

Village
of
Huntington Bay, N.Y.

Reducing Natural Gas Consumption

Test Results
For
Village Hall

A Confidential Report

Prepared by

Intellidyne LLC

Energy Savings Analysis Report on the effect of an *IntelliCon*[®]-HW on the Village Hall Boiler.

April 13, 2003

Methodology:

The test was conducted from 00:00:00 on 1/22/2003 to 23:59:59 on 2/18/2003 (28 Days). It consisted of alternating the *IntelliCon*[®]-HW's operational state from "On" to "Off" on alternating days of the week. Thus it was operating Thursday, Saturday, and Monday for the first and third weeks of the test, and operating Wednesday, Friday, Sunday, and Tuesday the second and fourth weeks of the test.

Burner run-time data was collected via a data logger that "time and date stamped" each transition of on-to-off and off-to-on of the burner. By analyzing these time/date stamps, the accumulated run-time of Burner operation was calculated for both the days when the *IntelliCon* unit was "On" and for the days when it was "Off".

To properly analyze to the run-time data, and determine the savings, the effects of changing outdoor air temperatures and changing solar loads (on the building's heating demand) must be compensated for. During the test period, outdoor air temperature and solar data were gathered "on-site" using data loggers.

During this test it was found that the solar load had no statistical effect on the Heating demand and was not adjusted for in the calculations. The Solar Loading chart has been included as part of this report.

Using the logged data the "Heating Degree Days" (HDD) were determined for the "On" days and for the "Off" days. It was found that the "On" days were on average colder than the "Off" days during the test period. To "normalize" the run-time data due to the effects of temperature changes we must either increase the "Off" data (since it was warmer on the "Off" days), or decrease the "On" data (since it was colder on the "On" days). For the purpose of this report the latter was chosen. In either case, the results are the same.

Following standard ASHRAE (American Society of Heating, Refrigeration, and Air-Conditioning Engineers) methods, the run times accumulated for the "On" days were normalized by multiplying the "On" run-times by the ratio of the "Off" HDD to the "On" HDD. This computation estimates the actual run times that would have occurred during the "On" days if the average temperatures had been the same as on the "Off" days. The accumulated Heating Degree Days for both the "On" and "Off" days were found to be:

Heating Degree Days for "On" Days (HDD_{on}).....	386
Heating Degree Days for "Off" Days (HDD_{off}).....	398

As this data shows, **it was 3.05% colder when the *IntelliCon* units were "Off" compared to when they were "On".**

The Correction Factor used to normalize the data is calculated using the "On" day and "Off" day Heating Degree Days. The Correction Factor formula is: $1 + ((HDD_{off} - HDD_{on}) / HDD_{off})$.

Once this correction factor is determined, the percentage of reduction in run-time for equivalent loads is then able to be calculated. The results are as follows:

Equipment:

Boiler: Weil McLain
M/N: EG-40-P1
Fuel: Nat. Gas
Firing Rate: 199,000
Heating Zones: 3
Dom. H/W Coil: Yes

Runtime Data Analysis:

Total Run Time for "Off" Days	8359 minutes
Total Run Time for "On" Days	7111 minutes
Correction Factor: = $1 + ((366-400) / 366) =$	0.9695
HDD Corrected "On" Time: = $8359 \times .9695 =$	8104 minutes
Reduction in run-time: = $(7111-8104)/7111 =$	13.96%
Calculated Savings = 13.96	

Burner Cycling Reduction:

It was determined that during the test the Burner cycled 1010 times during the "On" days, and 1168 times on the "Off" days. This is a **15.6% reduction in cycling** that will reduce pollution, sooting, and maintenance requirements.

Calculated Fuel Reductions:

The Boiler's burner has a nameplate firing rate of 199 MBH Nat. Gas/hr. This equates to 1.99 Therms / Hour or 0.033 Therms / Minute.

If we assume that for the two-week portion of the test that the IntelliCon-CHW was "Off"; 276 Therms (8359 minutes of run-time x 0.033 = 276) of natural gas were consumed, and we extend that to an approximate consumption for the month by multiplying the 276 by 2 we would get a consumption of 552 Therms. If we then apply the 13.96% savings we would realize a savings of 77 Therms or 7,700 cu/ft of natural gas.

Using current Natural Gas prices at 63¢ per Therm, we can calculate that the savings for the Test period would have been approximately \$48.51.

