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1990

I F F C O
KALOL - UNIT

P & S Section
Maintenance Deptt.
Report No. 12/1990

R E P O R T

ON

PLANT TURNOVER - 1990

(Ammonia Plant 5/02/90 TO 05/03/90)
(Urea Plant 31/01/90 TO 07/03/90)

INDIAN FARMERS FERTILISER CO-OPERATIVE LIMITED

11/05/1990

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I F F C O

Kalol - Unit

THE PLANT TURNAROUND AT A GLANCE

Sl. No.	Year	AMMONIA PLANT		UREA PLANT		Reason if any
		PERIOD From	To	PERIOD From	To	
1.	1975	06-05-75	21-05-75	06-05-75	21-05-75	Planned
2.	1976	26-03-76	20-04-76	26-03-76	20-04-76	Planned
3.	1976-77	05-12-76	22-01-77	05-12-76	24-01-77	101-JT Breakdown
4.	1978	21-02-78	15-03-78	21-02-78	23-03-78	101-BJ Breakdown
5.	1979	21-05-79	12-06-79	21-05-79	12-06-79	K-1101/2 3rd stage Cylinder
6.	1981	12-04-81	10-05-81	08-04-81	12-05-81	101-B Headers
7.	1984	01-01-84	25-01-84	01-C1-84	25-01-84	Planned
8.	1986	19-03-86	03-05-86	04-03-86	01-05-86	Reformer Revamping
9.	1987	12-04-87	03-05-87	12-04-87	02-05-87	Planned
10.	1988	18-04-88	14-05-88	18-04-88	13-05-88	Planned
11.	1989	03-07-89	14-07-89	26-06-89	14-07-89	H.P. Scrubber Breakdown
12.	1990	05-02-90	05-03-90	31-01-90	07-03-90	Planned

Downtime
in days

PLANT TURNAROUND - 1990P R E F A C E

IFFCO Kalol Unit had taken a planned Turnaround. On 31.1.1990 Urea Plant was stopped for inspection of HP Vessels by SPANICARBON and on 5/02/1990 Ammonia Plant was stopped for replacement of Methanator catalyst, replacement of intermediate tube supports of Mixed Feed Coil 'F', installation of Burner Blocks made of ceramic fibre, soft ceramic fibre insulation with SS cladding in HP & LP convection zones in place of castable refractory, inspection of reformer tubes, headers, transfer line etc and other piping and vessels, replacement of Methanator Effluent F.W.Heater, overhauling of rotating equipment like Air Compressor Drive Turbine, Refrigerant Compressor Drive Turbine and compressor LP & HP cases, BFW Pump Turbine, hydro-jet cleaning of heat exchangers, boiler inspection etc. In Urea Plant inspection of HP vessels, preventive maintenance of turbines and compressors including liner replacement of 2nd stage cylinder of GMH Compressor and replacement of distance piece in PB CO₂ compressor, Carbamate Pump casing (P-1201/B) replacement, W.H.Boiler annual inspection by Boiler Inspector, LP Carbamate Condenser baffle position changing, hydrojet cleaning of heat exchangers were done. In Offsites and B&MH plants CW Pumps and Turbines, Naphtha Feed Pumps were overhauled, BHLL Boiler was offered for inspection by Boiler Inspector, CF Fan cylinders made of wood were changed to FRP in three shells of Urea Cooling Towers. Inspection group conducted extensive inspection of vessels and piping in critical areas in entire plant. Electrical MCCs were overhauled. Instruments were overhauled and preventive maintenance was done. Minor modification in Ammonia and Urea Plants were carried out.

The turnaround was completed successfully. Ammonia production was lined up on 5/3/90 and Urea production commenced from 7/3/1990. The detailed report is attached herewith.

(03/91)

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TURKROUND - 1990

GENERAL - DETAILS

Sr.No.	Category	Qty.
--------	----------	------

Equipment Utilised

- (a) IFFCO :
- | | | |
|------|-------------|--------|
| 65 T | HM Crane | 01 No |
| 15 T | Coles Crane | 01 No |
| 18 T | Tata Crane | 01 No |
| 03 T | Forklifts | 02 Nos |
| 01 T | Forklift | 01 No |
| | Truck | 01 No |

- (b) HIRLD :
- | | |
|-----------|-------|
| H.M.Crane | 01 No |
|-----------|-------|

MANPOWER :

- (a) IFFCO :
- | | | |
|-------------------------------|---|----------|
| a) Mechanical |) | |
| b) Mechanical Services |) | |
| c) Electrical |) | Existing |
| d) Instrument |) | strength |
| e) Trainees in various trade) |) | |

- (b) Hired - Contractor

<u>Sr.No.</u>	<u>Category</u>	<u>Mandays</u>
1	Millwright	114
2	Fitter	672
3	Fabricator	194
-	Grinder	79
4	Rigger	1060
5	Welder- IER	06
6	Welder Non IER	123
7	Carpenter	14
8	Mason	34

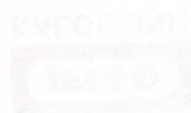
- (c) HIRED :- IFFCO Time office

1. Labour unskilled - 5900 Mandays

ANNUAL TURNAROUND - 1990IMPORTANT CONTRACT JOBS

Sr.No.	Name of Party	Work Description	W.O.No
1	M/s.CELCO Technical Service, Baroda	Replacement of intermediate mixed feed Coil supports of H.T.Convection zone.	L-3820/A
2	M/s.Orient Cerawool Ltd, Bombay.	Replacement of existing castable insulation by ceramic fibre insulation blanket in LT convection zone.	L-3835/A
3	M/s.Prodev Mfg.Co, Baroda.	Retubing of S.S.tubes in place of C.S.tubes in 136C Exchanger.	L-3850/A
4	M/s.Lloyd's Insulation Pvt.Ltd, New Delhi.	Replacement of existing Castable insulation by ceramic fibre insulation blanket and SS cladding in H.T.convection zone.	D-3845/A
5	M/s.Chemical Process Equipment, Bombay	Inspection of F.R.P. tank	D-8001/A
6	M/s.Usha Hydrodynamics Ltd, New Delhi	Hydrojetting of heat Exchangers.	D-3837/A
7	M/s.STAMICARBON	Inspection of high pressure Vessel	D-2535/U
8	M/s.P.D.I.L.	Inspection of high pressure Vessel.	D-2535/U
9	M/s.ALFA LAVAL, Baroda	Overhauling of Heat exchanger	D-2592/U
10	M/s.CELCO, Baroda	Provide skilled manpower	D-6278/U
11	M/s.B.Chauhan & Co, Kalol.	Painting	L-6255/U
12	M/s.GO COCL Engineering Co, Thane	wood-work repair of cooling towers.	D-4763/A
13	M/s.Teacon Coating	Painting	L-4376/A
14	M/s.Lloyd's Insulation Pvt.Ltd, Bombay.	Maintenance of Insulation	D-4355/P
15	M/s.Smitha Engineering Kalol	Fabrication	L-4356
16	M/s.Mahavir Engineering works, Baroda.	Skilled labour	L-4379
17	M/s.Crane Hiring Co, Baroda.	HM Crane Services	L-4391

Sr. No.	Party's Name	Description	W.O.No.
18	M/s. NDT Services, Ahmedabad.	Radiography of plant equipment pipings, vessels etc.	C-2697/I
19	M/s. NDT Services, Ahmedabad.	Ultrasonic flaw detection of plant piping, weld joints	D-2130/I
20	M/s. Madhusudan Mfg. Co., Ahmedabad	Maint. of Acid/Alkali proof brick lining in effluent tanks & W.T. plant.	D-5059/C
21	M/s. Chemisight Engrs. Baroda.	Bitumastic compound lining in W.T. plant.	D-5060/C
22	M/s. Chemisight Engr., Baroda.	Bitumastic compound lining in B&MH plant.	D-3157/C
23	M/s. Voltas Ltd, Bombay	Servicing of T.M.C. make L.T. Air circuit breakers.	D-4956/L
24	M/s. Kirloskar Ltd, Pune.	Servicing of Kirloskar 11KV MCCBS.	D-4958/L
25	M/s. United Instrument Services, Baroda	Overhauling, testing & calibration of various types of instruments.	D-5214/Inst.
26	M/s. Lloyds (I) P. Ltd Bombay.	Supply & fixing of insulation work.	D-5450/A



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ANNUAL TURBINE AROUND - 1990

AMMONIA PLANT
MECHANICAL JOBS

Code No	Description
1 01 01	<u>AIR COMPRESSOR TRAIN :</u>
01	<u>DRIVE TURBINE 101 JT :</u>
	This turbine was taken for complete overhauling as a preventive maintenance check up. After dismantling, the Rotor was taken out. Following were observed.
	1) There was no deposition of Silica on Rotor wheels. The Rotor was cleaned manually.
	2) Slight erosion was noticed on steam inlet side blade edges of 7th and 8th wheel.
	3) Slight erosion was found on blade roots of all the blades of 7th and 8th wheel.
	4) Similarly slight erosion was found on the balancing piece fitted on the 8th wheel.
	5) Minor silica deposition was found on all the diaphragms. But in 4, 5 and 6th diaphragms erosion was noticed on the matching faces of both top and bottom halves of these diaphragms. Hence replaced these 4 diaphragms assembly by the spare assembly. The other diaphragms were assembled after cleaning them by sand blasting.
	6) Also erosion was found on both top & bottom Casing faces near 2nd, 3rd, 4th and 5th diaphragm seating position. This was repaired by welding & smoothed the weld metal by grinding and filing.
	7) Labyrinth clearances were checked. Few labyrinths were replaced due to higher clearances and wear and tear.
	8) Checked the journal bearings. Bearings were found in good condition. Its diametrical clearance was measured. It was found to be 0.009". Boxed up the same bearings both in inboard and outboard bearings.
	9) Thrust bearing was inspected. (Centritech bearing) wear and tear was found in the face of all the shoes. But the float of the Rotor even with these shoes was found to be 0.012" only. However, shoes were replaced along with base ring assembly by new one.

Code No	Description
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- 10) Checked the sleeve bearings, fitted on the Governor Drive systems. Replaced the worn wheel shaft bearings by new one, since wear and tear was noticed. The other bearings were found in good condition, boxed up the same.
- 11) Checked the full travel of power piston of governor. It was found to be 1.555".
- 12) Lubricated all linkages of Nozzle bar assembly.
- 13) Turbine was checked for its OST and it was set at 7930 RPM.
- 14) Final clearances are maintained as per recommended values.

02) LP Case Compressor 101 JLP Case :

As a preventive maintenance check up inspected the bearing of Low pressure case compressor. After dismantling the bearing more wear and tear was found on both Inboard and Outboard bearings, both the journal bearings were assembled with new bearing housing and new pads.

Code No	Description
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Inspected the thrust bearing. Found thrust shoes and base ring assembly were in good condition, but the Rotor float was found on higher side (ie 0.019")
 Assembled the same thrust shoes and base ring with new thrust adjusting shim.

Clearance values :

- South side Bearing (Turbine side) = 0.007"
- North side bearing (G.B. side) = 0.006"
- Rotor thrust = 0.014"

03) SPEED INCREASER :

G.B. was opened for checking the gear teeth and bearings. Following jobs were carried out.

- 01 Both gear and pinion teeth were checked. Found in good condition.
- 02 Inspected the bearings of gear shaft and pinion shaft. All the bearings were found in good condition. Checked the diametrical clearance.

	<u>LP case side</u>	<u>HP case side</u>
Gear shaft bearing	0.006"	0.006"
Pinion shaft bearing	0.006"	0.006"
Thrust of Gear shaft	= 0.012"	
Thrust of pinion shaft	= 0.030"	

Boxed up the same bearing on both Gear shaft & Pinion shaft.

04) HP Case Compressor 101 JHP Case :

As a preventive maintenance check up inspected the bearings of HP case compressor. The clearance of out board bearing (North side bearing) was found on higher side i.e. 0.007" and also minor wear and tear was noticed on the pads. Assembled this bearing by new pads. The Inboard bearing (South side bearing) was found in good condition and assembled the bearing with same pads.

Code No Description

Clearance values :

Outboard bearing (North side bearing) = 0.004"
(New pad)

Inboard bearing (South side bearing) = 0.004"
(Old pad)

05) Interstage Cooler (130 JC)

Outlet line expansion bellow was replaced by new one, which is procured from M/s. Anup Engineering Work, Ahmedabad.

1 01 02

LUBE OIL PUMP & TURBINE FOR 101J/105J :

Eqpt. No. L.O. Pump drive Turbine 101-JLT :

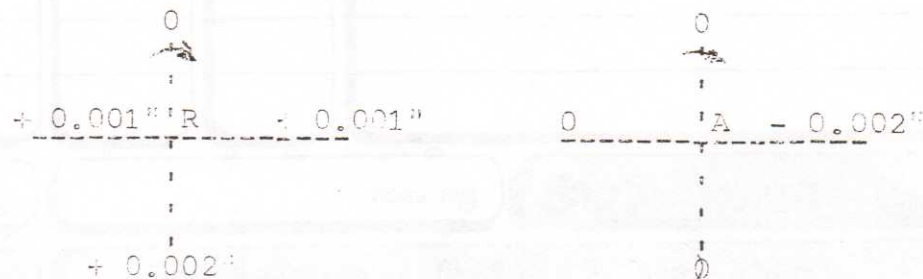
01 As a preventive maintenance check up we have taken this turbine for complete overhauling. The following jobs were carried out.

- a) After dismantling we found the Rotating blades and Sector blades were found in good condition.
- b) Minor wear and tear was found on bearings. Both Radial (SKF 6308) and Thrust Bearing (SKF 7312)
- c) Assembled the turbine with new bearings and Carbon Packings. Also provided a M.S.washer of 0.040" thick below the thrust bearing, in order to maintain proper clearance of 1/16" between Rotating blades & sector blades.

02 LUBE OIL PUMP (101 JL) :

As a preventive maintenance check up, we have taken out the complete pump (Screw pump) and installed the spare new pump assembly after doing proper alignment between turbine & pump.

The alignment readings are of under.



DIAL POINT ON PUMP

Code No

Description

1 01 03

REFRIGERATION COMPRESSOR TRAIN :01 DRIVE TURBINE -- 105 JT:

This turbine was taken for complete overhauling as a preventive maintenance check up after dismantling the Rotor was taken out. Following were observed.

- 1) There was no deposition of Silica on Rotor wheels.
- 2) Rotor was found in damaged condition. The details of damages are as under.
 - a) One shroud segment of 5th wheel (from steam inlet end) was thrown out and broken into pieces (total no. of segment 30)
 - b) One blade from this damaged segments has come out from its Root. Total number of blades on 5th wheel is 150 Nos.
 - c) The broken blade (one number) was found lodged in the 5th diaphragm of bottom casing.
 - d) Similarly the broken shrouds were found lodged in the 5th diaphragm of bottom casing.
 - e) One of the locking allen screw head was found broken which was provided on the moisture ring of 5th diaphragm half fitted in the top casing.

Due to the above damages on old Rotor, it was decided to put new spare turbine Rotor procured from M/s. Delaval and assembled the turbine unit.

- 3) Minor silica deposition was found on all the diaphragms, which were cleaned by sand blasting.
- 4) Labyrinth clearances were checked. Few labyrinths were replaced due to higher clearance and wear and tear.
- 5) Checked the journal bearings, Bearing were found in good condition. Its diametrical clearance was measured and found to be 0.009" Boxed up the same old bearings both inboard & outboard bearings.
- 6) Thrust bearing was inspected. It was found in good condition. Rotor thrust was found to be 0.010". Assembled the same thrust bearings.

Code No	Description
7)	Checked the governor drive system. Found increase in clearance on all the sleeve bearing fitted on the governor drive shafts. The clearance was varying from 0.006" to 0.008". Replaced all the six bearings new ones. Clearance was maintained between 0.003" to 0.006".
8)	Checked the full travel of power piston of governor. It was found to be 1.520".
9)	Lubricated all the linkages of nozzle bar assembly.
10)	Turbine was checked for its OST. It was not tripping even above 3000 rpm. Compared the trip assembly fitted on new Rotor with old Rotor assembly. Found the spring stiffness more on the new rotor assembly. Also thickness of washer was found to be 0.20" but on old trip assembly it was found to be 0.011". In order to reduce the time, it was decided to remove the trip assembly unit complete which was fitted on the old Rotor and to assemble on new Rotor. After doing this the turbine was checked for its OST. It was found tripped at 7900 RPM.
11)	Final clearances are recommended values.
02)	<p><u>LP CASE COMPRESSOR 105 JLP:</u></p> <p>During normal running, we have noticed more oil consumption/make up on 1053/101 J L.O. Console. This may be due to leakage of seal oil through mechanical seal of either LP case or HP case compressor. In order to attend this problem it was decided to open both LP and HP case compressor for complete overhauling and check its seals. The following jobs were carried out.</p>
	<ol style="list-style-type: none"> 1) Opened the top casing. 2) Bushings & Rings clearance were checked. 3) Rotor was found in good condition. 4) Checked the end play. It was found to be 0.015" 5) Rotor was taken out. 6) Removed the coupling, Journal bearings from both inboard and outboard ends.

Code No	Description
	7) Also removed the thrust bearing assembly and thrust collar.
	8) Mechanical seals were checked. Found the carbon seal of both the ends were found in good condition, minor scoring was noticed on the Rotary seat.
	9) Rotor was cleaned thoroughly.
10)	Assembled the mechanical seal with same carbon seal and reversing the face of stationary seat also replaced all the 'O' ring.
11)	Journal bearing were checked. Minor wear and tear was found on the pads of both inboard and outboard bearing. Assembled the bearings with new pads.
12)	Thrust bearing was checked found in good condition. Assembled the same.
13)	Assembled both the coupling hubs with new 'O' ring and backup washer.
14)	Few labyrinths were replaced due to more wear and tear.
15)	Rotor was positioned on its centre and checked the ring clearance.
16)	Boxed up the top casing with silicon rubber RTV sealant 732.
03)	<u>SPEED INCREASER :</u> Gear box was opened for checking the gear teeth and bearings. Following jobs were carried out.
	1) Both gear & pinion teeth were checked found in good condition.
	2) Inspected the bearings of gear shaft and pinion shaft. All the bearings were found in good condition. Assembled the same bearings after checking the diametrical clearance.

Ammonia (Mechanical)

Code No	Description	LP Case side	HP Case side
	Gear shaft bearing	0.012"	0.012"
	Pinion shaft bearing	0.012"	0.012"
	Thrust of gear shaft =	0.017	
	Thrust of pinion shaft =	0.040"	
3)	Boxed up the Gear box top cover.		
4)	<u>HP Case Compressor 105 JHP Case :</u>		
	This compressor was taken for complete overhauling. Following jobs were carried out.		
1)	Dismantled the top casing.		
2)	Clearance of Bushing & rings were checked.		
3)	Rotor was found in good condition.		
4)	Rotor thrust was checked. It was found to be 0.017".		
5)	Rotor was taken out for checking the Mech.seals.		
6)	Removed the coupling.		
7)	Removed the journal bearing pads from inboard and outboard side.		
8)	Also removed the thrust bearing assembly, Minor wear & tear was found on thrust shoes.		
9)	Mech.seals were checked. Found carbon seal of both the end were found in good condition scoring was found on the Rotary seat.		
10)	Assembled the mechanical seal with same carbon seal and reversing the stationary seat face. Also replaced complete set of 'O' ring by new one.		
11)	Rotor was cleaned throughly		
12)	Journal bearings were checked. Due to high clearance and minor wear and tear replaced the pads of both Inboard and outboard bearing.		
13)	Fitted the coupling tube with new 'O' ring and back up washer.		

Code No	Description
	14) Assembled the thrust bearing with new thrust shoes and maintained the rotor at 0.012"
	15) Due to higher diametrical clearance and also wear and tear most of the intermediate laybrinths were replaced by new one.
	16) Boxed up the top casing with silicon rubber RTV 732.

1 01 04 SYN. GAS COMPRESSOR TRAIN 103 J :

As general preventive maintenance check up, it was decided to check the bearing of 103 JAT Turbine & 103 JHP case of compressor. Following jobs/checks were carried out.

01 103 JAT TURBINE : (Back pressure turbine)

- 1) Inspected North side (LP case side) Journal Bearing found in good condition diametrical clearance was checked it was found to be 0.007" Boxed up the same.
- 2) Inspected southside (103 JBT side) journal bearing. Bearing pad was found in good condition but dia clearance was found on higher side (i.e. 0.013") Assembled the bearing with new pads and checked the clearance (i.e. 0.011") Boxed up the same.
- 3) Thrust bearing was checked. found okay. Rotor float was measure to be 0.012".

02 COMB SING TURBINE - 103 JBT :

- 1) Checked the Rotor float it was found to be 0.009" which is within the allowable limit.

