



Contract Holder  
Contract Number GS-07F-0422W

# Timed Interval Sampling Monitoring & Verification Report

*For*

## Island Colony

*located at*

**445 Seaside Ave.  
Honolulu, HI 96815**

**November 6, 2015**

**Prepared by:  
John D. Knapp  
President**

A DIVISION OF JDK INDUSTRIES, INC.



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# Power Conditioning and Energy Savings

## TIS Report

November 6, 2015

*For*

**Island Colony**

*located at*

**445 Seaside Ave.  
Honolulu, HI 96815**

*Prepared by:*

**Power Shaver, Energy Savings Systems®**

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## Executive Summary and Conclusions

During September of 2015, Island Colony purchased and installed a USES<sup>®</sup> Shunt Efficiency System, manufactured by USES<sup>®</sup> MFG INC. The purpose of the USES<sup>®</sup> System is to reduce the overall demand and consumption of power and improve overall power quality. A total of six (6) USES<sup>®</sup> Model XL-3D-480V and one (1) USES<sup>®</sup> Model XL-3Y-480V power conditioners were installed throughout the Island Colony facility and at the service entrance.

In accordance with the proposal offered to the Island Colony by Power Shaver, Energy Saving Systems<sup>®</sup> in September of 2015, the USES<sup>®</sup> System was evaluated to determine the average power conditioning results, power demand reductions and resultant monetary savings and return on investment (ROI). Power Shaver used Timed Interval Sampling (TIS) methods to determine the USES<sup>®</sup> System performance, and the results of the TIS testing from October 29, 2015 are presented herein. TIS analytical techniques conform to the International Performance Monitoring and Verification Protocols (IPMVP) as established by the U. S. Department of Energy as a mechanism to evaluate the performance of Energy Conservation Measures.

The installation of the USES<sup>®</sup> Shunt Efficiency System at the Island Colony facility has significantly improved power quality and resulted in a substantial decrease in electrical demand according to the conservative Amprobe DM II. The USES<sup>®</sup> System reduced the demand for electricity at high load by an average of **33.596 kW and 53.924 kVA**.

Due to the fact that utility customers are billed for Demand and Energy between the Real and Apparent Power powers, based on their Power Factor, power condition and power quality and the fact that our NIST certified and calibrated data logger Amprobe DM II Pro is very conservative to utility Revenue meters as to what it determines to be and measures as usable power, Power Shaver conservatively estimates the actual reduction in billed kWh to the Island Colony facility to be between the **Real Power kWh of 232,000** and **Apparent Power kVAh of 472,374** per year.

The performance of the USES<sup>®</sup> Shunt Efficiency System at the Island Colony facility has proven to be consistent with all of the estimated power quality improvements as outlined in Power Shaver's proposal to Island Colony in September of 2015. The USES<sup>®</sup> System was estimated to reduce annual consumption by approximately **232,000 kWh per year and cost by \$58,000.00**.

The data tables and graphs presented in this report clearly show the beneficial results provided by the USES<sup>®</sup> System. All power quality data was averaged to take into account short term load variations and to determine the average levels of power quality when the USES<sup>®</sup> System was activated and de-activated. All of the data tables presented in this report are from the TIS testing and evaluation conducted on October 29, 2015. Additional power quality improvements also realized by the installation of the USES<sup>®</sup> System are discussed later in this report.

The resultant power demand reductions during the TIS testing were used in an attempt to conservatively calculate the net annual effect of the USES<sup>®</sup> system in terms of actual savings and return on investment (ROI).

During Power Shavers' Discussions with the Island Colony management it was determined that the higher kW demands and poorest power conditions of the day for this 45 story building were in the early evening hours because of increased occupancy levels, air conditioning and elevator loads. As a result, the Power Shaver Timed Interval Sampling Verification recordings were scheduled for 7pm in order to capture and demonstrate the USES<sup>®</sup> demand reduction performance and power condition improvements during peak Kw demand and poor power conditions and to ensure management of the kW demand, energy reduction and power condition improvement abilities of USES<sup>®</sup> during the lower load periods of the day.

Power Shavers' Energy Saving Systems are truly "green" systems that reduce electric energy consumption. Installing the Power Shaver Energy Saving System<sup>®</sup> at the Island Colony facility will beneficially impact the environment by reducing the consumption of our precious natural resources. According to the U.S. Environmental Protection Agency and the U.S. Energy Information Administration, the proposed reduction of electricity demand provided by the Power Shaver System, will reduce **emissions of Greenhouse Gases by 176 tons per year** as well as your companies consumption of **Crude Oil by 136.49 barrels, Coal by 39.25 tons, Natural Gas by 770,053.48 cubic feet, Gasoline by 6,370.55 gallons or Diesel Fuel and Heating Oil by 5,707.65 gallons per year**, depending on which resource your power company depends on. There is also a significant reduction in water consumption associated with each of the above quantities reduced as it is a necessary part of all fuel processing. Power Shaver is proud to partner with you to reduce your operational cost and help sustain our environment for future generations.

Power Shaver is glad to be part of the Island Colony facilities energy savings program and looks forward to assisting with any additional needs in the future. For any questions or comments on this report, please contact John D. Knapp, CEO/President of Power Shaver, Energy Savings Systems<sup>®</sup> at (888) 9-POWER-5, or via email at [john@powershaver.com](mailto:john@powershaver.com).

# Summary of Power Quality Improvements

Analysis of the high load TIS testing results from October 29, 2015 demonstrate that the USES<sup>®</sup> technology has provided substantial improvements in overall power quality. The following power quality improvements have been realized by Island Colony:

- Real Power Demand Average (kW) – **Real Power demand was reduced by an average of 33.596 kW (6.72%)** at high load operational levels with 7 USES<sup>®</sup> Power Conditioners activated. Each USES<sup>®</sup> unit was individually tested and found to be operational and contributing to the overall power quality improvements as presented in the Power Shaver proposal of September 3, 2015.
- Real Power Demand Instant (kW) – **Real Power demand was reduced instantly by 31.7 kW (6.35%)** at high load operational levels when the USES<sup>®</sup> System was activated.
- Apparent Power Average – Apparent power was reduced by an average of 53.924 kVA (9.99%) at high load operational levels when the USES<sup>®</sup> System was activated. These results are considered in the ROI and Savings calculations as representative of high circuit load conditions.
- Apparent Power Instant – Apparent power was reduced instantly by 77.579 kVA (14.37%) at high load operational levels when the USES<sup>®</sup> System was activated.
- Reactive Power – Reactive power was reduced by an average of 151.883 kvar (75.22%) at high load operational levels when the USES<sup>®</sup> System was activated.
- Power Factor – Power Factor improved from 93% to 99% (7.33%) and remained lagging when the USES<sup>®</sup> System was activated.
- Amperage – Amperage was reduced by approximately 75.67 amps (11.28%) per phase when the USES<sup>®</sup> System was activated.
- Voltage – Voltage improved by an average of 3.29 volts (.69%) per phase (VAB, VBC, VCA) when the USES<sup>®</sup> System was activated.

## Savings and ROI Calculations

Evaluation of the USES<sup>®</sup> System installed at the Island Colony facility shows a range of demand reductions at high load when the USES<sup>®</sup> System is activated. During the TIS testing period, when the facility was operational, the average extrapolated billed energy reduction was estimated to be 26.45 kWh. The total annual reduction of power consumed is 26.48 kWh x 8760 hours per year = 232,000 kWh per year.

Assuming the 2015 average cost of power of \$0.25/kWh will increase in 2016 to \$0.26/kWh and by \$0.01/kWh each year thereafter, ROI savings are shown on the following pro-forma:

Year	COP	kWh/yr SVGS	SVGS/yr	
1	\$0.25	232,000	\$58,000	
2	\$0.26	232,000	\$60,320	
3	\$0.27	232,000	\$62,640	
4	\$0.28	232,000	\$64,960	
5	\$0.29	232,000	\$67,280	<b>Years 1-5</b>
6	\$0.30	232,000	\$69,600	<b>\$313,200</b>
7	\$0.31	232,000	\$71,920	
8	\$0.32	232,000	\$74,240	
9	\$0.33	232,000	\$76,560	
10	\$0.34	232,000	\$78,880	<b>Years 6-10</b>
11	\$0.35	232,000	\$81,200	<b>\$371,200</b>
12	\$0.36	232,000	\$83,520	
13	\$0.37	232,000	\$85,840	
14	\$0.38	232,000	\$88,160	
15	\$0.39	232,000	\$90,480	<b>Years 11-15</b>
<b>Total</b>		<b>3,480,000</b>	<b>\$1,113,600</b>	<b>\$429,200</b>

- Actual ROI = 15.93 Months
- Year 1 savings = \$58,000.00
- Purchase Cost, including installation costs = \$77,000.00
- Total Savings over 15 years = \$1,113,600.00 – \$77,000.00 = \$1,036,600.00

## USES<sup>®</sup> Power Quality Benefits

The installation of the USES<sup>®</sup> System at the Island Colony facility has resulted in measurable and verifiable power quality improvements, as well as other benefits which cannot be measured. A discussion of the power quality improvements resulting from the USES<sup>®</sup> System is presented below:

**Real Power Demand** - The USES<sup>®</sup> System reduces real power demand in two principal ways: Through amperage reductions on the circuit, which reduce “Copper Losses”, and through the reduction of Total Harmonic Distortion (THD) in the amperage and voltage supplied to operating loads, which improves motor efficiency. The amount of real power demand reduction associated with the USES<sup>®</sup> System exceeds that of comparable power factor correction capacitor (PFCC) equipment because of the reduced THD in addition to the improvement in power factor.

**Power Factor** – Power Factor is the ratio of real power to apparent power. Because the USES<sup>®</sup> System reduces both real power demand and apparent power demand, the power factor is improved and approaches unity, or 100%. Because the USES<sup>®</sup> System does not create RLC resonance, any leading Power Factor will have no effect on the performance or reliability of the equipment.

**Reactive Power, Apparent Power and Amperage** – The USES<sup>®</sup> System reduces the reactive power on the circuit in a manner which does not create RLC resonance. Each USES<sup>®</sup> Model XL-3D-480 power conditioner reduces reactive power by 29 kvar and each USES<sup>®</sup> Model XL-3Y-480 power conditioner reduces reactive power by 19 kvar. A reduction in reactive power results in a corresponding decrease in the apparent power on the circuit. This, in turn, results in a decrease in the amount of amperage on the circuit, which results in a decrease in real power demand as a result of reduced “Copper Losses” on the circuit. Copper losses manifest themselves as heat in motors and conductors and can reduce the useful life of motors, transformers and sensitive electronic equipment. The reduction in reactive power on the circuit also acts to “stiffen” the circuit by reducing overall circuit impedance. A “stiff” circuit will reduce the creation of voltage total harmonic distortion as a result of current harmonics.