Test Days:

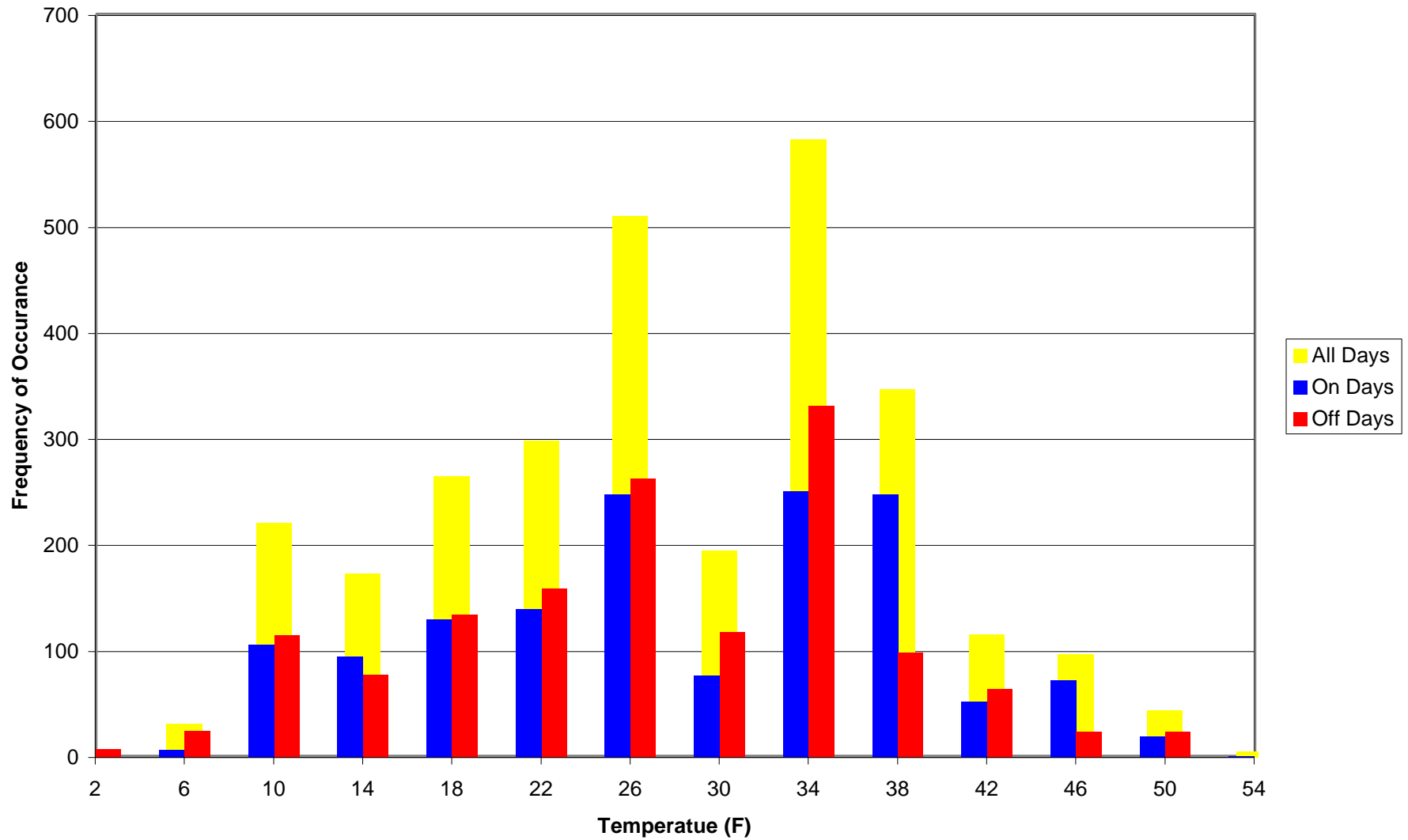
On days	DOW		Off days	DOW
			01/22/03	Wed
01/23/03	Thu		01/24/03	Fri
01/25/03	Sat		01/26/03	Sun
01/27/03	Mon		01/28/03	Tue
01/29/03	Wed		01/30/03	Thu
01/31/03	Fri		02/01/03	Sat
02/02/03	Sun		02/03/03	Mon
02/04/03	Tue		02/05/03	Wed
02/06/03	Thu		02/07/03	Fri
02/08/03	Sat		02/09/03	Sun
02/10/03	Mon		02/11/03	Tue
02/12/03	Wed		02/13/03	Thu
02/14/03	Fri		02/15/03	Sat
02/16/03	Sun		02/17/03	Mon
02/18/03	Tue			

Charts:

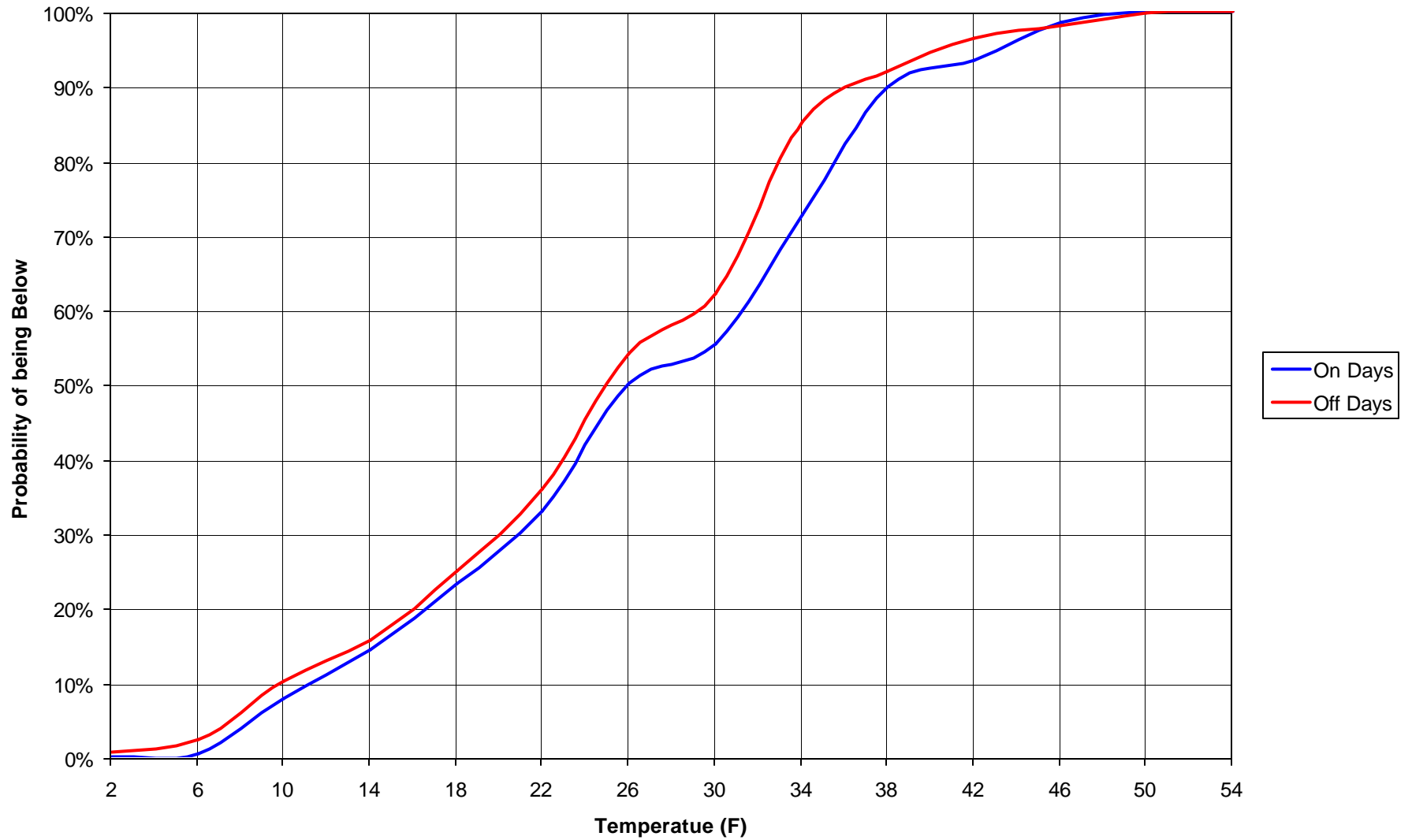
The following charts have been included for informational purposes and reflect no statistical differences between the days that the IntelliCon was "On" or "Off".

- Space Temperature:
 - Reception Area
 - Meeting Room
 - Police Department
- Solar Load
- Outdoor Air Temperature