03 LP Case - 103 :

Checked the Rotor float, it was found to be 0.019" which was within the allowable limit.

04 JHP Case - 103 :

- 1) Checked the north side (free end) journal bearing pads were found in good condition. Diametrical clearance was measured. it was found to be 0.005" which was with was the allowable limit Boxed up the same.
- 2) Inspected the south side(LP case side) journal brg. Pads were found in good condition. Diametrical clearance was to be 0.005" which was within the allowable limit.Boxed up the same.

Ammonia (Mechanical)

Code No	Description
	<p>3) Checked the Rotor float it was found to be 0.019". Thrust shoes were found in good condition. Final thrust was adjusted to 0.016" by new thrust adjusting shims.</p> <p>4) Coupling and its teeth of complete Train were cleaned and coupled.</p>
1 01 05	<p><u>WG COMPRESSOR TRAIN - 102 J/JE :</u></p> <p>The complete train was taken for general overhauling as a preventive maintenance check up.</p> <p>01 <u>WG Compressor:</u></p> <p>After decoupling, inspected both the journal bearings and thrust bearing. Bearings were found in good condition. Checked their clearance, found within the allowable limit. Boxed up the same.</p> <p><u>Bearing clearance are as follows :</u></p> <p>Journal bearing (I.B.bearing) 0.003" to 0.004" (Recommended 0.003" to 0.004")</p> <p>Journal Bearing (O.B.bearing) = 0.0045" (--- do ---)</p> <p>Thrust of the Rotor = 0.010" (Recmnd. 0.010" to 0.014")</p> <p>02 <u>DRIVE TURBINE - 102 JT:</u></p> <p>Inspected both the journal bearing. Bearing were found in good condition. However the diametrical clearance of outboard bearing (Governorside) bearing was found to be slightly on higher side ie 0.009". Also slightly high vibration was noticed at this bearing point during normal running condition. Hence it was decided to replace this bearing by new one. The Inboard side bearing was checked for its clearance found okay. Checked the Rotor float. Found O.k.</p> <p><u>Bearing clearance .</u></p> <p>Inboard bearing (old bearing) = 0.006" to 0.003" Outboard bearing (new bearing) = 0.005 to 0.007" Thrust (old bearing) = 0.001"</p>

Code No	Description
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03 DRY AIR PURGING MODIFICATION IN BEARING HOUSING SEAL OF DRIVE TURBINE (102JT)

We were facing the problem of water contamination in lube oil system of NG Compressor L.O.Console. Due to this frequency of replacement of L.O.filter element is quite and daily centrifuging of L.O.Console is must. To avoid this during this turn-round we carried out modification of Dry air purging in bearing housing seal of Drive turbine on both inboard & outboard side bearings. A hole of 1/16" dia was drilled on the bearing housing seal towards outside labyrinth side such that air flow will prevent the entry of any steam leakage from gland to bearing housing seal.

04 Misc. Jobs :

- 1) Strainer of both the L.O.Pumps were cleaned.
- 2) Replaced both the strainer/filter of Governor oil.
- 3) Lube oil pump drive turbine observation :
 During normal operation the turbine was getting tripped by itself and AOP starts. Also even after tripping the turbine could not come to stop position instead it was running continuously. During this shutdown this problem was attended. Following checks were carried out.
 - a) Inspected the emergency stop valve. Valve seat was found in good condition. Replaced the spring of valve spindle.
 - b) Set the clearance between plunger pin & Horizontal trip lever to a minimum value of 0.015". Also replaced spring fitted on the pilot valve.
 - c) Replaced the coupling pad between turbine and pump.
 - d) Checked OBT of turbine and get at 1300 RPM

05 3.5 AFA INDUCTION STEAM VALVE :

In normal operation this valve is kept in throttled condition and also it was operated manually. We had a problem of hard operation of Hand wheel of this valve. So it was decided to check the Hand wheel column for its problem.

Code No	Description
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JOB DONE :

After operation the top cover of hand wheel column, we noticed accumulation of mud particles above the Hydraulic operated piston. After removing the muds and other sediments, the hand wheel was operated freely. Then the valve was checked for its operation. But at full opening condition the valve was getting tripped. Again the top cover was opened, it was found that just after full open condition there was a gap between hand wheel spindle and spindle of main valve. High pressure oil was getting discharge through this gap and hence the oil pressure below the piston was reduced and it was closing the valve. In order to avoid the gap formation, we have provided 10 mm thick washer (as a stopper) below the distance ring of hand wheel spindle. There after we have checked for the valve operation. The valve was not tripping even after its fully opening.

- 06) Changed the direction of pipe line of seal oil trap vent line in order to avoid oil spillage on compressor platform.
- 07) Replaced the L.O. filter elements both the filter unit.

Code No	Description
1 02 01	<u>BFW PUMP & TURBINE - 104 J/JT :</u>
01	<u>BFW Pump - Standby Pump - 104J :</u> The following jobs were carried out in this pump.
	a) Replaced casing end cover gasket by new one. As it was leaking while normal running.
	b) Replaced the outer end Mech. seal assembly by new one. Since, in old assembly we found scoring on both Rot ary & stationary seat faces.
	c) Checked the journal bearing, Inboard bearing was found in good condition assembled the same whereas in the outboard bearing scoring was found on the white metal lining, so it was replaced by new one. Inboard Bearing (old) = 0.007" Outboard Bearing (New) = 0.006"
	d) Checked the thrust bearing. Found in good condition and assembled the same. Rotor thrust was found to be 0.018"
	e) Cleaned the oil tank, oil cooler and oil filter element.
02	<u>DRIVE TURBINE - 104 JT (Elliott Turbine)</u> Turbine was taken for complete overhauling. After dismantling the turbine following were observed and accordingly corrective action were taken
	a) No Silica deposition was observed on the Rotor.
	b) Wear & Tear was found on the thrust bearing (Ball Bearing) Also it was loose on its inner race. Assembled the new Bearing SKF 6310 by putting locktite on inner face of the bearing.
	c) The journal bearing clearances found on higher side. Replaced both inboard and outboard bearing by new assembly. Coupling side Bearing(Inboard berg.) = 0.011" Governor side Bearing(Outboard ") = 0.011"
	d) After putting the rotor in centre position, Measured the clearance between first wheel to sector and sector to second wheel. The clearances are Between First wheel to Sector = 0.030" Between Sector to Second wheel = 0.100"

Code No

Description

- f) Checked the axial float of the Rotor it was found to be 0.005".
- g) Overspeed trip assembly was cleaned.
- h) Inspected the Governor valve assembly since it was passing, the valve at full closed condition after opening the cover, it was noticed that the valve seat was not tight fitted on the valve body. A gap of 0.010" to 0.015" was there due to this valve seat was having a little tilting movement and uneven seating on the body sheet. Removed the valve seat, it was found that OD of the valve seat was less by 0.019" compare to the ID of the valve body.

Assembled the new flange on valve body with tight fit & tack welded with the body. Then fitted the valve spindle checked for its full contact. Found okay.

While fixing the Governor linkages on the Governor valve spindle, the full travel of the spindle was set at 7/16". After taking the turbine on slow role, the turbine could maintain its slow speed even after full opening of the up steam control valve, this indicated there is no passing through this governor valve.

- i) Checked the turbine OST. It was set at 4200 RPM
- j) Governor functioning was checked for various input signal. The reading are

3 Psi	-	1350 RPM
6 Psi	-	1700 "
9 "	-	2350 "
12 "	-	3100 "
15 "	-	3780 "

Code No Description

03 MEA PUMP DRIVE TURBINE - 107 JT
 (Murray Turbine)

As a preventive maintenance check up, we have inspected the Radial bearings and thrust bearing Bearings were found in good condition. Reassembled the same bearings. Coupling between turbine to pump and pump to pump were lubricated.

Clearance Readings :

Journal Bearing Inboard side = 0.005"

Journal Bearing outboard side = 0.005 to 0.006"

Thrust = 0.011"

1 02 02

BFW PUMP & TURBINE 104JA/JAT :

01 BFW Pump - 104 JA :

The following preventive maintenance jobs were carried out.

- a) Inspected both inboard and outboard journal bearings. Found minor scoring on the bearing sleeves. Also we found increase in diametrical clearance to a max. value of 0.008". Replaced both the journal bearings by new assembly.

Clearances were measured after putting new bearings.

Coupling side Bearing = 0.006"

(Inboard bearing)

Outboard bearing = 0.005"

65 Code No

Description

b) Checked the Rotor float, after it was found to be 0.019" dismantling thrust bearing, we noticed wear and tear on the shoe rivits & hence assembled the thrust bearing with new thrust shoes. Checked the Rotor float it was found to be 0.015".

c) Opened the main lube oil for its abnormal sound while running. Found looseness in the lock nut and lock washer of Drive gear. Apart from this the remaining parts are found in good condition. Assembled the pump.

d) Cleaned the oil tank

e) Cleaned the oil cooler & seal pot cooler.

f) Also cleaned the oil filter.

02 DRIVE TURBINE (Terry Turbine - 104 JAT)

The following preventive maintenance check up was carried out.

a) Replaced the carbon ring packings of front and rear glands. Since it was leaking.

b) Checked the journal bearings. More clearance was found on coupling side bearing, replaced this by new one. The Governor side bearing was found okay.

Coupling side Bearing (New) = 0.005"

Governor side Bearing (Old) = 0.007"

c) Thrust bearing was checked. Minor wear & tear was noticed on the thrust shoe. Assembled the thrust bearing with new shoes. The Rotor was found to be 0.019".

d) Replaced the carbon ring packing of the Governor valve spindle, since steam was leaking through the valve spindle.

e) Cleaned the over speed trip assembly.

f) Cleaned the oil tank, oil cooler & oil filters.

g) Turbine was checked for its OST and it was set at 4200 RPM

Code No

Description

h) Governor function was checked.
For various signal input. The readings are

7 Psi	-	1800 RPM
8 Psi	-	2050 "
9 Psi	-	2600 "
12 Psi	-	3100 "
15 Psi	-	3800 "
Max.	-	3900 "

Code No Description

1 03 01 I.L.FAN TRAIN - 101 BJ :

The complete I.L.Fan train was taken for general overhauling as a preventive maintenance check up.

01 IL Fan :

Inspected both the Journal bearings. Bearings were found in good condition. Checked the diametrical clearances, found within the allowable limit. Boxed up the bearings.

- I.B.Bearing clearance : 0.003" to 0.012"
- O.B.Bearing Clearance : 0.003" to 0.001"

02 Gear Box (Speed Reducer)

After opening the top cover, all the four journal bearings were inspected found in good condition. Checked the diametrical clearances found within the allowable limit. Also checked the teeth of Gear & pinion. Found okay. Checked the Backlash in Gear & pinion teeth, it was found to be 0.016" (Recommended 0.013" to 0.017") Thrust Bearing (Ball Bearing 216 KC1) of G.B. was replaced by SKF 6216 KC1 Bearing.

Also it was noticed wear and tear on the coupling piece of oil pump fitted in the Gear shaft. So, it was decided to replace the complete pump assembly by new one. The old one will be kept as a spare after repairing the coupling piece. Cleaned the L.O. Filters and L.O. Cooler.

<u>Bearing clearance .</u>	<u>Gear shaft Bearings</u>	<u>Pinion shaft Bearings</u>
Turbine side Bearing	0.003"	0.003"
I.L.Fan side Bearing	0.003"	0.006"

03 Drive Turbine (101 BJ) :

This turbine has been taken for overhauling. Accordingly casing cover was opened and taken out the Rotor assembly. Rotors was found in good condition. Cleaned the Rotor wheel blades manually. Removed the old thrust bearing (SKF 6310) & fitted a new bearing in place of it. Assembled the Rotor with new journal bearings & Carbon packings.

Code No Description

Bearing clearance :

I.B. Bearing = 0.007"
 O.B. Bearing = 0.007"

Carbon Seal clearance was maintained between 0.002" to 0.003".

Woodward Governor :

We have noticed that the Governor oil console was fully contaminated with mud and other foreign particles. So it was decided to dismantle the Governor & clean its internal thoroughly. After dismantling we found some mud particles & also more wear & tear in the thickness and small accumulator springs. After cleaning the internals assembled the Governor with new accumulator springs. (Both Big and small springs were replaced). Also replaced the oil seal of powerpiston. Turbine was checked for its OST. It was tripped at 4350 rpm.

Thereafter the governor was checked for its speed at various pneumatic settings. The readings are at

15 Psi	-	1460 RPM
12 "	-	2120 "
09 "	-	2760 "
06 "	-	3430 "
03 "	-	4190 "
Below 3 Psi	-	4210 "

1 11 01

Methanator - 106 D :

It was planned to replaced the Catalyst of Methanator during this turnaround. Accordingly the vessel manholes were opened, necessary blinds were provided. Top screens and bottom screens were removed. Screens were found in good condition. Old catalyst were unloaded and vessel inspection was done by Inspection staff. Thereafter loaded new catalyst and fixed the same screen. The vessel was boxed up after the catalyst loading was over.

Code No	Description
1 12 01	<u>PRIMARY REFORMER - 101-B :</u>
	01 All arch burner blocks (126 Nos) which are made of dense castable refractory was replaced by new modified Burner block RPC-ALFIBONL-2300 which are supplied M/s. Christy Refractories Company, U.S.A.
1 12 02	<u>PRIMARY REFORMER JOBS - 101 - B:</u>
	01 All catalyst tubes (336 Nos) were cleaned externally.
	02 Damaged, outlet manifold insulations were repaired at various points in all the eight header.
	03 Damaged Funnel slabs were replaced by new slabs (Imported 125 Nos)
	04 Reformer Funnel No.1 and 9 wall thickness was increased from 6 inch to 9 inch.
	05 Reformer bottom header drain valve (8 Nos) glands were repacked.
	06 AG Full line modification was carried out on Row No. 3 & 5, as it was done on Row No.4.
	07 Catalyst tube top plug flange leak were attended for following tubes
	733, 838, 612, 505, 439
	08 Atomising Steam line union leaks were attended for the following arch burners.
	203, 409, 504, 505, 507, 509, 701, 706, 707, 708, 709 and 809.
	09 Atomising Steam line valves were replaced with new one for following Burner.
	214 & 702
	10 Purging Steam line valves were replaced with new one for the following arch burners.
	106, 304, 412, 610, 701, 705, 708, 712, 713, 302, 309, 311, 911.

Code No	Description
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- 11 Naptha Needle valves were replaced for the following arch burners.
106, 109, 205, 206, 408
- 12 Purging steam line chocking was removed for the following arch burners.
504, 604, 607, 610, 707, 708 and 713
- 13 All arch burners primary Air resisters were tack welded in open condition.
- 14 Secondary air resister of all arch burners were made operable.
- 15 Naptha Burner No. 509 Llbow leak was attended.
- 16 Naptha Duplex strainer (2 Nos) were cleaned.
- 17 End plug of Transferline (107L) was opened for inspection and boxed up with new gasket.
- 18 3" Ø spool piece was welded to arrest overflow iron sensing of T 1-1-117 on Transfer line.
- 19 Reformer radiant zone, HL/LT Convection zone ID fan and its chimney were painted.

1 12 03

AUXILIARY BOILER :

The following major jobs were carried out.

- 1) Burner No. 1 & 2 were overhauled
- 2) Replaced the burner housing on burners No. 3, 4 & 5 from DGM 26 model to old EA 21 model. This is to make better draft condition for all Burners. since these burner No. 3, 4 & 5 were operated with EA-21 coppus burner.
- 3) Fuel line inlet strainers were cleaned in all the five burners.
- 4) West side panels (5 Nos) of Aux. Boiler were replaced by modified panels which are made of SS-310 plate.
- 5) Naptha to Aux. boiler leaky plug valve was replaced with new one of 2" Ø size.
- 6) Burner No. 2 Naptha Rotameter upstream valve was replaced and its atomising Steam line elbow leak was attended.

Code No	Description
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- 7) Auxiliary Boiler Coils blow-down valves glands were repacked.
- 8) Atomising steam Control valve (PIC V-181) Bypass valve bonnet leak was attended. Its upstream leaky glanga gasket was changed.

No. of ...
 Date ...
 By ...

1000 01 ...
 1000 01 ...
 1000 01 ...

Code No

Description

1 13 01

COOLERS CLEANING :

Following Coolers & Strainers were cleaned by Rod packing and water flushing.

- a) BFW Pumps (104J & JA) oil Coolers - 2 Nos
- b) BFW Pumps turbine (104JT & 104 JAT) oil cooler-2Nos
- c) ID Fan Turbine L.O.Coolers - 2 Nos
- d) MEA Turbine Cooler (107 JT) - 1 No
- e) BFW Pump CW Inlet line Strainer - 2 Nos
- f) BFW Pump Seal Coolers - 4 Nos
- g) ID Fan Turbine CW Inlet Strainer
- h) MEA Turbine (107JT & JAT) CW Inlet line Strainers - 2 Nos.
- i) Condensate Pump 170J & JA Seal Coolers - 2 Nos

1 13 02

Equipment No. 131 JC :

The old tube bundle made of CU-Ni (70-30) tube was replaced with new tube bundle of SA 249 GR 304 5/6" x 18 BWG tube during this turnaround. The tube bundle was Hydrotested on shell side at 8.1 Kg/cm²g. Found ok.

Equipment 136 C :

Retubing of remaining 197 tubes (Top seven Rows) were carried out with S.S.304 3/4" OD x 14 BWG tubes. Now all the tubes are of SS 304 tubes shell side hydrotest was done at 46 Kg/cm²g. Found Ok.

Code No	Description
1 15 01	<u>BOILER INSPECTION :</u> 01 <u>Annual Inspection of Wast Heat Boil (101CA/CB)</u> <u>Boiler No. GT-1631</u>

Open inspection of Steam drum was carried out.
Following major jobs were done.

- A) BFW Inlet Distribution Header 1st segment (North side) was found damaged on its water distribution hole. Due to erosion most of the holes were found enlarged. The complete header was made of 3 segments. The distribution holes of other segments were found in good condition. Removed the damaged length segment & installed new pipe of 6" \varnothing x Sch.40 (ASTM 106 Gr.B quality) having 1/2" \varnothing hole at equidistance as per old pipe piece removed.
- B) Tightened the loosened clamps which were provided on cyclones.
- C) Replaced the leaky (gland leak) Eye-Hye tapping valves (North side) by new angle valves of IBR quality procured from M/s. BHLL.
- D) Replaced the LG drain valve (south side) by new one, since the old one was passing.
- E) Replaced the Gaskets of 101CA/CB down corner flange.

Steam drum alongwith BFW system was hydrotested at 145 Kg/cm²g in presence of Boiler Inspector on 20/2/90

1 15 02	<u>RV'S TESTING :</u> <u>Job done on Steam Drum RV :</u>
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- 1) Lapped the bottom seat (Nozzle seat) of all the 3 RV's at position.
- 2) Replaced the Disc.Insert by new one on North side RV & Middle RV. assembled the south side RV with old Disc.insert after proper lapping.
- 3) All the 3 RV's were tested in presence of CBI on 01-03-90.

Ammonia (Mechanical)

Code No Description

Sr.No.	RV Description	Popping Pressure	Reset Pressure
1.	North RV	116.0kg/cm ² g (At position)	111.0kg/cm ² g (At Position)
2.	Middle RV	115.0kg/cm ² g (at position)	112.0kg/cm ² g (at position)
3.	South RV	114.0kg/cm ² g (at position)	103.0kg/cm ² g (at position)
4.	Super heater RV	112.0kg/cm ² g (at panel)	105.0kg/cm ² g (at panel)

02) Annual Inspection of L.P.Boiler (112C)
Boiler No. GP-1632

1. Following jobs were carried out.
 1. North side channel cover was removed. Since this was faulting for the replacement of 114C. Tightened this channel cover with new gasket.
 2. Hydrotest was carried out at 15.8kg/cm²g in presence of CBI on 16/02/90.
 3. Both the RV's were tested in workshop.

