ITC HOTEL SONAR BANGLA SHERATON & TOWERS

TECHNICAL PRESENTATION

CONTENTS

Hotel Infrastructure

- Plot area : 15.41 Acres OR 62379 Sq. Mts.
- Built up area : 35408 Sq. Mts.
- No of floors :
- EC Block : G + 7
- Tower Block : G + 7
- ITC One : G +1
- Suites : 7
- No. of rooms : 239
- F&B outlets : Peshawri, West View, Panasian, Eden Pavilion, Dumpukht, Dublin
  - Bay of Bengal, Spa Café

Hotel Infrastructure

- Banqueting : Pala,
- Conference : 5 Nos.
- Board Room : 2 Nos.
- Other facilities : Swimming pool , Health Club, Business centre, Jogging Park,

Hotel Infrastructure

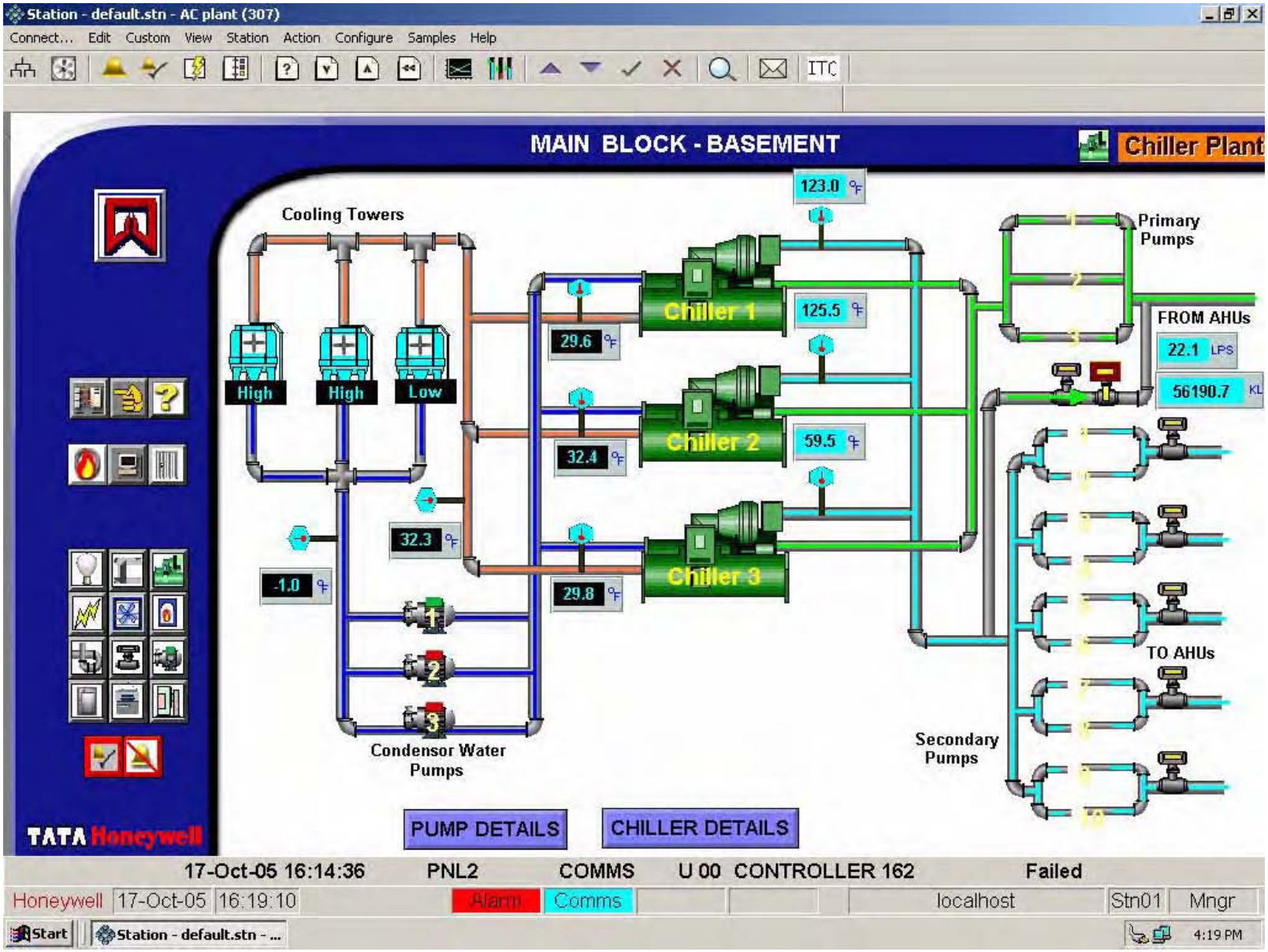
- ITC Sonar Bangla is one of the most by design energy efficient hotels, the system installed is designed keeping in mind the importance of conserving energy, following are the details of technical infrastructure and their design issues :
- The hotel has a well advanced **IBMS system** installed which is commissioned and maintained by TATA Honeywell through which the whole system can be controlled from a single control station as per the fed parameters thereby decreasing the time of operating time as well as reducing losses of wastage.

HVAC SYSTEM

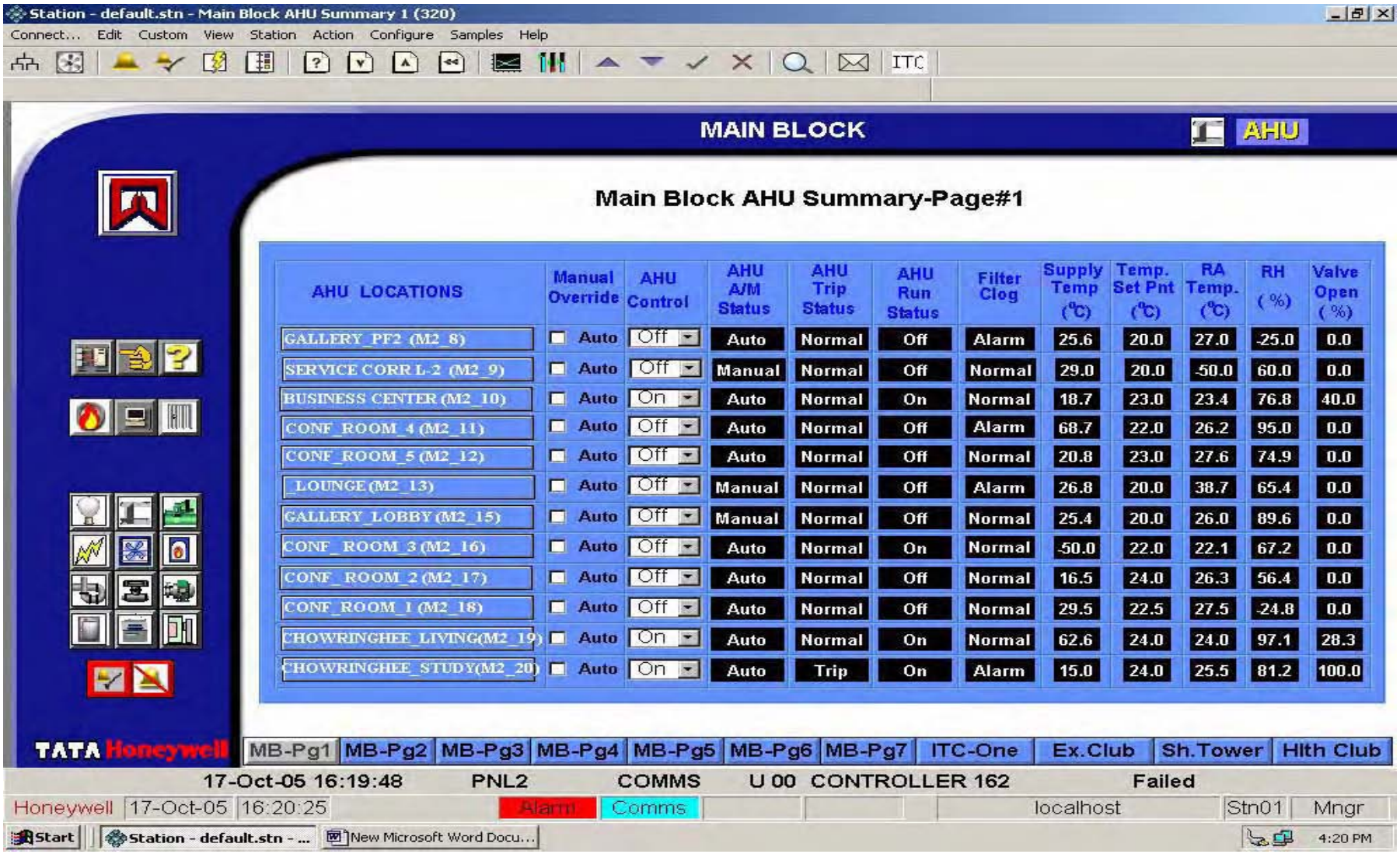
- Central plants for a/c
- 3x400 TR (TRANE Make)
- AHU'S : 65 nos.
- Treated fresh air units:18 nos.
- Window a/c's : 10 NOS.
- Fan coil units : 375 NOS.

