07	1076	4,283.40	$12,201.47	$2.85
Dec-06	1284	3,507.20	$7,281.09	2.08	Dec-07	1601	11,747.20	$32,191.90	$2.74
Jan-07	1627	7,973.90	$16,582.58	2.08	Jan-08	1608	10,661.50	$29,955.65	$2.81
Feb-07	1560	6,343.80	$13,192.58	2.08	Feb-08	1479	8,074.20	$22,624.54	$2.80
Mar-07	1296	7,890.90	$16,409.91	2.08	Mar-08	1475	1,450.00	$4,884.44	$3.37
Apr-07	872	611.80	$1,304.85	2.13	Apr-08	755	300.00	$1,091.34	$3.64
May-07	478	0.00	$0.00	0.00	May-08	468	200.00	$697.02	$3.49
Jun-07	136	0.00	$0.00	0.00	Jun-08	149	100.00	$416.37	$4.16
Yearly Totals	9268	47006.10	$96,251.73	2.05	Yearly Totals	9644	44,533.2	$121,678.02	$2.73
2006-07 Total Gallons		**47,006**			**2007-08 Total Gallons**		**44,533**		
2004-06 Average To	**9,456**	**45,770**	**$43,586**	**$0.95**					

2007-08 Lock-In r $3.00 / Gallon

FUEL SHEET

Insert data in pink cells only!

JOB:	NMCC
BUILDING:	Commons and Residential Buildings
DATE:	3/27/2009
Base Yr:	07/06 to 06/08
	(Month/Year to Month/Year)

	Heating Fuel		Kitchen Fuel	
Fuel Oil	**Gas**	**Propane**	**Gas**	**Propane**
Y	N	n	n	Y

Heating Fuel Adjustment			
BASE YR DEG DAYS	AVE YEAR DEG DAYS	BASE YR GALLONS	AVERAGE EXPECTED GALLONS
9,456	9659	45,770	46,734

FUEL INFORMATION

	SQUARE FEET	BASE YR BOILER EFFIC	TYPE FUEL	BASE YR GAL	BASE YR COST	$ GAL	BTU/ UNIT	$/PER mmBTU
Adj Base Line	68,894	0.83	2	45,770	$137,309	$3.00	140,000	$25.82
Adjustment		0.83	2	45,770	$93,723	$2.05	140,000	$17.62
Base Year		0.83	2	45,770	$43,586	$0.95	140,000	$8.20

ELECTRIC INFORMATION

	POWER METER-#	Annual KWH Used (KWH)	Annual KWH Cost ($)	Cost/ KWH ($)	BTU/ UNIT (BTU)	$/PER mmBTU ($)	Annual Demand (KW)	Annual KW Cost ($)	Cost/ KW ($)	SUNDRY CHARGES ($)	TOTAL ELEC Cost ($)
Adj Base Line	0	0	$0	$0.1252	3,413	$36.68	0	$0	$0.00	$0	$ -
Adjustment		0	$0	$0.1252	3,413	$36.68	0	$0	$0.00	$0.00	$0.00
Base Year	**Total**	0	$0	$0.0000	3,413	$0.00	0	$0	$0.00	$0	$ -
	Off Peak	0	$0	$0.00	3,413	$0.00	0	$0	$0.00	$0.00	
	Outside Lights	0	$0	$0.00	3,413	$0.00	0	$0	$0.00	$0.00	
	Main	0	$0	$0.00	3,413	$0.00	0	$0	$0.00	$0	

Note: Adjustment is to achieve current 10-01-08 rate

N/GAS INFORMATION

	Boiler Effic	N/GAS THERMS	N/GAS COST	N/GAS $/THRM	BTU/ UNIT	$/PER mmBTU
Adj Base Line	0.85	0	$0	$0.00	100,000	$0.00
Adjustment	0.85	0	$0	$0.00	100,000	
Base Year	0.85	0	$0	$0.00	100,000	$0.00

PROPANE INFORMATION

	Boiler Effic	PROPANE GALLONS	PROPANE COST	COST/ GALLON	BTU/ UNIT	$/PER mmBTU
Adj Base Line	0.85	0	$0	$1.57	91,000	$0.00
Adjustment	0.85	0	$0	$0.00		
Base Year	0.85	0	$0	$0.00	91,000	$0.00

mmBTU Conversion				
Energy	**Energy Abrev.**	**Units**	**BTUs**	**mmBTUs**
Electricity	kwh	kWh	3,413	0.003413
Natural Gas	Therm	Therm	100,000	0.1
	CCF	CCF	103,000	0.103
	MCF	MCF	1,030,000	1.03
Energy	**Abrev.**	**Units**	**BTUs**	**mmBTUs**
#2 Fuel	2	GAL	140,000	0.14
#4 Fuel	4	GAL	145,600	0.1456
#6 Fuel	6	GAL	153,600	0.1536
Coal	Coal	TON	24,000,000	24
Nat Gas	Gas	THERM	100,000	0.1
Propane	Prop	GAL	91,000	0.091
Steam	Stm	LBS	1,150	0.00115
		kLBS	1,150,000	1.15