Set pressure	:	140 Psig
Re Set pressure	:	130 Psig

Code No Description

1 17 01 VALVE REPAIR AND REPLACEMENT :

01 The following Relief valves were dismantled from the position and fitted back after testing.

Sr. No.	Item Description	RVNO.	Set Pressure	Reset Pressure.
1.	M.S.Heater RV	RV-MS-9	600Psi	540 Psi
2.	103JAF Sentinal RV	RV-103JAF	46kg/cm ² g	42kg/cm ² g
3.	New BFW Coil RV	RV BFW-1	1278Psi	1147 Psi
4.	11ata Steam RV	RV-S	210Psi	190 Psi
5.	Air Compressor discharge RV.	RV-101J	521Psi _g	443Psi _g
6.	1st stage Refrig-erent flash drum.	RV110F(A)	7.0kg/cm ² g	6.5kg/cm ² g
7.	----- do -----	RV110F(B)	7.0kg/cm ² g	6.5kg/cm ² g
8.	2nd stage refrig-flash drum.	RV-111F	6.4kg/cm ² g	6.0kg/cm ² g
9.	3rd Stage refrig-flash drum	RV-112F	6.5kg/cm ²	6.0kg/cm ²
10.	Refrigerant Comp. Discharge RV	RV-109A	270Psi _g	240 Psi _g
11.	K1-RV of PGR Plant	K1-RV	57.0kg/cm ²	51.6kg/cm ²

02 The following valves were repaired.

1) SP 71 valve :

This valve was very hard to operate. Complete valve was removed from its position. After dismantling, it was found that high spot/scratches on seat wedge. After smoothening the seat wedge assembled the valve with new bonnet gasket. Thereafter valve was checked for its opening & closing. Found okay & installed the same.

ii) Steam to Primary Reformer check valve was inspected found okay.

Code No	Description
3)	Condensate stripper (104E) Inlet Condensate line control valves (LCV 3A) up stream and down stream leaky block valves were replaced by 1½" Ø x 300 #1 SS 304 valve.
4)	11Kg/cm2 steam to NG Jacket leaky drain valve was replaced by new one.
5)	TRC-2 upstream leaky drain valve was replaced by new one.
6)	PICV-17 L/S trap leaky isolation valve was replaced.
7)	38kg/cm2g Steam to HTs line trap with block valve were replaced.
8)	V-1 upstream trap and its block valve were replaced.
9)	38kg/cm2 Steam battery limit upstream line trap and drain valve were replaced.
10)	Jump over valve of PICV-13A/B were replaced.
11)	104 JAT steam inlet line drain valve was replaced.
12)	Steam drum (101F) Eye-eye tapping valves 4 Nos were replaced by new one.
13)	SP.4 valve limit torque system was overhauled as it was not operating properly both in electrical and manual operating condition.
14)	SP-5 & SP-3 valves were checked and made operable.
15)	LTS Bypass motor operated valve SP-5 down Stream flange leak was rectified by welding & fitting the pitting area of flange.
16)	New drain valve was provided in LTS outlet desuperheating station.
17)	101E outlet motor operated valve operation was checked. Found okay.
18)	106D- Inlet chain valve gland was repacked.
19)	107JF sealing steam line block valve bonnet was replaced.
20)	FICV-13 down stream plug valve was greased as it was not operable.
21)	107F Bottom outlet line drain valve, bonnet was replaced with new one.

Code No	Description
22)	IRCV-18 Up stream drain valve was not operable, so it was replaced with new one.
23)	V-25 plug valve was made operable.
24)	112-JF Steam Inlet rack valve gland was re-packed.
25)	LC.2 level troll leaky drain valve was replaced.
26)	102JT Steam inlet line drain valve D/S of second isolation valve was replaced with new one.
27)	3.5 ata steam Hydraulic quick shut off valve was overhauled, since it was not operable.
28)	172J Discharge valve leaky diaphragm was replaced.
29)	103JAT TTV D/S flange leak was rectified and welding and filling the pitting on flange faces. Boxed up the flange with new gasket.
30)	CW Jump over valve was overhauled since it was very hard to operate.

1 19 01

VESSEL JOB :01 CO2 Stripper - 102 EA/EB :

During this turnaround both the stripper 102 EA/EB has taken for open inspection. Accordingly after putting necessary blinds and purging the vessel opened the top man holes. Following were observed & accordingly necessary repair work was carried out.

A) 102 EA (Reformer side Stripper)Observation:

- 1) All the bolts of MHA distributor inlet flange (connected to vessel flange) was found sheared/missing.
- 2) Both the side overflow plates was found cracked partly & broken into two pieces.
- 3) All the clamps of distributor header were found loose
- 4) Complete rows (17 rows) of trays were inspected Found in good condition, boxed up the same.
- 5) Checked the distributor pad. Found in good condition.

Code No	Description
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RECTIFICATION:

- 1) Provided new over flow plates of SS 316 3mm thick on both the sides.
- 2) Tightened the MEA Inlet line flange. Connected to the vessel flange with new bolts.
- 3) Distributor header clamps were tightened .
- 4) As a modification in order to avoid vibration of distributor header, we have provided a fabricated I Beam 6" size made of SS 316 across the Distributor header. This Beam was supported by bolting at both the ends. The attached fig shows the fitting installation.
- 5) At the bottom of vessel, the nozzle connected to 105 VA is fitted with a SS 304 liner. Checked for any leakage of liner on the welding by injecting the air through weep hole. Found a small crack on the welding joint, repaired by grinding and welding.

B) 102 EB (Silo side Stripper)
Observation :

- 1) All the bolts of MEA distributor inlet flange (connected to vessel flange) was found sheared/missing.
- 2) One side of overflow plates (Silo side) was found cracked and broken into pieces.
- 3) All the clamps of distributor header were found loose.
- 4) Complete rows (17 rows) of trays were inspected. Found in good condition. Boxed up the same.
- 5) Checked the demister pad. Found minor damages and looseness. Then it was decided to replace demister pad by new assembly. (Indigenous assembly)

RECTIFICATION :

- 1) Provided new over flow plates of SS 316 3mm thick (Silo side)
- 2) Tightened the MEA Inlet line flange connected to the vessel flange with new bolts.
- 3) Distributor header clamps were tightened.
- 4) Removed the old Demister pad and installed new spare demister pad assembly.

Ammonia (Mechanical)

Code No	Description
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- 5) Provided a fabricated I Beam 6" size made of SS 316 across the distributor header. This Beam was supported by bolting at both the ends. This is to avoid damaging of M.A. inlet flange bolts due to vibration of distributor header while running.
- 6) Inspected liner of Nozzle. Connected to 105 CB. Since M.A. was leaking through weep hole. A crack was noticed on the liner welding joint, by injecting the air through weep hole. It was repaired by grinding and welding.

INSPECTION OF VESSELS :

- 1) Secondary Ammonia separator (107F) vessel was inspected. Found okay.
- 2) All the three flash drums (110F, 111F, & 112F) were inspected. In 111F & 112F vapour outlet plates were found fallen. Refixed the same by welding.

1 20 01

FABRICATION JOBS :

- 1) Secondary Reformer (103D) jacket water overflow collection Pan was repaired by providing an additional plate on it.
- 2) Blow down drum (156 F) LCV 21 Bypass line was provided so as to connect blow down water to blow down cooler (174 C). This will facilitate easy maintenance of LCV 21.
- 3) Part of the condensate line (3" ϕ x Sch. 80) of 111 CA CB was replaced.
- 4) Replaced C.S. 12" ϕ x Sch. 160 45⁰ elbow at the outlet line of 124 C cooler. Since old elbow was showing thickness reduction much lower than the allowable value.

ANNUAL TURNAROUND - 1990AMMONIA PLANTINSPECTION JOBS

Code No.	Description
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During Shutdown February-March 1990, inspection of various vessels, furnaces, equipments and pipe lines was carried out. The details of observations made during visual inspection and other tests are as under.

1 31 01

01 PRIMARY REFORMER - 101-B :(A) Radiant Zone :

- i) Visual inspection of outlet manifold insulation, burner blocks, tunnel slabs, brick walls and roof insulation was carried out. The findings were immediately reported to the shift Engr. (Ammonia) for action.
- ii) D.P.test of both the filed weld joints of all the outlet manifold as well as all the weld joints of eight risers was carried out. Top most weld-joints in the furnace (D joints) of every fifth catalyst tube was checked by D.P.test. No defect was observed.
- iii) Creep measurement of outlet manifold was carried out at various locations. The detailed report is attached herewith.
- iv) Spot Radiography of Riser joints and complete radiography of Butt weldjoints of outlet manifolds (sixteen nos) was carried out. No service defect was observed in any of the weld joints.
- v) Creep measurement of Catalyst Tubes of 7th and 8th row was carried out below D weld joint and recorded.

(B) H.T.CONVECTION ZONE :

- a) During the shutdown, replacement of tube supports of Mixed Feed Coil (F-coil) was undertaken through M/s.Cedco, Baroda. Welders qualification tests and welding performance test were undertaken for 7 (seven) welders.

Visual inspection, D.P.test of tube support plates, weld joints with convection zone walls were carried out.

Ammonia (Inspection)

Code No	Description
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- b) Thickness measurement of 'F' (Mixed Feed) coil tubes and elbows was carried out and recorded.
- c) Creep measurement of Mixed Feed Coil tubes at random was carried out and recorded.
- d) Hardness of old elbows was measured. It was found to be 175 to 200 BHN.
- e) All the root weld joints and Final weld joints of 'F' coil (total 43 joints) were checked by D.P. test followed by radiography test. Necessary repairs were carried out at the defective locations and the joints were radiographed before final acceptance.

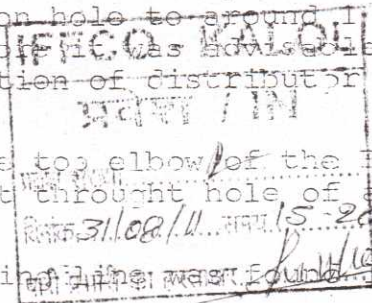
02 AUXILIARY BOILER :

Thickness measurement of the bottom headers of East wall, west wall and North wall tubes was carried out and recorded.

03 STEAM DRUM 101-F :

Visual inspection and thickness measurement of the shell was carried out. The following are the observations.

- i) Shell assumed greyish black colouration.
- ii) North end of the BFW inlet header distributor adjacent to socket was found to be badly eroded all around the periphery of the pipe internally as well as externally. On east and west side, the header has punctured as erosion has eaten away material and enlarge the distribution hole to around 1 1/2" dia. at both sides. Therefore it was advisable to replace the horizontal portion of distributor header and which was done.
- iii) The first weld joint in the top elbow of the BFW inlet header at North end has got through hole of approx. 1.0mm dia.
- iv) One clamp of phosphate dosing line was found loose.
- v) Scattered minor pittings and sticky mill - scales were observed on North dished end. One no pitting mark on top side of North dished end just above the manhole was observed having approx. 2mm depth which was observed in previous inspections also.
- vi) One No support bolt of cyclone separator was found sheared.
- vii) Scattered removed spots of scales/Depressions of approx. 1mm maximum. Depth were observed on the shell surface.



Code No

Description

- viii) The internal surface of the downcomers appeared to have some minor scattered pittings.
- ix) Some clamps of separator plates were found loose.
- x) Thickness measurement was carried out. Reports have already been given to maintenance including Boiler Inspector.
- xi) Thickness measurement of downcomers and risers of 101-F steam drum was carried out at approachable areas.

04 METHANATOR 106 - D :

- i) The shell was found to have grayish black colouration.
- ii) The internals of the vessel was found free from any corrosion/erosion effects. However, at three places three tip mark line depressions of 4 to 5 mm dia were observed to have maximum 1 mm depth. These seems to be present since fabrication time.
- iii) All the weld joints were found to be in good condition.
- iv) Gas outlet (inert and allumina) box was found in good condition. The netting over the box was also intact in position.
- v) The netting around the catalyst unloading pipe was observed to have got detached from one side due to tack weld breakage.
- vi) Surface of thermowell pipe was found in good condition and free from any corrosion/erosion attack.

05 TRANSFER LINE 107-D :

- i) Slight bulging was observed around the 8th riser in the reinforcement pad placed over the liner and also in the liner just at the west of the reinforcement pad (at the bottom side) some corrugations were observed.
- ii) Sixth and seventh riser reinforcement pads on liner were observed to have some bulging at North side.



DHSAS 18001

BUREAU VERITAS
Certification

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Ammonia (Inspection)

Code No

Description

- iii) Fifth riser reinforcement pad on liner was found intact i.e. without any considerable bulging.
- iv) Slight bulging has taken place in reinforcement pad around the fourth riser stub-end.
- v) The area around the third riser stub end was observed to be in good condition.
- vi) Near first and second riser stub end, reinforcement pad was found slightly bulged.

06 CO₂ STRIPPER 102-EA :

The visual inspection and thickness measurement of the shell were performed. Following are the observations.

i) Between 16th and 17th Tray :

The shell had assumed blackish colouration. Very thick coating were observed on trays as well as on shell surface. All the weld joints of down-comers plates supports and supporting horizontal ring were in good condition. All the tray fixing nuts bolts were intact in position.

ii) Between 15th and 16th tray :

The longitudinal and circumferential weld joints were in good condition. Coating was found to be present on the shell and tray surface. However, the surface of the shell was free from any corrosion or pitting marks.

iii) Between 14th and 15th tray :

Sealing/coating of thickness around 1 mm was found on shell as well as on tray surface.

iv) Between 2nd and 3rd tray :

The weld joints of the shell was found in good condition. The weld joint of the blind flanged nozzle with shell I.L. was also found in good condition.

Code No	Description
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- v) Between 3rd tray to 14th tray :
Coating was found less as compared to bottom portion of the shell. The weld joints were found in good condition.
 - vi) Between 1st and 2nd tray :
The shell surface as well as trays were observed in good condition i.e. free from any corrosion/erosion or pitting.
 - vii) Top compartment :
 - a) The overflow/weir plate on west side was found lying dislodged as all tack welds holding the plate in position were sheared off. The tray plate on which the overflow plate was tack welded had also got torn out at four places.
 - b) A crack of 1 inch length was observed in the West side distributor branch support plate at North corner.
 - c) All the nuts and bolts of the distributor inlet flange in South East corner of shell were found missing.
 - d) Three bolts of the inlet line top flange on distributor were found missing.
 - e) East side distributor branch pipe support clamp at North East was found loose.
 - f) Pipe support (1 inch dia) of the inlet distributor at East side (North end) was found damaged.
 - g) Demister pad, supports etc. were in considerably good condition.
 - h) To assess the condition of shell surface behind the wear plates in bottom most compartment, two nos of wear plates were removed and the shell was visually inspected. Thickness was checked on the shell behind wear plates. No sign of corrosion was observed on the shell. The thickness readings were recorded.
- The nozzle connecting 105 CA was D.P. tested and air tested for leakage through the lining as some bulging was observed on the nozzle lining. One pinhole was observed which was ground off, rewelded and D.P. tested, also air tested.

Code No

Description

07 CO₂ STRIPPLER 102-EE :

The visual inspection and thickness measurement of the shell was carried out. Following are the observations.

- i) The shell assumed blackish colouration. Thick coating like deposit was observed almost throughout the shell and the trays. The coating appeared to be thicker at the bottom part of the shell than its top part. No pitting or corrosion was observed on the shell. The weld joints of the vessel were in good condition.
- ii) Between 2nd and 3rd tray from top, the weld joint of blinded nozzle with shell was observed to have some undercutting in four inch length.
- iii) On the first tray from top, some portion of it got damaged by shearing in 3" length approx. between the liquid distribution holes causing a through -fare for liquid to flow down.
- iv) The weir plates on the tray on west side was found broken into three pieces as all the tack welds sheared off. Maintenance engineer was informed for repairing it.
- v) Some studs of the MEA distributor branch on west side were loose. The tack welding of distributor branch support both in North side and South side was found sheared off.
- vi) The bolts of the flange joint of the incoming nozzle were found missing.
- vii) L.P.T. Air and soap solution test of the nozzle liner connecting 105 CE was carried out as some bulging was observed on the nozzle lining. A small crack was observed in D.P.test and Air test which was repaired. After repair welding D.P.test and Air test were carried out confirming the soundness of the liner.
- viii) Thickness measurement of the vessel was done from inside. The wear plate in the bottom compartment was removed. Visual inspection and thickness measurement in the wear plate area also were carried out.
- ix) The tack weld joint of wear plate in the North end of the East side distributor tray found sheared off.

Code No	Description
08	<u>AMMONIA SEPARATOR 107-F :</u>
	<ul style="list-style-type: none"> i) In general the shell assumed greyish colouration. ii) Minor scattered pittings were observed on the shell surface. iii) All the weld joints in the vessel were found to be in good condition. iv) Some trace of rusting was observed in 1 1/2" x 1 meter area at the top side of the shell near man hole. v) Thickness measurement of the shell was carried out and recorded.
09	<u>AMMONIA FLUSH DRUM 111-F :</u>
	<ul style="list-style-type: none"> i) All the weld joint of the shell were found in good condition. ii) The demister and including their supports etc. were found intact and in position. iii) The impingement plate covering the vapour inlet line was found displaced as the tack welding got sheared off. iv) The shell assumed brownish colouration. v) Ultrasonic thickness measurement of the shell and dis. heads was done and the readings were recorded.
10	<u>START UP HEATER 102-B :</u>
	<p>Visual inspection and thickness measurement in the start up heater coils, coil-support and refractory lining were carried out. The observations are as follows.</p>
	<ul style="list-style-type: none"> i) The tube coils in general assumed grayish-black colouration. ii) Castable refractory wall behind the tubes was found to be in good condition except on the East side just below the top dome where part thickness of the castable has spallen. Similar spalling has also taken place on South-west side near top dome in an area of 6 inch x 12 inch approx. iii) Tube turn No. 47 and 33 (as counted from bottom) were observed to be not resting on supports.

Code No	Description
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- | | |
|-----|--|
| iv) | On the top st.length of tube going out from the start up heater was observed to be slightly buckled. |
| v) | Thickness measurement were recorded. |
| 11 | Ultrasonic Flow detection of the following pipe lines weld joints was carried out. <ul style="list-style-type: none"> i) SG-33-14" ii) SG-21-14" iii) SG-22-12" iv) SG-23-12" v) SG-34-14" vi) 105 ATA Steam line from superheater coils to 103 MAT. |

The detailed report of ultrasonic testing alongwith the isometric sketches of pipelines indicating the location of the joint nos is made. Wherever the defect indications were noted during ultrasonic testing, radiography was carried out. No service defect was observed in radiography.

- | | |
|----|--|
| 12 | Radiography of the following joints/lines was carried out. <ul style="list-style-type: none"> i) Both the butt weld joints of all eight outlet headers of primary reformer - 16 joints. ii) Single exposure of the topmost weld joint of all eight risers - 8 exposures. iii) 114-C inlet lines, BF-17-3" & BF-18-3" - 4 joints(Root and final iv) 114-C inlet line SG-1-12" - 2 joints. (Root and Final) v) Joint No.2 of SG-22-12" - 1 exposure vi) Joint No.4 of SG-22-12" - 2 exposures vii) Two joints of SG-13-12" (Root and Final) viii) Two shots in 105 ata steam line joints. |
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Ammonia (Inspection)

Code No	Description
13	Thickness measurement of the following pipelines was carried out.
1	B -10H-2"
2	BO-11H-2"
3	BO-12H-2"
4	BO-13H-2"
5	BO-14H-2"
6	SG-6-12"
7	PG-11A-16"
8	PG-11A-16"
9	PG-21-20"
10	PG-10-18"
11	SG-11-10"
12	SG-42-4"
13	SG-13-12"
14	SG-33-14"
15	SG-12-14"
16	SG-18-18"
17	SG-34-14"
18	SG-21-14"
19	SG-23-12"
20	SG-25-3"
21	PG-6-18"
22	PG-18-12"
23	PG-3-18"
24	PG-14-16"
25	PG-15-14"
26	PW-1-6"
27	PW-4-2 1/2"
28	PW-17-4"
29	PW-19-4"
30	PW-13-12"
31	PW-30-14"
32	PW-29-10"
33	MEA-1-12"
34	MEA-2-4"
35	MEA-3-4"
36	MEA-20-12"
37	MEA-3-12"
38	MEA-21-12"
39	CO-1A-18"
40	SG-35-12"
41	CO-18-18"
42	SG-11-10"
43	SG-6-12"
44	PG-13-18"
45	PG-26-18"
46	PG-12A-14"
47	PG-12B-14"
48	MEA-25-3"
49	MEA-26A-2 1/2"
50	MEA-26B-2 1/2"
51	MEA-7-10"
52	MEA-9A-8"
53	MEA-9B-8"
54	MEA-12A-12"
55	MEA-12B-12"
56	MEA-11-14"
57	MEA-28A-12"
58	MEA-28B-12"
59	MEA-29A-12"
60	MEA-29B-12"
61	CO-7-24"
62	PW-20-6"
63	Steam let down lines i.e i) MS-12-8" ii) MS-9-10" iii) MS-10-6" iv) MS-14-8" v) MS-13-8" vi) HS-11-6" vii) HS-9-3" viii) HS-12-6"
64	SG-14-10"
65	SG-15-10"

Code No

Description

- 14 Low Temperature shift converter Inlet
Boiler 112-C :

Thickness measurement of both the dished ends and middle shell was carried out. The report submitted to Inspector of Boiler.

- 15 Magnetic flux measurement was carried out on the followings.