- The a/c system used is of centralized type having screw chillers which are low energy consuming and with two way system I.e. primary and secondary pumping system.
- The secondary system is provided with VFD's and pressure transducers at the farthest points thereby operating the pumps at the optimum speed depending upon the a/c load

Below figure shows the chiller system of the hotel that can be monitored as well as controlled by BMS



- **All the AHU'S throughout the hotel are connected through BMS and are fed on a timer basis thereby minimizing the waste.**



- **The rooms are provided with individual thermostats with two settings one maintaining the occupied temperature set by the occupant and the second maintaining the default setting set for a vacant room**

Thermostats displaying the standard occupied temperature of 22 degc

GUEST ROOMS

- The guest rooms in the hotel are also designed for maximum comfort and minimum energy consumption
- The guestrooms are provided with key cards through which the electrical supply is given to the room so that if the room is unoccupied there is no supply hence conserving energy.

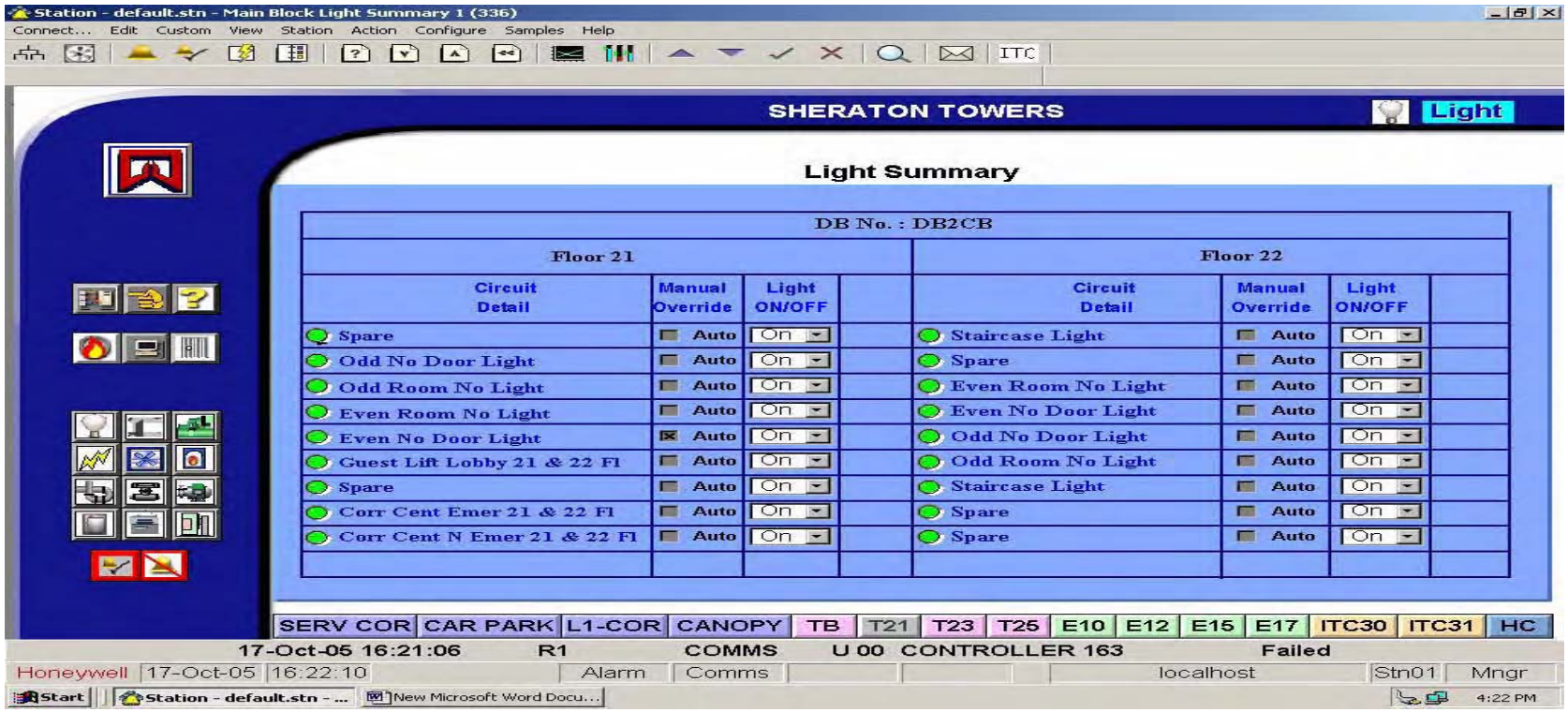
The above figure shows the key card in an activated position

- **E-SOLAR** glasses are used in the windows of the guest rooms which allow only the entrance of ultraviolet free light thereby reducing the usages of light fixtures as well as it acts as an insulator against the entry of heat hence reducing the chiller load.
- The rooms are provided with a dual flushing system of **3 ltrs** and **9 ltrs** discharge depending upon the requirement.
- The guest room taps are provided with energy efficient aerators controlling the flow of water .

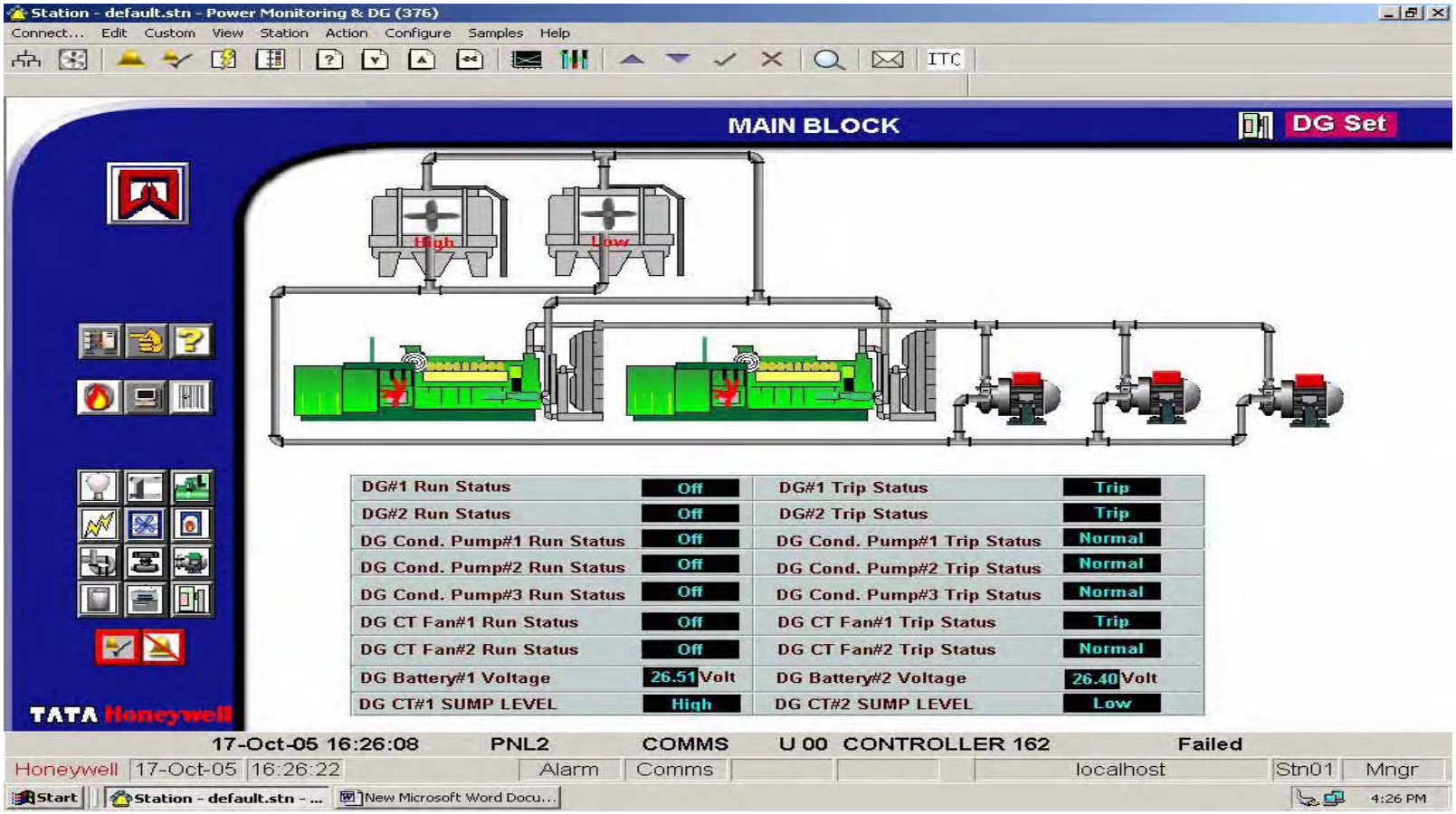
The above figure displays the dual system flushing knobs used in the guest rooms for discharging the required amount of water depending upon the usage.