	High	*Low*	*Average*
#2 Fuel	*141800*	*137000*	*139400*
#4 Fuel	*148100*	*143100*	*145600*
#6 Fuel	*155900*	*151300*	*153600*

LIGHTING SUMMARY

JOB:	NMCC
BUILDING:	Commons and Residential Buildings
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	**Units Saved**
LIGHTING KWH Saved	**8,767**
ANNUAL LIGHTING KW Saved	**19.9**
LIGHTING OPERATIONAL Savings $$$	**$0**

	Building Totals	
Information provided by lighting subcontractor	Lighting Base kW/Month	4.2
	Lighting Base kWh/Year	17,137
	Lighting kW Saved/Month	2.2
	Months/Year kw Saved	9.0
	Lighting kW Saved/YEAR	**19.9**
Calculated by lighting vender	Lighting kWh Saved/Year	9,742
	Reduction of run hours %	10%
Calculated by us	Lighting kWh Saved/Year	**8,767**

Sealing, Weatherstripping, Caulking, Windows & Doors

JOB:	NMCC
BUILDING:	Commons and Residential Buildings
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	
MECHANICAL KW Saved	
MMBtu Saved BEFORE oil heater	106
ECM OPERATIONAL Savings $$$	

Infiltration

% CFM Used	75%
Existing CFM	564
MMBtu Savings	106

Insulation

Area	0
Existing 'U' Value	0.2
Proposed 'U' Value	0.0264
Difference	0.1736
Annual Degree Days	7,327
MMBtu Savings	**0**

Work to be completed	No. of Units	Perimeter (ft)	Crackage (in)	Conversion to feet		Product
Exit Doors	33	20	1/16	1/12	=	3.4375
RTV's	0	0	1/6	1/12	=	0
Roof/ Wall Joint	1	354	1/8	1/12	=	3.6875
OH Door	-	0	1/6	1/12	=	0
Sweeps only (Doors)	-	0	1/16	1/12	=	0
					Total =	7.125

Infiltration Savings

Total Crack Area (SF)	Average Wind Speed (MPH)	Average Wind Speed (FPM)	Windward Diversity (%)	Infiltration Savings (CFM)
A	B	C = B x 5280 / 60	D	E = A x C x D
7.13	1.8	158.4	50%	564.300

NIGHT SETBACK SAVINGS CALCULATIONS

JOB:	NMCC
BUILDING:	Commons and Residential Buildi
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	0
MECHANICAL KW Saved	0
MMBtu Saved BEFORE oil heater	38
ECM OPERATIONAL Savings $$$	$0.00

Unit Designation	Zone / Area Served	Qty.	Wall Area	Floor/Roof Area	Coefficient of Heat Transfer, Wall 0.10-0.30	%, Windows	Coefficient of Heat Transfer, Windows 0.25-0.50	Below Heated Space	Coefficient of Heat Transfer, Roof 0.04-0.20	Zone Schedule: Existing Occupied Temperature	Existing Unoccupied Temperature	Proposed Occupied Temperature	Proposed Unoccupied Temperature	Existing Occupied Begin	Existing Occupied End	Proposed Occupied Begin	Proposed Occupied End	Fuel (O or P)	Savings MMBtu/Yr/unit	Oil MMBtu/Yr 38	Gas or Propane MMBtu/Yr 0
HV-1	Andrews Common Areas	1	0	3,500	0.20	0%	0.35	N	0.12	70	55	70	55	0:01	23:59	0:01	23:59	O	0	0	0
HV-2	Commons Dining	1	2,300	9,000	0.20	50%	0.35	N	0.12	70	60	70	60	3:00	21:00	10:00	21:00	O	39	39	0
UV-1	Commons Conference	1	1,200	2,500	0.20	35%	0.35	N	0.12	72	60	72	60	12:00	12:01	12:00	12:30	O	(1)	(1)	0
UV-2	Snow Conference	1	900	1,000	0.20	15%	0.35	Y	0.12	65	60	65	60	12:00	12:01	12:00	12:30	O	(0)	(0)	0
FT-1	Andrews Hall	1	5,500	9,000	0.20	30%	0.35	N	0.12	68	55	68	55	0:01	23:59	0:01	23:59	O	0	0	0
FT-2	Aroostook Hall	1	6,000	9,000	0.20	30%	0.35	N	0.12	68	55	68	55	0:01	23:59	0:01	23:59	O	0	0	0
FT-3	Penobscot Hall	1	9,500	9,000	0.20	30%	0.35	N	0.12	68	55	68	55	0:01	23:59	0:01	23:59	O	0	0	0
FT-4	Snow Hall	1	7,000	13,000	0.20	30%	0.35	N	0.12	68	55	68	55	0:01	23:59	0:01	23:59	O	0	0	0
FT-5	Washington Hall	1	8,000	9,000	0.20	30%	0.35	N	0.20	68	55	68	55	0:01	23:59	0:01	23:59	O	0	0	0

