



Report No. 12134  
Date: 08/20/04

# Fuel & Electricity Reduction Pilot Program

CONDUCTED AT

## SUFFOLK COUNTY

BOARD OF ELECTIONS BUILDING, YAPHANK  
CIVIL SERVICE BUILDING #158, HAUPPAUGE  
MEDICAL EXAMINERS BUILDING, HAUPPAUGE

FOR

## Suffolk County Department of Public Works

335 Yaphank Avenue, Yaphank, New York 11980

## TEST RESULTS FOR HEATING, COOLING AND REFRIGERATION SYSTEMS

A Confidential Report

*Prepared by*

**Intellidyne, LLC**

## EXECUTIVE SUMMARY

The attached technical report summarizes the Energy Saving Performance of the *IntelliCon*<sup>®</sup> energy saving controls which were installed at the following locations:

- **Board of Elections Building:** - Installed *IntelliCon*<sup>®</sup>-CHW on one (1) HB Smith hydronic heating boiler serving the entire building. The controls were installed on November 8<sup>th</sup>, 2003 and test data was collected until March 24, 2004. During the testing period the *IntelliCon*<sup>®</sup>-CHW delivered a fuel consumption reduction of **12.89% on the hydronic heating boiler and 10.91% on the State domestic hot water boiler.** These reductions were achieved with no degradation of the temperature maintenance and no noticeable impact to the buildings occupants. Also notable is the fact that the *IntelliCon*<sup>®</sup> controller reduced on/off cycling on the heating system by 22.8%.
- **Civil Service Building:** -Installed *IntelliCon*<sup>®</sup> -CAC on two (2) Trane roof-top packaged air conditioning systems serving the east side office and south side perimeter. The controls were originally installed on June 22<sup>nd</sup>, 2004 and test data was collected until July 17, 2004. During the testing period the *IntelliCon*<sup>®</sup> -CAC delivered an electric consumption reduction of **13.73% and a cycling reduction of 26.1% on the Trane 7.5 ton packaged system.** The *IntelliCon*<sup>®</sup> -CAC delivered an electric consumption reduction of **12.99% and a cycling reduction of 8.0% on the Trane 4.0 ton packaged system.**
- **Medical Examiners Building:** - Installed *IntelliCon*<sup>®</sup>-RU on three (3) walk-in refrigeration systems serving the Long Term Storage (Box #1), Short Term Donor Organ Storage (Box #2), and the Short Term Body Storage (Box #3). The controls were installed on April 17<sup>th</sup>, 2004 and test data was collected until June 13, 2004. During the testing period the *IntelliCon*<sup>®</sup>-RU control delivered an electric consumption reduction of **11.76 on the long term storage system, 10.52% on the Short Term Storage (Donor Organs) system and 12.77% on the Long Term Storage (Body Box) system.**

All of these systems operate on a 24 hours per day, 7 days per week basis. The test data was collected using “alternating day” methodology which is further described later in this report. Detailed data on solar load, outdoor temperature and indoor temperature was also collected and is part of this final report.

The Report contains the documentation that supports the summary results and further details the specific length of the test, overall temperature performance during the test and the predictability of the system performance after the *IntelliCon*<sup>®</sup> affect. This analysis clearly shows that the *IntelliCon*<sup>®</sup> controls deliver more than the minimum guaranteed savings of 10%. This improvement in operational efficiency and reduced energy usage, was achieved while providing consistent temperatures.

The IntelliCon<sup>®</sup> Energy Saving Control will deliver the following benefits to Suffolk County

- **Guaranteed Energy Savings**
- **Consistent Temperature Performance**
- **Reduced Wear and Tear from excessive on/off cycling**
- **15 Year Replacement Warranty**
- **Low Upfront costs and High ROI**
- **No Maintenance or Programming**

Intellidyne is confident you will agree that the application of IntelliCon<sup>®</sup> technology is an excellent business decision which can deliver real and meaningful operating cost reductions year in and year out.



90 Pratt Oval  
 Glen Cove, NY 11542  
 Phone: 516-676-0777  
 Fax: 516-676-2640

# Test Report

Report No. 12134-1

Date: 08/18/04

**Customer:**

Suffolk County  
 Department of Public Works  
 335 Yaphank Avenue  
 Yaphank, New York 11980-0059  
 Charles Bartha, Commissioner of Public Works

**Test Site Location:**

Suffolk County Board Of Elections  
 Yaphank Avenue  
 Yaphank, NY  
 Contact: Terry Sweezy

Test Type:  HEATING     AIR CONDITIONING     REFRIGERATION     OTHER: \_\_\_\_\_  
 Product Tested:  HW     LCH     LCS     CHW     CHS     AC     CAC     RU     OTHER: \_\_\_\_\_

**Type of Equipment:**

Manufacturer: HB Smith  
 Model: Series 28A-14  
 Capacity / Fuel: 4.3MMBTU/Hr. / #2 Fuel Oil (31.5 GPH)  
 Application: Hydronic Heating, 24/7  
 Area Served: Offices and Warehouse

Test Start Date: 11/08/03  
 Test End Date: 03/24/04  
 No. of Days in Test: 138

**BURNER RUN-TIME:**  in HRS.     in MIN.  
 IntelliCon ON-DAYS: 429:13:20  
 IntelliCon OFF-DAYS: 492:43:39  
 Burner Run-Time was 12.89% More on the OFF-Days.

**BURNER USAGE FACTOR:**  
 IntelliCon On-Days: 26%  
 IntelliCon Off-Days: 30%

**HEATING DEGREE-DAYS (FOR TEST PERIOD)**  
 IntelliCon ON-DAYS: 2122    It was 0.0% Colder on the On-Days.  
 IntelliCon OFF-DAYS: 2121  
 Total Degree-Days: 4243

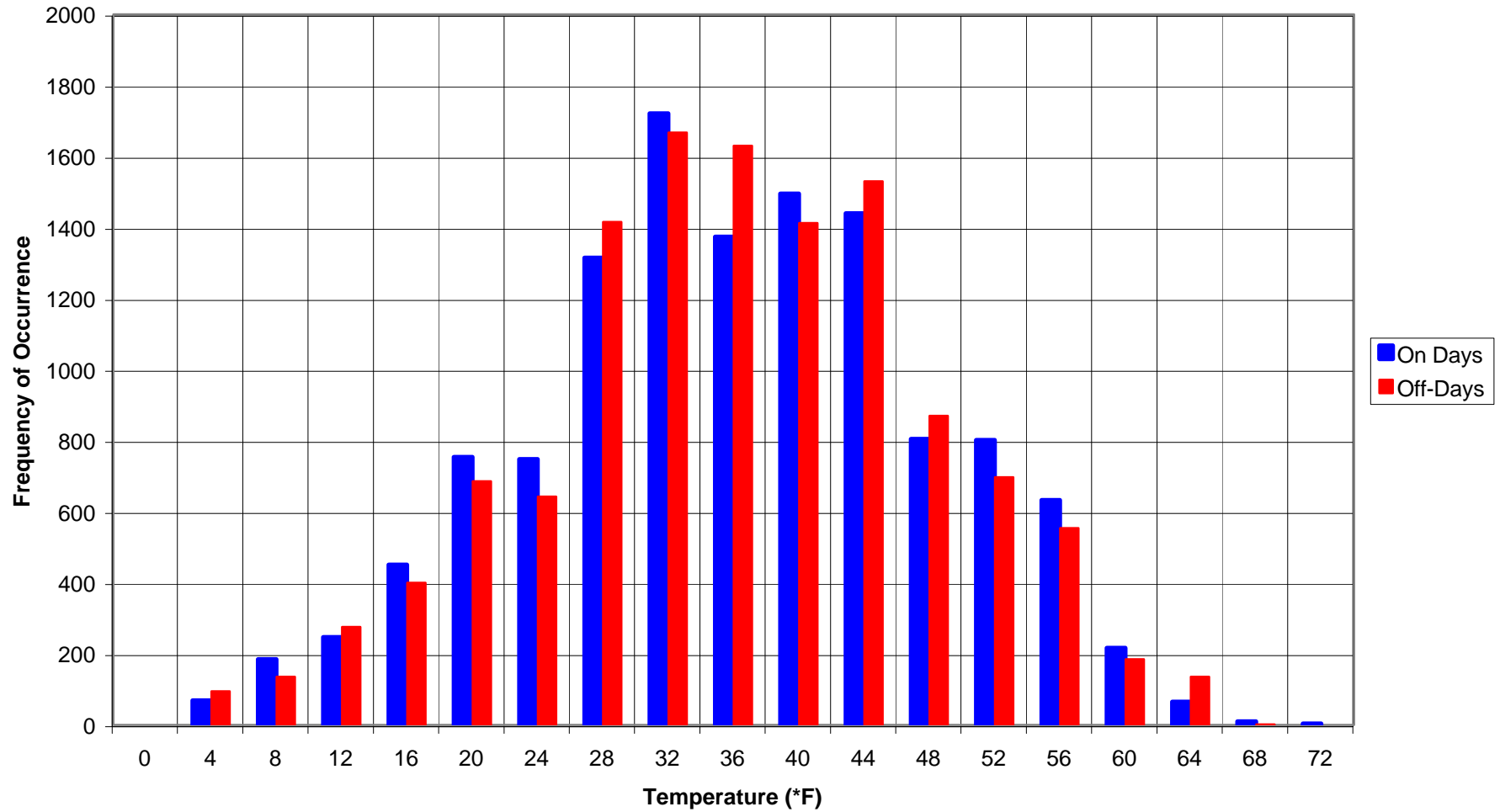
**SOLAR LOAD COMPENSATION: (Lumens/Sq. Ft.)**  
 IntelliCon ON-DAYS: 12204  
 IntelliCon OFF-DAYS: 12272    It was < 1% Sunnier on the OFF-Days.

**BURNER CYCLING REDUCTION:**  
 IntelliCon ON-DAYS: 1391  
 IntelliCon OFF-DAYS: 1802    Cycling was reduced by: 22.8%

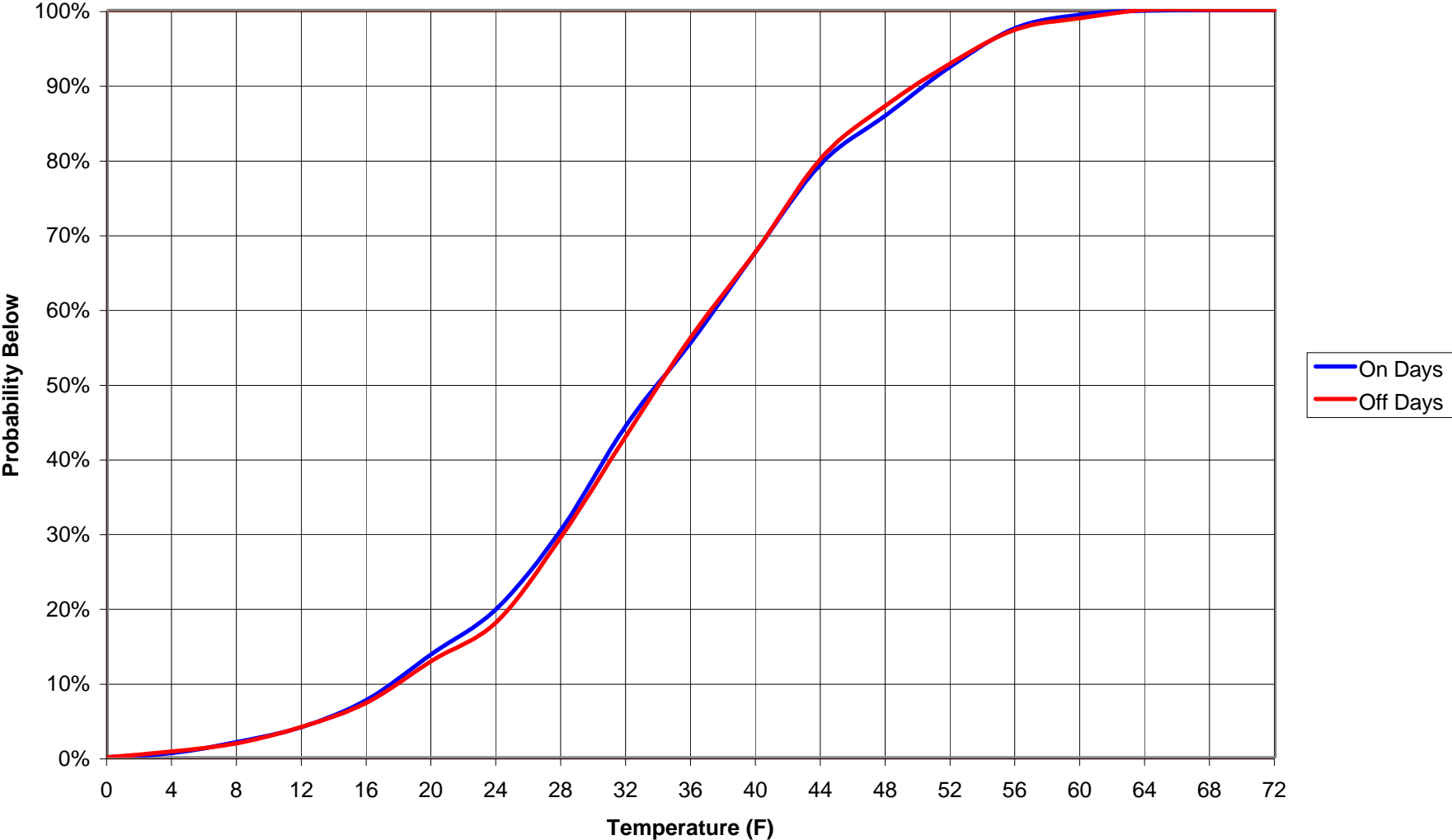
**Savings = 12.89%**

COMMENTS:

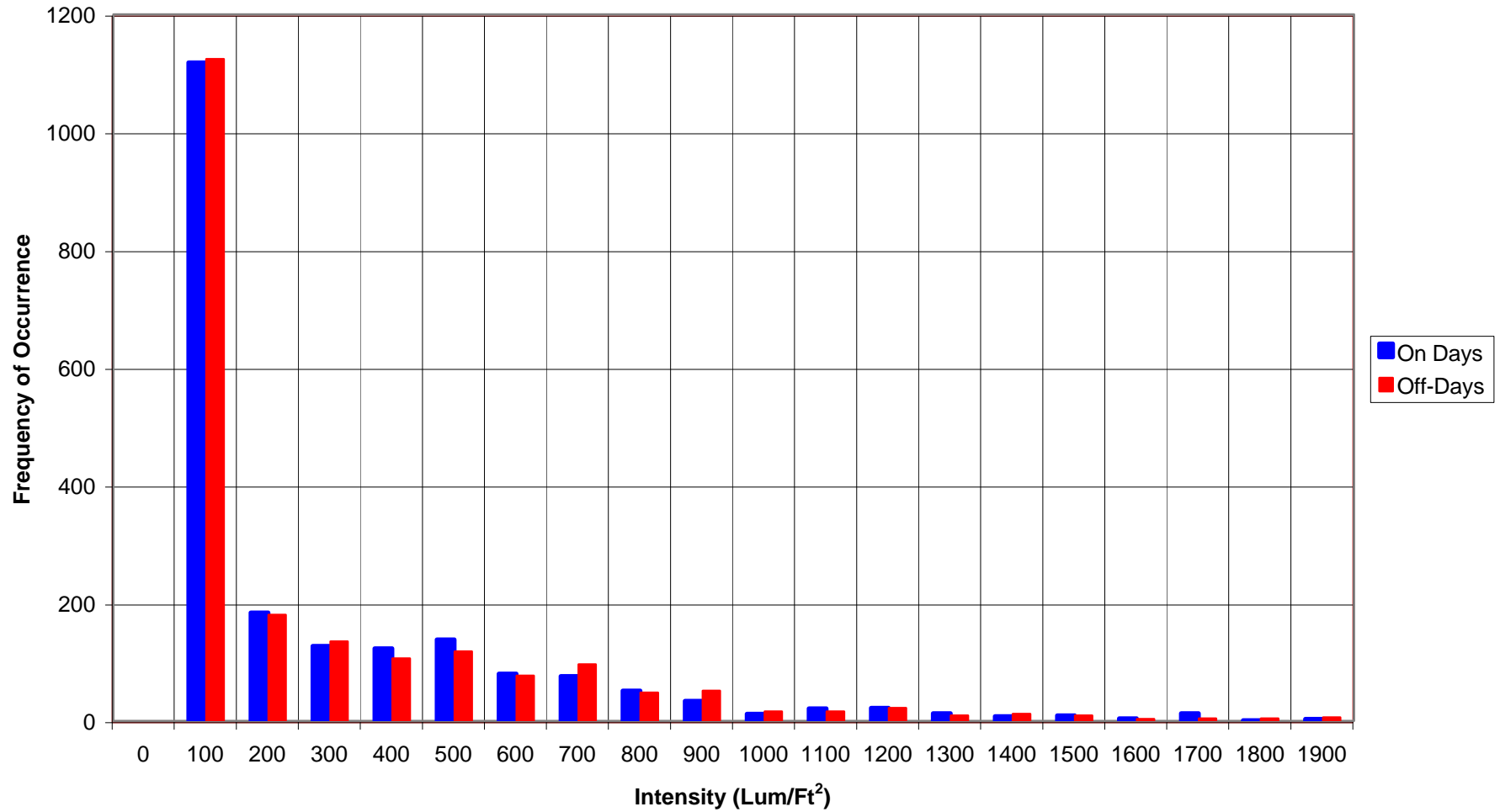
## Suffolk County - Board of Elections Outside Air Temperature Histogram



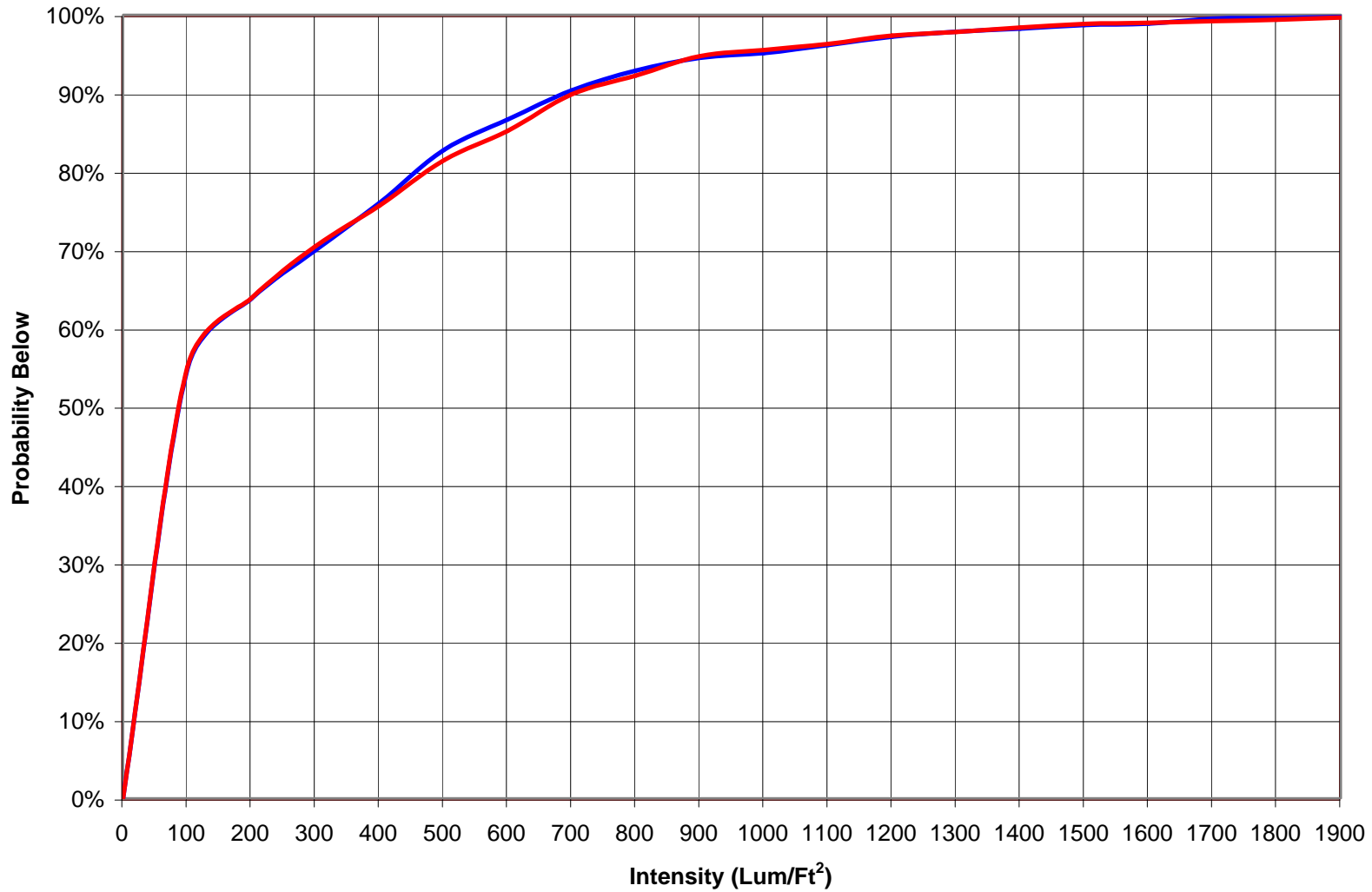
**Suffolk County - Board of Elections  
Outside Air Temperature Probabilities**



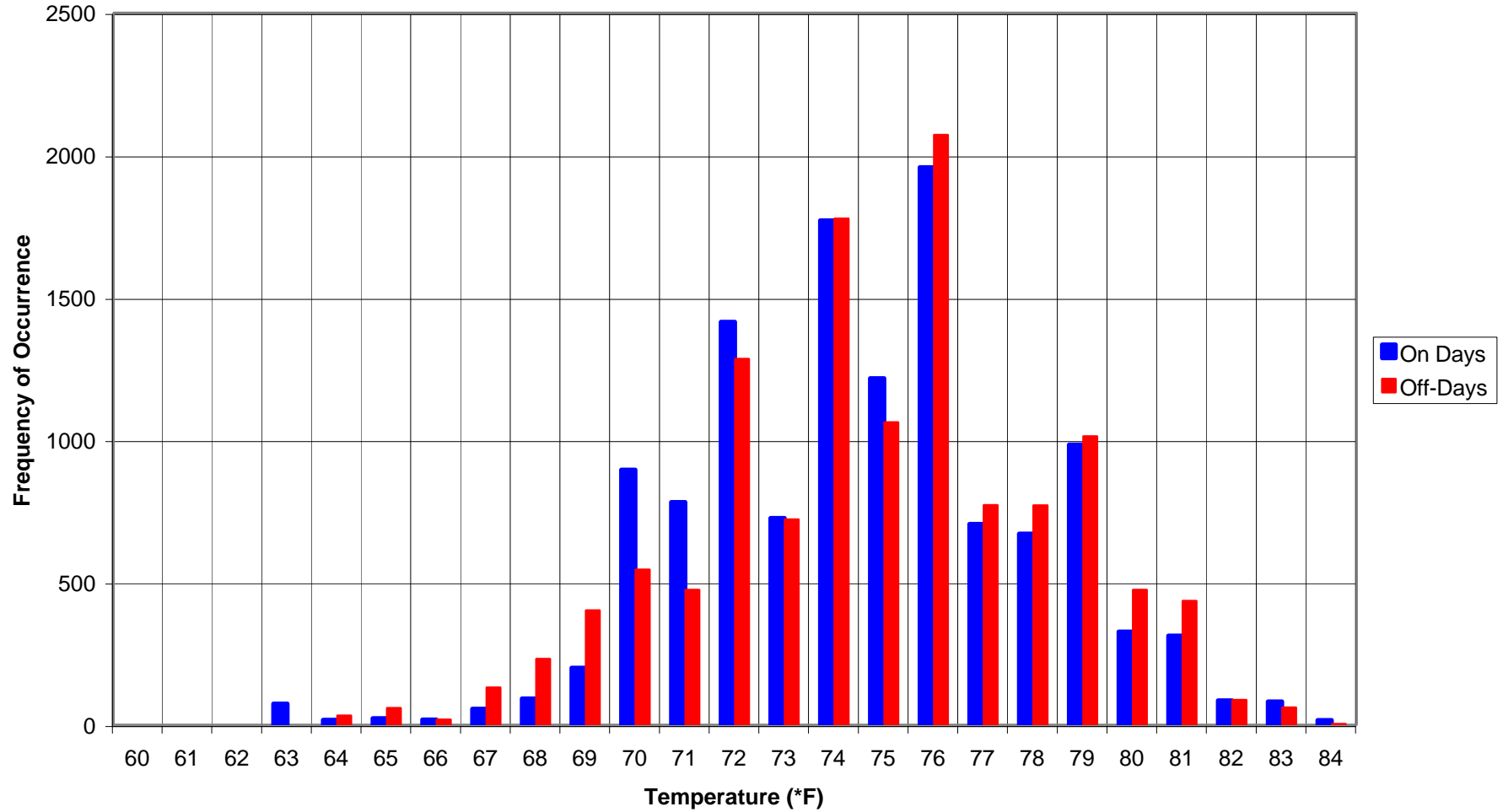
# Suffolk County - Board of Elections Solar Load Histogram