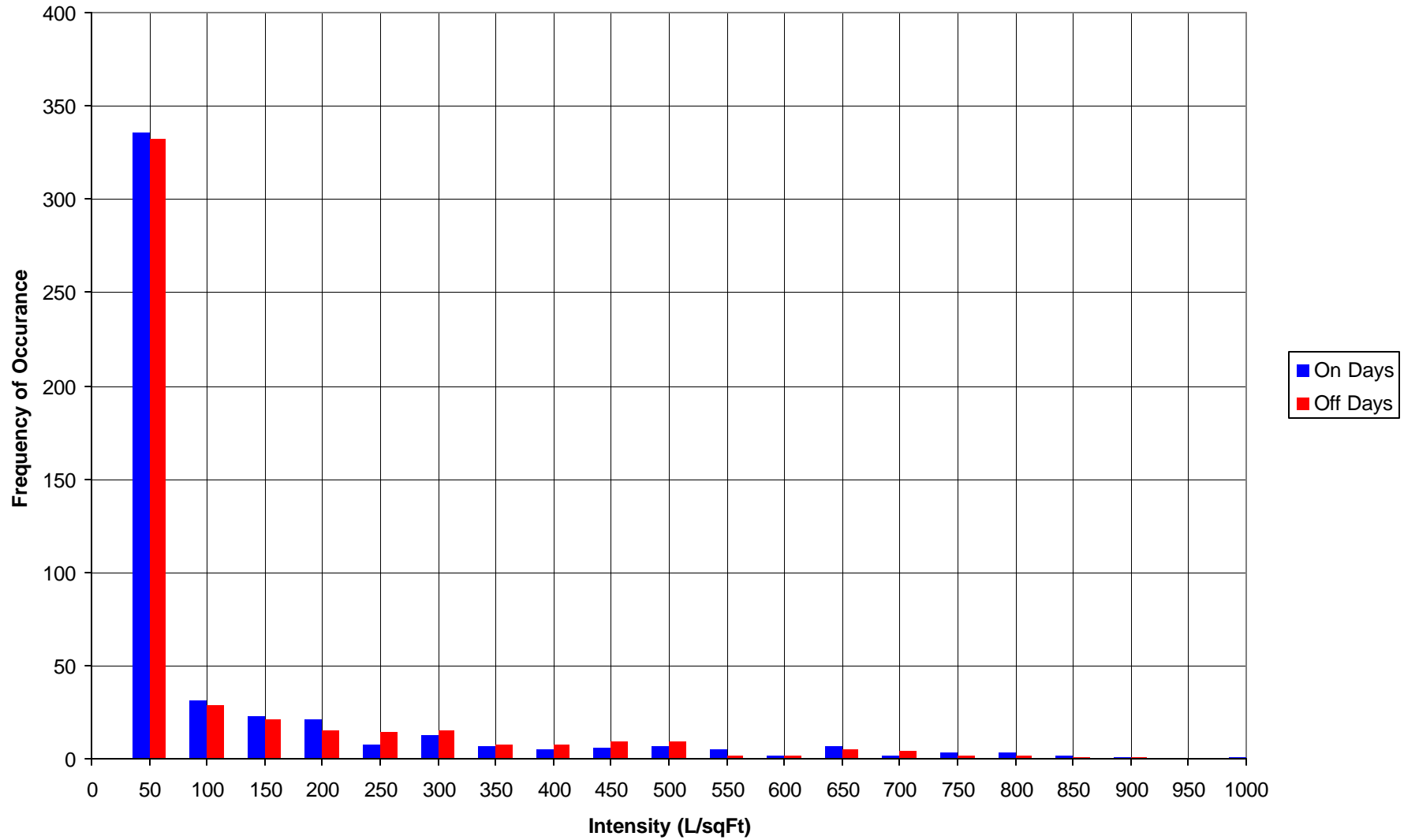
Outside Air Temperature Histogram



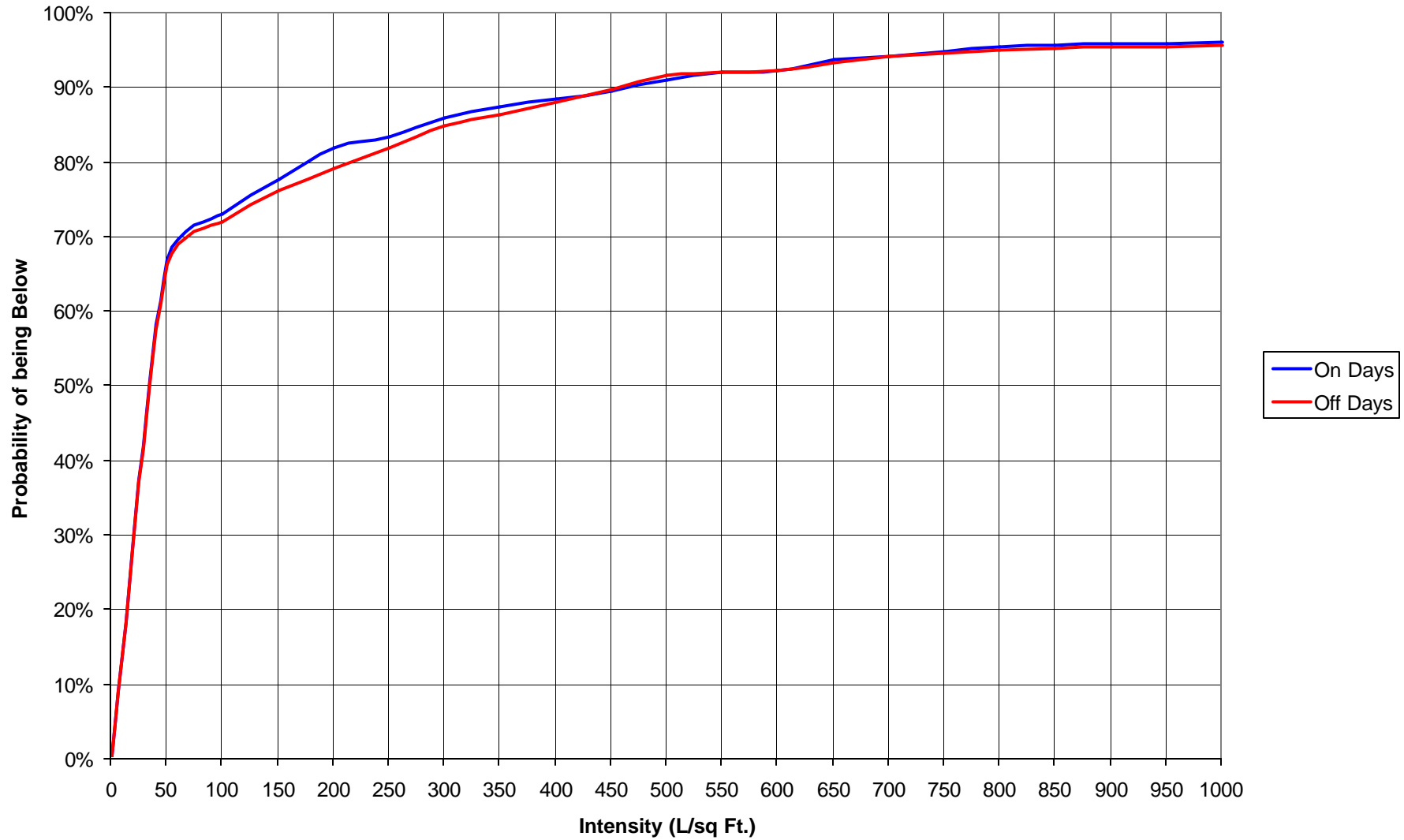
