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Energy audit report of M/s Glow Cast, Belgaum

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It is well worthy to mention that the efforts being taken and the enthusiasm shown by all the plant personnel towards energy conservation and sustainable growth was really admirable. We found all the personnel keen to implement the possible energy conservation aspects.

Last but not least, the interactions and deliberations with cluster coordinating agencies, industry associations, technology providers and who were directly or indirectly involved throughout the study were exemplary and the whole exercise was thoroughly a rewarding experience for TERI.

The Energy and Resources Institute (TERI)
New Delhi

Executive summary

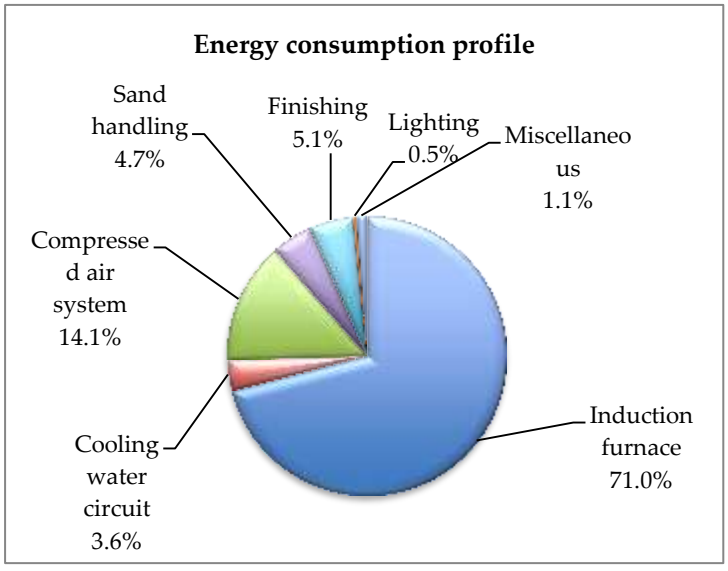
A detailed energy audit at M/s Glow Cast was conducted to identify the potential of energy savings. This report provides details of energy audit such as areas covered under the study, performance assessment of different equipment, potential areas for energy saving and estimated energy and cost savings along with investment required and payback periods. It provides insights to the plant for proper planning of investments on energy conservation recommendations.

Brief Introduction of the foundry unit

Name of the Unit	M/s Glow Cast
No. of years in operation	17
Factory address	76, Machhe Industrial Estate, Machhe Belgaum – 590 014
Type of industry	Spheroidal Graphite (SG) Iron and graded Cast Iron castings
Products Manufactured	Machine tools
Hours of operation per day	12
Number of days of operation per year	300
Energy used	Electricity

A detailed performance study was undertaken in the identified areas with the use of the sophisticated handheld instruments. Energy consumption pattern and production data were collected to estimate the specific energy consumption of the unit. The unit level baseline of the unit was also estimated using the historical data. The total energy consumption of the unit during FY 2014 – 15 was 131.5 toe (~1.5 million kWh) which is equivalent to 107 lakh rupees. The total CO_2 emission during this period is estimated to be 1,498 tonnes. Electricity was considered for CO_2 emission estimation.

The main source of the energy consumption in the plant is electricity used in induction melting furnace and to drive the process equipment and other auxiliaries, various utilities.



The unit manufactures ductile iron and graded CI castings which include gears and machine tools and supplies to various industries. The unit uses green sand and silicate sand moulding process. The total liquid melting production of the unit during 2014 – 15 was 1,712 tonnes and dispatched production was 1,051 tonnes. The plant has an installed capacity of 300 tonnes per month. With respect to production in financial year 2014 – 15 the capacity

utilization factor for the unit is 48%. The net yield of unit is around 60%.
The energy consumption in the plant is mainly for following: induction furnace, cooling water circuit, compressed air system, sand handling, finishing, lighting and miscellaneous. A pie chart depicting share of each area/section is given in figure.

Summary of energy conservation measures identified in unit

Key recommendations made in this energy audit report are summarised below.

S. No	Energy conservation measures	Annual energy savings Electricity (kWh)	Investment (Rs Lakh)	Savings Rs. lakh/ year	Simple payback year
1	Power factor improvement	1,475	0.74	0.85	0.9
2	Lid mechanism for induction furnace	12,851	2.00	0.79	2.5
3	Avoiding leakages in compressed air system	45,178	-	2.79	-
4	Retrofit the air compressor with variable frequency drive	25,953	2.50	1.61	1.6
5	Replacement of coil cooling pump of induction furnace	2,958	0.55	0.18	3.0
6	Replacement of raw water pump for panel cooling of induction furnace	3,430	0.55	0.21	2.6
7	Switch off the blender of sand mixer 03	1,800	-	0.11	-
8	Replacement of existing lighting system with energy efficient lighting system	3,440	1.25	0.21	5.9
	Overall	**97,085**	**7.59**	**6.76**	**1.1**

Total eight energy conservation measures are identified. Implementing then would attract a one-time investment of Rs 7.6 lakh; it would lead to annual savings of Rs 6.8 lakh. This would result in reduction in energy consumption by 6.3%. The specific energy consumption of entire foundry would improve from 1,455 kWh per tonne to 1,363 kWh per tonne.

1.0 Production and energy consumption

1.1 Introduction

M/s Glow Cast foundry unit was set up in 1997. The unit manufactures SG iron and graded CI castings and supplies to various industries. The unit has an installed capacity of 300 tonnes per month. Brief summary of unit is given in table 1.1.

Table 1.1: Brief description of unit

Name of the Unit	M/s Glow Cast
No. of years in operation	17
Factory address	76, Machhe Industrial Estate, Machhe Belgaum – 590 014
Type of industry	Spheroidal Graphite (SG) Iron and graded Cast Iron castings
Products Manufactured	Machine tools
Hours of operation per day	12
Number of days of operation per year	300
Energy used	Electricity

1.2 Process flow diagram

The major steps of process are mould sand preparation, charge preparation followed by melting, pouring, knockout and finishing. The unit uses green sand moulding process. The process flow diagram is shows in figure 1.2.

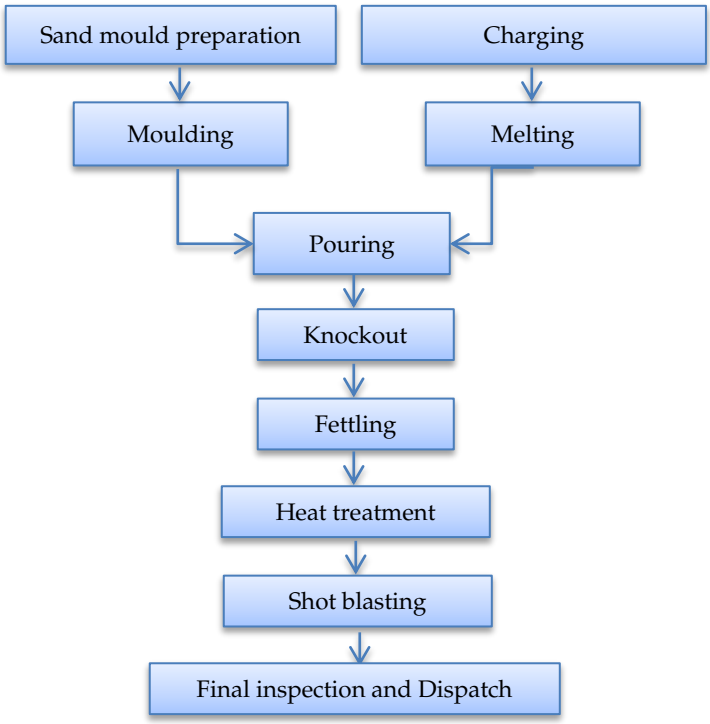


Figure 1.2: Process flow chart

1.3 Production and energy cost

The energy and production data for available period was taken from the unit for the analysis. The total liquid melting production of the unit during 2014–15 was 1,712 tonnes and dispatched production was 1,051 tonnes. The overall energy cost incurred for this production was 107 lakh rupees. Figure 1.3 refers the monthly production and energy cost profile of the unit.

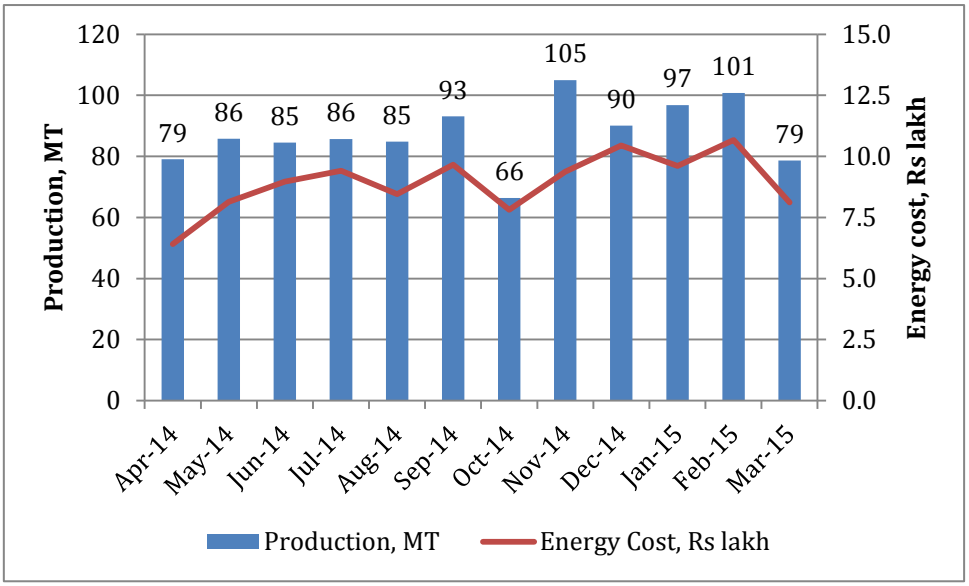


Figure 1.3: Production and energy cost profile

1.4 Energy sources availability and tariff details

Availability of listed energy types as above and their respective tariffs are given in table 1.4.

Table 1.4: Energy sources, availability and tariffs

S No	Energy source	Availability	Tariff details
1	Electricity	Supplied by HESCOM	Tariff category: HT-2(a) Voltage of supply: 11 kV Demand charges: Rs 170/kVA Energy charges: Rs 5.7/kWh (up-to 100,000 units) Rs 6.0/kWh (beyond 100,000 units) Time of day charges: 2200-0600: Rs -1.25/kWh 0600-1800: Rs 0.00/kWh 1800-2200: Rs +1.00/kWh PF penalty charges: For every 0.01 drop below 0.90, penalty Rs 0.03/kWh

1.5 Energy consumption

The total energy consumption of the unit during FY 2014 – 15 was 131.5 toe (~1.5 million kWh) which is equivalent to 107.06 lakh rupees. The total CO_2 emission during this period is estimated to be 1,498 tonnes. Electricity was considered for CO_2 emission estimation.

1.6 Performance indicators

1.6.1 Capacity utilization

The unit has an installed capacity of 300 MT per month. The actual monthly average melting is 142.7 MT. Thus, the capacity utilization (CU) of plant is 48%. The CU varies between 39 – 56%. The maximum CU was achieved in month of February in 2015 and minimum was in month of March in 2015. The CU is low due to lack of orders, thus the plant operates 12 hours per day only.

1.6.2 Net yield

The raw material consumption of foundry is around 146 tonnes per month and net casting sold is 87.6 tonnes per month. The net yield of foundry is 60%. The distribution of melting loss with spillage, runner and risers, rejection and net yield of foundry is given in figure 1.6.2.

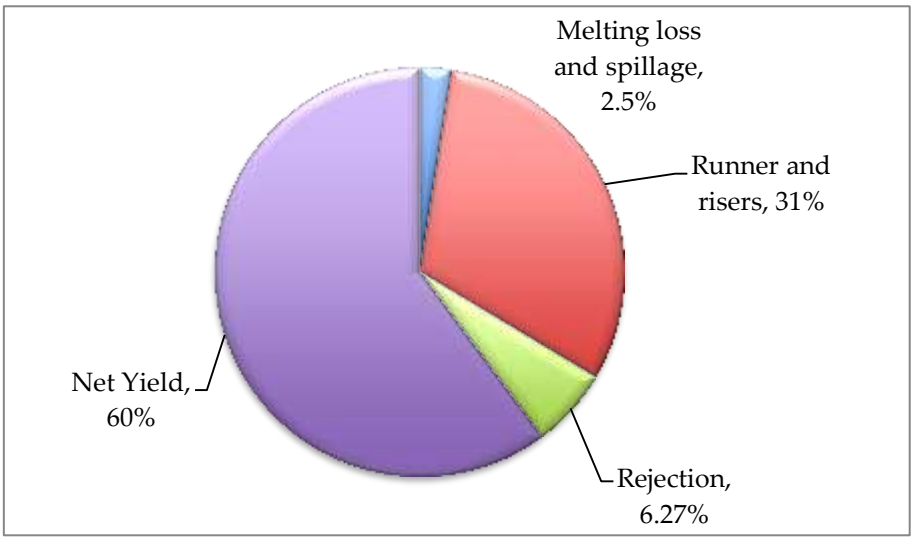


Figure 1.6.2: Net yield of foundry

1.6.3 Specific energy consumption

The average specific energy consumption (SEC) of the plant for the year FY 2014 – 15 was estimated based on the monthly consumption of electricity and monthly production. The overall SEC is estimated to be 1,455 kWh per metric tonne of production. The SEC for induction furnace for melting is estimated to be 633 kWh per tonne of melting.

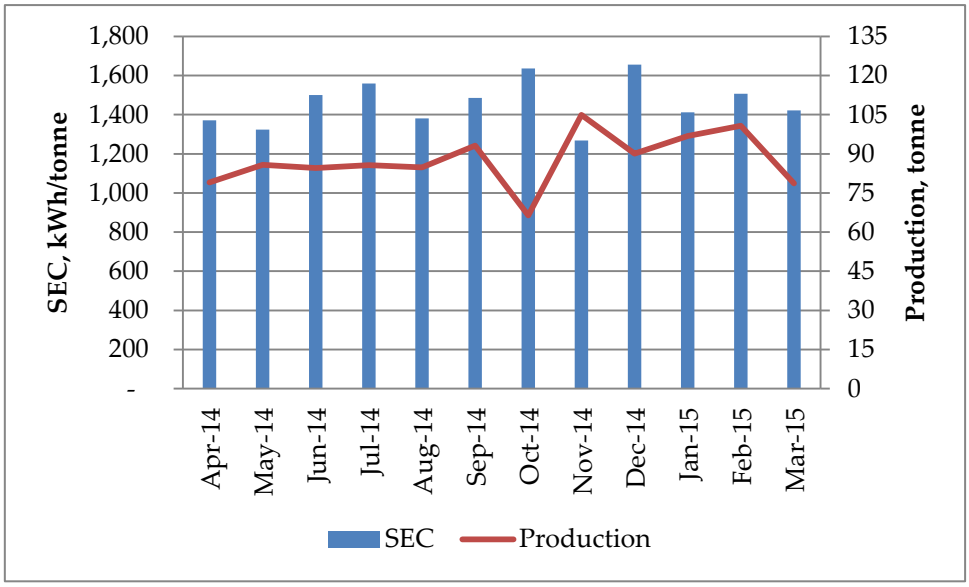


Figure 1.6.3: SEC and production profile

2.0 Electrical systems

2.1 Facility description

2.1.1 General

The main source of electricity for M/s Glow Cast is from Hubli Electricity Supply Company Ltd (HESCOM) at 11 kV grid supply. The 11 kV Main Receiving Station (MRS) is located within the plant premises. The power supplied at 11 kV is step down to 433/575 V using 1,000 kVA transformer (700 for furnace and 300 for auxiliary) and is fed to the respective power distribution board (PDB) and light distribution board (LDB) at 415/575 V through the LT switchgear located at main substation. Table 2.1.1 shows the design specifications and no-load and full-load losses of installed transformer.

Table 2.1.1: Technical specifications of transformer

Parameters	Transformer
Rating (KVA)	500
Application	Induction furnace Auxiliary and Utility
Type	ONAN
Primary Voltage (V)	11,000
Primary Current (Amps)	52.5
Secondary Voltage (Volts)	433/575
Secondary Current (A)	400/703
Rated No Load Loss (kW)	1.5
Rated load loss (kW)	10.8

The rate of power failure in Belgaum, Karnataka is insignificant. However to cater the necessary power requirements during power outages, the plant installed diesel generators.

To maintain the power factor near to unity, plant has provided the power factor correction system at main incomer at power control centre (PCC) level.

2.1.2 Electricity consumption data

The power supply to the facility is from HESCOM grid under the tariff category HT-2(a), with 750 kVA contract demand. The minimum billing demand is 563 kVA (75% of the contract demand). The detail of electricity consumption is given in the table 2.1.2.

Table 2.1.2: Monthly electricity consumption details

Month & Year	Electricity consumption (kWh)	Contact demand (kVA)	Power factor	Billed demand (kVA)	Demand charges (Rs)	Energy charges (Rs)	P.F. rebate/ penalty (Rs)	Monthly electricity bill (Rs)
Apr-14	108392	750	0.943	651	110670	582,415	-	640,436
May-14	113560	750	0.920	672	114240	651,360	-	814,299
Jun-14	126792	750	0.906	670	113900	730,752	-	896,581
Jul-14	133520	750	0.891	679	115430	771,120	4,006	940,998
Aug-14	117168	750	0.871	680	115600	673,008	10,545	845,074

Month & Year	Electricity consumption (kWh)	Contact demand (kVA)	Power factor	Billed demand (kVA)	Demand charges (Rs)	Energy charges (Rs)	P.F. rebate/ penalty (Rs)	Monthly electricity bill (Rs)
Sep-14	138400	750	0.949	659	112030	800,400	-	965,630
Oct-14	108632	750	0.953	674	114580	621,792	-	781,718
Nov-14	133024	750	0.956	674	114580	768,144	-	936,940
Dec-14	149056	750	0.965	684	116280	864,336	-	1,044,782
Jan-15	136672	750	0.965	671	114070	790,032	-	960,372
Feb-15	151888	750	0.972	724	123080	881,328	-	1,067,516
Mar-15	111864	750	0.940	719	122230	641,184	-	811,549
Average	**127414**	**750**	**0.936**	**680**	**115558**	**731,323**	**1,213**	**892158**
Total	1528968			91%	1386690	8775871	14,551	10,705,895

Important parameters only are presented in above table, details such as time of day tariff, electricity duty and others are not presented. Figure 2.1.2 presents the contract demand, billed demand and the energy consumed for the year FY 2014 – 15.

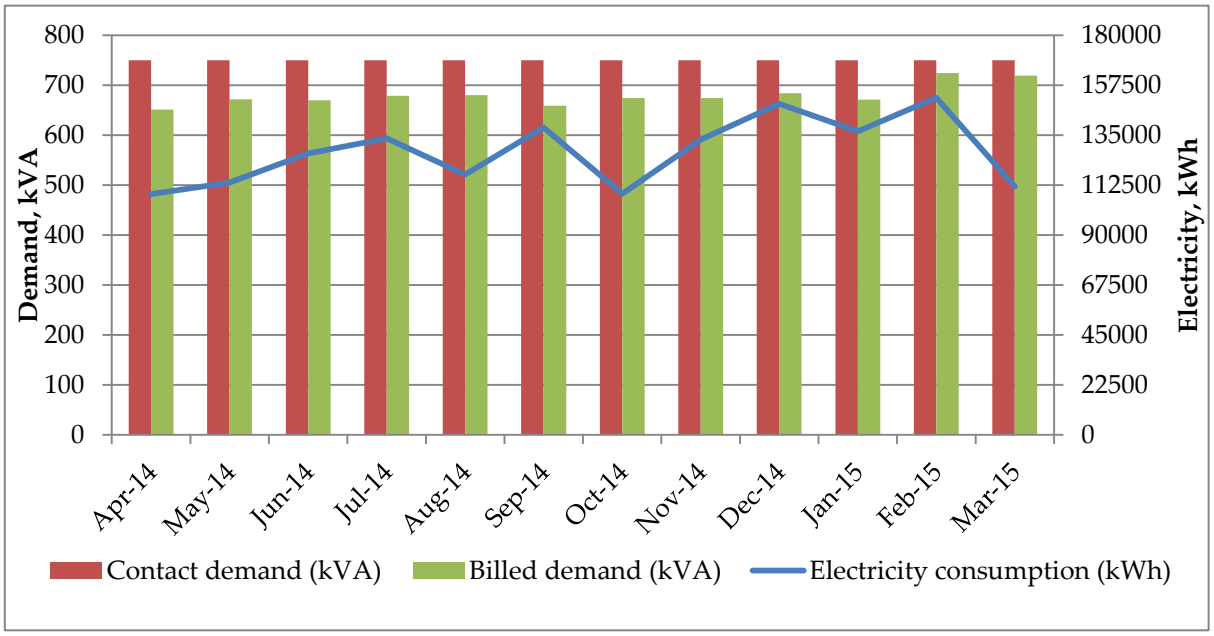


Figure 2.1.2: Demand and energy consumption pattern

As observed from above figure, plant has registered a maximum recorded demand of 724 kVA in the month of February 2015 whereas the minimum recorded demand of 651 kVA in the month of April 2014. The average recorded demand for the period was 680 kVA and it is 91% of the contract demand. Though, in past four months the average demand is 699 kVA which is 93% of contract demand. The average electricity consumption of the plant from HESCOM grid was about 127,414 kWh per month.

2.2 Observation and analysis

2.2.1 Electrical power measurement

Electrical power data logging was carried out on the main power incomer at LT feeder panel using three-phase power quality analyser extensively. All electrical parameters have been recorded for identification and analysis of demand and power factor management of the plant. The operating power parameters of distribution transformer at LT side were measured evaluate the operational efficiency pattern. Some necessary data has been taken from the plant services department logbook for historical pattern better analysis.

2.2.2 Main system parameters

The electrical and power parameters of 1,000 kVA transformer are summarises in table 2.2.2.

Table 2.2.2: Summary of electrical and power parameters at main incomer

	Transformer 1,000kVA		
Parameters	**Minimum**	**Average**	**Maximum**
Voltage, Volt	422	439	469
Current, Amp	48	615	770
Active Power (kW)	24	436	606
Apparent Power (kVA)	35	468	625
Power Factor, pf	0.68	0.93	0.97
% THD (Voltage)	0	8.2	11.4
% THD (Current)	0	25.2	146.3

Observation:

- The load at transformer is variable and it follows the power curve of induction furnace.
- The average demand is found to be about 468 kVA for transformer during the measurement period however; the demand is fluctuating due to instantaneous loads of the utility system. The maximum demand was 625 kVA
- The total harmonic distortion in voltage and current is exceeding the permissible limit and this could be avoided by installation of harmonic filters.

2.2.3 Transformer

Plant is stepping down the electricity board power using the step down transformer of capacity 1,000. Summary of the loading pattern and respective operation efficiency of the transformer is given in table 2.2.3.

Table 2.2.3: Summary of the operational efficiency of transformer

			Calculated parameters	
Transformer	**Load Conditions**	**Rated capacity, kVA**	**% Loading**	**% Efficiency**
1,000 kVA	Maximum	1,000	62.5	99.1
	Minimum		3.5	94.0
	Average		46.8	99.2

The average operational loading of transformer is 47 % whereas the best efficiency point is 37.27% for given losses characteristics.

2.2.4 Power factor management

Plant has provided the power factor correction system at main incomer BUS at LT side as well as at PCC. The power factor pattern at main incomer and its variation with demand was analysed to understand the effect of the capacitor bank during the load changeability conditions. Power factor studied from past 12 months electricity bills and the measured power factor at transformer is given in figure 2.2.4a and 2.2.4b.

