

Energy Conservation Measure implemented in 2006-2007

(To be filled up separately for each Energy Conservation Measure)

ID to be filled by BEE	Title of the measure Routing of Hot RCO ex AU-5 unit to VDU	Sector : Petroleum Refineries
Year to be filled by BEE		Technology
<p>Description of the energy conservation measure: Hot RCO Routing To VDU : Atmospheric distillation unit-V (AU-V) generally processes BH, IMPLS and IMPHS crudes. When AU-V operates in LS/BH mode, hot RCO from AU-V is routed to FPU-I and FPU-II for further processing and remaining portion of RCO is routed to GRE/GRSPF/GHC tanks via RCO run down coolers. Hot RCO routing to FPU-I and FPU-II significantly reduces the FO and FG requirement in fired heaters by increasing the coil inlet temperature or preheat. On the other hand when AU-V used to operate on HS mode, there was no such facility to route hot RCO from AU-V to VDU, as a result total RCO was routed to GRE/GRSPF tanks through RCO run down coolers. The vacuum distillation column in GRE used to processes hot RCO coming from AU-IV and cold RCO coming from storage tank. When AU-IV unit used to be under shutdown or processes IMPLS/BH crude, VDU unit used to processes total cold feed coming from storage and the FO and FG requirement in furnaces used to be higher due to poor preheat obtained.</p> <p>In view of above, it was proposed to route hot RCO from AU-V to VDU. Proposed scheme was divided in two parts. First part was the routing of hot RCO from AU-V to VDU in either or mode or in simultaneous mode with FPU-I and the second part was the temperature control of RCO rundown coolers (05-EE-00-022A/B/C/D) in AU-V unit to avoid RCO congealing problem. Hot RCO routing to VDU line was laid earlier but was never utilized/commissioned. Considering the existing facility, and other modifications as required ,process scheme as attached was implemented in April'2006</p> <p>The facility after implementation substantially reduced the fuel requirement in fired heater by increasing the preheat or CIT as well as prevented the LR congealing problem in the RCO rundown coolers of AU-V unit.</p>		
Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification	
	Attached separately	
Agency that executed the project (with complete address and email): In-house		
Total investment, Rs.: 3.6 lakh	Year of implementation: April 2006	

First year energy cost savings, Rs.: 45 lakh					
First year other savings, Rs.:					
On annual basis	kWh 000'	Coal (Tons)	Gas Nm ³	Oil (kL)	Other
Energy consumption before					Saving of 295 KL of fuel oil due to increase in feed preheat
Energy consumption after					
Energy tariff, Rs/ kWh/ Ton/ Nm ³ / kL ...					
Company complete address: Gujarat Refinery P.O. Jawaharnagar Vadodara - 391320 Contact person who could be contacted for more information: R. Krishnamurthy Chief Technical Services Manager Gujarat Refinery P.O. Jawaharnagar Vadodara - 391320 Tel No. – 0265-223 7305				We authorise Bureau to use this information for dissemination Signature Date	

Energy Conservation Measure implemented in 2006-2007

(To be filled up separately for each Energy Conservation Measure)