Outside Air Temperature Probability



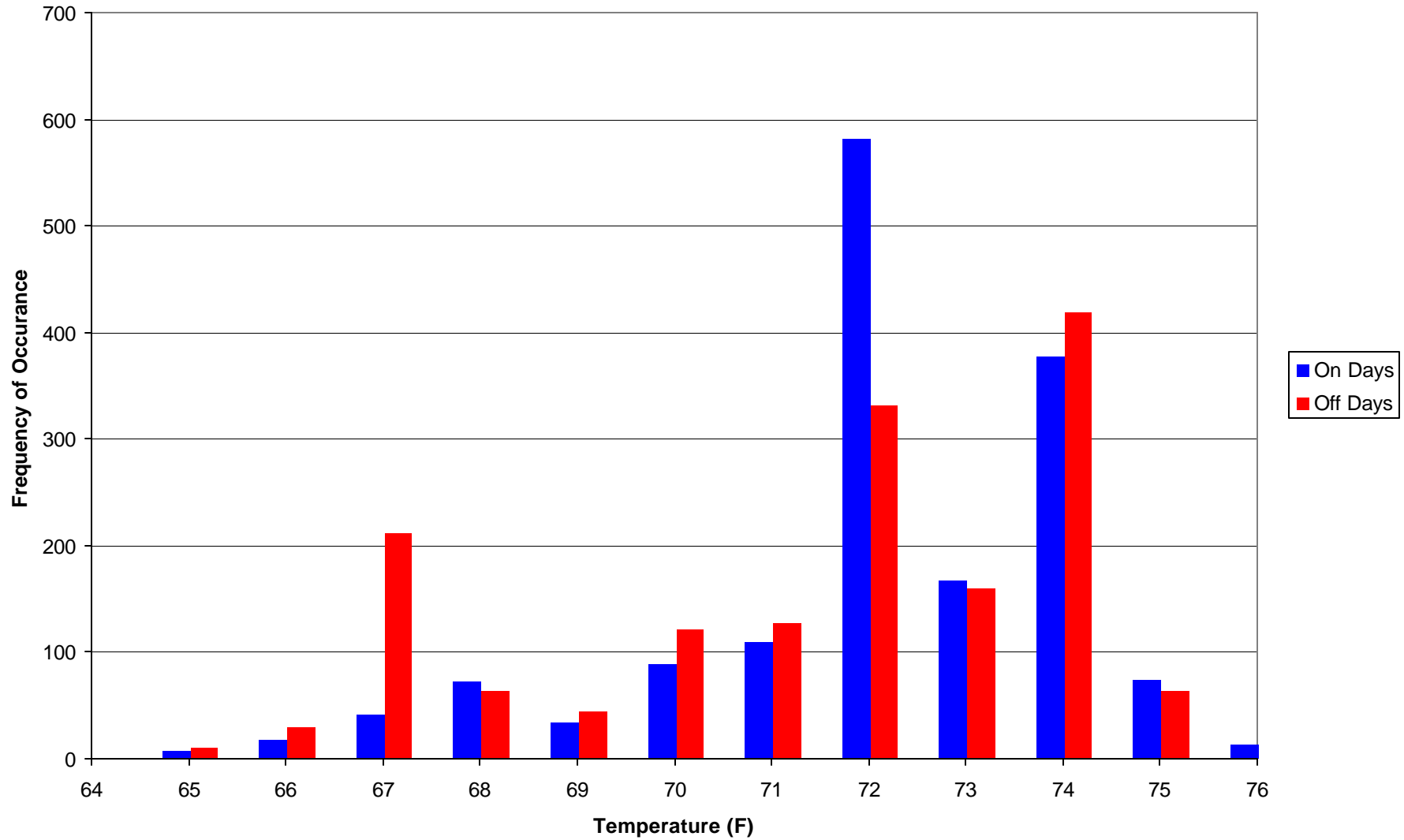
Solar Load Histogram



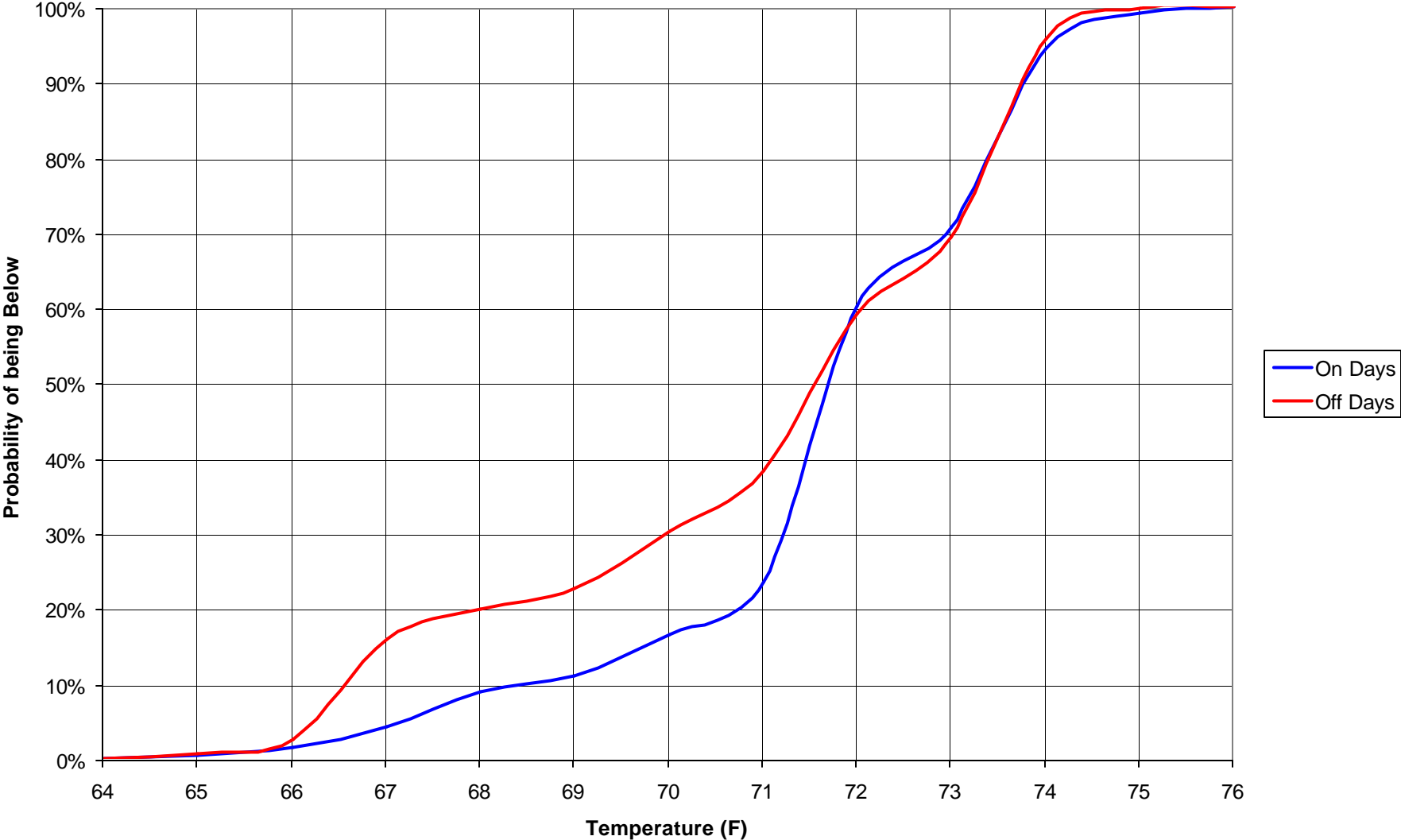