**Voltage Improvement** - By improving voltage across each of the three phases (VAB, VBC, VCA), circuit amperage is further reduced and motors will run cooler and last longer. Increased voltage will also lessen the likelihood of equipment tripping off due to utility voltage sags. Fluctuations in voltage are dampened by the coupling of the three phases of power supplied, which will lessen any likelihood of equipment tripping problems associated with voltage fluctuations.

**Harmonics** – The USES<sup>®</sup> System reduces the Harmful Harmonic Distortion of the amperage and voltage on the circuit by passing all power generated within the USES<sup>®</sup> System through 60 Hz band-pass Filters. Because the USES<sup>®</sup> System is connected to the electrical circuit in parallel, some HD will continue to pass on to the operational loads. However, because a significant portion of the power supplied to the load is “choked” to 60 Hz, total HD supplied to the load is reduced. This action significantly reduces the THD in the voltage and current provided to the operating motors, thus increasing motor efficiency. This also drastically reduces the amount of NON POWER CURRENT or



harmonic current, which the utility meter charges for as kWh. Problems associated with circuit harmonics include:

- Excessive Neutral Currents, where voltage harmonics result in additional current on the circuit neutral conductor, resulting in additional heat, possible overloading and the need to install additional neutral conductors.
- Overheated transformers, where harmonics generated on the secondary side of a delta-wye transformer will circulate on the primary side of the transformer. Some types of transformer losses, such as skin losses and eddy currents will increase by the square of the harmonic order.
- Overheated solenoid coils and lighting ballasts.
- Positive, negative and zero sequence voltages on motors and generators, where certain harmonic frequencies will try to rotate the motor forward or backward, or simply heat up the motor.
- Incorrect reading power meters, especially disc type watt-hour meters and averaging type current meters.
- Failure of electronic equipment, including nuisance tripping and overload.
- Nuisance tripping of circuit protection devices including false tripping of relays and failure of UPS devices to properly transfer.
- Blown fuses and overheated power factor correction capacitors due to the cumulative effects of harmonic THD and RLC resonance.

**Spike and Surge Protection** - Inherent in the USES<sup>®</sup> System, but not measured, is the ability to provide superior spike and surge suppression capabilities. A surge is any voltage increase lasting 3 or more nanoseconds. A spike is any voltage increase lasting less than 3 nanoseconds. The USES<sup>®</sup> device detects any surges or spikes traveling along one of the active phases and shunts it to the other two phases. From there, the transformer/choke sets within the USES<sup>®</sup> device attenuate the surge/spike through the action of the “chokes”, which use capacitors and inductors to resist the change in voltage and associated change in current, and flatten out the waveform. The surge/spike is recycled as usable power for the circuit. Because USES<sup>®</sup> “Wye” units were specified for this application, the USES<sup>®</sup> System will protect the circuit against ground fault transients or lightning strikes which can enter the circuit through the neutral conductor.

# Timed Interval Sampling (TIS) Techniques

Timed Interval Sampling (TIS) techniques are used to determine actual performance of the USES<sup>®</sup> System. In order to ensure the accuracy, transparency and repeatability of the TIS evaluation, Power Shaver, Energy Saving Systems<sup>®</sup> has developed TIS methods which adhere to the International Performance Measurement & Verification Protocols (IPMVP). The IPMVP, endorsed by the U.S. Department of Energy, provides an overview of the best practice techniques available for verifying the results of energy savings projects.

Timed Interval Sampling is a statistical method of energy measurement with regard to electrical consumption, measured as average wattage demand reductions over a short span of time. It is used in facilities with dynamic electrical loads where energy use is a function of manufacturing, environmental loads, and related equipment. TIS techniques are utilized to minimize the high degree of variables present when measuring energy consumption. These variables often include: weather conditions, facility operational techniques, and load variations.

When the USES<sup>®</sup> System is being evaluated, it is alternately activated and deactivated at timed intervals such as 5, 10 or 15 minutes, to compare the average demand of real power by the loads in the facility under equal conditions. All samples are recorded and averaged in each respective operating condition (on vs. off), in order to demonstrate the effects that the USES<sup>®</sup> System has on the circuit when activated and deactivated. Power Shaver used an Amprobe DM-II Pro<sup>®</sup> Multi-meter and Data Logger to perform TIS metering and recording. This “True RMS” meter meets the standards of the National Institute of Standards and Technology and the IPMVP.

Evaluation of the USES<sup>®</sup> System performance was made through analysis of the data recorded from the TIS testing. The Amprobe DM-II Pro<sup>®</sup> Multi-meter was connected at a point at or near the main service breaker serving the entire facility in order to measure overall circuit power quality and average energy savings. The USES<sup>®</sup> System was activated and deactivated for intervals of 2 minutes during the test period to measure the changes in overall power quality in each operating condition. A separate test of the cumulative effect of the USES<sup>®</sup> power conditioners was also conducted to confirm that each of the units is operating properly. The differences between conditioned and unconditioned power quality was determined and averaged to demonstrate the overall effect that the USES<sup>®</sup> System has on the circuit.

- All recorded data was evaluated and averaged in the following manner to determine the overall average performance of the USES<sup>®</sup> System: The average power quality for each full interval was calculated and compared to the next interval before and after each transition from on to off, and off to on.
- Each instantaneous change in power quality was determined by comparing the last one-second with the USES<sup>®</sup> System on to the first one-second with the USES<sup>®</sup> System off, and vice-versa.

- The average power quality was calculated before and 15-seconds after each transition from on to off, and off to on.
- The average power quality was calculated before and 30-seconds after each transition from on to off, and off to on.
- The average power quality was calculated before and 45-seconds after each transition from on to off, and off to on.
- The average power quality was calculated before and 60-seconds after each transition from on to off, and off to on.
- All representative transitional changes are averaged to derive the overall average performance of the USES<sup>®</sup> System.

This report shows all differences in electrical performance with the USES<sup>®</sup> System activated and deactivated including:

- Real Power demand reductions (Watts)
- Voltage improvements across each phase (Volts)
- Amperage reductions across each phase (Amps)
- Reactive Power reductions (var)
- Apparent Power reductions (VA)
- Power Factor improvement (%)

# Graphs and Data Tables

Through evaluation of the Amprobe DM-II Pro<sup>®</sup> Power Multi-meter and Data Logger recordings collected on October 29, 2015, we have prepared a series of graphs and data tables to show the effect of the USES<sup>®</sup> System. The following graphs are presented below, showing all changes to power quality and condition when the USES<sup>®</sup> System is activated or de-activated:

- Graph 1 – Real Power (Watts) – This graph shows real power in watts during the October 29, 2015 TIS testing.
- Graph 2 – Apparent Power (VA) – This graph shows apparent power during the October 29, 2015 TIS testing.
- Graph 3 – Reactive Power (var) – This graph shows reactive power during the October 29, 2015 TIS testing.
- Graph 4 – Power factor – This graph shows power factor as a decimal during the October 29, 2015 TIS testing.
- Graph 5 – Amperage (Amps) – This graph shows amperage in amps for 3 phases during the October 29, 2015 TIS testing.
- Graph 6 – Voltage (Volts) – This graph shows the voltage in volts for 3 phases during the October 29, 2015 TIS testing.

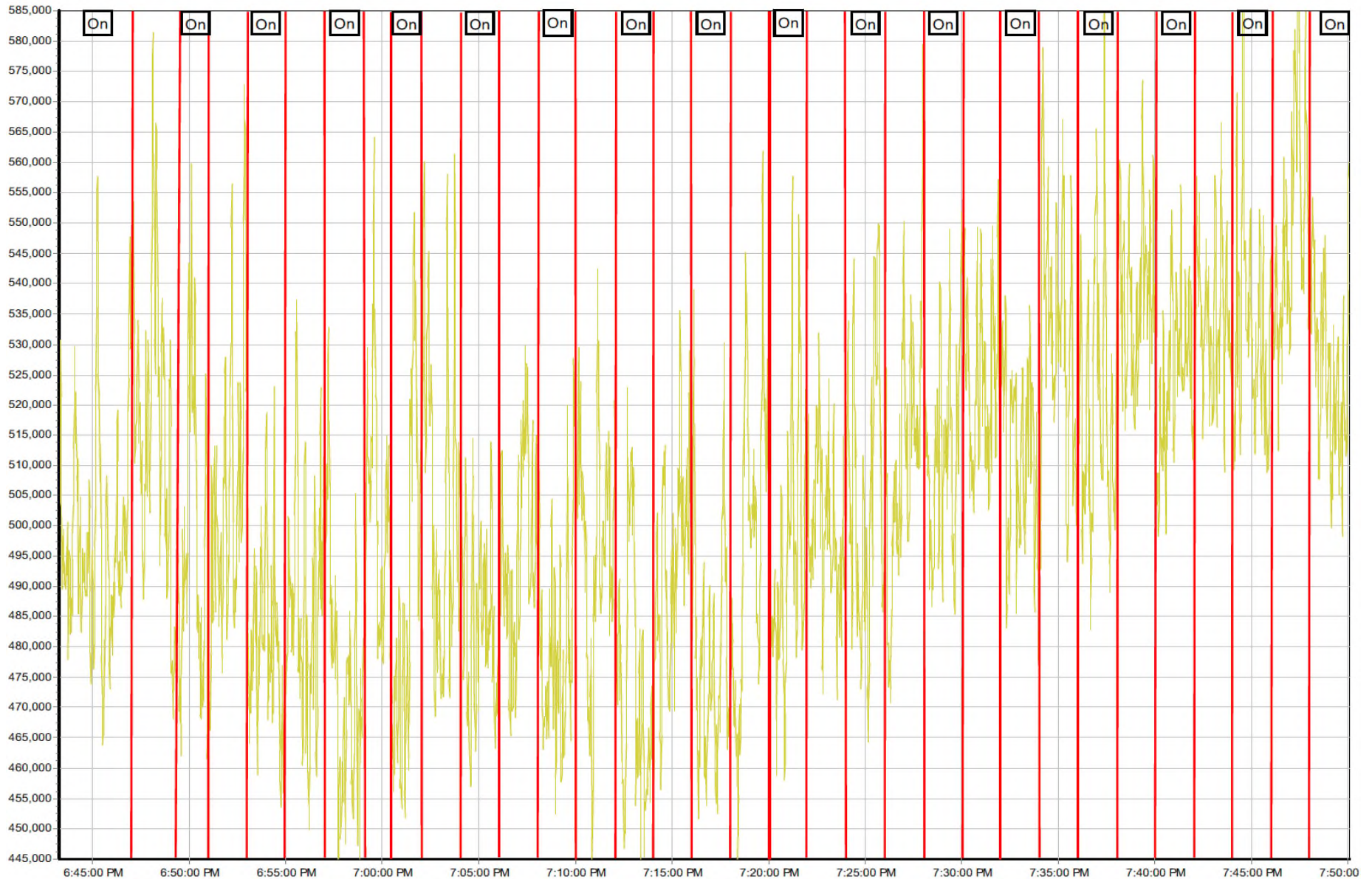
The following data tables are presented to show the average observed performance of the USES<sup>®</sup> System during the October 29, 2015 TIS testing. Please note that during the testing, each USES<sup>®</sup> unit was tested individually to ensure performance and evaluate circuit improvements.

