(12)

1991

I F F C O

K A L O L - U N I T

Planning Section
Maintenance Deptt.
Report No.12/1991

R E P O R T

O N

P L A N T T U R N A R O U N D - 1991

(AMMONIA PLANT 24-02-91 TO 13-03-1991)

(UREA PLANT 23-02-91 TO 14-03-1991)

INDIAN FARMERS FERTILISER CO-OPERATIVE LIMITED

I N D E X

I F F C O

K A L O L - U N I T

THE PLANT TURNAROUNDS AT A GLANCE

Sr. No.	Year	AMMONIA PLANT PERIOD FROM	TO	DOWNTIME DAYS	HRS	UREA PLANT PERIOD FROM	TO	DOWNTIME DAYS	HRS	REASONS IF ANY
1	1975	06-05-75	21-05-75	16	-	06-05-75	21-50-75	16		Planned
2	1976	26-03-76	20-04-76	26	-	26-03-76	26-03-76	26		Planned
3	1976-77	05-12-76	22-01-77	49	-	05-12-76	24-02-77	51		101-JT B/D
4	1978	21-02-78	15-03-78	23	-	21-02-78	25-03-78	31		101-BJ B/D
5	1979	21-05-79	12-06-79	23	-	21-05-79	12-06-79	23		K-1101/2, 3rd Stg. Cylinder
6	1981	12-04-81	10-05-81	29	-	08-04-81	12-05-81	35		101-B Headers
.	1984	01-01-84	25-01-84	25	-	01-01-84	25-01-84	25		Planned
8	1986	19-03-86	03-05-86	45	-	04-03-86	01-05-86	59		Reformer Revamping
9	1987	12-04-87	03-05-87	21	-	12-04-87	02-05-87	20		Planned
10	1988	18-04-88	14-05-88	27	-	18-04-88	13-05-88	26		Planned
11	1990	05-02-90	05-03-90	29	688.67	31-01-90	07-03-90	35	829.0	Planned
12	1991	24-02-91	13-03-91	18	429.08	23-02-91	14-03-91	20	459.25	Planned

PLANT TURNAROUND

PREFACE

KALOL UNIT had taken a planned turnaround.On 23/02/91 Urea Plant and on 24/02/91 Ammonia Plant were stopped. In Ammonia Plant primary reformer catalyst, HTS catalyst were replaced, W.H.Boilers were offered for annual inspection by Boiler Inspector, Primary Reformer catalyst tubes total 18 Nos were replaced, Air Compressor Turbine and Refrigerant Compressor Turbine were overhauled and rotors of both turbines duly repaired at the works of M/s.Delaval, U.S.A. were installed for checking their performance.Air Compressor LP case was overhauled, BFW Pump Drive Turbine (104-JT Elliot Turbine)Rotor was replaced by spare rotor, NG Compressor Turbine was overhauled with the help of BHEL personnel,Compressor was also overhauled. Bearings checking and preventive maintenance was carried out for Air compressor HP case, speed increaser, Syn Gas Compressor Drive Turbine, ID Fan, gear box and Turbine, BFW Pumps and Terry Turbine.In primary reformer burners along with burner blocks (56 Nos) were rotated by 90°for avoiding direct impingement of flame on catalyst tubes, damaged insulation and refractory were replaced.Piping from 104-D outlet to 103-C inlet channel cover was replaced with better material. In CO2 Absorber, additional demister pad 6 inch thick was installed. Heat exchangers oil coolers etc were cleaned by hydrojetting. In Urea Plant inspection of H.P.Vessels, H.P.Condenser and H.P.Stripper, was carried out by M/s.Stamicarbon Engineers.Stretching of tubes in H.P. Condenser was done. CO2 Centrifugal Compressor Turbine rotor repaired at works of M/s.NUOVO PIGNONE, Italy was replaced to check its performance. Carbamate Pump (P-1201-A) was overhauled. Bearings inspection and preventive maintenance check up was carried out for rotary equipment including CO2 Centrifugal Compressor, P.B.Compressor and Turbine, GHH Compressor Drive Turbine, H.P.NH3 Pump Drive Turbine, P.I.Fans etc Boiler Inspection was carried out in presence of CIB.Hydrojet cleaning of Heat Exchangers was done. Relining of Prill Tower Scaper floor was done. In Offsites and B&MH Plant, C.W.Pump (P-4402)was overhauled.Bearing inspection and preventive check up was done.C.W.Pump and Turbine, BFW Pumps (P-5111 & P-5112), FD Fans and Turbine, BHEL Boiler (GT-2068) was offered for inspection by CIB.Regenerative Air Heater overhauling was done with help of BHEL Engineers. Damaged conveyor belt (M-2122) was replaced, Acid proof lining in water treatment plant was carried out.Inspection of vessels in Ammonia, Urea Plant, Offsites and pipings was carried out.Maintenance of Electrical installations and MCCs and motors overhauling was done.Instruments panels, controls were checked up, repairs and replacement were done and contacts renewed.Minor modifications in Ammonia, Urea Plant and Offsites were carried out. The turnaround was completed sucessfully in record time of 429.08 hrs and Ammonia production was lined up on 13/03/91 and Urea production commenced from 14/03/91.

