



Report No. 12133
Date: 08/11/04

Fuel Reduction Pilot Program

CONDUCTED AT

OUR LADY OF GRACE

850 East 226th Street, Bronx, N.Y.

CONDUCTED FOR THE

Archdiocese of New York Building Commission

TEST RESULTS

FOR

HYDRONIC HEATING & DOMESTIC HOT-WATER
BOILERS

A Confidential Report

Prepared by

Intellidyne LLC

EXECUTIVE SUMMARY

The attached technical report summarizes the Energy Saving Performance of the IntelliCon® LCH control which was installed on the American Standard Model: Exebrook W-2012 hydronic heating boiler serving the entire convent and the IntelliCon® HW control which was installed on the State, Model: SBF75 120 NE2 75 Gal. Cap, domestic hot water heater. These systems operate on a 24 hours per day, 7 days per week basis at the OUR LADY OF GRACE convent located at 850 East 226th Street, Bronx, N.Y.

The IntelliCon® controls were originally installed on March 10th, 2004 and test data was collected until April 12, 2004. 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.

During the testing period at this particular location, **the IntelliCon-LCH delivered a fuel consumption reduction of 15.31% on the American Standard hydronic heating boiler and 10.91% on the State domestic hot-water heater.** These reductions were achieved without degradation of the temperature maintenance and no noticeable impact to the buildings occupants. Also notable is the fact that the IntelliCon® controllers reduced on/off cycling on both systems by over 30%.

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® affect. This validation analysis clearly shows the IntelliCon® control delivers above the minimum guaranteed savings of 10%. This improvement in operational efficiency was achieved while providing consistent and predictable space comfort.

Test Summary and Recommendations:

The Archdiocese of New York can expect a pay-back on the IntelliCon® investment in less than 12 months on the American Standard hydronic heating system. Although the IntelliCon® HW control delivered an impressive 10.91% reduction in fuel consumption on the small domestic hot water heater, this particular application may not be cost effective. The low usage factor on this system would indicate a longer ROI than on a system that was functioning in the more average 30% - 80% usage factor range.

The IntelliCon® Energy Saving Control will deliver the following benefits to the Archdiocese of New York and comes with a 15 year warranty against manufacturing defects.

- **Guaranteed Energy Consumption Reductions**
- **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® technology is an excellent business decision which can deliver real and meaningful operating cost reductions year in and year out.



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Test Report

Report No. 12133-1

Date: 08/11/03

Customer:

Archdiocese of New York Building Commission
 201 Seminary Avenue, Yonkers, N.Y., 10704

Contact: Bill O'Connor, Director, Archdiocesan Bldgs Commission

Test Site Location:

Our Lady Of Grace
 850 East 226th Street, Bronx, N.Y.

CONTACT: Superintendent, Joe

Test Type: HEATING AIR CONDITIONING REFRIGERATION OTHER: _____

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

Type of Equipment:

Manufacturer: American Standard
 Model: Exebrook W-2012
 Capacity/Fuel: 690,000 BTU/Hr / #2 Oil (5GPH)
 Area Served: Entire Convent

Location of Equip: Basement MER

Test Start Date: 03/10/04

Test End Date: 04/12/04

No. of Days in Test: 34

BURNER RUN-TIME:

in HRS. in MIN.

IntelliCon ON-DAYS: 105:35:31

IntelliCon OFF-DAYS: 124:41:03

The Burner ran 15.31% MORE on the "OFF" Days.

BURNER USAGE FACTOR:

IntelliCon On-Days: 26%

IntelliCon Off-Days: 31%

HEATING DEGREE-DAYS (FOR TEST PERIOD)

IntelliCon ON-DAYS: 351

It was 5.0% Warmer on the On-Days.

IntelliCon OFF-DAYS: 369

Total Degree-Days: 720

SOLAR LOAD COMPENSATION: (Lumens/Sq. Ft.)

IntelliCon ON-DAYS: 1765

IntelliCon OFF-DAYS: 1885

It was 6.35% Sunnier on the OFF-Days

BURNER CYCLING REDUCTION:

IntelliCon ON-DAYS: 614

IntelliCon OFF-DAYS: 886

Cycling was reduced by: 30.7%

Savings = 15.31%

COMMENTS:

Note: The effects of Heating Degree-Days and Solar Load negated each other... As such, it was not necessary to compensate for them when normalizing the results for comparison. Space temperature maintenance was maintained throughout the test period as is evidenced by the Histogram and Probability charts.