ELECTRICAL SYSTEM

- Normal supply : 11kv/3 phase /50C/s from CESC
- Transformers : 2x2000 kva
- Connected load : 3058 kw
- Most of the lightings of the hotel are connected through the BMS and are fed on a timer basis thereby minimizing the waste.
- The lightings in the restaurants are supplied with programmable dimmers controlling the light intensity as well as the consumption

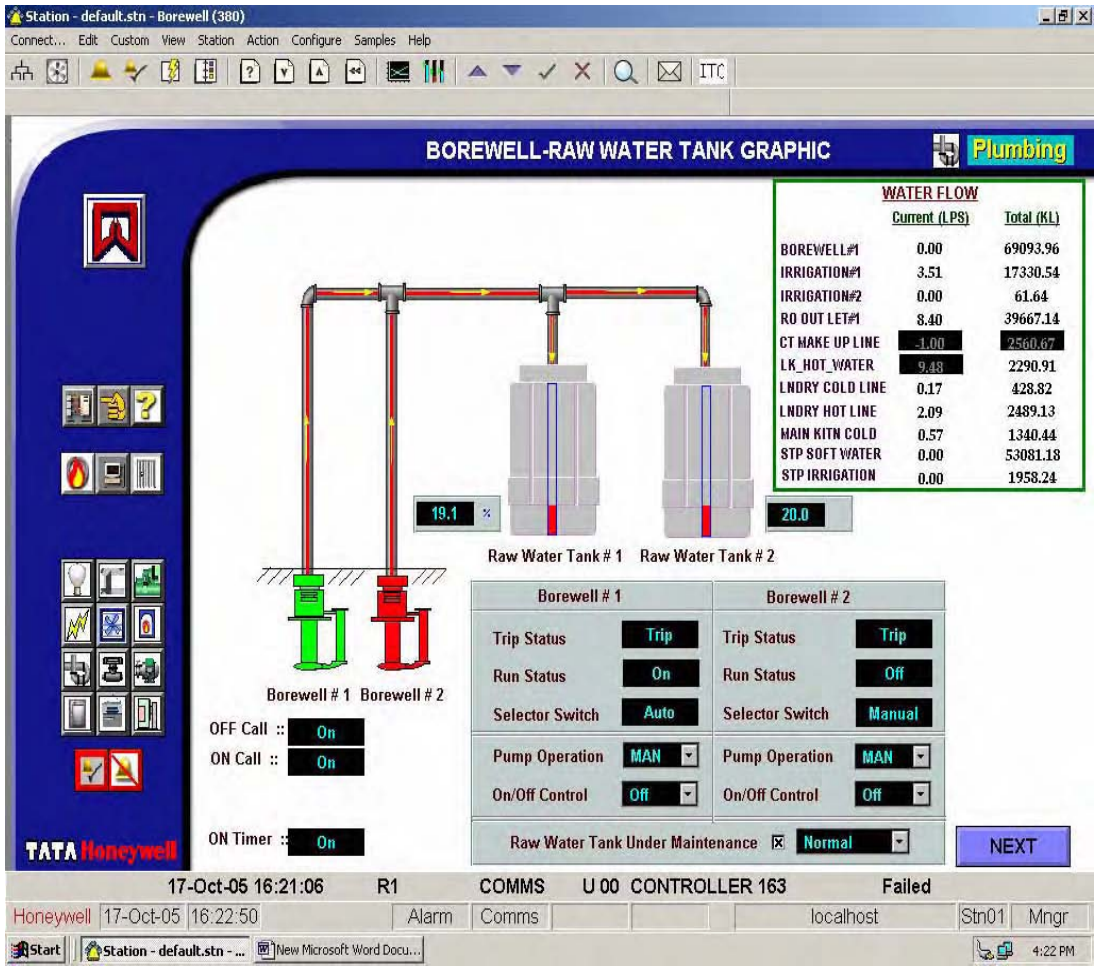


- Emergency DG set : 2x1250 kva of FG WILSON Make
- Total : 2500 kva
- Following dia. Represents the DG system connected through IBMS

