



INDIAN OIL CORPORATION LIMITED MATHURA REFINERY

Company Profile:

a) Indian Oil Corporation Limited:

Indian Oil Corporation Limited (IndianOil) is currently India's largest company by sales with a turnover of Rs. 2,20,779 crores (US \$ 51 billion) and profits of Rs. 7,499 crores (US \$ 1.73 billion) for fiscal 2006.

IndianOil is also the highest ranked Indian company in the prestigious Fortune 'Global 500' listing, having moved up 18 places to the 135th position this year based on fiscal

2006 performance. It is also the 20th largest petroleum company in the world.

IndianOil and its subsidiaries account for 47% petroleum products market share among public sector oil companies, 40.4% national refining capacity and 67% downstream product pipeline capacity. The IndianOil Group of companies owns and operates 10 of India's 19 refineries with a combined refining capacity of 60.20 million tonnes per annum (1.2 million barrels per day).

As the flagship national oil company in the downstream sector, IndianOil, together with its marketing subsidiary, IBP Co. Ltd., reaches precious petroleum products to millions of people everyday through a countrywide network of over 32,500 sales points. They are backed for supplies by 170 bulk storage terminals and depots, 101 aviation fuel stations and 89 Indane LPG bottling plants.

b) UNIT profile:

Mathura Refinery, commissioned in 1982, current rated capacity of 8.0 MMTPA crude processing, is meeting the product demand of Northwest region of the country including the National Capital Delhi. The Refinery processes low sulphur crude from Bombay High, imported low sulphur crude from Nigeria, and high sulphur crude from Middle East Countries. In the original refinery configuration, there was one primary Atmospheric Vacuum unit coupled with Vis-breaker Unit, Fluidised Catalytic cracking Unit, Bitumen Unit and Sulphur Recovery unit as secondary units. Subsequently, in order to meet the stringent product specification arising out of environmental considerations secondary units viz. Catalytic Reforming Unit (CRU), Diesel hydro de-sulphurisation Unit (DHDS), Once Through Hydro-cracker unit (OHCU), new Sulphur Recovery unit (SRU), MS quality upgradation, DHDT etc were incorporated in the refinery configuration. The process configuration of the Refinery employs state-of-the-art technologies with minimal impact on the environment. Mathura Refinery has always put in constant efforts to produce more and more clean fuels in stages in the interest of environment, public health and preservation of national monuments around Mathura region. As a result Mathura refinery has been able to supply highly eco-friendly petrol and diesel to NCT, NCR and Agra region in phased manner. Since, April 2005, Mathura Refinery is the first refinery in India, which is capable of producing 100% auto fuels meeting Euro – III norms.

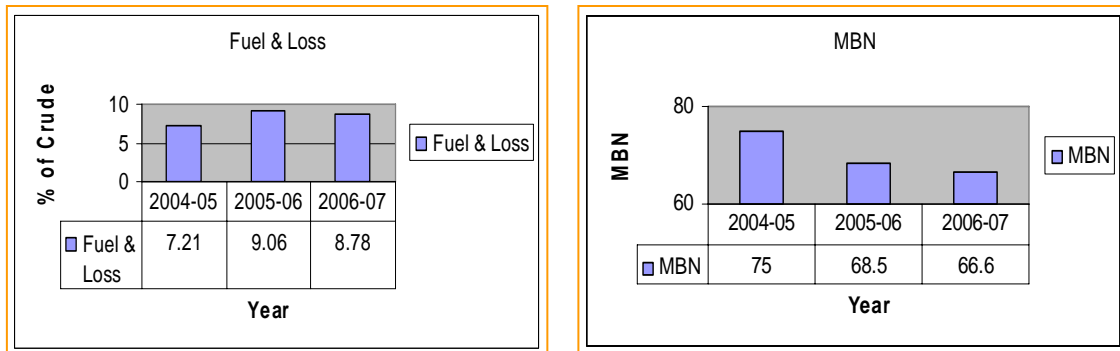


ii) Energy Consumption

Mathura Refinery consumes various types of fuels viz. Natural gas, R-LNG, refinery fuel gas and low Sulphur internal fuel oil (IFO) in furnaces / boilers. Natural gas, which is about 50% of total fuel consumed at MR is supplied by M/s GAIL whereas all others

fuels are generated in the refinery itself. The IFO is fired as alternate fuel in old furnaces only.