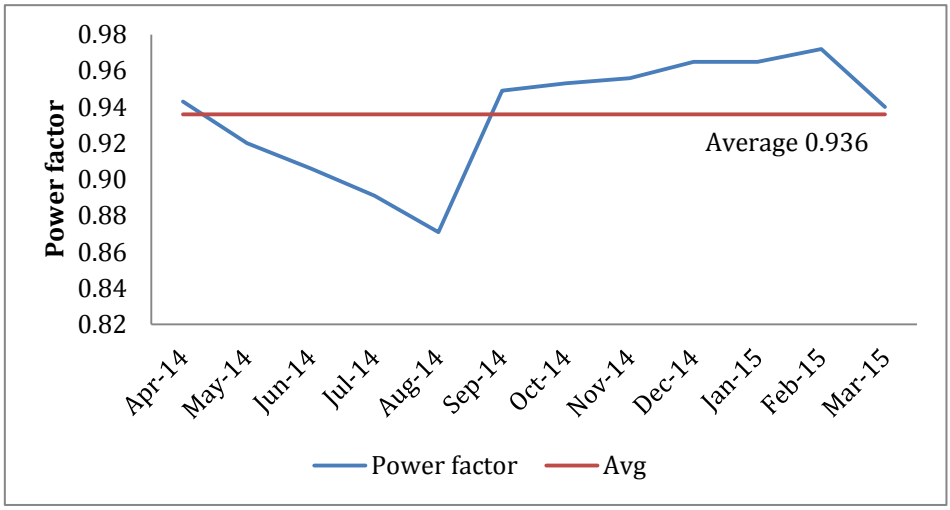


Figure 2.2.4a: Power factor variation during the year 2014-15

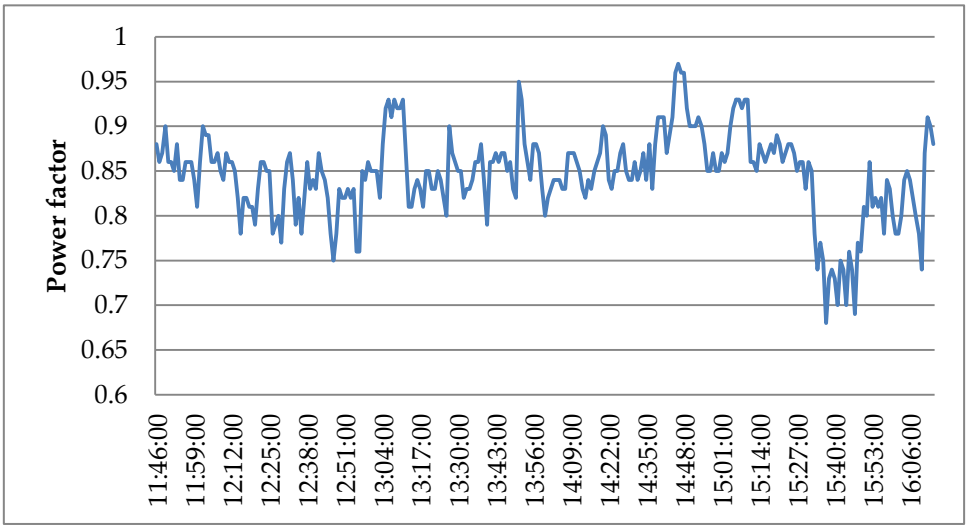


Figure 2.2.4b: Power factor at auxiliary panel

It has been observed that the average power factor of the plant at main incomer is around 0.931 during measurement and average for past one year is 0.936. It also has been observed that the power factor correction system required capacity augmentation to maintain the power factor unity.

2.2.5 Load factor of plant

The average monthly electricity consumption of plant is 127,414 kWh. The plant operates for 12 hours daily. The peak demand of plant is 680 kVA at power factor of 0.936 lag. This corresponds to a load factor of 66.7%. The load factor is good due to continuous running of induction furnace during operation period. IT can still be improved by maintaining furnace at full power, when in operation.

2.3 Energy conservation measures

2.3.1 Improving power factor and demand reduction

The average power factor recorded in foundry was 0.936. The average billed demand is 680 kVA and average maximum load is 636 kW. The power can be still improved near to unity by connecting capacitor bank. The power factor is quite low at the unit is at verge of paying penalty.

It was recommended to install capacitor bank of 150 kVAr capacity. Poor power factor does not only increase the penalty in billing but also increases demand charges and distribution losses. This will also reduce the demand by 37 kVA. The estimated annual energy savings by improving power factor is 1,475 kWh equivalents to a monetary saving of Rs 0.85 lakh. The investment requirement is Rs 0.74 lakh with a simple payback period of 0.9 year.

A detailed cost benefit analysis is been given in Table 2.3.1.

Table 2.3.1: Cost benefit analysis

Actual Parameters	Unit	Value
Contract demand	kVA	750
Minimum billing demand (@75%)	kVA	563
Average billed demand	kVA	680
Existing power factor	pf	0.94
Proposed power factor	pf	0.99
Existing real load	kW	636
New demand	kVA	643
Reduction in demand	kVA	37
Capacitor bank requirement	kVAr	149
Savings Estimation	**Unit**	**Value**
Annual energy saving	kWh	1,475
	toe/year	0.13
Energy cost saving	Rs lakh/year	0.09
Demand cost saving	Rs lakh/year	0.76
Monetary saving	Rs lakh/year	0.85
Investment cost for capacitor bank	Rs lakh	0.74
Simple payback period	years	0.9
CO_2 emission avoided	tCO_2/year	1.4

2.4 General recommendations

It was observed that current and voltage harmonics are crossing limits. In Karnataka as of now there is no penalty on harmonics but other states do have penalty. In future Karnataka may also introduce penalty on harmonics. The plant may consider installing harmonics filters. Table 2.4 gives details of harmonics. Harmonics from logged data is shown in figure 2.4a and 2.4b.

Table 2.4: Details of harmonics

Parameters	Permissible limit	Measure value
% THD Voltage	5.0%	7.0%
% THD Current	8.0%	23.0%
V 5th harmonics	3.0%	5.2%
V 7th harmonics	3.0%	2.3%

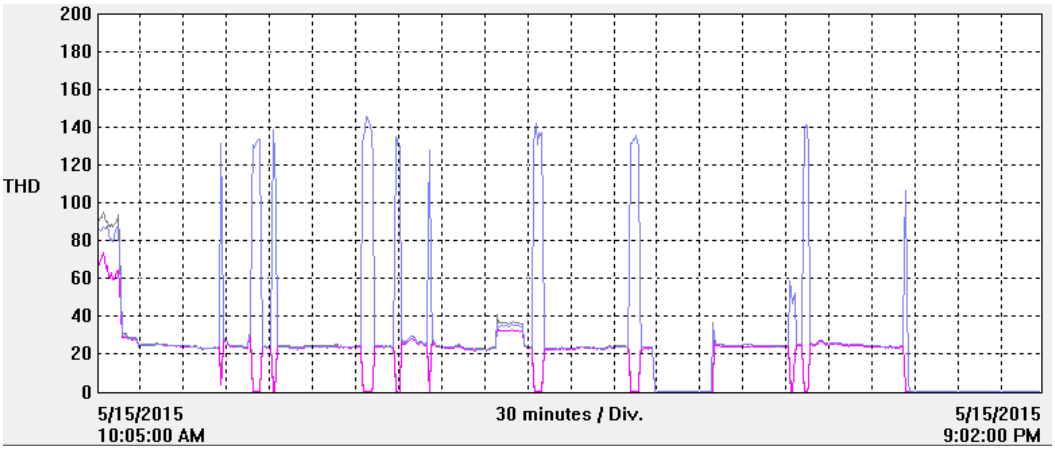


Figure 2.4a: Current harmonics

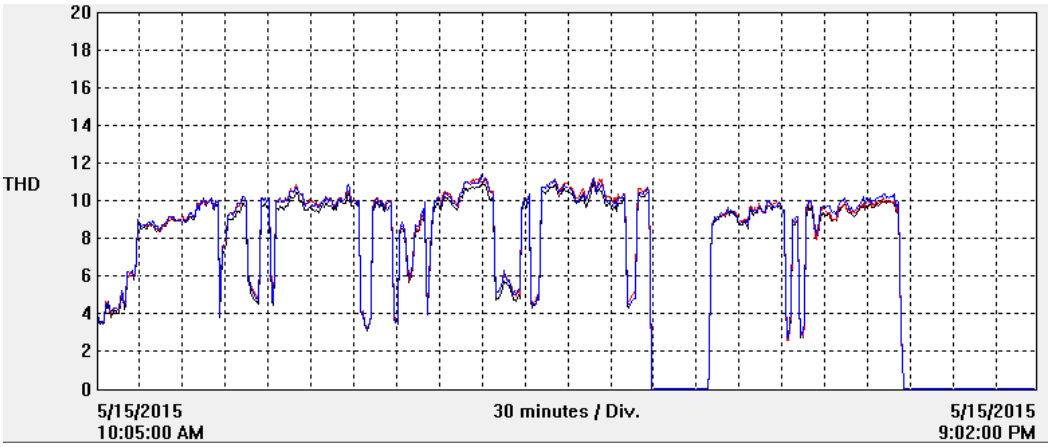


Figure 2.4b: Voltage harmonics

3.0 Furnace

3.1 Facility description

The plant is equipped with one induction melting furnace of rating 550 kW and it has three crucibles of capacity 500, 1000 and 2000 kg. The design parameters of the induction melting furnace are presented in Table 3.1.

Table 3.1: Induction melting furnace design parameters

Parameters/equipment ID	Furnace
Equipment	Induction furnace
Type	SCR
Make	Inductotherm
Voltage/Frequency, V/Hz	575/1000
Rating, kW	550
Crucible capacity, kg	1000 500 and 2000 (not in use currently)
Operating Temperature (°C)	1541 (CI) 1592 (SGI)
Mode of operation (batch/continuous)	Batch
Batch duration (minute)	72 (CI) 89 (SGI)

3.2 Observation and analysis

The study was conducted on 1000 kg crucible and six sample heats (batches) were studied to arrive at specific energy consumption of induction furnace, three each for CI and SGI. The details of observation are given in table 3.2. The power curves for the batches studied are shown in figure 3.2. Detailed furnace logging is given in annexure 3.2.

Table 3.2: Observation and measurement of induction furnace

Particular	Unit	CI	SGI
Raw material charge	kg	994	1,038
Units consumed	kWh	604	688
Cycle time (melting + pouring)	min	72	89
Specific Energy Consumption	kWh/MT	608	663
Tapping temperature	C	1,541	1,592

- There was no lid cover on furnace crucible, thus leading to radiation and convection losses, around 6% of input energy
- Currently the furnace is operating in one shift (10-11 hours depending on demand) and is left for natural cooling at end of day, leading to bigger crakes in refractory lining and reducing lining life
- It was recommended to use a fan for forced cooling of crucible, this not only increase lining life but also reduce the hours of coil cooling requirement after furnace is switched off
- The rejection level was near to 3-10%, study could be performed to reduce rejection
- The harmonics level is too high due to furnace operation. Current distortion is near 23.0% and voltage distortion is near 7.0%

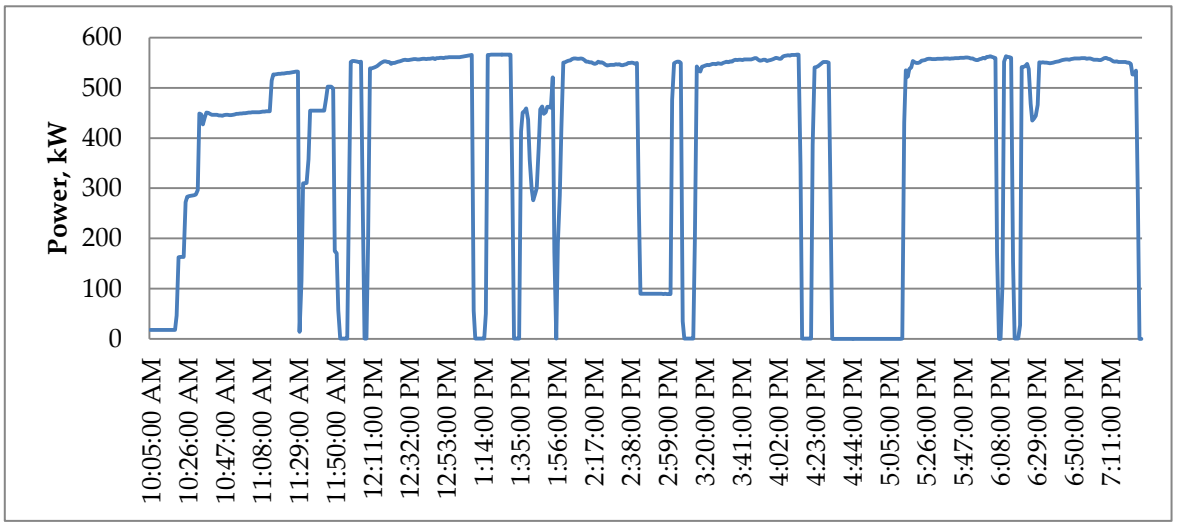


Figure 3.2: Power curve of induction furnace on 15th May 2015

3.3 Energy conservation measures

Based on the above analysis, identified energy efficiency measures in furnace are discussed in the following paragraphs.

3.3.1 Installation of lid mechanism for induction furnace

The operational parameters of the induction furnace including the electricity consumption and material charged were measured during the detailed energy audit and analysis of the past one year data. The specific energy consumption of the induction furnace was calculated to be 608 and 663 kWh per metric tonne of melting for CI and SGI melting respectively. It was found that the opening of induction furnace is circular with 508 mm diameter. The opening heat losses for one batch (heat) were calculated to be 39 kWh per heat. The heat loss is due to radiation and convection loss.

It is recommended to install a hydraulically operated lid mechanism for induction furnace to avoid opening losses. It was estimated that around six units per heat can be saved.

Table 3.3.1: Installation of Lid mechanism for induction furnace

Particulars	Unit	Value
CI/SGI heats per day	heats	3/3
Saving potential in CI/SGI heat	kWh/heat	6.95/7.33
Operational days per year	days	300
Annual saving potential	kWh/year	12,851
	toe/year	1.1
Energy cost per unit	Rs/kWh	6.19
Monetary saving	Rs lakh/year	0.79
Investment	Rs lakh	2.00
Simple payback period	years	2.5
CO_2 emission avoided	tCO_2/year	12.6

The estimated annual energy savings by using lid mechanism is 12,851 kWh equivalents to a monetary savings of Rs 0.79 lakh. The investment requirement is Rs 2.0 lakh with a simple payback period of 2.5 year. The annual reduction in CO_2 emission is estimated to be 12.6 tCO_2.

4.0 Compressed air system

4.1 Facility description

The plant has installed one screw type (air cooled) air compressor for meeting the compressed air requirement of instrumentation and service in the plant. The design parameters of the air compressor are presented in Table 4.1.

Table 4.1: Induction melting furnace design parameters

Particulars	Unit	AC01	AC02	AC03
Make		ELGI	ELGI	ELGI
Type		Screw (Air Cooled)		
Model		E22-7.5	E22-7.5	E45-7.5
Year		2009	2009	2013
Rated Capacity	m^3/min	3.57	3.57	8.45
	cfm	126	126	298
Pressure	bar	7.0	7.0	7.0
Power rating	kW	22.0	22.0	45.0

4.2 Observation and analysis

Either of air compressors AC01 or AC02 runs continuously on load whereas AC03 operates in load and unload mode. The compressors will be unloaded while reaching to the set pressure. This is analogous to start/stop control which controls the compressor functions, instead of the motor. When compressors in unload mode, the motor continues to operate however at much reduced load and no compressed air is delivered to the system. The compressed air pressure required at the end use point was observed to be about 6.0 – 7.0 kg/cm^2.

4.2.1 Performance assessment of air compressor

The details of FAD test conducted on the air compressor are given in table 4.2.1. The power curves for loading unloading of air compressor studied are shown in figure 4.2.1.

Table 4.2.1: Performance assessment of air compressor

Particulars	Unit	AC01	AC02	AC03
Suction area	cm^2	213.7	213.7	283.4
Suction velocity	m/s	2.69	2.65	4.65
FAD	m^3/min	3.45	3.40	7.91
	cfm	121.8	120.0	279.2
Motor power	kW	25.2	24.2	51.1
Shaft power	kW	29.6	28.5	60.1
Isothermal power	kW	11.0	10.9	25.3
Unload power	kW	21.10	20.70	18.40
Load period	hours	12,407	11,179	2,711
Unload period	hours	2,048	2,145	2,454
Load Period	%	86%	84%	52%

Particulars	Unit	AC01	AC02	AC03
Unload period	%	14%	16%	48%
Specific power consumption	**kW/cfm**	**0.207**	**0.202**	**0.183**
Volumetric efficiency	**%**	**97%**	**95%**	**94%**
Isothermal efficiency	**%**	**37%**	**38%**	**42%**
Operating hours	hour/year	1,800	1,800	3,600
Annual energy consumption	kWh/year	44,314	42,546	128,029

- The FAD of air compressors was estimated to be 122, 120 and 279 cfm respectively and the specific power consumption of air compressor was 0.207, 0.202 and 0.183 kW per cfm respectively
- The volumetric efficiency of air compressors were estimated to be 97%, 95% and 94% respectively
- The isothermal efficiency of air compressors were estimated to be 37%, 38% and 42% respectively
- The compressor AC01 and AC02 when in operation are ON load continuously whereas the compressor AC03 follows load-unload cycle. The curve for air compressor AC03 is given in figure 4.2.1

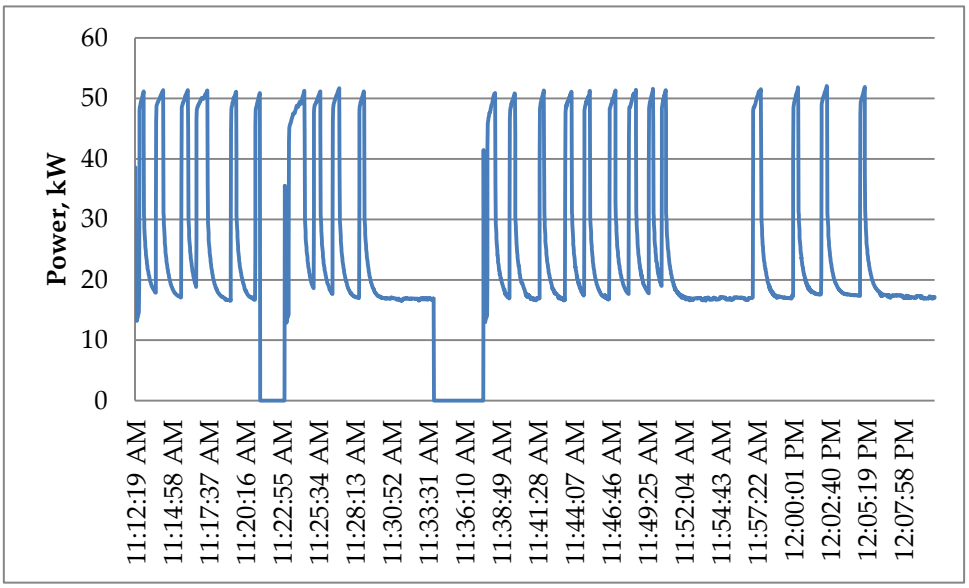


Figure 4.2.1: Power curve of air compressor AC03

4.2.2 Leakage test

The leakage test of the compressed air distribution system was conducted on AC01 during the field study. Under this test, all supply valves at utilization end were closed manually and compressor was operated for a period of 30 minutes. The loading and unloading time of the operating compressor during the leakage test is noted. The loading period is the generation of the compressed air, which is due to leakages in the distribution system. The estimated leakage in the compressed air distribution system is shown in table 4.2.2. Figure 4.2.2 shows load-unload cycle during leakage test. In an ideal system once pressure attained, the compressor should never come ON-load again during leakage test.

Table 4.2.2: Leakage assessment

Leakage Test	Unit	Value
Actual FAD	m^3/min	3.45
	cfm	122
Total ON time	sec	553
Total OFF time	sec	260
Leakage in plant	%	68
	cfm	82.86

Leaks are a significant source of wasted energy in a compressed air system of plant, often wasting a portion of the compressor's output. Compressed air leaks can also contribute to problems with system operations, including:

- Fluctuating system pressure, which can cause air tool and other air-operated equipment to function less efficiently, which possibly affects the production.
- Excess compressor capacity, resulting in higher than necessary costs
- Decreased service life and increased maintenance of supply equipment (including the compressor package) due to unnecessary cycling and increased run time.

By installing suitable application specific nozzles, taking the necessary maintenance practices and periodic inspection of distribution network, it would be possible to reduce the air leakages significantly. Although leaks can occur in any part of the system, the most common problem areas are: couplings, hoses, tubes, fittings, pipe joints, quick disconnects, FRLs (filter, regulator, and lubricator), condensate traps, valves, thread sealants, and point of use devices. Leakage rates are a function of the supply pressure in an uncontrolled system and increase with higher system pressures.

The total leakage quantity in the system in plant is estimated to 68% of the supplied air (from one compressor) which is equivalent to 83 cfm, which is significant. The permissible line losses in the industrial scenario are less than 10%.

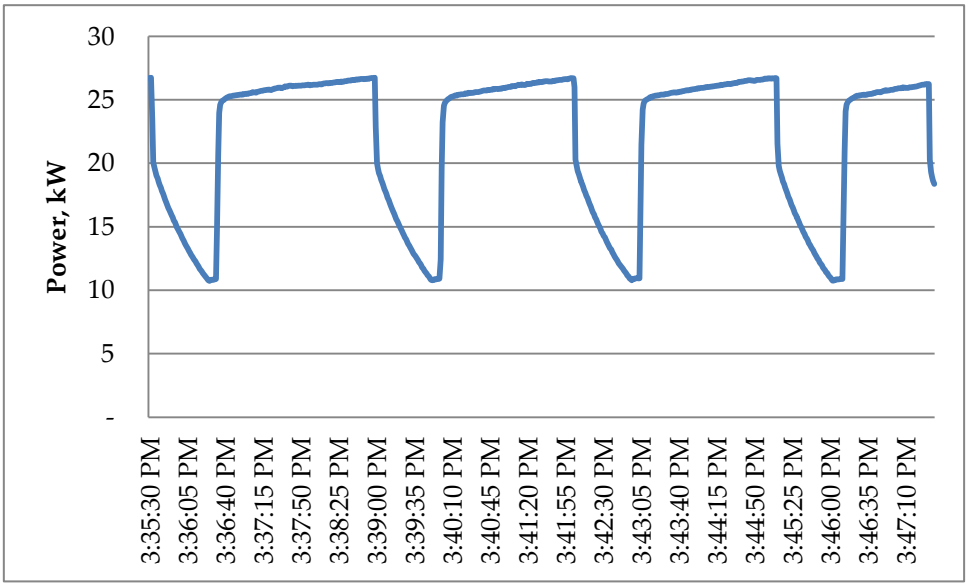


Figure 4.2.2: Power curve during leakage test

4.3 Energy conservation measures

Based on the above analysis, identified energy efficiency measures in air compressor are discussed in the following paragraphs.

4.3.1 Arresting leakages in compressed air system

From preliminary assessment it was found that leakage in line is very high in both the pipe lines. Leakage test was performed during break time to estimate the amount of leakage. The on time and off time were measured for two air compressors. The leakage in existing compressed air piping system was measured and found to be 12%, which is high.

It is recommended to reduce leakages in the compressed air piping system by periodically checking for air leaks and arresting them, and bring it down to about a nominal level of 5%.

Table 4.3.1: Leakage arresting

Particular	Unit	Value
Leakage in plant	cfm	82.86
Energy loss	kW/hour	14.7
Acceptable losses	%	10
Energy Saving	kW	12.5
Operating hours	hour	3,600
Annual energy saving	kWh/ year	45,178
	toe/year	3.89
Monetary saving	Rs lakh/year	2.79
CO_2 emission avoided	tCO_2/year	44.3

The estimated annual energy savings by arresting air leakage and reducing pressure setting is 45,178 kWh equivalents to a monetary savings of Rs 2.8 lakh. There is no investment requirement for this measure. The annual reduction in CO_2 emission is estimated to be 44.3 tCO_2.

4.3.2 Retrofit the air compressor with variable frequency drive (VFD)

The air compressor AC03 operates in load-unload mode. During study, it was operating at loading of 52% and unloading 48%. The screw air compressors are designed to give best efficiency/performance at loading over 80%. The loss of energy in unload period is quite substantial.

It is recommended to run either AC01 or AC02 for base load and after leakages are arrested the loading on AC03 will come down. Then, it is recommended to retrofit the air compressor AC03 with a variable frequency drive with pressure transducer. The compressor will follow the load variation and nullify the unload power wastage.

