POWER SHAVER
Energy Saving Systems

GSA Contract Holder
Contract Number GS-07F-0422W

Timed Interval Sampling Monitoring & Verification Report

For

ENTERPRISE RECORD DAILY $1

Located at

400 E Park Ave.
Chico, CA 95928

April 12, 2016

Prepared by:
John D. Knapp
President

Table of Contents

Power Conditioning and Energy Savings

TIS Report

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Located at

400 E Park Ave.
Chico, CA 95928

Prepared by:

Power Shaver, Energy Savings Systems

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Executive Summary and Conclusions

During February of 2016, the Chico Enterprise Record installed a USES® Shunt Efficiency System, manufactured by USES MFG INC. The purpose of the USES® System is to reduce the overall demand and consumption of power and improve overall power quality. A total of three (3) USES® Model XL-3D-480V and one (1) USES® Model XL-3Y-480V power conditioners were installed throughout the Chico Enterprise Record facility.

In accordance with the proposal offered to the Chico Enterprise Record, by Power Shaver, Energy Saving Systems in November of 2015, this USES® System was evaluated to determine the average power conditioning results, power demand reductions, resultant monetary savings and return on investment (ROI). Power Shaver used Timed Interval Sampling (TIS) methods to determine the USES® System performance and the results of the TIS testing from February 23rd 2016 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® Shunt Efficiency System at the Chico Enterprise Record facility, installed on the main service entrances and select sub-panels for a total of three (3) USES® XL 3-D 480V and one (1) USES® XL 3-Y 480V units, has significantly improved power quality and resulted in a substantial decrease in electrical demand. The USES® System reduced the demand for electricity at low load by approximately **66.33 kW** which Power Shaver calculates should result in a reduction in the cost of power by approximately **$12,124.00** and consumptions by approximately **62,107 kWh per year**. This equates to a Return on Investment (ROI) of **.70 years conservatively** based on 2014 usage and cost of power.

Due to the fact that utility customers are billed for Demand and Energy between the Real and Apparent Power powers based on their Default Power Factor (DPF) and power quality, along with the fact that the NERVE 20-20 electrical monitoring system and software used in this verification process also incorporate this same calculating method, a .85 DPF per the Chico Enterprise Record electrical tariff, Power Shaver understands these results to be accurate.

The performance of the USES® Shunt Efficiency System at the Chico Enterprise Record facility has proven to be consistent with all of the estimated power quality improvements as outlined in Power Shaver's proposal to the Chico Enterprise Record facility in November of 2015.

The data tables and graphs presented in this report clearly show the beneficial results provided by the USES® 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® System was activated and de-activated. All of the data tables presented in this report are from the TIS testing and evaluation conducted on February 23rd, 2016. Additional power quality improvements also realized by the installation of the USES® System are discussed later in this report. The resultant power demand reductions during the TIS testing were used to calculate the net annual effect of the

USES® system in terms of actual savings and return on investment (ROI).

During the Timed Interval Sampling, only half of the press was in operation and the duration of the run time was short. Power Shaver recorded one of the longer run times and with USES® on for the first half of the duration, and then turned USES® off for 6 minutes, then back on at the end of the recording.

Power Shavers' Energy Saving Systems are truly "green" systems that reduce electric energy consumption. Installing the Power Shaver Energy Saving System at the Chico Enterprise Record 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 47.2 tons per year** as well as your companies consumption of **Crude Oil by 36.54 barrels, Coal by 10.51 tons, Natural Gas by 206,148.63 cubic feet, Gasoline by 1,705.44 gallons or Diesel Fuel and Heating Oil by 1,527.98 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 Chico Enterprise Record's facilities energy savings program. Power Shaver also looks forward to assisting to reduce the electrical demands and costs to operate the remainder of the Chico Enterprise Record's facilities and their industry associates. For any questions or comments on this report, please contact John D. Knapp, CEO/President of Power Shaver, Energy Savings Systems at (888) 9-POWER-5, or via email at john@powershaver.com.

Summary of Power Quality Improvements

Analysis of the low load TIS testing results from February 23rd 2016 demonstrate that the USES® technology has provided substantial demand reductions and improvements in overall power quality and condition. The following improvements have been realized by Chico Enterprise Record.

- Real Power Demand Average (kW) – **Real Power billed demand was reduced by an average 66.33kW (31.3%)** at low load operational levels with (4) USES® Power Conditioners activated. Each USES® 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 November 2015. During the Off-Peak TIS testing of February 23rd 2016, the average real power demand reduction was 66.33kW. The results are used in the ROI and Savings calculations because they are representative of low load conditions.

- Apparent Power Average – Apparent power average demand was reduced by 31.27 kVA (17%) when the USES® System was activated.

- Reactive Power – Under low load, the reactive power demand was reduced an average of 122.75 kVAR (107%) when the USES® System was activated.

- Power Factor – Under low load, the power factor improved from .74 to .89 (20.2%) when the USES® System was activated.

- Amperage – Under low load, the circuit amperage was reduced by approximately 39.28 amps (18%) per phase for a total of 117.84 amps when the USES® System was activated.

- Voltage – Voltage improved by an average of 5.9 volts (1.2%) per phase (VAB, VBC, VCA) when the USES® System was activated.