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Test Report

Report No. 12133-2

Date: 08/11/03

Customer:

Archdiocese of New York Building Commission
 201 Seminary Avenue, Yonkers, N.Y., 10704

Contact: Bill O'Connor, Director, Archdiocesan Bldgs Commission

Test Site Location:

Our Lady Of Grace
 850 East 226th Street, Bronx, N.Y.

CONTACT: Superintendent, Joe

Test Type: HEATING AIR CONDITIONING REFRIGERATION OTHER: _____

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

Type of Equipment:

Manufacturer: State
 Model: SBF75 120 NE2 75 Gal. Cap
 Capacity/Fuel: 120,000 BTU/Hr / Natural Gas
 Area Served: Entire Convent

Location of Equip: Basement MER

Test Start Date: 03/20/04

Test End Date: 04/12/04

No. of Days in Test: 24

BURNER RUN-TIME: in HRS. in MIN.

IntelliCon ON-DAYS: 42:04:00

IntelliCon OFF-DAYS: 47:13:01

The Burner ran **10.91%**
 MORE on the "OFF" Days.

BURNER USAGE FACTOR:

IntelliCon On-Days: **15%**

IntelliCon Off-Days: **16%**

HEATING DEGREE-DAYS (FOR TEST PERIOD)

IntelliCon ON-DAYS: 351 It was **5.0%** Warmer on the On-Days.

IntelliCon OFF-DAYS: 369

Total Degree-Days: 720

SOLAR LOAD COMPENSATION: (Lumens/Sq. Ft.)

IntelliCon ON-DAYS: 1765

IntelliCon OFF-DAYS: 1885 It was **6.35%** Sunnier on the OFF-Days

BURNER CYCLING REDUCTION:

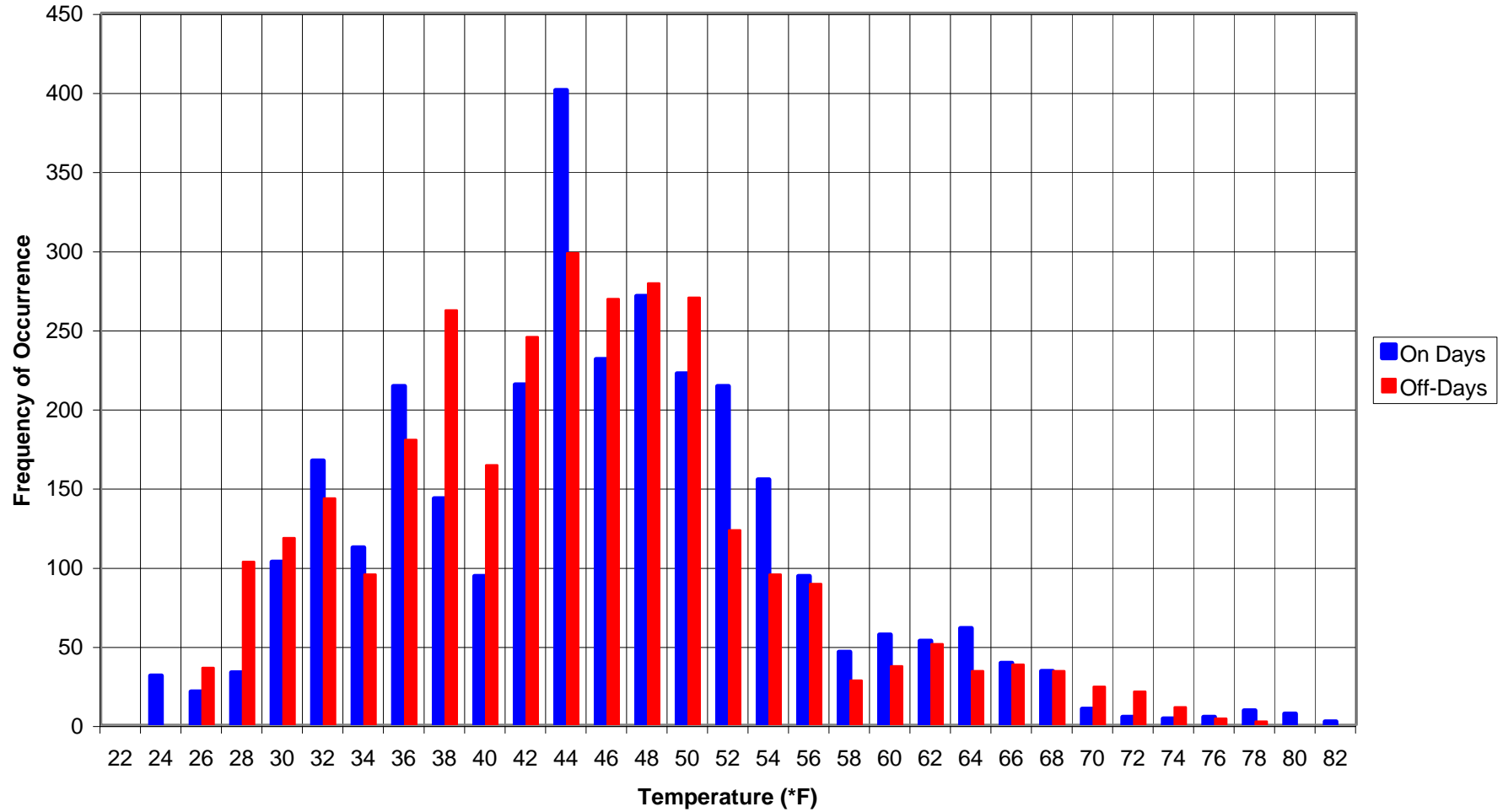
IntelliCon ON-DAYS: 478

IntelliCon OFF-DAYS: 694 Cycling was reduced by: **31.1%**

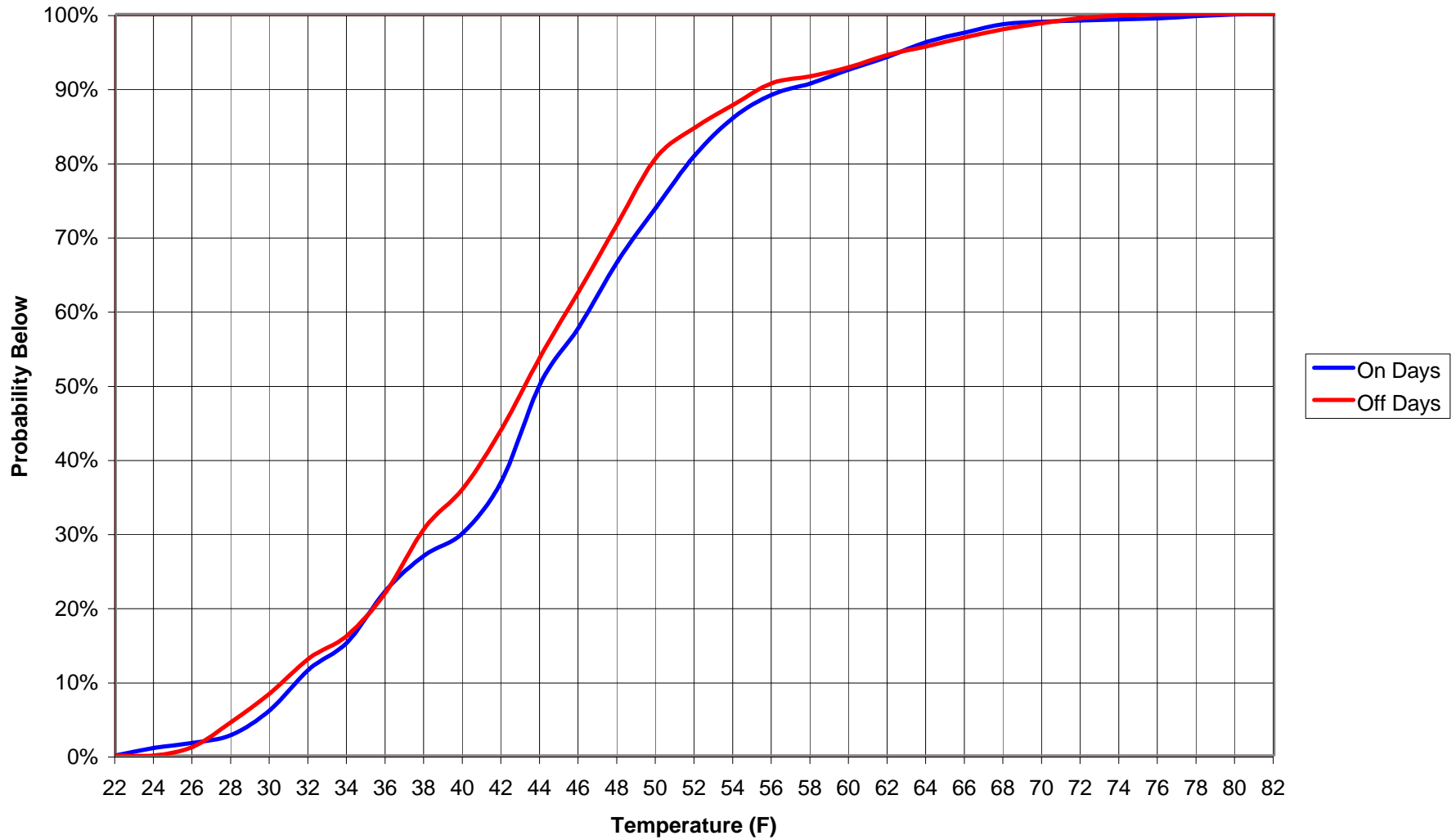
Savings = 10.91%

COMMENTS: Note: The effects of Heating Degree-Days and Solar Load negated each other... As such, it was not necessary to compensate for them when