The energy consumption in refinery is reported in terms of % Fuel & Loss on crude and MBTU/BBL/NRGF (MBN), where the term MBTU refers to total heat value of fuel & loss in thousand BTU, BBL refers to barrel of crude processed and NRGF is a derived factor that depends upon actual intake in both primary and secondary processing units. The % fuel & loss and MBN for last three years is as given below:



It may be mentioned that % fuel & loss of refinery has reduced from the previous year by 3% and specific energy consumption (MBN) the real yardstick of energy consumption is reduced by 2.75% from previous year.

iii) Energy Conservation Commitment, Policy and Set-up (please include a photocopy of unit's Energy conservation policy, if decided)

IndianOil is having strong Energy Conservation Commitment, which is also reflected in its Energy Management Policy. The policy consists of all points related to adopting & nurturing Energy Efficient and environment technologies. The policy is approved by the board of directors of the company and adopted by Mathura refinery. The **Energy Conservation Commitment, Policy and Set-up** are already elaborated at item No 13 above. Some of the major steps taken by Mathura Refinery for energy conservation are as given under:

- Installation of Air pre-heater (APH) in furnaces.
- Provision of high efficiency burners.
- Use of low-pressure gas in AVU /VBU furnaces which otherwise was being flared.
- Process optimization using advance process control.
- Use of LP steam in VDU for stripping purpose and for re-boiling in PRU etc.
- Change of service in crude pre-heat circuit from SR to LVGO for pre-heat improvement
- De-bottlenecking of main column 19-C-1 & Debutanizer 20-C-4 overhead circuits of FCC for recovery of gas and reduction of flare in summer months.
- Provision of secondary seal in tanks.
- Tank wagon gantry automation.
- Chemical treatment of CW system, thereby improving exchanger's fouling factor.

- VBU preheat exchanger-cleaning management.
- Comprehensive survey of burners components and re-assembling during annual turn around in 2004-05 by external agency M/s Camvid, Bangalore.
- Additional condensate recovery at Propylene unit.
- Yield and energy revamp of crude distillation unit in Aug-Sep' 04.
- Provision of New overhead Air coolers for crude distillation unit.
- Optimization of pre-heat train in AVU, FCCU & NSU with addition of new heat exchangers.
- Optimizing compressor loadings in DHDS and DHDT units
- Steam optimization in flare circuit
- Stepless control system in Reciprocating compressor
- Shell Global study

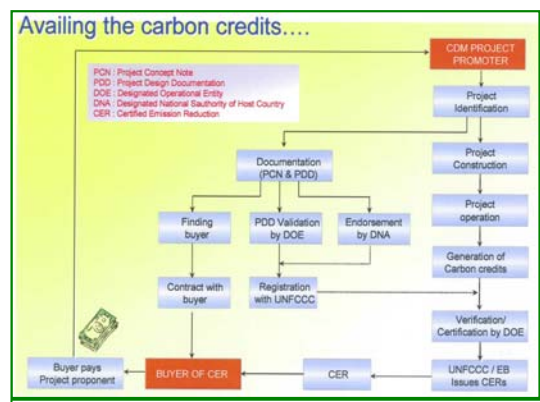
iv) Energy Conservation Achievements - The portion should include one paragraph write-up on each major energy conservation project implemented during the year 2006-07 only.

Annual Energy savings to the tune of 5,570 SRFT which is equivalent to Rs. 6.68 Crores were achieved with the implementation of major energy conservation schemes. Brief description of the schemes implemented in 2006-07 is mentioned at page no 19, item no. 16 above.

In addition, the benefits of energy conservation measures implemented earlier were sustained during the year 2006-07 also. Refinery has used extensively Physical Acoustic Leak detector for detecting gas loss to flare by regular survey of safety valves and control valves connected to flare. Internal Energy Audit group has carried out Encon audit of furnaces, heat exchangers, crude oil receipt, Natural gas receipt, custody transfer operation, steam leaks survey, etc.