Savings and ROI Calculations

Evaluation of the USES® System installed at the Chico Enterprise Record facility verifies a range of demand reductions at low load when the USES® System is activated. During the TIS testing period, when the facility was operational, the average extrapolated billed demand reduction was estimated to be 66.33 kW. The total projected annual reduction of energy consumed is 62,107 kWh per year.

Assuming the 2015 average cost of power of .19521 per kWh will increase in 2017 to .2002 per kWh and by 0.005 per kWh each year thereafter, ROI savings are shown on the following pro-forma:

Year	COP	KWh/yr SVGS	SVGS/yr	
1	$0.195	62,107	$12,123.91	
2	$0.200	62,107	$12,434.44	
3	$0.205	62,107	$12,744.98	
4	$0.210	62,107	$13,055.51	
5	$0.215	62,107	$13,366.05	**Years 1-5**
6	$0.220	62,107	$13,676.58	**$63,724.89**
7	$0.225	62,107	$13,987.12	
8	$0.230	62,107	$14,297.65	
9	$0.235	62,107	$14,608.19	
10	$0.240	62,107	$14,918.72	**Years 6-10**
11	$0.245	62,107	$15,229.26	**$71,488.26**
12	$0.250	62,107	$15,539.79	
13	$0.255	62,107	$15,850.33	
14	$0.260	62,107	$16,160.86	
15	$0.265	62,107	$16,471.40	**Years 11-15**
Total		**931,605**	**$214,464.79**	**$79,251.64**

- **Actual ROI = 0.70 years**
- **Year 1 savings = $12,123.91**
- **Installation costs = $8,500.00**
- **Total Savings over 15 years = $214,464 – $8,500 = $205,964**

USES® Power Quality Benefits

The installation of the USES® System at Chico Enterprise Record facility has resulted in measurable and verifiable demand reductions and power quality improvements, as well as other benefits which cannot be measured. A discussion of the power quality improvements resulting from the USES® System is presented below:

Real Power Demand - The USES® System reduces real power demand in two principal ways: through amperage reductions on the circuit, which also reduce "Copper Losses", and through the reduction of Harmonic Distortion (HD) in the amperage and voltage supplied to operating loads, which improves motor efficiency. The amount of real power demand reduction associated with the USES® System exceeds that of power factor correction capacitor (PFCC) equipment because of the reduced (HD), and additional proprietary benefits.

Power Factor – Power factor is the ratio of real power to apparent power. Because the USES® System reduces both real power demand and apparent power demand, the power factor is improved and approaches unity, or 100%. Because the USES® 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® System reduces the reactive power on the circuit in a manner which does not create RLC resonance. Each USES® Model XL-3D-480v power conditioner reduces reactive power by 27-29 kVAR and each USES® Model XL-3Y-480v power conditioner reduces reactive power by 17-19 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 and 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® System reduces the Harmful Harmonic Distortion (HHD) of the amperage and voltage on the circuit by passing all power generated within the USES® System through 60 Hz band-pass Filters. Because the USES® 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 HHD 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 measures 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® 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® 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® 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® “Wye” units were specified for this application, the USES® 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® System. In order to ensure the accuracy, transparency and repeatability of the TIS evaluation, Power Shaver, Energy Saving Systems 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® 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® System has on the circuit when activated and deactivated. Power Shaver used The NERVE energy intelligent 20-20 monitoring system and software 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® System performance was made through analysis of the data recorded from the TIS testing. The Nerve 20-20 monitoring system was connected at a point at or near the main service breaker at each of the three service entrances serving the entire facility in order to measure overall circuit power quality and average energy savings. The USES® System was activated and deactivated for intervals of two 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® 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® 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® System.

- Each instantaneous change in power quality was determined by comparing the last one-second with the USES® System on to the first one-second with the USES® System off, and vice-versa.

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

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

Graphs and Data Tables

Through evaluation of the NERVE 20-20 monitoring system recordings collected on February 23rd 2016, we have prepared a series of graphs and data tables to show the effect of the USES® System. The following graphs are presented below, showing all changes to power quality when the USES® System is activated or de-activated:

- Graph 1 – Real Power (KW) – This graph shows real power in KW during the February 23rd 2016 TIS testing.
- Graph 2 – Apparent Power (KVA) – This graph shows apparent power in KVA during the February 23rd 2016 TIS testing.
- Graph 3 – Reactive Power (kVAR) – This graph shows reactive power in kVAR during the February 23rd 2016 TIS testing.
- Graph 4 – Power factor – This graph shows power factor as a decimal during the February 23rd 2016 TIS testing.
- Graph 5 – Amperage (Amps) – This graph shows current in amps for 3 phases during the February 23rd 2016 TIS testing.
- Graph 6 – Voltage (Volts) – This graph shows the voltage in volts for 3 phases during the February 23rd 2016 TIS testing.