normalizing the results for comparison. This application may not be cost effective due to the low usage factor which would indicate a longer ROI than a system that was functioning in the more average 30% - 80% usage factor range.

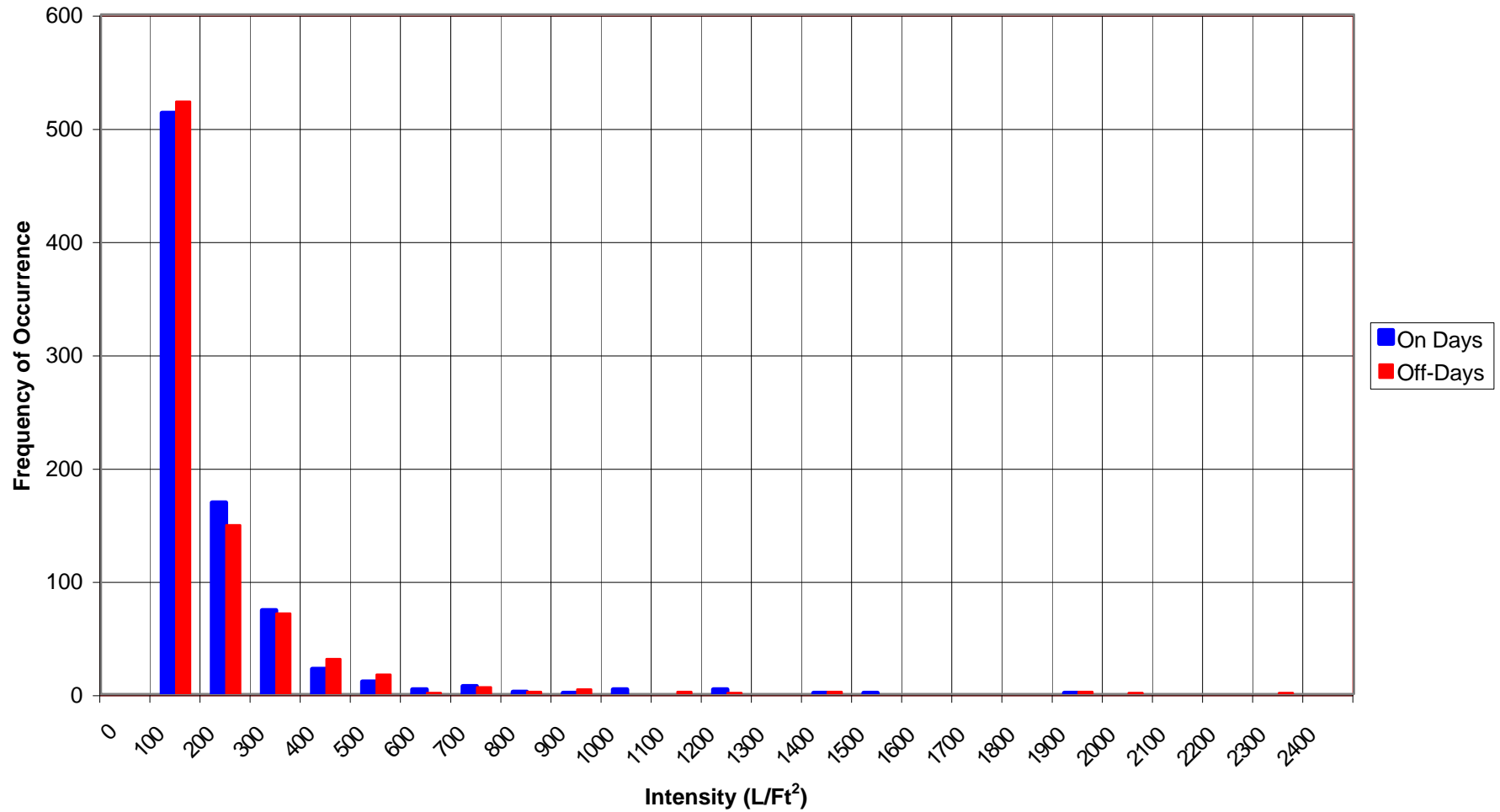
Our Lady of Grace Outside Air Temperature Histogram