PLANT TURNAROUND - 1991

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 "	01 "
	03 T Forklifts	01 "
	01 T " "	01 "
	Truck	01 "
b)	**HIRED**	
	Coles - 100 Ton Capacity	01 No
	120 FT TELESCOPIC BOOM	
	MANPOWER :	
a)	**IFFCO :**	
	a) Mechanical	Existing strength
	b) Mechanical Services	
	c) Electrical	
	d) Instrument	
	e) Trainees in various trade	

b) **HIRED** - Contractor

Sr.No.	Category	Mandays
1	Milwright Fitter	33
2	Fitter	588
3	Fabrication	55
	Grinder	47
4	Rigger	740
5	Welder IBR	10
6	Welder NIBR	45
7	Carpenter	18
8	Mason	23

c) **HIRED** - IFFCO Time office

Labour unskilled - 3100 Mandays

PLANT TURNAROUND - 1991

IMPORTANT JOBS DONE BY OUTSIDE AGENCIES

Sr.No.	Name of Party	Work Description	W.O.No.
1.	M/s.Nutech jetting equip.	Hydrojetting of Heat exchangers.	D-7327
2.	" Techno Engg.Works	Opening & boxing up of Heat Exchangers	D-7328
3.	" BHEL, Hyderabad	Overhauling of NG Comp.	D-8618
4.	" Stamicarbon	High pressure vessels inspection.	D-7552
5.	" Nigashu Engg.Works	Tube stretching of H-1202	D-7676
6.	" Alfa Laval	Cleaning of plate type heat exchanger	D-6300
7.	" Paharpur cooling tower Baroda.	Refiting of GRP grids wood works & misc.deck repairs in cooling towers.	D-8039
8.	" Jash Engg.(P)Ltd, Indore	Servicing of cooling towers sump gates - 4 Nos	D-8046
9.	" Chemical Process Equp.	Flood coating of Hcl storage tank No.S-1 by Isophthetic resin	D-8043
10.	" Coromandel Prodolite	Inspection of Hcl storage tank No.S-II from inside	D-5900
11.	" BHEL Trichy (Ranipet)	Servicing of Regernerative Air Heater of New BHEL boiler.	D-8024
12.	" Jagruti Rubber Works Ahmedabad.	Conveyor belt vulcanising	
13.	" Teacon coating (P)Ltd. Bombay.	Painting	D-6841
14.	" Lloyd Insulation(I)Pvt. Ltd.Bombay.	Maintenance of Insulation	D-6846
15.	" Smitha Engineering Kalol	Fabrication of Piping and Steel Structure.	D-4356
16.	" Mahavir Engg.Works Baroda.	Supply of Skilled Manpower.	D-6815