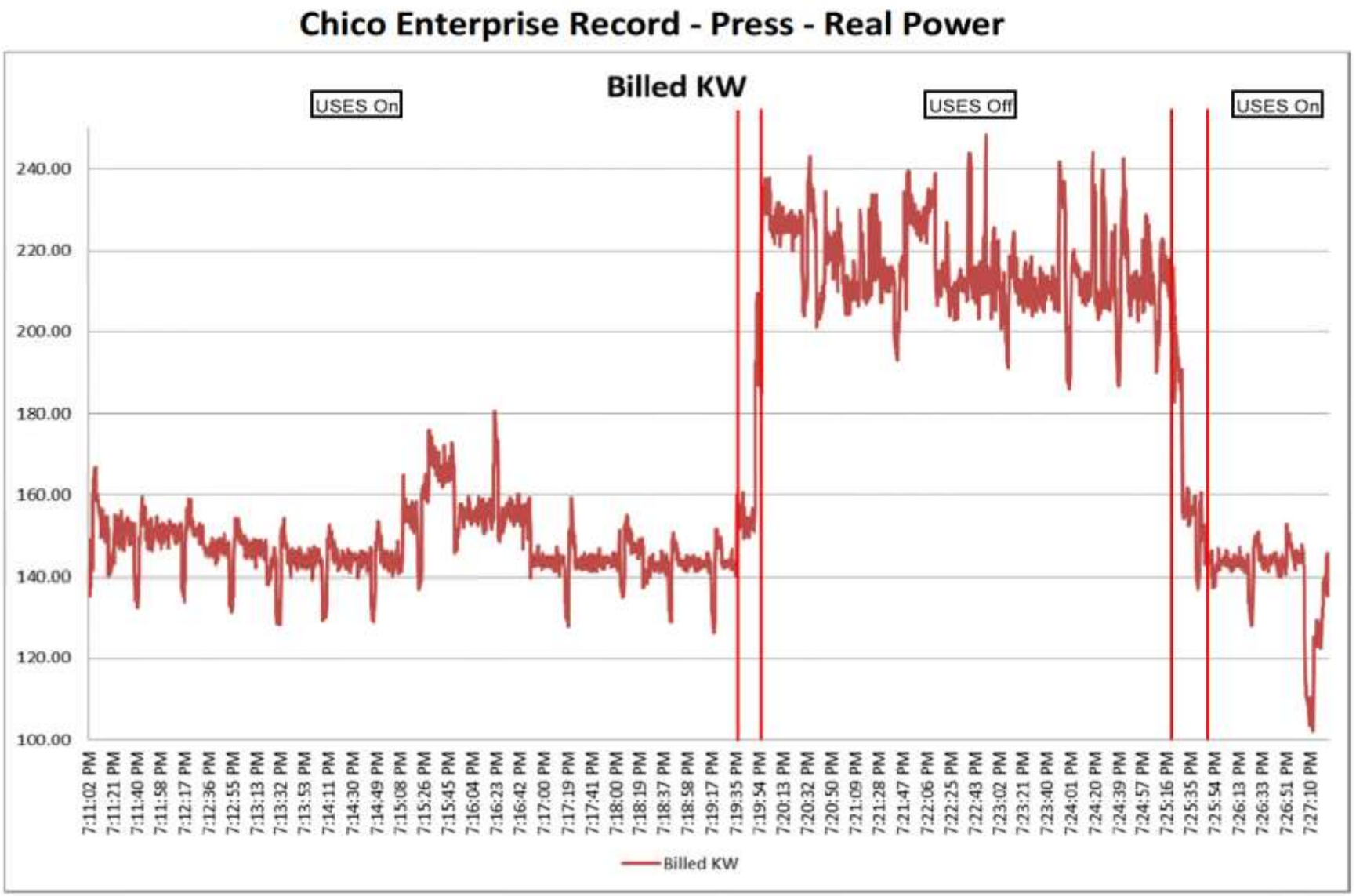
The following data tables are presented to show the average observed performance of the USES® System during the February 23rd 2016 TIS testing. Please note that during the testing, each USES® unit was tested individually to ensure performance and evaluate circuit improvements

- Table 1 – Real Power (KW) from the February 23rd 2016 TIS testing.
- Table 2 – Apparent Power (KVA) from the February 23rd 2016 TIS testing.
- Table 3 – Reactive Power (kVAR) from the February 23rd 2016 TIS testing.
- Table 4 – Power Factor from the February 23rd 2016 TIS testing.
- Table 5 – Amperage (Amps) 3 phases from the February 23rd 2016 TIS testing.
- Table 6 – Voltage (Volts) 3 phases from the February 23rd 2016 TIS testing.

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

Graph 1

Power Shaver® **NERVE Live 20-20**



Graph 1 above shows the **Press** Real Power Demand in kW during the TIS testing on February 23rd 2016 between 7:11pm and 7:27pm. With (3) USES® model XL-3D-480V and (1) USES® model XL-3Y-480V power conditioners operating, the real power demand is reduced an average of **66.33 kW.**