### Suffolk County - Board of Elections Solar Load Probabilities

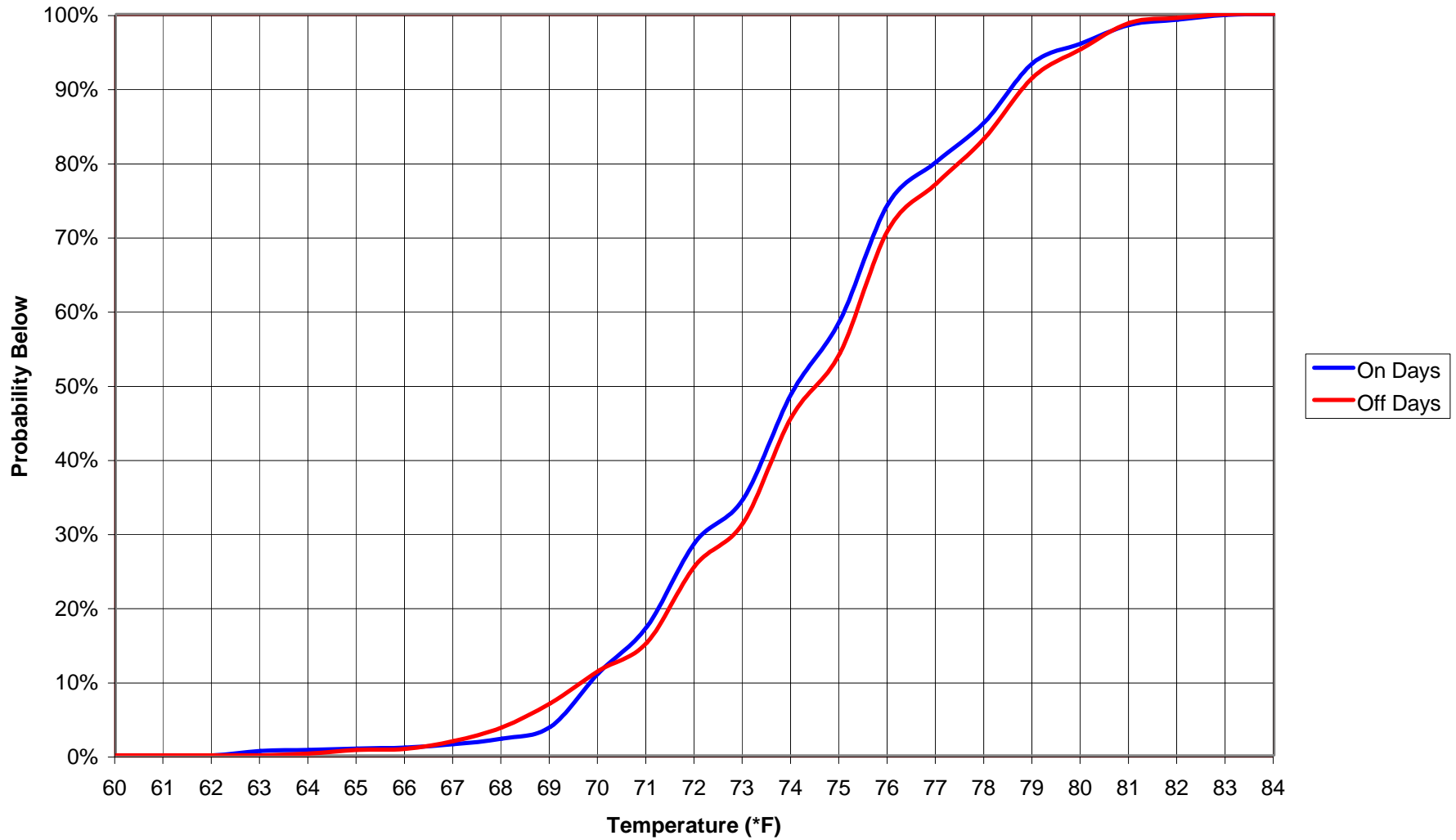


# Suffolk County - Board of Elections Office Temperature Histogram

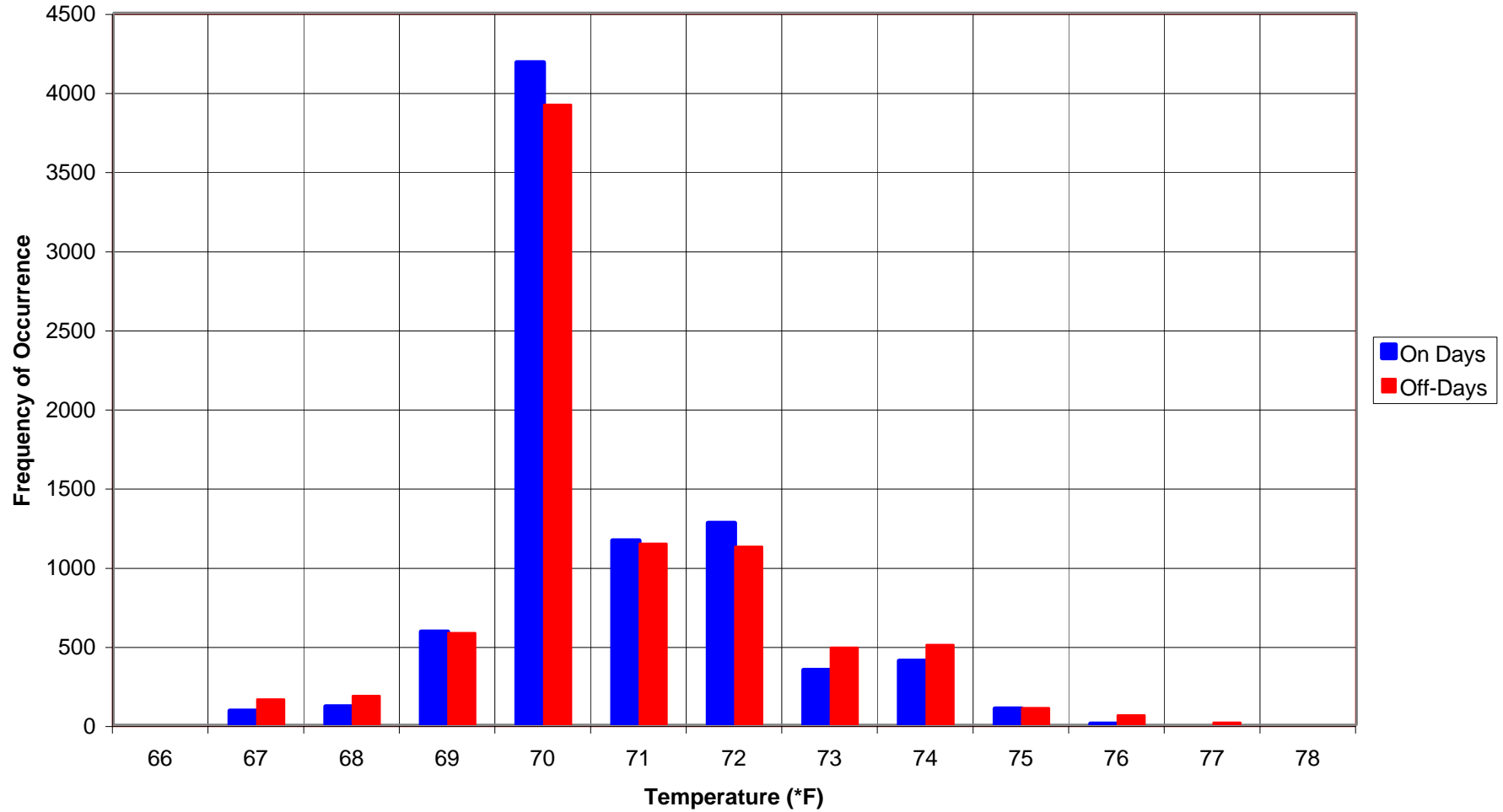




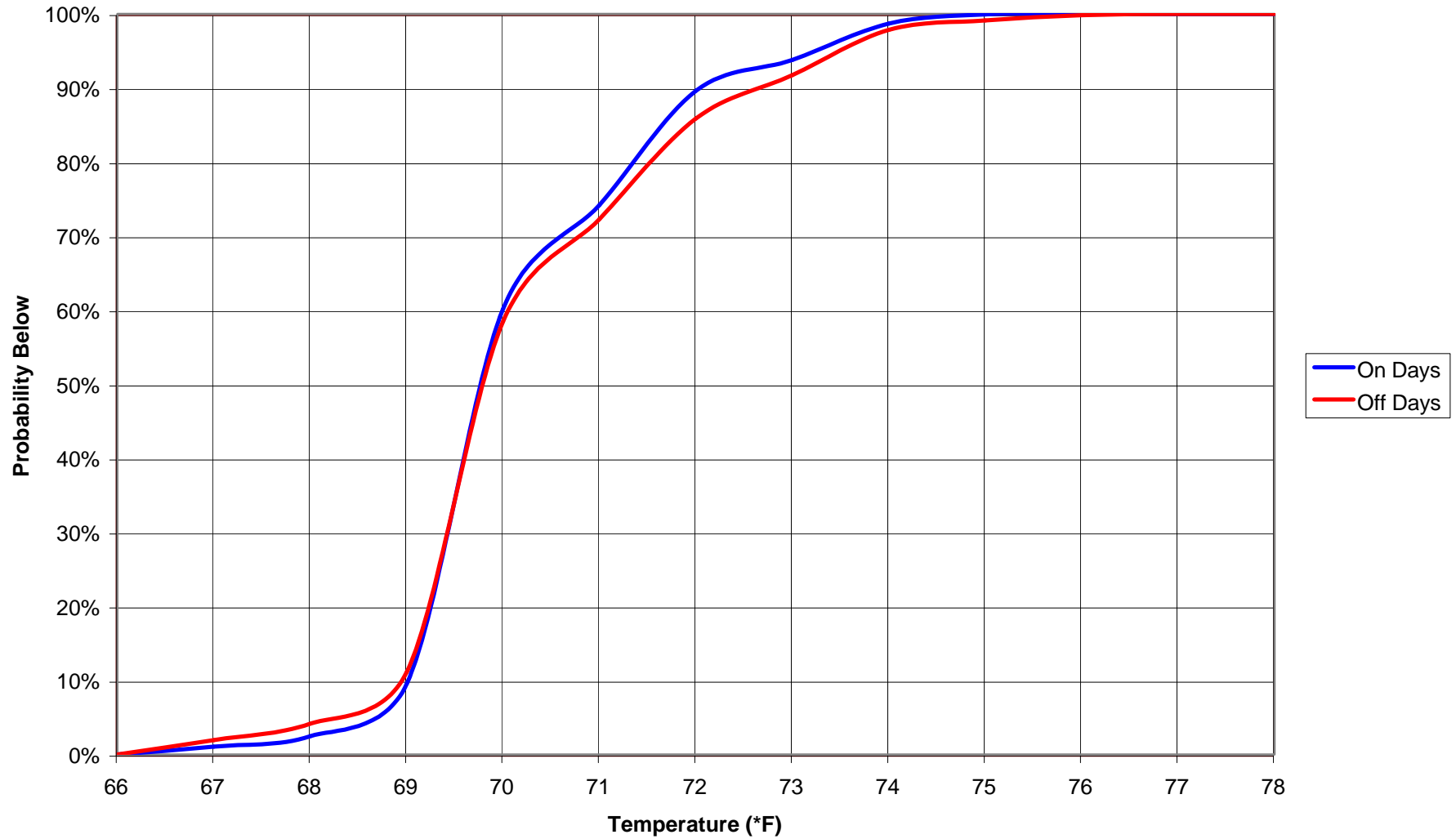
### Suffolk County - Board of Elections Office Temperature Probabilities



## Suffolk County - Board of Elections Warehouse Temperature Histogram



### Suffolk County - Board of Elections Warehouse Temperature Probabilities





90 Pratt Oval  
 Glen Cove, NY 11542  
 Phone: 516-676-0777  
 Fax: 516-676-2640

# Test Report

Report No. 12134-2

Date: 08/18/04

**Customer:**

Suffolk County  
 Department of Public Works  
 335 Yaphank Avenue  
 Yaphank, New York 11980-0059  
 Charles Bartha, Commissioner of Public Works

**Test Site Location:**

Civil Service Building #158  
 County Center Road, Hauppauge, NY  
 Contact: Bob Gadis

Test Type:  HEATING  AIR CONDITIONING  REFRIGERATION  OTHER: \_\_\_\_\_  
 Product Tested:  HW  LCH  LCS  CHW  CHS  AC  CAC  RU  OTHER: \_\_\_\_\_

**Type of Equipment:**

Unit # 18 Packaged Gas Heat, DX Cooling, Rooftop HVAC  
 Manufacturer: TRANE  
 Model: YCH048A4LOAA, S/N: C43144461D  
 Capacity / SetPt: 4 Tons / 72Deg F.  
 Act. V,Amps, Ph: 472VAC, Comp. Amps; 5.7 avg., 3Ph  
 Application: Heating/ Air Conditioning  
 Area Served: East side office

Test Start Date: 06/22/04  
 Test End Date: 07/17/04  
 No. of Days in Test: 26

**ACTUAL COMPRESSOR RUN-TIME:**  in HRS.  in MIN.  
 IntelliCon ON-DAYS: 90:42:18  
 IntelliCon OFF-DAYS: 97:31:43  
 Run-time was reduced by: 7.00%

**COMPRESSOR USAGE FACTOR:**  
 IntelliCon On-Days: 29%  
 IntelliCon Off-Days: 31%

**COOLING DEGREE-DAYS (FOR TEST PERIOD)**  
 IntelliCon ON-DAYS: 57  
 IntelliCon OFF-DAYS: 54  
 Total Degree-Days: 111  
 It was 4.1% Warmer on the On-Days.

**SOLAR LOAD COMPENSATION: (Lumens/Sq. Ft.)**  
 IntelliCon ON-DAYS: 287  
 IntelliCon OFF-DAYS: 253  
 It was 13.67% Sunnier on the On-Days.

**COMPRESSOR CYCLING REDUCTION:**  
 IntelliCon ON-DAYS: 311  
 IntelliCon OFF-DAYS: 338  
 Cycling was reduced by: 8.0%

**Savings = 12.99%**

COMMENTS: Note: It was determined during testing that an increase of solar load of 4% caused a 1% increase of run-time. It was also found that a 2% increase of Cooling Degree-days caused a 1% increase in runtime. Adjusting the On-Day run-time for the increased temperatures and solar loading yields an additional reduction of run-time of 4hrs 57mins and 33 seconds or a total adjusted ON-Day run-time of 85Hrs 44mins and 44 secs.