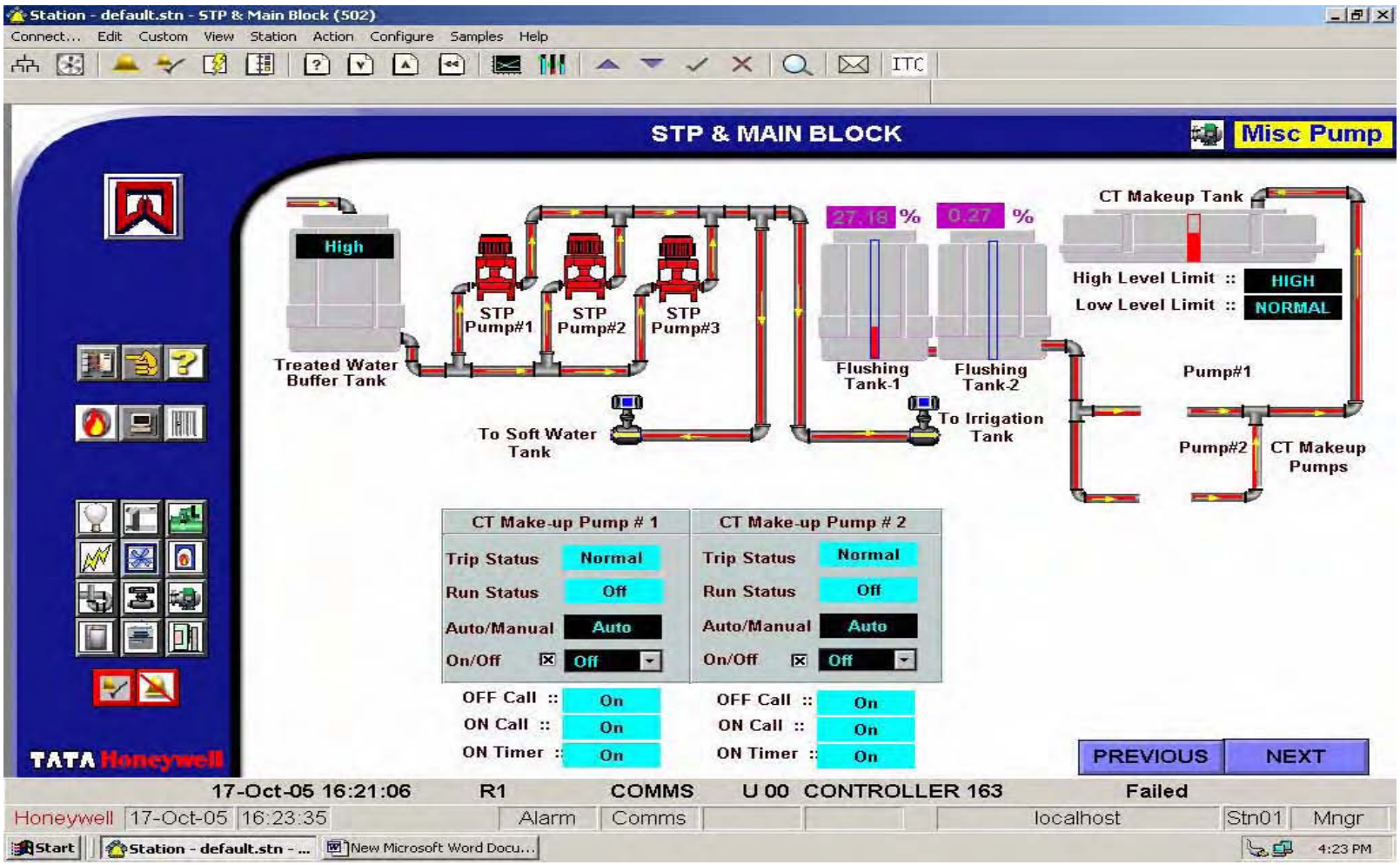


WATER MANAGEMENT SYSTEM

- Water supply : 2 nos. bore wells
- Storage tanks capacity(kl) Total
- Fire water 2x425 850 kl
- Raw water 2x150 300 kl
- Filtered water 3x225 675 kl
- Water treatment plant (R.O) 25m3/hr
- Boilers : 3 x 600 kg/hr
- Hot water generators : 3 x 4 lacs Kcal/hr
- Fire pump – hydrant : 171 m3/hr
- Fire pump – sprinkler : 171 m3/hr
- Sewage treatment plant : 400 kl/day technical



ITC SONAR BANGLA is a **ZERO WATER DISCHARGE** hotel i.e. whatever water is utilized throughout the hotel is taken back in a tank, treated through a filtration unit and again reused for flushing, cooling towers and gardening purpose thereby conserving a large amount of energy.



- Water in the hotel is received through bore wells whose on/off control can be done through the control room as well they are operated through a float valve placed in the receiver raw water tanks as well as the level in the raw water tanks can be monitored from the BMS control room.

- The water from the raw water tanks is supplied to the various areas of the hotel through hydro pneumatic tank system maintaining a constant pressure
- The pumping of potable water is also done through variable frequency drives .
- Hot water in the hotel is presently generated through the condensate steam return which is supplied to the kitchen and the laundry equipments.
- The hot water supply system is of closed loop type which helps in maintaining the temperature of hot water for a longer time.

ELEVATORS

- SONAR BANGLA has in all 14 elevators of Mitsubishi make.
- Out of 14, 6 elevators are in the public areas for the guest and the remaining are in the BOH area for the staff
- The remaining single elevator is used as a car elevator based in the parking.
- The elevators are maintained by installed and maintained by Mitsubishi itself.
- The elevators used are also energy conserving such that if kept idle for 3 min the light goes of in it and returns only when used again.

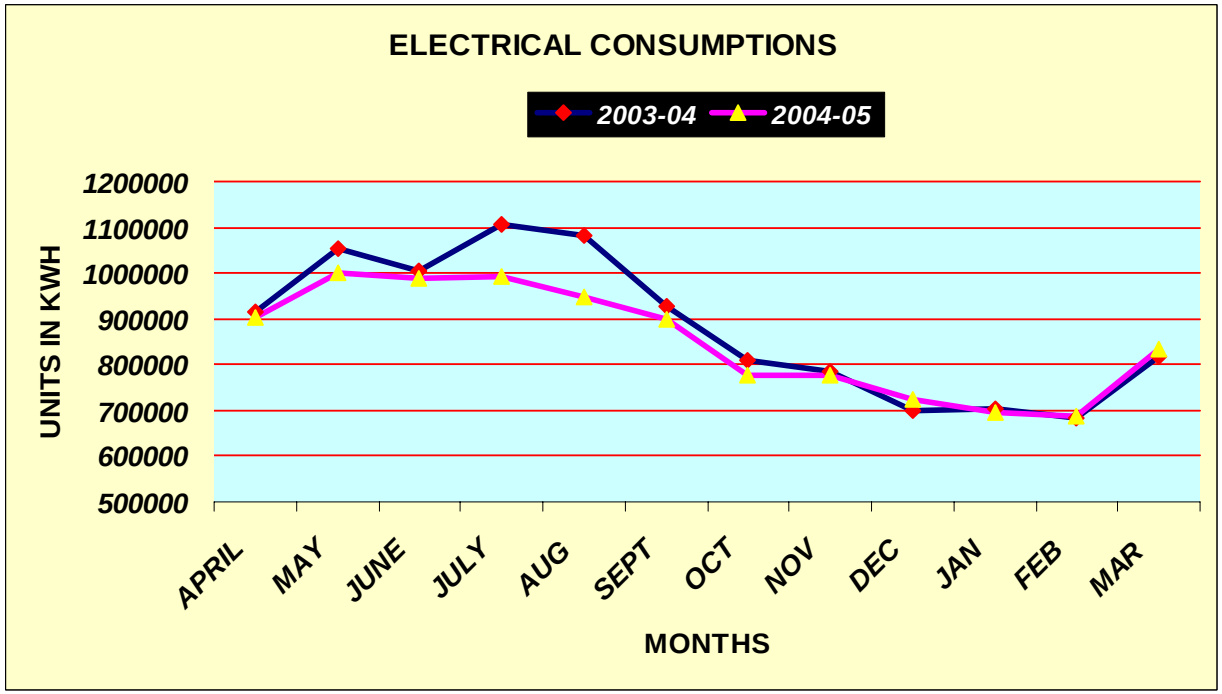
Above shown is the manual rescue call receiving centre of the elevators

HLP CONSUMPTIONS FOR THE FINANCIAL YEARS 03-04 & 04-05.

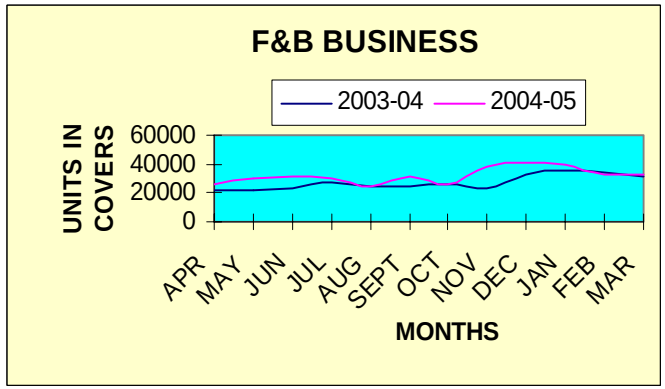
ELECTRICAL CONSUMPTION

- The fig. A shows the comparison of electrical consumptions for the last two FY's
- Where as fig.B,C&D determine the comparison of consumption of F&B, covers, Occupancy and laundry covers respectively for the last two years.