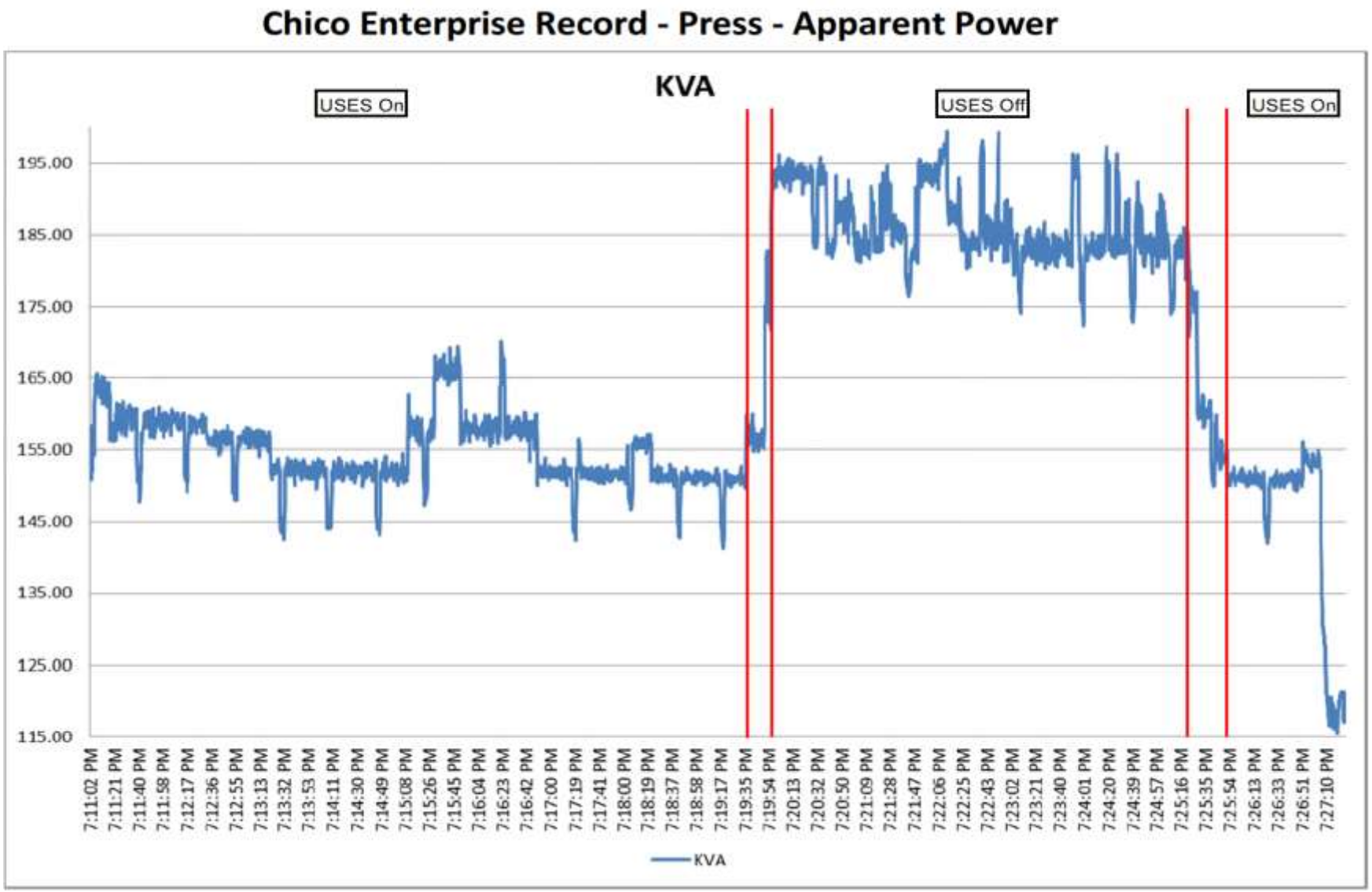
Table 1

Real Power Demand (KW) Billed						
Intervals						Instant Change At Transition
Interval Time Frame		# USES	Status	System On	System Off	
Overall Press Changes						
7:19:36 PM	7:19:56 PM		off	142.23	222.53	80.31
7:25:39 PM	7:25:45 PM		on	149.20	201.56	52.36
Transition Avg - On to Off				145.71		80.31
Transition Avg - Off to On					212.05	52.36
Average - All Transitions			66.33			

Table 1 above shows the analysis of the **Press** kW data of (3) USES® model XL-3D-480V and (1) USES® model XL-3Y-480V units collected by the NERVE 20-20 monitoring system during the TIS testing on February 23rd 2016. The real power demand is reduced an average of **66.33 kW.** Shaded cells are not included in the average performance calculations because load changes unrelated to the performance of the USES® system occurred during the averaging period.

Graph 2

Power Shaver® **NERVE Live 20-20**



Graph 2 above shows the **Press** Apparent Power in kVA during the TIS testing on February 23rd 2016 between 7:11pm and 7:27pm. With (3) USES® model XL-3D-480V and (1) USES® model XL-3Y-480V power conditioners operating. The apparent power is reduced an average of **31.27 kVA.**