Table 4.3.2: VFD retrofitting of air compressor

Particular	Unit	Value
Unload loss	kW	18.40
	kWh/ year	31,472
VFD loss	%	3

Particular	Unit	Value
	kWh/year	5,519
Annual energy saving	kWh/year	25,953
	toe/year	2.23
Monetary saving	Rs lakh/year	1.6
Investment	Rs lakh	2.5
Simple payback period	years	1.6
CO_2 emission avoided	tCO_2/year	25.4

The estimated annual energy savings by retrofitting air compressor with VFD is 25,953 kWh equivalents to a monetary savings of Rs 1.6 lakh. The investment requirement is Rs 2.5 lakh with a simple payback period of 1.6 year. The annual reduction in CO_2 emission is estimated to be 25.4 tCO_2.

5.0 Pumping system and cooling towers

5.1 Facility description

Pumping systems and cooling towers were installed in the plant, mainly for supplying cooling water to induction furnace. The furnace panel has one (demineralised water) DM water pump for its cooling. Soft water is circulated for coil cooling using another pump. The soft water and DM water is cooling using heat exchanger, where raw water flows in secondary circuit. The rated parameters of the pumps have been given in table 5.1a.

Table 5.1a: Rated parameters of the pumps taken up for study

Design Parameters	Unit	Coil cooling pump	Raw water pump coil cooling	Raw water pump panel cooling
Make		Kirloskar	Kirloskar	Kirloskar
Type		Mono-Block	Mono-Block	Mono-Block
Flow rate	m^3/hour	32.4	36.0	36.0
Head	m	43.5	23.5	23.5
Motor Power	kW	7.5	3.7	3.7
Overall Efficiency	%	52%	59%	59%

The plant is equipped with one cooling tower (CT) to cater to the cooling water requirements of the induction furnace. The rated parameters of the cooling towers have been given in table 5.1b.

Table 5.1b: Rated parameters of the cooling tower taken up for study

Parameters	CT
Type	Induced draft
Make/year	NA
Purpose	Coil water cooling in induction melting furnace
Capacity (lpm)	750
Pump power (kW)	3.7
Fan power (kW)	1.5
Operating hours per day	12
Other Location	Roof mounted

5.2 Observation and analysis

5.2.1 Pumps

The operating parameters, such as flow and head, were measured for all operating water pumps. Suction & discharge head of the pumps was measured by using standard pressure gauge from the plant. The flow rate of water delivered by the pumps was measured by using non-intrusive type flow meter. Simultaneously, operating electrical parameters of pump mainly voltage, current, power factor and kW were measured by using portable power analyser. The operating parameters and efficiency estimation is given in table 5.2.1.

Table 5.2.1: Estimation of efficiency of pump associated with induction furnace

Actual Parameters	Unit	Coil cooling pump	Raw water pump coil cooling	Raw water pump panel cooling
Flow rate	m^3/hour	13.6	32.0	13.7
Discharge Pressure	kg/cm^2	4.6	1.3	1.9
Differential Head	m	46	13	19
Power	kW	5.50	3.00	3.70
Overall efficiency	**%**	**30.9%**	**37.7%**	**19.2%**

5.2.2 Cooling towers in the plant

Operating parameters of cooling towers such as cooling water temperature at inlet and outlet, water flow rates, air flow rates and power consumption of fan motor were monitored by using digital thermometer, non-intrusive type flow meter, anemometer and power analyser respectively. The operating parameters and the performance of the cooling tower are shown in table 5.2.2.

Table 5.2.2: Estimation of operating parameters and performance of cooling towers

Measured Parameters	Unit	Value
Water flow rate	m^3/hour	45.7
Ambient temperature	°C	30.1
RH	%	52.3
T inlet	°C	35.0
T outlet	°C	31.7
Calculations	**Unit**	
DBT	°C	30.1
WBT	°C	23.9
Approach	°C	7.8
Range	°C	3.3
Heat removed to atmosphere	kCal/hour	150,645
	TR	49.82
Effectiveness	%	30%
Fan power	kW	1.23

5.3 Energy conservation measures

There is a scope of considerable energy savings in the pumps and cooling tower area, as this is clear from the performance assessment that some of the pumps installed are of poor efficiency.

5.3.1 Replacement of existing coil cooling pump with energy efficient pump

The power consumption of furnace coil cooling pump was measured to be 5.5 kW. The water flow rate was measured to be 13.6 m^3/hour which is lower than the design flow of 21 m^3/hr. The overall efficiency of the pump is calculated to be 31% which is lower than design efficiency (52%).

The performance of an induction furnace is directly linked with the performance of its cooling water circuit. Therefore, it is recommended to replace the existing furnace coil cooling pump with an energy efficient pump. Details of pump are given in annexure 5.3.

Table 5.3.1: Replacement of existing coil cooling pump with energy efficient pumps

Recommended Pump Specification	Units	Coil cooling pump
Flow rate	m^3/hour	21.0
Differential Head	m	46.0
Efficiency	%	53.9%
Power	kW	4.88
Energy saving	kW	0.62
Operating period	hour	4,800
Annual Energy saving	kWh/year	2,958
Cost saving		
Annual Monetary Saving	Rs lakh / year	0.18
Investment	Rs lakh	0.55
Simple Payback Period	years	3.0
CO_2 emission avoided	tCO_2/year	2.9

The estimated annual energy savings in coil cooling pump is 2,958 kWh equivalents to a monetary saving of Rs 0.18 lakh. The investment requirement is Rs 0.55 lakh with a simple payback period of 3.0 years. The annual reduction in CO_2 emission is estimated to be 2.9 tCO_2.

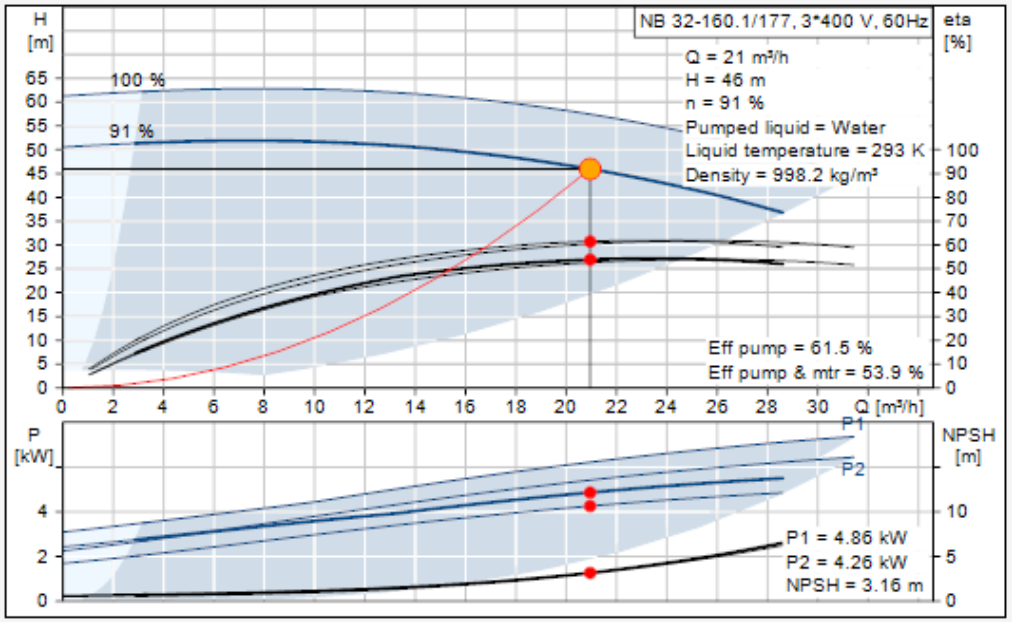


Figure 5.3.1: Proposed coil cooling pump

5.3.2 Replacement of existing raw water pump for panel cooling with energy efficient pump

The power consumption of raw water pump for panel cooling was measured to be 3.7 kW. The water flow rate was measured to be 13.7 m^3/hr, which is lower than the design flow of 36 m^3/hr. The overall efficiency of the pump is calculated to be 19% which is lower than design efficiency (59%).

The performance of an induction furnace is directly linked with the performance of its cooling water circuit. Therefore, it is recommended to replace the existing raw water pump with an energy efficient pump. Details of pump are given in annexure 5.3

Table 5.3.2: Replacement of existing raw water pump with energy efficient pumps

Recommended Pump Specification	Units	Raw water pump panel cooling
Flow rate	m^3/hour	27.0
Differential Head	m	23.0
Efficiency	%	61.6%
Power	kW	2.75
Energy saving	kW	0.95
Operating period	hour	3,600
Annual Energy saving	kWh/year	3,430
Cost saving		
Annual Monetary Saving	Rs lakh / year	0.21
Investment	Rs lakh	0.55
Simple Payback Period	years	2.6
CO_2 emission avoided	tCO_2/year	3.4

The estimated annual energy savings in raw water pump is 3,430 kWh equivalents to a monetary saving of Rs 0.21 lakh. The investment requirement is Rs 0.55 lakh with a simple payback period of 2.6 years. The annual reduction in CO_2 emission is estimated to be 3.4 tCO_2.

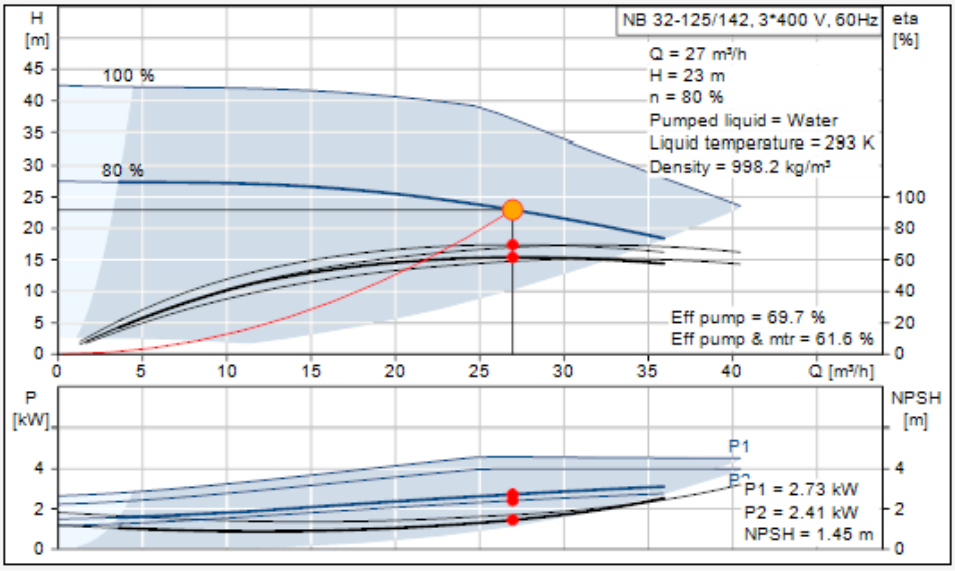


Figure 5.3.2: Proposed raw water pump

6.0 Motors

6.1 Facility description

The energy audit of electrical motors associated with utility and process equipment was carried out to assess the performance and identify potential for energy savings. The study included motors installed in the utility (water pumping, utilities, shot blasting, fettling) process machinery and other associated systems. The study focussed broadly on the following aspects with a view to assess the performance of motors:

- Loading of motors
- Nature of load (fixed or variable)

The details of measurements and observation on each of these three aspects are detailed in the following sections.

6.2 Observations and analysis

Different sections of the plant include pumping and sand handling. The operating parameters of motors were measured using portable instruments to observe load profile and power consumption. The range of motor loadings in different sections was evaluated. To evaluate the operating performance of motors and study the loading pattern, load tests were carried out for about 15 electrical motors in the plant covering utility and process areas.

6.2.1 On -load motor test

The operational loading of the electrical motors is calculated using the measured electrical parameters from the unit. The details of motors in sand handling are given in table 6.2.1a and details of motors in finishing (shot blast) are given in table 6.2.1b.

Table 6.2.1a: Sand handling motor power parameter and loading

	Motor rating						Motor operating parameters					
Motor Description	Rated power (kW)	Efficiency (%)	V	V_{thd} (%)	A	A_{thd} (%)	kW	kVA	PF	kVAr	Hz	% Loading
Sand Mixer 03 Main motor	11.3	85.0%	425	5.1	16.0	7.8	8.9	11.7	0.77	7.3	50.1	67%
Sand Mixer 03 Blender motor	5.5	86.0%	431	4.4	5.4	7.3	1.5	4.0	0.37	3.7	50.1	23%
Sand muller 02 200 kg	7.5	87.0%	428	10.3	8.2	23.6	5.0	6.1	0.82	3.5	50.1	58%
Sand muller 04 500kg main motor	22.0	90.5%	440	10.4	37.3	11.5	24.4	28.4	0.86	11.4	50.1	100%
Sand muller 04 500kg blender	15.0	89.5%	442	10.7	14.7	14.0	7.3	11.2	0.65	8.3	50.1	44%
Sand muller 04 500kg bucket elevator	3.7	86.0%	444	10.6	5.4	13.8	1.2	4.2	0.30	4.0	50.1	28%
Sand muller 04 500kg conveyor belt	3.7	86.0%	443	11.0	6.4	14.5	3.2	5.0	0.65	3.6	50.1	74%
Sand seiver	2.2	85.0%	432	10.2	3.5	15.7	1.4	2.6	0.55	2.2	50.1	56%

	Motor rating						Motor operating parameters					
Motor Description	Rated power (kW)	Efficiency (%)	V	V_{thd} (%)	A	A_{thd} (%)	kW	kVA	PF	kVAr	Hz	% Loading
Bucket elevator	2.2	85.0%	433	10.3	4.5	15.9	0.9	3.4	0.30	3.1	50.1	36%
Magnetic seperator	1.5	85.0%	428	10.1	2.0	9.4	1.0	1.5	0.66	1.1	50.1	56%
Conveyor belt	2.2	85.0%	429	10.2	4.3	15.3	1.2	3.1	0.39	2.8	50.1	48%
Knockout	7.5	87.0%	430	10.3	6.8	10.8	4.1	5.1	0.80	3.0	50.1	47%

Table 6.2.1b: Shot blast motor power parameter and loading

	Motor Rating						Motor Operating Parameters					
Motor Description	Rated power (kW)	Efficiency (%)	V	V_{thd} (%)	A	A_{thd} (%)	kW	kVA	PF	kVAr	Hz	% Loading
Shot blast upper turbine	15.0	85.0%	434	10.5	9.2	16.0	6.2	6.9	0.89	4.2	50.1	35%
Shot blast lower turbine	15.0	85.0%	436	10.7	10.1	14.7	6.6	7.6	0.87	3.8	50.1	38%
Dust collector	11.3	89.0%	432	10.8	13.8	21.5	6.3	10.3	0.62	7.5	50.1	50%
Hook spinning	7.5	87.0%	436	10.5	8.0	28.6	5.6	6.0	0.93	1.5	50.1	65%
Magnetic drum	7.5	87.0%	432	10.4	12.2	19.8	3.7	9.2	0.41	8.1	50.1	43%

The performances of the all-operating motors were assessed to understand the operational loading. The loading of the major motors was found under the normal performance range.

6.3 Energy conservation measures

There is a scope of considerable energy savings in the motors, this section details on it.

6.3.1 Switch off the blender motor of sand muller 03

The plant has designed the sand muller number 03 for operation of 350 kg. The positioning of blender and design is done accordingly. But currently the sand muller is operated with 200 – 250 kg sand only. Due to this the sand does not reach the level of blender at all and the blender is in idle operation. It is recommended to not use blender in the sand muller 03 since it is operating below 300 kg level.

Table 6.3.1: Switch off the blender motor of sand muller 03

Particular	Unit	Value
Power consumption	kW	1.5
Net operating hours per day	hour/day	4.0
Days per year	day/year	300
Annual energy saving	kWh/year	1,800
Monetary saving	Rs lakh/year	0.11
Investment	Rs lakh	-
Simple Payback Period	year	-
CO_2 emission avoided	tCO_2/year	1.8

The estimated annual energy savings in timer for shot blast machine is 1,800 kWh equivalents to a monetary saving of Rs 0.11 lakh. There is no investment required for this measure. The annual reduction in CO_2 emission is estimated to be 1.8 tCO_2.

6.4 General observations and recommendations

- The under loaded condition of motors in the plant are mainly because of its operating pattern.
- Inspecting motors regularly for wear in bearings and housings (to reduce frictional losses) and for dirt/dust in motor ventilating ducts (to ensure proper heat dissipation).
- Checking load conditions to ensure that the motor is not over or under loaded. A change in motor load from the last test indicates a change in the driven load, the cause of which should be understood.
- Lubricating appropriately. Manufacturers generally give recommendations for how and when to lubricate their motors. Inadequate lubrication can cause problems, as noted above. Over lubrication can also create problems, e.g. excess oil or grease from the motor bearings can enter the motor and saturate the motor insulation, causing premature failure or creating a fire risk.
- Checking periodically for proper alignment of the motor and the driven equipment. Improper alignment can cause shafts and bearings to wear quickly, resulting in damage to both the motor and the driven equipment.
- Ensuring that supply wiring and terminal box are properly sized and installed. Inspect regularly the connections at the motor and starter to be sure that they are clean and tight.
- Ambient conditions can also have a detrimental effect on motor performance. For example, excessively high temperatures, high dust loading, corrosive atmosphere, and humidity can impair insulation properties; mechanical stresses due to load cycling can lead to misalignment. However, with adequate care, motor performance can be maintained.
- Rewinding can affect a number of factors that contribute to deteriorated motor efficiency.

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7.0 Lighting system

7.1 Facility description

The total connected lighting load of the plant, as per the inventory collected during the detailed assessment study, was estimated to be 4.1 kW (including ballast losses). The different types of lamps operating in the plant are Fluorescent Tube Light (T-12), Metal Halide (MH) and Mercury Vapour (HPMV). Table 7.1 gives the type of lamps used in different areas of the plant.

Table 7.1: Details of the lighting system

S. No	Location in the plant	Type of lamps & ballast	No. of lamps	Rated wattage, watt (including ballast)	Connected load, kW	Average operating hours
1	Office and Plant	FTL T12	12	52	0.6	10
2	Plant	MH	4	265	1.1	5
3	Plant	HPMV	9	265	2.4	5

7.2 Energy conservation measures

7.2.1 Replacement of existing lighting system with efficient lighting system in phase manner

The foundry is using mixed lighting, including FTL T12 and HPMV. Fluorescent tube lights of 40W FTLs with conventional copper ballasts consume more energy. About 12 T12 and four T8 were found in different locations of the unit. It is proposed to replace all 40W copper ballast FTLs with 28W FTLs having electronic ballasts. Electronic ballasts help in instantaneous starting of lamps and have improved regulation for varying input voltage. Major benefits of T5 fixtures over conventional T12 FTL are as follows:

- Uniform light output for wide range of supply voltages.
- Instant start and flicker free operation.
- Improves the power factor almost close to unity.
- Less heat generation, hence load on ACs reduces.
- Increased lamp life around 15000 hrs.
- Higher lumen output per watt (around 105 lumens per watt)

Also, it is observed that foundry uses metal halide (4 nos.) and mercury vapour (9 nos.) lamp for lighting in shop floor. The lumens per watt of HPMV lamp are low and also the life is short. It is recommended to replace existing HPMV lamps by induction lamps. MH can be replace with 150 W induction lamps and HPMV with 120 W induction lamps.

Table 7.2.1: Replacement of existing lighting system with efficient lighting system

Particulars	Unit	Existing	Proposed
Type of lamp	-	T-12/MH/HPMV	T-5/Induction lamp
Wattage of lamps	W	40/250/20	28/150/120
Watt loss per ballast	W	12/15/15	2/0/0
No. of lamps to be replaced	No.	12/4/9	12/4/9
Average Operating Hours per day	Hours/Days	10/5/5	10/5/5
Operating day /year	No.	300	300
Energy consumption	kWh/year	7,040	3,600
Energy savings	kWh/year		3,440
Energy Cost	Rs/kWh		6.18
Energy cost savings	Rs lakh/ year		0.21
Initial retrofitting cost / lamps	Rs		585/11,500/8,000
Initial investment cost	Rs lakh		1.25
Payback period	Years		5.9
GHG emission factor	tCO_2/MWh		0.98
CO_2 avoided	t CO_2/year		3.4
Energy savings	toe/year		0.30

The envisaged annual energy saving potential in lighting is 3,440 kWh per year equivalent to a monetary saving of Rs 0.21 lakh per year. The investment requirement is Rs 1.25 lakh with a simple payback period of 5.9 years. The annual reduction in CO_2 emission is estimated to be 3.4 tCO_2.

8.0 Summary of potential savings

8.1 Summary of recommendations

The proposed energy conservation measures (ECMs) for various facilities of Glow Cast is categorized as no investment, short term investment and medium term investment based recommendations as per the following criteria:

- The energy savings measures, which are having immediate returns, are considered to be no investment recommendations.
- The energy saving measures, which are having a simple payback period of less than a year, are considered to be short term measures.
- The energy saving measures, which are having a simple payback period of 1 to 2 year, are considered to be medium term measures.
- The energy saving measures, which are having a simple payback period greater than 2 years, are considered to be long term measures.

The number of energy conservation measures under the above categories as given table 8.1:

Table 8.1: Categorization of energy conservation measures

Sr. No	Type of recommendation	ECM	Energy cost saving potential (Rs lakh)	Investment required (Rs lakh)	Simple payback (years)
1	No investment based	2	2.91	-	-
2	Short term return based (< 1 year)	1	0.85	0.74	0.9
3	Medium term return based (1-2 year)	1	1.61	2.50	1.6
4	Long term return based (> 2 year)	4	1.40	4.35	3.1
	Total	**8**	**6.76**	**7.59**	**1.1**

8.2 Recommended energy conservation measures

The recommended measures considered for energy audit report after discussion with unit representative is given in table 8.2

Table 8.2: Recommended energy conservation measures for implementation

S. No	Energy conservation measures	Annual energy savings Electricity (kWh)	Investment (Rs Lakh)	Savings Rs. lakh/ year	Simple payback year
1	Power factor improvement	1,475	0.74	0.85	0.9
2	Lid mechanism for induction furnace	12,851	2.00	0.79	2.5
3	Avoiding leakages in compressed air system	45,178	-	2.79	-
4	Retrofit the air compressor with variable frequency drive	25,953	2.50	1.61	1.6
5	Replacement of coil cooling pump of induction furnace	2,958	0.55	0.18	3.0
6	Replacement of raw water pump for	3,430	0.55	0.21	2.6

S. No	Energy conservation measures	Annual energy savings Electricity (kWh)	Investment (Rs Lakh)	Savings Rs. lakh/ year	Simple payback year
	panel cooling of induction furnace				
7	Switch off the blender of sand mixer 03	1,800	-	0.11	-
8	Replacement of existing lighting system with energy efficient lighting system	3,440	1.25	0.21	5.9
	Overall	**97,085**	**7.59**	**6.76**	**1.1**

Total eight energy conservation measures are identified. Implementing then would attract a one-time investment of Rs 7.6 lakh; it would lead to annual savings of Rs 6.8 lakh. This would result in reduction in energy consumption by 6.3%. The specific energy consumption of entire foundry would improve from 1,455 kWh per tonne to 1,363 kWh per tonne.

8.3 Lifetime energy and CO_2 savings

Implementation of the energy conservation measures in the unit may result in reduction in CO_2 emissions due to reduction in overall energy consumption. The estimated reduction in GHG emission by implementation of the recommended energy conservation measures is 95.1 tonne of CO_2 per year. The life time CO_2 emission reduction in estimated to be 1,427 tonne. The lifetime energy and CO_2 saving are given in table 8.3

Table 8.3: Lifetime CO_2 savings

S. No	Energy Conservation Measures	Life time energy saving (toe)	Life time CO_2 reduction (tonne)
1	Power factor improvement	1.90	21.68
2	Lid mechanism for induction furnace	16.58	188.91
3	Avoiding leakages in compressed air system	58.28	664.12
4	Retrofit the air compressor with variable frequency drive	33.48	381.51
5	Replacement of coil cooling pump of induction furnace	3.82	43.48
6	Replacement of raw water pump for panel cooling of induction furnace	4.43	50.43
7	Switch off the blender of sand mixer 03	2.32	26.46
8	Replacement of existing lighting system with energy efficient lighting system	4.44	50.56
	Overall	**125.2**	**1,427.1**

8.4 Renewable energy recommendation

The use of renewable energy technologies is not techno-economically feasible for melting, which is the most energy-intensive area in foundry application. Moreover, some of these technologies are not fully commercially mature and hence was not recommended for implementation.