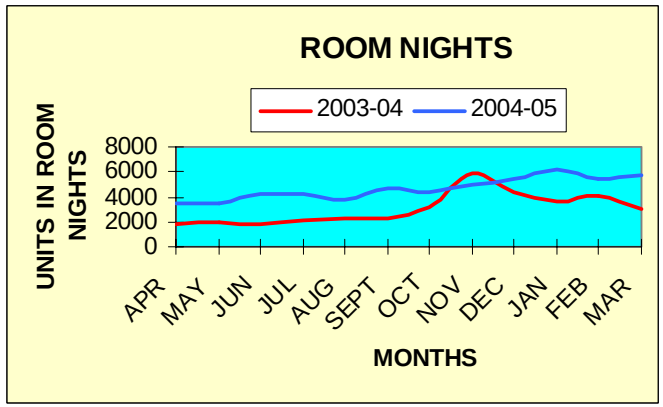
A



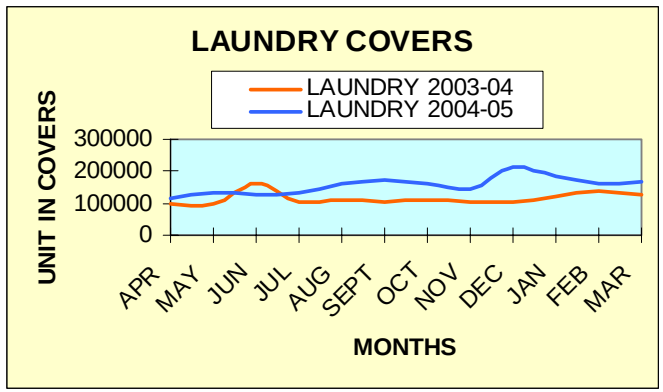
B



C



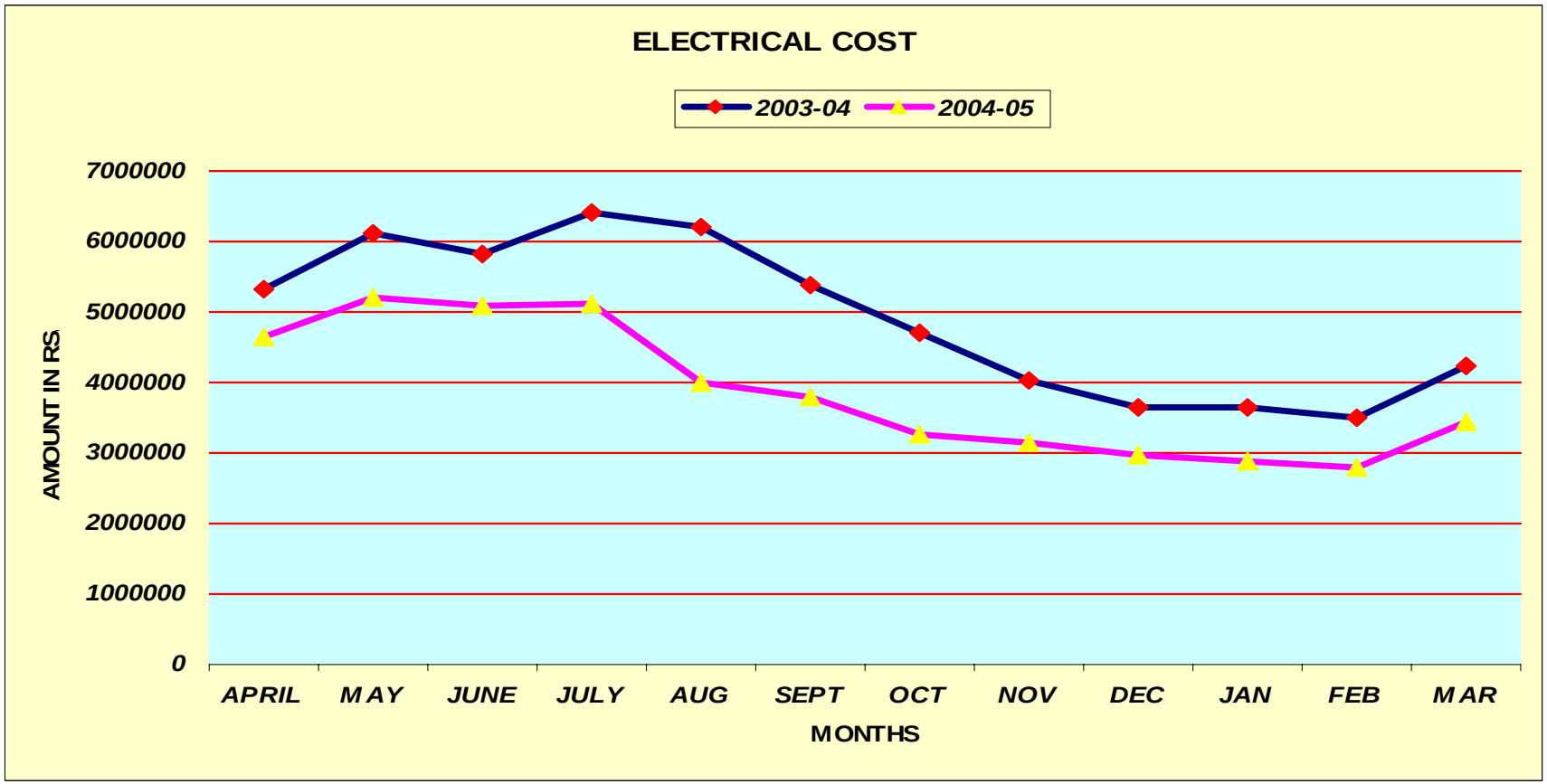
D



- The four graphs signify that in spite of a great hike in business by the hotel affecting in the increase of amount of total electrical load still the decrease in the electrical consumption has been tremendous .

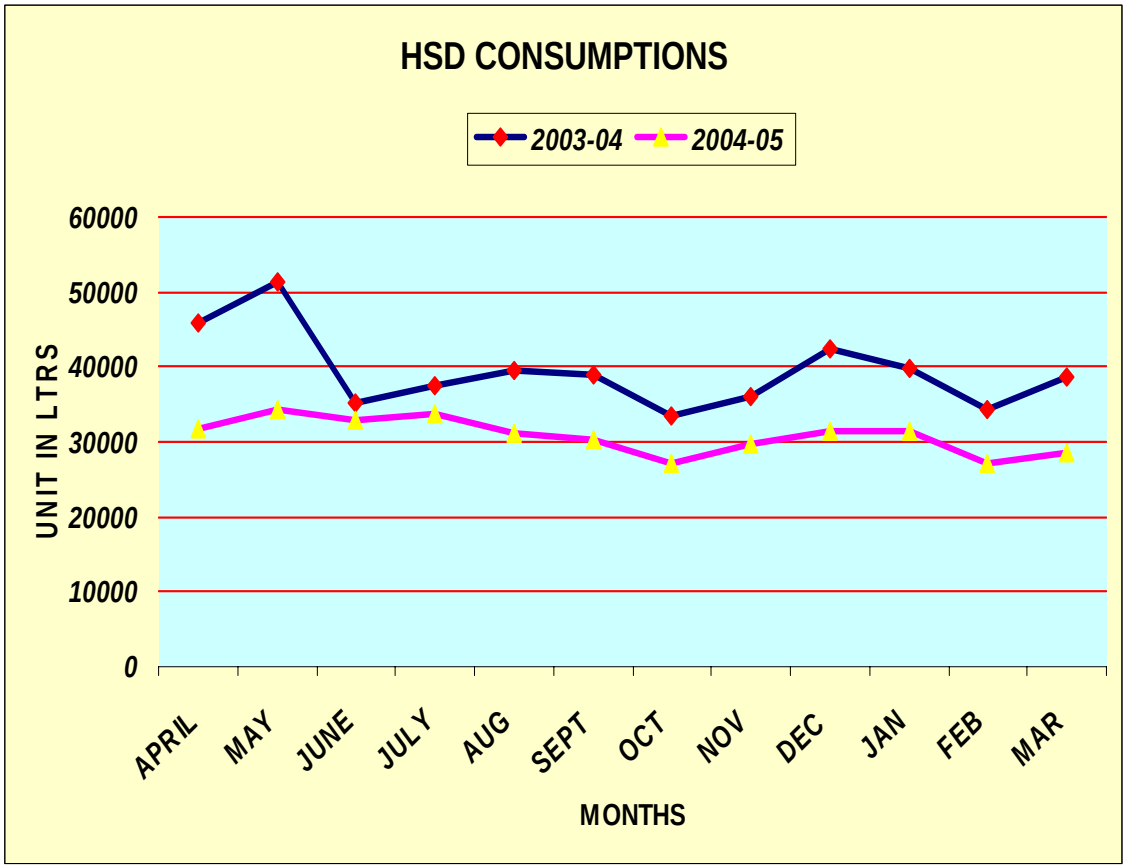
ELECTRICAL COST

•The below graph determines the comparison of total electrical cost incurred during the last two years The graph clearly indicates the efforts put by the energy conservation cell for conserving electricity.