Notes:
1. Coefficients of Heat Transfer are estimated by age, condition and construction of the building.
2. Weather bin data has been used to calculate deltaTxhours. The formula to determine deltaTxhours uses the existing and proposed schedules to determine fractions of the weather bins to be used in the deltaTxhour calculation. See note 3.
3. The deltaTxhours generated by the bin analysis is used in the following formula to determine MMBTU/yr. U.Coefficient of Heat TransferxAreaxdeltaTxhours=BTU. The hours are over a years period and the result is converted to millions of BTUs.
4. Areas of floors, walls, windows and roofs are estimated from drawings and onsite inspections.

New Ventilation Energy Cost

JOB:	NMCC
BUILDING:	Commons and Residential Buildings
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	0
MECHANICAL KW Saved	0
MMBtu Saved BEFORE oil heater	(99)
ECM OPERATIONAL Savings $$$	$0.00

Equipment Schedule

Unit Designation	Zone / Area Served	Qty.	Fan (N or E)	HP/ Unit	Fan kW Reading	Existing CFM OA/Unit	Proposed CFM OA/Unit	A/C (Y or N or E)	A/C Peak kW	% Eff. ERVs	Occupied Begin	Proposed Occupied End	Occupied Temp	Proposed Hrs/Yr	Fuel (O or P)	MMBtu/Yr/ unit	Oil MMBtu/Yr	Gas or Propane MMBtu/Yr	kW Usage/ Yr	KWH Usage/Yr
																	99	0	0	0
HV-1	Andrews Common Areas	0	E	3.00	1.16	300	900	N	0.00	0%	0:01	23:59	70.0	4,074	O	194	0	0	0	0
HV-2	Commons Dining	1	E	3.00	1.63	500	1,500	N	0.00	0%	10:00	21:00	70.0	1,870	O	94	94	0	0	0
UV-1	Commons Conference	1	E	0.25	0.15	150	450	N	0.00	0%	12:00	12:30	72.0	85	O	3	3	0	0	0
UV-2	Snow Conference	1	E	0.25	0.15	50	300	N	0.00	0%	12:00	12:30	65.0	85	O	2	2	0	0	0
HRU-1	Andrews Hall	1	E	0.00	0.00	450	900	N	0.00	50%	0:01	23:59	68.0	4,074	O	0	0	0	0	0
HRU-2	Aroostook Hall	1	E	0.00	0.00	450	900	N	0.00	50%	0:01	23:59	68.0	4,074	O	0	0	0	0	0
HRU-3	Penobscot Hall	1	E	0.00	0.00	450	900	N	0.00	50%	0:01	23:59	68.0	4,074	O	0	0	0	0	0
HRU-4	Snow Hall	1	E	0.00	0.00	650	1,300	N	0.00	50%	0:01	23:59	68.0	4,074	O	0	0	0	0	0
HRU-5	Washington Hall	1	E	0.00	0.00	450	900	N	0.00	50%	0:01	23:59	68.0	4,074	O	0	0	0	0	0

Notes:
1. Ventilation run hours are based on the new proposed schedules. They are based on a 34 week school heating cycle per year.
2. Weather bin data has been used to calculate deltaTxhours. The formula to determine deltaTxhours uses the existing and proposed schedules to determine fractions of the weather bins to be used in the deltaTxhour calculation. See note 3.
3. The deltaTxhours generated by the bin analysis is used in the following formulat to determine MMBTU/yr. CFMx1.08xdeltaTxhours=BTU. The hours are over a years period and the result is converted to millions of BTUs. A delta is calculated between existing and proposed
4. There are 193 M-F calendar days during the school year, inclusive of holidays.
5. If the equipment is existing and the fan is greater than 3Hp, kW readings are instantaneous during site visit and are assumed to be representative of the systems operation including post project implementation. If the equipment is existing and the fan is less than 3Hp, kW readings are calculated based on an assumed 70% loading and 85% efficiency. If the equipment is new, kW readings are calculated based on an assumed 70% loading and 85% efficiency.
6. Cooling COP is assumed to be 1.