- Table 1 – Real Power (Watts) from the October 29, 2015 TIS testing.
- Table 2 – Apparent Power (VA) from the October 29, 2015 TIS testing.
- Table 3 – Reactive Power (var) from the October 29, 2015 TIS testing.
- Table 4 – Power Factor from the October 29, 2015 TIS testing.
- Table 5 – Amperage (Amps) 3 phases from the October 29, 2015 TIS testing.
- Table 6 – Voltage (Volts) 3 phases from the October 29, 2015 TIS testing.

All Data Tables and Graphs, together with all raw data are included.

# Graph 1

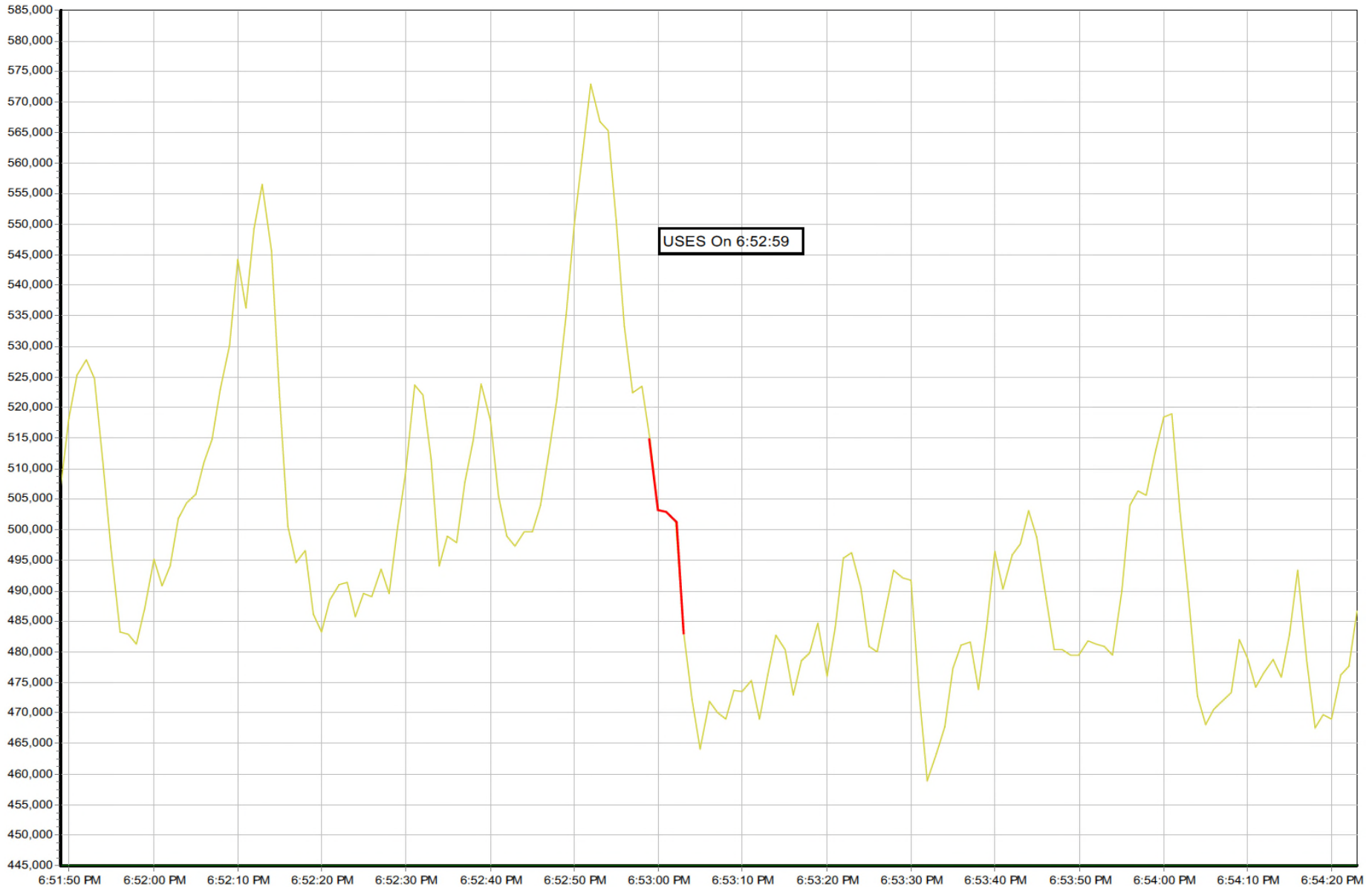
10/29/2015 6:43:16 PM - 10/29/2015 7:50:04 PM



**Graph 1** Above is the Real Power Demand in Watts during the TIS testing on October 29, 2015 between 6:43 pm and 7:50 pm with 6 USES<sup>®</sup> model XL-3D-480V and 1 USES<sup>®</sup> model XL-3Y-480V power conditioners operating. The real power demand is reduced by an average of **33,596.17 Watts**.

# Graph 1a

10/29/2015 6:43:16 PM - 10/29/2015 7:50:04 PM



**Graph 1a** Above is an instant change in Real Power Demand in watts during the TIS testing on October 29, 2015 at 6:52:59 pm, with 6 USES<sup>®</sup> model XL-3D-480V and 1 USES<sup>®</sup> model XL-3Y-480V power conditioners operating. The real power demand is instantly reduced by **31.718 kW** in high load conditions.