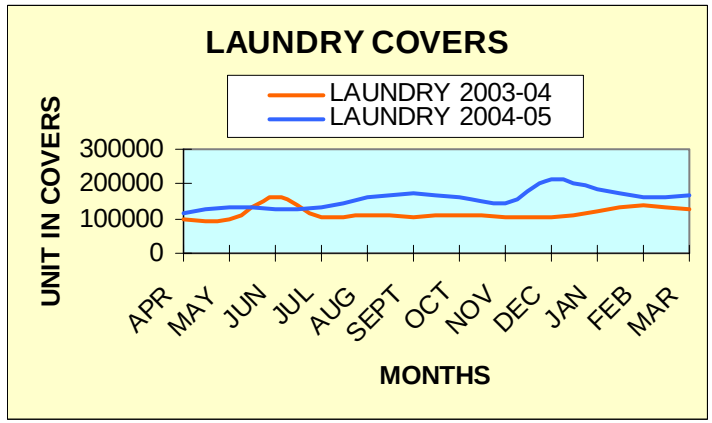


HSD CONSUMPTION

•Graph 1 determines the comparison of HSD consumptions in the last two financial years Graph 2 determines the comparison of laundry covers washed in the last two years clearly indicating the increase in covers in 04-05 affecting the HSD consumption Hence comparing 1 & 2 we get that there was a significant decrease in HSD consumption in spite of increase in load.



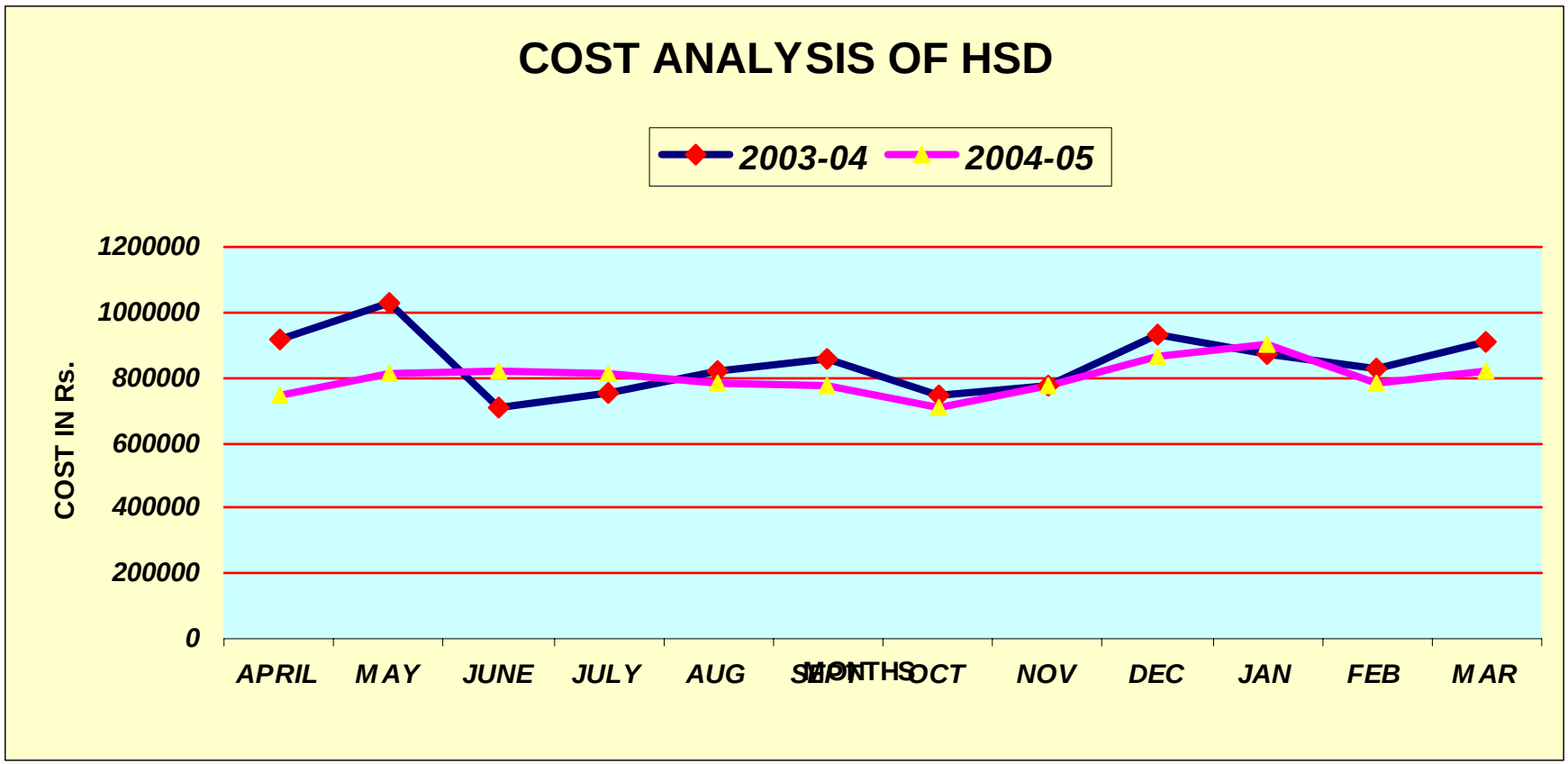
GRAPH 1



GRAPH 2

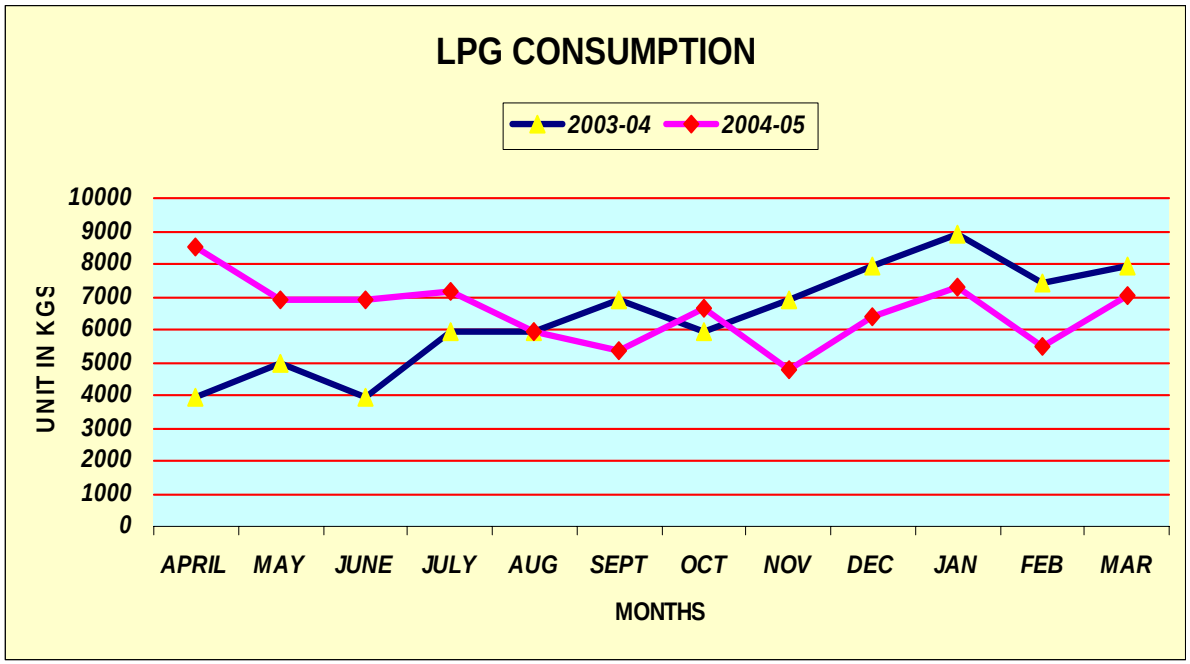
HSD COST

•The below graph signifies the comparison of HSD cost in the last two years
•The graph is not as effective as the HSD consumption graph in terms of savings because of a continuous hike in the diesel prices
•The avg. rate of diesel in the year 03-04 was Rs.21.3/lit where as the avg rate in 04-05 was Rs.25.2/lit. Hence the decrease in consumption was mark able in spite of the difference in the acting load.