VENTILATION CONTROLS

JOB:	NMCC	
BUILDING:	Commons and Residential Buildings	
DATE:	3/27/2009	

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	0
MECHANICAL KW Saved	0
MMBtu Saved BEFORE oil heater	291
ECM OPERATIONAL Savings $$$	$0.00

% Run Hours	% Outside Air
40%	100%
20%	75%
20%	50%
20%	25%
70.0%	Weighted average % Ventilation

Equipment Schedule

Unit Designation	Zone / Area Served	Qty.	CFM OA/Unit	% Eff. ERVs	Weighted Average Percent CFM OA	Occupied Begin	Proposed Occupied End	Occupied Temp	Proposed Hrs/Yr	Fuel (O or P)	MMBtu/Yr	Oil MMBtu/Yr	Gas or Propane MMBtu/Yr
												291	0
HV-1	Andrews Common Areas	0	900	0%	70%	0:01	23:59	70.0	4,074	O	87	0	0
HV-2	Commons Dining	1	1,500	0%	70%	10:00	21:00	70.0	1,870	O	64	64	0
UV-1	Commons Conference	1	450	0%	70%	12:00	12:30	72.0	85	O	1	1	0
UV-2	Snow Conference	1	300	0%	70%	12:00	12:30	65.0	85	O	0	0	0
HRU-1	Andrews Hall	1	900	50%	70%	0:01	23:59	68.0	4,074	O	41	41	0
HRU-2	Aroostook Hall	1	900	50%	70%	0:01	23:59	68.0	4,074	O	41	41	0
HRU-3	Penobscot Hall	1	900	50%	70%	0:01	23:59	68.0	4,074	O	41	41	0
HRU-4	Snow Hall	1	1,300	50%	70%	0:01	23:59	68.0	4,074	O	60	60	0
HRU-5	Washington Hall	1	900	50%	70%	0:01	23:59	68.0	4,074	O	41	41	0

Notes:
1. Ventilation run hours are based on the new proposed schedules. They are based on a 34 week school heating cycle per year.
2. Weather bin data has been used to calculate deltaTxhours. The formula to determine deltaTxhours uses the proposed schedules to determine fractions of the weather bins to be used in the deltaTxhour calculation. See note 3.
3. The deltaTxhours generated by the bin analysis is used in the following formula to determine MMBTU/yr. %OAxCFMx1.08xdeltaTxhours=BTU. The hours are over a years period and the result is converted to millions of BTUs.

OIL HEATER SAVINGS CALCULATIONS

JOB:	NMCC
BUILDING:	Commons and Residential Buildings
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	(2,025)
MECHANICAL KW Saved	
GALLONS OIL SAVED WITH oil heater	1,522
ECM OPERATIONAL Savings $$$	

Location: Boiler:	Commons and Residential Buildings Primary
Base Gallons consumed	**33,273**
Total gallons saved BEFORE heater	2,829
Net base gallons	30,444
Oil heater savings=5% of net gals	**5.0%**
Gallons Saved	1,522
kWh to Heat Oil @ 70 watt/gal	2025

BUILDING ROLL-UP

JOB:	NMCC
BUILDING:	Shops
DATE:	3/27/2009

Building Square Footage =	15,242

BUILDING TOTALS	ECMs Lighting	Envelope Sealing	Night Setback	CO2 Controls	Ventilation	Motors Drives	Oil Heaters	Shops Roll-Up Total
ANNUAL ENERGY SAVINGS								
20% Safety Factor Applied	N	N	Y	N	N	N	N	
OUTPUT Calculated MMBtu Saved		39	27	50	(61)			55
Gauranteed MMBtu Saved		39	22	50	(61)			49
MECHANICAL KWH Saved		0		0	0	(3,502)	(494)	(3,996)
MECHANICAL KW Saved		0		0	0	(4)	0	(4)
OIL GALLON Saved BEFORE oil heater		332	188	426	(522)			425
OIL GALLON Saved by oil heater							372	372
PROPANE GALLON Saved		0	0	0	0			0
NATURAL GAS THERMS Saved		0	0	0	0			0
Water & Sewer GALLONS Saved								0
LIGHTING KWH Saved	0							0
LIGHTING KW Saved	0							0
MECHANICAL KWH Savings $$$		$0		$0	$0	($438)	($62)	($500)
MECHANICAL KW Savings $$$		$0		$0	$0	$0	$0	$0
OIL Savings $$$		$997	$565	$1,278	($1,567)		$1,115	$2,388
PROPANE Savings $$$		$0	$0	$0	$0			$0
NATURAL GAS Savings $$$		$0	$0	$0	$0			$0
WATER & SEWER Savings $$$								$0
LIGHTING KWH Savings $$$	$0							$0
LIGHTING KW Savings $$$	$0							$0
TOTAL ENERGY SAVINGS $$$	$0	$997	$565	$1,278	($1,567)	($438)	$1,053	**$1,888**
ANNUAL OPERATIONAL SAVINGS								
ECM OPERATIONAL Savings $$$		$0	$0	$0	$0	$0	$0	$0
LIGHTING Operational Savings $$$	$0							$0
TOTAL OPERATIONAL SAVINGS $$$	$0	$0	$0	$0	$0	$0	$0	**$0**
INCLUDE ECM ?	N	Y	Y	Y	Y	Y	Y	