- 1 105-JT old rotor
- 2 105-JT New rotor
- 3 105-JT Top casing.
- 4 105-JT Bottom casing
- 5 105-J Gear Box
- 6 105-JLP Rotor
- 7 105-JLP Bottom casing
- 8 105-JHP Top casing.
- 9 105-JHP Bottom casing
- 10 105-JHP Rotor
- 11 101-JT Rotor
- 12 101-JT-Top casing
- 13 101-JT Bottom casing.

The detailed reports alongwith the sketch have been made.

Ammonia (Mechanical)

Code No	Description
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1 41 01	Following tube bundles were replaced.
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Equipment No. 114-C :

Due to recurring leakage problem (tube to tube sheet joint) in the existing tube bundle, the same was replaced by complete new Heat Exchanger which was procured from M/s. L & T, Bombay. The job of removal of old Heat Exchanger (28 tonne wt) from its position and installing new Heat Exchanger (32 Tonne wt.) was carried out by M/s. Cecco, Baroda (used our Hi Crane having 60 feet boom length)

The job of pipe line modification was carried out by IFFCO staff.

Necessary IBR approval was taken and hydrotested at 145 Kg/cm²g on 20/02/90 in presence of CBI

1 41 02	HEAT EXCHANGER :
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End covers of following Heat Exchanger were opened for cleaning the tubes by Hydrojetting. Boxed up the covers after Hydrotest.

Sr. No.	Equpt No.	Qty	Shell side Hydrotest Pressure	Remark
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
1	108C	4 Nos	7kg/cm ² g	All the tubes were cleaned by Hydrojetting.
2	105CA/CB	2 Nos	45kg/cm ² g	105CA:150 tubes were unable to clean. out of 2750 tubes. 105CB:75 tubes were unable to clean out of 2790 tubes.
3	111CA/CB	2 Nos	8.0kg/cm ² g	111CA: All the tubes were cleaned. 111CB:125 tubes were unable to clean out of 2790 tubes.

Ammonia (Mechanical)

Code No	Description		4	5
1	2	3	4	5
4	110C	2 Nos	-	All the tubes were cleaned. No Hydro-testing.
5	128C	1 No	-	do
6	127CA/CB	2 Nos	31.5kg/cm2	127CA: Three leaked tubes were plugged. Row No Tube NO from from Bottom 101 J side 10 35 18 22 27 21 12CB: found Ok.
7	129JC	1 No	-	All tubes were cleaned. No Hydro-testing.
8	130JC	1 No	-	do
9	101JCA	1 No	-	do
10	101JCA/JCB gland condenser	1 No each	-	do
11	173C	1 No	-	do
12	174C	1 No	-	do
13	175C	1 No	-	do
14	101J LO	2 Nos	-	do
15	102 J LO cooler	2 Nos	-	do
16	103 J LO cooler	2 Nos	-	do
18	101 JF & 103 JBT gland condenser	3 Nos	-	do



Code No	Description
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Following Heat Exchangers were opened tube bundle was pulled out, cleaned the tube bundle by hydrojetting and boxed up after hydrotest.

Sr. No	Equpt No	Qty	Shell side Hydrotest	Remark
18	109C	4 Nos	7.5kg/cm ² shell side 40kg/cm ² tube side	109C1A - One tube plugged Row No.6 from top and tube No. 8 from Silo side 109C1B - Found OK 109C2A - Found Ok 109C2B - Found Ok
19	116C	1 No	16kg/cm ² g shell side	Two tubes were plugged. Row No from top Tube No from silo side 3 2 9 11
20	124C	1 No	23kg/cm ² g shell side	Found okay

1 41 03

PRIMARY REFORMER - 101 B

01 Replacement of intermediate tube supports of mixed feed preheat coil 'F' of H.T.convection section of primary reformer.

JOB IN DETAIL : The mixed feed preheater coil 'F' was in operation for the last 15 years and during the last 2 - 2½ years, it had developed the following problems.

- i) All the Intermediate tube supports were damaged by burnt off and distortion of the seating portion.
- ii) Coil was completely fitted to one side nearly by 4" - 6" towards the free expansion end from the original horizontal position due to above mentioned tube supports distortion.



51

Ammonia (Mechanical)

Code No	Description
	iii) The end tube support plate (C.S.) also developed minor distortion and the C.S. bushes were burnt off.
	iv) The side walls of coil 'F' was damaged at certain areas due to falling off/cracking of L.H.V. refractory lining.
	v) Bearing brackets of intermediate tube supports were mostly in damaged condition.
	In order to rectify the above defects, the following repair job was carried out through M/s. Cadco Technical Services, Baroda vide our work order No.D-3820 dt. 17/10/89. Details of the job are as under.
	- Old damaged intermediate tube supports (4 Nos) and 1 No. C.S. end tube support were replaced by the following procedures
	- Header box side covers (2 Nos from bottom) of silo side were opened.
	- Two panels from bottom on cooling tower side were also opened.
	- L.H.V. insulation on both sides of coil 'F' (5½ thk) were removed by chipping and hammering.
	- Coil pipe joints to be outlet header (8 Nos) were cut by gas cutting and coil pipe joints to the inlet header (3 Nos) were cut by hacksaw. 32 Nos of elbow joints with the coil pipe on header box side were cut with gas cutting. Hence the coil pipes are made ready to pull out in pairs through wall No.3 opening of cooling tower side.
	- Each pair of coil pipe were pulled out of the coil assembly and thoroughly cleaned by compressed air.
	- Bevelling on cut portion of elbows, pipes, welds and stub ends of header were done by grinding to a degree of 37½
	- Old damaged C.S. guide plates of each tube supports tackwelded to the I beams were removed by gas cutting and the respective damaged intermediate tube supports were also removed, one by one.
	- All the old damaged brg. bracket supports were removed by gas cutting and these locations on I beam were smoothened by grinding to fix new brackets.

Code

Description

- Damaged end tube plate support was also dismantled and removed.
- New bearing brackets (8 Nos) of 25 Ni 20 Cr composition were tackwelded to the respective positions on I beam and their top levels were aligned with reference to the centre line of bottom header pipe stub ends. Final welding completed by S.S.310 electrode.
- New end tube support (1/2" thick) with C.S. bushings (48 Nos) of 5 1/2" I.D., 1/8" thick x 4 1/2" long were superimposed by 4 1/2" long, S.S.304 pipe bushing of 5 3/4" I.D. x 0.134" thick S.S. Bushings were tackwelded to the C.S. bushing as well as to the C.S. base plate. This end tube support plate is first erected over two Nos of newly installed bearings plate (2 1/2" x 2 1/2" x 5/8" thk) of 25 Cr - 20 Ni composition and then bolted up with existing side frames.
- 2 Nos of S.S.310 guide plate of size 115mm width x 6mm thick x 1000mm long were welded to the I beam towards the header box side of 1st intermediate tube support by keeping a distance of 15-18 mm from the centre of inter, tube support to the inner side of guide plate.
- 1st inter tube support carrying heat mark No. 1702 is installed in position and the S.S.304 guide plate of size 1000 x 115 x 6mm is also welded to the I beam towards the C.T. side keeping a distance as mentioned above.
- by all other plates as well as Int. tube supports were installed and levelled with reference to each other and with reference to the centre line of inlet header pipe stub ends.
- D.P. test and hardness testing of all bevelled portion of pipes and elbows were carried out.
- Pairs of tube were inserted from bottom to top and tackweld with corresponding stud ends were made.
- Root weld of all joints were made by TIG welding using 1/2 Cr - 1/2 MO filler rod (2.5 Ø mm) and D.P. tested X-ray of root weld were taken.
- Hot pass and final pass made by D & H chromotherme/ electrode of 2.5mm Ø & 3.15mm Ø.
- Final Radiography taken for all the complete joints.

Code No

Description

The following materials were procured and used for Coil 'F' repair.

Sr. No	Item	Matl.	Qty.	Remarks
1.	Intermediate tube support Drg.No. 01-DS-03156 sheet 1 of 1, Rev.'O'	25Cr-12Ni ASTM-A-447-50 type II	4	Procured from M/s. Patel Alloys Vatva. Ref.P.O. No. P-1603 dt. 27/6/89
2	Coil tube support brackets and end cover plate support Drg. No. 01-CS-03163 Sht. 1/1 Rev.'O'	25Cr 20 Ni	10 28 03	----- do ----- ----- do ----- ----- do -----
3	End tube support plate of ½" thick with C.S. & S.S. bushings. Drg. No. 01-01-CS-03157 sheet 1/1 Rev 'O'.	C.S.	01	Fabricated from Mech.W/shop.

02) INSULATION OF H.F. CONVECTION SECTION :

The wall area around coil 'F' upto a height of 118' elevation from bottom plate was insulated by 5½' thick supercera blanket of M/s. Lloyds Insulation, New Delhi. The details of the same are as given below.

- 1) Old insulations were removed including their C.S. retainers.
- 2) Surfaces were cleaned thoroughly by wire brushing.
- 3) S.S. 310 anchors of 135mm long were welded to the C.S. surface of wall at a pitch of 225 x 300 mm with S.S. 310 electrode. 111 by anchor Rod of S.S. 310 6mm dia x 138mm long welded at a spacing of 570 mm x 10 mm for fixing of S.S. 310 sheets.

Code No	Description
4)	<p>Standard supercera Roll blankets of 610 mm width is cut in proper length and inserted over the above anchoring system and pressured to bottom of stud. 111 by 5 layers of 111 lar blankets and last layer of ½" thick were pressed and these layers were kept in position by means of lock washers to get a final thickness of 131 mm thick. Then S.S.310 sheets of 0.5 mm thick and 1220 mm wide were cut into proper length and placed over the rods. These plates were hammered over. The S.S.rods to make holes and after preparing holes, plates are inserted over rods and washer is provided and tackwelded between the washer and rod.</p> <p>Simil. a ly all other portions were insulated. An overlap of 2" is kept over the S.S.plates on all sides.</p> <p><u>CIVIL JOB :</u></p> <p>The junct. on between the supercera blanket and old L.H.V. insulation is repaired as shown below.</p> <ul style="list-style-type: none"> - The edge of broken L.H.V. portion is made level and plain by L.H.V. patch work. - The gap between the repaired L.H.V. & supercera blanket were filled up tightly by 'U' folds of supercera blankets. This portion is covered by S.S.310 sheet projected from supercera blanket insulation portion. The above job was executed through M/s. Lloyds, New Delhi vide our W.O.No. D-3845 dt. 15/10/89.
(03)	<p><u>L.T. & H.T. Convection Section (top) of Primary Reformers:</u></p> <p>The insulation on the top portion of H.T. & L.T. convection section of primary reformer was done by means of 113 mm thick ceramic fibre blankets of M/s. Orient Cerwool, Bombay with S.S. anchoring system and 0.2mm thick S.S. plate protection. The details are as under.</p> <ul style="list-style-type: none"> - The old L.H.V. is removed by chipping and hammering including removal of retainer C.S. anchors and nets. - Surface were cleaned by wire brush. - S.S.304 anchor of 6mm dia x 113mm long are welded to the C.S. wall plate at a spacing of 224mm x 250mm.

Code No

Description

- Blankets of cut to proper length (depending site requirement) were inserted over these anchor rods. A total insulating thickness of (100 + 12.5mm) were made by using 4 layers of 25 mm thick and one layer of 12.5mm thick blankets.
- S.S.304 plates of 0.2 mm thick and 950mm width is cut into lengths of appropriate length.
- Holes of 20 mm dia is cut in each plate based on the spacing of bolts enumerated earlier.
- S.S. plates are provided over the anchor rods & bolted up by means of washer and nuts.

(04) AUX. BOILER WALL PANELS (5 NOS)

Aux. Boiler wall panels (5 Nos) on west side were removed due to suspension of insulation damaged which were insulated in 1987. It is observed that mostly all the five panels insulation were in damaged condition warranting replacement. We had already kept at site 3 nos of fresh C.S. panels ready i.e. panel Nos. 1, 2, & 5 (Notes: 5th panel in two pieces) The remaining panels i.e. 3 & 4 were salvaged from old removed panels of good condition. The peripheral flats of 150mm width of all the panels were replaced by 4 mm thick S.S.304 flats.

After clearing the panels, throughly, S.S.310 studs of 6" long were welded at a spacing of 250 x 250mm and 6 layers of 1" thick car wool fibre blankets properly cut to the size of the panels were installed. Then 0.8mm thick S.S.310 sheets cut to the proper size and were drilled to make holes of 10mm ϕ size according to the stud spacing. These sheets were imposed over the blankets and studs alongwith was washers were provided and twisted 90° for locking. Further tack welding of the studs with the S.S. plate were also done by S.S.310 electrode to get more rigidity to the anchoring system.

Code No

Description

The mechanical job of fabrication of pannels & installation were executed through M/s.Cedco,Baroda and the application of insulation were done through M/s.Orient Cerawool with their own material.

The following insulation materials were used for the pannel insulation of 16 M²(total).

- a) Ceramic fibre blankets = 22 Rolls
of RT-1260°C grade 1"
thick Rolls of size
610 x 76 00 mm
- b) S.S.310 studs of 6" long = 250 Nos
- c) S.S.310 sheet of 0.8mm = 18 M²
thick (ITFCO-supply)

ANNUAL PURCHASES - 1990

PLANT

CIVIL JOBS

Code No	Description
1 51 01 01	Replaced the damaged tunnel slabs including removing and carting the same. We have replaced 120 Hollow Tunnel Block.
02	Repair the damaged refractory near steam super heater Cap. No. 4 & 9. Patch work by Insulite - 9.
03	Repair refractory as per inspection report in hot well by insulite.
04	Breaking 4 1/2" thick tunnel wall of Row No.1 & 3 outer face side and making 6" thick wall in radiant zone.
05	Insulite of casting work in H.T.zone.
06	Replacement of burner block on burner face of Auxiliary boiler (Four Nos. of Burners block i.e. No. 2,3,4, & 5)
07	Headwall Trest wall repaired in Auxiliary boiler.
08	Side header wall by making 9" x 6" 2 1/2" fire bricks and pouring Insulite - 9.
09	Making two and half wall each of 2 mt. x 1.30m as a baffle wall in H.T.zone.
	Making 9" x 6" x 6 1/2" wall besides ceramics fibre insulation south side of H.T.zone.
10	Shuttering for pouring Insulite-9 at the junction of Refractory and Insulation.



ANNUAL TURNAROUND - 1990

AMMONIA PLANT

ELECTRICAL JOBS

Code No	Description
1 61 01	<p>01. Carried out preventive maintenance of all feeder compartments on following MCCs.</p> <p>MCC - 5, MCC - 5A/5B</p> <p>a) Checking of switch gear compartment.</p> <p>b) Replaced worn out contacts defective components like isolators, contactors, coil, Bimetal. relays, current transformers, fuse bases and connectors.</p> <p>02. Preventive maintenance carried out on all LPT ACBs (TMG/SIEMENS) installed at various MCCs.</p> <p>a) Replaced worn out contacts and damaged parts.</p> <p>b) Cleaned and lubricated the moving parts.</p> <p>c) Checked close/trip circuit for healthy operation.</p> <p>03. Provided temporary flood lights, hand lamps, welding generator connections and also hydrojetting equipment.</p> <p>04. Overhauled the following motors.</p> <p>P-1 101 - J</p> <p>113-J SP - 4</p> <p>110-J</p>

ANNUAL TURNAROUND - 1990

AMMONIA PLANT

INSTRUMENTATION JOBS

Code No	Description
1 71 01	FOLLOWING JOBS WERE CARRIED OUT :
	(A) CONTROL ROOM INSTRUMENTS JOBS :
01	General cleaning, overhauling and calibration of 90 J series pneumatic set point transmitters Receivers, Recorders and Controllers (about 25 Nos of Instrument.)
02	General cleaning and calibration of class 15 electronic temperature, vibration and analysis recorders (about 15 Nos of instrument)
03	Bently Nevada vibration monitoring system panels cleaning.
04	Installed one Oscilloscope (CRD) at bottom of B/N vibration panel.
05	Instrument air header regulators overhauled and flushed two headers. No any dust particles were observed.
06	Lica-1 Control station dual receiver gauge was found damaged. It was replaced by new one.
	(B) FIELD INSTRUMENTS JOBS :
01	B/N Vibration System :
	Most of all vibration probes of all compressors were removed for mechanical bearing inspection purpose. General checking of all probes proximitors, Extension cables etc was carried out. About 10 Nos of probes and cables were replaced by new one and same were installed back after completion of mechanical jobs.
02	General overhauling of air regulators, valve positioners, replacing of gland packing and stroke checking of following control valves were carried out.
	FICV/FRCV - 1, 1-1, 3, 5, 8, 9, 10, 11, 15, 16, 17
	LICV - 14, 16, 18, 19, 21, 26, 27
	PICV/PRCV - 2, 4, 13A-B, 14, 15, 18, 23, 24, 25, 28
	LRCV - 11, 12, 142
	MICV - 13 to 16
	V - 1, 7, 102, 150

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Ammonia (Instrument)

Code No	Description
03	Over and above as mentioned in item No.2 following control valves were opened out for checking of internal parts. Replacement were made as mentioned below.
FRCV - 2	: Actuator diaphragm was opened out for checking, found OK.
LICV - 2	: Hand jack unit was found broken Replaced by new one.
LCV - 2A	: Valve plug stem was found bent. New stem was prepared in w/shop and replaced.
PICV-20	: Scratches were found on seat. Lapping was done for getting tight shut-off.
LCV-23	: Both seats and plug was found eroded. Replaced complete set. Complete overhauling carried out in Inst. W/shop.
LCV - 13:	Diaphragm was found hard. Replaced by new one. Seat was found damaged due to rubbing replaced. Plug guide bushing clearance was increased. Prepared new and replaced.
LCV - 16:	Hand jack unit was jam. Replaced by repaired one which was removed from LCV-2.
LCV - 13:	Diaphragm was found damaged. Replaced. Complete overhauling was done in w/shop
FICV-12	: Diaphragm was found OK. Replaced valve positioner by new one. Seat and plug found Ok. General overhauling and stroke checking was done at site.
FICV-14	: Diaphragm was found hard. Replaced. Seat and plug found OK. General overhauling and stroke checking was done at site.
MICV-22	: Pneumatic actuator was leaking internally. Replaced by new one with modified stem 3/8" ϕ x 24 UNF threads. Hydraulic piston cylinders teflon seal rings replaced. Stroking was done at site.
TRCV-10	: Diaphragm was found Ok. Stroking was done at site.

Code No	Description
V- 18	: Diaphragm was found Ok. Overhauling hand jack unit. Stroking was done at site.
LCV-26/27	: Air and signal tubing support were corroded Replaced by new angle support and also replaced some portion of copper tubing.
101-102J	: Governor oil self regulators (PC) were completely overhauled. Diaphragm, Seat, Plug, etc. were found Ok.
103-J	: Governor oil self regulator (PC) diaphragm was found hard. Replaced by new one.
103-J	: H.P./L.P. Seal oil level control valves diaphragm were found Ok.
04.	: <u>FOLLOWING PRESSURE TRANSMITTERS OVERHAULED AND CALIBRATED ON LEAD WEIGHT TESTER IN INST.W/SHOP</u>
	PIC - 5,13,25,8, Pia - 82
	PRC - 1,2,4,9,12,18, PR-62, 19,23
05.	: Calibration of following differential pressure transmitters for flow etc. Checked after general cleaning. Zero and span adjustment were made wherever required.
	FRC - 1,2,3,5, LRC - 4
	FR - 6,33, PLI 26-27, 34-35, 36-37, 4.
	FIC - 7,8,15,9,10,11,12,14,16,17
06.	: Field mounted Electronic transmitters for CCC System and microprocessor based control loop FRC-1, FRC-2 and LICA-1 were calibrated.
07.	: General overhauling of most of all level control units were carried out. However following level control were calibrated by giving actual water head to float chambers.
	LC - 19 LC- 23 LC- 2
08.	: EYE-HYB : Replaced some of the wire with new luges.
09.	: FIC - 9-10-11 : Pilot tubes were opened out for inspection purposes. All were found Ok.

Code No	Description
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10. 101 E :
Provided 1/4" Ø S.S. sampling line from top outlet upto ground floor. Also provided on 1/2" Ø S.S. valve at inlet and 1/4" Ø S.S. valve at bottom on ground.
11. 101/105J :
Lube oil console AOP switch sensing element was found punctured. Replaced by new switch O - 16kg/cm² range and set at 8.4 kg/cm².
12. V-27 :
Angle supports provided for pneumatic signal tubings and replaced some portion of tubing by new tubing.
13. Tia - 35/85 :
Prepared one platform for attending the T-C/thermo-well as there was no any approach for attending job.
14. 5 KVA UPS :
General cleaning checking and trip checking was carried out by service Engineer from M/s. Vistan Electronics, Pune. Same was found satisfactory.
15. THI - 13 :
Due to mechanical pipe line modification location of thermowell was shifted to a long distance therefore, capillary length was adjusted accordingly through shortest route.
16. New Air Dryer :
Heater cut off thermostat switches replaced by new Aplas, temperature switches.
17. N.G. COMPRESSOR :
Calibrated important trip switch 372, 374, 370, etc checked trip system.
18. N.G. Compressor :
40 ata governor positioner was overhauled and fault was rectified by changing the position of one of its diaphragm.