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 Fax: 516-676-2640

# Test Report

Report No. 12134-3

Date: 08/18/04

**Customer:**

Suffolk County  
 Department of Public Works  
 335 Yaphank Avenue  
 Yaphank, New York 11980-0059  
 Charles Bartha, Commissioner of Public Works

**Test Site Location:**

Civil Service Building #158  
 County Center Road, Hauppauge, NY  
 Contact: Bob Gadis

Test Type:  HEATING  AIR CONDITIONING  REFRIGERATION  OTHER: \_\_\_\_\_  
 Product Tested:  HW  LCH  LCS  CHW  CHS  AC  CAC  RU  OTHER: \_\_\_\_\_

**Type of Equipment:**

Unit # 21 Packaged Gas Heat, DX Cooling, Rooftop HVAC  
 Manufacturer: TRANE  
 Model: YCH090A4H0AA, S/N: CS11428120  
 Capacity / SetPt: 7.5Tons / 70Deg F.  
 Act. V,Amps, Ph: 472VAC, Comp. Amps; 9.7 avg., 3Ph  
 Application: Heating/ Air Conditioning  
 Area Served: South side perimeter

Test Start Date: 07/02/04  
 Test End Date: 07/17/04  
 No. of Days in Test: 16

**ACTUAL COMPRESSOR RUN-TIME:**  in HRS.  in MIN.  
 IntelliCon ON-DAYS: 44:36:13  
 IntelliCon OFF-DAYS: 48:30:22  
 Run-time was reduced by: 8.04%

**COMPRESSOR USAGE FACTOR:**  
 IntelliCon On-Days: 23%  
 IntelliCon Off-Days: 25%

**COOLING DEGREE-DAYS (FOR TEST PERIOD)**  
 IntelliCon ON-DAYS: 43 It was 4.2% Warmer on the On-Days.  
 IntelliCon OFF-DAYS: 41  
 Total Degree-Days: 84

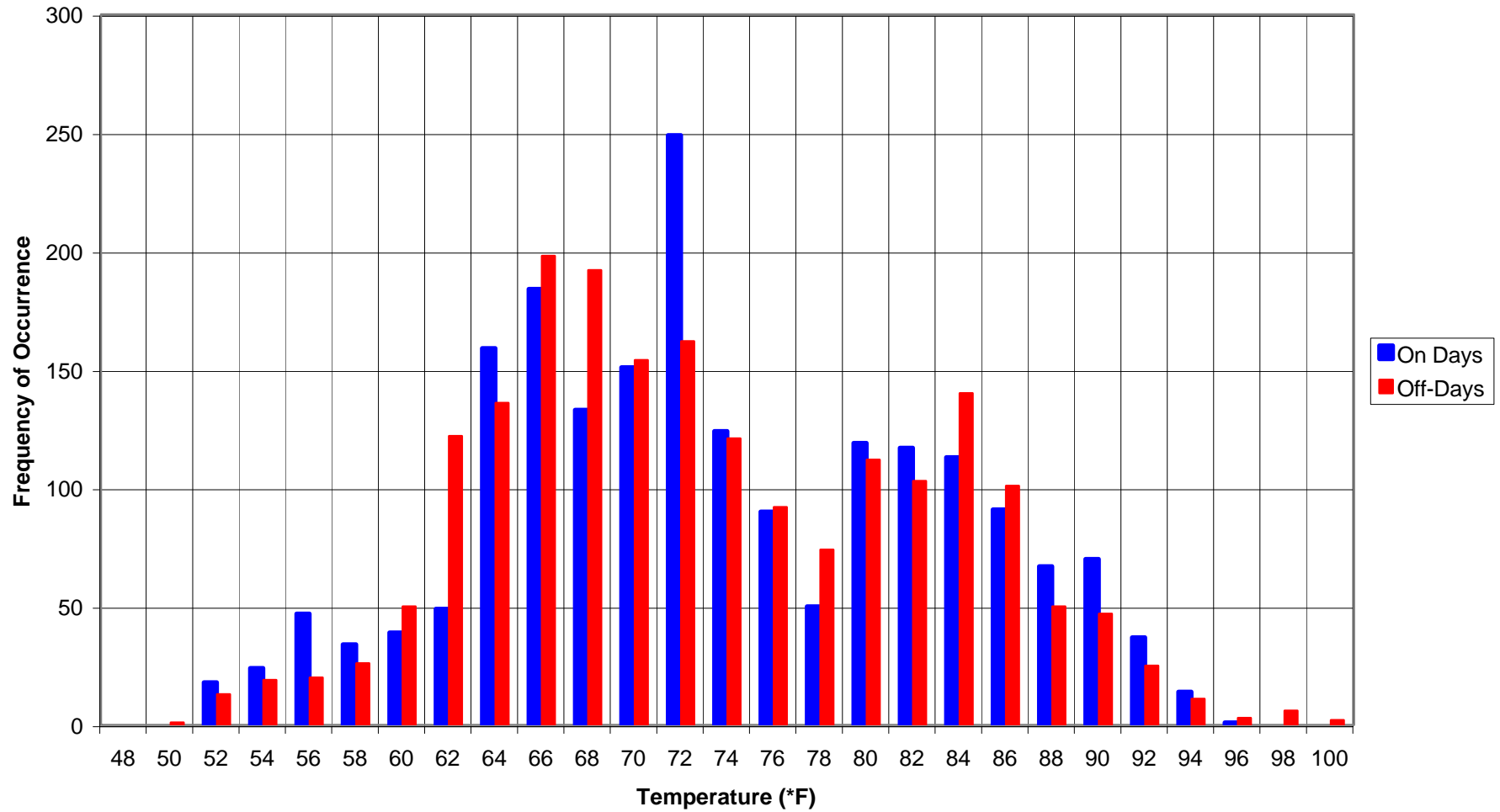
**SOLAR LOAD COMPENSATION: (Lumens/Sq. Ft.)**  
 IntelliCon ON-DAYS: 200  
 IntelliCon OFF-DAYS: 173 It was 15.90% Sunnier on the On-Days.

**COMPRESSOR CYCLING REDUCTION:**  
 IntelliCon ON-DAYS: 453  
 IntelliCon OFF-DAYS: 613  
 Cycling was reduced by: 26.1%

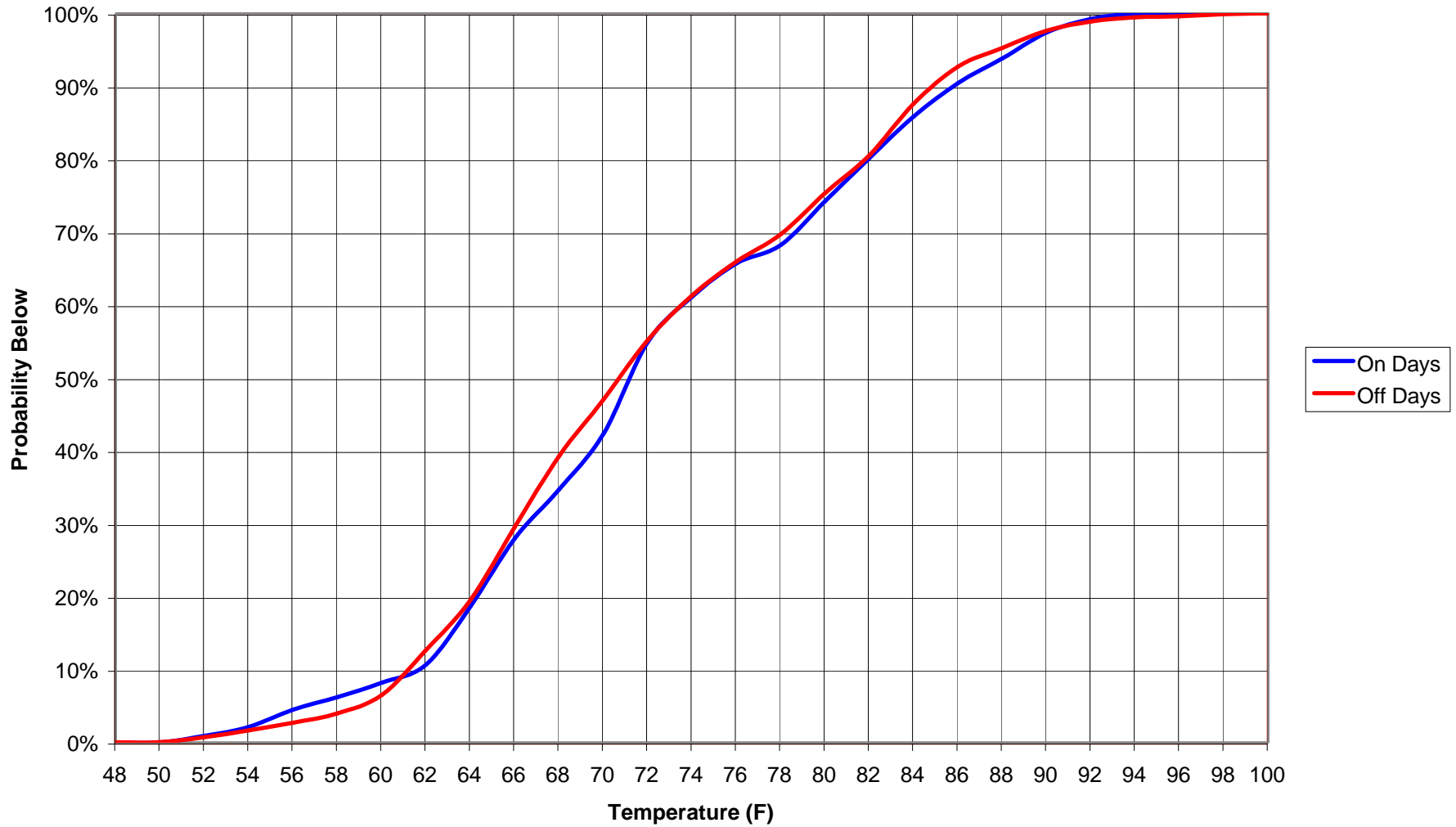
**Savings = 13.73%**

COMMENTS: Note: It was determined during testing that an increase of solar load of 4% caused a 0.75% increase of run-time. It was also found that a 2% increase of Cooling Degree-days caused a 1% increase in runtime. Adjusting the On-Day run-time for the increased temperatures and solar loading yields an additional reduction of run-time of 2hrs 26mins and 19sec or a total adjusted ON-Day run-time of 42Hrs 09mins and 54 secs.

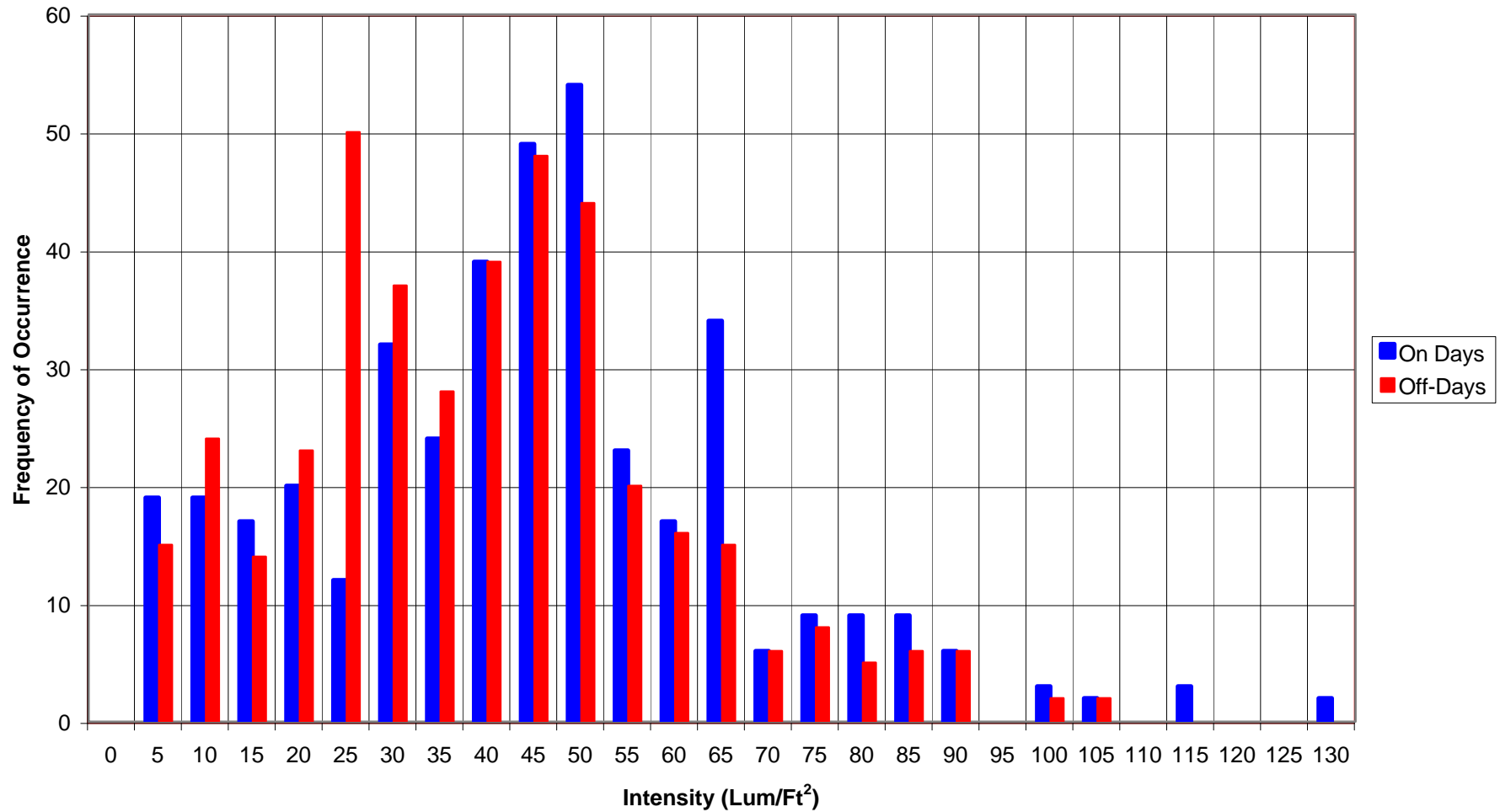
### Suffolk County - Civil Service Building #158 Outside Air Temperature Histogram



