Name Of Customer		**INDIAN OIL CORPORATION LTD.**	
Address		**Gujarat Refinery , Baroda**	
M/C Model No		**WCFX33CL2R1R**	
M/C Sr.No		**2A02100096**	
Capacity		**190 TR**	
Power		**400 V, 3-PH, 50 HZ**	
HARTFORD MEDIUM SCREW CHILLER			
COMPRESSOR MODEL	**RLA**	**LRA**	**FACTORY CHARGED**
1215BHL6V5KOEMBJOC.TI	111 A	885 A	142 KG
1218BHL6V5KOEMBJOC.TI	143 A	1030 A	171 KG
CONTROL VOLTS		115/1/50	
REFRIGERANT		R-134A	
FULL LOAD AMPS		253 A	

VOLTAS LIMITED

A TATA Enterprise

COMPARISON OF 10/4/2012 IS TAKEN WITH 24/04/2012 Mainly considering the similar condensing water inlet temperature.

However a comparison is also made between 10th April and 14th May based on energy efficiency norms and the same is shown below after the readings.

OPERATIONAL READINGS	PRE Data DATE : 10.04.12				POST Data DATE : 24.04.12				POST Data DATE : 14.05.12			
TIME	11:00	1:00	3:00	5:00	11:00	1:00	3:00	5:00	11:00	1:00	3:00	5:00
Chiller Leaving Water Temp F	47.3	47.1	47.3	47.1	49.4	48.9	48	47.6	47.1	46.8	47.1	47.3
Chiller Entering Chiller Water Temp F	52.3	51.4	51.3	51.6	54.8	54.3	53.4	53	52.3	52.3	52.5	52.3
Chiller Temp Diff	5	4.3	4.5	4.5	5.4	5.4	5.4	5.4	5.2	5.5	5.4	5
Suction Press PSI	35	35	30	35	35	35	35	35	40	40	40	40
Disch Press PSI	135	135	135	135	135	135	135	125	150	158	139	149
Total Compr Amps (1+2)	257.4	244.5	230.1	236.4	236	219	242	221	257	267	242	242
Compr FLCP% 1	91	90	92.9	87.9	94.7	83.6	85.8	81.4	91.9	99	92.9	90.9
Compr FLCP% 2	92	95	85.8	88.9	95.6	100	80.3	85.8	98.2	100	91.9	92.9
Chiller Inlet wtr Press Kg/cm2												
Chiller Outlet Wtr Press Kg/cm2												
Chiller Press Drop Kg/cm2												
Condenser Leaving Water Temp F	91.2	90.2	88.5	87.9	90.8	89	88.3	85.1	94.8	95.7	91.9	92.8
Condenser Entering Water Temp F	84.2	83.4	82.2	82.3	85.8	84.7	83.8	80.5	89	89.9	86.7	88.1
Cooling water temp diff	7	6.8	6.3	5.6	5	4.3	4.5	4.6	5.8	5.8	5.2	4.7
Condenser Inlet Wtr Press Kg/cm2												
Condenser Outlet Wtr Press Kg/cm2												
Condenser Press Drop Kg/cm2												
Power Factor	0.656	0.619	0.562	0.591	0.697	0.637	0.703	0.645	0.722	0.738	0.683	0.683
Volts	417	417	417	417	408	409	408	409	412	412	412	413
Suction Temp F	47.1	44.7	46.4	46.6	47.3	47.4	46	46.5	46.8	46.2	46.7	46.8
Disch Temp F	125.2	129.5	129.9	129	121.2	116.2	115.8	112.8	131.7	129.9	120	131.3
Liquid Line Temp F	86.7	93.5	94.6	93.7	92.4	91	95.5	92.3	96.4	96.2	95.7	94.4
Superheat of Chiller F												
Subcooling at Liquid Line F												
Discharge Superheat F												
Cooler Approach F												
Condenser Approach F												
IKW Total	122.2	109.6	93.6	101.1	116.67	99.18	120.8	101.48	132.66	141.03	118.26	118.59
Chiller Flow in GPM	572	572	572	572	572	572	572	572	572	572	572	572
Condenser Flow in GPM	787.6	787.6	787.6	787.6	787.6	787.6	787.6	787.6	787.6	787.6	787.6	787.6
Capacity in TR	119.6	102.5	107.2	107.2	128.7	128.7	128.7	128.7	123.93	131.08	128.7	119.16
IKW/TR	1.02	1.07	0.87	0.94	0.9	0.77	0.94	0.79	1.07	1.07	0.92	0.99
Condenser Heat Rejection (TR)	229.7167	223.1533	206.745	183.7733	164.0833	141.1117	147.675	150.9567	190.3367	190.3367	170.6467	154.2383
Heat balance (%)	-49%	-67%	-54%	-35%	-1%	10%	9%	4%	-18%	-11%	-5%	-1%
SST												
SDT												
Cathall Core Pressure Inlet	35	35	35	35	35	35	35	35	35	35	35	35
Cathall Core Pressure Outlet	35	35	35	35	30	35	35	35	35	35	35	35
Cathall Core Press Diff	0	0	0	0	0	0	0	0	0	0	0	0
Compr 1												
Suct Filter Pressure Inlet	35	30	30	30	35	35	35	35	40	40	35	35
Suct Filter Pressure Outlet	35	30	30	30	30	35	35	35	40	40	35	35
Suct Filter Press Diff	0	0	0	0	5	0	0	0	0	0	78	0
Compr 2												
Suct Filter Pressure Inlet	35	30	30	30	35	35	35	35	40	40	35	35
Suct Filter Pressure Outlet	35	30	30	30	35	35	35	35	40	40	0	35
Suct Filter Press Diff	0	0	0	0	0	0	0	0	0	0	0	0
Compr 1												
Oil Filter Pressure @ load port on LOAD	75	70	70	70	70	90	120	110	95	80	80	120
System Disch Press	135	135	135	135	135	135	135	125	150	158	139	149
Oil Filter Press Diff	60	65	65	65	65	45	15	15	55	78	59	29
Compr 2												
Oil Filter Pressure @ load port on LOAD	75	65	70	70	75	80	75	75	80	80	80	80
System Disch Press	135	135	135	135	135	135	135	125	150	158	139	149
Oil Filter Press Diff	60	70	65	65	60	55	60	50	70	78	59	69
Ambient Temp Degree F DBT	95	100	102	99	94	96	100	98	93	96	100	98
Ambient Temp Degree F WBT	76	77	74	76	78	76	76	71	79	80	77	78
CHILLER PUMP WORKING	1,4	1,4	1,4	1,4	1,3,4	1,3,4	1,3,4	1,3,4	1,3,4	1,3,4	1,3,4	1,3,4
COOLING WTR PUMP WORKING	1,3,4	1,3,4	1,3,4	1,3,4	1,3,4	1,3,4	1,3,4	1,3,4	1,3,4	1,3,4	1,3,4	1,3,4
CT FAN WORKING	1,2,3	1,2,3	1,2,3	1,2,3	1,2,3	1,2,3	1,2,3	1,2,3	1,2,3	1,2,3	1,2,3	1,2,3