Code No	Description
19.	<u>N.G. Compressor</u> : Overhauled and calibrated important flow and pressure transmitters.
20.	<u>PGR</u> : E-4 Provided new 1/2" dia tapping from alarm switch impulse line and shifted a level transmitters to a new location. Pneumatic tubing also changed accordingly.
21.	Provided shed to important trip solenoid valve to protect from rain.
22.	<u>PGR</u> : Important flow transmitters FT-100, 115, 173, 176 and LT-134 and 185 were calibrated. Stroke checking of their respective control valve were also done.
23.	Lot of other jobs were completed during startup of the plant as and when reported by plant people.

ANNUAL TURNAROUND - 1990

ALTONIA PLANT

TECHNICAL DEPARTMENT JOBS

Code No	Description
1 81 01	MODIFICATION IN ATOMISATION STEAM HEATER OF ARC BURNERS IN PRIMARY REFORMER :

As per original condition, the steam pressure in some burner rows remained around 2.3 Kg/cm² g against requirement of 3.16 Kg/cm²g at burners tips as recommended by burner supplier. Because of lower steam pressure at some burners, the flame was yellowish and smoky.

In order to increase pressure, the original 100 NB line have been replaced with 150 NB mm dia, and also closed loop have been provided with steam supply to both the ends of each burners row, to equalize the pressure in all the burners rows. It has been observed that steam pressure is increased from 2.3 Kg/cm² to 2.8Kg/cm² after modification.

ANNUAL TURNAROUND - 1990

UREA PLANT

MECHANICAL JOBS

Code No	Description
	Urea plant was shutdown on 31st January, 1990 for T.A. 1990 and was back on stream on 7th March, 1990. Following jobs were carried out.
2 01 01	<u>CO₂ CENTRIFUGAL COMPRESSOR K-1101-1 :</u> Inspected bearings, found bearings in good condition. Assembled the bearings after thorough cleaning. After start up oil was found leaking from free end bearing oil seal; cleaned the oil drain pipe (which was choked) and replaced the oil seal.
2 01 02	<u>CO₂ CENTRIFUGAL COMPRESSOR TURBINE Q-1101/1 :</u> Inspected bearings and couplings found in good condition.
2 01 03	<u>P.B.CO₂ COMPRESSOR K-1101/2 :</u> Distance piece of first stage was replaced. Following jobs were done. <ul style="list-style-type: none"> a) Drained oil. b) Dismantled cylinder. c) Dismantled gas packings and wiper packings. d) Pulled out piston rod first stage. e) Removed cross head and gudgeon pin. f) Chipped off foundation of Distance piece. g) Removed distance piece. h) Chipped off further foundation of distance piece. i) Placed the distance piece on sole plate with the help of wedges on the foundation. j) Levelled the distance piece. k) Grouted the foundation. l) Assembled cross head, cylinder, piston cover gas packing wiper packings.
	<u>Following parts were replaced :</u> <ul style="list-style-type: none"> a) Distance piece. b) Piston rod assembly, since piston rod material was peeled off at some places on gas packing area. c) Gas packing. d) Oil Serve system 150 - 1200 liters
	Removed two valves of each stage, run compressor on slow roll for 4 hrs. Assembled the valves after slow roll and speeding up compressor for 10 minutes.

Code No	Description
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2 01 04 P.B. COMPRESSOR GEAR BOX :

Removed the cover. Checked gears. Final wheel as noticed earlier broken in one tooth by 3" was in same condition. No further deterioration noticed. Checked bearings of high speed pinion. Found in good condition. Checked clearances. Found O.k.

2 01 05 P.B. COMPRESSOR DRIVE TUBRINE Q-1101/2 :

Inspected bearings. Found bearings in good condition. Measured the clearance. Found o.k.

2 01 06 CO₂ GHM COMPRESSOR K-1001:- Replaced 2nd stage liner

Following job were done.

- A) 1) Remove 2nd stage suction vessel.
- 2) Pulled out piston.
- 3) Removed gas packing, wiper packing.
- 4) Removed cylinder.
- 5) Bore out the liner.
- 6) Inserted liner after machining on O.D. of liner.
- 7) Honing was done in liner.
- 8) Drilled holes for oil.
- 9) Taken out in the cylinder face, valve pocket faces, gas packing area face.
- 10) Valve pocket cutting.
- 11) Assembled cylinder in position levelled it.
- 12) Connected it with discharge vessel. Placed suction vessel in position.
- 13) Inserted piston.
- 14) Assembled gas packing, wiper packing.

After this compressor was run with two valves removed in each cylinder on slow roll for 4 hrs (Air run) speeded up for 10 minutes. Boxed up valves.

B) Drained the crank case oil from tank. Cleaned the tank. Charged Servo Prime-76 oil after centrifuging. Cleaned the filters.

C) Drained the console for Q-1001 and gear box. Cleaned the console. Replaced the filters.

D) Cleaned the lube oil cooler. 1600 litres new Servo prime-68 oil charged.

Code No	Description
2 01 07	<p><u>GHH COMPRESSOR DRIVE TURBINE Q-1001 :</u> Inspected bearings and couplings. Found bearings in good condition.</p>
2 02 01	<p><u>AMMONIA PUMP P-1102 A :</u> Checked the crank case bolts for tightness. Checked the manifold valves and replaced one defective suction valve.</p>
2 02 02	<p><u>AMMONIA PUMP DRIVE TURBINE Q-1102/A :</u> Replaced the rotor since existing rotor was with worn out journal at exhaust end. Assembled with reconditioned bearings new carbon rings and new thrust ball bearing.</p> <ol style="list-style-type: none"> 1) Overhauled the steam inlet valve, trip valve. 2) Checked the overspeed of turbine, set it at 4600 RPM 3) <p><u>Following parts were consumed :</u></p> <ol style="list-style-type: none"> 1) Rotor (Reconditioned) 2) Carbon rings. 3) Journal bearing. 4) Ball bearing (thrust bearing) 1 No. 5) Coupling half (rotor side)
2 02 03	<p><u>CARBAMATE PUMP P-1201/B :</u> Replaced the pump. Following jobs were involved. :</p> <ol style="list-style-type: none"> 1) Decoupled the pump. 2) Pulled out plunger. 3) Removed plunger and gland. 4) Pulled out cross head connecting rods. 5) Pulled out top half of casing. 6) Pulled out bottom half of casing with crankshaft. 7) Placed in position lower half of new pump. (with crank shaft which was reconditioned) 8) Aligned it with gear box. 9) Assembled upper half of casing. 10) Assembled con rods, cross heads. 11) Assembled cylinder, stuffing boxes packing, plungers align plungers. 12) Charged fresh oil. 13) Coupled pump gear box turbine.

Code No	Description
2 02 04	<u>LUBE OIL PUMP TURBINE FOR GHH COMPRESSOR :</u> Replaced the coupling and bearing.
2 02 05	<u>CO₂ SPRAY COOLER SUMP PUMP :P-1106A :</u> Replaced existing Akay Pump with Khimline pump as part of modification - Energy Saving. Following jobs were done 1) Removed the existing 8 x 6 - 16 Akay pump with motor coupling and baseplate. 2) Made pockets for new pump (Khimline make) base. 3) Grouted the foundation bolts.-- 4) Levelled the pump and did final grouting. 5) Modified suction and discharge pipe to suit new pump. 6) Carried out necessary modification in electrical cable. 7) Run the pump after alignment.
2 02 06	<u>BFW PUMP P-1506 :</u> Replaced existing pump with reconditioned pump, since old pump was not developing 11 Kg/cm ² pressure required for hydraulic test of Boiler Drum. This pump develops 14 Kg/cm ² pressure.
2 02 07	<u>MLT PUMP P-1408 :</u> Motor was taken for overhauling. Realigned and coupled.
2 03 01	<u>PRIL TOWER FANS K-1401/1 to 4 :</u> All the bearings were cleaned, inspected, greased and fans aligned with motors.
2 03 02	<u>INLET AIR FAN K-1701 :</u> Bearings realigned. Additional supports were provided to restrict the axial movement of the shaft and casing.
2 13 01	Following Coolers were opened, hydrojetting was done and boxed up. A) 1) H-1421 Flash tank condenser. 2) H-1423 1st stage evaporator condenser. 3) H-1425 2nd stage Evaporator condenser. 4) H-1426 2nd Stage evaporator. 5) P-1102 A/B and GE lube oil coolers. 6) P-1201 A/B & G.B lube oil coolers. 7) Q-1101 & 1101-2 lube oil cooler. 8) GHH Compressor/Drive turbine lube oil coolers.

Code No

Description

(B) H-1206 - CCS-I-WATER COOLER - PLATE HEAT EXCHANGER

01. Dismantled the plate heat exchanger. Found gasket in good condition. Lot of debris were found. Cleaned the plates. Boxed up.
02. H-1301 Desorber Cooler :
Plate heat exchanger- Dismantled the plate Heat Exchanger. Gaskets were found damaged. Replaced all gaskets.

2 15 01 BOILER INSPECTION OF 4 ATA STEAM DRUM V-1501 BY CIB:

4 ata Steam Drum V-1501 was tested at a pressure of 11 Kg/cm² in presence of Boiler Inspector. Steam drum was also offered for open inspection. Both relief valves were also offered for inspection to Boiler Inspector. Following jobs were carried out.

- 1) Opened the manholes.
- 2) Removed the relief valves.
- 3) Provided blinds.
- 4) Cleaned the steam drum.
- 5) Fixed back the fallen plates at southend riser. These plates were found fallen inside the drum. Fixing bolts were sheared off.
- 6) Boxed up the manholes.
- 7) Carried out departmental hydrotest at 11 Kg/cm².
- 8) Checked RVs for popping pressure. Set pressure found 7.5 Kg/cm² and reset at 6.5 Kg/cm² in presence of boiler inspection on test bench.
- 9) Open inspection & hydrotest at 11kg/cm² in presence of Boiler Inspector was carried.
- 10) Boxed up manholes, Remove blinds, assemble RVs.

2 17 01 A) FOLLOWING RVs WERE TESTED/REPLACED :

- 1) Ammonia suction vessel - RV replaced.
- 2) P-1201 A/B/C - RVs removed from position, overhauled set at 161 Kg/cm².

Code No	Description
B)	<u>FOLLOWING VALVES WERE REPLACED/RECONDITIONED :</u>
1)	P-1501 - P-1506 - Discharge isolation valves replaced.
2)	Q-1102 Steam inlet valve - Pulled out bonnet, lapped seats, boxed up.
3)	Q-1001 - GHH Compressor Drive turbine exhaust valves. 23 ata - Rectified bonnet leakage. Cut was taken in the valve body.
4)	P-1102 - A - 1st recycle valve replaced.
5)	P-1102 A - 1st Discharge valve gland leak rectified. Provided new gland packing.
6)	P-1102 B - 2nd suction valve replaced.
7)	P-1102 B - 1st and 2nd Discharge isolation valves gland leak rectified.
8)	P-1201-A 1st Discharge valve bonnet leak rectified by providing new gasket.
9)	H-1203 - 2nd Drain valve bonnet replaced as it was hard to operate.
10)	CO2 to H-1203 valve replaced, (near scrubber)
11)	HPF to Stripper first valve bonnet replaced.
12)	HPF to common Carbamate line - both valve bonnets replaced.
13)	HPF Ammonia to autoclave all five passing valve rectified.
14)	HPF Carbamate to H-1202 1st isolation valve made operative.
15)	HPF to FICV - 1204 - 2nd valve attended for passing.
16)	HPF to PRCV - 1202 - 2nd isolation valve bonnet leak rectified, Bleeder valve bonnet replaced.
17)	NRV to P-1501/P - 1506 Seat lapped as these were passing.

Code No	Description
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2 20 01 FABRICATION JOBS :

- 01. Replaced H-1201 HP Stripper gas out let flanges (2 No 250 N.B.) and 1 No Elbow SS 316 L
- 02. Replaced V-1201 - off gas outlet first pair of flanges - 100 NB.
- 03. Replaced V-1202 off gas out let flanges (2nd pair) at bottom of Scrubber.
- 04. Replaced 3rd elbow in off gas line of V-1201 as its thickness was found 7.8 mm (original thickness 10.5mm)
- 05. Pipe Steam leaks and corroded pipes replaced (during inspection)
- 06. P.B.Compressor third stage suction vessel; Modified outlet of the vessel.

ANNUAL TURNAROUND - 1990UREA PLANTINSPECTION JOBS

Code No	Description
2 31 01	<p>The following vessels and tanks were opened and offered for inspection in Urea plant. Visual inspection and thickness measurement etc. were carried out. The observations are given below:</p> <p>01. <u>V-1112 (After stage separator)</u></p> <p>01 No corrosion or pitting was observed on shell internal surface.</p> <p>02 Colouration of the shell was reddish brown.</p> <p>03 Demister pad was taken out, found to be in good condition and was fitted back.</p> <p>04 Some scattered pittings of approx. upto 0.5mm deep were observed in bottom dished end.</p> <p>05 Thickness measurement readings are recorded.</p> <p>02. <u>V-1111 (Inter stage separator)</u></p> <p>01 No corrosion or pittings was observed on shell surface and its weld joints.</p> <p>02 Colouration of the shell inside was reddish brown.</p> <p>03 Thickness measurements readings are recorded.</p> <p>03. <u>H-1422 (First Evaporator)</u></p> <p>01 Shell inside colouration was blackish.</p> <p>02 Fastening bolts of angle (near to manhole), supporting the cone were found to have got bent, which was reported to production people.</p> <p>03 All weld joints were found to be okay.</p> <p>04 Other internal fittings were found to be intact.</p> <p>05 Thickness measurement readings are recorded.</p> <p>04. <u>V-1206 (L.P.Vent Scrubber)</u></p> <p>01 The condition of the vessel top is good.</p> <p>02 Demister pad was found to be in good condition.</p> <p>03 Grill fittings were intact.</p>

Code No

Description

05. H-1424 (Second Evaporator)
- 01 No corrosion or erosion was observed in the vessel.
 - 02 The shell inside has assumed brownish black colouration.
 - 03 All fittings were found to be intact.
 - 04 The overall condition of the vessel internals is good.
 - 05 Thickness measurement readings are recorded.
06. V-1101 (CO₂ Knock out drum)
- 01 Condition of demister pad was okay.
 - 02 The inside epoxy paint coating of vessel was okay.
 - 03 Thickness measurement readings are recorded.
07. H-1104 (CO₂ Spray cooler)
- 01 No internal corrosion was observed.
 - 02 All weld joints were found to be in good condition.
 - 03 Condition of demister pad was found satisfactory.
 - 04 Inside epoxy paint of vessel was found to be okay.
 - 05 All fittings were found to be intact.
 - 06 Thickness measurement readings are recorded.
08. V-1202 (Rectifying column) Top :
- 01 The shell inside has assumed blackish colouration.
 - 02 The overall condition of vessel top chamber internals found to be good.
- Bottom :
- 01 The colouration of the shell was brownish.
 - 02 All weld joints were found to be in good condition.
 - 03 Thickness measurement readings are recorded.

Code No	Description
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09. V-1301 (Desorber)Top :

- 01 No corrosion or erosion was observed in the vessel
- 02 The colouration of the shell was greyish black.
- 03 All fittings and trays were found to be okay.

Bottom :

- 01 The bottom shell of the vessel has assumed brownish red colouration.
- 02 Bottom tray and tray supports were found to be in good condition.
- 03 Thickness measurement readings are recorded.

10. V-1423 (First Evaporator Scrubber)

- 01 Reddish brown colouration was assumed by the shell inside.
- 02 Demister pad was found slightly damaged and have got displaced from its position, at the west side, which was reported to production people.
- 03 Trays were found to be intact.
- 04 Thickness measurement readings are recorded.

11. V-1421 (Flash tank scrubber)

- 01 No corrosion or erosion was observed in the vessel.
- 02 The colouration of the shell was reddish brown.
- 03 Grill fittings were intact.
- 04 Thickness measurement readings are recorded.

12. V-1203 (L.P.Absorber)

- 01 No corrosion or erosion was observed in the shell
- 02 The shell colouration was found blackish.
- 03 All weld joints were found to be okay
- 04 Grills were found to be intact.
- 05 Thickness measurement readings are recorded.

Code No

Description

13. T-1301 (Ammonia water tank)
- 01 No corrosion or erosion was observed in the vessel
 - 02 Re fish brown colouration was observed in approx. upto 3/4th height of the tank from bottom and top 1/4th of the shell has assumed grey colouration.
 - 03 All weld joints were found to be okay.
 - 04 Some bulging was observed in the bottom plates of the tank which is present since last few years.
 - 05 Thickness measurement recorded.
14. T-1401 (Urea solution tank)
- 01 All weld joints were found to be free from corrosion and erosion.
 - 02 The colouration of the shell was brownish.
 - 03 Bottom plates of the tank were found to have bulged up approx. by half inch.
 - 04 Thickness measurement readings are recorded.
15. T-1501 (Condensate tank)
- 01 The colouration of the shell was brownish black.
 - 02 The fillet weld joint of condensate inlet pipe which was extended in previous shutdown (by Tech. Deptt.) had some pinholes and also some corrosion /erosion was observed on it. There fore, this fillet weld was ground off and rewelding was done and dye tested.
 - 03 Thickness measurement readings are recorded
16. V-1501 (4 ata Steam drum)
- 01 The shell has assumed blackish colouration.
 - 02 Slight pitting was observed on the dished ends of the vessel.
 - 03 Condition of demister pads was good.
 - 04 Two riser baffle plates were dislodged, which was reported to shift Engr. (Urea) for putting back.
 - 05 Some bolts of riser plates were found missing, which was reported to Shift Engr.
 - 06 Thickness measurement readings are recorded.

Code No	Description
17. <u>V-1502 (23 Ata Steam drum)</u>	<p>01 The vessel assumed brownish black colouration in general.</p> <p>02 Inlet line and its supports found to be intact.</p> <p>03 Top distributor for steam outlet found to be ok.</p> <p>04 Some rusting was observed on both dished ends.</p> <p>05 All weld joints were found to be ok.</p>
18. <u>V-1503 (9 Ata steam drum)</u>	<p>01 The vessel internal assumed blackish colouration.</p> <p>02 All weld joints were found to be ok.</p> <p>03 All internal fittings were found intact.</p> <p>04 Formation of loose mill scale was observed on some places on south dished end.</p> <p>05 No corrosion or erosion was observed in the vessel.</p> <p>06 Thickness measurement readings are recorded.</p>
19. <u>Visual Inspection :</u>	<p>Ferrite content measurement, liner and cladding thickness measurement of H.P. Carbamate Condenser, H.P. Stripper and Autoclave were carried out along with the Stamicarbon team who has furnished the report.</p>
20. Eddy-current tube testing of H.P.C.C. and H.P. Stripper carried out by Stamicarbon team and site report submitted by them.	
21. L.P. Carbamate Condenser's tube testing was done along with PAIL people who submitted site report.	
22(1). Three nos of weld joints in 10" NB line of H.P. Stripper top were rewelded for replacing the corroded flanges and elbow. Four nos. of weld joints 4" NB were made for replacing one elbow and a flange at Autoclave top and three nos. of weld joints and flange of carbamate line below H.P. Scrubber were also done. All the joints were eye-tested and radiographed after root run and final run.	
(2). The 60 ata Steam line from old S.G. Plant (Header) to urea control room were ultrasonically tested for service defects.	