# Suffolk County - Civil Service Building #158 Outside Air Temperature Probabilities



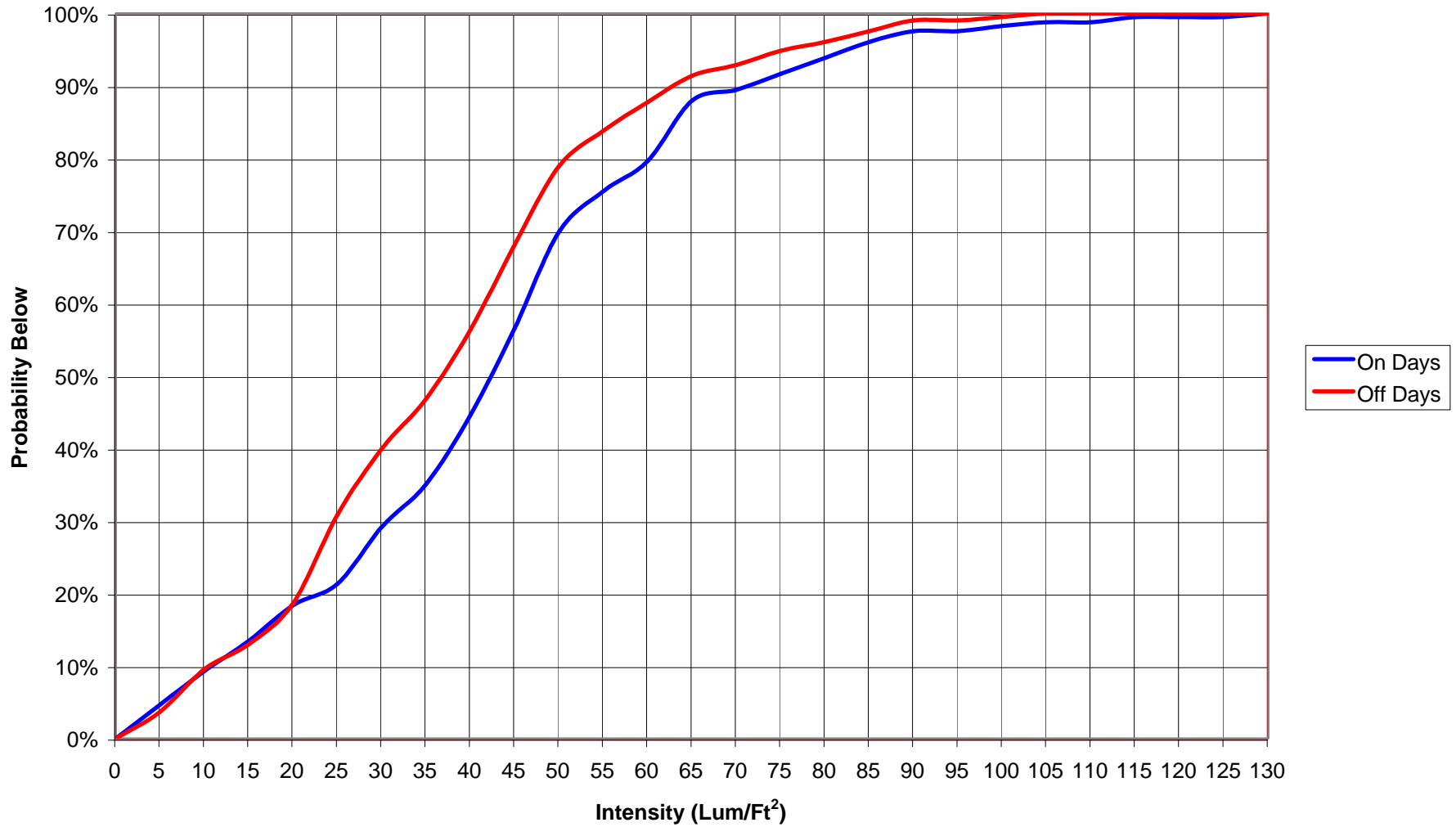
## Suffolk County - Civil Service Building #158 Solar Load Histogram