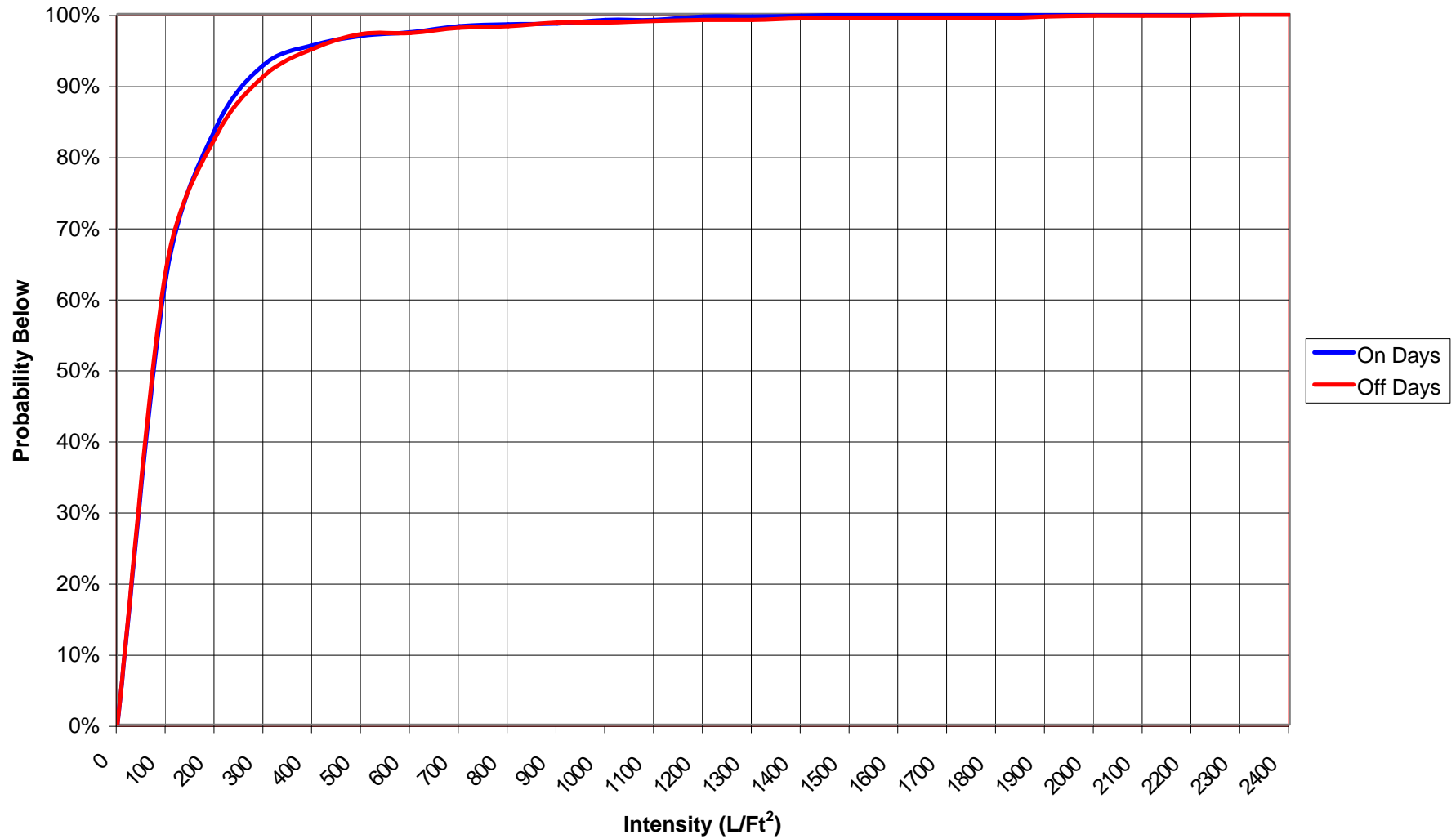
Our Lady of Grace Outside Air Temperature Probabilities