Clean Development Mechanism (CDM):

Climate change is one of the most significant sustainable developments facing the international community. The average global temperature is rising sharply due to emission of Green House Gases (GHGs) by both developed & developing countries. The consequences may lead to extreme weather events and adversely impact on human health. The Global initiatives on GHG mitigation lead to Kyoto Protocol. The Kyoto Protocol establishes three mechanisms viz. Clean Development Mechanism (CDM), International Emission Trading (IET) and Joint Implementation (JI) to supplement actions to achieve real, long term, measurable and cost effective GHG reductions.



Under CDM, a project is identified for reduction in GHG emission and participating industry accrues Certified Emission Reduction (CER) credits. One CER is equivalent to 1 MT of CO₂ emission. The credits can be used to contribute to the emission reduction commitments of industrialized countries.

Pre-validation of AVU revamp project is completed under phase I and process design document (PDD) submitted by Price Waterhouse Copper (PWC) for phase II projects like Pressure Recovery turbine and Stepless control system under CDM.

v) Energy Conservation Plans and Targets

Mathura Refinery is committed to further reduce energy consumption by finding out new avenues on continuous basis. Refinery has planned for VBU revamp, stepless control in DHDT compressor, APH in VBU, Foggy cooler in GTs etc at an estimated cost of ~ Rs. 13.31 Crores which will bring a saving of ~ 7,450 SRFT/year. The list of major proposals as a part of its future plans for energy conservation is mentioned as per item no. 18 and 19 at page no. 26 above.

vi) Environment & Safety:

Mathura Refinery, being located in the sensitive Taj Trapezium Zone (TTZ), is the first industry in India for which an expert committee carried out a scientific Environmental Impact Assessment (EIA) study. Implementation of the recommendations of the EIA study even before commissioning of the refinery, laid a strong foundation of the Environmental Management System right since inception and it is an ever-continuing mission. Refinery has already adopted Quality Management System Standard ISO 9001, Environmental Management System Standard ISO 14001 and Occupational Health & Safety Management System Standard OHSAS 18001. The commitment to safety, health and environment protection has also been duly incorporated in the corporation Safety, Health &



IndianOil

Indian Oil Corporation Limited

Mathura Refinery

सुरक्षा, स्वास्थ्य और पर्यावरण नीति

मथुरा रिफ़ाइनरी सतत विकास, सुरक्षित कार्यस्थल एवं कर्मचारियों, ग्राहकों के साथ-साथ सामुदायिक जीवन स्तर में समृद्धि सुनिश्चित करते हुए स्वच्छ पर्यावरण के प्रति पूर्ण जागरूकता के साथ कारोबार करने के लिए प्रतिबद्ध है। मथुरा रिफ़ाइनरी में हमारा विश्वास है कि अच्छी सुरक्षा, स्वास्थ्य और पर्यावरण निष्पादन, कुशल और लाभप्रद कारोबार प्रबंध का आंतरिक हिस्सा है।

हम:

- ✓ जन समुदाय, प्रक्रियाओं और परिसंपत्तियों को सुरक्षा के लिए अच्छे मानक स्थापित करेंगे और उन्हें बनाए रखेंगे।
- ✓ सुरक्षा, व्यावसायिक स्वास्थ्य और पर्यावरण संरक्षण के संबंध में सभी नियमों और विनियमों का पालन करेंगे।
- ✓ निरंतर सुरक्षा, स्वास्थ्य और पर्यावरण संरक्षण को प्राप्त करने के लिए योजना बनाएंगे, डिजाइन करेंगे और उनका प्रचालन करेंगे तथा सुविधाओं, प्रक्रियाओं और कार्यसिधियों को बनाए रखेंगे।
- ✓ दुर्घटनाओं और आपदा स्थितियों में कारगर और तत्काल कार्रवाई के लिए प्रशिक्षित, सज्जत और तैयार रहेंगे।
- ✓ बाहरी निकायों द्वारा आयोजित अपने सुरक्षा, स्वास्थ्य और पर्यावरण आचरण की जांच का स्वागत करेंगे, ताकि टेकनोलॉजियों का विकास बना रहे।
- ✓ दुर्घटनाओं को रोकने और अपने सुरक्षा, स्वास्थ्य और पर्यावरण निष्पादन में सुधार लाने के लिए उद्योग के सर्वोत्तम तरीकों को अपनाकर उन्हें बढ़ावा देंगे।
- ✓ निरंतर सुधार के लिए सुरक्षा, व्यावसायिक स्वास्थ्य और पर्यावरण संरक्षण में अग्रणी बने रहने के लिए प्रतिबद्ध रहेंगे।
- ✓ पारिस्थितिक संतुलन और विरासत को सुरक्षित रखने के लिए प्रयास करेंगे।