Code No	Description
3)	For defective spots found in ultrasonic test were radiographed for confirming the nature of defects. However, the defects were originally acceptable ones and no service cracks were revealed by the tests.
23.	The following lines were tested for thickness measurement by ultrasonics :
01	PR-1201-8"
02	PR-1226-2"
03	PR-1230-6"
04	PR-1202-10"
05	PR-1203-8"
06	PR-1204-8"
07	PR-1205-6"
08	PR-1205-3"
09	GA-1201-6"
10	PR-1206-6"
11	PR-1207-14"
12	PR-1208-4"
13	PR-1212-4"
14	PR-1215-16"
15	PR-1214-12"
16	PR-1219-8"
17	PR-1223-4"
18	PR-1224-3"
19	EA-1112-6"
20	GA-1203-1"
21	GA-1202-1"
22	Discharge line for P-1102 A/B
23	60 ata steam line to Q-1101-2
24	4 ata exhaust line of Q-1101-2-
25	60 ata steam line on the pipe rack
26	60 ata steam line to Q-1101-1
27	PICV-1129 U/S 23 ata header I/E 4 ata header.
28	4 ata steam header to Q-1101-1.
29	23 ata line of V-1502
30	H-1201 shell side condensate outlet to V-1502 and V-1503.
31	ST-1119-2"
32	4 ata exhaust of Q-1113/A
33	ST-1101-4"
34	ST-1102-8"
35	40 ata header to Q-1201/A
36	4 ata exhaust of Q-1201/A
37	40 ata header to Q-1201/B
38	4 ata exhaust of Q-1204/B
39	Suction line of P-1204 A/B
40	SC-1210-10"

Code No	Description
41	SC-1502-3"
42	P-1501/P-1506 Suction line from T-1501
43	Discharge line of P-1505 A/B.
44	Suction line of P-1505 A/B
45	4 ata Steam to H-1422.
46	9 ata steam line to H-1424.
47	ST-1406-1 1/2"
48	ST-1412-6"
49	ST-1413-1 1/2"
50	9 ata/ 4 ata steam supply line to V-1301
51	Down comers and risers of H-1202
52	Blow down line of V-1501

Code No	Description
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2 31 02

INSPECTION OF VESSELS :

01. INSPECTION OF H.P.STRIPPER H-1201 BY STAMICARBON :

Previous inspections were carried out during April '88 and June '89. This time M/s. Stamicarbon Inspectors Mr. R.KOSTER and Mr. M.WARNIER inspected the vessel. The top and bottom covers were opened. All the ferrules were taken out for checking. Condition of the ferrules was found to be okay. No decrease in differential pressure was noticed in 20 Nos repaired ferrules which were installed during June, 89.

Only 172 tubes have been measured for remaining wall thickness over a length of about 3 meters from the top. Minimum and maximum wall thickness measured are 2.55 mm and 3.05 mm respectively. In the liquid inlet divider one particular portion on the top of the seal welding was found corroded and hence repaired by grinding and welding by using electrode Thermanite 19-15H. Length of the repaired weld is 100 mm.

On the Stripped gas out-let line flange joint on the top of the stripper, the flanges were found corroded due to condensing corrosion. Both the flanges with elbow were replaced by new one. Extra ring line steam tracing on the flanges was provided.

- Material used :
- 2200 teflon sleeves
 - 10" x 1500 = SS 316L flanges - 2 Nos
 - 10" x 1500 = SS 316L Elbow - 1 No
 - 1/2" NB x 40 Sch. C.S. pipe - 8 mtrs.
 - Liquid divider - 1 No
 - Repaired tie rods - 18 Nos
 - Oval ring gasket for 10" x 1500 = 1 No
 - Electrode - Thermanite 19-15H
 - Top & bottom cover gaskets - 2 Nos.

02. INSPECTION OF H.P.CONDENSER - H-1202 BY M/S. STAMICARBON :

Top and bottom covers were removed. Rasching bed basket and distributor trays were dismantled. Remaining wall thickness of all the tubes in top 1 meter was measured by M/s. Stamicarbon Inspectors.

Code No

Description

17 and 29 tubes were found with thickness 1.9mm or less and with some defect of corrosion respectively. One tube was completely pulled out for thorough inspection to find out the defects and for analysis. Repair activities were done in 61 tubes out of which 5 Nos of tubes were plugged. After completion of repair work total no of tubes remained plugged = 33 Nos. Gas inlet ring line modification suggested by IFFCO was approved by M/s.Stamicarbon. Earliest gas inlet nozzle has a baffle of 300mm ϕ at distance of about 150mm from pipe which was connected with help of 4 rigid strip supports. This gas inlet was modified during April, 1988 shutdown as per M/s.Stamicarbon.

This year a ring line was fabricated of 1600 mm O.D. and 280 dia cross section made of 5 mm thick rolled from plate. This ring line was fabricated in 17 segments with mitre joints and connected to the gas inlet nozzle with the help of flanged, fabricated elbow, Ring line was made in 3 pieces joining them with the help of flanges.

Suitable support was provided with the basket, sketch of the modification as shown in drawing No. 02 CS 0406 Top cover was taken to work shop and weld material was deposited on the gasket seating surface (which was corroded) and then machined to the required size Top and bottom covers were boxed up.

03. INSPECTION OF AUTOCLAVE V-1201 BY STAMICARBON :

Top cover was opened. Alternate segments of sieve trays were removed. Condition of all weld seams, sieve trays were found okay. M/s.Stamicarbon Engineers inspected the vessel. 7 Nos of tray support clits were found corroded which were replaced by new ones in alternate positions.

All the tray holding bolts and tray connecting bolts were found corroded which were replaced completely. In two places clit welding were repaired for pin hole. Off gas out let line flanges were replaced because of some corrosion due to condensation. Ring line steam tracing was provided on flanges. Cover was boxed up after proper assembly of trays.

Code No	Description
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Material consumed :

Thermanit 19-15H Electrodes - 25 Nos
 Plate type clits of 8mm thick - 7 Nos
 Tray connecting bolts with nuts & washers - 400 Nos
 Tray holding bolts with 2 Nuts & washers - 140 Nos
 Top cover gasket - 1 No
 1/2" NB x 40 Sch C.S. pipe - 4 Mtr.
 SS 316L 4" x 1500 = flanges - 2 Nos

04. L.P. CARBAMATE CONDENSER H-1205 :

Dismantled all obstructing piping, structures and then channel cover was taken out. Suitable lifting arrangement was made to lift the tube bundle.

07 meters high 1.5meter square vertical cage with 05 Nos platforms was fabricated. Tube bundle was taken out and was placed in the fabricated cage.

Position of all baffles was shifted 30 mm lower and suitable tie rods arrangements were fixed. 05 mm ϕ rods were inserted between all the tubes and tack-weld with the baffles to restrict the suspected movement of tubes in baffle holes.

Lower 3 baffles were provided with 4" x 8" shoes near jack bolt to prevent the shell from damages due to vibration of the tube bundle.

Inside the shell all the grooves formed due to baffle hitting to the shell was filled with weld material and ground to level.

Tube bundle was boxed up and then test ring was clamped to it. All the connections to the shell was blinded and shell was hydrotested at 12 Kg/cm². No tube was found leaking. Blinds were removed, channel covers, connecting piping and structures were fixed.

05. V-1111/V-1112 : Inter Cooler/After cooler/ Separator for K-1101-1 :

Removed the cover. Checked. Lemister pad, Found in good condition. Vessel inspected. Boxed up pad and placed cover, Tightened cover bolts.

Code No	Description
06. <u>23 ATA STEAM SATURATOR V-1501</u> :	Opened Cleaned, Boxed up after inspection.
07. <u>9 ATA STEAM SATURATOR V-1503</u> :	Opened manhole, Cleaned, Boxed up after inspection.
08. <u>CONDENSATE TANK T-1501</u> :	Opened manhole, cleaned the tank. In one of the condensate inlet pipe welding defect was noticed. Rectified it, Boxed up manhole.
09. <u>AMMONIA WATER TANK T-1301</u> :	Opened the manhole for cleaning. About 100 litres of oil was found at the bottom of tank. Boxed up after cleaning.
10. <u>UREA SOLUTION TANK T-1401</u> :	Opened the manhole cover Boxed up after inspection.
11. <u>RECTIFYING COLUMN V-1202</u> :	Taken out the top dish end cover, Inspected internals found okay. Boxed up with new gasket. Welded cut steam tracing.
12. <u>L.P.ABSORBER V-1203</u> :	Top and bottom manholes were opened. Condition of the bed support liquid inlet nozzle was found okay. Boxed up after inspection.
13. <u>DESORBER V-1301</u> :	Top and bottom manholes opened. Trays were in good condition. Boxed up.
14. <u>FLASH TANK SCRUBBER V-1421</u> :	Manholes opened, inspected and boxed up.
15. <u>1ST EVAPORATOR SCRUBBER : V-1423</u> :	One each segments of trays were dismantled for inspection. Lemister pad and trays internals were in good condition. Boxed up after inspection.
16. <u>1ST EVAPORATOR/SEPARATOR H-1422</u> :	Opened the manhole for inspection. No abnormality found. Boxed up manhole.

Code No	Description
17.	<u>2ND EVAPORATOR H-1424 :</u> Manhole: was opened and inspected the internals. Boxed up.
18.	<u>2ND EVAPORATOR CONDENSER H-1425 :</u> Spool piece connecting the booster ejector with 2nd stage evaporator/condenser was removed for inspection of modification carried out during May, 1988. No deposit was found surrounding the tubes. Boxed up the distance piece.
19.	<u>CO₂ SPRAY COOLER H-1104 :</u> Opened top manhole. Inspection was carried out. Painted from inside. Boxed up.
20.	<u>CO₂ KNOCKOUT DRUM V-1101 :</u> Opened the manhole for inspection of internals and demister. Found okay. Boxed up.
21.	<u>AMMONIA SUCTION FILTER :</u> Replaced the filter.

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URSA PLANT

CIVIL JOBS

Code No

Description

- | Code No | Description |
|---------|---|
| 2 51 01 | 01 Araldite/Hardner & Silica lining work on scrapper floor of Prill tower. |
| | 02 Red-mardana flooring repairs at ground floor. |
| | 03 Epoxy(Araldite-Hardner) painting of drilling room inside and outside. |
| | 04 Painting R.C.C. tanks of spray cooler. |
| | 05 Bitumasticlining work on PT top floor and Prill bucket room and top floor inspected and repaired |
| | 06 Painting at PT top and near 4/203 |
| | 07 Damaged pillar support repaired by epoxy |
| | 08 Making ramp for approach of H.M.Crane near H.P. Ammonia Pump. |
| | 09 Epoxy grouting of heat exchanger CCS - II |
| | 10 Epoxy grouting for supporting 4 Nos. of supports for avoiding vibration of 10 Fan Prill Cooling System. |
| | 11 Breaking Epoxy concrete under distance phase of P.B.Compressor and groutingthe same by Epoxy after replacing distance piece. |
| | 12 Making pocket for pump motor 1103 Spray cooler and grouting the same. |
| | 13 A.C.Sheet clacing on side of Prill tower exhaust Fan (Lift side) |

UREA PLANT

ELECTRICAL JOBS

Code No	Description
2 61 01	01 Carried out preventive maintenance of all feeder compartments on following MCCs. MCC - 6, MCC - 14
	a) Checking of switch gear compartment
	b) Replaced worn out contacts, defective components like isolators, contactors coil bimetal relays current transformers, fuse bases and connectors.
	02 Preventive maintenance carried out on all LT ACBS (TMG/SIEMENS) installed at various MCCs.
	a) Replaced worn out contacts and damaged parts.
	b) Cleaned and lubricated the moving parts.
	c) Checked close/trip circuit for healthy operation.
	03 Provided temporary flood lights, hand lamps, welding generator connection and also hydrojetting equipment.
	04 Overhauled the following motors. P-1408 M-2119 K-1401/1 K-1401/2 K-1401/3
	05 Preventive maintenance carried out as transformers TR - 17
	a) Filtration of oil in all transformers.
	b) Replaced silica gel in dehydrating breather of transformer.
	06 Modification and rewiring carried out on all feeder compartment of MCC- 14.
	07 Replaced rope switches on all conveyors.
	08 Carried out maintenance of all lighting distribution boards and local switches and junction boxes of conveyors for cleaning and tightening of connections.

UREA PLANT
INSTRUMENTATION JOBS

Code No	DESCRIPTION
2 71 01	<p>01. <u>FIELD TRANSMITTERS</u> :</p> <p>Checking and calibration was carried out for the following instruments.</p> <p>PIC-1202, LIC-1203, PIC-1301, FR-1504, PIC-1421/22 FIC-1203.</p> <p>FRC-1421, PR-1421 and Pad type level transmitters like LI-1421 LRC-1421 and LIC-1202. All the above transmitters are cleaned overhauled and calibrated.</p>
	<p>02. The following control valves are attended for necessary overhauling/checking etc.</p> <p>a) <u>PRCV-1201</u>:</p> <p>Removed control valve from line to inspect the seat and plug. The plug was found eroded. Machined bigger size plug of the old model and made it suitable for new (existing) model of the valve. Replaced the eroded plug by it. Fixed back the control valve on line. Cleaned the valve and valve positioner and checked valve stroke.</p> <p>b) <u>LICV-1203</u> :</p> <p>It was reported passing. Removed valve and checked the seat and plug. Found small cut on them. Bapped them and fixed back the control valve. Overhauled valve positioner and checked stroke.</p> <p>c) <u>PICV-1202</u> :</p> <p>Opened valve from line to inspect seat and plug. Quite small scratches were observed on seat and plug. Lapped them and fixed back the control valve on line. Overhauled the valve positioner and checked valve stroke.</p> <p>d) <u>LCV-1502A</u>:</p> <p>The leakage was observed in split body of the valve. Removed valve from line, replaced the split body gasket and fixed back the valve. Cleaned valve positioner and checked valve stroke.</p>

Code No	Description
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e) LRCV-1201 :

Removed from line to inspect seat and plug, found them eroded badly. Replaced the set of seat and plug by brand new (imported) set. Fixed back the valve on line and checked valve stroke after overhauling the valve positioner and positioner transmitter.

f) FRCV-111 :

Overhauled the valve positioner and volume booster. The hand jack casting was broken. So replaced the complete hand jack unit by the h/j unit from HICV-1121. Checked valve stroke.

g) HICV-1121 :

Overhauled the valve positioner and volume booster. The plug was slightly adjusted downward for tight shutoff. Checked valve stroke.

h) HICV-1205 :

Valve stroke was reported passing badly. Removed valve from line and found butterfly gasket in damaged condition. Replaced it by new one.

i) Lube oil self actuating valves of oil consoles in compressor area:

The bottom flanges were opened to inspect seats and plugs. Found them alright. The nipple of GHH Compressor lube oil line was found broken. Changed it by new one.

j) HICV-022 :

At the time of startup it was reported not functioning properly. Opened actuator alongwith bonnet and found the lock spring ring and spring washers of pilot plug in damaged condition. Removed all internal parts, Overhauled and replaced the complete plug along with pilot plug assembly by old (single piece) plug. The seat ring seat ring gasket and cage are not changed, they were provided in the valve at the time of fixing up the pilot plug assembly. New pilot plug is to be reconditioned.

Code No	Description
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03. BATTERY ROOM :
- Removed old charger panel of charger nos I, II and III from battery room as the chargers were failing to work for many time. Removed batteries of this charger panel. Cleaned the charger (IV) panel and other boxes. Also removed the old and unused cables from battery room to control room. Painted all boxes and panels.
04. MAIN PANEL AND COMPRESSOR PANEL INSTRUMENTS :
- A) TI-1 :
- Interchanged the mounting of Analog temperature Indicator and multipoint switching unit to make the provision for mounting new Instruments.
- B) C.C.S. II :
- Mounted the Digital Indicating controller on panel. Given necessary wiring connections.
- C) Manual loaders :
- Mounted two manual loaders with two position rack on panel. One manual loader is used for HIC-1204 and second one is to be used for CCS-II HICV- valve.
- D) TRS :
- Overhauled and calibrated all the multipoint recorders of both the panels.
- E) Flushed out the air headers in control room and compressor panels. Removed extra cables and dressed some cables and dressed some cables. Properly cleaned all the instruments and panels. Painting is done wherever required.
05. FIELD JUNCTION BOXES :
- Opened all the pneumatic and electrical junction boxes for inspection cleaned them and also cleaned the electrical terminals by solvent. Painted the boxes and covered them.
06. FIELD AIR HEADERS :
- Replaced the corroded air headers (1/2" dia) by S.S. tubes in prill tower top area and pump areas in ground floor. The old defective isolation valves are also changed and provided new fittings as required.

Code No	Description
07.	<u>S.S.TUBING ON 4 ATA DRUM AREA :</u> The copper tubes were getting punctured for many times. Replaced all the signal copper tubes by 1/4 O.D. S.S.Tubes from the Instrument of 4 ata drum to JB-13.
08.	<u>IMPULSE LINE MODIFICATION</u> The old and corroded carbon steel Impulse lines of following Instruments are removed and provided S.S.tubings with necessary changes. FR-1301 (TX) , PIC - (TX) , FR-1504 (TX) Solenoid valves of P-1203 A & B
09.	<u>CONTROL VALVES :</u> General checking, cleaning, greasing overhauling of air stroke checking of all the control valves were carried out Auto manual operation of valves was also checked.
10.	Removed and reinstalled the following instruments of centrifugal Compressor, P.B.Compressor, and GHH Compressor to facilitate the mechanical maintenance jobs. a) All the pressure gauges (fixed back after calibration) b) All the temperature gauges and thermocouples including bearing thermocouples. c) Pechometers. d) All the vibration monitoring probes. The probes were fixed back after calibration.
11.	<u>JOBS RELATED TO H.P.STRIPPER :</u> a) Removed Radioactive source from stripper and kept in lead container up to the completion of mechanical jobs. Fixed source back. b) Ferrule test set was made ready and given necessary tubing connection from air source. c) Removed the wetleg set along with d/p transmitter of LRC-1201 and fixed back the complete set after the completion and mech.jobs. d) The source detector unit of level monitoring system and thermocouples were also removed for stripper work fixed back, then

Code No

Description

12. The related instruments of carbamate pumps (P-1201 A/B) were also removed and fixed back for pump maintenance job.
13. L.R. - 1201 :
The source was removed and fixed after the completion of Autoclave checking jobs. The detector pad was also inspected and calibration of Radiac Relay was carried out.
15. C.C.S. - II
Mounted the valve positioner on TICV - Cont. valve provided necessary Air regulators and tubing for cont. valve and I/P converter. Provided pressure gauge and temperature gauges on new Condensate lines. Laid out the T/C Compensation cables and signal cable of I/P converter from control room to site and terminated them by providing cable glands. Balanced the valve positioners and I/P converter by giving 0-100% 4 to 20 ml amp DC signal from digital controller.
16. LOCAL PANEL OF P.B. LUBE OIL SYSTEM :
Removed defective capillary type temp. gauges from panel. Modified the cutout to mount new 6" dia. capillary gauges. The pressure switches PICI - 1162 and PLCO-1163 are calibrated. Cleaned and painted the panel.
17. PRC - 1201 :
Opened flange tapping and flushed out the impulse line of old pressure transmitter. Filled up the water in impulse line and fixed the flanged connection of new transmitter.
18. MISC. JOBS :
- During the visit of Boiler Inspector calibrated, checked and fixed the required Instruments on 4 atm drum as per his instructions.
 - Thermowells on H.P. System : The flanged thermowells like TR-1203 TR-1209 on H.P. condensate and TR-1206 on off gases were removed for inspection and found them o.k. fixed back them.

Code No

Description

- c) Flushed out the Instrument air lines and main headers.
- d) Painted the C.S. impulse line and air lines in the field.
- e) Flushed out some impulse line before startup.
- f) Removal and refixing of some field Instrument. The tubes, cables, thermocouples etc to facilitate some Mechanical jobs in plant area.
- g) Filled up gland packing in TICV-1301 and PICV-1123
- h) Field Rotameters are overhauled.
- i) Provision of 110 V.A.C. supply in BHEL Panel is made for Beacon (local) Digital speed Indicator.

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UREA PLANT

TECHNICAL DEPARTMENT JOBS

Code No

Description

2 81 01

01 HEAT RECOVERY FROM CONDENSATE CIRCULATING SYSTEM - II IN UREA PLANT (PHASE - I)

As per original design circulating condensate (which is removing heat of formation of carbamate within H.P.Scrubber H-1203) is cooled by cooling water in cooler H-1207 from 130°C to 120°C. Instead of that one more cooler H-1207A has been installed to cool circulating condensate by surface condensate (which is going to deareator of boiler at the rate of 25 to 30 T/hr). By this way, the temperature of surface condensate is increased from 50°C to 100°C

02 INCREASING THE DISCHARGE DUST HEIGHT OF PRILL TOWER I.D.FAN.

Urea dust laden air discharged from one of the ID Fan was corroding the nearby structure. Hence the dust has been increased by 2.5m.

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OFFSITE

MECHANICAL JOBS

Code No Description

3 02 01 CW PUMP TURBINE Q-4401/B :
OVERHAULING

- 01 Overhauled governor, relay cylinder, stop valve, extra nozzle, emergency trip valve.
- 02 Rotor condition checked, found Ok. cleaned it manually.
- 03 Replaced Carbon Rings.