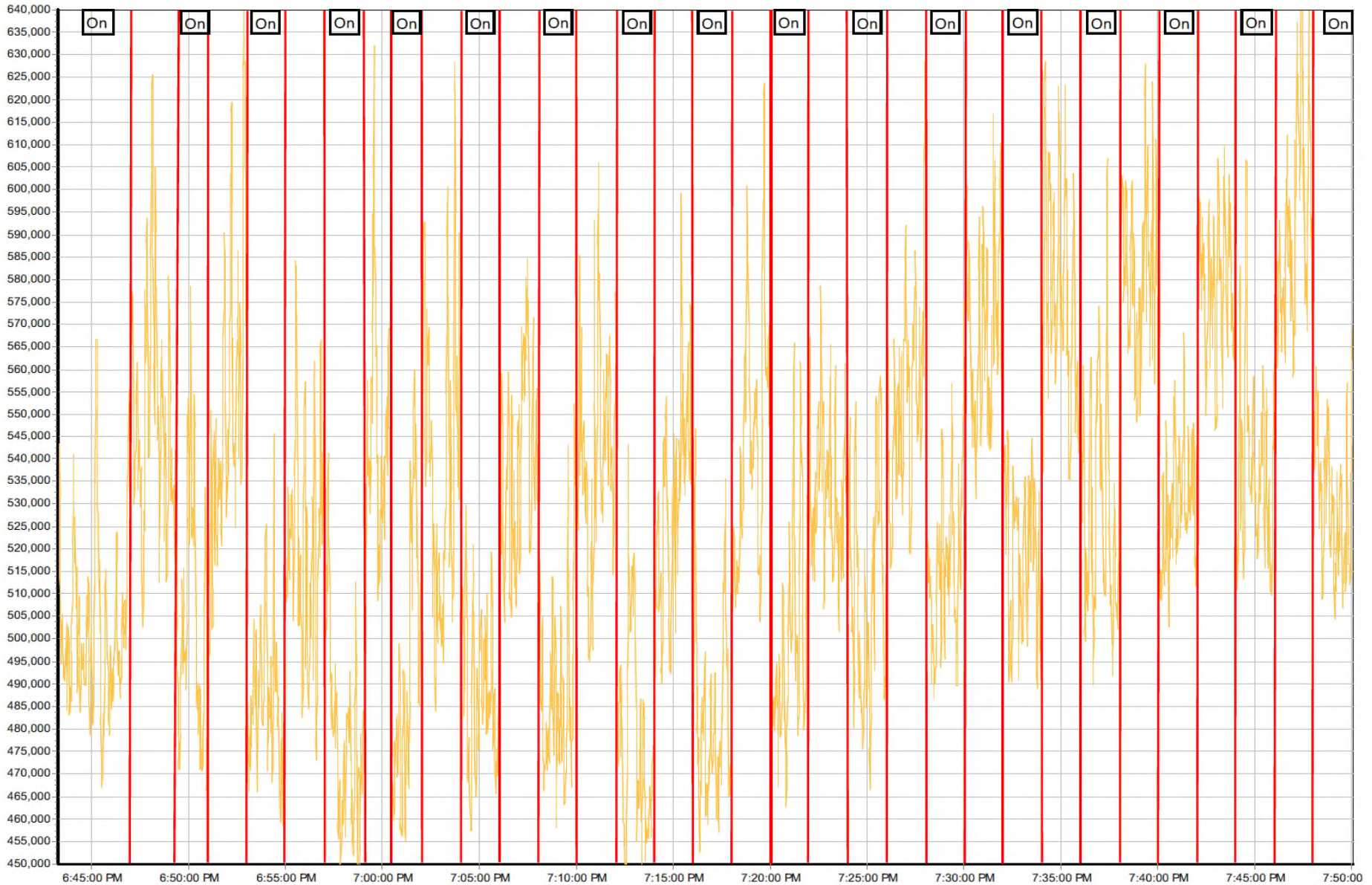
## Table 1

Real Power Demand (Watts)													
Intervals				Full Interval		Instant Change At Transition	15 Sec Change At Transition	30 Sec Change At Transition	45 Sec Change At Transition	60 Sec Change At Transition			
Interval Time Frame		# USES	Status	System On Average	System Off Average						Difference Off to On	Difference On to Off	
6:43:16 PM	6:46:59 PM		on	497999.65									
6:47:02 PM	6:49:20 PM		off		516686.64		18686.99	8172.93	-12574.04	-20879.75	-21162.13	-1609.69	
6:49:26 PM	6:50:57 PM		on	497239.66		19446.98		-3718.34	-1562.06	-43333.03	-31146.43	5376.35	
6:51:05 PM	6:52:59 PM		off		505729.16		8489.50	5440.91	35405.16	23755.53	52764.41	40424.97	
6:53:03 PM	6:54:53 PM		on	480871.50		24857.66		31718.13	34769.79	51259.50	34228.97	24844.94	
6:55:00 PM	6:56:59 PM		off		486007.28		5135.78	17781.04	31124.79	55201.94	14641.66	56598.69	
6:57:05 PM	6:59:01 PM		on	473048.10		12959.17		4605.31	11648.25	27132.78	53495.31	49237.94	
6:59:24 PM	7:00:24 PM		off		503220.11		30172.01	25972.72	42369.75	-513.47	14347.03	-2562.53	
7:00:30 PM	7:02:00 PM		on	487623.14		15596.97		8381.84	-2436.03	25594.65	-1652.63	-47156.53	
7:02:02 PM	7:04:01 PM		off		505097.74		17474.60	3131.53	9539.90	12441.15	-16422.82	-36189.28	
7:04:23 PM	7:05:58 PM		on	480362.04		24735.70		49055.03	22660.84	35637.31	32750.63	41202.31	
7:06:21 PM	7:08:00 PM		off		496344.09		15982.05	24407.25	-2906.09	7356.97	13950.04	39740.63	
7:08:04 PM	7:09:47 PM		on	477788.22		18555.88		8121.25	34163.22	28415.84	24192.69	21973.25	
7:10:07 PM	7:12:02 PM		off		496126.48		18338.26	28403.87	32999.25	-3246.16	-29196.13	55441.06	
7:12:07 PM	7:13:57 PM		on	472389.96		23736.51		41194.56	36916.38	50391.97	2376.22	60402.60	
7:14:02 PM	7:15:57 PM		off		492305.18		19915.21	-17028.81	10287.72	36214.60	2222.29	19066.29	
7:16:01 PM	7:17:57 PM		on	479204.96		13100.21		27284.81	37940.56	30289.62	52526.09	38399.47	
7:18:07 PM	7:19:58 PM		off		497666.46		18461.50	10605.00	-3392.13	11130.41	69684.53	30594.66	
7:20:08 PM	7:21:58 PM		on	496368.25		1298.21		25219.96	37311.90	9009.03	30604.84	9429.84	
7:22:00 PM	7:23:57 PM		off		499515.15		3146.89	-4766.31	-1830.56	16214.69	-7680.96	8486.63	
7:24:18 PM	7:25:58 PM		on	503848.31		-4333.16		18647.63	4305.60	20605.31	651.00	-18354.44	
7:26:01 PM	7:28:00 PM		off		512052.71		8204.40	25342.88	-12796.09	12078.94	28017.25	51161.72	
7:28:07 PM	7:29:58 PM		on	511332.70		-11817.55		59162.28	83196.34	59527.68	39151.81	67067.75	
7:30:03 PM	7:31:57 PM		off		524837.22		13504.52	-5797.94	-8820.94	-37602.82	843.75	-10952.32	
7:32:10 PM	7:33:57 PM		on	510301.67		-10786.52		-6572.31	17917.69	-13536.84	2923.06	-3322.28	
7:34:01 PM	7:35:57 PM		off		531021.12		20719.45	8173.03	55726.88	49500.94	40474.19	52475.00	
7:36:04 PM	7:37:56 PM		on	520541.10		-8488.39		-7840.63	7945.75	2368.78	-25635.28	-23412.72	
7:38:06 PM	7:39:58 PM		off		537990.05		17448.95	29454.66	40957.28	40341.59	20387.84	18069.72	
7:40:03 PM	7:41:59 PM		on	524544.40		-12491.69		1699.63	17265.22	33747.91	-15649.25	-1689.87	
7:42:04 PM	7:43:59 PM		off		534294.48		9750.09	11705.78	32256.75	25127.63	5248.34	24663.13	
7:44:03 PM	7:45:57 PM		on	532474.68		-1453.56		21469.10	2523.94	-58282.56	-588.31	2666.07	
7:46:02 PM	7:47:57 PM		off		549512.86		17038.18	-6250.00	10855.93	-15159.66	13788.81	-3159.07	
7:48:19 PM	7:50:03 PM		on	523236.02		7785.10		7577.38	621.69	364.07	15299.00	12369.97	
Average - System Off				499869.83									
Average - System On				498186.73									
Difference				1683.10									
Transition Avg - On to Off						7043.85		25227.07	38691.41	35193.85	35410.92	38823.59	
Transition Avg - Off to On							15580.28	34218.94	29868.20	36260.26	35281.17	26986.28	
Average - All Transitions				33596.17	6.72%								

**Table 1** Above is the analysis of the wattage data of 6 USES<sup>®</sup> model XL-3D-480V and 1 USES<sup>®</sup> model XL-3Y-480V units collected by the Amprobe DM-II Pro Multi-Meter and Data-Logger during the TIS testing on October 29, 2015. Each interval is 2 minutes in duration. The real power demand is reduced by an average of **33.596 kW**. Shaded cells are not included in the average performance calculations because load changes unrelated to the performance of the USES<sup>®</sup> system occurred during the averaging period. Because of load changes, full interval comparisons are not used to quantify reductions in real power demand.

# Graph 2

10/29/2015 6:43:16 PM - 10/29/2015 7:50:04 PM

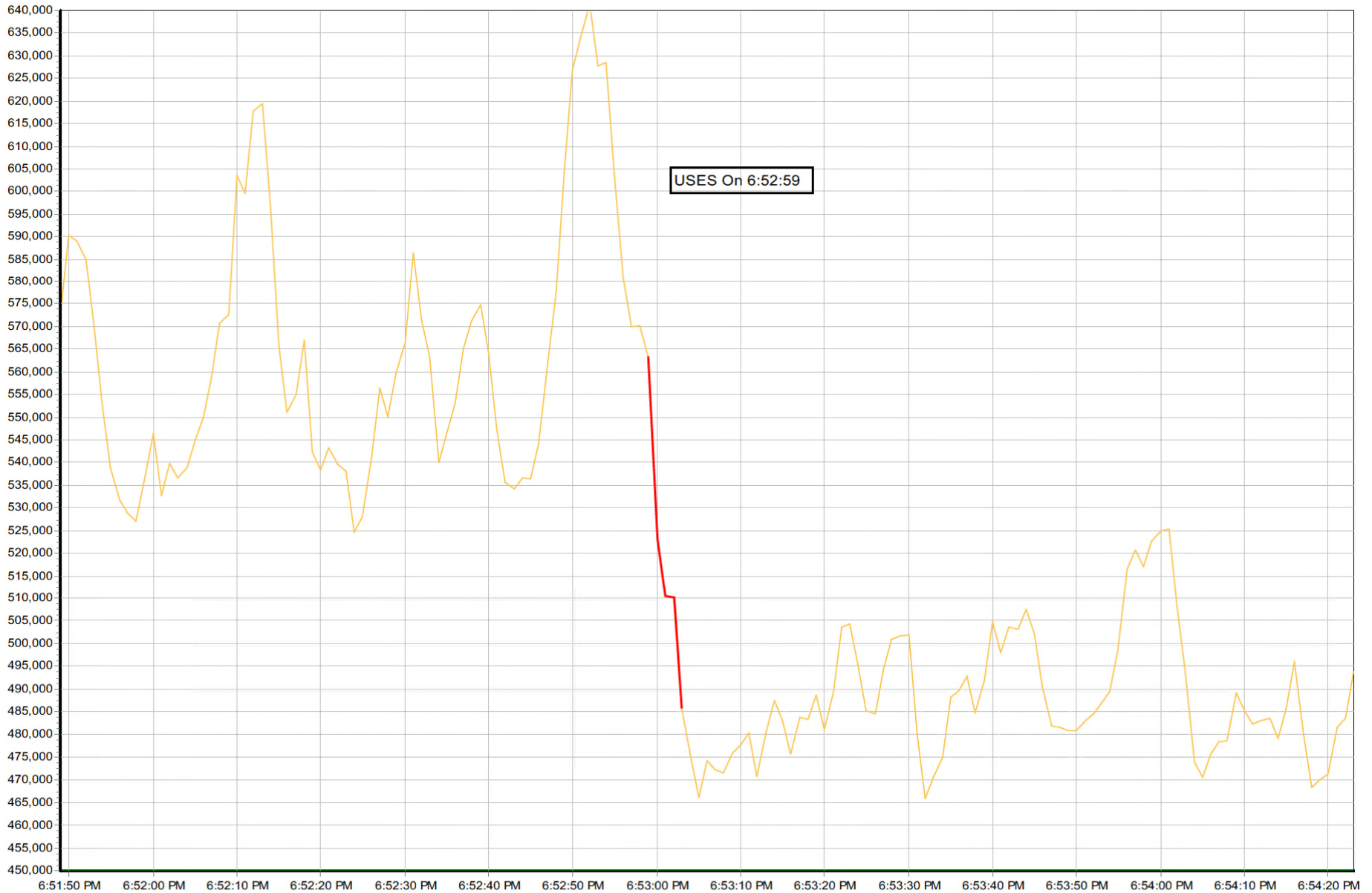


**Graph 2** Above is the Apparent Power in volt amps during the TIS testing on October 29, 2015 between 6:43 pm and 7:50 pm with 6 USES<sup>®</sup> model XL-3D-480V and 1 USES<sup>®</sup> model XL-3Y-480V power conditioners operating. The apparent power is reduced by an average of **53,924.99 VA**.



# Graph 2a

10/29/2015 6:43:16 PM - 10/29/2015 7:50:04 PM



**Graph 2a** Above is an instant change in Apparent Power in volt amps during the TIS testing on October 29, 2015 at 6:52:59 pm, with 6 USES<sup>®</sup> model XL-3D-480V and 1 USES<sup>®</sup> model XL-3Y-480V power conditioners operating. The apparent power demand is instantly reduced by **77.579 kVA** in high load conditions.