ID to be filled by BEE	Title of the measure	Sector : Petroleum Refineries
Year to be filled by BEE	Replacement of APH of Vacuum Heater 03-FF-001 in FPU-2 without taking the shutdown of unit	Technology
<p>Replacement of existing APH module was carried out in FPU-2 without shutting down of the heater by innovative way averted 12days of the Hydrocracker and 19days Feed preparation Unit-II shutdown.</p> <p><u>Introduction</u> In FPU-2, Vacuum feed heater is having cast tube Air preheated with 3 air passes and a single vertical flow down flue gas path. There are 2nos FD fans operating at 50% load and 1 no ID fan evacuating the flue gases from APH to the stack. The flue gases are entering the APH at around 287 deg C and are getting cooled to around 180 deg C. The unit was commissioned in 1993. In 2001 Jan-Feb s/d, severe corrosion of bottom cast iron module by sulphurous deposits was observed. The same was replaced during the shutdown itself with new cast iron module. During operation of the unit severe intermixing of combustion air and flue gas was suspected and furnace firing was heavily constrained. Total replacement of APH module with glass module for bottom section was done during July 2006 without shutting down of the unit by implementing the innovative idea of running the furnace with flue gas bypassing APH for the first time, this has saved Fuel Oil worth 4.5 Crore rupees as shut down was possible in July'08 and interim shut don would have cost 59 Crore as opportunity loss.</p> <p><u>Problems faced because of leakage in APH in year 2005-06:</u> The proper pre-heat was not taking place due to short circuit of the flue gas and Air, which was resulted in pressurization of the furnace. Due to short-circuiting of the Air and Flue gas the vibration of the ID fan was increased and foundation bolts were damaged. Jamming of the Outlet Guide vanes were also observed due to which the proper flow was not taking place.</p> <p><u>Team Efforts to avoid the Shutdown of the Unit:</u></p> <p>The replacement plan was made earlier by shutting down the plant for 19days to install the new APH module. The same was once again reviewed by the team under the leadership of the DGM (TS)/CMNM-I before taking the decision to go for the shutdown of the unit. The group of people from MN/PN/INSP was jointly made a visit to the site to review the plan. The group checked the various options to execute the APH replacement jobs by avoiding the unit shutdown.</p> <ul style="list-style-type: none"> ➤ It was decided to make trial to run the furnace using the bypass duct. ➤ Checking of the Furnace parameter while bypassing the APH ➤ Re-visioning of the Guillotine gates to use in bypassing the Air from inlet to outlet of the APH. ➤ IF the furnace is running by-using the Bypass duct, then the calculated risk with all the safety measures can be taken for isolating the APH inlet and out duct flue gas lines by blinding during operation of Furnace. ➤ The Guillotine gates were closed in running condition of the Furnace to isolate the air inlet and outlet to the APH. ➤ The Furnace parameters were found normal after bypassing the APH through the Bypass duct. <p>After thorough checking it was decided to isolate the APH by providing the blind in</p>		

running condition by taking the calculated risk and safety in view, since there is no isolation provision in flue gas inlet & outlet lines.

REPLACEMENT PLAN

- Fabrications of the required diameter blinding since the sizes are very large having inlet line Dia. 2.2Mtrs & outlet line is Square. 1.2Mtrs X 1.2Mtrs.
- Erection of the scaffolding for taking the Dimension of the line size to fabricate the flange and erection of the scaffolding
- Fabrication of the supports to the conical portion and Flue gas duct.
- Blinding of the flue gas duct at inlet and outlet was carried out at two locations in running condition of the furnace/Plant by taking proper care and safety measures to divert the combustion air fully through the bypass duct without disturbing the Furnace operation.
- The main combustion air duct inlet to the bottom module was isolated by providing blinds. Prefabricated CS blind was inserted in the dia 2200mm refractory lined inlet flue gas duct to APH top module. Similarly Rectangle blind was also inserted at the ID fan discharge duct to isolate APH.
- The Beam Support was fabricated to support the Duct Elbow piece (Dia. 2.2Meters) to support the suction duct. Proper holding clamps were welded to hold the bottom duct of the ID Fan inlet duct at all the four sides. Structures were cut and removed at four locations to hold the APH duct to remove from the top.
- Removed the top Elbow and Conical duct from the top by using the 180T telescopic boom crane.



Removal of the old Module



Installation of the new Module

- De-bolted the first module (Top) and lifted from the top and followed the same procedure to remove all remaining two modules.

Gadgets used for replacement of the APH modules

- 180 Ton Telescopic boom crane for executing the job

LIFTING OF GLASS MODULE

Lowering of the new Module



Replacement Procedure carried out:

- Reverse sequence is used for installation of the New APH mode
- Total Weight of the modules removed and installed is: 146Tons(73 tons+73tons)
- This job was carried out with utmost care and taking proper safety measures since the lift height. is 40mtrs.

Achievement

- By innovative idea averted the shutdown of the FPU-II unit planned for 19 Days without loss of throughput.
- Averted the Hydrocracker shutdown after one week of the FPU-II due to lack of feed to Hydrocracker. Re-circulation/Shutdown of the Hydrogen unit due to shutdown of the Hydrocracker unit.