% Dollars Saved Per Year			
% of Elect. $ Saved	0.0%	$ Elec (Baseline)	$0
% of Oil $ Saved	10.1%	$ Oil (Baseline)	$23,572
% of LP Gas $ Saved	0.0%	$ LP Gas (Baseline)	$0
% of Natural Gas $ Saved	0.0%	$ Natural Gas (Baseline)	$0
% of Water/Sewer $ Saved	0.0%	$ Water/Sewer (Baseline)	$0
		$ Total (Baseline)	$23,572

% Units Saved Per Year			
% of Elect. KW Saved	#DIV/0!	Elec KW (Baseline)	0
% of Elect. KWH Saved	#DIV/0!	Elec KWH (Baseline)	0
% of Oil GALLONS Saved	10.1%	Oil GALLONS (Baseline)	7,857
% of L.P. Gas GALLONS Saved	0.0%	L.P. Gas GALLONS (Baseline)	0
% of Natural Gas THERMS Saved	0.0%	Natural Gas THERMS (Baseline)	0
% of Water & Sewer GALLONS Saved	0.0%	Water & Sewer GALLONS (Baseline)	0

Square Foot Analysis	Pre Retrofit	Post Retrofit
Elec $/Sq Ft/Yr	$0.00	$0.03
Oil $/Sq Ft/Yr	$1.55	$1.39
LP Gas $/Sq Ft/Yr	$0.00	$0.00
Natural Gas $/Sq Ft/Yr	$0.00	$0.00
Water & Sewer $/Sq Ft/Yr	$0.00	$0.00
Total Utility Cost $/Sq Ft/Yr	**$1.55**	**$1.42**
Elec KW/Sq Ft/Yr	0.0000	0.0003
Elec KWH/Sq Ft/Yr	0.00	0.26
Oil GALLONS/Sq Ft/Yr	0.52	0.46
LP Gas GALLONS/Sq Ft/Yr	0.00	0.00
Natural Gas THERMS/Sq Ft/Yr	0.00	0.00
Water & Sewer GALLONS/Sq Ft/Yr	0.00	0.00

UTILITY DATA SHEET

JOB:	NMCC
BUILDING:	Shops
DATE:	3/27/2009

Meter: Electric

The campus is	kWh	kWh Delivery	kWh Supply	Total kWh Charges	$/kWh	Delivery kWh Rate	Supply kWh Rate	kW	Demand Charge	$/kW	Total Charges
07/25/07											
08/24/07											
09/26/07											
10/24/07	The campus is main metered only. See Christie Complex Utility Data for the electrical usage for the campus.										
11/27/07											
12/26/07											
01/24/08											
02/22/08											
03/24/08											
04/23/08											
05/22/08											
06/23/08											
2007-8 Total											

Utility: Oil

Meter: WES Oil #2

Date	HDD	Gal	Cost	$/Gal	Date	HDD	Gal	Cost	$/Gal
Jul-06	17	800.00	$1,732.56	2.17	Jul-07	70	0.00	$0.00	$0.00
Aug-06	159	0.00	$0.00	0.00	Aug-07	125	0.00	$0.00	$0.00
Sep-06	310	168.60	$321.62	1.91	Sep-07	297	0.00	$0.00	$0.00
Oct-06	670	200.20	$361.96	1.81	Oct-07	541	203.00	$501.09	$2.47
Nov-06	859	1,135.70	$2,083.71	1.83	Nov-07	1076	1,942.30	$5,437.27	$2.80
Dec-06	1284	959.80	$1,996.00	2.08	Dec-07	1601	768.50	$2,175.03	$2.83
Jan-07	1627	1,758.40	$3,656.76	2.08	Jan-08	1608	1,027.50	$2,922.32	$2.84
Feb-07	1560	1,627.30	$3,384.13	2.08	Feb-08	1479	2,426.80	$6,777.98	$2.79
Mar-07	1296	1,269.90	$2,640.89	2.08	Mar-08	1475	786.70	$2,610.59	$3.32
Apr-07	872	539.50	$1,150.65	2.13	Apr-08	755	0.00	$0.00	$0.00
May-07	478	0.00	$0.00	0.00	May-08	468	100.30	$349.56	$3.49
Jun-07	136	0.00	$0.00	0.00	Jun-08	149	0.00	$0.00	$0.00
Yearly Totals	9268	8,459.4	$17,328.28	$2.05	Yearly Totals	9644	7,255.1	$20,773.84	$2.86
2004-05 Total Gallons		8,459			2005-06 Total Gallons		7,255		
2004-06 Avera	9,456	7,857	$19,051	$2.42					

2007-08 Lock-Ir $3.00 / Gallon

FUEL SHEET

Insert data in pink cells only!