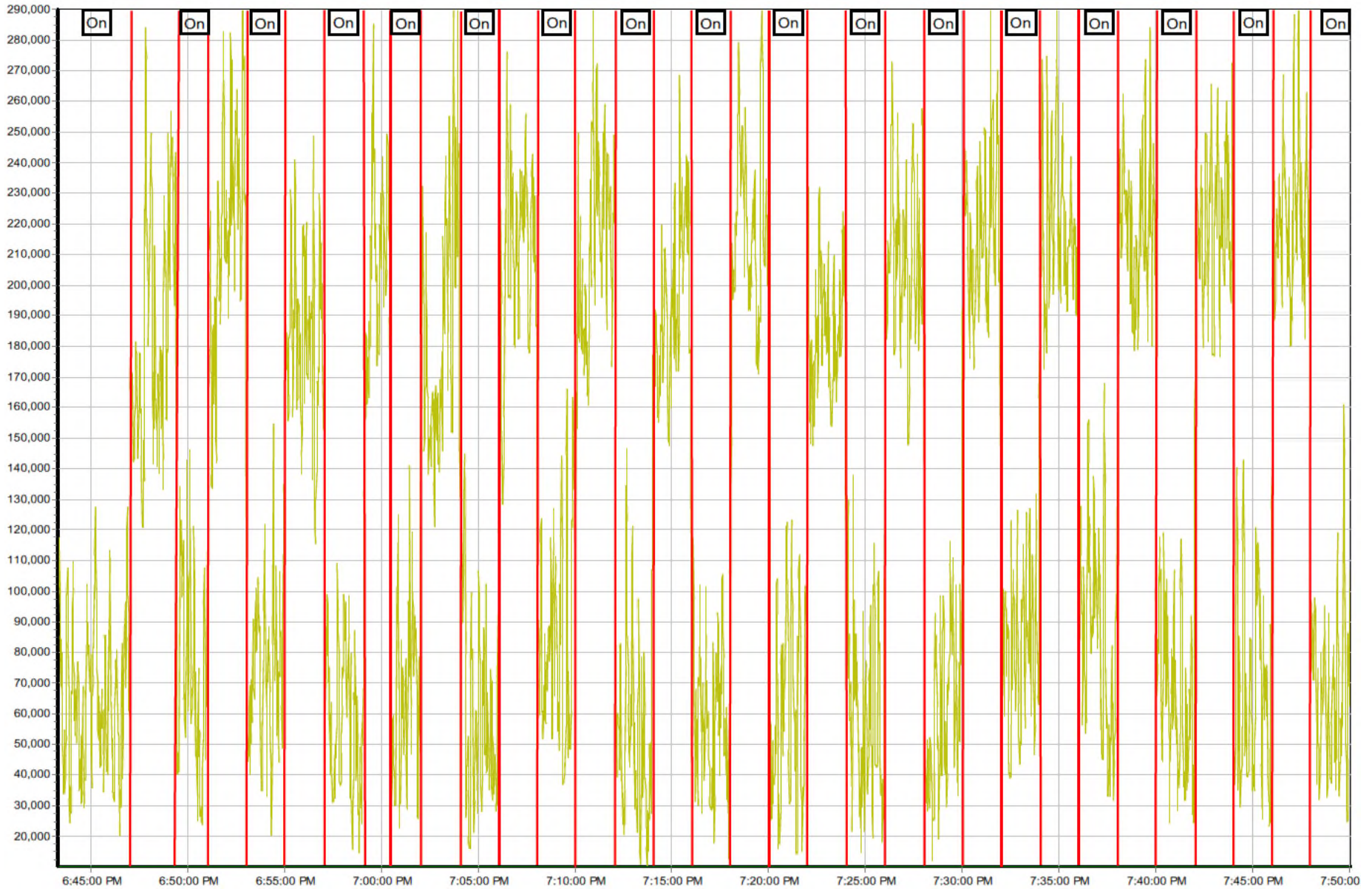
## Table 2

Apparent Power (VA)													
Intervals				Full Interval				Instant	15 Sec	30 Sec	45 Sec	60 Sec	
Interval Time Frame		# USES	Status	System On Average	System Off Average	Difference Off to On	Difference On to Off	Change At Transition	Change At Transition	Change At Transition	Change At Transition	Change At Transition	
6:43:16 PM	6:46:59 PM	0	on	502769.09									
6:47:02 PM	6:49:20 PM	0	off		550100.12		47331.03	35931.32	12028.82	195.57	30084.88	40054.69	
6:49:26 PM	6:50:57 PM	0	on	503521.93		46578.19		52044.29	46045.94	-4741.81	22932.72	60941.19	
6:51:05 PM	6:52:59 PM	0	off		551761.81		48239.88	34204.04	56554.22	63798.04	120679.41	75327.47	
6:53:03 PM	6:54:53 PM	0	on	486589.42		65172.39		77579.44	80254.69	92857.41	81836.72	69804.97	
6:55:00 PM	6:56:59 PM	0	off		519823.33		33233.91	45956.10	61995.69	88405.47	42644.50	97032.53	
6:57:05 PM	6:59:01 PM	0	on	477209.87		42613.46		24823.25	32191.72	49040.87	74905.40	63014.78	
6:59:24 PM	7:00:24 PM	0	off		548275.18		71065.31	54478.40	88150.47	44793.40	56470.09	48018.40	
7:00:30 PM	7:02:00 PM	0	on	492299.12		55976.05		59189.56	49013.90	75802.47	46097.78	339.68	
7:02:02 PM	7:04:01 PM	0	off		539030.15		46731.02	27459.56	42262.68	31448.37	8753.65	-9772.35	
7:04:23 PM	7:05:58 PM	0	on	483537.51		55492.64		103737.43	68186.62	87444.97	86795.12	94665.59	
7:06:21 PM	7:08:00 PM	0	off		542033.48		58495.97	60646.06	35594.44	39160.84	46101.09	88241.56	
7:08:04 PM	7:09:47 PM	0	on	485303.10		56730.38		38490.25	64944.69	57471.66	55263.81	51946.69	
7:10:07 PM	7:12:02 PM	0	off		540874.10		55571.00	64077.44	71343.62	21882.40	35027.90	118539.69	
7:12:07 PM	7:13:57 PM	0	on	475920.01		64954.09		90180.84	83431.56	95816.84	49692.34	111052.19	
7:14:02 PM	7:15:57 PM	0	off		529377.39		53457.38	15365.28	34263.78	67712.16	29889.12	58239.53	
7:16:01 PM	7:17:57 PM	0	on	483137.08		46240.31		55189.88	65907.53	57961.60	72152.13	68229.13	
7:18:07 PM	7:19:58 PM	0	off		544321.13		61184.05	54695.25	45785.06	69839.00	112865.87	67543.06	
7:20:08 PM	7:21:58 PM	0	on	501044.86		43276.27		63345.97	72767.16	43143.22	59627.03	45995.78	
7:22:00 PM	7:23:57 PM	0	off		533426.08		32381.23	18465.59	21530.66	45415.28	21561.91	34017.34	
7:24:18 PM	7:25:58 PM	0	on	507884.39		25541.70		54160.85	36335.53	54098.44	30703.53	15218.41	
7:26:01 PM	7:28:00 PM	0	off		554150.18		46265.79	71022.03	28451.15	42697.65	73403.09	85031.65	
7:28:07 PM	7:29:58 PM	0	on	515557.88		17868.21		106753.88	129722.19	102435.88	81803.75	114433.57	
7:30:03 PM	7:31:57 PM	0	off		568841.50		53283.63	22308.44	25507.00	-1399.50	39172.82	22228.38	
7:32:10 PM	7:33:57 PM	0	on	516980.03		16446.06		30938.93	56858.09	18322.93	41127.25	26582.56	
7:34:01 PM	7:35:57 PM	0	off		575054.43		58074.40	42584.31	82637.25	80174.18	74672.00	90033.31	
7:36:04 PM	7:37:56 PM	0	on	528337.09		25813.10		27300.69	43395.97	33220.32	655.69	5057.32	
7:38:06 PM	7:39:58 PM	0	off		581469.57		53132.49	75335.75	94435.13	83510.63	48720.13	44588.75	
7:40:03 PM	7:41:59 PM	0	on	529314.56		24835.62		43474.82	59289.13	75849.72	24529.94	40144.44	
7:42:04 PM	7:43:59 PM	0	off		577837.13		48522.57	52331.28	68644.40	64561.47	52830.40	67265.15	
7:44:03 PM	7:45:57 PM	0	on	537374.78		37679.64		73746.22	53200.32	-19129.68	51584.32	55198.82	
7:46:02 PM	7:47:57 PM	0	off		592974.09		55599.31	25159.44	48670.19	17060.31	49717.44	23251.50	
7:48:19 PM	7:50:03 PM	0	on	528037.12		47017.30		52666.69	41458.31	45067.75	60774.94	55632.00	
Average - System Off				539902.28									
Average - System On				503224.58									
Difference				36677.70									
Transition Avg - On to Off						42014.71		43751.27	53721.72	54318.51	43503.50	60062.38	
Transition Avg - Off to On							50769.08	53080.83	56885.41	60469.09	55988.45	57468.72	
Average - All Transitions				53924.99	9.99%								

**Table 2** Above is the analysis of the Apparent Power data of 6 USES<sup>®</sup> model XL-3D-480V and 1 USES<sup>®</sup> model XL-3Y-480V units collected by the Amprobe DM-II Pro Multi-Meter and Data-Logger during the TIS testing on October 29, 2015. Each interval is 2 minutes in duration. The apparent power is reduced by an average of **53.924 kVA**. Shaded cells are not included in the average performance calculations because load changes unrelated to the performance of the USES<sup>®</sup> system occurred during the averaging period. Because of load changes, full interval comparisons are not used to quantify reductions in apparent power demand.

# Graph 3

10/29/2015 6:43:16 PM - 10/29/2015 7:50:04 PM



**Graph 3** Above is the Reactive Power in VAR during the TIS testing on October 29, 2015 between 6:43 pm and 7:50 pm with 6 USES<sup>®</sup> model XL-3D-480V and 1 USES<sup>®</sup> model XL-3Y-480V power conditioners operating. The reactive power is reduced by an average of **151,883.33 var.**