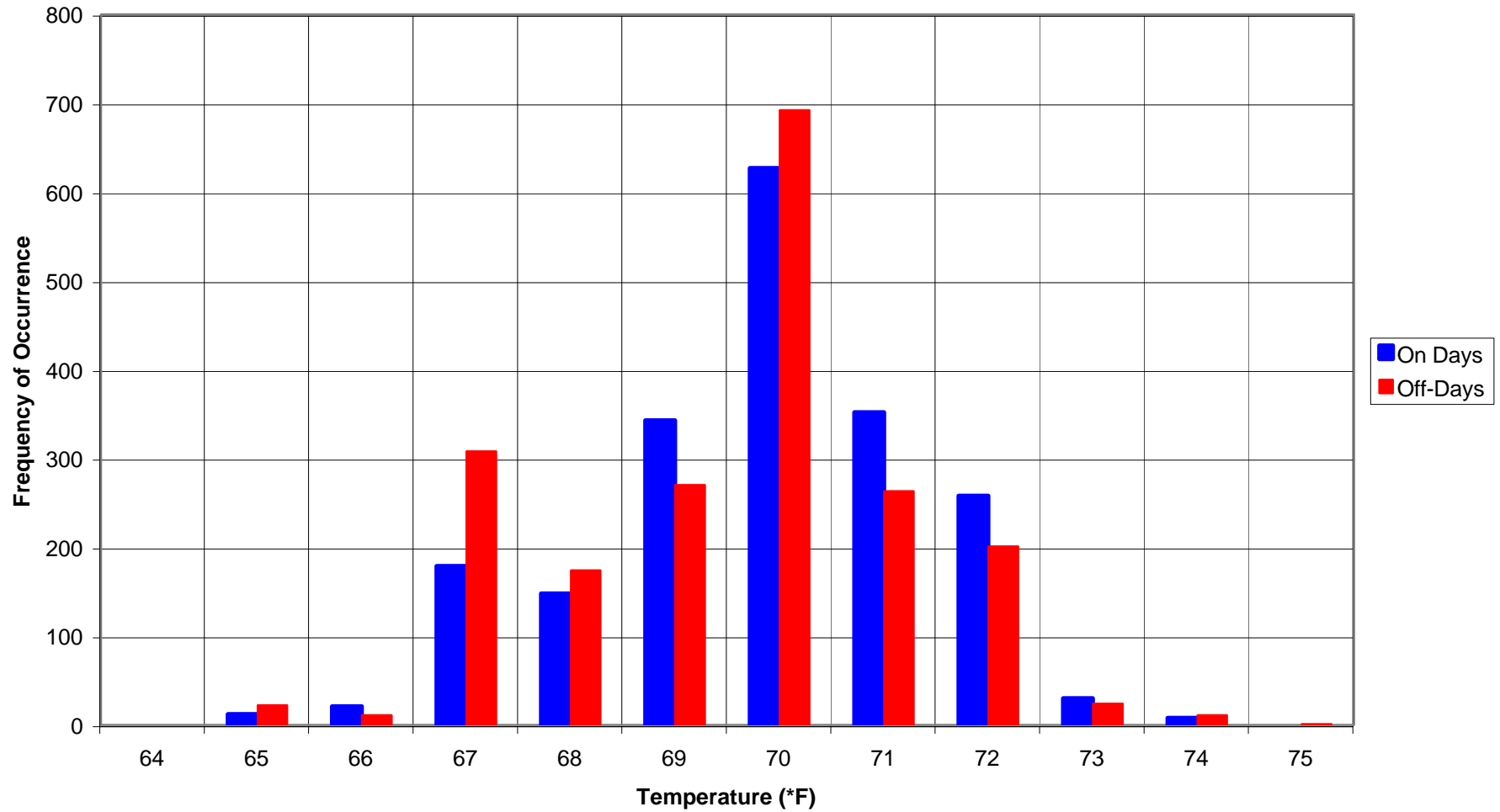


# Suffolk County - Civil Service Building #158

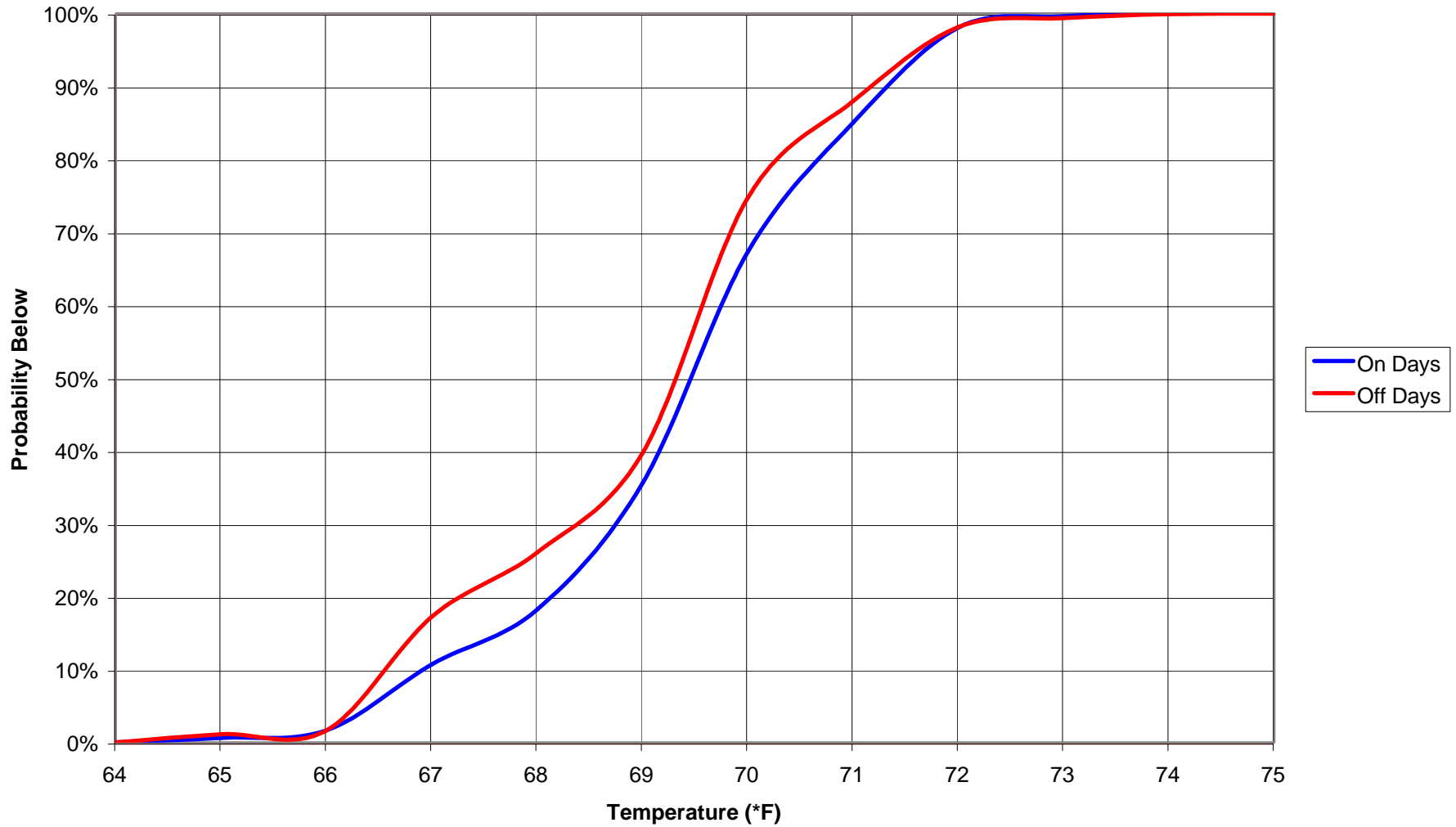
## Solar Load Probabilities



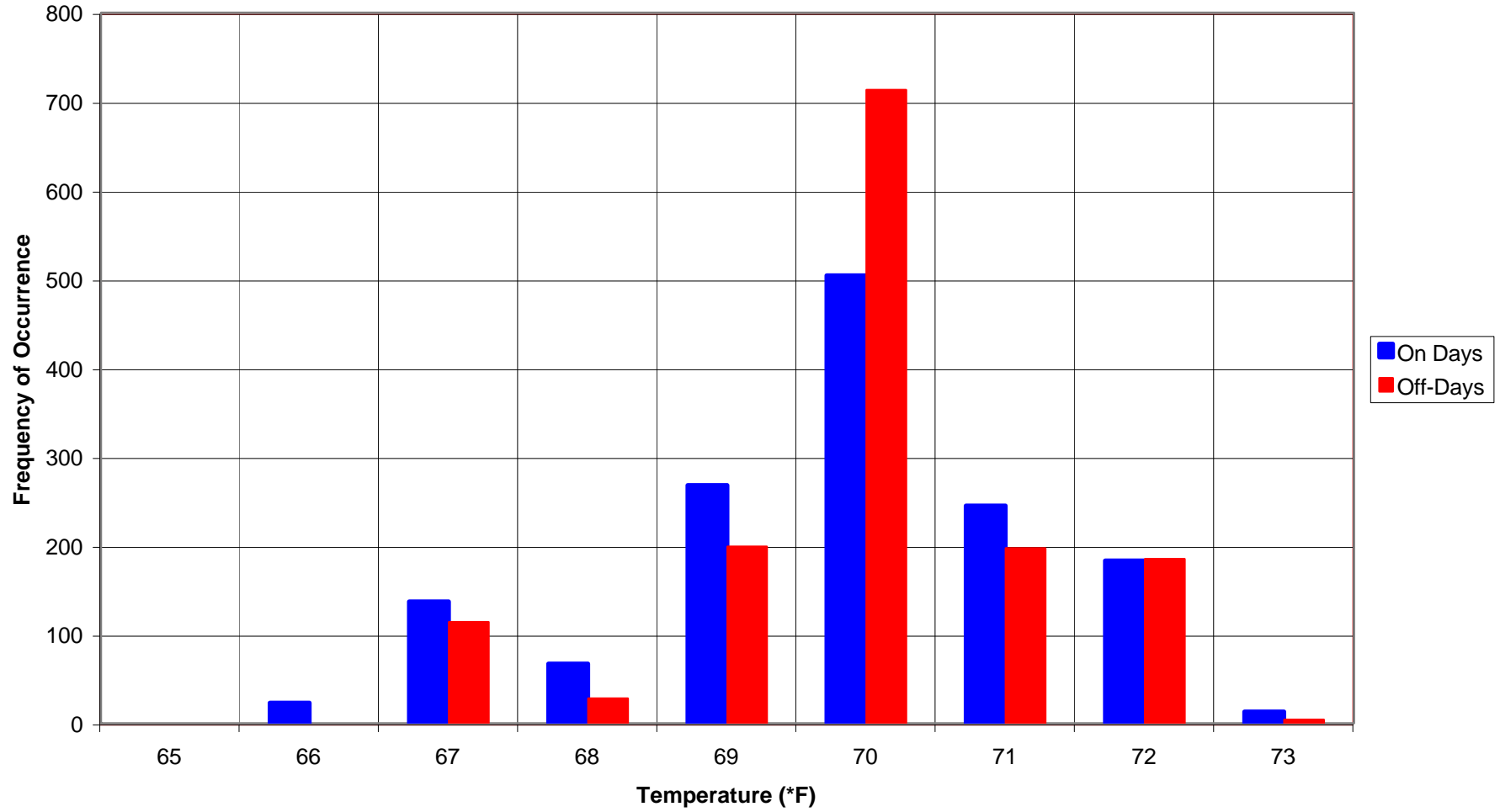
### Suffolk County - Civil Service Building #158 AC 18 Space Temperature Histogram



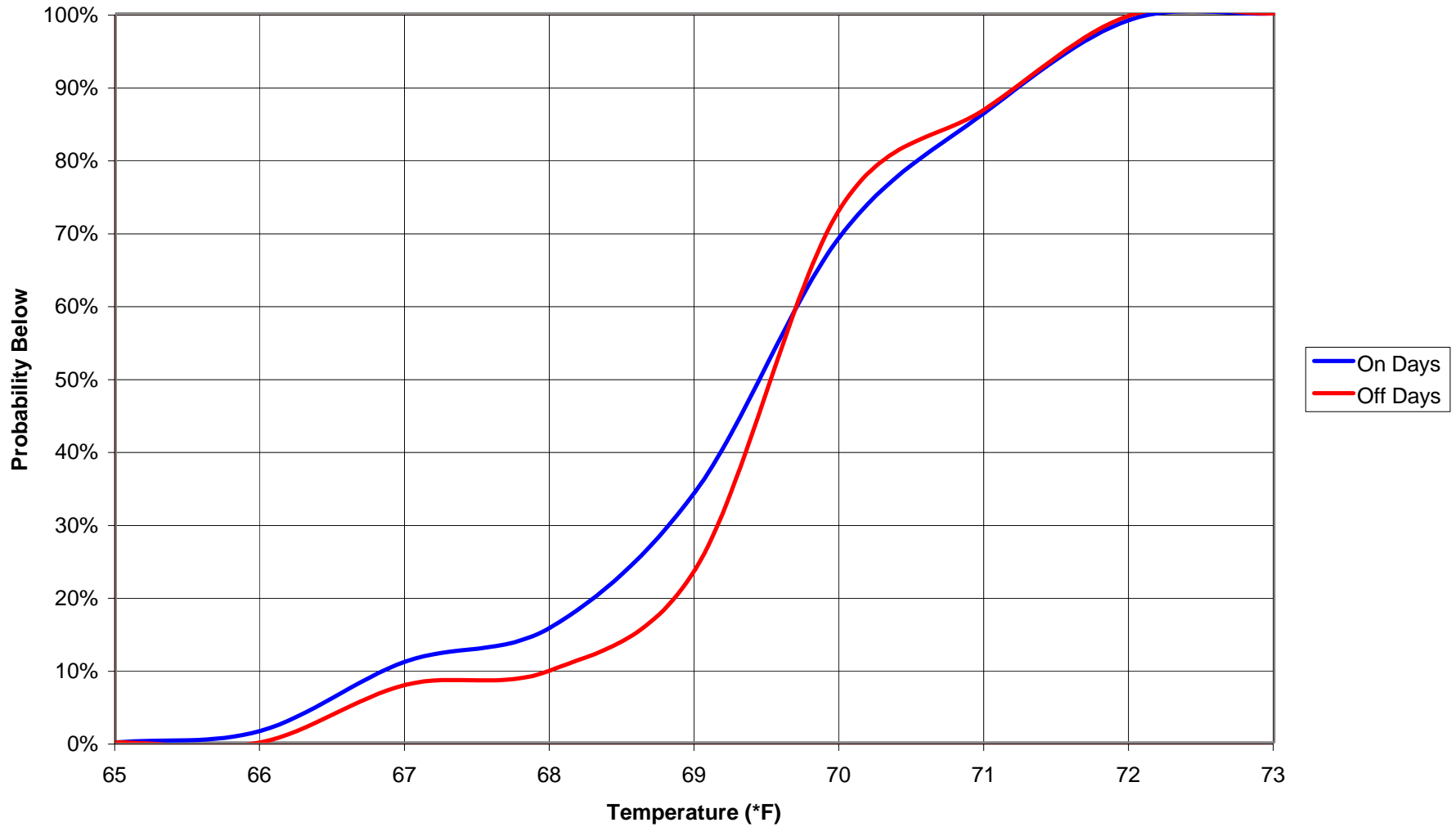
### Suffolk County - Civil Service Building #158 AC 18 Space Temperature Probabilities



### Suffolk County - Civil Service Building #158 AC 21 Space Temperature Histogram



### Suffolk County - Civil Service Building #158 AC 21 Space Temperature Probabilities





90 Pratt Oval  
 Glen Cove, NY 11542  
 Phone:516-676-0777  
 Fax: 516-676-2640

# Test Report

Report No. 12134-4

Date: 08/20/04

**Customer:**

Suffolk County  
 Department of Public Works  
 335 Yaphank Avenue  
 Yaphank, New York 11980-0059  
 Charles Bartha, Commissioner of Public Works

**Test Site Location:**

Medical Examiners Building  
 County Center Road, Hauppauge, NY  
  
 Contact: Bob Gadis

Test Type:  HEATING  AIR CONDITIONING  REFRIGERATION  OTHER: \_\_\_\_\_  
 Product Tested:  HW  LCH  LCS  CHW  CHS  AC  CAC  RU  OTHER: \_\_\_\_\_

**Type of Equipment:**

Walk In Refrigeration, Tagged "BOX 1"  
 Manufacturer: Bally  
 Model: PND 75-1  
 Capacity / SetPt: 3/4 HP / 32Deg F.  
 Act. V,Amps, Ph: 208VAC, Comp. Amps; 2.0, 3Ph  
 Application: Long Term Storage

Test Start Date: 04/17/04  
 Test End Date: 06/05/04  
 No. of Days in Test: 50

**ACTUAL COMPRESSOR RUN-TIME:**  in HRS.  in MIN.  
 IntelliCon ON-DAYS: 140:30:12  
 IntelliCon OFF-DAYS: 159:14:14  
 Run-time was reduced by: 11.76%

**COMPRESSOR USAGE FACTOR:**  
 IntelliCon On-Days: 23%  
 IntelliCon Off-Days: 27%

**Savings = 11.76%**

COMMENTS: Note: Actual box temperature was being maintained at 31°F.



90 Pratt Oval  
 Glen Cove, NY 11542  
 Phone: 516-676-0777  
 Fax: 516-676-2640

# Test Report

Report No. 12134-5

Date: 08/20/04

**Customer:**

Suffolk County  
 Department of Public Works  
 335 Yaphank Avenue  
 Yaphank, New York 11980-0059  
 Charles Bartha, Commissioner of Public Works

**Test Site Location:**

Medical Examiners Building  
 County Center Road, Hauppauge, NY  
  
 Contact: Bob Gadis

Test Type:  HEATING  AIR CONDITIONING  REFRIGERATION  OTHER: \_\_\_\_\_  
 Product Tested:  HW  LCH  LCS  CHW  CHS  AC  CAC  RU  OTHER: \_\_\_\_\_

**Type of Equipment:**

Walk In Refrigeration, Tagged "BOX 2"  
 Manufacturer: Bally  
 Model: PND 100-1  
 Capacity / SetPt: 1 HP / 45Deg F.  
 Act. V,Amps, Ph: 208VAC, Comp. Amps; 3.0, 3Ph  
 Application: Short Term Storage (donor organs)

Test Start Date: 04/17/04  
 Test End Date: 06/13/04  
 No. of Days in Test: 58

**ACTUAL COMPRESSOR RUN-TIME:**  in HRS.  in MIN.  
 IntelliCon ON-DAYS: 348:49:37  
 IntelliCon OFF-DAYS: 389:51:28  
 Run-time was reduced by: 10.52%

**COMPRESSOR USAGE FACTOR:**  
 IntelliCon On-Days: 50%  
 IntelliCon Off-Days: 56%

**Savings = 10.52%**

COMMENTS: Note: Contrary to the setpoint of the box (45°F) the actual Box temperature was being maintained at 38° F.



90 Pratt Oval  
 Glen Cove, NY 11542  
 Phone: 516-676-0777  
 Fax: 516-676-2640

# Test Report

Report No. 12134-6

Date: 08/20/04

**Customer:**

Suffolk County  
 Department of Public Works  
 335 Yaphank Avenue  
 Yaphank, New York 11980-0059  
 Charles Bartha, Commissioner of Public Works

**Test Site Location:**

Medical Examiners Building  
 County Center Road, Hauppauge, NY  
  
 Contact: Bob Gadis

Test Type:  HEATING  AIR CONDITIONING  REFRIGERATION  OTHER: \_\_\_\_\_

Product Tested:  HW  LCH  LCS  CHW  CHS  AC  CAC  RU  OTHER: \_\_\_\_\_

**Type of Equipment:**

Walk In Refrigeration, Tagged "BOX 3"  
 Manufacturer: Bally  
 Model: PND 200-1  
 Capacity / SetPt: 2 HP / 41Deg F.  
 Act. V,Amps, Ph: 208VAC, Comp. Amps; 6.0, 3Ph  
 Application: Short Term Storage (Body box)

Test Start Date: 04/17/04  
 Test End Date: 06/13/04  
 No. of Days in Test: 58

**ACTUAL COMPRESSOR RUN-TIME:**  in HRS.  in MIN.

IntelliCon ON-DAYS: 298:45:09  
 IntelliCon OFF-DAYS: 342:28:49  
 Run-time was reduced by: 12.77%