Safety, Health & Environment (SH&E) Policy

"Mathura Refinery is committed to conduct business with strong environment conscience ensuring sustainable development, safe workplaces and enrichment of quality of life of Employees, Customers and the Community. We at Mathura Refinery, believe that good S,H&E performance is integral part of efficient and profitable business management.

We shall:

- ✓ Establish and maintain good standards for safety of the people, the processes and the assets.
- ✓ Comply with all rules and regulations on Safety, Occupational Health and Environmental Protection.
- ✓ Plan, design, operate and maintain all facilities, processes and procedures to secure sustained Safety, Health and Environmental Protection.
- ✓ Remain trained, equipped and ready for effective and prompt response to accidents and emergencies.
- ✓ Welcome audit of our S, H&E conduct by external body, so that stakeholder confidence is safeguarded.
- ✓ Adopt and promote industry best practices to avert accidents and improve our S, H&E performance.
- ✓ Remain committed to be a leader in Safety, Occupational Health and Environment Protection through continuing improvement.
- ✓ Make efforts to preserve ecological balance and heritage."

जे.पी. गुहाराय
(जे.पी. गुहाराय)
कार्यकारी निदेशक

Date: 1st March 2005

दिनांक : 1 मार्च 2005

Environment (SHE) policy.

- a) **Environment:** A full-fledged Environment Protection (EP) Cell having qualified engineers exists to deal with all environmental issues. A well-equipped Pollution Control Lab has also been established to monitor environmental performance on day-to-day basis. The lab is approved by the Ministry of Environment & Forests (MoE&F) and accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL). In addition, a full-fledged Occupational Health Center (OHC) is functional at the refinery for monitoring of work-related hazards namely toxic gas hazards, noise hazards, etc. and health monitoring of employees.

The process configuration of the refinery employs the state-of-the-art technologies with minimal impact on the environment. Besides this, a number of other steps like continuous quality improvement of the products have been taken up for preservation of the environment and maintain ecological balance. The various Environment Protection measures taken are given below:

i) **Monitoring and control of Hydrocarbon & Sulphur Dioxide emission:**

- Use of low sulphur liquid fuel, De-sulphurisation and Sulphur Recovery from fuel gases and use of Natural Gas in boilers and furnaces.
- A new Tail Gas Treating Unit (TGTU) commissioned in Dec' 05 to further increase the Sulphur recovery from the tail gas being flared into the atmosphere.
- Tall chimneys for better dispersion of pollutants so that the Ground Level Concentrations are kept at the minimum.
- Three **Ambient Air Monitoring Stations (AAMS)** in refinery premises and four AAMS far beyond the work area for continuous ambient air quality monitoring. In addition, a mobile van for Ambient Air Quality (AAQ) monitoring.
- Fugitive emissions of VOC minimization by deploying floating roof tanks in crude oil & light products service. In addition, now secondary seals are being provided in a phased manner to further bring down the emission level.
- Greenbelt developed at the refinery also acts as a curtain to restrict the spread of fugitive emissions beyond the work area.
- **Eco- Friendly Products:** Keeping in view the fact that vehicular emission is one of the biggest sources of air pollution, Mathura Refinery is in consistent process to produce more and more clean fuels. In this context only, MSQ and DHDT units have been commissioned in April-June' 05 for quality upgradation of automobile fuels, meeting Euro-III norms as per Govt Auto Fuel Policy. Mathura Refinery has already taken the required steps for implementation of Euro IV grade auto fuels by April'2010 as per the honorable Supreme Court directive.