### Table 3

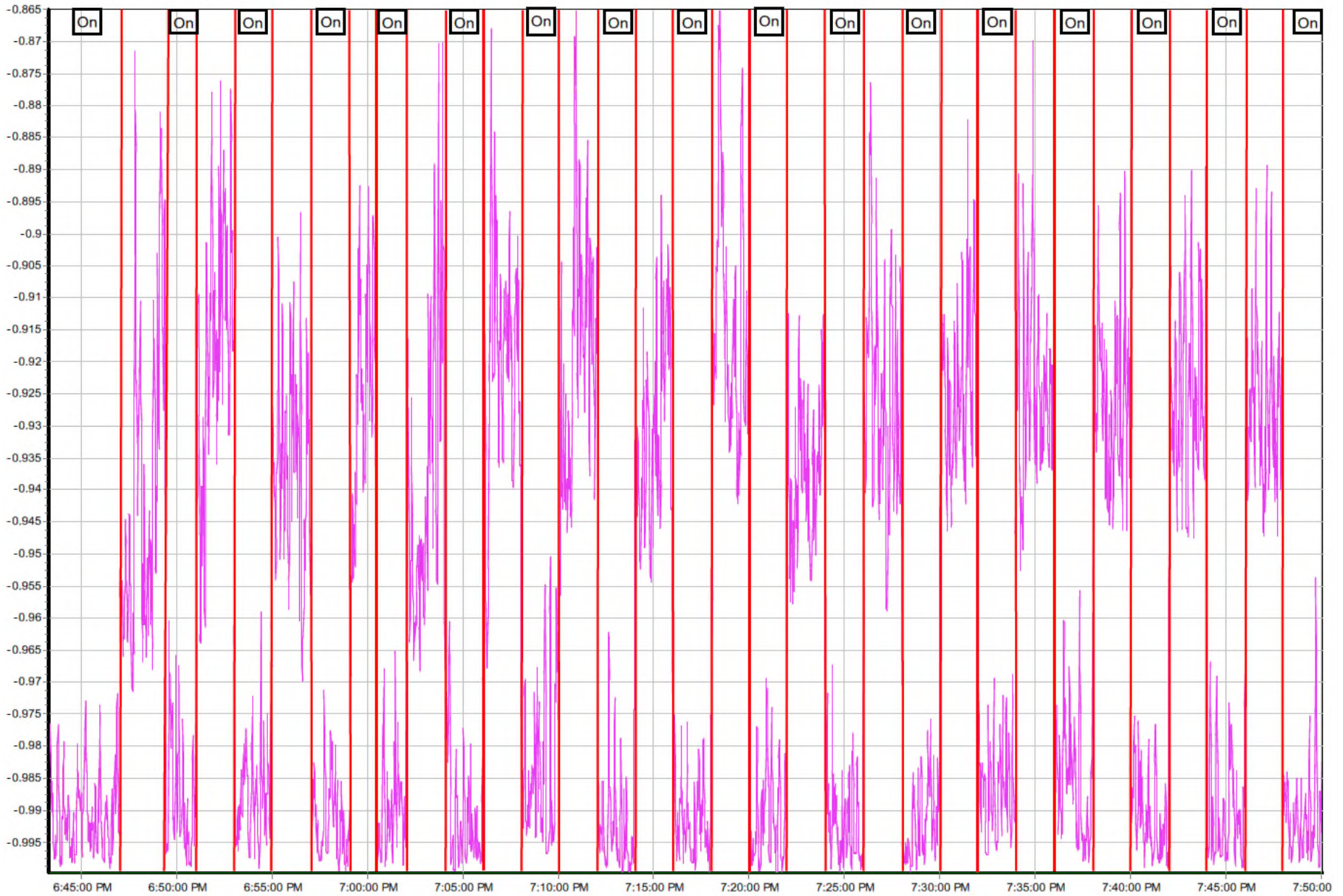
Reactive Power (VAR)													
Intervals				Full Interval				Instant Change At Transition	15 Sec Change At Transition	30 Sec Change At Transition	45 Sec Change At Transition	60 Sec Change At Transition	
Interval Time Frame	# USES	Status	System On Average	System Off Average	Difference Off to On	Difference On to Off							
6:43:16 PM	6:46:59 PM	0	on	65362.29									
6:47:02 PM	6:49:20 PM	0	off		184980.96		119618.67	126235.08	112980.96	100195.36	182621.72	163354.86	
6:49:26 PM	6:50:57 PM	0	on	73567.13		111413.83		203236.52	145081.12	100883.85	184622.52	201278.93	
6:51:05 PM	6:52:59 PM	0	off		218791.48		145224.35	116552.87	98659.31	150008.92	220039.35	140010.96	
6:53:03 PM	6:54:53 PM	0	on	71303.10		147488.38		175583.80	172472.90	147143.11	194747.69	167557.64	
6:55:00 PM	6:56:59 PM	0	off		183171.62		111868.52	122249.75	132362.20	143345.82	121191.67	163031.34	
6:57:05 PM	6:59:01 PM	0	on	59112.05		124059.57		100940.10	104471.84	121350.06	115800.09	61816.38	
6:59:24 PM	7:00:24 PM	0	off		216998.95		157886.90	130521.95	180439.92	170112.70	165448.84	182042.46	
7:00:30 PM	7:02:00 PM	0	on	63363.06		153635.89		184841.14	191369.57	180109.59	159586.35	154495.14	
7:02:02 PM	7:04:01 PM	0	off		185207.87		121844.82	120034.98	146634.28	103237.06	119585.87	120089.16	
7:04:23 PM	7:05:58 PM	0	on	51058.63		134149.25		219715.61	146488.13	186859.80	209455.85	202772.35	
7:06:21 PM	7:08:00 PM	0	off		217102.59		166043.96	162584.65	163212.97	147111.93	149297.95	197115.86	
7:08:04 PM	7:09:47 PM	0	on	80521.16		136581.43		127822.12	132866.80	119134.90	134886.97	125483.04	
7:10:07 PM	7:12:02 PM	0	off		213802.18		133281.02	148953.63	156969.46	113134.55	201868.30	220893.30	
7:12:07 PM	7:13:57 PM	0	on	51899.78		161902.40		186445.95	166327.69	160230.02	169842.30	206981.36	
7:14:02 PM	7:15:57 PM	0	off		193643.17		141743.39	149655.69	129237.36	156741.88	139454.86	174865.95	
7:16:01 PM	7:17:57 PM	0	on	58006.33		135636.84		127393.98	128544.33	125436.02	78251.76	150663.31	
7:18:07 PM	7:19:58 PM	0	off		219006.21		160999.88	177275.83	186323.22	211136.75	187142.45	162967.01	
7:20:08 PM	7:21:58 PM	0	on	62188.07		156818.14		176958.47	146140.31	133943.77	105201.78	155126.31	
7:22:00 PM	7:23:57 PM	0	off		186405.43		124217.36	101564.44	102450.92	123137.13	118979.17	110867.55	
7:24:18 PM	7:25:58 PM	0	on	59071.62		127333.81		171324.58	130092.00	143856.07	115668.88	142724.15	
7:26:01 PM	7:28:00 PM	0	off		210588.01		151516.39	197298.70	178235.59	153917.16	197114.46	170328.95	
7:28:07 PM	7:29:58 PM	0	on	61173.99		149414.03		205546.57	194050.83	163663.52	160419.44	202843.04	
7:30:03 PM	7:31:57 PM	0	off		218533.79		157359.81	114299.81	131406.28	130823.42	144012.98	127853.28	
7:32:10 PM	7:33:57 PM	0	on	80168.29		138365.51		148840.87	164118.00	110457.90	155738.04	101371.61	
7:34:01 PM	7:35:57 PM	0	off		219698.66		139530.37	124999.97	113039.02	122804.30	130785.43	142038.07	
7:36:04 PM	7:37:56 PM	0	on	85515.03		134183.63		127123.97	130328.61	104557.29	80776.32	90586.78	
7:38:06 PM	7:39:58 PM	0	off		219875.39		134360.36	176181.69	197050.08	171569.93	126782.66	120872.55	
7:40:03 PM	7:41:59 PM	0	on	66568.08		153307.31		158125.49	161078.55	162740.22	145292.46	158375.15	
7:42:04 PM	7:43:59 PM	0	off		219072.46		152504.39	186953.81	179150.58	186319.11	203489.97	194731.78	
7:44:03 PM	7:45:57 PM	0	on	66585.32		152487.14		206419.70	188125.50	113159.81	204208.88	209291.31	
7:46:02 PM	7:47:57 PM	0	off		222006.25		155420.93	123490.44	144240.41	124101.37	139737.38	109485.83	
7:48:19 PM	7:50:03 PM	0	on	65430.46		156575.79		185652.59	148229.75	180792.94	191024.82	167319.95	
Average - System Off				201911.04									
Average - System On				65934.96									
Difference				135976.08									
Transition Avg - On to Off						142084.56		142428.33	147024.54	144231.09	159222.07	156284.31	
Transition Avg - Off to On							138272.89	169123.22	153111.62	140894.93	150345.26	156167.90	
Average - All Transitions per phase				151883.33	75.22%								

**Table 3** Above is the analysis of the Reactive Power data of 6 USES<sup>®</sup> model XL-3D-480V and 1 USES<sup>®</sup> model XL-3Y-480V units collected by the Amprobe DM-II Pro Multi-Meter and Data-Logger during the TIS testing on October 29, 2015. Each interval is 2 minutes in duration. The reactive power is reduced by an average of **151.883 kVAR**. Shaded cells are not included in the average performance calculations because load changes unrelated to the performance of the USES<sup>®</sup> system occurred during the averaging period. Because of load changes, full interval comparisons are not used to quantify reductions in reactive power demand.



# Graph 4

10/29/2015 6:43:16 PM - 10/29/2015 7:50:04 PM



**Graph 4** Above is the Power Factor in decimals during the TIS testing on October 29, 2015 between 6:43 pm and 7:50 pm with 6 USES<sup>®</sup> model XL-3D-480V and 1 USES<sup>®</sup> model XL-3Y-480V power conditioners operating. The power factor is increased from **93% to 99%**.