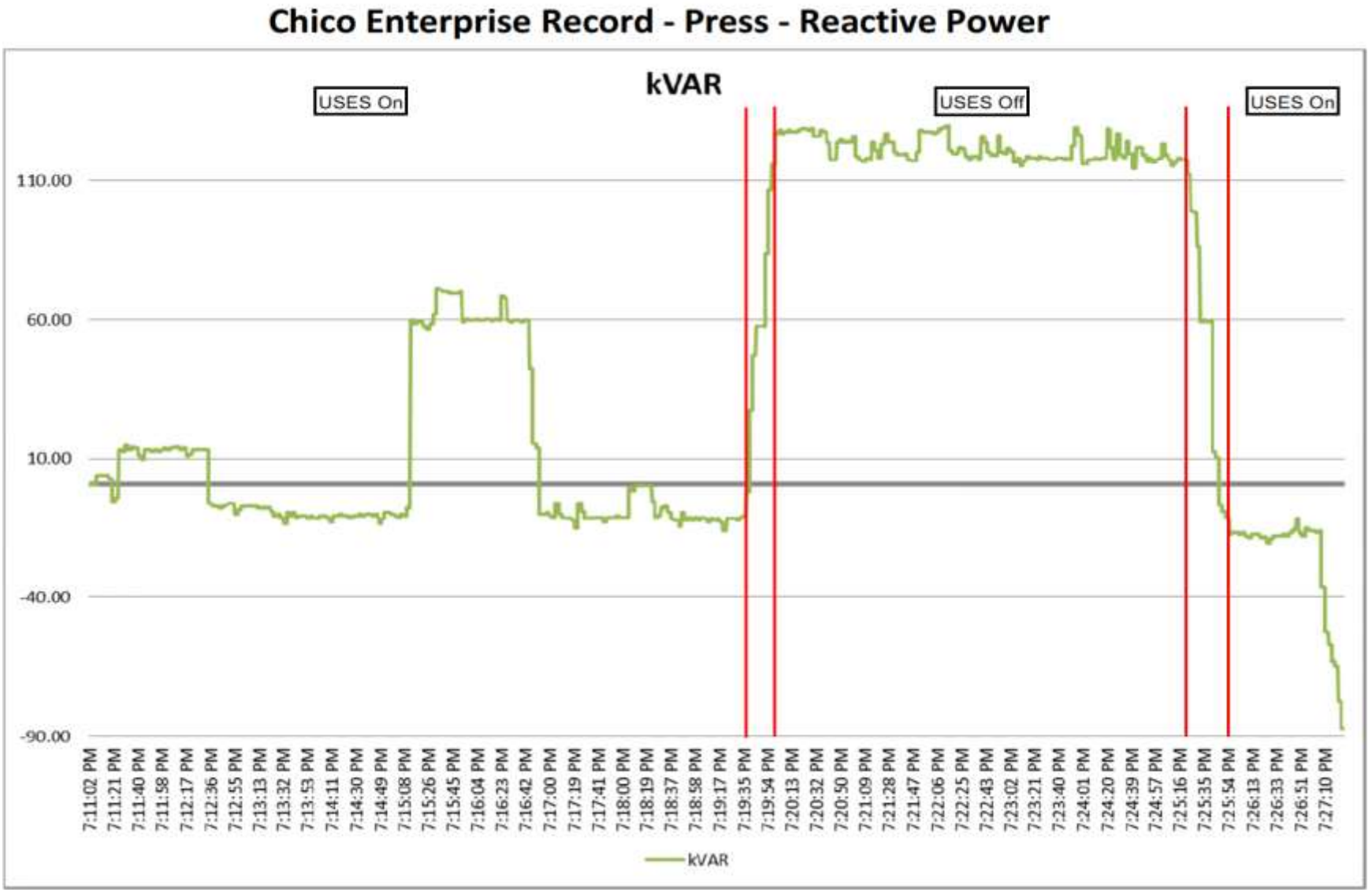
Table 2

Apparent Power (KVA) Measured						
Intervals						Instant Change At Transition
Interval Time Frame		# USES	Status	System On	System Off	
Overall Press Changes						
7:19:36 PM	7:19:56 PM		off	150.57	188.19	37.62
7:25:39 PM	7:25:45 PM		on	154.14	179.07	24.93
Transition Avg - On to Off				152.36		37.62
Transition Avg - Off to On					183.63	24.93
Average - All Transitions			31.27			

Table 2 above shows the analysis of the **Press** Apparent Power data of (3) USES® model XL-3D-480V and (1) USES® model XL-3Y-480V units collected by the NERVE 20-20 monitoring system during the TIS testing on February 23rd 2016. The test data shows an apparent power reduction of about **31.27 kVA.** Shaded cells are not included in the average performance calculations because load changes unrelated to the performance of the USES® system occurred during the averaging period.

Graph 3

Power Shaver® **NERVE Live 20-20**



Graph 3 above shows the **Press** Reactive Power in kVAR during the TIS testing on February 23rd 2016 between 7:11pm and 7:27pm. With (3) USES® model XL-3D-480V and (1) USES® model XL-3Y-480V power conditioners operating. The reactive power is reduced an average of **122.75 kVAR.**