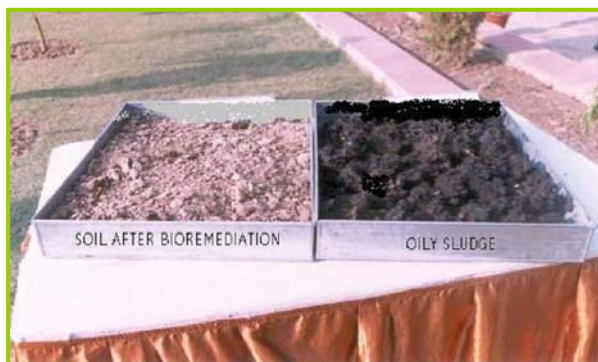


ii) Water Conservation

- Mathura Refinery has a full-fledged Effluent Treatment Plant (ETP) consisting of physical, chemical, biological and tertiary treatment facilities. This is a unique system, which not only removes hazardous pollutants, but also converts them into environmentally acceptable forms.
- The effluent treatment plant has been modernized in Mar' 07 with the aim of emulsified oil removal, better sludge management, covered storage for oily waste water to minimize emission of VOC, centrifuges for better sludge management and filters for final filtration of treated water which will be feed to the upcoming RO plant.
- Part of the treated effluent is recycled for various uses in the refinery resulting in conservation of fresh water. The remaining quantity is let in the river Yamuna or Barari Minor Canal.
- The treated effluent is being gainfully used by local farmers for irrigation purpose. It has been conclusively proved through the 'Experimental Farming Project' conducted from 1987 to 2002 in association with the Aligarh Muslim University that there is no adverse impact of the treated effluent on the soil and crop productivity.
- A new RO unit of capacity 150 M³/Hr is being added in ETP utilizing treated effluent for generation of DM water.

iii) Land Protection

- Mathura Refinery has adopted environmentally sound solid waste management practices based on the philosophy of minimization of generation of solid waste and safe disposal of residual waste.
- Under the ETP modernization project Bio-sludge and Oily sludge Centrifuges were installed to minimize the volume of oily sludge generated.
- Besides biological treatment of wastewater in ETP, the refinery has been using microbial processes for treatment and detoxification of oily sludge. The biological sludge generated in ETP is used as bio manure in the green belt area of the refinery thereby avoiding the use of chemical fertilizers.
- Installation of Bio tower in place of trickling filter have significantly improved the biological treatment.
- An impervious PVC lined secured landfill site having proper leachate collection facility has been constructed for disposal of residual sludge.
- The Research & Development (R&D) Center of Indian Oil Corporation Ltd. in association with The Energy & Resources Institute (TERI) has developed a microbial mix of five selective naturally occurring organisms called 'Oilivorous-S' which converts organic constituents of oily sludge into non-toxic compounds viz. Carbon Dioxide and water. The technology has been successfully developed at Mathura Refinery from experimental stage to commercial stage.



- For 'Resource from Waste', Mathura Refinery has installed an anaerobic digester for treatment of canteen waste to produce bio gas which is being used in canteen resulting in saving of cooking gas.
- Groundwater monitoring is also periodically carried out to ensure that there is no impact of refinery operations on the groundwater quality.

iv) Cleaning through Greening

- In the vicinity of the Effluent Treatment Plant, thriving on treated effluent, a beautiful ecological park with lush green cover has been developed in an area of 4.45 acre. Water bodies in the park are receiving water from ETP. Thousands of migratory birds visit this park every year between October to February. The park is a testimony to Eco-friendly operations at Mathura Refinery.
- Mathura Refinery has done extensive tree plantation in and around the refinery as tree plantation provides long-term far-reaching benefits, besides serving as a pollution sink, this green cover also enhances the aesthetic look. The refinery has planted about 1, 67,000 trees/shrubs in the refinery premises, township, surrounding villages and Mathura Region . The refinery has taken extra-ordinary initiatives to provide green cover to the archeological heritage sites especially the Taj Mahal by planting 1,15,000 trees in Agra region including Taj Reserve Forest. Mathura Refinery also provided 6000 trees to Social Forestry Department for UP government initiative to plant One Crore trees in One Day.