Note :

Comparing 10/4/2012 to 24/4/2012

The average kw/ton consumption during pre test data comes to 0.975 and post test it comes to 0.85
The savings on KW/TON comes to almost 12%.

The Cooling Capacity in kw before treatment was
4.57 x 572 x 500 x .000293 = 382.9
COP = 382.9 / 106.2 = 3.60

The Cooling Capacity in kw AFTER treatment was
5.4 x 572 x 500 x .000293 = 452.5
COP = 452.5 / 109.5 = 4.13

	Before	After	Change	
Cooling Capacity in KW	382.9	452.5	18%	increase
COP	3.6	4.13	15%	increase
KW / Ton	0.975	0.85	12%	decrease

Comparing 10/4/2012 to 14/5/2012

The major difference is in **Condensing water inlet temp.**
As per Asia energy efficiency norms every 0.55 deg C increase power consumption by 3%.
In case of 14/5/2012 the temp recorded was 88.4 F = 33.3 Deg C.
verses 83 F = 28.3 Deg C on 10/4/2012 a difference of 5 Deg C (33.3 - 28.3)
This would effectively have an impact of 5 / 0.55 x 3 = 27 %

In order to compare the results we need to add 27% on kwh recorded in pre-test to arrive at kwh consumption at higher water inlet temp. at CONDENSER.
IKW on 10/4/2012 was 106.2 adding 27% on this will make it 134.9 IKW

The Cooling Capacity in kw **BEFORE treatment** was
4.57 x 572 x 500 x .000293 = 382.9
COP = 382.9 / 134.9 = 2.84
kw/ton = 134.9 / 111 = 1.21

The Cooling Capacity in kw **AFTER treatment** was
5.27 x 572 x 500 x .000293 = 441.6
COP = 441.6 / 127.6 = 3.46
kw/ton = 127.6 / 125.7 = 1.01

	Before	After	Change	
Cooling Capacity in KW	382.9	441.6	15%	increase
COP	2.84	3.46	22%	increase
KW/Ton	1.21	1.01	16%	decrease