- The total replacement job completed with in a **7 days** in place of planned **19 days** and commissioned successfully.
- The high volume of the dismantling and erection of APH modules were completed with all safety measures and without any incident through proper planning and co-ordination though the Furnace was in operation.
- This was achieved by excellent co-ordination among all Departments and Good team work

Total saving

- By considering the **19 Days** FPU-II shutdown the feed is suitable to operate the HCU for a week after FPU-II the remaining **12days** shall be the HCU shutdown.
- **Saving of 12 days shutdown of HCU- Rs.12 DaysX4.95 Crores per day saving=59.4 Crores (Aprox).**

IFO SAVING:

ATTRIBUTE	UNIT	BEFORE REPLACEMENT (Total Air through bypass header)	AFTER REPLACEMENT
Unit throughput	MTPD	6200	6200
Combustion air Inlet to Furnace	Deg C	34	198
Combustion air flow	MT/hr	41	35
Stack temperature	Deg C	250	165
ID Suction temperature	Deg C	Was not in line	158
Flue gas temperature after convection	Deg C	285	292
Combustion air duct pressure	mmWC	120	125
Max skin temp	DegC	495	494
Flue gas temperature before convection	DegC	446	437

ATTRIBUTE	UNIT	DESIGN	ACTUAL
Combustion air In/out	DegC	35/232	35/198
Flue gas In/Out	DegC	350/180	285/166
Combustion air flow	Kg/hr	72577	35000
Minimum skin temperature (Dew point)	DegC	137	159(calculated for Design max S content of 0.8%wt) 164(calculated for actual S content of 1.1%wt)
Duty	MMKcal/hr	3.8	1.63

Picture/ sketch/ drawing before modification (if available)		Picture/ sketch/ drawing after modification				
Agency that executed the project (with complete address and email):						
Total investment, Rs.: 83.7 lakh			Year of implementation: Sep 2006			
First year energy cost savings, Rs.: 237.7 lakh						
First year other savings, Rs.:						
On annual basis	kWh 000'	Coal (Tons)	Gas Nm ³	Oil (kL)	Other	
Energy consumption before					Saving of 1557 KL of fuel oil due to on-line replacement of APH by innovative method instead of planned replacement in July 2008	
Energy consumption after						
Energy tariff, Rs/ kWh/ Ton/ Nm ³ / kL ...						
Company complete address: Gujarat Refinery P.O. Jawaharnagar Vadodara - 391320				We authorise Bureau to use this information for dissemination		
Contact person who could be contacted for more information: R. Krishnamurthy Chief Technical Services Manager Gujarat Refinery P.O. Jawaharnagar Vadodara - 391320				Signature		
Tel No. – 0265-223 7305				Date		

Energy Conservation Measure implemented in 2006-2007

(To be filled up separately for each Energy Conservation Measure)

ID to be filled by BEE	Title of the measure Increasing availability of APH of LAB plant	Sector : Petroleum Refineries
Year to be filled by BEE		Technology
<p>Description of the energy conservation measure: LAB Plant Hot Oil heater is having a APH of 5 mmKcal/hr. Hot oil heater is having 40 numbers of soot blowers and it used to take ~ 2 hours and 15 minute for complete soot blowing in sequential manner. During the period of soot blowing the APH used to be in bypass condition. By continuously observing the soot blowing operation and brain storming it was observed that soot blowing time can be reduced by half by parallel operation of the two soot blower train each having 20 soot blowers. The above procedure for soot blowing was implemented and this resulted in increased availability of LAB Plant APH by 1 hour daily.</p>		
Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification	
Agency that executed the project (with complete address and email): In-house		
Total investment, Rs.: NIL	Year of implementation: April 2006	

First year energy cost savings, Rs.: 30.4 lakh					
First year other savings, Rs.:					
On annual basis	kWh 000'	Coal (Tons)	Gas Nm ³	Oil (kL)	Other
Energy consumption before					Saving of 199 KL of fuel oil due to increased availability of APH
Energy consumption after					
Energy tariff, Rs/ kWh/ Ton/ Nm ³ / kL ...					
Company complete address: Gujarat Refinery P.O. Jawaharnagar Vadodara - 391320 Contact person who could be contacted for more information: R. Krishnamurthy Chief Technical Services Manager Gujarat Refinery P.O. Jawaharnagar Vadodara - 391320 Tel No. – 0265-223 7305				We authorise Bureau to use this information for dissemination Signature Date	