## Table 4

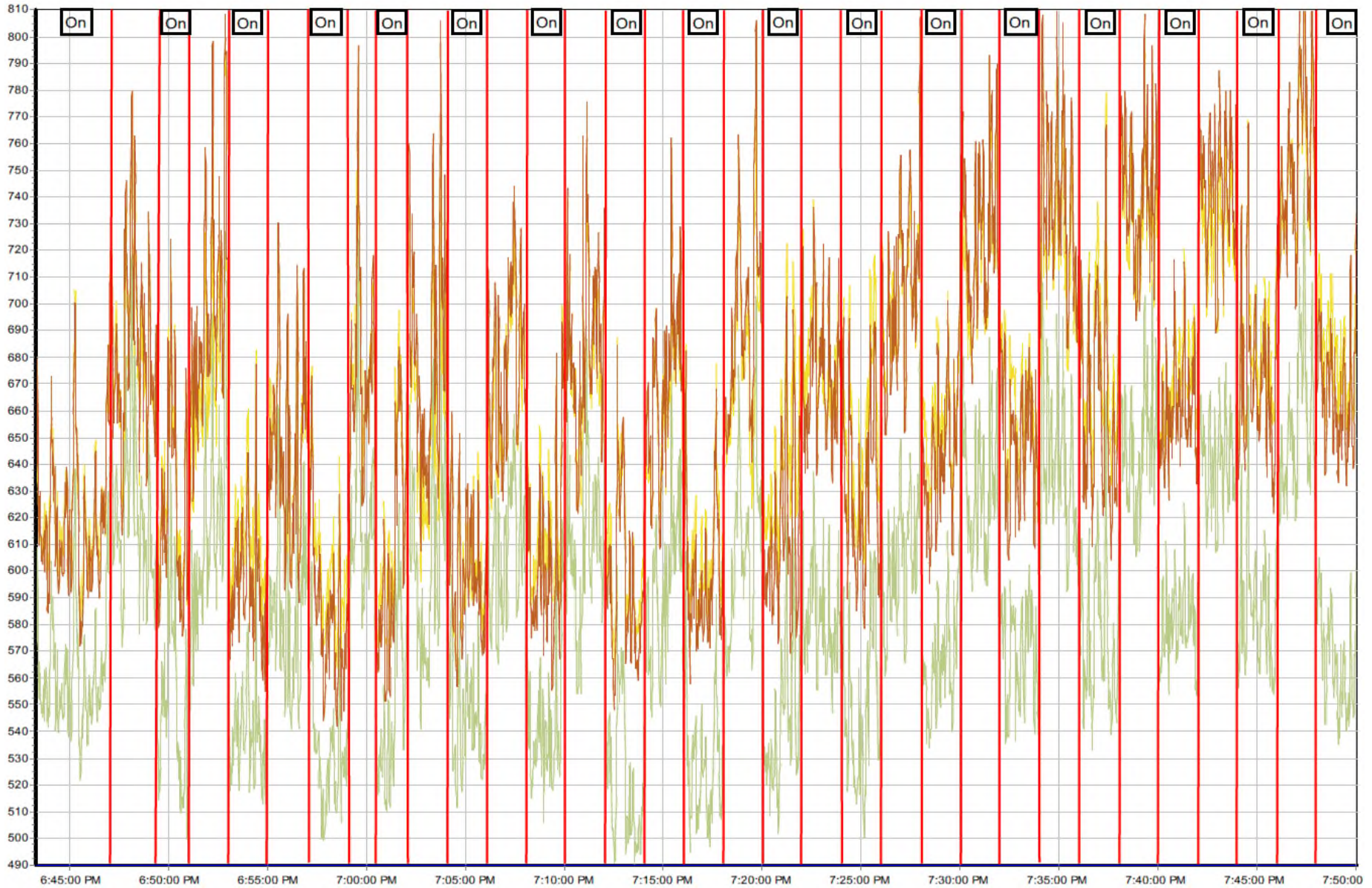
<b>Power Factor</b>												
Intervals				Full Interval		Instant Change At Transition	15 Sec Change At Transition	30 Sec Change At Transition	45 Sec Change At Transition	60 Sec Change At Transition		
Interval Time Frame		# USES	Status	System On Average	System Off Average						Difference Off to On	Difference On to Off
6:43:16 PM	6:46:59 PM	0	on	0.99								
6:47:02 PM	6:49:20 PM	0	off		0.94		0.05	0.04	0.04	0.04	0.09	0.07
6:49:26 PM	6:50:57 PM	0	on	0.99		0.05		0.11	0.09	0.08	0.10	0.11
6:51:05 PM	6:52:59 PM	0	off		0.92		0.07	0.06	0.04	0.07	0.11	0.06
6:53:03 PM	6:54:53 PM	0	on	0.99		0.07		0.08	0.08	0.07	0.09	0.08
6:55:00 PM	6:56:59 PM	0	off		0.94		0.05	0.05	0.05	0.06	0.05	0.07
6:57:05 PM	6:59:01 PM	0	on	0.99		0.06		0.03	0.03	0.04	0.04	0.02
6:59:24 PM	7:00:24 PM	0	off		0.92		0.07	0.05	0.07	0.08	0.07	0.09
7:00:30 PM	7:02:00 PM	0	on	0.99		0.07		0.10	0.10	0.09	0.09	0.09
7:02:02 PM	7:04:01 PM	0	off		0.94		0.05	0.05	0.06	0.04	0.05	0.06
7:04:23 PM	7:05:58 PM	0	on	0.99		0.06		0.10	0.08	0.09	0.10	0.10
7:06:21 PM	7:08:00 PM	0	off		0.92		0.08	0.07	0.08	0.06	0.06	0.09
7:08:04 PM	7:09:47 PM	0	on	0.98		0.07		0.05	0.05	0.05	0.05	0.05
7:10:07 PM	7:12:02 PM	0	off		0.92		0.07	0.06	0.06	0.05	0.12	0.10
7:12:07 PM	7:13:57 PM	0	on	0.99		0.08		0.08	0.08	0.08	0.08	0.09
7:14:02 PM	7:15:57 PM	0	off		0.93		0.06	0.07	0.05	0.06	0.06	0.08
7:16:01 PM	7:17:57 PM	0	on	0.99		0.06		0.05	0.05	0.05	0.04	0.06
7:18:07 PM	7:19:58 PM	0	off		0.91		0.08	0.09	0.10	0.11	0.08	0.07
7:20:08 PM	7:21:58 PM	0	on	0.99		0.08		0.07	0.06	0.06	0.05	0.07
7:22:00 PM	7:23:57 PM	0	off		0.94		-0.05	0.04	0.04	0.05	0.05	0.05
7:24:18 PM	7:25:58 PM	0	on	0.99		-0.06		0.07	0.06	0.06	0.06	0.07
7:26:01 PM	7:28:00 PM	0	off		0.92		-0.07	0.08	0.08	0.06	0.08	0.06
7:28:07 PM	7:29:58 PM	0	on	0.99		-0.07		0.08	0.08	0.07	0.07	0.08
7:30:03 PM	7:31:57 PM	0	off		0.92		-0.07	0.05	0.06	0.07	0.06	0.06
7:32:10 PM	7:33:57 PM	0	on	0.99		-0.06		0.06	0.07	0.05	0.06	0.05
7:34:01 PM	7:35:57 PM	0	off		0.92		-0.06	0.07	0.05	0.06	0.06	0.07
7:36:04 PM	7:37:56 PM	0	on	0.99		-0.06		0.07	0.07	0.06	0.05	0.06
7:38:06 PM	7:39:58 PM	0	off		0.93		-0.06	0.07	0.08	0.07	0.05	0.04
7:40:03 PM	7:41:59 PM	0	on	0.99		-0.07		0.07	0.07	0.07	0.07	0.07
7:42:04 PM	7:43:59 PM	0	off		0.93		-0.07	0.07	0.06	0.07	0.09	0.07
7:44:03 PM	7:45:57 PM	0	on	0.99		-0.07		0.09	0.08	0.07	0.09	0.09
7:46:02 PM	7:47:57 PM	0	off		0.93		-0.06	0.06	0.06	0.06	0.06	0.05
7:48:19 PM	7:50:03 PM	0	on	0.99		-0.06		0.08	0.07	0.08	0.08	0.07
Average - System Off				0.93								
Average - System On				0.99								
Difference				0.06								
Transition Avg - On to Off						0.01		0.06	0.06	0.06	0.07	0.07
Transition Avg - Off to On							0.01	0.07	0.07	0.07	0.07	0.07
Average - All Transitions				0.07	7.33%							

**Table 4** Above is the analysis of the Power Factor data of 6 USES<sup>®</sup> model XL-3D-480V and 1 USES<sup>®</sup> model XL-3Y-480V units collected by the Amprobe DM-II Pro Multi-Meter and Data-Logger during the TIS testing on October 29, 2015. Each interval is 2 minutes in duration. The power factor is increased from **93% to 99%**. Shaded cells are not included in the average performance calculations because load changes unrelated to the performance of the USES<sup>®</sup> system occurred during the averaging period. Because of load changes, full interval comparisons are not used to quantify increase in power factor.



# Graph 5

10/29/2015 6:43:16 PM - 10/29/2015 7:50:04 PM



**Graph 5** Above is the Current in Amps per phase during the TIS testing on October 29, 2015 between 6:43 pm and 7:50 pm with 6 USES<sup>®</sup> model XL-3D-480V and 1 USES<sup>®</sup> model XL-3Y-480V power conditioners operating. The current is reduced by an average of **75.67 Amps per phase.**

## Table 5

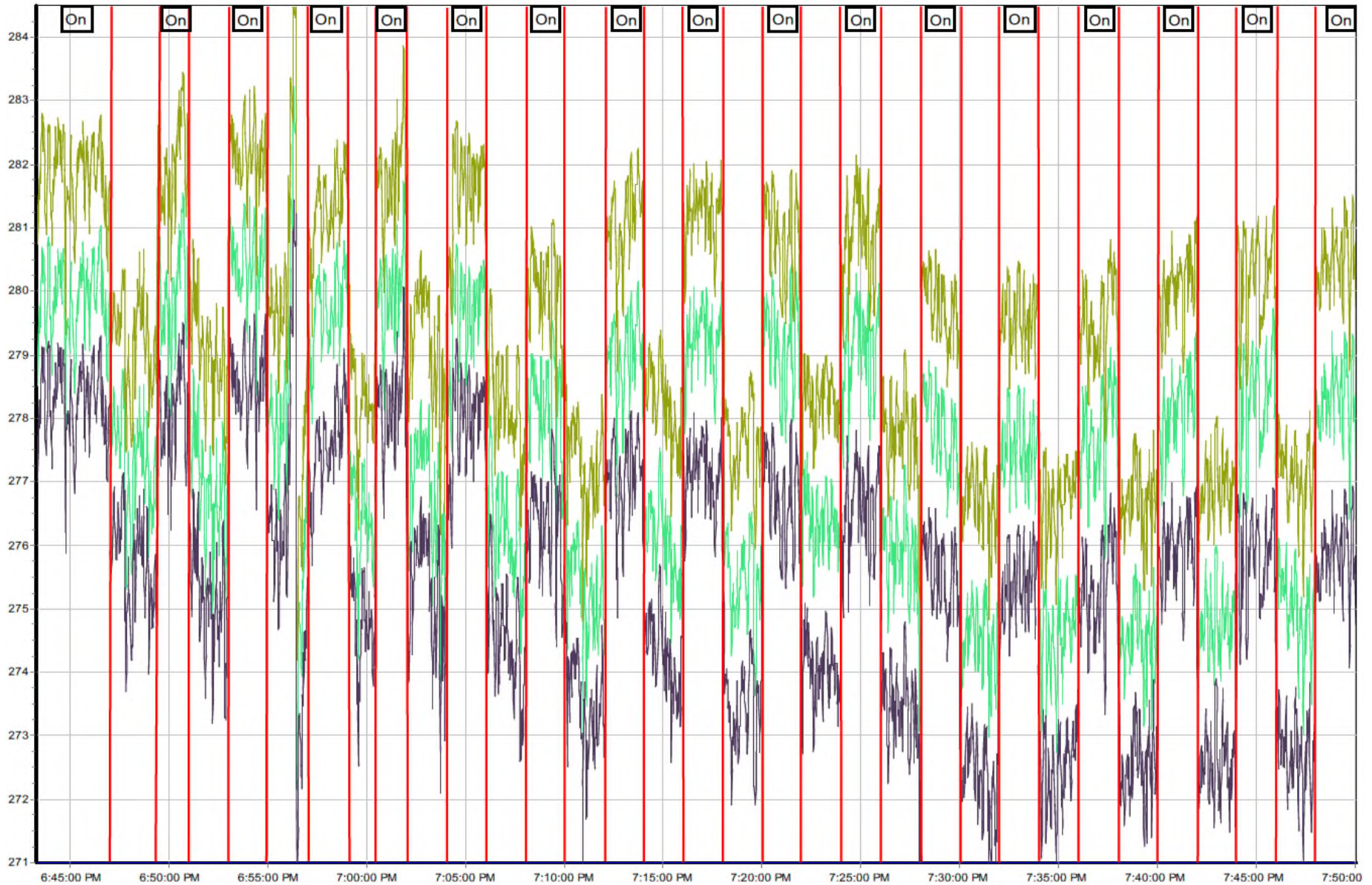
RMS Current (Amps)												
Intervals				Full Interval				Instant Change At Transition	15 Sec Change At Transition	30 Sec Change At Transition	45 Sec Change At Transition	60 Sec Change At Transition
Interval Time Frame		# USES	Status	System On Average	System Off Average	Difference Off to On	Difference On to Off					
6:43:16 PM	6:46:59 PM	0	on	600.95								
6:47:02 PM	6:49:20 PM	0	off		663.65		62.70	48.08	18.46	3.73	44.57	55.39
6:49:26 PM	6:50:57 PM	0	on	602.13		61.52		71.86	62.43	-1.45	35.67	82.22
6:51:05 PM	6:52:59 PM	0	off		666.51		64.38	44.58	70.41	82.07	154.68	94.76
6:53:03 PM	6:54:53 PM	0	on	581.05		85.46		101.43	104.83	117.54	107.51	91.93
6:55:00 PM	6:56:59 PM	0	off		626.29		45.24	60.35	79.65	112.03	57.01	120.65
6:57:05 PM	6:59:01 PM	0	on	573.04		53.25		33.77	42.45	65.15	94.61	78.20
6:59:24 PM	7:00:24 PM	0	off		663.87		90.83	72.01	115.68	61.75	75.70	67.99
7:00:30 PM	7:02:00 PM	0	on	588.28		75.58		80.60	69.54	99.74	63.72	12.02
7:02:02 PM	7:04:01 PM	0	off		651.33		63.05	37.98	57.76	42.65	14.97	-5.72
7:04:23 PM	7:05:58 PM	0	on	577.69		73.64		135.81	89.55	115.42	115.92	124.61
7:06:21 PM	7:08:00 PM	0	off		656.65		78.96	80.60	50.16	53.32	61.57	115.84
7:08:04 PM	7:09:47 PM	0	on	583.66		73.00		52.49	84.44	74.98	72.68	68.58
7:10:07 PM	7:12:02 PM	0	off		657.38		73.73	84.64	93.19	31.30	52.57	155.34
7:12:07 PM	7:13:57 PM	0	on	572.74		84.64		118.14	109.69	123.67	69.24	144.10
7:14:02 PM	7:15:57 PM	0	off		641.35		68.61	25.54	46.21	87.75	40.64	77.77
7:16:01 PM	7:17:57 PM	0	on	579.48		61.87		72.46	85.80	76.18	90.03	88.77
7:18:07 PM	7:19:58 PM	0	off		661.39		81.92	74.29	65.11	94.57	146.66	88.90
7:20:08 PM	7:21:58 PM	0	on	601.67		59.72		85.56	93.67	58.29	76.43	63.12
7:22:00 PM	7:23:57 PM	0	off		646.34		44.67	27.50	29.76	60.48	31.42	45.76
7:24:18 PM	7:25:58 PM	0	on	609.63		36.71		73.45	49.26	71.70	41.51	24.77
7:26:01 PM	7:28:00 PM	0	off		673.05		63.42	95.42	43.25	58.59	99.06	111.63
7:28:07 PM	7:29:58 PM	0	on	621.17		51.87		143.54	169.79	136.27	111.79	153.11
7:30:03 PM	7:31:57 PM	0	off		693.32		72.14	32.29	36.31	3.11	53.80	32.73
7:32:10 PM	7:33:57 PM	0	on	623.12		70.20		45.09	77.66	28.70	58.82	37.38
7:34:01 PM	7:35:57 PM	0	off		700.75		77.63	57.55	105.28	103.48	97.05	115.76
7:36:04 PM	7:37:56 PM	0	on	637.31		63.44		38.99	58.89	44.57	4.65	9.45
7:38:06 PM	7:39:58 PM	0	off		708.49		71.18	100.25	125.47	110.43	64.79	60.04
7:40:03 PM	7:41:59 PM	0	on	637.04		71.45		60.58	81.13	100.95	38.02	58.64
7:42:04 PM	7:43:59 PM	0	off		703.54		66.50	73.41	93.05	87.97	75.43	91.46
7:44:03 PM	7:45:57 PM	0	on	646.48		57.05		100.55	74.44	-18.07	74.14	78.18
7:46:02 PM	7:47:57 PM	0	off		721.66		75.18	36.39	66.41	26.49	67.32	33.53
7:48:19 PM	7:50:03 PM	0	on	635.49		86.18		73.25	57.75	63.61	83.24	75.95
Average - System Off				670.97								
Average - System On				604.17								
Difference				66.80								
Transition Avg - On to Off						66.60		59.43	68.51	72.35	71.08	84.50
Transition Avg - Off to On							68.76	80.47	81.96	84.06	75.55	78.77
Average - All Transitions per phase				75.67	11.28%							