JOB:	NMCC
BUILDING:	Shops
DATE:	3/27/2009
Base Yr:	07/06 to 06/08
	(Month/Year to Month/Year)

	Heating Fuel		Kitchen Fuel	
Fuel Oil	**Gas**	**Propane**	**Gas**	**Propane**
Y	N	N	N	N

Heating Fuel Adjustment

BASE YR DEG DAYS	AVE YEAR DEG DAYS	BASE YR GALLONS	AVERAGE EXPECTED GALLONS
9,456	9659	7,857	8,023

FUEL INFORMATION

	SQUARE FEET	BASE YR BOILER EFFIC	TYPE FUEL	BASE YR GAL	BASE YR COST	$ GAL	BTU/ UNIT	$/PER mmBTU
Adj Base Line	15,242	0.83	2	7,857	$23,572	$3.00	140,000	$25.82
Adjustment		0.83	2	7,857	$4,521	$0.58	140,000	$4.95
Base Year		0.83	2	7,857	$19,051	$2.42	140,000	$20.87

Note: Adjustment is to achieve current 2007 lock-in rate of $2.23/Gallon

ELECTRIC INFORMATION

	POWER METER-#	Annual KWH Used (KWH)	Annual KWH Cost ($)	Cost/ KWH ($)	BTU/ UNIT (BTU)	$/PER mmBTU ($)	Annual Demand (KW)	Annual KW Cost ($)	Cost/ KW ($)	SUNDRY CHARGES ($)	TOTAL ELEC Cost ($)
Adj Base Line	0	0	$0	$0.1252	3,413	$36.68	0	$0	$0.00	$0	$ -
Adjustment		0	$0	$0.1252	3,413	$36.68	0	$0	$0.00	$0.00	$0.00
Base Year	Total	0	$0	$0.0000	3,413	$0.00	0	$0	$0.00	$0	$ -
	Off Peak	0	$0	$0.00	3,413	$0.00	0	$0	$0.00	$0.00	
	Outside Lights	0	$0	$0.00	3,413	$0.00	0	$0	$0.00	$0.00	
	Main	0	$0	$0.00	3,413	$0.00	0	$0	$0.00	$0	

Note: Adjustment is to achieve current 10-01-08 rate

N/GAS INFORMATION

	Boiler Effic	N/GAS THERMS	N/GAS COST	N/GAS $/THRM	BTU/ UNIT	$/PER mmBTU
Adj Base Line	0.85	0	$0	$0.00	100,000	$0.00
Adjustment	0.85	0	$0	$0.00	100,000	
Base Year	0.85	0	$0	$0.00	100,000	$0.00

PROPANE INFORMATION

	Boiler Effic	PROPANE GALLONS	PROPANE COST	COST/ GALLON	BTU/ UNIT	$/PER mmBTU
Adj Base Line	0.85	0	$0	$1.57	91,000	$0.00
Adjustment	0.85	0	$0	$0.00		
Base Year	0.85	0	$0	$0.00	91,000	$0.00

mmBTU Conversion

Energy	Energy Abrev.	Units	BTUs	mmBTUs
Electricity	kwh	kWh	3,413	0.003413
Natural Gas	Therm	Therm	100,000	0.1
	CCF	CCF	103,000	0.103
	MCF	MCF	1,030,000	1.03
Energy	**Abrev.**	**Units**	**BTUs**	**mmBTUs**
#2 Fuel	2	GAL	140,000	0.14
#4 Fuel	4	GAL	145,600	0.1456
#6 Fuel	6	GAL	153,600	0.1536
Coal	Coal	TON	24,000,000	24
Nat Gas	Gas	THERM	100,000	0.1
Propane	Prop	GAL	91,000	0.091
Steam	Stm	LBS	1,150	0.00115
		kLBS	1,150,000	1.15

	High	*Low*	*Average*
#2 Fuel	*141800*	*137000*	*139400*
#4 Fuel	*148100*	*143100*	*145600*
#6 Fuel	*155900*	*151300*	*153600*

Sealing, Weatherstripping, Caulking, Windows & Doors

JOB:	NMCC
BUILDING:	Shops
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	
MECHANICAL KW Saved	
MMBtu Saved BEFORE oil heater	39
ECM OPERATIONAL Savings $$$	

Infiltration

% CFM Used	75%
Existing CFM	206
MMBtu Savings	39

Insulation

Area	0
Existing 'U' Value	0.2
Proposed 'U' Value	0.0264
Difference	0.1736
Annual Degree Days	7,327
MMBtu Savings	**0**

Work to be completed	No. of Units	Perimeter (ft)	Crackage (in)	Conversion to feet		Product
Exit Doors	14	20	1/16	1/12	=	1.458333
RTV's	0	0	1/6	1/12	=	0
Roof/ Wall Joint	-	0	1/8	1/12	=	0
OH Door	4	82	1/6	1/12	=	1.138889
Sweeps only (Doors)	-	0	1/16	1/12	=	0
					Total =	2.597222

Infiltration Savings

Total Crack Area (SF)	Average Wind Speed (MPH)	Average Wind Speed (FPM)	Windward Diversity (%)	Infiltration Savings (CFM)
A	B	C = B x 5280 / 60	D	E = A x C x D
2.60	1.8	158.4	50%	205.700