v) Environmental Awareness

Environmental awareness amongst employees is created through articles published in in-house bulletins, structured training programme and observance of the World Forestry Day, Earth Day & World Environment Day. Employees are imparted training, induction as well as refresher, on responsible practices to be followed for protection of the environment. Contractors' personnel are educated on environmental safety on a continual basis.

Environmental awareness amongst the local population is created by involving

They said it...

" I am fascinated by the development that has taken place with respect not only to the Refinery but to the Environment which looks more healthy and thriving."

Omer Mohamed Abdelsalam,
Economist & General Director,
Ministry of Finance & National Economy,
Republic of Sudan
17.07.2006

" Visit to refinery was a satisfactory experience as I was able to see a lot of greenery in and around refinery. I was also impressed to see winged visitors at Eco Park particularly Ibis, Herons, Egrets, Night Herons etc. building nest in Prosopis Juliflora adjoining and in between the water body. I was also suggested to observe butterflies, which are good indicators of environment. I wish them good luck in future endeavor."

Dr. H. Rajamohan,
IFS,
DFO, Mathura,
29.07.2005

"Congratulations for the environmental success and the efficient management. On this occasion we would like to progress on relations with India. We are very much impressed by what we have seen here, many congratulations to the officials who have contributed to the success of the refinery"

His Excellency Dr. Mehmet Hilmi Guler,
Ministry of Energy and Natural Resources,
Republic of Turkey.
25.11.2005

them in the activities like observance of the World Environment Day. In addition, awareness about safety from fire, disaster, etc. is also created amongst the nearby habitats. Apart from this, as a part of on-going awareness programme in the refinery, tank truck drivers are educated on safe transportation of petroleum products and to deal with emergency situations on road.

In our efforts to preserve the ecology, a campaign has been launched in the township on 'Non-use of Polythene Bags' for our common benefit and well-being. An annual flower show is organized in the refinery township premises to inculcate the culture of keeping the environment clean and green. The environment protection measures under taken by Refinery have always been well appreciated by the visiting dignitaries.

vi) Concern for Community

Mathura Refinery has initiated various community development activities viz. clean drinking water, health & medical care, welfare of women etc. to improve the quality of life of the community. Refinery has contributed in development of children education by providing infra structure to schools. Refinery has also established a 50-bedded hospital known as 'Swarna Jayanti Samudayik Hospital' on NH-2 near township for the benefit of the neighbouring community and spent nearly ~ Rs 2 crores last year towards running expenses of the hospital. Near about 58, 000 patients (including both indoor & out door) had been treated in the Swarna Jayanti Hospital. The refinery is also operating two mobile dispensaries and serving the community.

- b) **SAFETY:** Safety being an integral part of refinery operation, best practices on safety are in place at Mathura Refinery. The safety is accorded the highest priority. To make the refinery a safe place for its employees, environment and nearby community, the high standard of safety is maintained. Latest equipments on safety are introduced time to time. Safety system is continuously monitored and upgraded through monthly shop floor safety meetings, Management Review and through Internal/ External safety audits.

Following are the highlights of MR safety system/programme:

- A well-laid firewater network to cater the need of firewater to tackle simultaneous two major fires in the refinery.
- Modern fire fighting equipment with trained fire fighting crew.
- Vast communication in the refinery includes fire telephones; microprocessors based fire alarms system with talk back facility and walkie-talkies with base stations all over the refinery.
- For immediate detection of any incidental release of gases during refinery operation, gas detectors with audio-visual alarm have also been provided.
- This elaborate fire fighting and communication system is maintained in trim condition by daily review of fire fighting system in Refinery Shift Manager meetings and conducting regular Mock Drills. Emergency drills for on-site and offsite are conducted at stated frequency with dedicated teamwork and emergency organogram.
- Updated 'On-site Emergency Plan', 'OISD Standards', 'Material Safety Data Sheets', status of ESA / SSC recommendations and 'status of Statutory Licenses' has been put on the INTRANET of Mathura Refinery for easy access by end users.