Annexures

Annexure: 3.2 Logging of induction furnace

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	10:05:00 AM	552.3	546.0	549.7	3.7	3.9	3.9	23	29	26	91.2	68.3	86.2	17.9	0.3	17.6	25.3	0.69	0.77	0.65	50.06
5/15/2015	10:06:00 AM	553.0	546.9	550.3	3.5	3.6	3.6	23	29	26	93.0	71.0	86.1	17.8	0.6	18.0	25.4	0.69	0.76	0.65	50.09
5/15/2015	10:07:00 AM	555.8	549.7	553.2	3.6	3.7	3.7	23	29	26	92.7	71.4	86.3	17.8	0.9	18.0	25.4	0.69	0.76	0.65	50.10
5/15/2015	10:08:00 AM	557.1	550.7	554.5	3.5	3.6	3.6	24	29	26	95.6	74.1	87.6	17.8	1.2	18.4	25.6	0.68	0.75	0.64	50.09
5/15/2015	10:09:00 AM	556.2	549.9	553.6	3.6	3.7	3.8	23	29	26	93.3	71.5	87.3	17.8	1.5	18.1	25.4	0.68	0.76	0.64	50.05
5/15/2015	10:10:00 AM	553.9	547.8	551.5	4.5	4.7	4.6	23	29	26	90.7	65.6	87.2	17.7	1.8	12.7	25.0	0.69	0.78	0.64	50.01
5/15/2015	10:11:00 AM	553.2	547.0	550.9	4.4	4.6	4.5	23	29	26	90.7	67.2	88.5	17.7	2.1	15.6	25.2	0.69	0.78	0.64	49.96
5/15/2015	10:12:00 AM	551.7	545.5	549.4	4.5	4.7	4.7	23	29	26	89.2	61.5	85.4	17.7	2.4	8.0	24.8	0.70	0.80	0.64	49.92
5/15/2015	10:13:00 AM	554.2	548.0	551.7	4.2	4.4	4.4	22	29	26	87.9	61.2	81.1	17.8	2.7	7.9	24.6	0.70	0.80	0.66	49.89
5/15/2015	10:14:00 AM	554.0	547.7	551.4	3.9	4.1	4.2	22	29	25	89.4	63.5	81.8	17.7	3.0	11.5	24.7	0.69	0.79	0.65	49.87
5/15/2015	10:15:00 AM	553.7	547.4	551.1	4.0	4.2	4.2	22	29	25	88.2	60.3	80.1	17.7	3.3	7.3	24.5	0.70	0.80	0.65	49.87
5/15/2015	10:16:00 AM	552.2	545.8	549.6	4.2	4.4	4.3	22	29	25	89.0	60.2	81.9	17.7	3.6	7.1	24.6	0.70	0.80	0.65	49.87
5/15/2015	10:17:00 AM	550.4	543.8	547.6	4.2	4.4	4.4	23	29	25	89.7	62.3	86.5	17.7	3.8	6.8	24.9	0.69	0.80	0.63	49.87
5/15/2015	10:18:00 AM	551.0	544.5	548.3	4.2	4.4	4.4	23	29	26	90.9	63.4	87.4	17.8	4.1	8.0	25.1	0.69	0.79	0.64	49.86
5/15/2015	10:19:00 AM	582.1	575.5	579.6	4.1	4.3	4.3	23	29	25	94.5	64.8	88.3	17.9	4.4	6.9	25.7	0.67	0.78	0.62	49.89
5/15/2015	10:20:00 AM	588.6	582.1	586.2	4.1	4.3	4.4	51	57	53	80.1	57.8	73.3	46.2	5.2	19.7	55.2	0.73	0.81	0.69	49.90
5/15/2015	10:21:00 AM	582.9	576.4	580.4	5.0	5.1	5.3	170	176	172	31.8	29.7	30.7	162.6	7.9	70.0	177.0	0.91	0.92	0.92	49.94
5/15/2015	10:22:00 AM	585.4	578.6	582.8	5.0	4.9	5.1	169	177	171	31.9	29.7	30.5	162.9	10.6	70.1	177.3	0.91	0.92	0.92	49.96
5/15/2015	10:23:00 AM	588.1	581.6	585.5	4.3	4.5	4.5	169	175	171	31.8	29.8	30.8	162.9	13.4	69.9	177.3	0.91	0.92	0.92	49.96
5/15/2015	10:24:00 AM	590.3	583.8	587.9	4.5	4.7	4.8	168	175	170	31.9	30.1	31.3	163.1	16.1	70.3	177.6	0.91	0.92	0.92	49.90
5/15/2015	10:25:00 AM	589.2	582.4	586.5	6.1	6.2	6.3	282	289	284	29.7	28.6	29.1	271.9	20.6	115.2	295.4	0.92	0.92	0.92	49.89
5/15/2015	10:26:00 AM	592.5	585.5	589.5	6.0	6.0	6.3	291	299	293	29.7	28.6	29.0	282.9	25.3	119.7	307.2	0.92	0.92	0.92	49.89
5/15/2015	10:27:00 AM	592.1	585.0	589.1	6.1	6.1	6.2	293	300	295	29.8	28.6	29.1	284.3	30.1	121.1	309.0	0.92	0.92	0.92	49.91
5/15/2015	10:28:00 AM	590.5	583.6	587.7	6.2	6.2	6.3	295	302	297	29.5	28.4	28.9	285.1	34.8	122.1	310.2	0.92	0.92	0.92	49.93
5/15/2015	10:29:00 AM	589.3	582.2	586.3	6.2	6.3	6.4	297	303	298	29.5	28.4	29.1	285.9	39.6	123.3	311.3	0.91	0.92	0.92	49.94
5/15/2015	10:30:00 AM	592.5	585.0	589.1	5.9	6.0	6.0	295	302	297	29.7	28.6	29.2	286.5	44.3	123.2	311.9	0.92	0.92	0.92	49.94

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	10:31:00 AM	590.8	583.5	587.6	6.2	6.2	6.3	297	304	299	29.6	28.4	29.0	287.4	49.1	124.2	313.0	0.91	0.92	0.92	49.94
5/15/2015	10:32:00 AM	588.4	581.3	585.6	6.9	7.0	7.1	308	315	309	29.1	28.1	28.5	296.2	54.1	128.9	323.0	0.91	0.92	0.92	49.96
5/15/2015	10:33:00 AM	585.4	578.2	582.3	9.0	9.1	9.1	468	475	469	25.6	24.9	25.1	448.9	61.6	191.0	487.9	0.92	0.92	0.92	49.98
5/15/2015	10:34:00 AM	585.2	578.0	582.0	8.9	9.1	9.0	466	473	467	25.7	25.0	25.2	446.8	69.0	190.8	485.9	0.92	0.92	0.92	49.98
5/15/2015	10:35:00 AM	584.4	577.3	581.4	8.6	8.7	8.7	446	453	447	26.0	25.3	25.6	427.0	76.1	183.0	464.6	0.92	0.92	0.92	49.99
5/15/2015	10:36:00 AM	585.4	578.4	582.4	8.6	8.7	8.7	460	466	461	25.8	25.2	25.4	441.1	83.5	188.5	479.7	0.92	0.92	0.92	50.02
5/15/2015	10:37:00 AM	589.0	582.0	586.0	8.7	8.8	8.8	467	474	468	25.9	25.3	25.5	450.5	91.0	191.7	489.6	0.92	0.92	0.92	50.04
5/15/2015	10:38:00 AM	589.1	581.8	586.0	8.6	8.7	8.8	466	474	467	25.9	25.3	25.4	450.1	98.5	192.2	489.4	0.92	0.92	0.92	50.07
5/15/2015	10:39:00 AM	592.5	585.1	589.4	8.6	8.7	8.8	462	469	463	25.9	25.4	25.5	448.3	106.0	191.7	487.5	0.92	0.92	0.92	50.07
5/15/2015	10:40:00 AM	591.9	584.3	588.7	8.7	8.8	8.9	461	468	461	25.9	25.5	25.5	446.4	113.4	190.8	485.5	0.92	0.92	0.92	50.03
5/15/2015	10:41:00 AM	588.1	580.5	585.0	8.8	8.8	8.9	464	471	464	26.0	25.4	25.5	446.2	120.8	190.9	485.3	0.92	0.92	0.92	49.99
5/15/2015	10:42:00 AM	585.5	578.2	582.5	8.7	8.8	8.8	465	472	466	25.9	25.3	25.5	446.2	128.3	190.9	485.3	0.92	0.92	0.92	49.98
5/15/2015	10:43:00 AM	585.1	577.8	582.0	8.8	9.0	9.0	466	473	467	25.8	25.2	25.4	446.5	135.7	190.9	485.6	0.92	0.92	0.92	49.95
5/15/2015	10:44:00 AM	585.6	578.3	582.6	8.7	8.9	8.9	464	471	465	26.0	25.4	25.6	444.7	143.1	190.2	483.7	0.92	0.92	0.92	49.96
5/15/2015	10:45:00 AM	588.7	581.0	585.6	8.5	8.7	8.7	462	469	462	26.4	25.8	25.7	444.7	150.5	190.4	483.8	0.92	0.92	0.92	49.94
5/15/2015	10:46:00 AM	588.9	581.2	585.6	8.4	8.6	8.7	462	469	462	26.5	26.0	26.0	444.5	157.9	191.2	483.9	0.92	0.92	0.92	49.94
5/15/2015	10:47:00 AM	587.0	579.8	584.0	8.5	8.6	8.7	464	471	465	26.3	25.7	25.8	445.8	165.4	191.8	485.3	0.92	0.92	0.92	49.95
5/15/2015	10:48:00 AM	587.5	580.2	584.2	8.4	8.5	8.6	464	470	465	26.2	25.7	25.8	446.2	172.8	191.3	485.5	0.92	0.92	0.92	49.94
5/15/2015	10:49:00 AM	587.8	580.7	584.7	8.4	8.4	8.5	463	470	465	26.2	25.7	25.9	446.0	180.2	191.2	485.3	0.92	0.92	0.92	49.96
5/15/2015	10:50:00 AM	585.8	578.6	582.6	8.6	8.7	8.8	465	471	466	25.8	25.5	25.5	445.6	187.7	191.2	484.9	0.92	0.92	0.92	49.99
5/15/2015	10:51:00 AM	585.9	578.9	583.2	8.7	8.7	8.8	464	470	466	25.8	25.4	25.5	445.8	195.1	189.5	484.4	0.92	0.92	0.92	49.98
5/15/2015	10:52:00 AM	586.0	579.0	583.3	8.7	8.8	8.9	465	471	466	25.9	25.6	25.7	446.2	202.5	190.5	485.1	0.92	0.92	0.92	49.98
5/15/2015	10:53:00 AM	582.6	575.5	579.9	8.9	9.0	9.0	469	475	470	25.6	25.3	25.4	447.1	210.0	191.5	486.4	0.92	0.92	0.92	49.96
5/15/2015	10:54:00 AM	584.3	577.0	581.5	9.0	9.1	9.2	469	475	470	25.4	25.1	25.2	448.4	217.5	192.1	487.8	0.92	0.92	0.92	49.95
5/15/2015	10:55:00 AM	586.5	579.0	583.7	9.0	9.0	9.2	467	473	468	25.6	25.3	25.4	448.0	224.9	191.9	487.4	0.92	0.92	0.92	49.94
5/15/2015	10:56:00 AM	586.0	578.4	583.0	9.1	9.1	9.2	468	474	468	25.5	25.1	25.2	448.5	232.4	192.0	487.9	0.92	0.92	0.92	49.94
5/15/2015	10:57:00 AM	586.9	579.2	583.9	9.1	9.2	9.2	467	473	468	25.5	25.1	25.2	449.0	239.9	192.0	488.4	0.92	0.92	0.92	49.93
5/15/2015	10:58:00 AM	586.3	578.6	583.2	9.0	9.1	9.2	468	474	469	25.4	25.0	25.2	449.3	247.4	192.0	488.6	0.92	0.92	0.92	49.93
5/15/2015	10:59:00 AM	584.4	576.7	581.3	9.0	9.1	9.1	469	476	471	25.3	24.9	25.1	449.6	254.9	193.7	489.6	0.92	0.92	0.92	49.93
5/15/2015	11:00:00 AM	585.6	578.1	582.6	9.0	9.0	9.0	468	475	470	25.4	25.0	25.2	449.9	262.4	192.4	489.3	0.92	0.92	0.92	49.96

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	11:01:00 AM	587.2	579.6	584.2	9.0	9.1	9.0	468	475	469	25.4	25.1	25.4	450.4	269.9	192.9	490.0	0.92	0.92	0.92	49.97
5/15/2015	11:02:00 AM	587.4	579.8	584.5	9.0	9.1	9.0	468	475	470	25.3	24.9	25.3	451.0	277.4	192.7	490.4	0.92	0.92	0.92	50.00
5/15/2015	11:03:00 AM	584.4	577.0	581.4	9.0	9.1	9.1	471	478	473	25.1	24.8	25.1	451.5	284.9	193.3	491.1	0.92	0.92	0.92	50.07
5/15/2015	11:04:00 AM	584.6	577.0	581.3	8.9	9.1	9.0	471	478	472	25.3	24.6	25.1	451.6	292.4	193.7	491.4	0.92	0.92	0.92	50.09
5/15/2015	11:05:00 AM	587.2	579.6	583.9	9.1	9.2	9.1	469	476	470	25.4	24.8	25.1	451.5	300.0	193.6	491.3	0.92	0.92	0.92	50.10
5/15/2015	11:06:00 AM	587.2	579.6	583.8	9.0	9.1	8.9	468	476	470	25.4	24.7	25.1	451.1	307.5	193.3	490.8	0.92	0.92	0.92	50.08
5/15/2015	11:07:00 AM	586.8	579.2	583.5	8.9	9.1	9.0	469	477	470	25.4	24.7	25.0	451.6	315.0	193.8	491.5	0.92	0.92	0.92	50.09
5/15/2015	11:08:00 AM	586.0	578.2	582.4	9.1	9.3	9.2	471	478	471	25.0	24.4	24.6	452.1	322.5	194.5	492.2	0.92	0.92	0.92	50.09
5/15/2015	11:09:00 AM	584.6	576.8	581.0	9.2	9.4	9.4	472	480	473	24.7	24.3	24.3	452.6	330.1	194.9	492.8	0.92	0.92	0.92	50.10
5/15/2015	11:10:00 AM	586.5	578.9	583.1	9.2	9.4	9.4	471	478	472	24.8	24.4	24.3	452.9	337.6	195.4	493.3	0.92	0.92	0.92	50.11
5/15/2015	11:11:00 AM	589.1	581.2	585.6	9.1	9.3	9.2	469	477	470	25.0	24.5	24.6	453.4	345.2	195.4	493.7	0.92	0.92	0.92	50.08
5/15/2015	11:12:00 AM	590.1	582.4	586.7	9.1	9.3	9.2	468	475	469	25.1	24.6	24.8	453.0	352.7	195.0	493.2	0.92	0.92	0.92	50.06
5/15/2015	11:13:00 AM	586.8	579.4	583.6	9.2	9.3	9.3	471	478	472	25.2	24.5	24.7	453.2	360.3	195.5	493.6	0.92	0.92	0.92	50.03
5/15/2015	11:14:00 AM	584.9	577.4	581.4	9.8	9.9	9.9	536	543	537	24.0	23.6	23.8	514.3	368.9	220.9	559.7	0.92	0.92	0.92	50.03
5/15/2015	11:15:00 AM	585.5	577.9	581.9	9.7	9.9	9.7	548	555	549	24.1	23.6	23.9	526.6	377.6	226.4	573.2	0.92	0.92	0.92	50.00
5/15/2015	11:16:00 AM	587.0	579.3	583.3	9.6	9.8	9.6	547	554	548	24.3	23.8	24.0	526.9	386.4	227.0	573.7	0.92	0.92	0.92	49.96
5/15/2015	11:17:00 AM	583.3	575.7	579.8	10.0	10.1	10.1	551	558	552	23.7	23.2	23.4	527.4	395.2	227.6	574.4	0.92	0.92	0.92	49.95
5/15/2015	11:18:00 AM	583.2	575.8	580.0	9.9	10.1	10.0	552	558	553	23.7	23.3	23.5	527.8	404.0	228.5	575.1	0.92	0.92	0.92	49.93
5/15/2015	11:19:00 AM	584.9	577.7	581.8	10.0	10.1	10.2	550	557	551	23.8	23.5	23.5	527.8	412.8	228.2	575.1	0.92	0.92	0.92	49.92
5/15/2015	11:20:00 AM	587.3	580.1	584.0	9.9	9.9	10.0	548	555	549	24.0	23.7	23.8	528.2	421.6	228.7	575.6	0.91	0.92	0.92	49.94
5/15/2015	11:21:00 AM	588.0	580.7	584.7	9.8	9.9	10.1	547	555	549	24.0	23.7	23.8	528.7	430.4	228.7	576.0	0.91	0.92	0.92	49.96
5/15/2015	11:22:00 AM	588.6	581.2	585.3	9.9	10.0	9.9	547	555	549	24.1	23.8	23.8	529.0	439.2	229.4	576.6	0.91	0.92	0.92	49.96
5/15/2015	11:23:00 AM	587.0	579.6	583.7	10.0	10.1	10.0	549	557	551	24.1	23.7	23.6	529.5	448.1	229.8	577.2	0.91	0.92	0.92	49.98
5/15/2015	11:24:00 AM	586.5	578.9	583.1	10.1	10.1	10.2	550	558	552	23.9	23.5	23.5	529.9	456.9	230.0	577.7	0.91	0.92	0.92	50.01
5/15/2015	11:25:00 AM	586.0	578.4	582.7	9.7	9.9	9.8	552	560	552	24.3	23.8	23.8	530.6	465.7	231.1	578.7	0.91	0.92	0.92	50.01
5/15/2015	11:26:00 AM	585.7	578.1	582.3	9.6	9.8	9.6	552	560	553	24.4	23.9	24.0	531.1	474.6	231.1	579.2	0.91	0.92	0.92	50.02
5/15/2015	11:27:00 AM	583.9	576.3	580.6	9.9	10.1	10.1	555	562	555	24.0	23.6	23.7	531.6	483.4	232.0	580.0	0.91	0.92	0.92	50.05
5/15/2015	11:28:00 AM	583.8	576.0	580.3	9.8	10.0	10.0	557	564	557	24.6	24.1	24.3	532.1	492.3	235.1	581.7	0.91	0.92	0.92	50.04
5/15/2015	11:29:00 AM	581.8	574.4	578.3	9.9	10.0	10.1	560	567	562	25.3	24.8	25.0	532.5	501.2	238.9	583.6	0.91	0.91	0.91	50.04
5/15/2015	11:30:00 AM	594.0	587.1	590.7	3.9	4.1	4.0	16	16	26	7.3	4.7	132.1	14.0	501.4	5.2	19.8	0.03	0.04	0.15	49.98

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	11:31:00 AM	588.8	581.9	585.6	5.5	5.7	5.7	121	123	127	10.5	11.3	97.1	114.4	503.3	49.9	127.9	0.31	0.32	0.38	49.95
5/15/2015	11:32:00 AM	583.6	576.7	581.0	7.3	7.5	7.6	326	332	326	28.5	27.7	28.1	310.0	508.5	140.3	340.3	0.91	0.91	0.91	49.94
5/15/2015	11:33:00 AM	583.3	576.4	580.9	7.3	7.6	7.7	326	332	326	28.6	27.6	28.0	310.0	513.7	140.2	340.3	0.91	0.91	0.91	49.94
5/15/2015	11:34:00 AM	582.1	575.2	579.6	7.5	7.7	7.8	327	333	327	28.5	27.5	27.9	310.1	518.8	140.4	340.4	0.91	0.91	0.91	49.95
5/15/2015	11:35:00 AM	579.8	572.8	577.1	7.9	8.1	8.2	378	385	378	27.6	26.8	27.1	357.9	524.8	161.1	392.5	0.91	0.91	0.91	49.98
5/15/2015	11:36:00 AM	579.6	572.5	576.7	9.0	9.2	9.3	480	486	480	25.7	25.1	25.3	454.6	532.4	203.2	497.9	0.91	0.91	0.91	50.01
5/15/2015	11:37:00 AM	577.1	570.0	574.1	9.1	9.3	9.3	482	488	482	25.6	24.9	25.1	454.6	540.0	204.5	498.5	0.91	0.91	0.91	50.01
5/15/2015	11:38:00 AM	573.0	565.8	569.9	9.1	9.4	9.4	485	491	486	25.3	24.6	24.9	454.6	547.5	204.1	498.3	0.91	0.91	0.91	50.01
5/15/2015	11:39:00 AM	577.4	570.3	574.4	9.1	9.4	9.3	481	488	482	25.6	24.9	25.1	454.6	555.1	204.4	498.5	0.91	0.91	0.91	49.99
5/15/2015	11:40:00 AM	578.5	571.2	575.2	9.2	9.5	9.5	480	487	481	25.4	24.7	25.0	454.6	562.7	204.1	498.3	0.91	0.91	0.91	49.98
5/15/2015	11:41:00 AM	577.3	570.1	574.0	9.2	9.5	9.6	482	488	482	25.5	24.8	24.9	454.7	570.3	204.4	498.5	0.91	0.91	0.91	49.95
5/15/2015	11:42:00 AM	578.6	571.3	575.3	9.5	9.8	9.9	480	487	481	25.0	24.3	24.6	454.7	577.8	203.0	498.0	0.91	0.91	0.91	49.93
5/15/2015	11:43:00 AM	577.1	569.8	573.8	9.5	9.8	9.9	482	489	482	25.1	24.4	24.6	454.8	585.4	202.8	497.9	0.91	0.91	0.91	49.94
5/15/2015	11:44:00 AM	574.4	566.7	570.8	9.4	9.8	9.9	484	491	484	25.2	24.4	24.6	454.8	593.0	203.2	498.1	0.91	0.91	0.91	49.93
5/15/2015	11:45:00 AM	575.7	568.1	572.2	9.6	10.0	10.0	509	516	509	25.0	24.2	24.4	478.7	601.0	214.2	524.5	0.91	0.91	0.91	49.94
5/15/2015	11:46:00 AM	576.3	568.9	572.9	9.9	10.2	10.3	533	540	533	24.7	24.0	24.2	502.4	609.4	224.7	550.4	0.91	0.91	0.91	49.98
5/15/2015	11:47:00 AM	572.8	565.5	569.4	9.9	10.3	10.3	536	543	537	24.4	23.7	24.0	502.3	617.7	224.6	550.3	0.91	0.91	0.91	49.99
5/15/2015	11:48:00 AM	571.6	564.3	568.2	9.8	10.2	10.2	537	545	538	24.5	23.9	24.2	502.5	626.1	225.1	550.6	0.91	0.91	0.91	50.00
5/15/2015	11:49:00 AM	572.1	564.6	568.5	9.7	10.0	10.0	533	540	533	24.8	24.1	24.5	498.4	634.4	223.7	546.3	0.91	0.91	0.91	50.01
5/15/2015	11:50:00 AM	579.2	572.1	576.6	5.8	6.1	6.1	185	191	185	31.1	29.2	30.2	174.5	637.3	79.6	191.8	0.91	0.91	0.91	50.02
5/15/2015	11:51:00 AM	582.6	575.3	579.9	5.9	6.1	6.1	179	186	180	31.2	29.2	30.5	170.6	640.2	78.1	187.6	0.90	0.91	0.91	50.00
5/15/2015	11:52:00 AM	586.4	579.4	583.1	5.2	5.5	5.5	59	62	67	16.7	13.7	100.1	56.5	641.1	24.3	64.6	0.31	0.31	0.38	49.99
5/15/2015	11:53:00 AM	586.0	579.4	582.8	5.1	5.5	5.3	-	-	11	-	-	131.5	0.4	641.1	-3.5	3.5	-	-	0.12	50.02
5/15/2015	11:54:00 AM	586.0	579.3	582.6	4.9	5.3	5.2	-	-	10	-	-	129.9	0.3	641.1	-3.5	3.5	-	-	0.10	50.06
5/15/2015	11:55:00 AM	587.9	581.3	584.6	4.7	5.1	4.9	-	-	10	-	-	133.5	0.3	641.1	-3.5	3.5	-	-	0.10	50.08
5/15/2015	11:56:00 AM	589.5	582.9	586.1	4.7	5.0	4.9	-	-	10	-	-	134.4	0.3	641.1	-3.5	3.5	-	-	0.10	50.08
5/15/2015	11:57:00 AM	590.7	584.0	587.3	4.6	4.9	4.8	-	-	10	-	-	134.0	0.4	641.1	-3.5	3.5	-	-	0.11	50.09
5/15/2015	11:58:00 AM	587.5	580.3	584.1	6.6	6.9	6.8	273	276	278	14.3	13.4	76.0	259.0	645.4	116.0	286.2	0.46	0.46	0.51	50.06
5/15/2015	11:59:00 AM	583.0	575.7	579.6	9.9	10.2	10.2	579	585	579	24.7	24.2	24.5	551.4	654.6	248.1	604.6	0.91	0.91	0.91	50.08
5/15/2015	12:00:00 PM	585.3	578.1	582.0	9.8	10.2	10.2	579	585	579	24.9	24.2	24.5	553.6	663.9	248.9	607.0	0.91	0.91	0.91	50.10