NIGHT SETBACK SAVINGS CALCULATIONS

JOB:	NMCC
BUILDING:	Shops
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	0
MECHANICAL KW Saved	0
MMBtu Saved BEFORE oil heater	27
ECM OPERATIONAL Savings $$$	$0.00

										Zone Schedule											
										Existing		Proposed		Existing		Proposed		Fuel	Savings	Oil	Gas or Propane
Unit Designation	Zone / Area Served	Qty.	Wall Area	Floor/Roof Area	Coefficient of Heat Transfer, Wall 0.10-0.30	%, Windows	Coefficient of Heat Transfer, Windows 0.25-0.50	Below Heated Space	Coefficient of Heat Transfer, Roof 0.04-0.20	Occupied Temperature	Unoccupied Temperature	Occupied Temperature	Unoccupied Temperature	Occupied Begin	Occupied End	Occupied Begin	Occupied End	(O or P)	MMBtu/Yr/unit	MMBtu/Yr 27	MMBtu/Yr 0
FT-1	Autobody	1	6,000	9,000	0.20	5%	0.35	N	0.10	68	52	68	52	6:00	16:00	6:00	16:00	O	0	0	0
Furnace	Maintenance Shop	1	3,000	4,500	0.20	30%	0.35	N	0.10	70	65	70	60	6:00	16:00	6:00	16:00	O	27	27	0
Furnace	Maintenance Garage	1	900	1,500	0.20	0%	0.35	N	0.10	61	60	61	60	6:00	16:00	6:00	16:00	O	0	0	0

Notes:
1. Coefficients of Heat Transfer are estimated by age, condition and construction of the building.
2. Weather bin data has been used to calculate deltaTxhours. The formula to determine deltaTxhours uses the existing and proposed schedules to determine fractions of the weather bins to be used in the deltaTxhour calculation. See note 3.
3. The deltaTxhours generated by the bin analysis is used in the following formula to determine MMBTU/yr. U.Coefficient of Heat TransferxAreaxdeltaTxhours=BTU. The hours are over a years period and the result is converted to millions of BTUs.
4. Areas of floors, walls, windows and roofs are estimated from drawings and onsite inspections.

VENTILATION CONTROLS

JOB:	NMCC
BUILDING:	Shops
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	0
MECHANICAL KW Saved	0
MMBtu Saved BEFORE oil heater	(61)
ECM OPERATIONAL Savings $$$	$0.00

Equipment Schedule

Unit Designation	Zone / Area Served	Qty.	Fan (N or E)	HP/ Unit	Fan kW Reading	Existing CFM OA/Unit	Proposed CFM OA/Unit	A/C (Y or N or E)	A/C Peak kW	% Eff. ERVs	Occupied Begin	Proposed Occupied End	Occupied Temp	Proposed Hrs/Yr	Fuel (O or P)	MMBtu/Yr/unit	Oil MMBtu/Yr	Gas or Propane MMBtu/Yr	kW Usage/ Yr	KWH Usage/Yr
																	61	0	0	0
HRU-1	Autobody	1	E	0.00	0.00	1,000	2,000	N	0.00	50%	6:00	16:00	68.0	1,700	O	61	61	0	0	0
HRU-2	Maintenance Shop	1	E	0.50	0.31	450	450	N	0.00	50%	6:00	16:00	70.0	1,700	O	0	0	0	0	0
Furnace	Maintenance Garage	1	E	0.50	0.31	150	150	N	0.00	0%	6:00	16:00	61.0	1,700	O	0	0	0	0	0

Notes:

1. Ventilation run hours are based on the new proposed schedules. They are based on a 34 week school heating cycle per year.
2. Weather bin data has been used to calculate deltaTxhours. The formula to determine deltaTxhours uses the existing and proposed schedules to determine fractions of the weather bins to be used in the deltaTxhour calculation. See note 3.
3. The deltaTxhours generated by the bin analysis is used in the following formulat to determine MMBTU/yr. CFMx1.08xdeltaTxhours=BTU. The hours are over a years period and the result is converted to millions of BTUs. A delta is calculated between existing and proposed cfm.
4. There are 193 M-F calendar days during the school year, inclusive of holidays.
5. If the equipment is existing and the fan is greater than 3Hp, kW readings are instantaneous during site visit and are assumed to be representative of the systems operation including post project implementation. If the equipment is existing and the fan is less than 3Hp, kW readings are calculated based on an assumed 70% loading and 85% efficiency. If the equipment is new, kW readings are calculated based on an assumed 70% loading and 85% efficiency.
6. Cooling COP is assumed to be 1.