Solar Load Probability



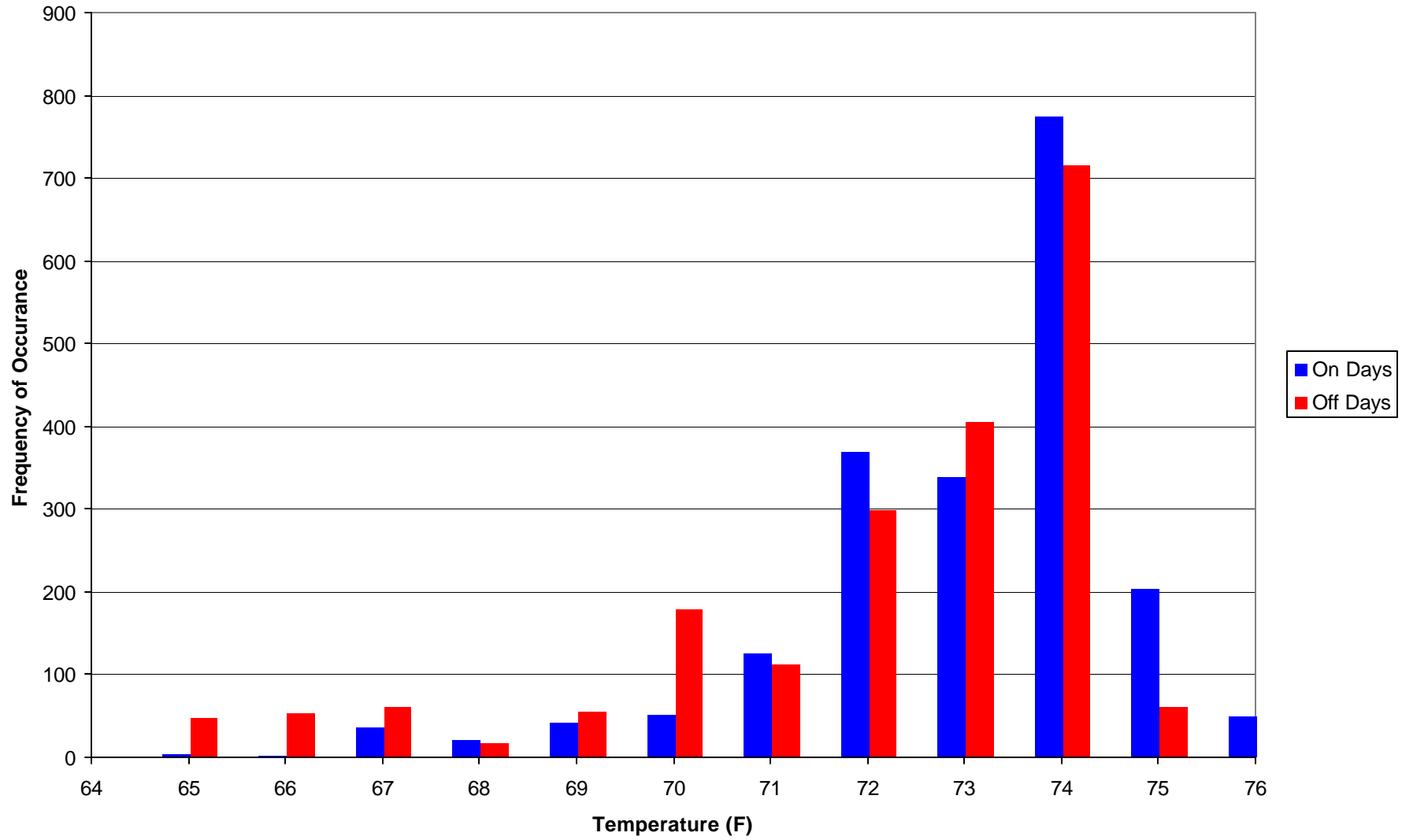
Reception Temperature Histogram