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	12:01:00 PM	586.3	579.2	583.2	9.8	10.1	10.1	577	584	578	25.0	24.3	24.7	553.4	673.1	248.7	606.7	0.91	0.91	0.91	50.08
5/15/2015	12:02:00 PM	585.9	578.8	582.8	9.9	10.2	10.2	577	583	577	24.8	24.1	24.5	552.5	682.3	247.8	605.6	0.91	0.91	0.91	50.10
5/15/2015	12:03:00 PM	585.8	578.9	583.0	9.7	10.0	10.0	577	583	577	24.9	24.3	24.6	552.2	691.5	247.7	605.2	0.91	0.91	0.91	50.06
5/15/2015	12:04:00 PM	583.9	576.7	580.6	9.7	10.0	10.1	577	583	577	24.8	24.1	24.4	550.7	700.7	247.1	603.6	0.91	0.91	0.91	50.04
5/15/2015	12:05:00 PM	584.8	577.7	581.7	9.9	10.2	10.2	577	583	577	24.6	23.9	24.2	551.8	709.9	247.2	604.7	0.91	0.91	0.91	50.04
5/15/2015	12:06:00 PM	592.3	586.2	589.1	6.8	7.2	7.1	250	253	256	15.0	17.1	84.7	239.1	713.9	105.8	264.1	0.40	0.41	0.47	50.08
5/15/2015	12:07:00 PM	596.8	591.1	593.5	4.7	5.0	4.8	-	-	10	-	-	139.2	0.4	713.9	-3.5	3.6	-	-	0.10	50.10
5/15/2015	12:08:00 PM	593.7	588.2	590.5	4.5	4.9	4.7	-	-	10	-	-	126.0	0.2	713.9	-3.4	3.4	-	-	0.07	50.09
5/15/2015	12:09:00 PM	591.9	586.2	589.0	6.3	6.6	6.5	195	197	202	11.9	11.0	101.5	186.5	717.0	76.5	204.5	0.35	0.36	0.41	50.09
5/15/2015	12:10:00 PM	586.0	580.0	583.2	9.7	10.0	10.0	562	568	563	25.4	24.5	24.7	538.5	726.0	221.7	582.4	0.92	0.93	0.93	50.07
5/15/2015	12:11:00 PM	583.5	577.5	580.8	9.6	10.1	10.0	565	570	565	25.3	24.4	24.6	538.5	734.9	219.6	581.6	0.92	0.93	0.93	50.03
5/15/2015	12:12:00 PM	584.7	578.6	582.0	9.8	10.2	10.2	566	570	566	25.2	24.2	24.5	540.0	743.9	220.3	583.2	0.92	0.93	0.93	49.99
5/15/2015	12:13:00 PM	587.8	581.8	585.1	9.7	10.0	10.0	563	568	564	25.3	24.4	24.7	541.0	752.9	221.3	584.5	0.92	0.93	0.93	49.97
5/15/2015	12:14:00 PM	587.3	581.0	584.2	9.7	10.1	10.0	566	571	566	25.3	24.3	24.7	542.9	762.0	223.3	587.1	0.92	0.93	0.93	49.92
5/15/2015	12:15:00 PM	587.8	581.5	584.9	9.6	10.0	10.0	568	574	569	25.6	24.6	24.9	545.8	771.1	226.2	590.8	0.92	0.93	0.93	49.90
5/15/2015	12:16:00 PM	588.4	581.8	585.2	9.8	10.1	10.2	571	576	572	25.3	24.3	24.7	549.1	780.2	228.9	594.9	0.92	0.92	0.92	49.89
5/15/2015	12:17:00 PM	588.6	582.1	585.5	9.8	10.1	10.1	572	578	573	25.2	24.2	24.6	551.0	789.4	230.8	597.4	0.92	0.92	0.92	49.90
5/15/2015	12:18:00 PM	589.9	583.6	587.0	9.8	10.2	10.1	572	579	574	25.1	24.1	24.5	552.7	798.6	232.2	599.5	0.92	0.92	0.92	49.93
5/15/2015	12:19:00 PM	587.5	581.1	584.5	10.1	10.4	10.4	575	581	576	24.6	23.7	24.0	553.0	807.9	232.5	599.9	0.92	0.92	0.92	49.94
5/15/2015	12:20:00 PM	584.9	578.4	581.7	10.3	10.7	10.6	577	583	578	24.5	23.6	23.9	551.5	817.0	233.5	598.9	0.92	0.92	0.92	49.94
5/15/2015	12:21:00 PM	584.2	578.0	581.2	10.2	10.6	10.6	577	583	578	24.7	23.7	24.0	551.3	826.2	233.8	598.8	0.92	0.92	0.92	49.96
5/15/2015	12:22:00 PM	584.9	578.6	581.8	10.2	10.5	10.6	573	579	574	24.7	23.8	24.1	548.0	835.4	232.0	595.0	0.92	0.92	0.92	49.96
5/15/2015	12:23:00 PM	585.4	579.2	582.3	10.3	10.7	10.6	574	580	575	24.7	23.8	24.1	549.4	844.5	232.9	596.7	0.92	0.92	0.92	49.95
5/15/2015	12:24:00 PM	585.3	579.2	582.5	10.5	10.9	10.8	574	580	575	24.3	23.3	23.6	549.9	853.7	232.7	597.1	0.92	0.92	0.92	49.98
5/15/2015	12:25:00 PM	586.6	580.3	583.6	10.5	10.7	10.7	574	580	575	24.5	23.5	23.9	550.8	862.9	234.3	598.5	0.92	0.92	0.92	50.01
5/15/2015	12:26:00 PM	589.3	583.0	586.4	10.0	10.4	10.4	573	578	573	24.8	24.0	24.3	551.8	872.1	235.9	600.1	0.92	0.92	0.92	50.02
5/15/2015	12:27:00 PM	590.4	584.1	587.6	10.0	10.4	10.4	572	578	573	24.9	23.9	24.3	552.5	881.3	236.3	600.9	0.92	0.92	0.92	50.03
5/15/2015	12:28:00 PM	592.0	585.7	589.2	10.0	10.3	10.4	572	578	573	25.0	24.1	24.5	554.0	890.5	238.1	603.0	0.92	0.92	0.92	50.03
5/15/2015	12:29:00 PM	595.1	588.8	592.2	9.6	10.0	9.9	570	576	571	25.4	24.6	24.9	555.2	899.8	239.7	604.7	0.91	0.92	0.92	50.05
5/15/2015	12:30:00 PM	595.5	589.1	592.5	9.6	9.9	9.8	570	576	571	25.4	24.5	24.8	555.8	909.0	239.4	605.1	0.92	0.92	0.92	50.06

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	12:31:00 PM	595.8	589.5	592.8	9.6	9.9	9.9	570	576	571	25.5	24.7	24.9	555.5	918.3	239.5	605.0	0.91	0.92	0.92	50.07
5/15/2015	12:32:00 PM	596.1	589.7	593.2	9.6	9.9	10.0	570	575	570	25.6	24.9	24.9	555.1	927.5	239.5	604.6	0.91	0.92	0.92	50.08
5/15/2015	12:33:00 PM	596.5	589.9	593.5	9.7	10.1	10.0	570	576	570	25.5	24.4	24.6	556.1	936.8	240.0	605.7	0.91	0.92	0.92	50.09
5/15/2015	12:34:00 PM	595.9	589.1	592.6	9.8	10.3	10.1	571	578	572	25.0	24.0	24.5	556.7	946.1	240.7	606.5	0.91	0.92	0.92	50.09
5/15/2015	12:35:00 PM	594.9	588.5	591.9	9.6	10.0	9.8	573	578	573	25.4	24.4	24.6	557.2	955.4	241.8	607.4	0.91	0.92	0.92	50.08
5/15/2015	12:36:00 PM	597.5	591.0	594.4	9.6	10.0	9.8	571	576	571	25.5	24.6	24.8	557.3	964.7	244.4	608.6	0.91	0.92	0.92	50.07
5/15/2015	12:37:00 PM	598.1	591.4	594.9	9.5	9.9	9.8	570	575	570	25.5	24.7	24.9	556.5	973.9	241.7	606.7	0.91	0.92	0.92	50.06
5/15/2015	12:38:00 PM	597.8	591.2	594.7	9.6	10.0	9.9	570	576	571	25.5	24.5	24.9	556.9	983.2	242.4	607.4	0.91	0.92	0.92	50.03
5/15/2015	12:39:00 PM	597.6	591.1	594.6	9.5	9.8	9.7	570	576	571	25.5	24.6	25.0	557.3	992.5	242.7	607.9	0.91	0.92	0.92	50.00
5/15/2015	12:40:00 PM	596.4	589.9	593.2	9.4	9.8	9.7	572	578	573	25.6	24.7	25.1	557.6	1,001.8	243.8	608.6	0.91	0.92	0.92	49.98
5/15/2015	12:41:00 PM	595.4	588.8	592.2	9.6	9.9	9.8	573	579	574	25.3	24.5	24.9	557.9	1,011.1	244.2	609.0	0.91	0.92	0.92	49.98
5/15/2015	12:42:00 PM	595.6	589.1	592.7	9.9	10.1	10.1	572	578	574	25.0	24.2	24.6	557.4	1,020.4	243.5	608.3	0.91	0.92	0.92	50.00
5/15/2015	12:43:00 PM	597.9	591.3	594.9	9.7	10.0	10.0	571	576	571	25.3	24.4	24.8	557.7	1,029.7	243.9	608.7	0.91	0.92	0.92	50.01
5/15/2015	12:44:00 PM	596.9	590.4	593.9	9.9	10.2	10.3	572	577	573	25.0	24.1	24.6	558.0	1,039.0	244.1	609.1	0.91	0.92	0.92	50.04
5/15/2015	12:45:00 PM	595.9	589.6	593.1	9.9	10.2	10.2	573	579	574	25.2	24.3	24.8	558.4	1,048.3	245.4	610.0	0.91	0.92	0.92	50.06
5/15/2015	12:46:00 PM	593.7	587.5	591.0	9.8	10.1	10.0	576	581	577	25.3	24.5	24.9	558.8	1,057.6	246.8	610.9	0.91	0.92	0.92	50.05
5/15/2015	12:47:00 PM	591.6	585.4	588.9	9.8	10.2	10.1	576	582	577	25.3	24.4	24.9	557.1	1,066.9	246.4	609.2	0.91	0.92	0.92	50.03
5/15/2015	12:48:00 PM	593.5	587.3	590.8	9.8	10.1	10.2	576	581	577	25.3	24.5	24.9	558.8	1,076.2	246.8	610.9	0.91	0.92	0.92	50.02
5/15/2015	12:49:00 PM	594.1	587.7	591.2	9.7	10.1	10.0	576	581	577	25.2	24.4	24.8	559.1	1,085.5	246.8	611.2	0.91	0.92	0.92	49.97
5/15/2015	12:50:00 PM	595.2	588.9	592.3	9.6	9.8	9.7	576	581	577	25.8	24.9	25.5	559.7	1,094.8	248.5	612.4	0.91	0.92	0.92	49.95
5/15/2015	12:51:00 PM	596.4	589.8	593.3	9.7	9.8	9.8	574	580	576	25.8	24.9	25.5	559.7	1,104.2	248.4	612.4	0.91	0.92	0.92	49.95
5/15/2015	12:52:00 PM	595.3	588.9	592.3	9.6	10.0	9.8	576	580	576	25.8	24.9	25.4	559.2	1,113.5	248.9	612.1	0.91	0.92	0.92	49.98
5/15/2015	12:53:00 PM	597.6	591.0	594.6	9.9	10.1	10.1	573	579	574	24.7	23.9	24.4	560.4	1,122.8	245.2	611.8	0.91	0.92	0.92	50.01
5/15/2015	12:54:00 PM	598.3	591.8	595.3	10.1	10.2	10.1	573	579	575	25.1	24.4	24.9	560.6	1,132.2	248.6	613.2	0.91	0.92	0.92	50.03
5/15/2015	12:55:00 PM	598.7	592.3	595.8	10.0	10.2	10.2	573	578	574	24.8	24.2	24.6	560.8	1,141.5	247.4	612.9	0.91	0.92	0.92	50.05
5/15/2015	12:56:00 PM	599.6	593.2	596.7	10.0	10.2	10.1	572	577	573	24.8	24.1	24.6	560.8	1,150.9	247.3	612.9	0.91	0.92	0.92	50.06
5/15/2015	12:57:00 PM	600.8	594.6	598.1	9.9	10.1	10.1	571	576	572	24.9	24.3	24.7	560.8	1,160.2	247.4	613.0	0.91	0.92	0.92	50.08
5/15/2015	12:58:00 PM	601.4	595.1	598.7	9.9	10.2	10.2	570	575	571	24.9	24.3	24.7	560.9	1,169.6	247.3	613.0	0.91	0.92	0.92	50.09
5/15/2015	12:59:00 PM	600.6	594.2	597.8	10.3	10.5	10.8	571	576	572	24.5	23.9	24.3	561.0	1,178.9	247.0	613.0	0.91	0.92	0.92	50.08
5/15/2015	1:00:00 PM	602.8	596.3	600.0	10.4	10.6	10.9	569	574	570	24.3	23.8	24.2	561.1	1,188.3	246.5	612.9	0.91	0.92	0.92	50.07

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	1:01:00 PM	603.7	597.4	600.9	10.2	10.4	10.7	568	573	569	24.4	24.0	24.4	561.3	1,197.6	246.5	613.1	0.91	0.92	0.92	50.08
5/15/2015	1:02:00 PM	602.8	596.5	600.2	9.8	10.0	10.0	569	575	571	24.9	24.4	24.7	561.7	1,207.0	248.0	614.0	0.91	0.92	0.92	50.10
5/15/2015	1:03:00 PM	601.8	595.6	599.1	9.8	10.0	10.1	571	577	573	24.9	24.4	24.8	562.3	1,216.4	248.9	615.0	0.91	0.92	0.92	50.09
5/15/2015	1:04:00 PM	604.2	598.1	601.6	9.8	10.1	10.0	570	575	571	25.0	24.3	24.8	563.0	1,225.7	249.5	615.8	0.91	0.92	0.92	50.10
5/15/2015	1:05:00 PM	608.5	602.4	606.1	9.9	10.1	10.1	566	571	568	25.1	24.4	25.0	563.7	1,235.1	250.1	616.7	0.91	0.92	0.92	50.12
5/15/2015	1:06:00 PM	608.4	602.2	605.8	9.9	10.1	10.0	567	572	569	25.2	24.5	25.1	564.3	1,244.5	250.9	617.6	0.91	0.92	0.92	50.17
5/15/2015	1:07:00 PM	609.4	603.1	606.7	9.8	9.9	9.9	567	572	569	25.6	24.9	25.5	564.8	1,253.9	251.8	618.4	0.91	0.92	0.91	50.20
5/15/2015	1:08:00 PM	611.3	605.0	608.6	9.9	10.1	10.1	565	570	567	25.5	24.8	25.4	565.2	1,263.4	252.0	618.8	0.91	0.92	0.92	50.20
5/15/2015	1:09:00 PM	625.3	619.6	622.5	4.3	4.4	4.4	56	56	65	8.6	6.5	131.8	55.8	1,264.3	23.3	64.6	0.10	0.10	0.22	50.17
5/15/2015	1:10:00 PM	627.2	621.7	624.3	4.0	4.1	4.1	-	-	11	-	-	134.8	0.5	1,264.3	-2.8	3.9	-	-	0.13	50.14
5/15/2015	1:11:00 PM	627.6	622.2	625.0	4.0	4.2	4.1	-	-	11	-	-	139.3	0.4	1,264.3	-3.2	3.8	-	-	0.11	50.14
5/15/2015	1:12:00 PM	627.4	622.0	624.8	3.5	3.6	3.6	-	-	11	-	-	146.3	0.4	1,264.3	-3.6	3.8	-	-	0.10	50.15
5/15/2015	1:13:00 PM	627.8	622.1	624.8	3.2	3.3	3.3	-	-	11	-	-	144.2	0.4	1,264.3	-3.7	3.8	-	-	0.10	50.13
5/15/2015	1:14:00 PM	625.4	619.8	622.6	3.4	3.5	3.4	-	-	11	-	-	140.8	0.4	1,264.3	-3.6	3.8	-	-	0.10	50.12
5/15/2015	1:15:00 PM	623.0	617.3	620.2	3.5	3.6	3.5	-	-	11	-	-	139.1	0.4	1,264.3	-3.7	3.8	-	-	0.10	50.09
5/15/2015	1:16:00 PM	622.6	616.8	619.9	4.0	4.1	4.1	50	51	60	4.1	3.6	119.6	50.3	1,265.2	20.2	58.5	0.11	0.11	0.22	50.08
5/15/2015	1:17:00 PM	613.7	607.5	611.2	9.5	9.7	9.7	563	568	564	25.6	24.9	25.5	565.3	1,274.6	251.6	618.8	0.91	0.92	0.91	50.06
5/15/2015	1:18:00 PM	611.0	604.8	608.5	9.6	9.9	9.7	566	571	567	25.5	24.6	25.3	565.7	1,284.0	252.3	619.4	0.91	0.92	0.91	50.02
5/15/2015	1:19:00 PM	609.0	602.8	606.3	9.8	10.1	10.0	568	574	569	25.4	24.6	25.3	565.9	1,293.5	253.3	620.0	0.91	0.91	0.91	50.00
5/15/2015	1:20:00 PM	608.4	602.0	605.5	10.0	10.2	10.2	569	575	570	25.3	24.4	25.2	566.0	1,302.9	253.3	620.1	0.91	0.91	0.91	50.00
5/15/2015	1:21:00 PM	606.9	600.5	604.0	9.9	10.2	10.1	570	576	572	25.2	24.4	25.1	566.1	1,312.3	252.8	620.0	0.91	0.92	0.91	49.99
5/15/2015	1:22:00 PM	604.2	597.9	601.4	9.7	10.0	9.8	573	578	574	25.3	24.4	25.1	566.2	1,321.8	252.3	619.9	0.91	0.92	0.92	50.00
5/15/2015	1:23:00 PM	603.4	596.9	600.6	9.8	10.0	10.0	573	579	574	25.0	24.3	24.8	566.3	1,331.2	251.8	619.7	0.91	0.92	0.92	50.05
5/15/2015	1:24:00 PM	601.1	594.5	598.2	9.9	10.1	10.1	575	581	576	24.6	23.9	24.4	566.1	1,340.6	251.7	619.5	0.91	0.92	0.92	50.03
5/15/2015	1:25:00 PM	601.8	595.5	599.1	9.6	9.9	9.9	575	580	576	25.0	24.3	24.8	566.1	1,350.1	252.4	619.8	0.91	0.92	0.92	50.03
5/15/2015	1:26:00 PM	602.9	596.6	600.2	9.5	9.8	9.6	574	579	575	25.1	24.3	24.9	566.3	1,359.5	252.5	620.1	0.91	0.92	0.92	50.06
5/15/2015	1:27:00 PM	602.5	596.1	599.7	9.7	10.0	9.9	575	580	576	24.9	24.2	24.7	566.3	1,368.9	252.6	620.1	0.91	0.92	0.92	50.05
5/15/2015	1:28:00 PM	604.9	598.6	602.3	9.6	9.9	9.9	572	578	573	25.0	24.3	24.8	566.3	1,378.4	252.9	620.2	0.91	0.91	0.91	50.05
5/15/2015	1:29:00 PM	604.8	598.6	602.3	9.8	10.1	10.1	572	577	573	24.8	24.0	24.6	566.2	1,387.8	252.5	620.0	0.91	0.92	0.91	50.04
5/15/2015	1:30:00 PM	606.1	599.9	603.7	9.8	10.1	9.9	571	576	572	25.0	24.3	24.9	566.3	1,397.3	252.5	620.0	0.91	0.92	0.91	50.02