**COMPRESSOR USAGE FACTOR:**

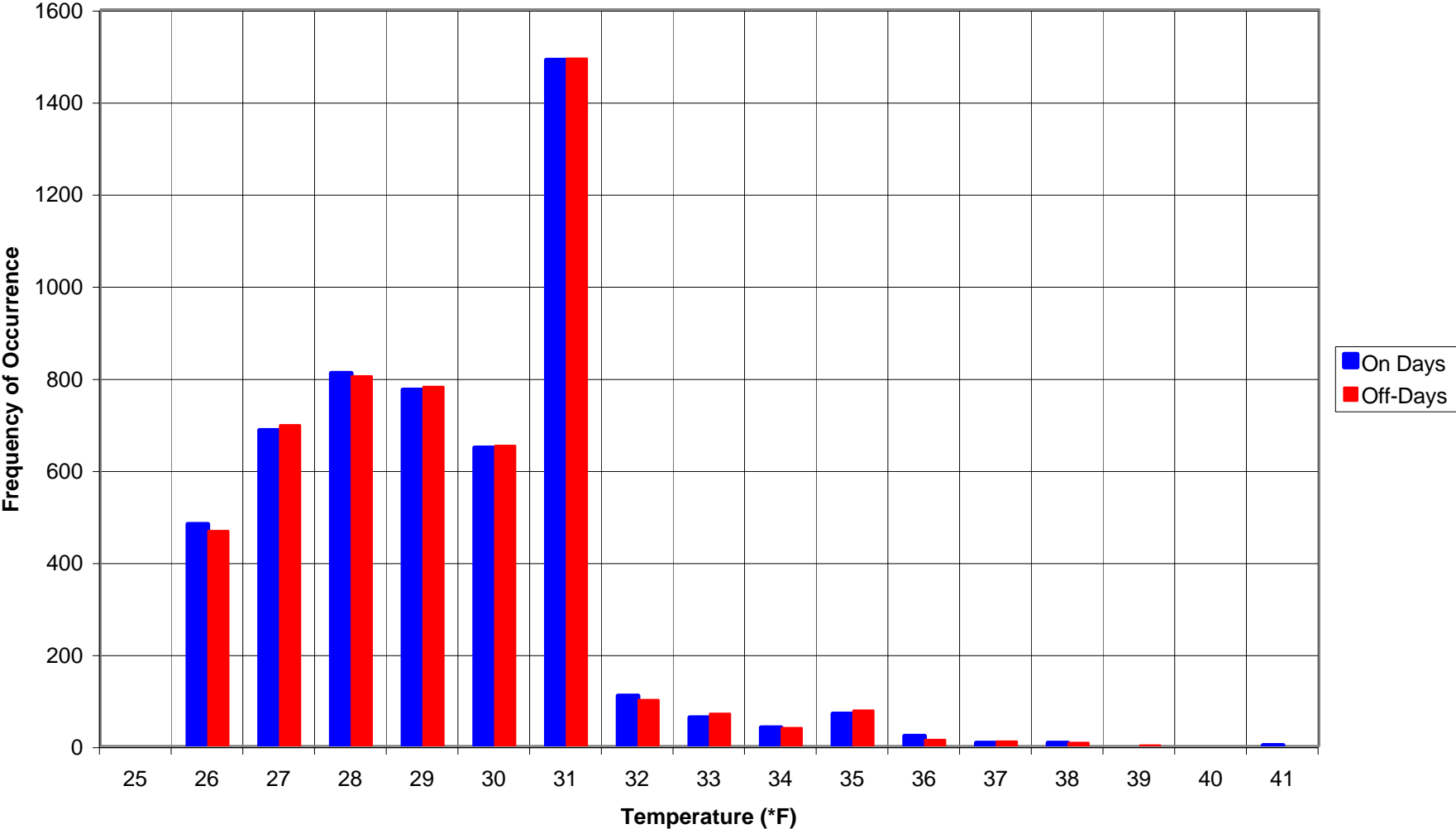
IntelliCon On-Days: 43%  
 IntelliCon Off-Days: 49%

**Savings = 12.77%**

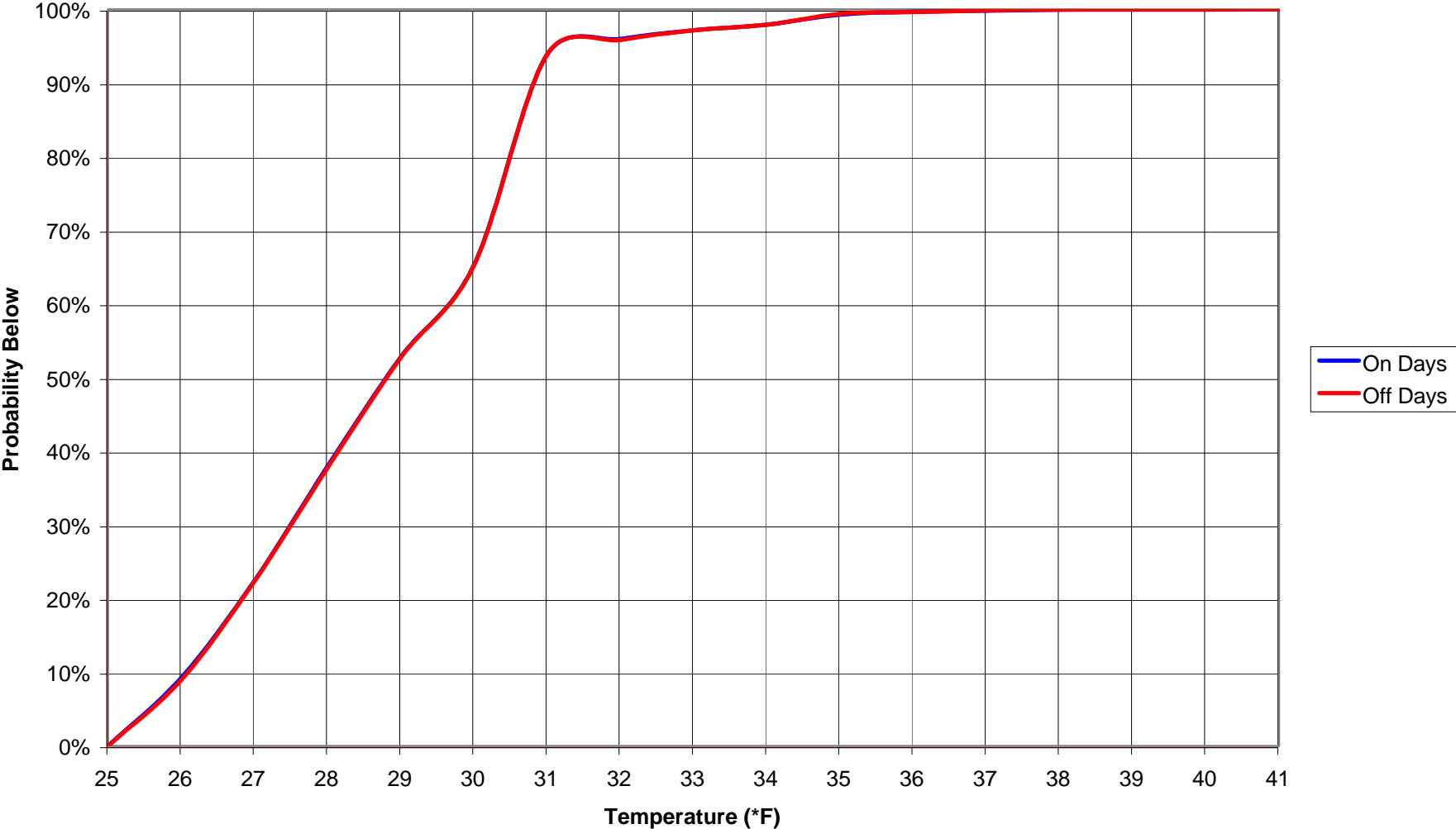
COMMENTS: Note: Contrary to the setpoint of the Box (41°F), testing revealed two (2) distinct setpoints. One at 35°F the other at 38°F. Perhaps the setpoints were adjusted during the testing? Unknown.



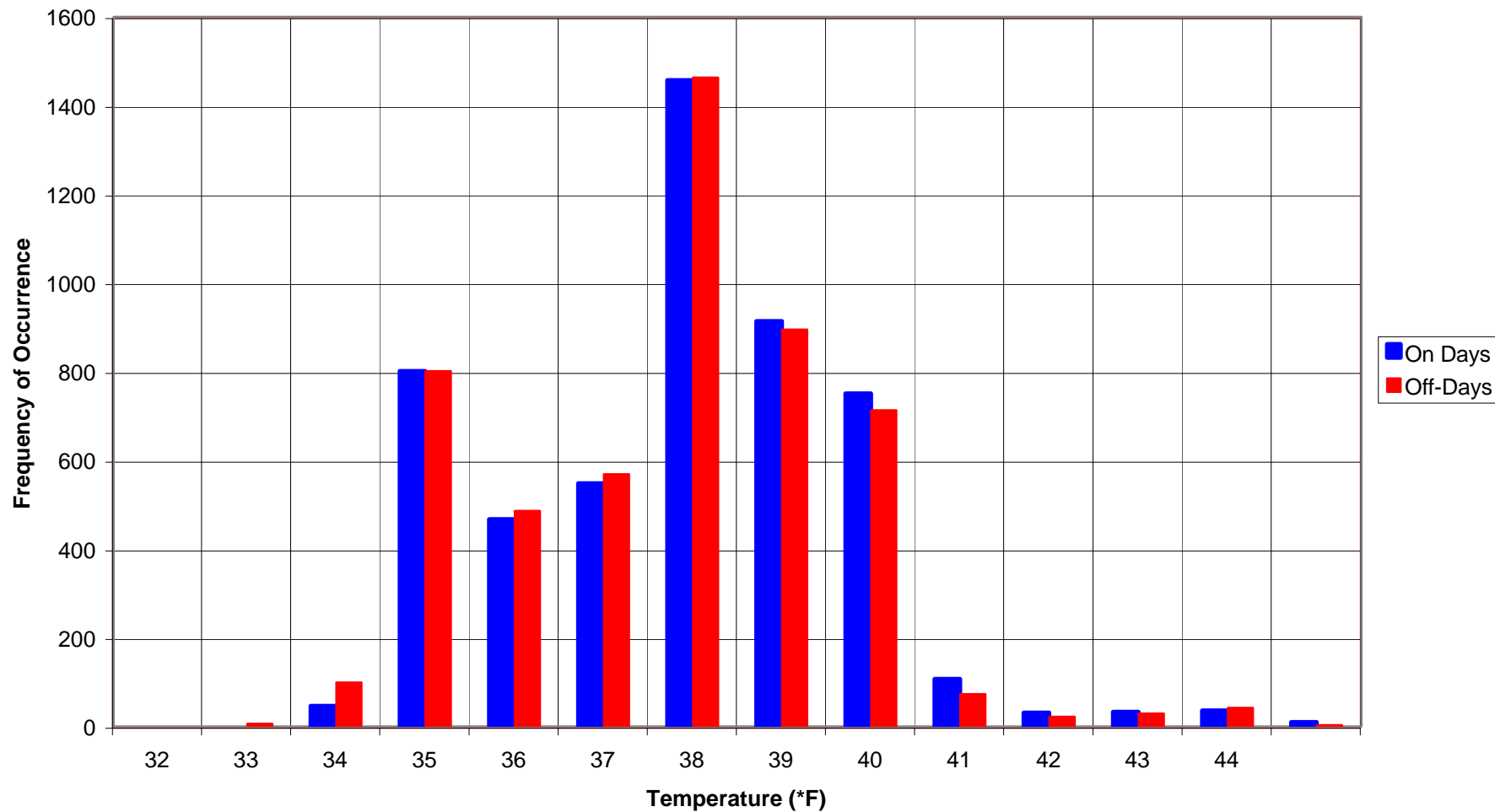
### Suffolk County - Medical Examiner Box #1 Temperature Histogram



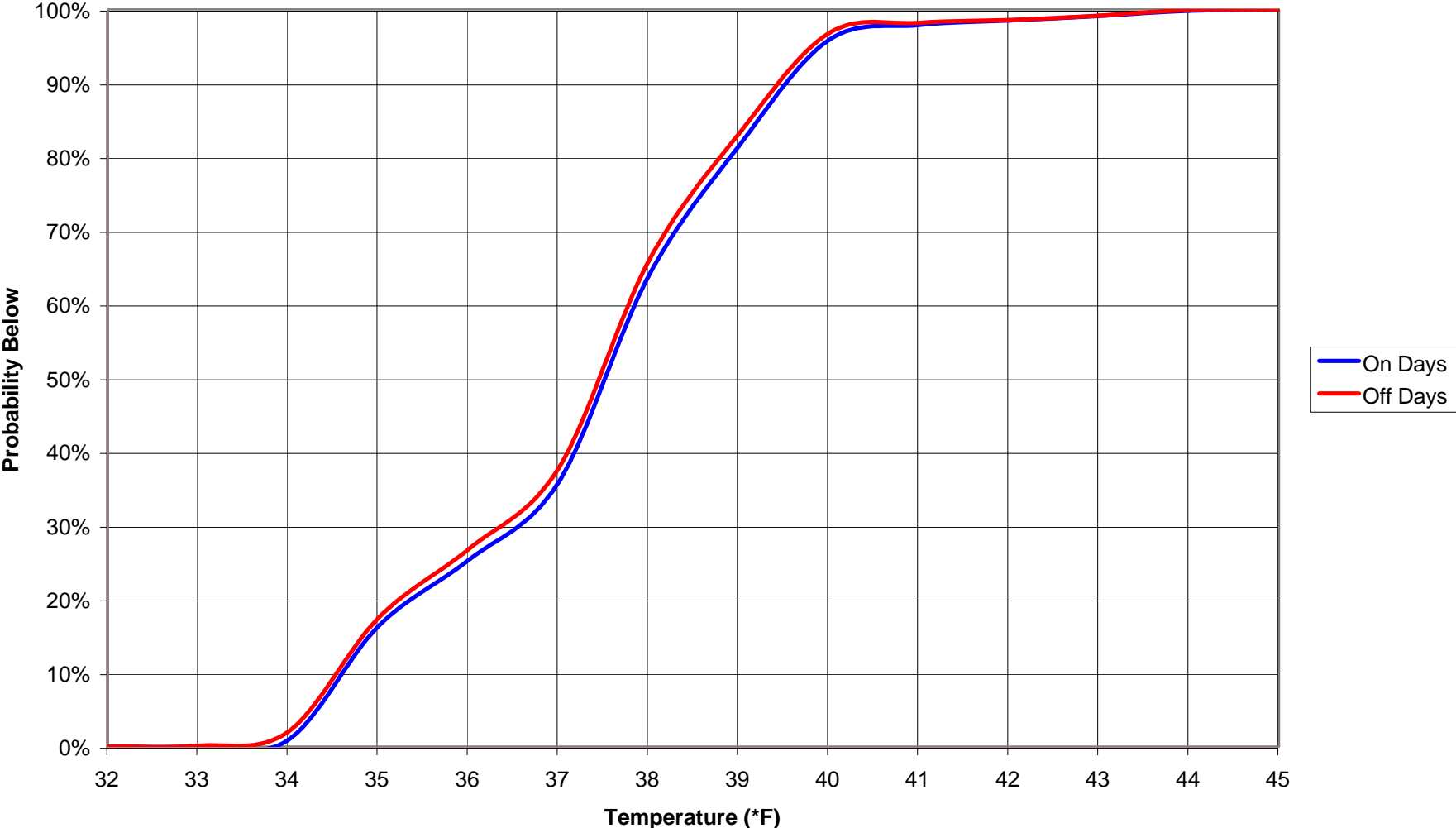
# Suffolk County - Medical Examiner Box #1 Temperature Probabilities