Sr.No.	Name of Party	Work Description	W.O.No.
17.	M/s.Crane Hiring Co,Baroda	100 T Coles crane services	D-6318
18.	" ABB Ltd, Baroda	Supply of skilled manpower for overhauling of Turbines compressors etc.	D-8258
19.	" Greaves Cotton	Servicing of AMF set	
20.	" CELCO, Baroda	Supply of welders	
21.	" P.D.I.L.,Sindri	Automatic ultrasonic scanning of Primary Reformer Tubes.	D-2146
22.	" NDT Services,Ahmedabad.	Ultrasonic flow Letection and thickness measurement of pipe lines vessels etc.	D-2041
23.	" ------- do -------	Magnetic Particle Testing of vessel weldjoints,pipe weld joints etc.	
24.	" ------- do -------	Radiography job	D-2040
25.	IFFCO,Aonla unit	Eddy current scanning of Reformer tubes	
26.	Chemisite,Baroda	P.T.Scrapper floor lining	D-7619
27.	Madhusudan,Ahmedabad	Acid proof lining	D-3178
28.	Chemisite Engrs.,Baroda	Bitumistic lining	D-3174
29	BHEL,Baroda	Servicing 66KV Pross/OCB's	D-7258
30	Siemens Ltd,Ahmedabad	Servicing of Siemens make to ACBS	D-7256
31	Voltas Ltd,Baroda	Servicing of Fmg make to ACBS	D-7259
32	Kirlosker Systems P.Ltd,B'bay	Servicing of 11 Kv MOCB's	D-7260
33	Greaves Cotton Co,Bombay	Servicing of AMF set	D-7261
34	Elecon Engineer,Baroda	Testing & calibration of EE make relays.	D-7264
35	HHE Ltd,Madras	Servicing of HHE	D-7257
36	Standard Batteries P.Ltd Bombay	Installation & Commissing of SPG 100 ER-110 Nos at MPSS.	
37	Vistar Electronics,Pune	P.M.of rectifier,inverter & batteries.	D-5365

PLANT TURNAROUND - 1991

AMMONIA PLANT

MECHANICAL JOBS

Code No.	Description
1 01 01	AIR COMPRESSOR TRAIN - 101-J HP CASE COMPRESSOR ~~101-JHP~~ 101-JHP As a prevent e maintenance check up, inspected the bearings of HP case compressor. - Both inboard and outboard were found in good condition Boxed up the same. - Similarly thrust bearing was also found in good condition. - Bearing clearances were measured and found to be within the allowable limits. Inboard journal bearing - 0.006" Outboard journal bearing - 0.005" Axial float - 0.012" * Noted LP CASE COMPRESSOR 101- JLP As a preventive maintenance check up, this compressor was taken for complete overhaul. The following jobs were carried out on this compressor. 1) Removed the top casing cover 2) Rotor was found in good condition, however dust particles and rusting were noticed in all the wheels of the Rotor. 3) Checked the Interstage labyrinth clearances labyrinths were found in good condition. 4) Rotor assembly was taken out and cleaned thoroughly (manual cleaning) 5) Cleaned the diaphragms and diffusers of both bottom and top halves without taking out from the casing. 6) Replaced the end seal of discharge side, by new one since more rubbing was noticed on the old end seal. 7) Rotor was positioned on the bottom casing and again checked the interstage labyrinth clearances 8) Positioned the top casing cover & tighthed the bolts. 9) Replaced the tilting pads (5 Nos) of G.B.side(ie suction side) Journal bearing. Since more rubbing marks were noticed on the bearing pads. The turbine side(ie Discharge side) Journal bearing pads were found in good condition. Similarly thrust bearing shoes were also found in good condition. * Noted 10) Checked for oil leakages after lube oil circulation. 11) Checked the vibration levels of both the journals thrust bearings on load condition and found to be normal.

Code No. Description

1 01 01 (03) TURBINE ROTOR REPLACEMENT 101-JT

In April-90 a new spare turbine Rotor was installed after replacing the old damaged Rotor assembly. The damaged Rotor assembly was sent to M/s.Delaval, USA for necessary repair. After reblading the 5th row blades, and all necessary repair and dynamic balancing check, the rotor was received at our site. During this plant turnaround it was planned to install this repaired rotor assembly for checking its reliability and performance. Accordingly the following jobs were carried out on the turbine.

1) Removed the inlet and exhaust pipe lines and all the oil pipe lines.

2) Removed the Governor assembly & Top casing cover.

3) Rotor was found in good condition. Checked the front and rear gland labyrinths and interstage labyrinth clearances. All labyrinth were found in good condition.

4) Rotor assembly was taken out.

5) Removed the 3rd Diaphragm (from steam inlet side) for cleaning the minor silica deposition. After cleaning both the diaphragm halfs it was put back on its position. There was no much deposit on remaining diaphragms.