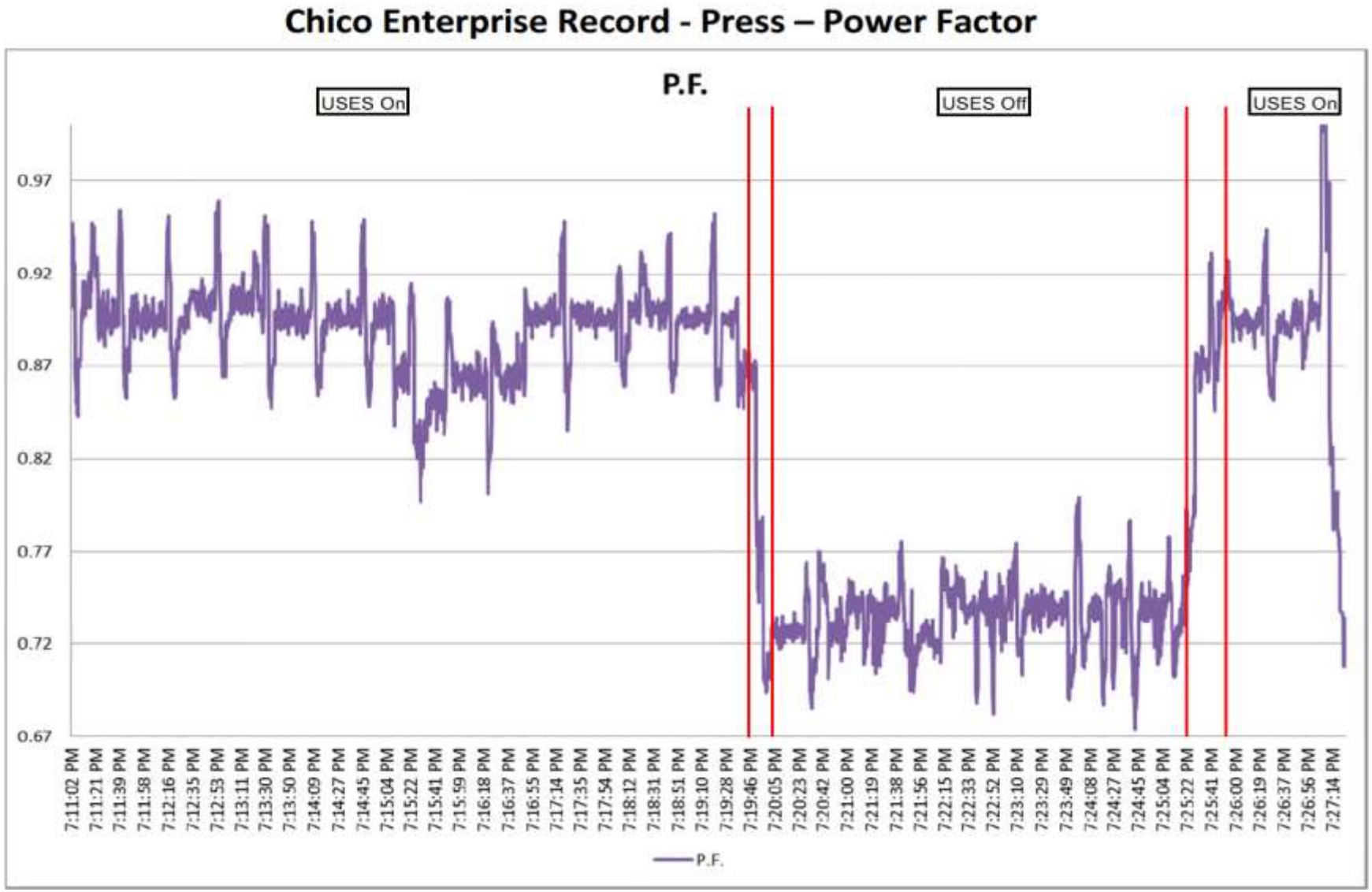
Table 3

Reactive Power (KVAR)						
Intervals						Instant Change At Transition
Interval Time Frame		# USES	Status	System On	System Off	
Overall Press Changes						
7:19:36 PM	7:19:56 PM		off	-10.41	116.18	126.59
7:25:39 PM	7:25:45 PM		on	-6.57	112.34	118.91
Transition Avg - On to Off				-8.49		126.59
Transition Avg - Off to On					114.26	118.91
Average - All Transitions			122.75			

Table 3 above shows the analysis of the **Press** Reactive Power data of (3) USES® model XL-3D-480V and (1) USES® model XL-3Y-480V units collected by the NERVE 20-20- monitoring during the TIS testing on February 23rd 2016. The test data shows a reactive power reduction of about **122.75 kVAR.** Shaded cells are not included in the average performance calculations because load changes unrelated to the performance of the USES® system occurred during the averaging period.

Graph 4

Power Shaver® **NERVE Live 20-20**



Graph 4 above shows the **Press** Power Factor in decimals during the TIS testing on February 23rd 2016 between 7:11pm and 7:27pm. With (3) USES® model XL-3D-480V and (1) USES® model XL-3Y-480V power conditioners operating. The power factor is increased on average from **74% to 89%.**