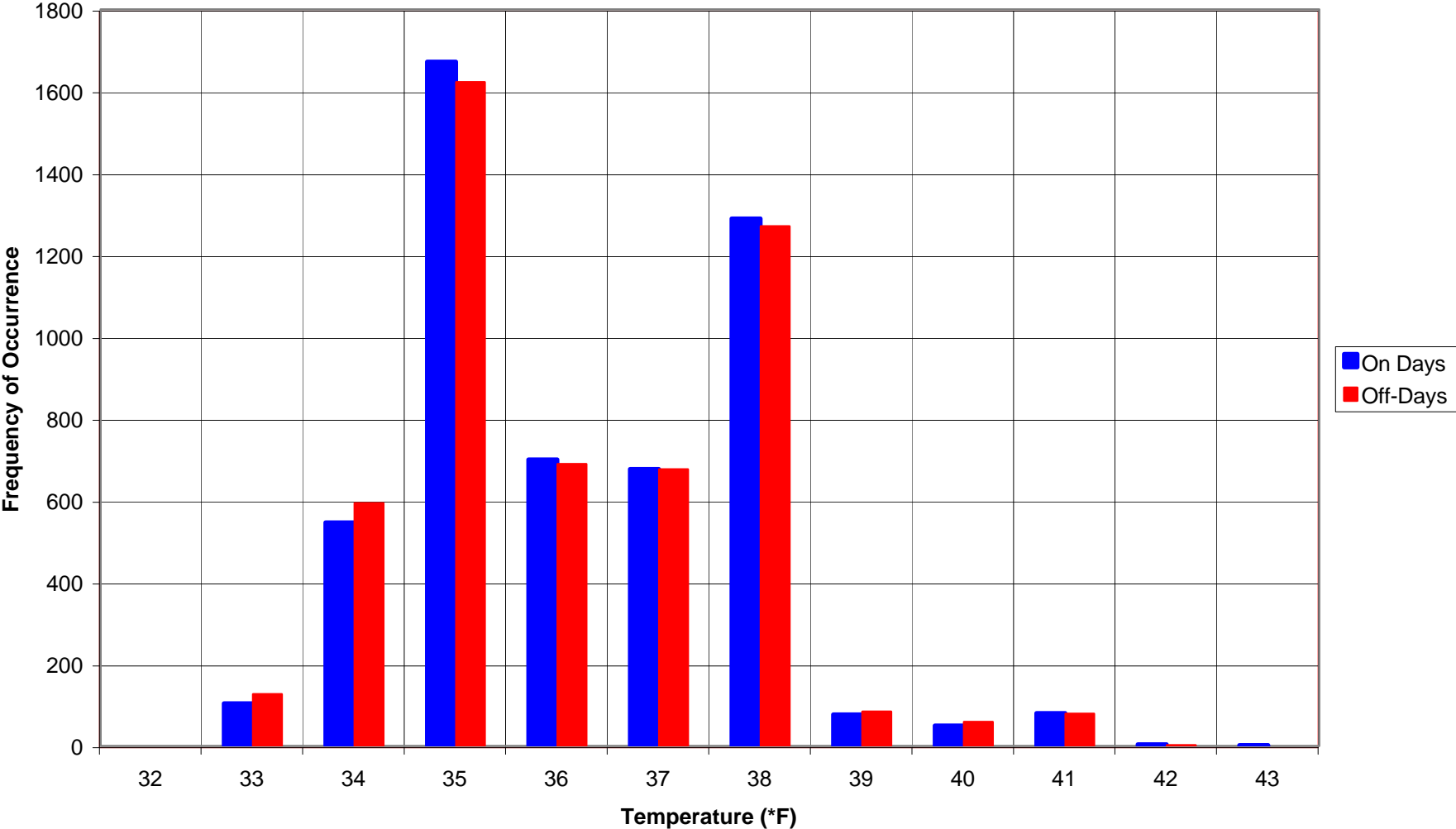
### Suffolk County - Medical Examiner Box #2 Temperature Histogram



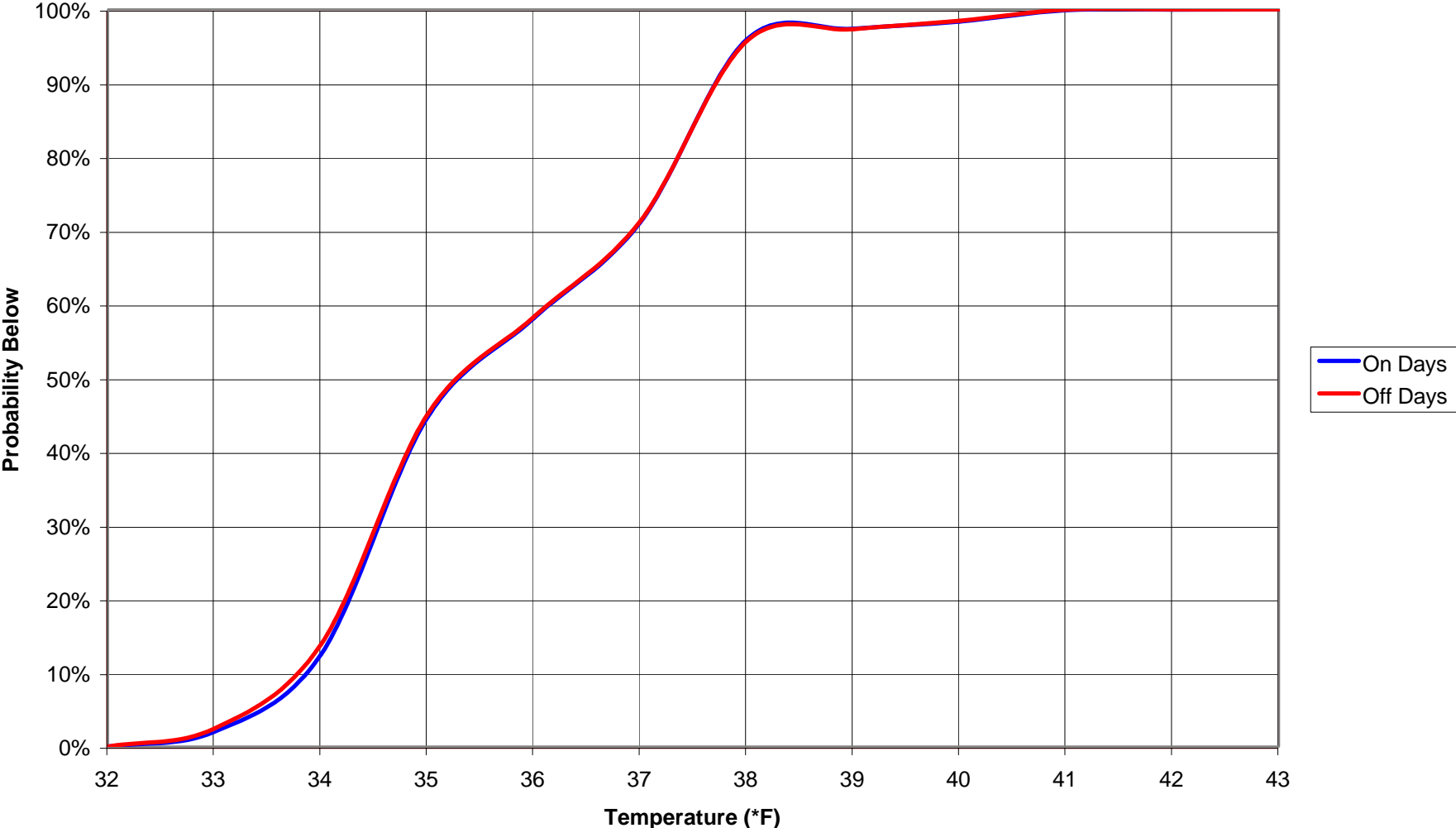
# Suffolk County - Medical Examiner Box #2 Temperature Probabilities



### Suffolk County - Medical Examiner Box #3 Temperature Histogram



### Suffolk County - Medical Examiner Box #3 Temperature Probabilities





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Glen Cove, NY 11542  
Phone: 516-676-0777  
Fax: 516-676-2640

# Testing Methodology

## EQUIPMENT USED FOR TESTING PURPOSES

Specific timing and data logging devices are used to gather detailed information about the unit(s) being evaluated. Each device has been carefully selected for its reliability, capability and function. The individual devices INTELLIDYNE uses are explained below.

### 1. TIME CLOCK:

Manufacturer: Tork Model: 8007V-0

Is used to switch the IntelliCon® product in and out of the circuit. This is done on a 24 hour basis. The result is that the IntelliCon® product is in control ("in" the circuit) one day and not in control ("out" of circuit) the next day. A 14 day time clock was selected so that a complete alternation of days that IntelliCon® is in control would result.

### 2. CURRENT SWITCH:

Manufacturer: Veris Industries Model: Hawkeye 608/908

The current switch is used to monitor when current is being drawn by the cooling/refrigeration compressor or heating burner. When current is sensed it is "On" when no-current is sensed it is off "OFF". The current switch is used in conjunction with the "Change-of-State" data logger.

### 3. "CHANGE-OF-STATE" DATA LOGGER:

Manufacturer: Onset Computer Corp. Model: H06-001-02

This device monitors and logs the "change-of-states" (the on / off status) of the unit being tested. It is used in conjunction with the CURRENT SWITCH, above, and time and date-stamps (logs) each change of status. By processing the logged data, the durations for each cycle can be determined.

### 4. "LIGHT INTENSITY" DATA LOGGER

Manufacturer: Onset Computer Corp. Model: HLI

This data logger is used to monitor and log Light Intensity and is used to determine the solar-load influence on the facility.

### 5. "T/Rh" DATA LOGGER

Manufacturer: Onset Computer Corp. Model: H08-004-02

This data logger is used to monitor and log the temperature and relative humidity in the conditioned space.

### 6. "TEMPERATURE" DATA LOGGER

Manufacturer: Onset Computer Corp. Model: H08-001-02

This data logger is used to monitor and log the outdoor air temperature, and is used to determine the degree-day influence on the facility

## **WHAT DATA IS COLLECTED**

Linking all of the above together with the IntelliCon® product being “in” and “out” of the circuit, on alternating days, yields the following data:

- ? How many on/off cycles per day (if applicable).
- ? Total “on time” per cycle, per day.
- ? Total “off time” per cycle, per day.
- ? What the solar load of the facility was during the test period (if applicable).
- ? What the relative humidity in the conditioned space was during the test period (if applicable).
- ? What the temperature of the conditioned space was during the test period (if applicable).
- ? What the outdoor air temperature was during the test period (if applicable).

## **How The Data Is Analyzed**

Upon completion of the test, all the data is evaluated to calculate the reduction of consumption (savings).

Short-term testing analysis can only be performed properly by the elimination and reduction of as many variables as possible and through the analysis of the data on a statistical basis. The alternating “in” circuit / “out” of circuit testing has the advantage of minimizing the variations due to time-sensitivity, day-of-week sensitivity, degree-day effects, etc.

In order to properly evaluate the data, the following must be determined:

1. A baseline must be established. Baseline consumption data is the “use” or consumption information that is unaffected by the IntelliCon economizer (“out” of circuit). This may be derived during the test (which is what is done here) or from historical records. The advantage of deriving the base-line during the test is that site specific degree-day and solar data may be determined as opposed to weather-service data that may or may not be indicative of the test site.
2. It is necessary to determine what effects or influences are caused by solar- load and degree-day variations. This is done by performing a statistical analysis on the solar and degree-day data collected during the base-line phase.
3. In order to properly compare the two consumption cases (IntelliCon “in” and “out” of circuit), and determine the savings, it is necessary to adjust (or “normalize”) the data collected during the “in-circuit” phase. The consumption data collected when the IntelliCon economizer was “in-circuit”, is “normalized” by compensating for the effects of the solar and degree-day influences that occurred during the same phase of the test. This is accomplished by applying the statistical analysis results of the solar and degree-day influences (collected during the base-line phase) as a means to compensate for the solar and degree-day variations that occurred during the “in” circuit phase of the test.
4. The normalized consumption data acquired during the “in” circuit phase is compared to the base-line data and the savings determined.