CAMERON

DATE: September 18, 1989

SUBJECT: FRIGITECH REFRIGERANT OIL ADDITIVE

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A two week test was run on a 40 Ton A/C Unit outside the Plant Engineering Building (Cypress). The test consisted of monitoring the total Kilowatt-Hour load of the unit for a period beginning one week before adding Frigi-Tech product and one week after. After reviewing the data from this study the following results were concluded based on a 244 day cooling season and a $.039/KwH energy cost.

*Total Energy Savings = $27.43/ Mo.

* Payback Period = 9.3 Mo.

Based on energy saving and proposed improvement in equipment life and maintenance, the use of Frigi-Tech product appears to be justifiable.

Additional information concerning this study are provided in the body of this report.

An air conditioning load is a function of many different variables related to inlet and outlet water temperature, refrigerant charge, system pressure, etc. Since this test was

done on the same unit under similar equipment conditions the effects of these variables were considered approximately equal, before and after the oil additive was injected. In addition to system characteristics the condition of the following variables were considered significant.

* Temperature (ambient)

 * Humidity Level

* Office Equipment Heat Load

* Human Heat Load

* In/Out Office Traffic

In order to calculate an energy savings attributed to the use of Frigi-Tech Refrigerant Oil Additive, a before and after test was performed on a 40 Ton unit at the Plant Engineering Building (Cypress).

To assure similar heat load on the unit, a before/after test period was established that would meet the following conditions.

* The combined effect of temperature and humidity must average equal values over any period used.

* In/Out office traffic in the building must be approximately equal over the same period.

*Human and machine heat load inside the building must be approximately equal over the same time period.

Based on this criteria Wednesday 8/23/89 and Friday 8/25/89 were selected as reference loads on the system. These days are one day before and one day after the Frigi-Tech Oil Additive was injected into the system.

Temperature and humidity data was gathered from Intercontinental Airport by the National Weather Service.

A temperature and humidity index (THI) was calculated at 6 hour intervals (5:00 a.m., 11:00 a.m., 5:00 p.m., 11:00 p.m.)

THI = (.55* Amb. Temp.) + (.2* Dew Point) +17.5

Office equipment and human heat load are assumed to be approximately equal between the two test periods. The same is true for In/Out traffic.

Kilowatt-Hour (KwH) values were recorded over the same 6 hour intervals.

PROJECTED ENERGY USAGE

Before Frigi-Tech Additive: 557KwH *244 Cooling Days/Yr. = 136125.2 KwH/ Yr.

After Frigi-Tech Additive: 523 KwH * cooling Days/ Yr. = 127685.2 KwH/ Yr.

ENERGY COST

Before Frigi-Tech Additive: 136125.1 KwH/ Yr. * $0.039/KwH =$5,308.88

After Frigi-Tech Additive: 127685.2 KwH/ Yr. * $0.039/ KwH= $ 4979.72

$$\text{DIFFERENCE} \quad (\$ \ 329.16)$$

ENERGY SAVING

SAVINGS: = $329.16/Yr.

= $ 27.43/Mo.

PAY BACK= INSTALLATION COST/MONTHLY SAVINGS =   9.3 MONTHS

EFFICIENCY CALCULATION

8/23/89	PERIOD	THI	KWH
	1	72.80	101.50
	2	82.70	156.40
	3	77.60	231.40
	4	76.70	143.90
AVERAGE		**77.45**	**158.30**

COOLING INDEX (CI) = KwH (AVG)/THI (AVG)=   158.30/77.45=2.04 KwH/THI

8/25/89	PERIOD	THI	KWH
	1	73.35	85.69
	2	81.75	152.41
	3	80.00	214.40
	4	74.65	141.70

AVERAGE		77.44	148.55

COOLING INDEX (CI) = KwH (AVG)/ THI (AVG) =   148.55/77.44=1.92 KwH/THI

EFFICIENCY = CI (8/25/89)/ CI (8/23/89) =   0.939

SUMMARY

*PROJECTED ENERGY COST

   * $4,979.72/YR.

*ENERGY SAVINGS

   *$27.43/MO.

   *$329.16/YR.

* PAY BACK/ 40 TON UNIT = 9.3 MONTHS