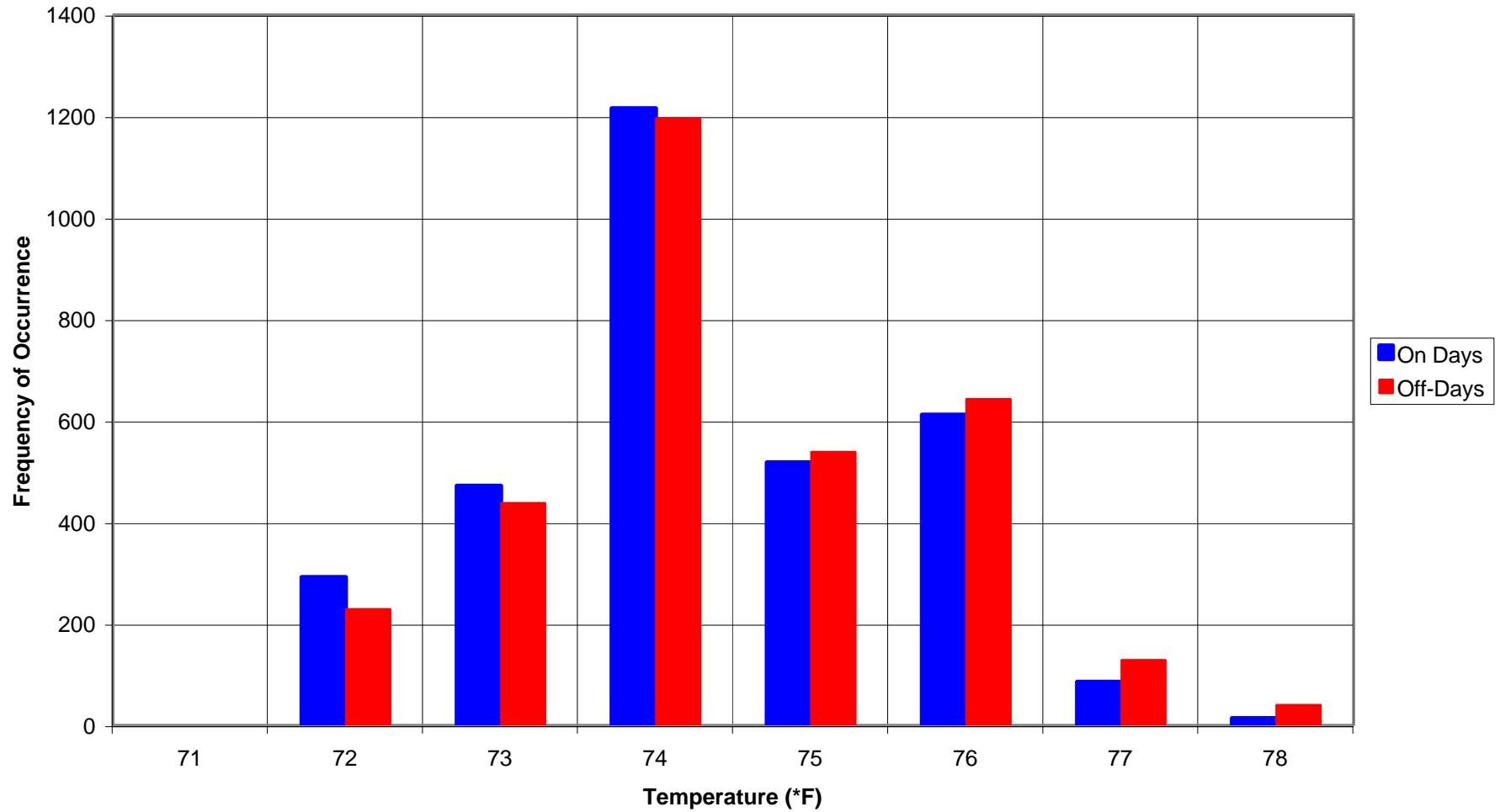
Our Lady of Grace Solar Load Histogram



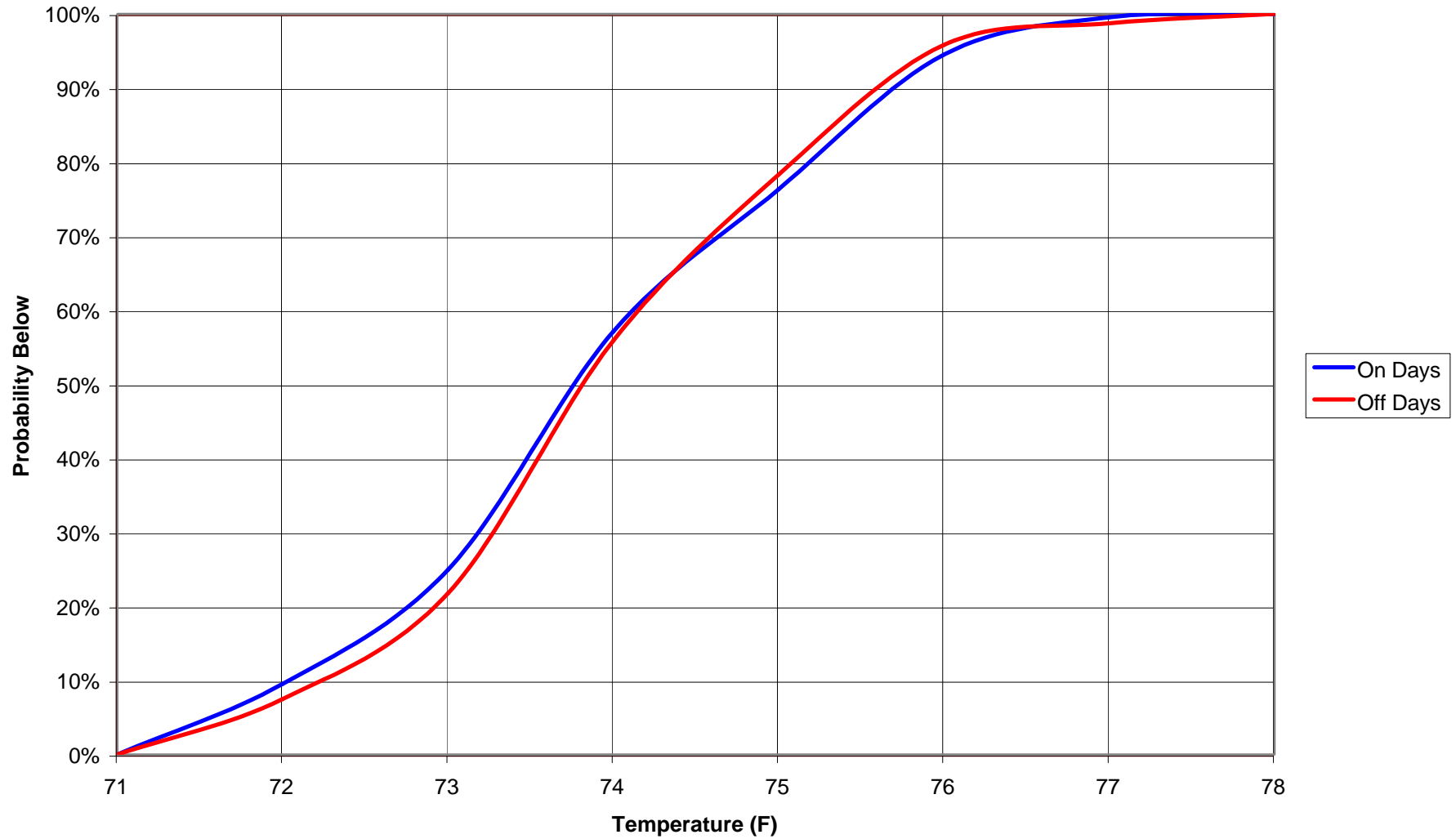
Our Lady of Grace Solar Load Probabilities



Our Lady of Grace Space Temperature Histogram



Our Lady of Grace Space Temperature Probabilities





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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.