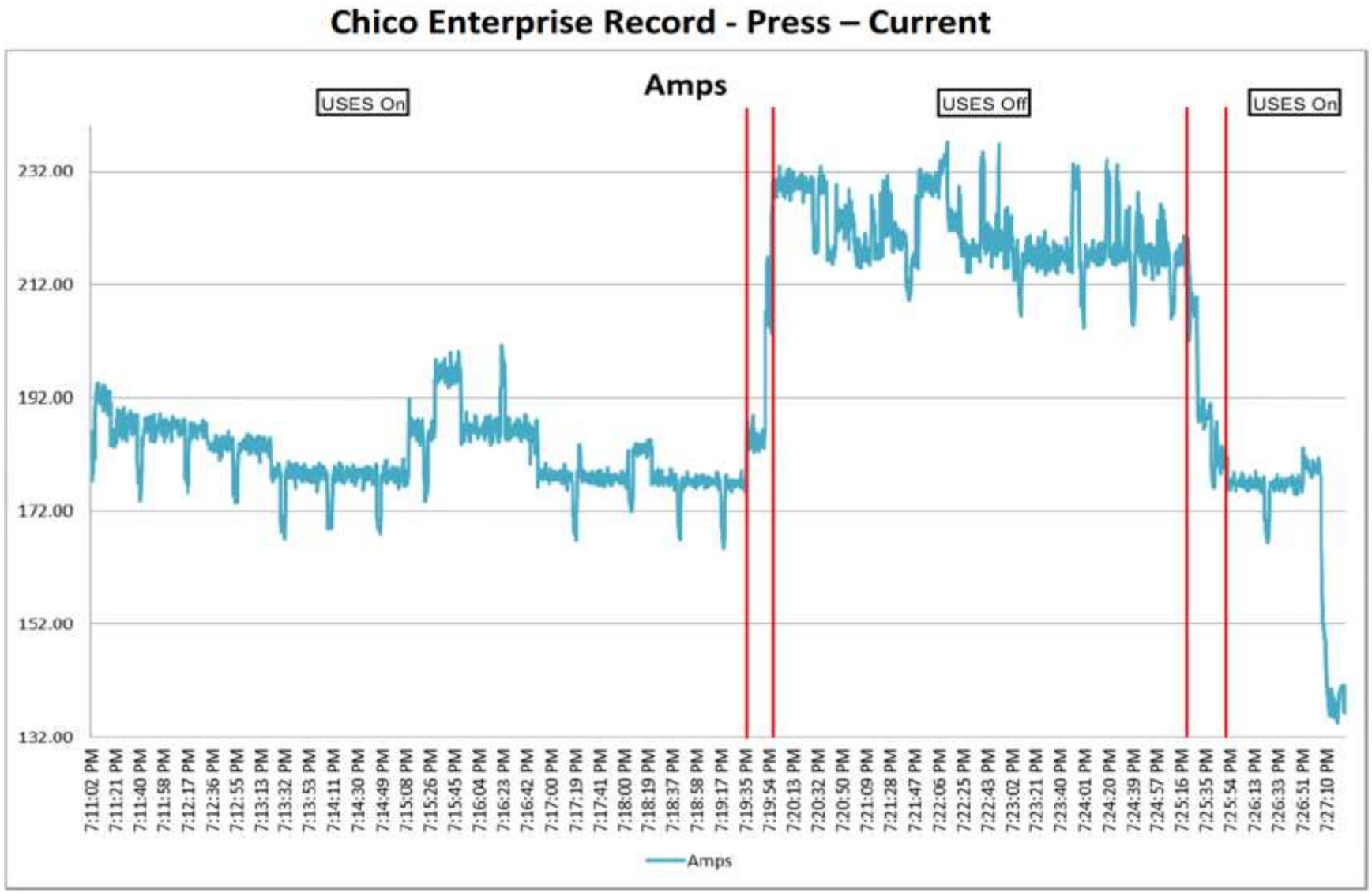
Table 4

Power Factor						
Intervals						Instant Change At Transition
Interval Time Frame		# USES	Status	System On	System Off	
Overall Press Changes						
7:19:36 PM	7:19:56 PM		off	0.90	0.72	0.18
7:25:39 PM	7:25:45 PM		on	0.88	0.76	0.12
Transition Avg - On to Off				0.89		0.18
Transition Avg - Off to On					0.74	0.12
Average - All Transitions			0.15			

Table 4 above shows the analysis of the **Press** Power Factor data of (3) USES® model XL-3D-480V and (1) USES® model XL-3Y-480V units collected by the NERVE 20-20- monitoring during the TIS testing on February 23rd 2016. The test data shows the power factor is increased on average from **74% to 89%.** Shaded cells are not included in the average performance calculations because load changes unrelated to the performance of the USES® system occurred during the averaging period.

Graph 5

Power Shaver® **NERVE Live 20-20**



Graph 5 above shows the **Press** Current in Amps per phase during the TIS testing on February 23rd 2016 between 7:11pm and 7:27pm. With (3) USES® model XL-3D-480V and (1) USES® model XL-3Y-480V power conditioners operating. The current is reduced an average of **39.28 Amps per phase.**