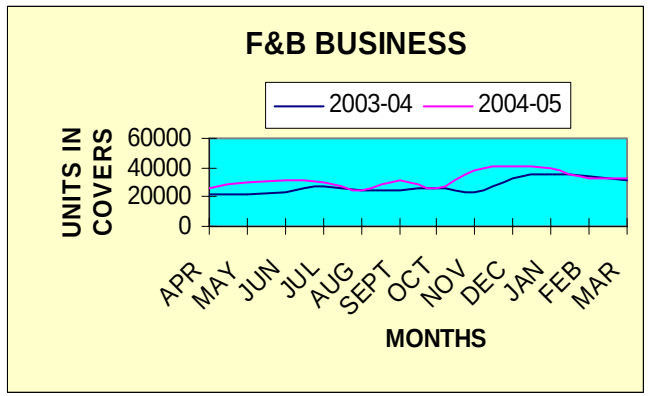


LPG CONSUMPTION

•Graph 1 signifies the comparison of LPG consumption in the last two years
•The consumption is much more in the starting three four months of 04-05 as compared to 03-04 Because of increase in F&B (which is seen from graph 2),increase in banquets (being a marriage season) and because of increase in staff (including contractors) which was not that much in 03-04 being starting of the hotel, hence this justifies the increase in consumption.



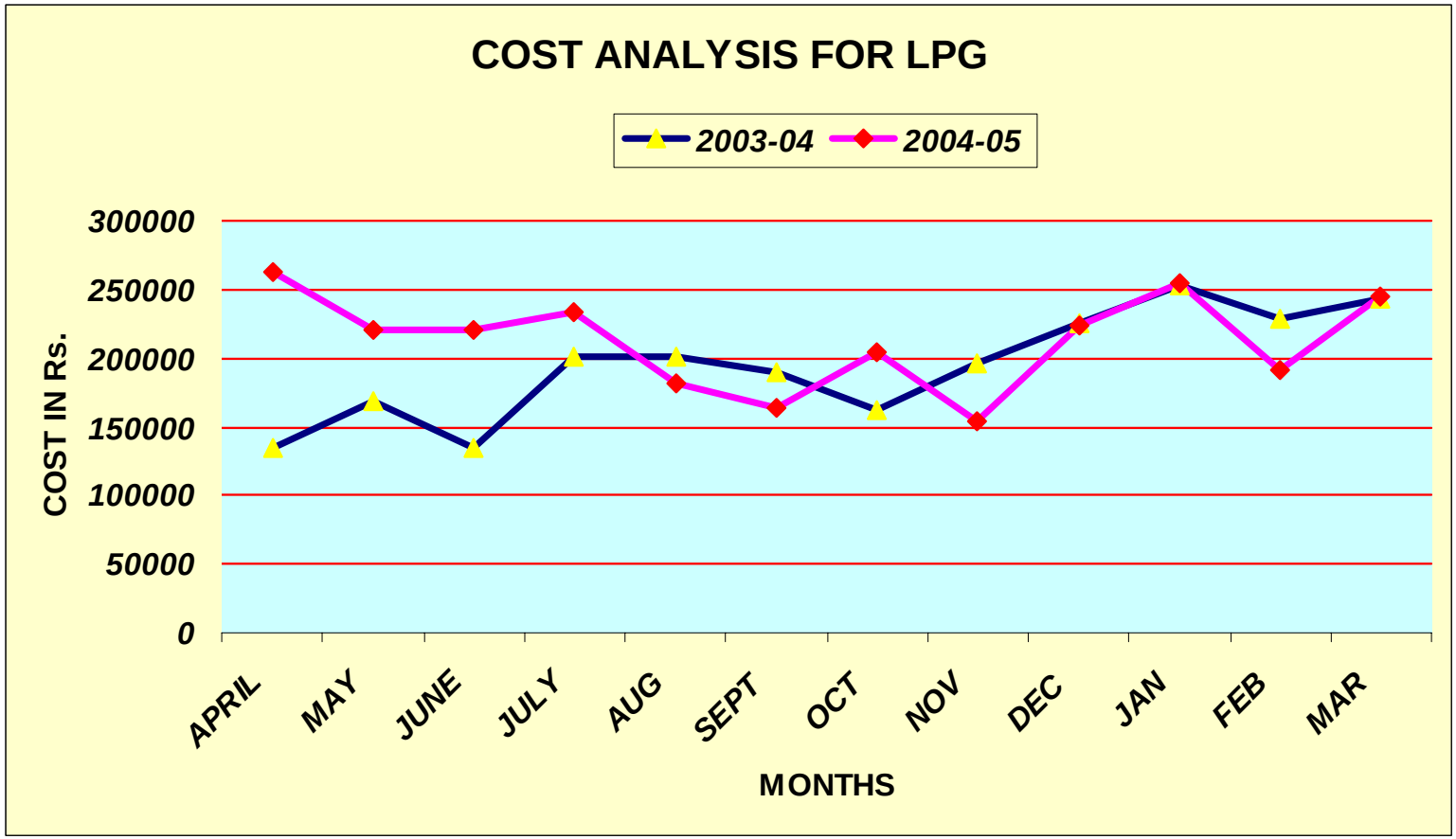
Graph 1



Graph 2

COST COMPARISON FOR LPG

•The below graph shows the comparison of cost spent for LPG ,the graph of 04-05 is much higher as compared to the graph of 03-04 because of hike in price of LPG with the progress of time.
•The average cost for LPG during the year 03-04 was Rs.30.5/kg and for the year 04-05 the average cost/kg was Rs.32.7/- hence justifies the hike.



DETAILS OF ENERGY EFFICIENT PROJECTS

FY 03-04 – INITIATION OF AUDIT

FY 04-05 – IMPLEMENTATION OF PROJECTS

IMPLEMENTATION OF ENERGY CONSERVING PROJECTS AND THEIR RESULTS

- After one year of the official commencement of the hotel the energy conservation cell felt that there is a scope for implementing projects which can conserve energy.
- The in house team decided to do it in co-ordination with an authorized external agency.
- After a detailed study and discussion it was decided that **UV Krishna Rao** team would be given the task of carrying out an energy audit in the hotel.
- The audit started in the month of DEC.2003
- After a detailed study of the whole system of the hotel in coordination with the in house team the external auditing team submitted a list of proposals which had a great potential of conserving energy if implemented.
- The energy conservation cell after getting the necessary approval from the management decided to go ahead with the implementations of the project.
- Following are the details of implementation of projects and their results

INSTALLATON OF VFD FOR MAIN KITCHEN EXHAUST FAN

- 1 No. of 30 kw exhaust fan of fixed speed of 70,000 cmh is installed for proper kitchen ventilation.
- This fan was working continuously for 24 hrs ,365 days at the rated load and was consuming 720 units per day.
- The auditing team found that the actual requirement was only around 35000 cmh considering the operating load of the kitchen.
- To lower the rpm of the fan through VFD to adjust it to the rated load also to fascillate the scope of reducing the fan speed depending on peak and off peak load of the kitchen.
- Savings achieved : 21KW.

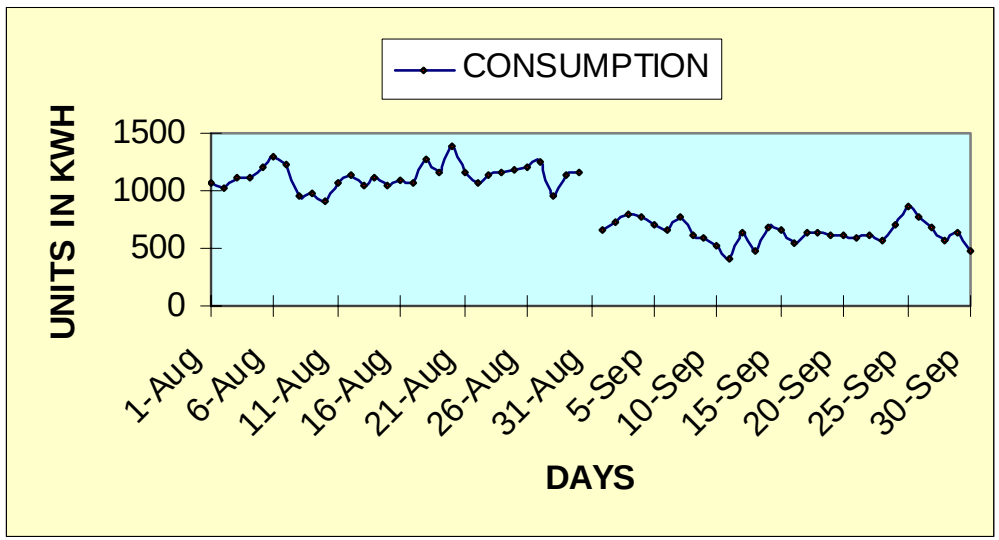
Hours of operation : 24 hrs/day

Energy tariff : Rs.4.55 /kwh

Savings per year : Rs.8.3 lakhs

Cost of implementation : Rs.21000/-

- The below graph signifies the sudden decrease in the consumption of the exhaust fan after the installation of the VFD
- The gap in the graph signifies the date of installation of the VFD.