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	1:31:00 PM	614.0	608.0	611.6	7.2	7.3	7.2	301	303	306	20.0	16.7	73.9	299.0	1,402.2	133.0	329.6	0.49	0.50	0.55	50.02
5/15/2015	1:32:00 PM	620.7	614.9	618.0	3.8	4.1	3.9	-	-	11	-	-	135.5	0.4	1,402.3	-3.7	3.8	-	-	0.11	50.01
5/15/2015	1:33:00 PM	619.7	614.1	616.9	3.6	3.8	3.7	-	-	10	-	-	134.3	0.3	1,402.3	-3.6	3.6	-	-	0.08	50.00
5/15/2015	1:34:00 PM	620.4	615.0	617.7	3.5	3.7	3.5	-	-	10	-	-	128.7	0.3	1,402.3	-3.6	3.7	-	-	0.08	49.97
5/15/2015	1:35:00 PM	620.9	615.3	618.1	3.5	3.7	3.6	-	-	11	-	-	130.5	0.6	1,402.3	-3.9	4.0	-	-	0.16	49.96
5/15/2015	1:36:00 PM	612.0	605.7	609.8	8.1	8.2	8.3	414	419	416	28.2	26.7	31.3	413.4	1,409.2	172.6	448.2	0.89	0.90	0.90	49.97
5/15/2015	1:37:00 PM	609.5	602.7	607.0	8.5	8.7	8.7	453	458	454	27.2	26.2	26.9	451.0	1,416.7	187.4	488.4	0.92	0.93	0.92	49.97
5/15/2015	1:38:00 PM	608.8	602.1	606.1	8.6	8.7	8.9	457	462	458	27.1	26.2	26.8	454.2	1,424.2	189.9	492.3	0.92	0.92	0.92	49.96
5/15/2015	1:39:00 PM	606.6	599.9	604.0	8.6	8.7	8.8	463	468	465	27.1	26.2	26.8	458.7	1,431.9	193.4	497.8	0.92	0.92	0.92	49.95
5/15/2015	1:40:00 PM	605.1	598.6	602.7	8.3	8.4	8.5	442	448	444	27.5	26.6	27.2	437.0	1,439.2	186.9	475.3	0.92	0.92	0.92	49.96
5/15/2015	1:41:00 PM	605.8	599.4	603.6	7.4	7.5	7.6	361	367	363	28.7	27.7	28.6	357.2	1,445.1	155.2	389.4	0.91	0.92	0.92	49.97
5/15/2015	1:42:00 PM	607.3	600.9	605.1	6.4	6.6	6.8	302	308	304	29.6	28.4	29.5	299.5	1,450.1	131.5	327.1	0.91	0.92	0.92	49.97
5/15/2015	1:43:00 PM	610.4	604.0	608.2	5.7	5.9	6.0	276	282	278	30.2	28.7	29.9	275.9	1,454.7	120.9	301.2	0.91	0.92	0.92	49.96
5/15/2015	1:44:00 PM	608.8	602.5	606.7	6.1	6.2	6.4	290	296	292	30.0	28.4	29.6	288.7	1,459.5	126.4	315.2	0.91	0.92	0.92	49.97
5/15/2015	1:45:00 PM	608.2	601.9	606.0	6.5	6.6	6.7	303	308	304	29.7	28.3	29.3	300.4	1,464.5	131.9	328.0	0.91	0.92	0.92	50.01
5/15/2015	1:46:00 PM	605.0	598.6	602.6	7.7	7.8	8.0	384	390	386	28.2	27.2	28.1	379.3	1,470.9	164.9	413.6	0.91	0.92	0.92	50.02
5/15/2015	1:47:00 PM	601.8	595.4	599.3	8.5	8.7	8.8	465	470	467	27.0	26.2	26.7	457.4	1,478.5	194.8	497.2	0.92	0.92	0.92	50.02
5/15/2015	1:48:00 PM	602.1	595.6	599.5	8.4	8.5	8.7	470	476	472	27.1	26.3	26.9	462.6	1,486.2	196.6	502.7	0.92	0.92	0.92	50.02
5/15/2015	1:49:00 PM	599.4	593.1	596.8	8.4	8.5	8.7	457	463	459	27.1	26.4	27.0	448.3	1,493.7	191.7	487.6	0.92	0.92	0.92	50.03
5/15/2015	1:50:00 PM	598.4	592.0	595.8	8.5	8.6	8.8	461	467	463	27.2	26.4	27.0	451.1	1,501.2	193.6	490.9	0.92	0.92	0.92	50.01
5/15/2015	1:51:00 PM	596.0	589.5	593.6	9.0	9.1	9.2	474	480	476	26.5	25.8	26.4	462.2	1,508.9	197.6	502.7	0.92	0.92	0.92	50.01
5/15/2015	1:52:00 PM	596.9	590.4	594.6	9.1	9.3	9.5	473	479	475	26.3	25.6	26.1	461.9	1,516.6	197.3	502.3	0.92	0.92	0.92	50.01
5/15/2015	1:53:00 PM	596.7	590.3	594.5	9.0	9.2	9.3	472	477	473	26.4	25.7	26.3	460.1	1,524.3	196.3	500.2	0.92	0.92	0.92	50.02
5/15/2015	1:54:00 PM	595.0	588.5	592.6	9.7	9.9	10.0	535	541	537	25.3	24.7	25.2	521.0	1,532.9	219.0	565.2	0.92	0.92	0.92	50.03
5/15/2015	1:55:00 PM	603.1	597.1	600.6	6.0	6.2	6.1	178	180	186	14.8	13.0	94.0	173.0	1,535.8	70.9	190.3	0.30	0.31	0.42	50.04
5/15/2015	1:56:00 PM	608.9	603.0	606.1	4.0	4.2	4.0	-	-	11	-	-	128.3	0.7	1,535.8	-3.8	3.9	-	-	0.17	50.05
5/15/2015	1:57:00 PM	604.6	598.3	602.3	5.7	5.9	6.0	194	198	198	23.3	21.6	57.0	190.7	1,539.0	82.0	209.0	0.66	0.66	0.70	50.03
5/15/2015	1:58:00 PM	601.3	594.8	599.1	6.9	7.1	7.2	291	296	293	29.4	28.1	29.1	285.4	1,543.8	123.5	311.0	0.91	0.92	0.92	50.03
5/15/2015	1:59:00 PM	598.9	592.5	596.7	8.5	8.7	8.7	429	434	431	27.1	26.0	26.9	419.7	1,550.8	179.1	456.3	0.92	0.92	0.92	50.03
5/15/2015	2:00:00 PM	596.6	590.3	594.3	9.8	10.1	10.1	563	569	565	25.0	24.5	24.9	550.2	1,559.9	232.8	597.5	0.92	0.92	0.92	50.01

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	2:01:00 PM	594.4	587.9	592.1	9.7	10.0	10.0	567	572	568	25.3	24.7	25.2	550.9	1,569.1	234.7	598.8	0.92	0.92	0.92	50.02
5/15/2015	2:02:00 PM	593.9	587.5	591.5	9.9	10.2	10.2	569	574	570	25.1	24.5	25.0	552.7	1,578.3	235.8	600.9	0.92	0.92	0.92	50.04
5/15/2015	2:03:00 PM	595.3	589.0	593.0	9.9	10.3	10.2	568	574	570	24.9	24.4	24.8	553.9	1,587.6	236.9	602.4	0.92	0.92	0.92	50.05
5/15/2015	2:04:00 PM	596.6	590.1	594.2	9.8	10.1	10.0	568	574	569	24.9	24.3	24.8	554.6	1,596.8	237.5	603.3	0.92	0.92	0.92	50.07
5/15/2015	2:05:00 PM	596.4	589.6	593.7	9.6	9.9	9.8	571	577	572	24.9	24.2	24.8	557.4	1,606.1	240.6	607.1	0.92	0.92	0.92	50.08
5/15/2015	2:06:00 PM	595.1	588.5	592.5	9.9	10.3	10.1	573	579	574	24.6	23.9	24.5	558.3	1,615.4	241.4	608.2	0.91	0.92	0.92	50.08
5/15/2015	2:07:00 PM	595.8	589.3	593.3	10.1	10.5	10.3	573	578	574	24.4	23.7	24.2	558.6	1,624.7	241.0	608.4	0.92	0.92	0.92	50.06
5/15/2015	2:08:00 PM	594.4	587.9	591.7	10.3	10.6	10.5	574	579	574	24.2	23.5	24.1	558.1	1,634.0	241.3	608.1	0.91	0.92	0.92	50.05
5/15/2015	2:09:00 PM	594.2	587.7	591.5	10.2	10.5	10.4	574	579	575	24.4	23.8	24.3	558.1	1,643.3	242.3	608.5	0.91	0.92	0.92	50.02
5/15/2015	2:10:00 PM	595.6	589.2	592.9	10.2	10.5	10.4	573	578	574	24.6	23.9	24.5	558.6	1,652.6	243.2	609.2	0.91	0.92	0.92	50.01
5/15/2015	2:11:00 PM	594.5	588.3	591.7	10.1	10.4	10.3	573	579	574	24.5	23.9	24.4	557.6	1,661.9	242.7	608.1	0.91	0.92	0.92	49.99
5/15/2015	2:12:00 PM	591.3	584.9	588.4	10.1	10.4	10.3	574	580	575	24.5	23.8	24.4	555.3	1,671.2	240.8	605.3	0.91	0.92	0.92	49.97
5/15/2015	2:13:00 PM	587.7	581.6	584.8	9.9	10.2	10.1	574	580	575	24.7	24.0	24.5	552.4	1,680.4	240.5	602.5	0.91	0.92	0.92	49.97
5/15/2015	2:14:00 PM	588.1	581.9	585.3	9.8	10.1	9.9	574	580	575	25.0	24.3	24.9	552.0	1,689.6	240.5	602.1	0.91	0.92	0.92	49.98
5/15/2015	2:15:00 PM	586.8	580.6	584.2	9.7	10.0	9.9	574	580	574	25.1	24.4	24.9	550.7	1,698.7	240.4	600.9	0.91	0.92	0.92	49.99
5/15/2015	2:16:00 PM	587.0	580.9	584.4	9.6	9.9	9.8	574	579	576	25.7	24.8	25.4	551.0	1,707.9	243.0	602.2	0.91	0.92	0.92	50.01
5/15/2015	2:17:00 PM	585.6	579.3	582.7	9.7	9.8	10.0	573	579	575	25.4	24.6	25.1	549.2	1,717.1	241.4	599.9	0.91	0.92	0.92	49.99
5/15/2015	2:18:00 PM	584.6	578.4	581.8	10.2	10.4	10.4	572	579	574	24.7	24.0	24.5	547.8	1,726.2	240.8	598.3	0.91	0.92	0.92	49.99
5/15/2015	2:19:00 PM	585.9	579.6	582.9	10.3	10.5	10.5	572	579	575	24.8	23.9	24.4	548.7	1,735.4	241.8	599.6	0.91	0.92	0.92	50.02
5/15/2015	2:20:00 PM	586.4	580.0	583.4	10.2	10.6	10.5	574	581	575	24.1	23.3	23.8	552.0	1,744.6	240.6	602.1	0.91	0.92	0.92	50.03
5/15/2015	2:21:00 PM	585.4	579.3	582.6	10.5	10.9	10.8	574	580	575	23.9	23.2	23.6	550.2	1,753.7	240.9	600.6	0.91	0.92	0.92	50.01
5/15/2015	2:22:00 PM	586.1	579.8	583.2	10.7	11.1	11.1	574	580	575	23.8	23.0	23.4	550.9	1,762.9	241.1	601.4	0.91	0.92	0.92	50.01
5/15/2015	2:23:00 PM	583.8	577.4	581.0	10.7	11.1	11.1	574	580	575	23.8	23.0	23.4	548.8	1,772.1	240.3	599.2	0.91	0.92	0.92	50.02
5/15/2015	2:24:00 PM	581.8	575.5	579.1	10.6	11.0	11.1	573	579	574	23.9	23.2	23.7	546.1	1,781.2	240.1	596.6	0.91	0.92	0.92	50.03
5/15/2015	2:25:00 PM	580.1	573.8	577.4	10.7	11.0	11.0	574	580	574	23.8	23.1	23.5	544.7	1,790.2	239.5	595.1	0.91	0.92	0.92	50.03
5/15/2015	2:26:00 PM	580.4	574.0	577.7	10.7	11.1	10.9	573	580	574	23.6	23.0	23.4	544.8	1,799.3	239.6	595.2	0.91	0.92	0.92	50.02
5/15/2015	2:27:00 PM	580.4	573.9	577.6	10.8	11.1	11.0	574	580	575	23.4	22.7	23.1	545.6	1,808.4	239.5	595.8	0.91	0.92	0.92	50.02
5/15/2015	2:28:00 PM	580.9	574.4	578.1	10.8	11.2	11.0	574	580	574	23.5	22.7	23.2	545.5	1,817.5	239.6	595.8	0.91	0.92	0.92	49.99
5/15/2015	2:29:00 PM	580.5	574.0	577.7	10.7	11.1	11.0	574	580	575	23.5	22.8	23.2	545.5	1,826.6	239.7	595.9	0.91	0.92	0.92	49.97
5/15/2015	2:30:00 PM	583.1	576.7	580.4	10.8	11.2	11.0	573	579	574	23.7	22.9	23.3	547.0	1,835.7	240.4	597.5	0.91	0.92	0.92	49.97

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	2:31:00 PM	582.3	575.9	579.5	10.8	11.2	11.0	573	579	574	23.7	22.9	23.3	546.5	1,844.8	240.5	597.1	0.91	0.92	0.92	49.98
5/15/2015	2:32:00 PM	583.0	576.4	580.2	10.8	11.1	11.2	573	579	574	23.8	22.9	23.4	547.2	1,853.9	240.8	597.8	0.91	0.92	0.92	50.02
5/15/2015	2:33:00 PM	580.4	574.1	577.7	10.9	11.1	11.4	573	579	574	23.5	22.9	23.3	544.9	1,863.0	240.1	595.5	0.91	0.92	0.92	50.06
5/15/2015	2:34:00 PM	579.9	573.3	577.0	10.8	11.1	11.0	574	580	575	23.4	22.8	23.1	545.1	1,872.1	240.2	595.7	0.91	0.92	0.92	50.05
5/15/2015	2:35:00 PM	581.2	574.4	578.2	10.9	11.2	11.1	574	580	575	23.3	22.7	23.0	546.3	1,881.2	240.7	597.0	0.91	0.92	0.92	50.06
5/15/2015	2:36:00 PM	582.4	575.7	579.6	10.9	11.2	11.3	574	580	574	23.3	22.8	23.0	547.2	1,890.3	240.8	597.8	0.91	0.92	0.92	50.07
5/15/2015	2:37:00 PM	583.7	577.0	580.9	10.8	11.1	11.2	575	581	575	23.5	22.9	23.1	549.3	1,899.5	241.7	600.1	0.91	0.92	0.92	50.08
5/15/2015	2:38:00 PM	583.7	577.0	580.9	10.5	10.9	11.0	575	581	575	23.7	23.1	23.3	549.5	1,908.6	242.1	600.5	0.91	0.92	0.92	50.08
5/15/2015	2:39:00 PM	585.0	578.5	582.3	10.2	10.6	10.7	574	580	575	24.2	23.6	23.8	549.9	1,917.8	242.9	601.2	0.91	0.92	0.92	50.08
5/15/2015	2:40:00 PM	584.1	577.7	581.4	10.1	10.5	10.6	574	581	575	24.4	23.6	24.0	549.4	1,927.0	243.4	600.9	0.91	0.92	0.92	50.09
5/15/2015	2:41:00 PM	583.0	576.3	580.2	10.2	10.6	10.5	574	581	575	24.4	23.5	23.9	547.9	1,936.1	243.3	599.5	0.91	0.92	0.92	50.10
5/15/2015	2:42:00 PM	584.9	578.2	582.1	10.1	10.6	10.4	574	581	575	24.4	23.5	24.0	549.6	1,945.3	244.4	601.5	0.91	0.92	0.92	50.10
5/15/2015	2:43:00 PM	590.6	584.6	588.5	6.7	7.0	7.0	276	282	278	41.3	35.6	37.0	263.7	1,949.7	122.2	291.0	0.86	0.88	0.87	50.08
5/15/2015	2:44:00 PM	591.0	585.1	589.3	4.8	5.1	5.1	93	99	95	37.5	33.0	35.3	89.9	1,951.1	44.3	100.2	0.89	0.91	0.90	50.06
5/15/2015	2:45:00 PM	589.2	583.3	587.7	4.9	5.2	5.2	94	100	95	37.1	33.1	35.5	89.7	1,952.6	44.2	100.0	0.89	0.91	0.89	50.03
5/15/2015	2:46:00 PM	591.1	585.0	589.5	4.9	5.2	5.2	93	99	95	37.2	33.4	35.7	89.7	1,954.1	44.3	100.0	0.89	0.90	0.89	50.01
5/15/2015	2:47:00 PM	590.0	583.8	588.4	5.2	5.6	5.5	93	100	95	37.1	32.9	35.4	89.6	1,955.6	44.2	99.9	0.89	0.91	0.89	49.98
5/15/2015	2:48:00 PM	590.7	584.5	588.9	5.4	5.7	5.9	93	100	95	37.4	33.2	35.9	89.6	1,957.1	44.4	100.0	0.89	0.90	0.89	49.96
5/15/2015	2:49:00 PM	592.3	585.9	590.4	5.8	6.2	6.4	93	99	94	37.3	32.9	35.7	89.6	1,958.6	44.5	100.0	0.89	0.90	0.89	49.96
5/15/2015	2:50:00 PM	593.9	587.6	592.2	5.7	6.1	6.1	93	99	94	37.0	32.9	35.5	89.6	1,960.1	44.3	99.9	0.89	0.90	0.89	49.97
5/15/2015	2:51:00 PM	594.2	588.1	592.7	5.7	6.0	5.9	93	99	94	36.7	33.2	35.5	89.6	1,961.6	44.3	99.9	0.89	0.90	0.89	49.99
5/15/2015	2:52:00 PM	594.7	588.6	593.2	5.6	5.9	5.8	93	98	94	37.1	33.0	35.8	89.5	1,963.1	44.4	99.9	0.89	0.90	0.89	50.00
5/15/2015	2:53:00 PM	593.1	587.0	591.5	5.6	5.9	5.9	93	99	95	37.5	33.6	36.3	89.5	1,964.6	44.7	100.0	0.89	0.90	0.89	50.01
5/15/2015	2:54:00 PM	593.4	587.4	591.7	5.2	5.5	5.5	93	99	94	37.8	33.1	35.7	89.5	1,966.1	44.4	99.9	0.89	0.90	0.89	50.01
5/15/2015	2:55:00 PM	593.5	587.6	591.9	5.2	5.5	5.4	93	98	95	37.5	33.1	35.6	89.5	1,967.6	44.3	99.9	0.89	0.90	0.89	50.03
5/15/2015	2:56:00 PM	594.6	588.8	593.1	4.8	5.1	5.1	93	98	94	37.6	33.3	36.0	89.5	1,969.1	44.3	99.9	0.89	0.90	0.89	50.05
5/15/2015	2:57:00 PM	593.3	587.3	591.8	4.8	5.1	5.3	93	98	94	37.3	33.0	35.8	89.5	1,970.6	44.0	99.7	0.89	0.91	0.89	50.01
5/15/2015	2:58:00 PM	593.6	587.5	592.1	4.7	5.0	5.1	93	98	94	37.1	33.0	35.9	89.5	1,972.0	44.0	99.7	0.89	0.91	0.89	50.00
5/15/2015	2:59:00 PM	591.7	585.6	590.2	4.9	5.2	5.3	93	99	94	36.5	32.5	35.2	89.4	1,973.5	43.6	99.5	0.89	0.91	0.90	49.98
5/15/2015	3:00:00 PM	590.0	583.8	588.3	5.1	5.4	5.4	93	99	95	36.6	32.8	35.4	89.4	1,975.0	43.9	99.6	0.89	0.91	0.89	49.96

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	3:01:00 PM	591.8	585.8	590.2	4.9	5.1	5.4	93	99	95	36.4	33.3	36.0	89.4	1,976.5	44.1	99.7	0.89	0.90	0.89	49.96
5/15/2015	3:02:00 PM	584.9	578.2	582.3	9.4	9.6	9.6	499	505	499	26.1	25.1	25.9	476.4	1,984.5	213.6	522.1	0.91	0.91	0.91	49.95
5/15/2015	3:03:00 PM	583.6	576.7	580.7	10.0	10.2	10.2	575	580	575	24.3	23.7	24.1	548.9	1,993.6	244.4	600.8	0.91	0.91	0.92	49.96
5/15/2015	3:04:00 PM	585.6	578.8	582.9	9.7	10.0	9.9	574	580	575	24.4	23.9	24.3	550.5	2,002.8	245.1	602.6	0.91	0.92	0.92	50.01
5/15/2015	3:05:00 PM	586.8	580.0	584.1	9.7	10.0	9.9	575	580	575	24.4	23.9	24.3	552.0	2,012.0	245.5	604.2	0.91	0.92	0.92	50.06
5/15/2015	3:06:00 PM	586.8	580.0	584.1	10.0	10.3	10.2	575	581	575	24.2	23.7	24.0	552.1	2,021.2	246.0	604.5	0.91	0.91	0.92	50.08
5/15/2015	3:07:00 PM	585.0	578.3	582.2	10.0	10.3	10.4	574	580	575	24.2	23.7	24.1	549.6	2,030.3	245.5	602.0	0.91	0.91	0.91	50.09
5/15/2015	3:08:00 PM	596.3	590.1	593.5	4.8	5.0	4.9	37	37	47	8.4	5.3	131.2	35.1	2,030.9	14.0	42.1	0.07	0.07	0.18	50.08
5/15/2015	3:09:00 PM	595.2	588.9	592.2	4.4	4.6	4.5	-	-	10	-	-	137.0	0.3	2,030.9	-3.5	3.5	-	-	0.09	50.05
5/15/2015	3:10:00 PM	596.0	589.8	593.1	4.5	4.6	4.6	-	-	10	-	-	142.7	0.3	2,030.9	-3.5	3.5	-	-	0.07	50.03
5/15/2015	3:11:00 PM	596.7	590.5	593.8	4.5	4.7	4.6	-	-	10	-	-	131.4	0.2	2,030.9	-3.5	3.5	-	-	0.07	50.02
5/15/2015	3:12:00 PM	596.2	590.2	593.5	4.6	4.8	4.6	-	-	10	-	-	138.0	0.3	2,030.9	-3.5	3.5	-	-	0.07	49.98
5/15/2015	3:13:00 PM	594.8	588.7	592.0	4.9	5.1	5.0	-	-	10	-	-	136.0	0.3	2,030.9	-3.5	3.5	-	-	0.08	49.96
5/15/2015	3:14:00 PM	594.5	588.4	591.8	4.8	4.9	4.9	-	-	10	-	-	137.9	0.4	2,031.0	-3.5	3.6	-	-	0.10	49.96
5/15/2015	3:15:00 PM	589.8	583.5	587.2	7.1	7.3	7.3	206	209	213	9.5	11.1	93.7	196.6	2,034.2	80.7	215.4	0.36	0.37	0.44	49.95
5/15/2015	3:16:00 PM	582.8	576.0	580.1	10.6	10.8	10.8	569	575	570	23.9	23.5	23.9	542.4	2,043.3	222.9	586.4	0.92	0.93	0.93	49.95
5/15/2015	3:17:00 PM	581.1	574.4	578.4	10.6	10.8	10.8	565	570	565	23.9	23.4	23.7	536.8	2,052.2	218.9	579.7	0.92	0.93	0.93	50.01
5/15/2015	3:18:00 PM	580.4	573.8	578.0	10.4	10.7	10.7	561	566	561	23.8	23.3	23.6	532.4	2,061.1	215.7	574.5	0.92	0.93	0.93	50.06
5/15/2015	3:19:00 PM	583.4	576.8	580.7	10.6	10.9	10.9	568	573	568	23.8	23.3	23.5	541.9	2,070.1	220.6	585.1	0.92	0.93	0.93	50.05
5/15/2015	3:20:00 PM	584.7	578.3	582.1	10.6	10.8	10.8	568	573	568	23.9	23.4	23.7	543.1	2,079.2	223.3	587.2	0.92	0.93	0.93	50.05
5/15/2015	3:21:00 PM	583.2	576.8	580.6	10.8	11.0	11.0	570	576	571	23.8	23.2	23.6	544.4	2,088.2	225.7	589.3	0.92	0.93	0.93	50.02
5/15/2015	3:22:00 PM	583.5	577.2	581.0	10.8	11.1	11.1	572	577	573	23.8	23.1	23.5	545.8	2,097.3	227.3	591.2	0.92	0.92	0.92	49.98
5/15/2015	3:23:00 PM	582.4	576.0	579.9	10.8	11.1	11.0	572	578	573	23.6	23.0	23.4	545.2	2,106.4	225.9	590.1	0.92	0.93	0.93	49.98
5/15/2015	3:24:00 PM	582.2	575.7	579.8	10.8	11.1	11.1	574	579	574	23.6	23.0	23.4	546.7	2,115.5	226.3	591.7	0.92	0.93	0.93	50.01
5/15/2015	3:25:00 PM	581.9	575.5	579.4	10.9	11.2	11.2	575	581	576	23.4	22.9	23.2	547.7	2,124.7	227.0	592.9	0.92	0.93	0.93	50.04
5/15/2015	3:26:00 PM	582.7	576.1	580.0	10.7	11.0	10.9	574	580	575	23.7	23.1	23.5	547.7	2,133.8	227.5	593.1	0.92	0.93	0.92	50.04
5/15/2015	3:27:00 PM	582.3	575.7	579.7	10.6	10.9	10.8	574	580	575	23.8	23.2	23.6	547.3	2,142.9	227.8	592.8	0.92	0.92	0.92	50.06
5/15/2015	3:28:00 PM	583.7	577.2	581.2	10.3	10.5	10.6	574	580	575	24.3	23.7	24.1	548.7	2,152.1	230.0	594.9	0.92	0.92	0.92	50.10
5/15/2015	3:29:00 PM	581.9	575.1	579.2	10.4	10.7	10.6	575	582	576	24.1	23.4	23.9	548.1	2,161.2	231.0	594.8	0.92	0.92	0.92	50.11
5/15/2015	3:30:00 PM	582.0	575.6	579.7	10.4	10.7	10.6	575	581	576	24.1	23.5	24.0	547.9	2,170.3	232.5	595.2	0.92	0.92	0.92	50.10