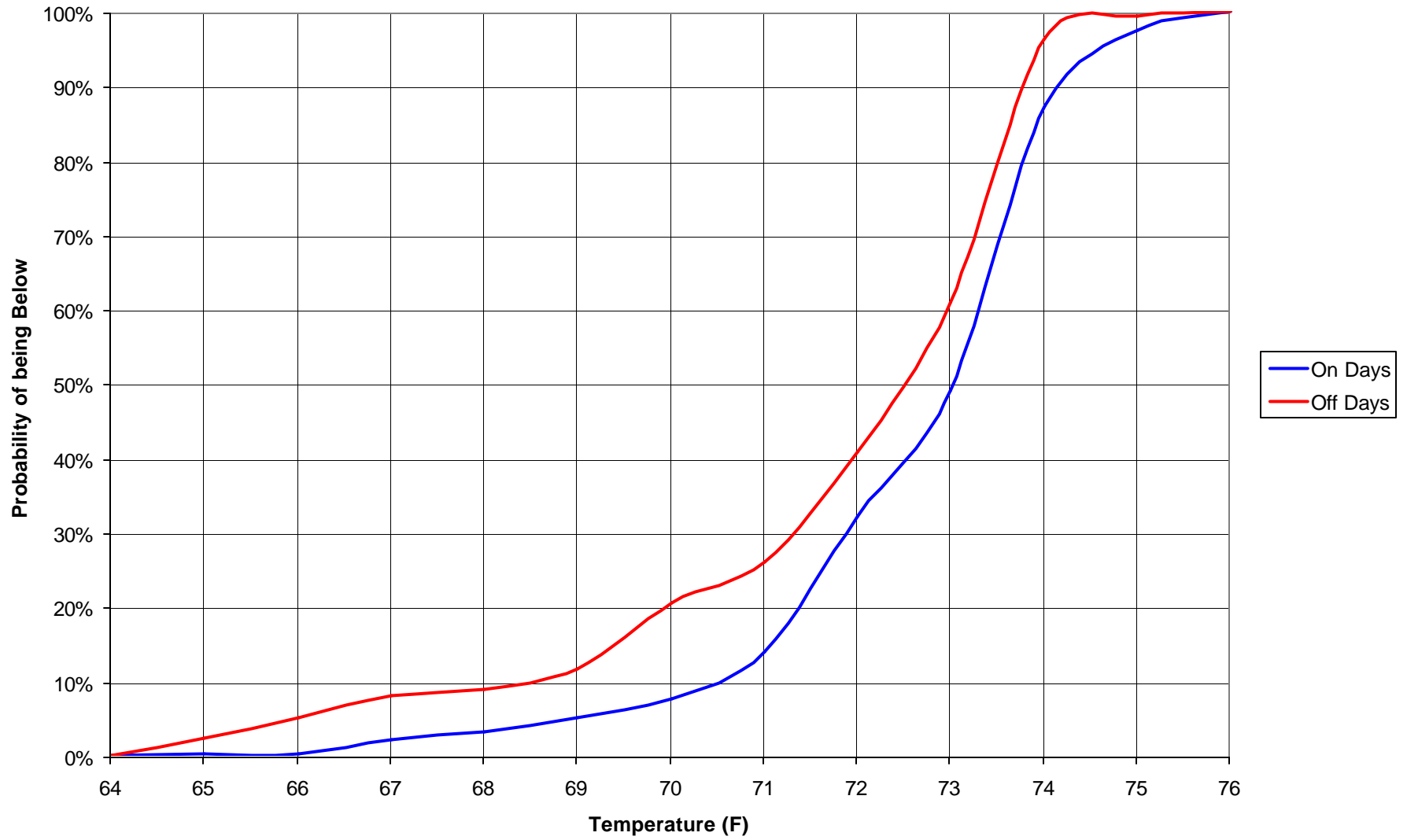
Reception Temperature Probability



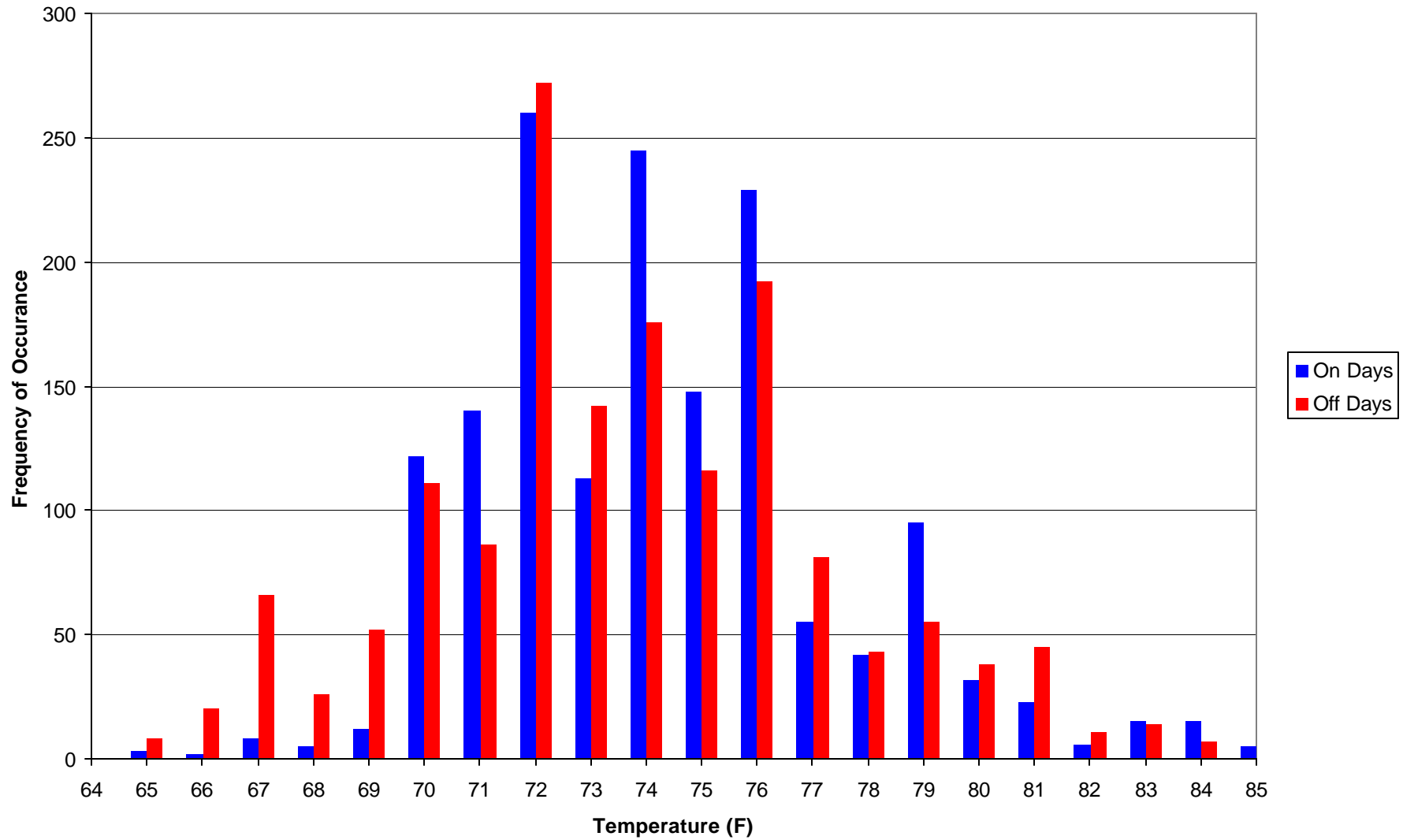
Meeting Room Temperature Histogram



Meeting Room Temperature Probability



Police Dept. Temperature Histogram



Police Dept. Temperature Probability