CARBON RING CLEARANCES :

<u>Steam inlet End</u>			<u>Exhaust End</u>		
<u>Shaft dia</u>	<u>Carbon Ring I.D</u>	<u>Clearance</u>	<u>Shaft dia</u>	<u>Carbon Ring I.D</u>	<u>Clearance</u>
106.92mm	S1 107.25	0.33mm	106.92	E1 107.25	0.33mm
106.92 "	S2 107.25	0.33mm	106.92	E2 107.25	0.33 "
106.92 "	S3 107.20	0.28mm	106.92	E3 107.15	0.23 "
106.92 "	S4 107.15	0.23mm	106.92	E4 107.15	0.23 "
106.92 "	S5 107.15	0.23mm	106.92	E5 107.15	0.23 "
96.88 "	S6 97.05	0.17mm	96.88	E6 97.05	0.17 "
96.88 "	S7 97.05	0.17mm	96.88	E7 97.05	0.17 "

04 Thrust pads replaced with new pads and thrust clearance maintained to 0.011" i.e. Axial thrust 0.011".

Clearance between Rotor & Diaphragm
 Mx : 0.088"
 Mini : 0.077"

Oil labyrinth clearance:
 Governor side : 0.006")
 Gear Box side : 0.003") Radial

Journal Bearing clearance 0.007" Both side
 Overspeed trip speed set to 6740 RPM

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Offsite (Mechanical)

Code No

Description

05. Checked Gear Box and its bearings. Bearing clearances and thrust
- a) Gear shaft bearing (Pump side) - 0.005"
 - b) Gear shaft bearing (turbine side) - 0.005"
 - c) Pinion shaft bearing (Pump side) - 0.006"
 - d) Pinion shaft bearing (turbine side) - 0.006"
 - e) Pinion thrust - 0.006"
 - f) Gear thrust - 0.007"
- 06 Console oil changed with new Servoprima 68.
- 07 Cleaning of oil Cooler, MOP & MOP suction strainer discharge filter.
- 08 Checked gear coupling found Ok. Regreased and coupled.
- 09 Measured Vibration level and found O.K.

3 02 02

COOLING WATER PUMP TURBINE Q - 4403 :

Bearing clearances and checking done and clearances found as under.

IN TURBINE :

1. Thrust of turbine - 0.0135" (Before overhauling)
2. Journal Bearing clearance (Out Board) - 0.18mm
3. Journal Bearing clearance (In Board) - 0.18mm

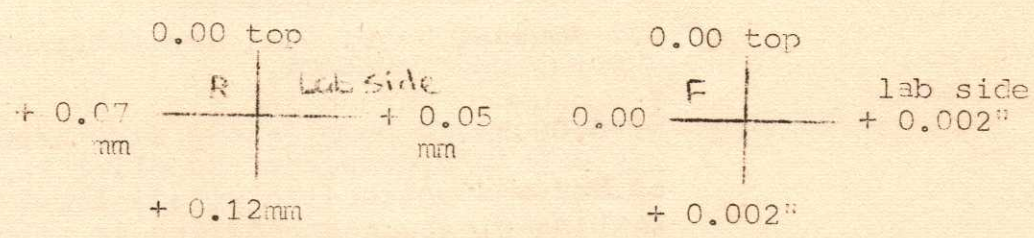
* Adjusted thrust and final thrust maintained is 0.003" .

IN GEAR BOX :

Bearing clearances and thrust.

1. Gear shaft Bearing (turbine side) - 0.165mm
2. Gear shaft Bearing (pump side) - 0.18mm
3. Pinion shaft Bearing (turbine side) - 0.19mm
4. Pinion shaft Bearing (Pump side) - 0.16mm
5. Thrust of Gear - 0.006"

Code No	Description
3 02 03 & 04	COOLING WATER PUMP P-4402, P-4403 :
	01 Decoupled the pump and Removed casing.
	02 Inspected Rotor condition, casings, and neck rings found Ok.
	03 Cleaned Casings, Gasket area and Rotor manually.
	04 New Gasket of 1mm thickness Champion 20 provided and Boxed up casing.
	05 New Gland packing provided (1" thickness)
	06 Also checked Bearing clearance which is 0.003" on Both side for P-4403.
∠ white	07 Also In-board bearing of P-4402, top Half/metal worn out badly, so replaced, Bearing and clearance maintained as In board bearing - 0.25mm Out board bearing - 0.21mm
	08 Flush gland cooling line and valve changed.
	09 Checked alignment with prime mover Pump (P-4402) found 0.030" down. Realigned pump & motor and coupled it with fresh grease.
	10 Alignment readings maintained are as under (P-4402)

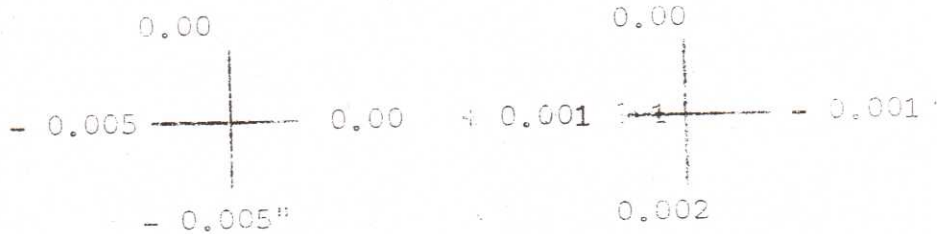


Alignment Reading - Dial on Pump

Code No	Description
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3 02 05 RAW WATER PUMP AND TANK AREA :

01 Raw water pump P-4101/B Base plate changed, alignment done. Alignment of Raw water pump.



Also gland of pump and valve repacked of both pumps i.e. P-4401/A & B.

02 Drinking water line from Raw water tanks first valve changed (3" Diaphragm valve)

03 Fire water line first valve (3" gate valve) from Raw water tank changed.

3 02 06 COOLING WATER PUMPS - P-4401/A/B/C/B :

Gland packing done and gland sealing water line flushed in all pumps i.e. P-4401/A/B/C/ & D.

3 02 07 SUMP ISOLATION GATE CHECKED :

All cooling water sump isolation gates except P-4402 checked and found Ok.

3 02 08 Cooling water pump P-4402 discharge gate jamming problem checked in presence of supplier representative. The defect was noticed in misalignment of gate which was rectified. The gate function is smooth.

3 02 09 BOILER FEED WATER PUMP TURBINE Q-5111 :

- a) Oil filters, console and coolers cleaned and oil Servoprime-68 replaced.
- b) All steam leak as per shutdown list attended.
- c) Nozzle Box drain line and vent line modified.

Code No	Description
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- d) To attend abnormal sound from Governor, following jobs done.
 - 1) Removed MOP pump drive shaft, checked and found its bearing damaged.
 Replaced Bearing (MSK-7206A) - 4 Nos (i.e. 2 in each shaft)
 Also main bearings condition checked found as under.
 - Turbine thrust - 0.0085"
 - Journal Bearing clearance (coupling side) - 0.27mm
 (Governor side) - 0.26mm
 - 2) Oil guard clearance (coupling side) - 0.3mm
 - 3) Oil Guard clearance (Out Board) - 0.32mm
- e) Replaced Governor of Q-5111 Turbine

3 02 10 REPLACEMENT OF H.C.L.TRANSFER PUMP P-4210/A WITH INDEGENEOUS :

- a) Removed old pump with base from foundation.
- b) Installed new indogeneous pump with base. With replacing suctions and Discharge piping and valves.
- c) Trail taken satisfactory.
- d) Vibration taken found normal.

3 03 01 LEGASSER BLOWER K-4201/A :

- Replacement of Legasser blower K-4201/A
- a) Removed Legasser Blower.
 - b) Installed New Blower with suction filter.
 - c) Trial taken and vibration found o.k.

Code No	Description
3 03 02	<p><u>FL FAN TURBINE Q-5113 :</u> All bearings inspected and clearance measured. Bearings found Ok.</p> <p><u>Pinion Shaft :</u> Clearance</p> <p>a) Journal Bearing (turbine side) - 0.11 to 0.13mm b) Journal Bearing (Fan side) - 0.12mm c) Thrust - 0.007" (0.175mm)</p> <p><u>Gear Shaft :</u> Clearances</p> <p>a) Journal Bearing (turbine side) - 0.11 to 0.120mm b) Journal Bearing (Fan side) - 0.11mm c) Thrust - 0.003" (0.2mm)</p>
3 03 03	<p><u>Regenerative Air Heater R-5111 :</u></p> <p>i) Checked baskets condition and seal clearance measured. Two damaged baskets of hot end repaired. Seal clearance found ok.</p> <p>ii) Flushed bearing oil of RWH, Air motor & gear box.</p>
3 03 04	<p><u>F.L.Fan oil Console :</u> Oil drained, cleaned the sump and refilled the oil Servoprime-68, Filter Strainer and oil cooler also cleaned.</p> <p>01 Also checked clutch system and oil changed. 02 Throttle valve gland packing done. 03 Main 60 ata valve for Q-5113 attended for steam flow problem. 04 All steam leaks attended in F.D.Fan area as per job list.</p>
3 03 05	<p><u>COOLING TOWER FAN NO. 7 (AMMONIA) FOUNDATION BASE REPAIRS :</u></p> <p>1) Removed Fan Blades, Gear Box and Motor from base and removed one cylinder sheet. 2) Removed Base structure from position and put it on shop floor for repair.</p>

Code No	Description
	03) Removed corroded weakened members of structure supports and provided new foundation base.
	04) Cleared Structure by Scraping and Brushing and applied two coats of paints after primer.
	05) Checked level and put the structure back to position and assemble gear box and fan blades. Put motor in position and alignment done. Trial taken successful and Boxed up fan cylinder.
	06) Vibration checked found satisfactory.
3 14 01	<u>STEAM LEAKS :</u>
	01 Q-4401 stop valve bottom side steam leakage attended.
	02 Leaking tappings repair of P-4402 discharge line after isolation valve.
	03 Steam leaks as per list given were attended.
3 15 01	01 <u>BOILER INSPECTION GT-2068 (BHEL BOILER)</u> <u>BHEL BOILER</u> <u>STEAM DRUM/MUD DRUM (F-5111)</u> Opened Manholes of steam drum and Mud drum and cleaned the same. Also got inspected by our inspection department for correction, pitting and wall thickness. Found ok. Boxed up the man holes for hydrotest. <u>HYDRAU TEST : BY DEPARTMENT AND CIB :</u> Boxed up steam Drum and Mud drum. Manholes and Blind provided for inlet and out let connection of steam Drum and Mud drum and gagged safety valves. Tested departmentally at the pressure of 90kg/cm ² and noted pressure drop rate, found ok. before offering for inspection to Boiler Inspector Same test was done in presence of Boiler Inspector for inspection and also opened inspection of steam drum/mud drum done by Boiler Inspector.
	02 <u>Gas Burners :</u>
	1) Both Gas Burners checked and cleaned.
	2) Steam leak jobs as per shutdown list attended.
	3) Replaced damaged expansion bellow.

Code No	Description
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L.S.H.S. Charge pump and oil heater area steam leak attended as per shutdown job list.

Soot Blowers are steam leak job attended as per list.

All valves connected to steam drum front side and rear side area, gland repacked.

3 17 01

VALVE GLAND LEAKS LPC BHLL BOILER :

- 01 All soot-blowers gland repacked.
- 02 BFW turbine 60 ata steam isolation valve gland repacked (4 ata isolation valve gland repacked)
- 03 FL Fan turbine 60 ata & 4 ata steam isolation valve gland repacked.
- 04 BHLL boiler all high pressure 1st isolation valves gland repacked, which are directly mounted on the steam drum.
- 05 Low stream and up stream isolation valves of 14 ata control valve gland repacked.
- 06 14 ata CV's bypass valve gland repacked.
- 07 Lye-Hyd water level gauge glass, drum level low and trip switches steam side and water side and gauge glasses isolation valves gland repacked.
- 08 Rear side and front side water gauge glasses steam and water side valves gland repacked.
- 09 Remote water level recorder water side impulse line gland repacked.
- 10 FL Fan throttle valve gland leakage rectified.
- 11 60 ata steam stop valve for BHLL Boiler gland repacked.
- 12 60 ata steam isolation valve near Urea plant gland repacked alongwith its bypass and drain valves.
- 13 IJT Boiler 60 ata steam header isolation and bypass valve gland repacked.
- 14 40 ata steam control valve's isolation valve gland repacked and bypass of that valve.
- 15 40 ata steam control valve's bypass valve replaced.

Code No	Description
16	40 ata steam isolation valve to CW turbine No. Q-4401/A/B and Q-4403 gland repacked.
17	40 ata and 4 ata steam isolation valve in CT area for (offsite and Ammonia plant) interconnection valves gland repacked.
18	IJT boiler No.1 FD Fan turbine exhaust to 4 ata steam header provided isolation valve.
19	60 ata steam header drain valve box removed in front of air receiver.
20	Bonnet leakage of main feed water shutoff valve attended.
21	BHEL Boiler feed check valve bonnet leakage attended.
22	Feed water isolation and bypass valve gland repacked
23	IJT Boiler and new boiler feed water line inter connection valve and its bypass valve gland repacked.
24	30% feed water bypass valve gland repacked.
25	Control room side level gauge and trip system box removed.
02	<u>VALVE GLAND LEAK REPAIR ETC - WATER TREATMENT :</u>
01	HCl storage tank out let all first valves are changed alongwith drain valve.
02	DM units RW header 1st isolation valve are overhauled and gland repacked of all valves.
03	Gland packing of raw water isolation valve for cation's done.
03	<u>COOLING TOWER AREA :</u>
01	Overhauled all distribution valves (22 Nos) of Ammonia and Urea cooling towers.
02	Q-4401/A steam flow meter 1st isolation valves passing rectified.
03	Q-4401/B 40 ata steam main isolation valve passing rectified.
04	Overhauling of superheat Relief valve done and set to popping pressure of 64.5 kg/cm ² and resetting pressure 61.8 kg/cm ² .

Code No	Description
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3 18 01	<u>STEAM TRAPS :</u>
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Steam leak of 4 ata, 40 ata and 60 ata steam header from BHEL Boiler, Boiler No.1 and Boiler No.2 were attended and trap rectified as per job list.

01 One 6" NRV changed on 4 ata steam turbine exhaust to 4 ata header replaced for Q-5101B

02 All jobs as per shutdown job list attended.

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OFFSITES

INSPECTION JOBS

Code No	Description
3 31 01	01 <u>BHEL BOILER :</u>
	01 Visual inspection and thickness measurement of steam drum and mud drum was carried out, measurement recorded.
	02 Thickness measurement of furnace tubes and superheater tubes was carried out and recorded.
	03 Report of thickness measurement was handedover to Inspector of Boiler.
	02 <u>DEAERATOR OF BHEL BOILER V-5111 & V-5112 :</u>
	i) <u>Deaerator head :</u>
	1 No corrosion or erosion was observed in the shell.
	2 Top portion of the deaerator head assumed blackish brown colouration.
	3 Colouration of the bottom portion of deaerator head was reddish brown.
	4 Angles supporting the trays were found to be slightly bent.
	5 All the weld joints of Deaerator head were in good condition.
	6 Overall condition of the deaerator head is good.
	ii) <u>Deaerator feed water storage tank :</u>
	1 Shell assumed brownish black colouration.
	2 Rusting was observed in both the dished ends.
	3 Overall condition of tank is satisfactory.
	4 Thickness measurement was done and recorded.
	03) <u>CATION - III :</u>
	1 Thickness measurement of cation III has been carried out. Measurements were recorded.
	2 Spark testing and visual inspection of the new rubber lining was carried out. The mendable defects were repaired.

Offsite (Inspection)

Code No	Description
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- 01 Ultrasonic testing of 60 ata steam line from old S.G. plant to Urea plant has been done. **NO** significant defect was found in any of the joint.

Code No	Description
3 31 02	<p><u>DEARATOR INTERNAL INSPECTION V-5112 :</u></p> <p>01 Manhole cover of Dearator opened, found many trays bolts in loose condition. Removed all the trays, cleaning done and refixed the trays in position and welding done on plates and Boxed up manhole cover after proper checking.</p> <p>02 Valves and flange joint leaks were attended as per list in Dearator area.</p>
3 31 03	<p><u>HCl TANK S2 INSPECTION AND REPAIRS :</u></p> <p>Inspection of HCl tank, S2 was done departmently, Following damages observed.</p> <ol style="list-style-type: none">Coming out resin chips.Secrition of white powder.Minor cracks near base corner inside tankTank supports cracked from outside tank. <p>Tank was repaired departmently at the damaged portion. Tank inspected through inspection section after repair and found Ok.</p> <p>Overhauled HCl transfer pump - P-4210/B</p>

ANNUAL TURNAROUND - 1990OFFSITESCONTRACT JOBS

Code No	Description
3 41 01	<p><u>W.T.PLANT CATION - III RUBBER LINING :</u> Re-rubber lining of Cation III vessel was carried out by M/s.INDUSTRIAL LININGS, Baroda.</p>
3 41 02	<p><u>COOLING TOWERS WOODEN STRUCTURES REPAIRS :</u> Following Repair work was carried out by M/s.Gokul Engg. Co, Thane. Staff on cooling towers (Urea & Ammonia</p> <ol style="list-style-type: none"> 01 Repairing of drift Eliminator 02 Repairing of damaged fills and fill's grids. 03 Repaired/replaced damaged louver sheets. 04 Repaired/replaced stair case and railing wood work where damaged.
3 41 03	<p><u>FAN CYLINDER REPLACEMENT OF U1,U2,U3 - H-4402 :</u> Urea side cooling tower fan cylinders which were made of wooden plywood, changed with FRP Fan cylinders by M/s.Paharpur Cooling Towers, Baroda in U1,U2 & U3.</p>
3 41 04	<p><u>INSPECTION OF HCl TANK S1 :</u> Inspection of S1 HCl Tank was carried out by M/s.Chemical Process Engineering, Bombay who is the supplier of the tank on 10.2.90 found ok.Internal get coat found Ok. Hardness checked inside tank - 35 - 45 Hardness checked outside tank - 40 - 50</p>

ANNUAL TURNAROUND - 1990

OFFSITES

CIVIL JOBS

Code No	Description
3 51 01	<u>BHEL BOILER</u>
01	Boiler furnace & SH zones are cleaned and damaged refractory are repaired.
02	Refractory work on burner phase with all Vata on floor and ceiling.
03	CT make up sump painted with Epoxy paint (Aeralcite coating) internally.
04	Strong effluent and weak effluent channels coated with aeralcite coating.
05	Acid/alkali proof brick lining work like drain, NaOH & HCl, Storage and measuring area. Strong and weak effluent channel completed.
06	Plastering work of C.T.make sump from inside
07	Bitumastic lining work on floor of water treatment plant.
08	Acid/Alkali proof brick lining work in strong weak effluent pits, Manholes including plaster work concrete grouting completed.
09	Replacement of damaged wooden covers on C.T.sump and channel.
10	Repairing of wooden platform for cooling water spreader and distribution of Urea and Ammonia side cooling tower.
11	Repairing of A.C.sheet vertical cladding of cooling towers No. 9.

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OFFSITE

ELECTRICAL JOBS

Code No	Description
3 61 01	<p>01 Preventive maintenance carried out on transformers. TR 1A, 1B and 19</p> <ul style="list-style-type: none"> a) Filtration of oil transformers. b) Replaced silica gel in dehydrating breather of transformers. <p>02</p> <ul style="list-style-type: none"> a) Carried out oil filtration of Potential transformers at 66 KV yard. b) Painted all three potential transformers. c) Replaced silica gel in dehydrating breathers. <p>03 Maintenance carried out on all BHEL make MOCBs and OCBs.</p> <ul style="list-style-type: none"> a) Checking and tightening of connections. b) Lubricating of mechanism. c) Replacement of silica jel in dehydrating breathers. d) Checked trip-alarm circuits. e) Carried out painting of all MOCBs & OCBs. <p>04 Maintenance carried out in all Air Break Isolators at 66 KV yard.</p> <ul style="list-style-type: none"> a) Cleaning the contacts and tightening connections. b) Checked for proper alignment of all poles. c) Carried out painting and lubricated the mechanism. <p>05 Carried out painting of LC distribution boards, Earthing boxes, structure and gantries at 66 KV yard.</p> <p>06 Preventive maintenance carried out on all 11 KV switch gear (GEC/TMG/Kirlosker) installed at 66 KV substation and 11 KV sub station.</p> <ul style="list-style-type: none"> a) Replaced worn out contacts & damaged parts. b) Replaced defective gaskets in Kirloskar MOCBs. c) Replaced insulating oil wherever required. d) Replaced damaged Air puffers on ACB e) Lubricated the mechanism and checked close-trip circuits for proper operation.