**Table 5** Above is the analysis of the Current data of 6 USES<sup>®</sup> model XL-3D-480V and 1 USES<sup>®</sup> model XL-3Y-480V units collected by the Amprobe DM-II Pro Multi-Meter and Data-Logger during the TIS testing on October 29, 2015. Each interval is 2 minutes in duration. The current is reduced by an average of **75.67 Amps per phase**. Shaded cells are not included in the average performance calculations because load changes unrelated to the performance of the USES<sup>®</sup> system occurred during the averaging period. Because of load changes, full interval comparisons are not used to quantify reductions in amps.



# Graph 6

10/29/2015 6:43:16 PM - 10/29/2015 7:50:04 PM



**Graph 6** Above is the Voltage in Volts per phase during the TIS testing on October 29, 2015 between 6:43 pm and 7:50 pm with 6 USES<sup>®</sup> model XL-3D-480V and 1 USES<sup>®</sup> model XL-3Y-480V power conditioners operating. The voltage is increased by an average of **3.29 Volts per phase**.

## Table 6

RMS Voltage (Volts)												
Intervals				Full Interval		Instant Change At Transition	15 Sec Change At Transition	30 Sec Change At Transition	45 Sec Change At Transition	60 Sec Change At Transition		
Interval Time Frame		# USES	Status	System On Average	System Off Average						Difference Off to On	Difference On to Off
6:43:16 PM	6:46:59 PM	0	on	279.99								
6:47:02 PM	6:49:20 PM	0	off		277.40		2.59	2.72	2.34	2.23	3.53	3.68
6:49:26 PM	6:50:57 PM	0	on	280.07		2.67		4.06	3.16	1.68	3.72	4.12
6:51:05 PM	6:52:59 PM	0	off		277.02		3.05	2.55	2.36	3.70	5.10	3.26
6:53:03 PM	6:54:53 PM	0	on	280.42		3.40		3.78	3.60	3.38	4.24	3.45
6:55:00 PM	6:56:59 PM	0	off		277.79		2.63	2.48	2.97	3.26	2.97	2.24
6:57:05 PM	6:59:01 PM	0	on	279.52		1.73		1.93	1.86	2.82	2.77	1.82
6:59:24 PM	7:00:24 PM	0	off		276.27		3.25	2.89	4.23	3.48	3.56	3.99
7:00:30 PM	7:02:00 PM	0	on	280.07		3.79		3.89	4.07	4.11	3.41	4.41
7:02:02 PM	7:04:01 PM	0	off		277.07		3.00	2.46	3.01	2.15	2.34	2.08
7:04:23 PM	7:05:58 PM	0	on	279.94		2.87		5.02	3.36	4.16	4.80	4.71
7:06:21 PM	7:08:00 PM	0	off		276.16		3.78	3.41	3.34	3.05	2.98	4.36
7:08:04 PM	7:09:47 PM	0	on	278.26		2.10		2.70	2.98	2.61	2.83	2.61
7:10:07 PM	7:12:02 PM	0	off		275.31		2.95	3.26	3.36	2.45	3.90	5.17
7:12:07 PM	7:13:57 PM	0	on	279.06		3.75		4.29	4.00	3.65	3.88	4.96
7:14:02 PM	7:15:57 PM	0	off		276.21		2.85	2.85	2.37	2.92	2.26	3.37
7:16:01 PM	7:17:57 PM	0	on	279.19		2.99		2.75	2.98	3.05	2.24	3.38
7:18:07 PM	7:19:58 PM	0	off		275.50		3.69	3.76	3.88	4.57	4.26	3.45
7:20:08 PM	7:21:58 PM	0	on	278.89		3.38		3.89	3.31	2.74	2.50	3.23
7:22:00 PM	7:23:57 PM	0	off		276.22		-2.66	2.19	2.23	2.81	2.60	2.43
7:24:18 PM	7:25:58 PM	0	on	278.91		-2.69		3.62	2.70	3.14	2.16	2.89
7:26:01 PM	7:28:00 PM	0	off		275.60		-3.31	4.26	3.61	3.23	4.48	3.90
7:28:07 PM	7:29:58 PM	0	on	277.73		-2.13		5.12	4.58	4.15	4.13	5.05
7:30:03 PM	7:31:57 PM	0	off		274.51		-3.21	2.27	2.50	2.33	2.71	2.43
7:32:10 PM	7:33:57 PM	0	on	277.58		-3.07		3.06	3.42	2.37	3.39	2.37
7:34:01 PM	7:35:57 PM	0	off		274.58		-3.00	2.63	2.59	3.06	2.97	3.07
7:36:04 PM	7:37:56 PM	0	on	277.54		-2.96		2.41	2.64	2.10	1.54	1.58
7:38:06 PM	7:39:58 PM	0	off		274.56		-2.98	3.91	4.66	4.11	2.79	2.94
7:40:03 PM	7:41:59 PM	0	on	278.05		-3.49		3.72	3.86	4.07	3.49	3.87
7:42:04 PM	7:43:59 PM	0	off		274.79		-3.26	4.25	4.28	4.25	4.52	4.27
7:44:03 PM	7:45:57 PM	0	on	278.16		-3.37		4.54	3.67	2.12	4.65	4.44
7:46:02 PM	7:47:57 PM	0	off		274.92		-3.25	2.51	2.93	2.35	2.98	2.38
7:48:19 PM	7:50:03 PM	0	on	278.26		-3.34		3.53	2.74	3.63	3.90	3.45
Average - System Off		275.87	x 1.73	477.81								
Average - System On		278.92	x 1.73	483.09								
Difference				5.28								
Transition Avg - Off to On						0.35		3.02	3.17	3.12	3.37	3.31
Transition Avg - On to Off							0.38	3.64	3.31	3.11	3.35	3.52
Average - All Transitions per Phase				3.29	0.69%							

**Table 6** Above is the analysis of the Voltage data of 6 USES<sup>®</sup> model XL-3D-480V and 1 USES<sup>®</sup> model XL-3Y-480V units collected by the Amprobe DM-II Pro Multi-Meter and Data-Logger during the TIS testing on October 29, 2015. Each interval is 2 minutes in duration. The voltage is increased by an average of **3.29 Volts per phase**. Shaded cells are not included in the average performance calculations because load changes unrelated to the performance of the USES<sup>®</sup> system occurred during the averaging period. Because of load changes, full interval comparisons are not used to quantify increase in voltage.

## Installation Configuration



The photographs above show the installation of the USES<sup>®</sup> Shunt Efficiency System by Power Shaver, Energy Saving Systems<sup>®</sup> at the Island Colony facility located at 445 Seaside Ave., Honolulu, HI 96815.

# Acceptance of TIS Report

Having read the USES® System Evaluation for the Island Colony facility, dated November 6, 2015, I hereby accept the results and agree that Power Shaver, Energy Saving Systems® has sufficiently validated the guarantees as provided in the Purchase Agreement dated September 3, 2015.



**445 Seaside Ave.  
Honolulu, HI 96815**

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Authorized Signature

Title

Date