INSTALLATION OF VFDS IN IN BANQUET KITCHEN EXHAUST & PAN ASIAN AHU

- It was observed that the banquet kitchen exhaust was also running at full load at full speed where as the same was not required, hence to operate it as per the requirement the exhaust was fixed with a VFD and following are the results:
- Savings achieved : 9.54 kw
- Hours of operation : 24 hrs/day.

energy tariff : Rs.4.55/kwh

savings/year : Rs.75000.

date of implementation : 06/09

- It was found that the Pan Asian AHU was running continuously for the whole day at full load where as the peak load was only at the time of lunch and dinner when the occupancy was high hence in order to optimize the loading a VFD was installed for the AHU.
- Savings : 5 kw

Hours of operation : 24 hrs/day

Energy tariff : rs.4.55/kwh

Savings/year : Rs.2 lakh.

Cost of installation ; Rs.75000/-

Date of implementation : 25/02

Installed VFD

Display signifying the modulation of speed of the VFD depending upon the load

REPLACEMENTS OF LAMPS.

- Replacement of halogen bulbs with CFL bulbs in different areas :
- It was found that in many areas halogen bulbs were used which if replaced with CFL lamps would have given the same lux level at a very less wattage consumption & the same were replaced with the mentioned specifications and their results :
- In many areas halogen bulbs of 60 w/80 W were replaced by 11W/CFL.
- Savings : 2 kw

Hours of operation : 22hrs/day

Savings/year : Rs.73073/-

Cost of implementation : Rs.10000/-

- Replacement of indicating lamp with CFL in ITC 1:
- ITC 1 is a block of two floors consisting mainly the special suites of the hotel.
- In al the total no. of rooms in ITC 1 are 30.
- Earlier the indicating lamps of the rooms were having halogens of 50 W although the only purpose of the lights were to illuminate the room nos..
- Hence the same were replaced by 11W CFL lamps.
- Savings : 1,1 KW

Hours of operation : 24 hrs/day

Energy tariff : Rs.4.55/kwh

Savings/year : Rs.43844/-

Cost of implementation : Rs.6000/-

MODIFICATION OF PAU'S IN SHERATON TOWERS & EXECUTIVE CLUB CORRIDORS

- It was observed that six of the fifteen precooled air units were delivering air quantities in excess of design.
- The effect of higher air quality was two fold:
- 1.It was putting additional loads on the chiller package and thus expending more energy and
- 2.Energy was expended directly by means of extra kw at the fan shaft.
- The same was optimized by modifying system i.e. by increasing the dia.of the PAU pulley hence decreasing its speed thereby providing the actual amount of energy which is needed.
- Savings achieved : 33.5 kw

Hours of operation : 24 hrs/day

Energy tariff : RS.4.55 Kwh/year

Savings/year : Rs.1335243/-

Cost of implementation : Rs.10000/-

HOT WATER GENERATION

- Earlier the practice of generating hot water was through the hot water generators.
- Where as the condensate steam which used to return through the steam traps from the kitchen and laundry was simply wasted in the drain.
- This system was modified and a condensate recovery system was installed by placing two plate heat exchangers in the return line thereby generating hot water through the condensate and using this condensate as feed water for the boiler.
- This system has completed eliminated the use of **HOT WATER GENERATORS**.

OPTIMISING AIR ENERGY IN THE LAUNDRY COMPRESSOR

- it was found that the unloading time of the compressor had increased because of various air leaks in the line
- At the same time the pressure maintained was not constant .
- To avoid these problems the system was installed with a receiver, PRV and by arresting various identified leaks resulting in the following :
- Average ideal running hour/day previously : 16.45 hrs
- Average kwh consumption /day previously : 72.38 kwh.
- Average ideal runing hour/day after installing the receiver. : 5.73 hrs.
- Average kwh consumption ?day now : 25.212 kwh
- Savings achieved /day : 47.16 kwh
- Savings achieved /year : Rs.78321/-
- Cost of implementation : Rs.50000/-

The highlighted place determines the place of installation of receiver and PRV in the outlet line of the compressor

MODIFICATION OF STP AREA

- The waste water treatment area is build in an open area of the hotel and had many openings .
- Still there was a provision of fresh air supply through fans which were continuously running resulting in wastage of electrical energy
- This was restricted by stopping the usage of fresh air fans there by maintaining the exhaust requirement by the outside air hence saving the mentioned energy.
- Savings : 2.2 kw

  Hours of operation : 24 hrs/day

  Energy tariff : Rs.4.55/kwh

  Savings/year : Rs.87688/-

A. The main entrance for the STP area showing the open space entry of the plant

B. Inside pic of the plant room clearly indicating the amount of fresh air coming through the entrance

OPTIMISATION OF CONDENSOR WATER FLOW

- It was found that the condensor water flow through the condenser water pumps was much more than the desired capacity
- Because of which the pump was running at full load and was consuming higher amps
- To the correct flow of water Throughout the system the valve in the line was kept throttled earlier.
- This was rectified by trimming the impeller of the condenser water pump thereby reducing its output as well as resulting in lower amps consumption.
- Savings : 13 kw

Hours of operation : 24 hrs/day
Energy tariff : Rs.4.55/kwh
Savings/year : 6.14 lakhs
Cost of implementation : Rs.2500/-

MODIFICATIONS OF OTHER PUMPS

- It was found that many of the pumps in different areas were of higher capacities as compared to what was required hence were drawing more power unnecessarily.
- Hence these pumps were modified by trimming their impellers and following were the savings achieved:

1. **Raw water pump of R.O Plant :**

- Savings : 0.99 kw
- Hours of operation : 17 hrs/day
- Energy tariff : Rs.4.55/kwh
- Savings in kwh/yr : 6175.8 kwh
- Savings/year : Rs.32422/-
- Cost of implementation : Rs.2500/-

2. **R.O high pressure pump of R.O plant :**

- Savings/hr : 0.18 kw
- Hours of operation : 17 hrs/day
- Energy tariff : Rs.4.55/kwh
- Savings in kwh/yr : 1168 kwh
- Savings/year : Rs.5314/-
- Cost of implementation : Rs.2500/-

3. **Main porch reflection circulation pump :**

- Savings/hr : 1.04 kw
- Hours of operation : 17 hrs/day
- Energy tariff : Rs.4.55/kwh
- Savings in kwh/yr :6453.2 kwh
- Savings/year : Rs.29362/-
- Cost of implementation : Rs.2500/-

MAIN PORCH REFLECTION POOL CIRCULATION PUMP (BEFORE MODIFICATION)

VALVE THROTTLED

REMOVED IMPELLER

MAIN PORCH REFLECTION POOL CIRCULATION PUMP (AFTER MODIFICATION)

RAW WATER PUMP NO.2 (BEFORE MODIFICATION)

(F)
ENERGY CONSERVATION

VALVE THROTTLED

RAW WATER PUMP NO.2 (AFTER MODIFICATION)

SPARES REMOVED FROM THE PUMP

PRESSURE AFTER MODIFICATION

VALVE IN FULL OPEN CONDITION

BOILER MODIFICATION

- It was observed that the combustion of fuel in the boiler was improper because of which many hydrocarbons were remaining unburnt and were vanishing in the form of smoke .
- This was rectified by placing a **magnetizer** in the fuel inlet line of the boiler,
- The magnetizer helped in the proper combustion of the fuel thereby reducing smoke and increasing the efficiency of the boiler .

The highlighted area determines the place where magnetizer is fixed at the inlet line of the boiler helping in proper complete and clean combustion