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	3:31:00 PM	584.4	578.1	582.1	10.6	10.9	10.8	574	580	575	24.1	23.3	23.8	549.6	2,179.5	233.8	597.3	0.92	0.92	0.92	50.10
5/15/2015	3:32:00 PM	585.7	579.3	583.4	10.7	11.0	10.9	574	580	575	23.8	23.0	23.5	550.9	2,188.7	234.0	598.6	0.92	0.92	0.92	50.08
5/15/2015	3:33:00 PM	586.6	580.1	584.4	10.6	11.0	10.8	575	581	575	23.8	23.1	23.6	552.0	2,197.9	235.1	600.0	0.92	0.92	0.92	50.05
5/15/2015	3:34:00 PM	585.2	578.6	582.9	10.6	10.9	10.8	575	581	575	23.8	23.1	23.6	550.9	2,207.1	235.4	599.1	0.92	0.92	0.92	50.06
5/15/2015	3:35:00 PM	585.9	579.2	583.6	10.5	10.8	10.7	576	581	576	24.0	23.2	23.7	552.5	2,216.3	236.3	600.9	0.92	0.92	0.92	50.09
5/15/2015	3:36:00 PM	585.2	578.7	582.9	10.4	10.8	10.7	576	582	576	23.9	23.2	23.6	551.8	2,225.5	236.8	600.5	0.92	0.92	0.92	50.10
5/15/2015	3:37:00 PM	588.2	581.6	585.8	10.4	10.7	10.5	576	582	577	24.0	23.3	23.8	554.6	2,234.7	238.6	603.7	0.92	0.92	0.92	50.10
5/15/2015	3:38:00 PM	593.5	586.8	591.2	10.3	10.6	10.5	572	578	573	24.3	23.7	24.1	555.9	2,244.0	238.8	605.1	0.92	0.92	0.92	50.07
5/15/2015	3:39:00 PM	592.8	586.1	590.4	10.1	10.3	10.2	573	578	573	24.6	24.1	24.5	555.4	2,253.2	239.7	604.9	0.92	0.92	0.92	50.06
5/15/2015	3:40:00 PM	593.1	586.6	591.0	9.9	10.2	10.0	573	578	573	24.6	24.1	24.5	555.7	2,262.5	241.1	605.8	0.91	0.92	0.92	50.05
5/15/2015	3:41:00 PM	597.1	590.4	594.9	10.0	10.2	10.1	570	575	570	24.8	24.3	24.6	556.2	2,271.8	241.1	606.2	0.91	0.92	0.92	50.03
5/15/2015	3:42:00 PM	596.4	589.8	594.4	10.0	10.3	10.1	570	575	570	24.8	24.2	24.5	555.6	2,281.0	240.8	605.5	0.91	0.92	0.92	50.03
5/15/2015	3:43:00 PM	595.4	588.9	593.4	10.1	10.4	10.3	572	577	572	24.8	24.4	24.6	556.3	2,290.3	241.7	606.6	0.91	0.92	0.92	49.99
5/15/2015	3:44:00 PM	594.9	588.2	592.6	10.2	10.6	10.3	572	577	572	24.7	24.0	24.4	556.5	2,299.6	241.7	606.7	0.91	0.92	0.92	49.98
5/15/2015	3:45:00 PM	592.5	585.8	590.2	10.4	10.7	10.5	575	580	575	24.4	23.8	24.1	556.6	2,308.8	241.8	606.9	0.91	0.92	0.92	49.95
5/15/2015	3:46:00 PM	594.2	587.5	592.1	10.1	10.5	10.3	573	578	572	24.4	23.8	24.1	556.5	2,318.1	240.4	606.2	0.92	0.92	0.92	49.93
5/15/2015	3:47:00 PM	595.2	588.7	593.2	9.7	10.2	10.1	572	577	571	24.5	23.9	24.2	556.5	2,327.4	240.2	606.2	0.92	0.92	0.92	49.95
5/15/2015	3:48:00 PM	594.3	587.8	592.2	9.8	10.3	10.2	573	579	573	24.3	23.8	24.1	557.7	2,336.7	241.3	607.6	0.91	0.92	0.92	49.95
5/15/2015	3:49:00 PM	592.7	586.0	590.5	10.1	10.4	10.5	576	582	575	24.1	23.6	23.9	558.9	2,346.0	242.9	609.4	0.91	0.92	0.92	49.95
5/15/2015	3:50:00 PM	591.9	585.2	589.6	10.5	10.7	10.9	577	583	578	24.3	23.7	24.2	558.9	2,355.3	245.6	610.5	0.91	0.92	0.92	49.94
5/15/2015	3:51:00 PM	590.4	583.9	588.2	10.9	11.2	11.1	577	582	577	24.1	23.6	23.9	556.2	2,364.6	246.0	608.2	0.91	0.92	0.92	49.94
5/15/2015	3:52:00 PM	588.6	581.9	586.3	11.0	11.3	11.3	576	582	576	24.0	23.3	23.8	554.1	2,373.8	245.0	605.9	0.91	0.92	0.92	49.94
5/15/2015	3:53:00 PM	588.6	582.0	586.3	10.7	11.0	10.8	576	582	577	24.0	23.5	23.8	554.6	2,383.1	244.8	606.3	0.91	0.92	0.92	49.95
5/15/2015	3:54:00 PM	588.7	582.1	586.3	10.4	10.7	10.5	577	583	578	24.0	23.5	23.8	555.9	2,392.3	245.0	607.5	0.91	0.92	0.92	49.98
5/15/2015	3:55:00 PM	588.9	582.3	586.4	10.6	11.0	10.9	577	583	578	24.0	23.2	23.6	555.9	2,401.6	245.3	607.6	0.91	0.92	0.92	49.98
5/15/2015	3:56:00 PM	587.0	580.6	584.7	10.7	11.2	11.0	577	582	577	23.9	23.0	23.3	553.6	2,410.8	244.3	605.1	0.91	0.92	0.92	49.98
5/15/2015	3:57:00 PM	587.8	581.4	585.4	10.6	11.1	10.8	576	582	577	23.8	22.9	23.3	554.4	2,420.1	243.3	605.4	0.91	0.92	0.92	49.97
5/15/2015	3:58:00 PM	589.2	582.9	587.0	10.6	11.2	11.0	576	581	576	23.9	23.0	23.3	555.1	2,429.3	244.1	606.4	0.91	0.92	0.92	49.98
5/15/2015	3:59:00 PM	591.0	584.7	588.8	10.3	10.7	10.7	576	581	576	24.6	23.7	24.0	556.8	2,438.6	246.2	608.8	0.91	0.92	0.92	50.00
5/15/2015	4:00:00 PM	592.1	585.7	589.8	10.1	10.6	10.5	576	582	576	24.6	23.8	24.2	557.8	2,447.9	246.1	609.7	0.91	0.92	0.92	49.99

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	4:01:00 PM	594.6	588.3	592.2	9.8	10.3	10.1	575	581	576	25.1	24.2	24.6	559.7	2,457.2	247.3	611.9	0.91	0.92	0.92	49.99
5/15/2015	4:02:00 PM	593.7	587.5	591.4	9.8	10.3	10.0	576	582	577	25.3	24.4	24.9	559.2	2,466.5	249.0	612.2	0.91	0.92	0.92	49.99
5/15/2015	4:03:00 PM	592.5	586.4	590.4	9.9	10.3	10.1	576	581	576	24.8	24.1	24.4	557.6	2,475.8	248.0	610.3	0.91	0.91	0.92	50.01
5/15/2015	4:04:00 PM	593.4	587.3	591.2	9.9	10.3	10.1	575	580	575	24.8	24.1	24.3	558.0	2,485.1	248.4	610.8	0.91	0.91	0.92	50.02
5/15/2015	4:05:00 PM	598.1	591.9	595.9	9.6	10.0	9.8	575	580	575	25.1	24.3	24.6	562.1	2,494.5	250.4	615.4	0.91	0.91	0.92	50.03
5/15/2015	4:06:00 PM	601.3	595.2	599.2	9.7	10.2	10.0	573	579	574	25.2	24.3	24.8	563.8	2,503.9	251.3	617.3	0.91	0.91	0.92	50.02
5/15/2015	4:07:00 PM	602.2	596.0	600.0	9.8	10.2	10.0	573	578	574	25.1	24.2	24.7	564.5	2,513.3	251.5	618.0	0.91	0.92	0.92	50.04
5/15/2015	4:08:00 PM	602.7	596.5	600.3	9.5	10.0	9.8	573	579	574	25.4	24.5	25.0	564.9	2,522.7	252.7	618.9	0.91	0.91	0.91	50.05
5/15/2015	4:09:00 PM	601.9	595.8	599.7	9.9	10.4	10.2	574	579	574	25.1	24.3	24.7	564.4	2,532.1	252.7	618.4	0.91	0.91	0.91	50.03
5/15/2015	4:10:00 PM	602.5	596.5	600.4	9.9	10.2	10.2	574	579	574	25.1	24.4	24.7	565.2	2,541.5	253.3	619.4	0.91	0.91	0.91	50.00
5/15/2015	4:11:00 PM	603.6	597.6	601.5	9.9	10.2	10.2	574	578	574	25.0	24.5	24.9	565.8	2,551.0	253.8	620.1	0.91	0.91	0.91	49.97
5/15/2015	4:12:00 PM	602.8	596.8	600.7	9.9	10.2	10.2	574	578	574	25.0	24.5	24.8	565.3	2,560.4	254.0	619.8	0.91	0.91	0.91	49.97
5/15/2015	4:13:00 PM	604.1	598.1	602.1	10.2	10.4	10.4	573	577	574	24.9	24.2	24.7	565.8	2,569.8	253.8	620.2	0.91	0.91	0.91	49.98
5/15/2015	4:14:00 PM	604.2	598.0	602.2	10.1	10.4	10.2	573	578	574	24.9	24.2	24.7	566.0	2,579.3	253.7	620.2	0.91	0.91	0.91	49.98
5/15/2015	4:15:00 PM	607.1	601.3	605.1	7.8	8.1	8.1	351	354	356	22.9	19.1	66.5	345.5	2,585.0	155.8	381.1	0.56	0.57	0.62	49.96
5/15/2015	4:16:00 PM	614.2	608.7	612.0	4.5	4.8	4.7	-	-	11	-	-	131.8	0.5	2,585.0	-3.7	3.8	-	-	0.14	49.97
5/15/2015	4:17:00 PM	614.1	608.8	611.8	4.4	4.7	4.6	-	-	10	-	-	131.9	0.4	2,585.0	-3.6	3.7	-	-	0.10	49.97
5/15/2015	4:18:00 PM	614.3	609.0	612.0	4.5	4.8	4.5	-	-	10	-	-	134.0	0.3	2,585.0	-3.6	3.6	-	-	0.08	49.95
5/15/2015	4:19:00 PM	613.2	607.9	611.0	4.7	5.0	4.7	-	-	10	-	-	134.3	0.3	2,585.0	-3.6	3.6	-	-	0.08	49.95
5/15/2015	4:20:00 PM	612.4	606.8	609.8	4.8	5.1	4.8	-	-	11	-	-	136.6	0.5	2,585.0	-3.7	3.8	-	-	0.12	49.93
5/15/2015	4:21:00 PM	612.1	606.4	609.5	4.9	5.3	4.9	-	-	11	-	-	130.4	0.8	2,585.1	-3.9	4.0	-	-	0.19	49.91
5/15/2015	4:22:00 PM	599.9	593.6	597.5	8.8	9.2	8.9	397	400	400	21.1	19.7	51.2	386.6	2,591.5	157.6	418.7	0.70	0.71	0.75	49.90
5/15/2015	4:23:00 PM	596.0	589.2	593.6	10.3	10.7	10.4	555	559	555	24.4	23.4	24.1	540.5	2,600.5	220.5	583.8	0.92	0.93	0.93	49.91
5/15/2015	4:24:00 PM	595.3	588.8	593.0	10.4	10.7	10.5	556	561	556	24.4	23.3	24.2	541.1	2,609.5	221.4	584.6	0.92	0.93	0.93	49.96
5/15/2015	4:25:00 PM	593.3	586.6	590.9	10.3	10.7	10.5	561	565	561	24.5	23.6	24.4	543.3	2,618.6	224.6	587.9	0.92	0.93	0.93	50.01
5/15/2015	4:26:00 PM	593.5	586.6	591.0	10.3	10.6	10.4	563	567	563	24.6	23.8	24.4	545.5	2,627.7	227.5	591.1	0.92	0.92	0.92	50.02
5/15/2015	4:27:00 PM	592.2	585.3	589.6	10.3	10.6	10.4	567	572	568	24.4	23.6	24.3	549.0	2,636.8	230.4	595.4	0.92	0.92	0.92	49.95
5/15/2015	4:28:00 PM	591.6	584.8	589.1	10.3	10.6	10.6	570	575	570	24.3	23.4	24.1	551.3	2,646.0	231.9	598.1	0.92	0.92	0.92	49.94
5/15/2015	4:29:00 PM	592.2	585.4	589.7	10.4	10.7	10.6	569	575	570	24.3	23.5	24.3	551.3	2,655.2	231.1	597.8	0.92	0.92	0.92	49.93
5/15/2015	4:30:00 PM	593.1	586.4	590.7	10.5	10.8	10.7	568	574	569	24.2	23.6	24.2	551.5	2,664.4	231.2	598.0	0.92	0.92	0.92	49.93

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	4:31:00 PM	589.6	582.4	585.3	10.4	10.6	10.6	571	578	572	24.3	23.6	24.3	550.3	2,673.6	232.1	597.3	0.92	0.92	0.92	49.95
5/15/2015	4:32:00 PM	353.5	347.3	335.2	6.9	6.5	7.0	340	355	347	14.5	15.1	14.7	321.0	2,678.9	135.7	348.6	0.56	0.57	0.56	29.98
5/15/2015	4:33:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:34:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:35:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:36:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:37:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:38:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:39:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:40:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:41:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:42:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:43:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:44:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:45:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:46:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:47:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:48:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:49:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:50:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:51:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:52:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:53:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:54:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:55:00 PM	-	-	-	-	-	-	-	-	9	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:56:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:57:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:58:00 PM	-	-	-	-	-	-	-	-	9	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	4:59:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	5:00:00 PM	-	-	-	-	-	-	-	-	9	-	-	-	-	2,678.9	-	-	-	-	-	- - -

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	5:01:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	5:02:00 PM	-	-	-	-	-	-	-	-	10	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	5:03:00 PM	-	-	-	-	-	-	-	-	9	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	5:04:00 PM	-	-	-	-	-	-	-	-	9	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	5:05:00 PM	-	-	-	-	-	-	-	-	9	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	5:06:00 PM	-	-	-	-	-	-	-	-	9	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	5:07:00 PM	-	-	-	-	-	-	-	-	9	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	5:08:00 PM	-	-	-	-	-	-	-	-	9	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	5:09:00 PM	-	-	-	-	-	-	-	-	9	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	5:10:00 PM	-	-	-	-	-	-	-	-	9	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	5:11:00 PM	-	-	-	-	-	-	-	-	9	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	5:12:00 PM	-	-	-	-	-	-	-	-	9	-	-	-	-	2,678.9	-	-	-	-	-	- - -
5/15/2015	5:13:00 PM	483.5	477.6	480.4	1.2	1.2	1.1	0	1	10	-	-	37.5	0.2	2,678.9	-0.4	3.4	0.01	0.01	0.03	38.39
5/15/2015	5:14:00 PM	623.6	615.9	620.6	6.8	6.9	6.9	423	428	423	31.9	28.8	30.2	430.0	2,686.1	179.4	466.1	0.91	0.92	0.91	50.07
5/15/2015	5:15:00 PM	615.9	608.5	612.8	8.7	8.8	8.8	531	536	531	26.2	25.1	26.0	534.7	2,695.0	224.1	579.8	0.92	0.92	0.92	50.07
5/15/2015	5:16:00 PM	615.7	608.2	612.5	8.8	8.9	8.8	518	524	519	26.2	25.1	26.0	521.9	2,703.7	219.7	566.3	0.92	0.92	0.92	50.06
5/15/2015	5:17:00 PM	614.7	607.3	611.4	9.0	9.1	9.2	535	540	536	26.0	25.0	25.9	537.6	2,712.7	226.3	583.3	0.92	0.92	0.92	50.07
5/15/2015	5:18:00 PM	614.1	606.9	610.8	9.0	9.1	9.1	538	544	539	26.0	25.0	25.7	540.8	2,721.7	227.8	586.9	0.92	0.92	0.92	50.06
5/15/2015	5:19:00 PM	614.8	607.7	611.7	9.1	9.2	9.2	550	555	551	25.9	24.9	25.7	553.4	2,730.9	232.4	600.2	0.92	0.92	0.92	50.06
5/15/2015	5:20:00 PM	614.3	607.2	611.1	9.1	9.2	9.2	549	553	549	25.8	24.9	25.5	550.9	2,740.1	231.3	597.4	0.92	0.92	0.92	50.06
5/15/2015	5:21:00 PM	613.0	605.8	609.7	9.2	9.3	9.3	549	554	549	25.7	24.9	25.5	549.8	2,749.2	231.2	596.5	0.92	0.92	0.92	50.05
5/15/2015	5:22:00 PM	611.1	604.2	608.1	9.2	9.3	9.4	550	554	550	25.4	24.8	25.3	549.3	2,758.4	231.0	595.9	0.92	0.92	0.92	50.01
5/15/2015	5:23:00 PM	611.6	604.7	608.6	9.3	9.3	9.3	551	555	551	25.4	24.7	25.3	551.0	2,767.6	233.2	598.3	0.92	0.92	0.92	50.00
5/15/2015	5:24:00 PM	611.8	605.1	608.9	9.2	9.3	9.4	553	558	554	25.3	24.6	25.3	554.0	2,776.8	236.1	602.2	0.92	0.92	0.92	49.97
5/15/2015	5:25:00 PM	611.4	604.5	608.4	9.4	9.5	9.5	554	559	555	25.3	24.6	25.2	554.4	2,786.1	237.1	603.0	0.92	0.92	0.92	49.97
5/15/2015	5:26:00 PM	610.3	603.2	607.2	9.5	9.6	9.7	557	562	557	25.3	24.6	25.1	555.6	2,795.3	238.4	604.6	0.92	0.92	0.92	49.97
5/15/2015	5:27:00 PM	611.6	604.5	608.6	9.3	9.4	9.4	557	562	557	25.4	24.7	25.2	557.2	2,804.6	240.0	606.7	0.92	0.92	0.92	49.99
5/15/2015	5:28:00 PM	610.9	604.0	608.0	9.5	9.6	9.6	558	563	559	25.3	24.6	25.2	557.6	2,813.9	241.1	607.5	0.91	0.92	0.92	50.02
5/15/2015	5:29:00 PM	611.0	604.3	608.0	9.4	9.5	9.5	558	563	558	25.4	24.6	25.3	557.7	2,823.2	240.8	607.5	0.91	0.92	0.92	50.02
5/15/2015	5:30:00 PM	610.7	603.9	607.9	9.4	9.5	9.5	558	563	559	25.4	24.7	25.3	557.4	2,832.5	240.9	607.3	0.91	0.92	0.92	50.02

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	5:31:00 PM	610.8	604.1	608.0	9.3	9.5	9.4	558	563	559	25.5	24.8	25.4	557.5	2,841.8	241.3	607.5	0.91	0.92	0.92	50.03
5/15/2015	5:32:00 PM	610.9	604.1	608.0	9.3	9.4	9.3	558	563	559	25.5	24.9	25.5	557.5	2,851.1	241.5	607.5	0.91	0.92	0.92	50.06
5/15/2015	5:33:00 PM	610.9	604.3	608.2	9.1	9.2	9.2	558	563	559	25.5	24.9	25.6	557.7	2,860.4	241.3	607.7	0.91	0.92	0.92	50.02
5/15/2015	5:34:00 PM	612.9	606.0	610.1	8.8	8.9	8.9	556	561	557	25.8	25.1	25.9	557.9	2,869.6	241.5	608.0	0.91	0.92	0.92	50.01
5/15/2015	5:35:00 PM	615.0	608.2	612.3	8.8	9.0	8.8	555	560	554	26.0	24.9	25.8	558.1	2,879.0	242.0	608.4	0.91	0.92	0.92	50.01
5/15/2015	5:36:00 PM	617.0	610.2	614.2	8.8	9.0	8.9	553	558	553	26.0	24.9	25.9	558.0	2,888.3	242.1	608.3	0.91	0.92	0.92	50.04
5/15/2015	5:37:00 PM	616.0	609.3	613.3	8.8	9.0	8.9	554	559	554	25.9	24.9	25.8	558.2	2,897.6	241.9	608.4	0.91	0.92	0.92	50.03
5/15/2015	5:38:00 PM	615.4	608.7	612.7	9.0	9.1	9.0	555	559	554	25.8	24.8	25.6	558.2	2,906.9	242.3	608.5	0.91	0.92	0.92	50.05
5/15/2015	5:39:00 PM	616.6	609.9	614.0	8.8	9.1	9.0	553	558	553	25.9	24.9	25.8	558.2	2,916.2	241.7	608.3	0.91	0.92	0.92	50.05
5/15/2015	5:40:00 PM	615.6	609.0	613.0	8.6	8.7	8.8	554	558	554	26.2	25.1	26.0	558.1	2,925.5	241.4	608.1	0.91	0.92	0.92	50.04
5/15/2015	5:41:00 PM	595.6	588.7	592.6	9.5	9.7	9.5	574	579	574	25.6	24.5	25.4	558.3	2,934.8	245.4	609.9	0.91	0.92	0.92	50.06
5/15/2015	5:42:00 PM	594.2	587.2	591.2	9.6	9.8	9.7	576	581	576	25.4	24.3	25.2	558.8	2,944.1	246.2	610.6	0.91	0.92	0.92	50.06
5/15/2015	5:43:00 PM	596.1	588.6	593.2	9.4	9.7	9.5	575	579	573	25.5	24.5	25.3	559.0	2,953.4	247.5	611.4	0.91	0.92	0.92	50.02
5/15/2015	5:44:00 PM	597.8	590.4	595.0	9.3	9.5	9.5	573	577	571	25.5	24.5	25.2	559.3	2,962.7	247.3	611.6	0.91	0.92	0.92	50.00
5/15/2015	5:45:00 PM	599.3	591.8	596.3	9.4	9.7	9.6	572	576	570	25.3	24.4	25.1	559.4	2,972.0	247.9	611.8	0.91	0.92	0.92	50.00
5/15/2015	5:46:00 PM	600.3	592.8	597.5	9.4	9.6	9.5	571	575	569	25.3	24.4	25.0	559.5	2,981.4	247.7	611.9	0.91	0.92	0.92	50.00
5/15/2015	5:47:00 PM	599.0	591.4	596.0	9.4	9.6	9.5	573	577	571	25.2	24.4	25.1	559.7	2,990.7	248.2	612.3	0.91	0.92	0.92	50.01
5/15/2015	5:48:00 PM	597.3	589.7	594.2	9.7	9.9	9.7	574	579	573	25.1	24.3	25.0	559.8	3,000.0	248.7	612.5	0.91	0.92	0.92	49.99
5/15/2015	5:49:00 PM	598.2	590.6	595.0	9.7	9.8	9.8	574	579	573	25.2	24.5	25.1	560.6	3,009.4	249.6	613.6	0.91	0.92	0.92	50.00
5/15/2015	5:50:00 PM	598.2	590.6	595.1	9.5	9.6	9.6	574	579	573	25.4	24.7	25.4	560.6	3,018.7	250.2	613.9	0.91	0.91	0.91	50.00
5/15/2015	5:51:00 PM	596.9	589.4	594.1	9.4	9.4	9.5	575	579	574	25.3	24.9	25.3	559.9	3,028.0	250.1	613.3	0.91	0.91	0.91	50.00
5/15/2015	5:52:00 PM	595.4	588.0	592.5	9.4	9.5	9.4	575	579	574	25.4	24.7	25.2	558.5	3,037.4	250.1	611.9	0.91	0.91	0.91	49.99
5/15/2015	5:53:00 PM	594.9	587.4	592.0	9.4	9.5	9.5	576	580	574	25.4	24.5	25.2	558.7	3,046.7	250.0	612.1	0.91	0.91	0.91	50.00
5/15/2015	5:54:00 PM	593.5	586.0	590.6	9.8	10.0	10.1	575	579	574	25.1	24.4	25.0	556.5	3,055.9	249.8	610.0	0.91	0.91	0.91	49.99
5/15/2015	5:55:00 PM	592.6	584.9	589.5	9.8	9.9	10.1	575	579	573	25.1	24.4	24.9	555.4	3,065.2	249.6	609.0	0.91	0.91	0.91	50.00
5/15/2015	5:56:00 PM	592.7	584.9	589.6	9.7	9.9	9.9	575	580	573	25.1	24.4	25.0	555.6	3,074.5	250.0	609.3	0.91	0.91	0.91	50.03
5/15/2015	5:57:00 PM	593.3	585.7	590.3	9.6	9.8	9.7	576	580	574	25.1	24.3	24.9	557.0	3,083.7	250.3	610.6	0.91	0.91	0.91	50.05
5/15/2015	5:58:00 PM	595.3	587.5	592.2	9.7	9.9	9.8	575	579	573	25.0	24.3	24.9	558.0	3,093.0	248.9	611.0	0.91	0.91	0.91	50.07
5/15/2015	5:59:00 PM	596.3	588.5	593.2	9.7	9.9	9.7	576	580	574	25.1	24.3	24.9	559.6	3,102.4	249.5	612.7	0.91	0.91	0.91	50.10
5/15/2015	6:00:00 PM	596.4	588.7	593.3	9.8	10.0	9.8	575	579	573	25.0	24.3	24.9	558.6	3,111.7	249.6	611.8	0.91	0.91	0.91	50.10