Table 5

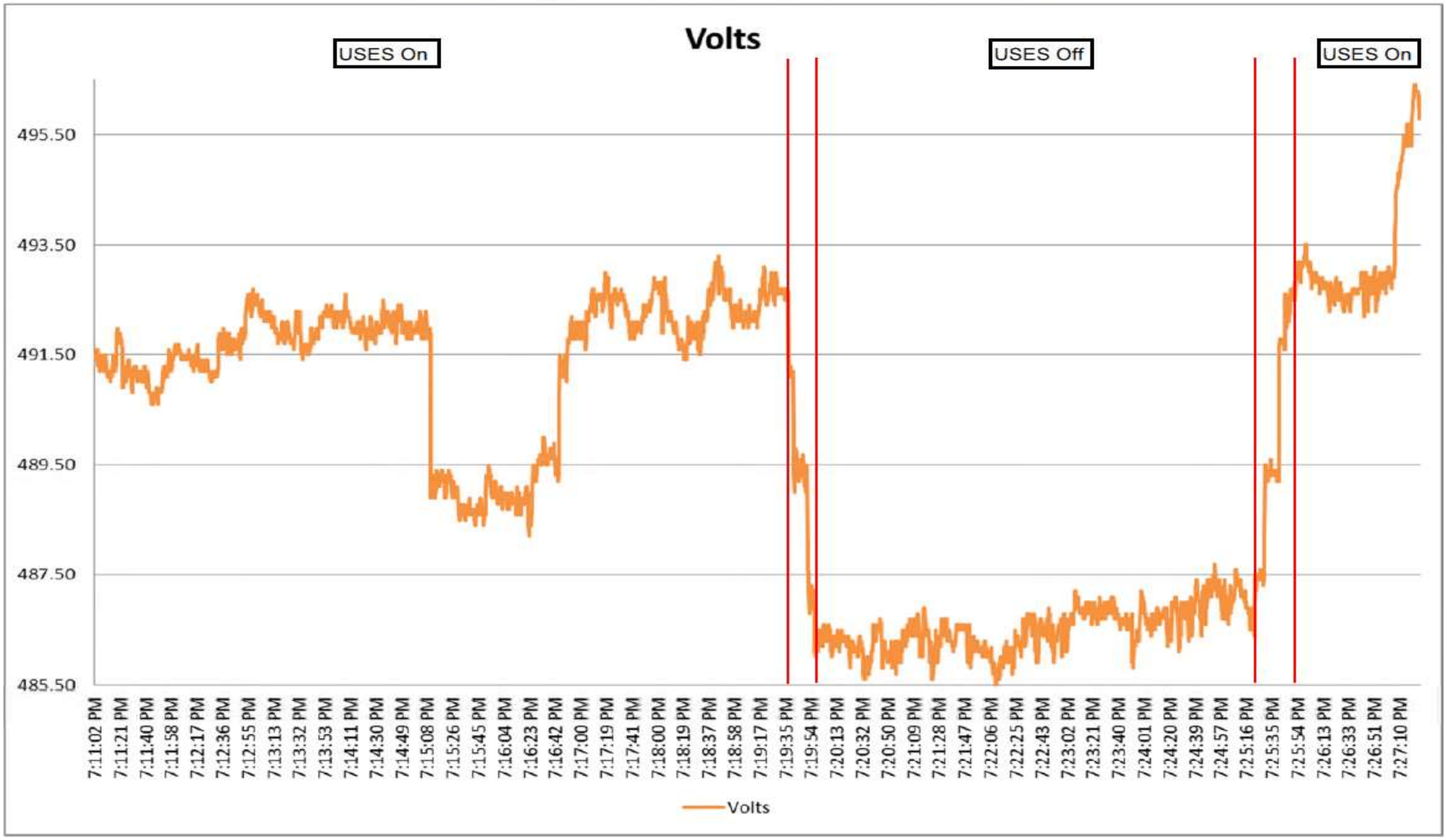
Current (Amps)						
Intervals						Instant Change At Transition
Interval Time Frame		# USES	Status	System On	System Off	
Overall Press Changes						
7:19:36 PM	7:19:56 PM		off	176.51	223.55	47.04
7:25:39 PM	7:25:45 PM		on	180.64	212.15	31.51
Transition Avg - On to Off				178.57		47.04
Transition Avg - Off to On					217.85	31.51
Average - All Transitions			39.28			

Table 5 above shows the analysis of the **Press** Amperage data of (3) USES® model XL-3D-480V and (1) USES® model XL-3Y-480V units collected by the NERVE 20-20- monitoring during the TIS testing on February 23rd 2016. The test data shows the current is reduced an average of **39.28 Amps per phase.** Shaded cells are not included in the average performance calculations because load changes unrelated to the performance of the USES® system occurred during the averaging period.

Graph 6

Power Shaver® **NERVE Live 20-20**

Chico Enterprise Record - Press – Voltage



Graph 6 above shows the **Press** Voltage in Volts per phase during the TIS testing on February 23rd 2016 between 7:11pm and 7:27pm. With (3) USES® model XL-3D-480V and (1) USES® model XL-3Y-480V power conditioners operating. The voltage is increased an average of **5.9 Volts per phase.**

Table 6

Line to Line Voltage						
Intervals						Instant Change At Transition
Interval Time Frame		# USES	Status	System On	System Off	
Overall Press Changes						
7:19:36 PM	7:19:56 PM		off	492.60	486.20	6.40
7:25:39 PM	7:25:45 PM		on	492.60	487.20	5.40
Transition Avg - On to Off				492.60		6.40
Transition Avg - Off to On					486.70	5.40
Average - All Transitions			5.90			

Table 6 above shows the analysis of the **Press** Voltage data of (3) USES® model XL-3D-480V and (1) USES® model XL-3Y-480V units collected by the NERVE 20-20- monitoring during the TIS testing on February 23rd 2016. The test data shows the voltage is increased an average of **5.9 Volts per phase.** Shaded cells are not included in the average performance calculations because load changes unrelated to the performance of the USES® system occurred during the averaging period.

Installation Configuration

The photographs above show the installation of the USES® Shunt Efficiency System by Power Shaver, Energy Saving Systems at the Chico Enterprise Record facility located on main service entrances and select subpanels

Acceptance of TIS Report

Having read the USES® System Evaluation for the Chico Enterprise Record facility dated April 12, 2016, I hereby accept the results and agree that Power Shaver, Energy Saving Systems has sufficiently validated the projections as provided in the Purchase Agreement dated November 20, 2015.

400 E Park Ave.
Chico, CA 95928

Authorized Representative Title Date