Code No

Description

07. Preventive maintenance carried out on all LF ACBs (TMC/ONE END) installed at various MCCs.
- Replaced worn out contacts and damaged parts.
 - Cleaned and lubricated the moving parts.
 - Checked close/trip circuit for healthy operation.
08. Carried out preventive maintenance of all feeder compartments on following MCCs.
- | | |
|--------------|-----------|
| 1. MCC-1 | 6. MCC-3 |
| 2. MCC-2 | 7. MCC-8 |
| 3. MCC-2A | 8. MCC-11 |
| 4. MCC-2B/2E | |
| 5. MCC-2F | |
- Checking of switch gear compartments.
 - Replaced worn out contacts, defective components like, isolators, contactors, coil, Bimetal relays, current transformers, fuses bases and connectors.
- 09
- Modification carried out by providing Siemens make switch fuse unit on fire pump feeder compartments in MCC-1.
 - Replaced power contactor with Siemens 3TB-56 on fire pump local panel.
- 10 Modification carried out by providing Siemens make 630 A SF unit on emergency supply feeder of MCC-2 bus-section.
- 11 Carried out the modification on Soot-Blower panel by replacing existing L & T contactors with Siemens contactors.
- 12 Overhauled the following Motors.
Offsites - H-4401/6 H-4401/3
- 13 In addition to above provided temporary flood lights, hand lamps, welding generator connections.

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OFFSITE

INSTRUMENTATION JOBS

Code No	Description
3 71 01	(A) <u>NEW BOILER :</u>
01	FCV - 1 Control valve was replaced with new control valve. CV of old control valve plug and seat was increased and fixed. Old control valve body was damaged due to erection hence was passing badly.
02	TRCV - 4 & 5 Replaced 'O' ring of Auto Manual switch as it was passing.
03	All the limit switches ^{were} cleaned, lubricated and checked. also checked the wiring.
04	PRCV - 1 - 14 ata control valve stroke checking was done.
05	Removed both the Ignitor and inspected and cleaned the system. The Spark plug of Ignitor for burner No. 1 was found damaged, hence replaced.
06	Inspection of Eye-Hye level indicating system was done.
07	Flushing of all furnace draft gauges sensing point was done.
08	Refitting of Glycol after Calibration were done in LSHS flow Tx, Press TX, Pressure gauges and pressure switches.
09	General cleaning and checking of O ₂ Analyser were done. Replacement of defective components was also carried out.
10	Cleaning, lubrication and checking of all dampers was done, also checked the operation.
11	Calibration and cleaning of F/N system relay etc. of all field transmitters for flow Pressure, level was carried out.
12	Cleaning and calibration of all field pressure, temperature switches was carried out.
13	Cleaning of all field control valves, valve positioner, accessories also checking of strokes were done.

Offsite (Instrument)

Code No	Description
14	Checking of all P.C & PTL's done.
15	General checking and cleaning of Viscosity Transmitter w s done.
16	Cleaning and checking day tank level indicator.
17	Checking of Main panel & Annunciator bulbs.
18	All the burner trip valves, alongwith accessories like Air regulator, lock out relays, limit switches were checked. Replaced/Removed defective components and checked the operation.
19	All gas valves were cleaned along with accessories and checked the operation.
20	Checking of F.L.Fan low oil pressure switch was done.
21	All EMS Panel components like contactor, timers etc were checked and cleaned; also termination was checked. Replaced the defective components.
22	Calibration of TR-30/30A carried out.
23	Checking and cleaning of Inverter UPS system batteries etc carried out.
24	Installation of cooling fans on UPS cabinet.
25	Checking of Deaerator level high and low switches
26	Checking of steam Drum & other PI.
27	Cleaning of all control panels was done.
28	All pneumatic, electrical, thermocouple JD were cleaned and checked. Also provided necessary tagging in Pneumatic jobs.
29	Flushing of Air header and rectification of leakage was carried out.
30	Provided necessary tagging for EMS Panel trip contactors by Painting.
31	PCV-2 Flange leakage attended.
32	Feed water pump luboil trip switches checking was done.
33	Calibration of Drum pressure gauge in presence of Boiler Inspector was done.
34	Painting to J.B & Control valves.
35	Calibration of all control panel instruments like receiver recorders, controller, draft gauges, receiver switches, receiver gauges etc.

Code No	Description
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(B) D.M. PLANT AREA :

- 01 Checking & cleaning of Silica analyser was done.
- 02 Cleaning of valve positioner/Hand jack assembly and stroke checking Raw water, Sump level make up Control valve was done.
- 03 General checking of contactor wiring, solenoid wiring and cleaning of Panel was done.
- 04 Checking of all Anion flow totaliser was done.
- 05 Calibration of all pressure gauge were done
- 06 Calibration of all field flow, level and pressure transmitter after cleaning of F/N & relays was done.
- 07 Calibration of all control panel Instrument was done after cleaning.
- 08 General cleaning and checking of all conductivity meters was done.
- 09 Checking of instrument air leakage on control valve.
- 10 Installation of Pneumatic JB in HCl tank area.
- 11 Covering of all filed Instruments.

(C) I.G. PLANT :

- 01 General checking and cleaning of Hydrogen & Oxygen analyser.
- 02 Shifting of I.G. Compressor pressure gauges with tubing was done.
- 03 IG control panel transformer were barnt it was removed and repaired. Provided alternative supply.
- 04 Replaced all Indicating bulb holders.
- 05 Checking of all pneumatic instruments was done.
- 06 Checking of Control valve and cleaning was done.

(L) COOLING TOWER AREA :

- 01 Checking and Calibration of all field pressure gauges, temperature gauges, switches and sump level transmitter was done.

Offsite(Instrument)

Code No	Description
02	General checking and Calibration of all PH meters was done.
03	Cleaning of V/P & Stroking checking of control valve VICV-3153. 3154 done.
04	Checking of Tachometers and relocation of JB.
05	Painting of main panel, all local panel, Junction boxes.
06	Turbine Steam flow TX fitting leakage after Isolation valves rectified.
07	Thermaxwell leakage of turbine No.3 rectified.
08	All oil pressure switch calibration done.
(E)	<u>EFFLUENT TREATMENT AND CHROMATE PLANT AREA :</u>
01	Replacement of corroded Air header with S.S.P.P.A.B
02	Calibration of all field flow pressure level transmitters.
03	Cleaning of O/P's & Stroking of control valves
04	Calibration of all panel instruments.
05	Painting of Control panel and local PH meter boxes.
06	Provided new PH meter for strong effluent.
(F)	<u>AMMONIA STORAGE AREA :</u>
01	Painting of local control panel and main control panel, control valves and junction boxes carried out.
02	Main panel control instrument calibration was done.
03	for receiver recorders, Pressure switches, receiver gauges etc.
03	Cleaning and calibration of all field switches was done.
04	Replacement of PVC tube with S.S.for compressor K-3101 done.
05	Installation of new annunciator with hooter & timer was done.
06	Replacement of digital level indicator for Ammonia storage and checking & lubrication of level indicating system.

Offsite (Instrument)

Code No	Description
07	Stroke Igniter system checking & cleaning.
08	All Pneumatic J/B & Electrical J/B cleaning and checking.
09	All field pneumatic instruments like flow level, pressure transmitter cleaning of relay F/N System and Calibration checking.
10	Inter lock checking of compressor trip circuit.
11	Covering of all field instruments.
12	Replacement of Naptha pressure switch with new one.
13	Checkings of Annunciator system.

ANNUAL TURNAROUND - 1990
B&MH PLANT
MECHANICAL JOBS

Code No	Description												
4 01 01	<p><u>REFRIGERATION COMPRESSOR K-3101 :</u></p> <p>Discharge pressure of first stage and suction pressure of second stage was going high to the tune of 5.25kg/cm2 and relief valve of first stage was popping.</p> <p>All four valves of second stage discharge were taken out and chocked. Valve plate of one valve found broken. After repairing and checking for passing with naphtha, all 4 valves were refitted and compressor started.</p> <p>All four number suction valves of 2nd stage were opened valves found okay, but unloader was not working satisfactorily in the valve operation.</p> <p>Unloader was made okay by adjusting the length of the unloader fork by filling and fitting was done.</p> <p>When compressor restarted with four valves of second stage pressure of first stage discharge and second stage suction was observed more than normal (4.4kg/cm2 instead of 3.9kg/cm2) but constant and no relief valve popping was observed.</p> <p>The reason for this high pressure was that the compressor was running on raw water. Later on when cooling water was started, the normal pressure of 3.2kg/cm2 is observed.</p>												
4 02 01	<p><u>OVERHAULING OF NAPHTHA PUMP P-3302 A. :</u></p> <p><u>REASONS FOR TAKING THE PUMP FOR MAINTENANCE :</u></p> <p>a) For removing four nos of top impellers to reduce discharge pressure and flow in view of the reduced requirement of Naphtha.</p> <p>b) Preventive maintenance job.</p> <p><u>DISTANCE OF THE TOP SHAFT FACE FROM THE FACE OF COUPLING HALF :</u></p> <table data-bbox="462 1500 1117 1590"> <tr> <td>Before Dismantling</td> <td>=</td> <td>9.2 mm</td> </tr> <tr> <td>After Assembly</td> <td>=</td> <td>9.2 mm</td> </tr> </table> <p><u>CLEARANCE OF THRUST COLLAR :</u></p> <table data-bbox="462 1657 1292 1758"> <tr> <td>Before Dismantling</td> <td>=</td> <td>0.045"</td> </tr> <tr> <td>After Assembly</td> <td>=</td> <td>0.030"to 0.032"</td> </tr> </table>	Before Dismantling	=	9.2 mm	After Assembly	=	9.2 mm	Before Dismantling	=	0.045"	After Assembly	=	0.030"to 0.032"
Before Dismantling	=	9.2 mm											
After Assembly	=	9.2 mm											
Before Dismantling	=	0.045"											
After Assembly	=	0.030"to 0.032"											

Code No.	Description
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LISTANCE OF 1ST IMPELLER AND TAPER LOCK BUSH
FACE FROM IMPELLER SHAFT STEP :

Before Dismantling x = 96.7mm
After Assembly x = 96.7mm

GENERAL OBSERVATIONS

∠ in Pump found in good condition. Impeller shaft was worn off as bush fitting space and bushes were found worn off. Mechanical seal was found/damaged condition. Bearings of housing was in good condition. Impellers and Neck rings were found in good condition. No rubbing is observed.

MECH. SEAL ASSEMBLY :

Condition of following Parts after Dismantling :

Carbon face and Shaft sleeve were damaged.

On Installation :

- 1) In minimum flow line trial was taken as NH₃ plant was shutdown. Current drawn 46 Amps. and discharge pressure - 26 kg/cm².
- 2) On full load when discharge line was charged. Amperage drawn was 48 Amps. and discharge pressure is 24 kg/cm².

SPARE PARTS REPLACED/REPAIRED :

- a) Impeller shaft.
- b) Top shaft.
- c) Fluorosend bush of bowl and seal housing.
- d) Mechanical Seal
- e) Bearing - 7213
- f) Shaft lock coupling with lock rings.
- g) Bowl 'O' ring 15 Nos.
- h) Seal housing 'O' ring
- i) leak off line 'O' ring.

Code No.	Description
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SPECIAL REMARK :

By removing top four impellers the discharge. Pressure measured when run in minimum flow line was found 26 kg/cm².

Clearance of G.M.greeze collar (On top of bearing housing) - 016"

OVERHAULING OF NAPHTHA PUMP P-3302/B :

REASONS FOR TAKING THE PUMP FOR MAINTENACE :

- a) For removing four Nos of top impellers to reduce discharge pressure and flow in view of the reduced requirement of Naphtha.
- b) Preventive maintenance job.

DISTANCE OF THE TOP SHAFT FACE FROM THE FACE OF COUPLING HALF :

Before Dismantling = 9.5 mm
 After Assembly = could not measure

CLEARANCE OF THRUST COLLAR :

Before Dismantling = .030"
 After Assembly = .030"

DISTANCE OF 1ST IMPELLER AND TAPER LOCK BUSH FACE FROM (a) IMPELLER SHAFT STEP :

Before Dismantling x = 96.6 mm
 After Assembly x = 96.6 mm

GENERAL OBSERVATION :

Pump found in good condition. Impeller shaft was worn off at bush fitting space and bushes were found worn off. Mechanical Seal was found in good condition but carbon insert was worn off in the bore. Bearing housing was in excellent condition. Impellers and Nock rings were found in good condition. No rubbing is observed.

MECH. SEAL ASSEMBLY :

Condition of following Parts after dismantling :

Carbon face and Shaft sleeve were found reasonably good.

Code No	Description
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AMPERAGE DRAWN BY THE PUMP MOTOR
ON INSTALLATION :

In minimum flow line the trial was taken as Ammonia plant was shutdown. Current drawn - 41.00 Amps.

SPARE PARTS REPLACED/REPAIRED :

- a) Impeller shaft
- b) Top shaft.
- c) Bush for bowl and seal housing.
- d) Mechanical Seal
- e) One damaged bowl.
- f) Bearing 7213 thrust bearing
- g) Shaft lock coupling with lock rings.
- h) Bowl 'O' ring 15 Nos
- i) Lock bush for impeller - 10 Nos
- j) Seal housing 'O' rings
- k) Leak off line 'O' ring

SPECIAL REMARK :

By removing top four impellers the discharge pressure measured when run in minimum flow line was found 26.5 kg/cm².

Clearance of G.M. Grease collar (on top of bearing housing) - 0.016".

4 02 02 Dust solution pump at hopper floor coupling rubber found damaged and coupling was badly misaligned resulting in damage of coupling also.

New coupling rubber spilder. installed after necessary alignment.

4 03 01 RECLAIM MACHINE M-2116 :

Main gear box, sweveling gear box, top cover removed, Checking of gears done and general cleaning done. Input shaft gear box sweveling gear box was found with burrs on the teeth. Burrs were removed with stone and fresh oil was poured in. Oil was changed in travelling and hoisting gear box. Fresh alignment of all gear boxes with motor was done

Code No	Description
	<ul style="list-style-type: none"> a) Gear train side cover was removed. It was observed that lot of Urea was deposited in the sump. Complete cleanir was done and oil was changed. b) Chain sprokotside cover was removed. Bearing (Needle roller bearing N.A.4824) of bucket elevator shaft end cover was found completely damaged and replaced with new. Chain was completely cleaned with diesel and new grease applied. c) Brake shoe replaced and oil in thruster was topped up. d) Cardium compound applied on wire rope and open teethed gears of hoist.
4 16 01	Strainer cleaned Naphtha filters for feed line and unloading line cleaned 2 Nos each wiremesh found okay.
4 17 01	<ul style="list-style-type: none"> a) <u>RE PACKED VALVES GLAND AS UNDER :</u> <ul style="list-style-type: none"> i) 4 ata trap isolation valve gland in front of Training Centre. ii) 4 ata tracing line first valve gland -T-3101. iii) Behind M.C.C. at storage area, 4 ata oil tracing line 1st valve gland. iv) 4 ata oil tracing 1st valve gland behind operator cabin. b) <u>FOLLOWING VALVE OVERHAULED AS THEY WERE HARD TO OPERATE :</u> <ul style="list-style-type: none"> i) Gate valve 4" NB - 2 Nos in Naphtha feed line suctic to the pump. ii) Ball valve 4" NB - 2 Nos in Naphtha feed line suction to the pump. iii) Naptha loading line, discharge of the pump to tank gate valves 6" NB - 2 Nos. c) 4 ata strap oil tracing line behing T-3101 d) 4 ata for heating tracing oil main isolation valve 100 mm up stream flange joint and gland leakage attended.

Code No Description

4 21 01 PLANT TRANSFER CONVEYOR M - 2110 :

- a) Gear box overhauling was done. Top cover and worm wheel shaft removed cleaning was done. Oil changed. All coupling bushes changed as they were damaged. Alignment of drum pulley with gear box checked and found okay. Alignment was done between motor and gear box.
- b) Idlers - 4 Nos changed under the chute at tail end as these were jammed.

4 21 02 FRESH UREA SHUTTLE CONVEYOR M-2112 :

- a) Fabricated the structure at head end for lifting the gear box and drum pulley.
- b) Gear box top cover and worm wheel shaft removed. Cleaning was done. Pitting marks were observed on the teeth of the worm wheel. Oil was changed. Alignment was checked with drum pulley and alignment was done between motor and gear box.

4 21 03 TRIPPER UNIT M-2114 :

- a) Gear box dismantled. Cleaning was done. Oil changed. Coupling alignment checked. Chain cleaning and greasing was done.
- b) Idlers - 2 Nos changed as these were jammed.
- c) Discharge chute of Tripper towards Urea side was replaced with new 8" square section chute as the old was badly corroded. Also the cross section area was to be increased to ensure more rate of flow. So the cross section area of 6" I.D. pipe was converted to 8" square section.

4 21 04 RECLAIM CONVEYOR M-2117 :

Gear box top cover removed. Oil changed after doing complete cleaning. Alignment was done between motor and gear box.

4 21 05 BAGGING BUILDING FLEED CONVEYOR M-2121 :

- a) Old chute was removed and new prefabricated chute was erected.
- b) Cleaning hole covers on pipe coming from conveyor M-2110 were made new and with proper hinges to avoid leakage - 4 nos.
- c) New skirt rubber provided all along the new chute.
- d) Vulcanized joint was repaired in conveyor belt as it started tearing from one place and a 2" cut was observed.

Code No

Description

4 21 06 BAGGING BUILDING HOPPER CONVEYOR M-2122 :

- a) Gear box top cover and worm wheel shaft were removed. Cleaning was done. Oil was changed. Alignment was done between motor and gear box.
- b) Belt repairing was done at two places by vulcanizing as the belt was tearing.

4 21 07 TRIPPER OF CONVEYOR M-2127 :

- a) Gear box overhauled. Oil changed. Chain cleaned and greasing done. Alignment between motor and gear box was done.

4 21 08 SLAT CONVEYORS M-2124 :1 to 8 :

- a) All gear boxes of slat conveyors including the one on platform were overhauled. Worm wheel shaft bearing of conveyor No.1 platform and conveyor No.8 found damaged, hence changed with new one.(Bearing No.7210) Complete slats with chain changed with new on platform conveyor as the breakage of the conveyor was frequent.
- b) Stitching machine poles were overhauled and greased. In machine No.3 the base plate of motor found damaged. This was replaced by new one.

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B&MH PLANT

CIVIL JOBS

Code No	Description
4 51 01	01 Bitumastic lining work including removing the damaged lining on ground floor, Tail end floor of M-2110 & M-2117, Partly on walkway of 2121 & 2110 on machine floor of Bagging conveyor gantry from Urea to Silo.
	02 Cement plaster on wall of conveyor gantry from Urea to Silo about 4 x 2 meter size.
	03 Painting of Transformer of Silo TR 4A & 4 B

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B&MH PLANT

ELECTRICAL JOBS

Code No	Description
4 61 01	01 Carried out preventive maintenance of all feeder compartments on following MCCs.
	MCC - 4, MCC - 4A, MCC - 9
	a) Checking of switch gear compartment. b) Replaced worn out contacts, defective components like isolators, contactors, coil, bimetal relays, current transformers, fuse bases and connectors.
	02 Preventive maintenance carried out on all LT ACBs (TMG/SIEMENS) installed at various MCCs.
	a) Replaced worn out contacts and damaged parts. b) Cleaned and lubricated the moving parts. c) Checked close/trip circuit for healthy operation.
	03 Provided temporary flood lights, hand lamps, welding generator connection.
	04 Overhauled the following motors.
	P-3302A P-3302-B, M-2112 M-2110, M-2116 (Sweve - lling Drive)
	M-2116 (Travel Drive)
	M-2166 (Lifting Drive)
	M-2116 (Chain Drive)
	M-2117 M-2124/1 to 8 M-2122.
	05 Preventive maintenance carried out transformers. 5A - 5B
	a) Filtration of oil in all transformers. b) Replaced silica jel in dehydrating breather of transformers. c) Replaced the gaskets damaged ones in TR 5A d) Carried out painting of transformer TR 5A & 5B e) Replaced oil of transformers 5A & 5B
	06 Shifted the incoming power cables of MCC-9 from TR-5B secondary to bus section bus bars.
	07 Replaced Rope switches on all conveyors.
	08 Provided addition light fittings on vibrating screen at silo.
	09 Carried out maintenance of all lighting distribution boards & local switches & junction boxes of conveyors for cleaning & tightening of connections.
	10 Repaired/replaced all light fittings on all conveyors at BMH plant.

ANNUAL TURNAROUND - 1990B&H PLANTINSTRUMENT JOB

<u>Code No</u>	<u>Description</u>
4 71 01	01 Cleaning and checking of all packer scales control cabinet.
	02 Checking of all solenoid valves, Proxi switches contactors etc.
	03 Calibration and checking of Libra Scales.
	04 Installation of new Electronic weighing machine on Railway Platform.
	05 Calibration of micro processor based machines.
	06 Painting of packer scale control cabinets, Libra machine platforms, etc.