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	6:01:00 PM	599.8	592.1	596.8	9.7	9.9	9.8	574	579	573	25.2	24.5	25.0	561.8	3,121.0	250.5	615.1	0.91	0.91	0.91	50.10
5/15/2015	6:02:00 PM	600.1	592.6	597.2	9.8	10.0	10.0	573	578	572	25.2	24.5	25.1	561.4	3,130.4	250.7	614.8	0.91	0.91	0.91	50.08
5/15/2015	6:03:00 PM	601.2	593.7	598.3	9.7	9.8	9.9	574	579	573	25.3	24.5	25.1	563.0	3,139.8	251.2	616.6	0.91	0.91	0.91	50.08
5/15/2015	6:04:00 PM	600.6	593.3	597.8	9.6	9.8	9.7	573	578	572	25.4	24.5	25.2	561.8	3,149.1	251.3	615.5	0.91	0.91	0.91	50.08
5/15/2015	6:05:00 PM	600.2	592.8	595.7	9.4	9.5	9.5	571	578	571	25.5	24.7	25.4	560.1	3,158.5	250.4	613.5	0.91	0.91	0.91	50.09
5/15/2015	6:06:00 PM	600.3	593.5	594.9	9.4	9.5	9.6	568	577	571	25.4	24.8	25.4	558.9	3,167.8	250.6	612.5	0.91	0.91	0.91	50.11
5/15/2015	6:07:00 PM	611.8	606.3	606.5	4.8	4.9	5.0	176	179	184	10.6	13.8	59.6	171.5	3,170.7	77.6	192.3	0.28	0.29	0.31	50.12
5/15/2015	6:08:00 PM	618.2	613.4	613.0	2.7	2.7	2.8	-	-	10	-	-	54.5	0.1	3,170.7	-3.5	3.5	-	-	0.04	50.15
5/15/2015	6:09:00 PM	619.0	614.3	613.9	2.7	2.7	2.8	-	-	10	-	-	47.2	0.1	3,170.7	-3.5	3.5	-	-	0.04	50.16
5/15/2015	6:10:00 PM	614.9	609.9	610.2	3.9	4.0	4.2	108	112	116	20.6	20.5	53.1	108.7	3,172.5	49.1	121.4	0.46	0.48	0.49	50.14
5/15/2015	6:11:00 PM	604.3	598.4	598.9	8.7	8.8	9.1	556	566	562	25.9	25.5	25.9	552.4	3,181.7	246.3	604.8	0.91	0.92	0.91	50.13
5/15/2015	6:12:00 PM	603.7	597.8	598.1	8.8	8.9	9.0	567	577	573	25.7	25.3	25.8	562.8	3,191.1	250.5	616.0	0.91	0.92	0.91	50.09
5/15/2015	6:13:00 PM	601.9	596.4	596.4	8.8	8.9	9.1	567	577	574	25.7	25.2	25.8	561.8	3,200.4	250.0	614.9	0.91	0.92	0.91	50.05
5/15/2015	6:14:00 PM	601.0	595.6	595.5	8.9	9.0	9.2	567	577	574	25.7	25.2	25.7	561.1	3,209.8	249.7	614.2	0.91	0.92	0.91	50.00
5/15/2015	6:15:00 PM	600.5	595.3	595.1	9.0	9.1	9.2	567	577	574	25.8	25.2	25.8	560.0	3,219.1	249.8	613.3	0.91	0.92	0.91	50.00
5/15/2015	6:16:00 PM	610.0	605.5	604.6	4.7	4.8	4.8	156	159	166	10.1	12.6	101.0	152.8	3,221.6	72.4	171.9	0.25	0.26	0.35	49.96
5/15/2015	6:17:00 PM	613.0	608.5	607.5	2.8	2.9	2.9	-	-	10	-	-	137.5	0.3	3,221.7	-2.7	3.7	-	-	0.09	49.97
5/15/2015	6:18:00 PM	610.7	606.0	605.2	3.0	3.0	3.1	-	-	10	-	-	141.7	0.3	3,221.7	-2.8	3.6	-	-	0.07	49.97
5/15/2015	6:19:00 PM	610.7	606.0	605.2	2.8	2.9	3.1	-	-	10	-	-	141.2	0.3	3,221.7	-1.9	3.7	-	-	0.09	49.98
5/15/2015	6:20:00 PM	609.1	604.5	603.7	3.5	3.5	3.7	28	28	38	4.0	3.3	128.2	27.5	3,222.1	14.6	33.4	0.08	0.08	0.20	50.01
5/15/2015	6:21:00 PM	601.0	595.7	595.7	9.3	9.5	9.7	549	558	555	26.4	26.0	26.5	541.0	3,231.1	223.9	585.5	0.92	0.93	0.92	50.04
5/15/2015	6:22:00 PM	602.0	596.8	596.7	9.3	9.5	9.7	549	558	555	26.4	25.9	26.5	541.8	3,240.2	223.8	586.2	0.92	0.93	0.92	50.07
5/15/2015	6:23:00 PM	599.7	594.6	594.6	9.7	10.0	10.1	552	562	559	25.9	25.3	26.0	543.3	3,249.2	224.8	588.0	0.92	0.93	0.92	50.07
5/15/2015	6:24:00 PM	599.0	593.9	593.7	9.6	10.0	10.1	557	567	564	25.9	25.2	25.9	547.7	3,258.4	228.6	593.5	0.92	0.93	0.92	50.06
5/15/2015	6:25:00 PM	597.0	591.9	591.7	9.7	10.0	10.1	548	558	556	25.9	25.1	26.0	537.6	3,267.3	227.1	583.6	0.92	0.92	0.92	50.05
5/15/2015	6:26:00 PM	600.7	595.9	595.7	8.9	9.1	9.2	475	484	482	27.1	26.3	27.2	468.6	3,275.1	200.7	509.8	0.92	0.92	0.92	50.03
5/15/2015	6:27:00 PM	603.5	598.5	598.5	8.2	8.2	8.5	439	448	446	27.9	27.2	28.1	434.8	3,282.4	187.4	473.5	0.91	0.92	0.92	50.03
5/15/2015	6:28:00 PM	604.8	599.9	599.8	8.0	8.0	8.3	442	451	449	28.1	27.3	28.3	438.9	3,289.7	189.2	478.0	0.91	0.92	0.92	50.03
5/15/2015	6:29:00 PM	603.7	598.9	598.7	8.3	8.4	8.7	448	457	455	27.9	27.1	28.0	444.2	3,297.1	191.5	483.7	0.91	0.92	0.92	50.00
5/15/2015	6:30:00 PM	604.6	599.6	599.4	8.6	8.7	8.9	470	478	476	27.6	26.8	27.7	465.9	3,304.9	200.4	507.2	0.91	0.92	0.92	49.97

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	6:31:00 PM	603.5	598.4	598.3	9.3	9.6	9.7	556	566	563	26.6	25.9	26.7	550.9	3,314.0	233.8	598.5	0.92	0.92	0.92	49.98
5/15/2015	6:32:00 PM	602.6	597.5	597.3	9.3	9.6	9.7	556	566	563	26.3	25.6	26.6	550.3	3,323.2	232.9	597.5	0.92	0.92	0.92	49.98
5/15/2015	6:33:00 PM	602.0	596.8	596.8	9.4	9.7	9.8	558	567	564	26.5	25.8	26.6	550.7	3,332.4	234.6	598.6	0.92	0.92	0.92	49.99
5/15/2015	6:34:00 PM	599.9	594.6	594.6	9.3	9.5	9.7	559	568	565	26.5	26.0	26.6	550.0	3,341.6	234.9	598.1	0.92	0.92	0.92	50.02
5/15/2015	6:35:00 PM	599.2	593.8	593.5	9.3	9.5	9.7	560	569	567	26.5	26.0	26.6	550.4	3,350.7	235.6	598.8	0.92	0.92	0.92	50.02
5/15/2015	6:36:00 PM	597.6	592.1	591.8	9.3	9.4	9.8	561	570	567	26.6	26.2	26.7	549.4	3,359.9	235.8	597.9	0.92	0.92	0.92	50.03
5/15/2015	6:37:00 PM	598.0	592.4	592.2	9.4	9.4	9.8	561	569	566	26.5	26.0	26.7	549.0	3,369.0	235.8	597.5	0.92	0.92	0.92	50.03
5/15/2015	6:38:00 PM	599.6	594.2	593.9	9.3	9.4	9.8	560	568	565	26.8	26.3	26.9	549.7	3,378.2	236.9	598.6	0.91	0.92	0.92	50.01
5/15/2015	6:39:00 PM	600.2	594.8	594.6	9.0	9.2	9.5	560	568	565	26.8	26.4	27.0	550.4	3,387.4	237.8	599.6	0.91	0.92	0.92	50.01
5/15/2015	6:40:00 PM	599.7	594.4	594.2	9.0	9.1	9.4	561	570	567	26.7	26.2	26.9	551.7	3,396.6	238.7	601.1	0.91	0.92	0.92	50.00
5/15/2015	6:41:00 PM	600.3	595.1	594.8	9.1	9.1	9.5	561	570	567	26.5	26.1	26.8	552.3	3,405.8	239.0	601.8	0.91	0.92	0.92	49.98
5/15/2015	6:42:00 PM	601.2	596.0	595.8	9.0	9.1	9.3	561	570	567	26.5	26.1	26.8	553.0	3,415.0	239.8	602.7	0.91	0.92	0.92	50.00
5/15/2015	6:43:00 PM	600.4	595.0	594.7	9.3	9.4	9.7	562	571	569	25.9	25.6	26.3	553.9	3,424.2	240.8	604.0	0.91	0.92	0.92	50.01
5/15/2015	6:44:00 PM	599.5	593.9	593.7	9.6	9.7	9.9	564	574	571	25.5	25.3	26.0	555.4	3,433.5	242.1	605.9	0.91	0.92	0.92	49.97
5/15/2015	6:45:00 PM	600.3	594.9	594.6	9.6	9.7	10.0	564	573	571	25.5	25.3	25.9	555.9	3,442.7	242.4	606.5	0.91	0.92	0.92	50.01
5/15/2015	6:46:00 PM	601.3	596.0	595.5	9.7	9.8	10.1	563	573	571	25.4	25.1	25.8	556.3	3,452.0	242.6	606.9	0.91	0.92	0.92	50.08
5/15/2015	6:47:00 PM	601.4	595.8	595.3	9.8	9.8	10.1	563	573	571	25.4	25.1	25.8	556.5	3,461.3	243.3	607.4	0.91	0.92	0.92	50.08
5/15/2015	6:48:00 PM	600.5	594.8	594.0	9.9	10.0	10.2	563	574	572	25.2	24.8	25.5	556.2	3,470.6	242.7	606.8	0.91	0.92	0.92	50.09
5/15/2015	6:49:00 PM	601.4	595.7	595.1	9.7	9.8	10.0	564	574	571	25.5	25.1	25.8	556.9	3,479.8	244.0	608.0	0.91	0.92	0.92	50.11
5/15/2015	6:50:00 PM	603.0	597.4	596.8	9.5	9.6	9.9	563	573	571	25.7	25.3	26.0	557.9	3,489.1	244.9	609.4	0.91	0.92	0.92	50.12
5/15/2015	6:51:00 PM	603.1	597.6	597.2	9.4	9.6	9.7	564	574	571	25.9	25.4	26.1	558.4	3,498.4	245.6	610.1	0.91	0.92	0.92	50.12
5/15/2015	6:52:00 PM	603.8	598.1	597.8	9.4	9.5	9.6	563	573	570	25.9	25.2	26.1	558.7	3,507.8	245.3	610.3	0.91	0.92	0.92	50.11
5/15/2015	6:53:00 PM	603.8	598.3	597.8	9.4	9.5	9.7	563	573	570	25.8	25.3	26.1	558.8	3,517.1	245.3	610.3	0.91	0.92	0.92	50.07
5/15/2015	6:54:00 PM	603.7	598.6	597.9	9.3	9.5	9.6	563	573	570	25.8	25.1	26.0	558.7	3,526.4	244.3	609.8	0.91	0.92	0.92	50.03
5/15/2015	6:55:00 PM	603.0	597.9	597.3	9.2	9.4	9.5	564	574	571	26.0	25.4	26.3	558.9	3,535.7	245.2	610.4	0.91	0.92	0.92	49.98
5/15/2015	6:56:00 PM	602.4	597.5	596.4	9.3	9.4	9.6	564	574	572	25.8	25.4	26.1	559.1	3,545.0	245.2	610.5	0.91	0.92	0.92	49.99
5/15/2015	6:57:00 PM	601.4	596.6	595.5	9.5	9.6	9.8	565	575	573	25.7	25.3	26.0	558.9	3,554.3	245.3	610.4	0.91	0.92	0.92	50.01
5/15/2015	6:58:00 PM	597.6	592.7	591.6	9.6	9.7	9.8	567	578	576	25.2	24.9	25.5	558.2	3,563.6	244.6	609.4	0.91	0.92	0.92	49.96
5/15/2015	6:59:00 PM	598.5	593.5	592.3	9.7	9.8	9.9	567	578	575	25.2	24.8	25.4	558.6	3,572.9	244.8	609.9	0.91	0.92	0.92	49.97
5/15/2015	7:00:00 PM	598.9	593.9	592.6	9.7	9.8	10.1	567	577	575	25.1	24.7	25.4	558.8	3,582.3	244.6	610.0	0.91	0.92	0.92	49.97

Date	Time	Voltage (Line)			%VTHD			Current (Line)			% ATHD			kW	kWh	kVAr	kVA	PF Line1			Hz
		L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	Sum		Sum	Sum	L1	L2	L3	
5/15/2015	7:01:00 PM	597.1	592.3	591.0	9.8	9.9	10.3	567	578	575	25.2	24.7	25.3	557.4	3,591.5	244.4	608.7	0.91	0.92	0.92	49.97
5/15/2015	7:02:00 PM	595.3	590.5	589.1	9.6	9.7	9.9	568	578	576	25.2	24.7	25.4	556.1	3,600.8	244.5	607.5	0.91	0.92	0.92	49.96
5/15/2015	7:03:00 PM	594.7	589.8	588.5	9.8	10.0	10.2	568	578	577	25.1	24.5	25.2	555.7	3,610.1	244.8	607.2	0.91	0.92	0.92	49.99
5/15/2015	7:04:00 PM	595.5	590.5	589.2	9.8	10.0	10.1	567	577	576	25.1	24.5	25.2	555.8	3,619.3	245.0	607.4	0.91	0.92	0.92	50.06
5/15/2015	7:05:00 PM	594.3	589.2	587.9	9.8	10.0	10.1	568	578	577	25.0	24.4	25.1	555.4	3,628.6	244.7	607.0	0.91	0.92	0.92	50.11
5/15/2015	7:06:00 PM	594.6	589.6	588.1	9.9	10.0	10.2	568	577	576	24.8	24.2	25.0	555.4	3,637.8	244.0	606.6	0.91	0.92	0.92	50.13
5/15/2015	7:07:00 PM	596.6	591.6	590.1	9.7	9.8	9.9	568	578	576	25.0	24.4	25.2	557.5	3,647.1	244.9	608.9	0.91	0.92	0.92	50.12
5/15/2015	7:08:00 PM	598.5	593.6	591.9	9.7	9.9	10.1	567	578	576	25.1	24.4	25.1	559.1	3,656.5	245.3	610.5	0.91	0.92	0.92	50.11
5/15/2015	7:09:00 PM	599.0	594.1	592.4	9.7	9.8	10.1	568	578	577	25.3	24.5	25.4	559.9	3,665.8	246.2	611.7	0.91	0.92	0.92	50.11
5/15/2015	7:10:00 PM	597.6	592.9	591.1	9.8	10.0	10.1	567	577	576	24.9	24.3	25.1	557.8	3,675.1	245.2	609.4	0.91	0.92	0.92	50.10
5/15/2015	7:11:00 PM	597.1	592.5	590.6	9.9	10.0	10.2	567	577	576	24.9	24.2	24.9	557.5	3,684.4	245.1	609.1	0.91	0.92	0.92	50.08
5/15/2015	7:12:00 PM	595.2	590.4	588.7	9.8	9.9	10.2	567	577	576	24.8	24.3	24.8	555.6	3,693.6	244.7	607.1	0.91	0.92	0.92	50.06
5/15/2015	7:13:00 PM	592.1	587.3	585.6	9.9	10.0	10.3	567	578	576	24.6	24.1	24.7	553.0	3,702.9	244.2	604.6	0.91	0.92	0.92	50.04
5/15/2015	7:14:00 PM	592.1	587.3	585.6	10.0	10.1	10.3	567	577	575	24.8	24.2	24.8	552.3	3,712.1	244.4	604.0	0.91	0.92	0.92	50.01
5/15/2015	7:15:00 PM	592.4	587.9	586.1	10.0	10.2	10.4	566	577	575	24.7	24.1	24.8	552.5	3,721.3	244.3	604.1	0.91	0.92	0.92	49.98
5/15/2015	7:16:00 PM	592.9	588.4	586.4	10.1	10.1	10.4	565	576	574	24.8	24.3	25.0	551.7	3,730.5	244.6	603.5	0.91	0.92	0.91	49.98
5/15/2015	7:17:00 PM	592.1	587.6	585.7	9.9	10.0	10.2	565	576	575	24.8	24.3	25.0	551.5	3,739.7	244.6	603.3	0.91	0.92	0.91	49.96
5/15/2015	7:18:00 PM	591.5	586.9	585.1	10.0	10.1	10.3	566	577	575	24.8	24.1	24.8	551.5	3,748.8	244.5	603.3	0.91	0.92	0.91	49.96
5/15/2015	7:19:00 PM	591.7	587.0	585.2	10.0	10.0	10.2	566	577	575	24.8	24.2	24.9	551.5	3,758.0	244.9	603.4	0.91	0.92	0.92	49.98
5/15/2015	7:20:00 PM	590.5	585.8	583.8	10.0	10.1	10.3	567	577	576	24.7	23.9	24.6	551.4	3,767.2	244.4	603.2	0.91	0.92	0.92	50.03
5/15/2015	7:21:00 PM	590.3	585.6	583.5	10.0	10.0	10.3	566	577	575	24.9	24.1	24.9	550.4	3,776.4	244.7	602.4	0.91	0.92	0.91	50.01
5/15/2015	7:22:00 PM	589.7	585.0	583.1	9.9	10.0	10.3	567	577	575	24.8	24.1	24.8	550.2	3,785.6	244.3	602.1	0.91	0.92	0.91	50.03
5/15/2015	7:23:00 PM	587.7	582.7	580.7	10.0	10.1	10.4	566	577	574	24.6	23.9	24.6	547.5	3,794.7	242.9	599.0	0.91	0.92	0.91	50.04
5/15/2015	7:24:00 PM	587.3	582.3	580.4	9.5	9.7	9.8	545	556	553	25.3	24.4	25.3	526.8	3,803.5	234.3	576.6	0.91	0.92	0.91	50.02
5/15/2015	7:25:00 PM	588.1	583.3	581.3	9.4	9.5	9.8	544	555	552	25.5	24.6	25.5	526.4	3,812.3	234.5	576.3	0.91	0.92	0.91	50.01
5/15/2015	7:26:00 PM	586.2	581.5	579.4	9.8	9.9	10.0	553	564	563	25.1	24.3	25.2	534.4	3,821.2	238.1	585.0	0.91	0.92	0.91	50.00
5/15/2015	7:27:00 PM	591.7	587.4	585.0	6.7	6.7	6.9	287	293	297	16.4	16.8	78.5	275.7	3,825.8	127.3	305.3	0.46	0.48	0.53	50.00
5/15/2015	7:28:00 PM	598.7	594.7	591.8	3.2	3.1	3.3	-	-	10	-	-	107.3	0.2	3,825.8	-2.7	3.4	-	-	0.06	49.98
5/15/2015	7:29:00 PM	50.2	49.7	49.7	0.2	0.2	0.2	-	-	9	-	-	6.7	0.0	3,825.8	-0.3	0.3	-	-	0.00	4.99

Annexure: 5.3 Details of pumps proposed

Description	Coil cooling pump	Raw water pump
Product name:	NB 32-160.1/177 A-F-A-BAQE	NB 32-125/142 A-F-A-BAQE
Technical:		
Speed for pump data:	2880 rpm	2880 rpm
Actual calculated flow:	21 m /h	27 m /h
Resulting head of the pump:	46 m	23 m
Actual impeller diameter:	177 mm	142 mm
Impeller nom:	160.1 mm	125 mm
Impeller max:	177 mm	142 mm
Shaft seal:	BAQE	BAQE
Secondary shaft seal:	NONE	NONE
Shaft diameter:	24 mm	24 mm
Curve tolerance:	ISO9906:2012 3B	ISO9906:2012 3B
Pump version:	A	A
Materials:		
Pump housing:	Cast iron	Cast iron
	EN-GJL-250	EN-GJL-250
	ASTM A48-40 B	ASTM A48-40 B
Impeller:	Cast iron	Cast iron
	EN-GJL-200	EN-GJL-200
	ASTM A48-30 B	ASTM A48-30 B
Material code:	A	A
Installation:		
Maximum ambient temperature:	55 C	55 C
Maximum operating pressure:	16 bar	16 bar
Flange standard:	EN 1092-2	EN 1092-2
Connect code:	F	F
Pump inlet:	DN 50	DN 50

Description	Coil cooling pump	Raw water pump
Pump outlet:	DN 32	DN 32
Pressure stage:	PN 16	PN 16
Wear ring(s):	neckring(s)	neckring(s)
Liquid:		
Liquid temperature range:	0 - 120 C	0 - 120 C
Liquid temp:	20 C	20 C
Density:	998.2 kg/m	998.2 kg/m
Kinematic viscosity:	1 mm2/s	1 mm2/s
Electrical data:		
Motor type:	SIEMENS	SIEMENS
IE Efficiency class:	NEMA Energy / IE2 50Hz / NRC	NEMA Premium / IE3 50Hz
Number of poles:	2	2
Rated power - P2:	7.5 kW [8.6 kW]	4 kW [4.6 kW]
Mains frequency:	50 Hz	50 Hz
Rated voltage:	3 x 380-420D/660-725Y V [3 x 440-480D/0-0Y V]	3 x 380-420D/660-725Y V [3 x 440-480D/0-0Y V]
Rated current:	14,0-12,6/8,00-7,30 A [13,8-12,4/- A]	7,60-6,90/4,40-4,00 A [7,60-6,90/- A]
Starting current:	720-720 % [840-840 %]	710-710 % [820-820 %]
Cos phi - power factor:	0,92	0,91
Rated speed:	3540 rpm [3550 rpm]	3550 rpm [3555 rpm]
Efficiency:	IE2 89,5% [IE2 90,2%]	IE3 88,5%
Motor efficiency at full load:	89,5-89,5 % [90,2-90,2 %]	88,5-88,5 %
Motor efficiency at 3/4 load:	90,7-90,7 % [91,2-91,2 %]	89,4-89,4 % [89,2-89,2 %]
Motor efficiency at 1/2 load:	91,2-91,2 % [91,5-91,5 %]	89,4-89,4 % [88,8-88,8 %]
Enclosure class (IEC 34-5)::	55 (Protect. water jets/dust)	55 (Protect. water jets/dust)
Insulation class (IEC 85):	F	F
Motor protec:	PTC	PTC
Motor No:	83U15222	83U15213
Lubricant type:	Grease	Grease