VENTILATION CONTROLS

JOB:	NMCC
BUILDING:	Shops
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	Units Saved
MECHANICAL KWH Saved	0
MECHANICAL KW Saved	0
MMBtu Saved BEFORE oil heater	50
ECM OPERATIONAL Savings $$$	$0.00

% Run Hours	% Outside Air
40%	100%
20%	75%
20%	50%
20%	25%
70.0%	Weighted average % Ventilation

Equipment Schedule

Unit Designation	Zone / Area Served	Qty.	CFM OA/Unit	% Eff. ERVs	Weighted Average Percent CFM OA	Occupied Begin	Proposed Occupied End	Occupied Temp	Proposed Hrs/Yr	Fuel (O or P)	MMBtu/Yr	Oil MMBtu/Yr	Gas or Propane MMBtu/Yr
												50	0
HRU-1	Autobody	1	2,000	50%	70%	6:00	16:00	68.0	1,700	O	36	36	0
HRU-2	Maintenance Shop	1	450	50%	70%	6:00	16:00	70.0	1,700	O	9	9	0
Furnace	Maintenance Garage	1	150	0%	70%	6:00	16:00	61.0	1,700	O	4	4	0

Notes:

1. Ventilation run hours are based on the new proposed schedules. They are based on a 34 week school heating cycle per year.
2. Weather bin data has been used to calculate deltaTxhours. The formula to determine deltaTxhours uses the proposed schedules to determine fractions of the weather bins to be used in the deltaTxhour calculation. See note 3.
3. The deltaTxhours generated by the bin analysis is used in the following formula to determine MMBTU/yr. %OAxCFMx1.08xdeltaTxhours=BTU. The hours are over a years period and the result is converted to millions of BTUs.

ENERGY EFFICIENT MOTOR & VSD SAVINGS CALCULATIONS

JOB:	NMCC
BUILDING:	Shops
DATE:	03/27/09

ANNUAL ENERGY SAVINGS	**Units Saved**
MECHANICAL KWH Saved	**(3,502)**
MECHANICAL KW Saved	**(4.1)**
ECM OPERATIONAL Savings $$$	

MOTOR CALCULATIONS

LOCATION	Garage EF
MOTOR EXISTING CONDITION	
EQPT TYPE	Pump
EQPT#	EF-1
H.P.	1.00
ACT.H.P.	?
RATED AMPS.	?
AMPS 1	?
AMPS 2	?
KW	?
KVAR	?
KVA	?
PF %	?
VOLTS	230

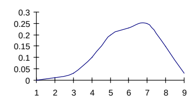
ASSUMPTIONS
1. kW was measured for one pump and applied to the others.
2. Only one pump runs at a time.

0.746	
Existing	Pump
HP	0.00
Run Hours	5,712
Load Factor	0.84
Motor Eff.	0.92
kWh	0
KW	0.0
Proposed	
HP	1.0
Run Hours	5,712
Load Factor	0.84
Motor Eff.	0.920
kWh	3,891
KW	0.7

Monthly kw X six months = annual kw

Motor kWh Saved	(3891)
Monthly Motor KW saved	(0.7)
Annual kw saved	(4.1)

SPEED DRIVE CALCULATIONS



DUTY CYCLE X	
0.2	0
0.3	0.01
0.4	0.03
0.5	0.1
0.6	0.2
0.7	0.23
0.8	0.25
0.9	0.15
1	0.03
1.1	1
	1

KWH (new motor	
0.2	0
0.3	22
0.4	67
0.5	202
0.6	358
0.7	331
0.8	253
0.9	82
1	5

KWH USED WITH SPEED DRIVE =	3,891
KWH USED W/O SPEED DRIVE =	3,891
VSD kWh SAVINGS =	**0**
VSD to be installed? Y or N:	**N**

This is the power the motor would use at part loads with NO speed drive

MOTOR INPUT X	
0.2	0.57
0.3	0.67
0.4	0.71
0.5	0.72
0.6	0.75
0.7	0.8
0.8	0.88
0.9	0.99
1	1.2

This is the power the motor would use at part loads with a VFD.

VFD INPUT X	
0.2	0.09
0.3	0.11
0.4	0.14
0.5	0.2
0.6	0.29
0.7	0.43
0.8	0.62
0.9	0.85
1	1.16
	3.89

Standard duty cycle distribution

0
0.01
0.03
0.1
0.2
0.23
0.25
0.15
0.03
1
0
0.05
0.16
0.23
0.23
0.2
0.09
0.03
0.01

OIL HEATER SAVINGS CALCULATIONS

JOB:	NMCC
BUILDING:	Shops
DATE:	3/27/2009

ANNUAL ENERGY SAVINGS	**Units Saved**
MECHANICAL KWH Saved	**(494)**
MECHANICAL KW Saved	
GALLONS OIL SAVED WITH oil heater	**372**
ECM OPERATIONAL Savings $$$	

Location: **Boiler:**	**Shops** **Primary**
Base Gallons consumed	**7,857**
Total gallons saved BEFORE heater	425
Net base gallons	7,433
Oil heater savings=5% of net gals	**5.0%**
Gallons Saved	372
kWh to Heat Oil @ 70 watt/gal	494