- Adequacy of firewater network was checked by an external agency in March' 04. The study was carried out in view of implementation of new Projects like MSQU and DHDT.
- Similarly, comprehensive Risk Analysis study carried out in March' 04 by M/s EIL.
- Senior officers take daily Safety Tour of the refinery. For this, the entire refinery is divided in 27 zones. Officers record their observations in the prescribed checklist for compliance.
- Security rounds by a multi-disciplinary team are conducted regularly beyond normal working hours.
- In addition, Mathura Refinery took the initiative in assessing and evaluating its prevailing 'Safety culture' by engaging renowned consultant M/s Dupont (who has the record of no accident for last 100 years) in the field of 'Safety', who had conducted a detail 'Employee Perception Survey' followed by 'Safety culture Foundation Building Exercises' during the period from October to Dec 2006. Pathforward for IOCI leadership towards reaching 'World Class Safety Standard' has been identified for adoption and implementation.

Implementation of Total Productivity Management (TPM)

MR has adopted a time tested work philosophy viz TPM, which promises total elimination of all unnecessary cost associated with material, operations, maintenance time and minimization of all types of losses with total involvement of every employee. Encouraged with the initial success of pilot model of TPM launched in Dec'03 it was followed by the TPM in every section of the refinery.

Mathura Refinery		KAIZEN - SHEET									
Plant : DHDT		Machine : LP STEAM CONDENSATE									
Kaizen theme : Pool LP condensate transfer from V29 to V23		Idea : To improve LP condensate transfer to V23 by pressurizing with N2									
Problem/present status : LP condensate transfer to V23 (main condensate drum) was not possible because of low delta P between V29 and V23.		Countermeasure : To have higher delta P between V29 and V23, a N2 hose was connected to V29.		Bench mark Target : Completion : Kaizen Finish : Team member :		J.K. Dhar Md. Ayub		Benefits: 3 tons of condensate/hr pump out to condensate header, which earlier was drained.		Loss before : 3 after : 0	
Analysis : Because of low delta P between V29 and V23, LP steam condensate was not transferred.		Results : After pressurizing with N2 LP steam condensate transfer to V23 from V23 was established and no LP steam condensate draining was done.				Score & plan for Operational Deployment P no. : B no. : F no. : S no. : M no. : Y no. :		3 0		3 0	

TPM KAIZEN sheet

In addition to TPM, employees are encouraged to suggest improvements in operation, energy conservation, safety or any other related matters. The **accepted suggestion** is implemented and duly recognized as well. This has brought sea change in the approach and attitude of every employee and it is helping to achieve greater heights in every field of operation/performance. This also helped in **generation of idea bank** in the refinery.

Implementation of Six Sigma

Mathura Refinery has taken Six Sigma business process improvement initiative in a big way and has already acquired certifications for 4 Black Belt and 2 Green Belt projects from Motorola University USA. Benefit / savings of Rs. 326 Lacs per year have been accomplished in the certified Projects. Precisely with the aim of reduction in energy consumption level a six-sigma Black Belt project titled '**Reduction of energy consumption in Mathura Refinery**' was undertaken. Energy consumption data of

various units of the refinery was collected, compared & gathered that energy consumption in AVU is highest. Further, it was noted that direct fuel consumption was the highest energy being consumed within the AVU. The goal was set to reduce the direct fuel consumption by 1000 SRFT/year.

The process leading to the consumption of direct fuel was mapped in detail and it was found that the energy consumption could be reduced by increasing the preheat recovery. Necessary process modifications were carried out during the M&I shut down to re-route the Vacuum Slop through RCO heat exchangers and exchange the heat from the Slop for heating the Crude Oil to increase the preheat.

The improved process is in operation now and this has resulted in a saving of direct fuel consumption estimated at **3000 SRFT/year**. The monetary savings are estimated to be Rs. 250 Lacs per year.