6) Taken out the coupling hub from the removed turbine rotor. Checked for the taper contact of the coupling hub on the repaired rotor shaft, found to be 80% contact. Fitted the hub on the repaired rotor keeping the proper standoff position.

7) Rotor was positioned on the bottom casing and checked the front and rear gland labyrinths and interstage labyrinth clearances.

8) Checked the inboard and outboard journal bearings and thrust bearing assembly. Found in good condition, and assembled the same. Axial float was found to be 0.030" it was brought to 0.008" by putting new shim (old shim 0.106 New shim 0.126")

9) Positioned the top casing cover & tightened the casing bolts.

10) Positioned the exhaust and inlet pipe lines, governer assembly and oil pipe lines.

11) Lubricated all linkages of nozzle bar assembly.

12) Checked for oil leakages after starting the lube oil circulation.

13) Turbine was checked for its OST and it was found to be tripped at 7750 rpm.

14) Checked the vibration levels of both inboard and outboard bearings on load conditions and found to be normal.

Code No	Description

1 01 02

NG COMPRESSOR 102-J ✓

NG Compressor was taken for complete overhaul. Following jobs were carried out.

1) Compressor Barrel was removed and shifted to workshop for dismantling.

2) Journal and thrust bearings were removed. Removed the thrust collar, coupling hub and oil seals. Also removed the end covers.

3) Both the journal bearings and thrust bearing were found in good condition. Both the oil seals were found in damaged condition.

4) Bundle was taken out from the barrel and split out horizontally.

5) Rotor was taken out, cleaned and inspected. Checked its runout, found okay.

6) Scoring was noticed on the Rotor shaft at the location of HP oil seal (Discharge side) Smoothened the scoring portion.

7) Assembled the bundle with same old rotor and new labyrint seals, new oil seals and 'O' rings.

8) Bundle was inserted into the barrel and both the end covers were positioned.

9) Assembled the old journal bearing assembly and thrust bearing assembly.

10) Checked the Rotor float at Zero position and maintained as per recommended value.

11) Checked the axial dispalcement with thrust bearing found Ok.

12) Barrel was shifted to site and placed on its base.

13) Fixed the coupling hub on the rotor.

14) Aligned the compressor and turbine without pipe line jointings and maintained as per protocol values

15) After fixing the pipe line joints again checked the alignment between compressor and turbine, found no change.

16) Coupled the spacer assembly and positioned the oil jet for coupling lubrication. Also checked the coupling float and recorded.

* Noted

17) Modified the drain pipe line of both the side bearings for easy removal.

18) Cleaned the L.O.Pump suction strainer.

Code No	Description
1 01 02	19) Oil flushing was carried out by putting a mesh on the lube oil and governor oil line and it was kept on circulation for a period of 8 to 10 hours.
	20) Machine was taken load and went up to a speed of 13350 rpm Machine performanc e was found satisfactory.

1 01 02

NG COMPRESSOR DRIVE TURBINE 102-JT

The following major jobs were carried out in this turbine unit with the help of BHEL Personnel.

1) Front and rear journal bearings and thrust bearing were taken out and inspected. Front bearing was found in good condition assembled the same bearing. Rear bearing was found damaged about 30 Sq.mm area of the whitemetal was peeled off due to overheating. Rotor shaft journal was found in good condition. Assembled the rear bearing with spare bearing assembly Clearances were maintained as per recommended value. Similarly thrust bearing was also checked, found in good condition. Boxed up the same.

2) HP Servo motor was dismentled for overhauling. Scoring was noticed in the main spindle OD and cylinder ID. Sealrings (2 Nos) were also found in damaged condition. Assembled the servo motor with new seal rings and with same old spindle and bush.

3) Both the LP Servo motors were dismantled. It was found on one of the LP servo motor (Right side of the turbine) Pilot piston thrust ball bearing was found damaged and assembled this servo motor with new bearing. Similarly the other Servo motor (Left side of the turbine) was also assembled after thorough checking.

4) HP Control valve assemblies were taken out and checked the valve cone and its seat. Found okay. Also measured the idle lift of the valves. Similar checking was carried out on LP control valve assemblies.

5) Dismantled the emergency stop valve and inspected the followings.

   a) Strainer was found in good condition.
   b) Stop valve piston was found in good condition. However slight increase in diametrical clearance was observed.
   c) Slight scoring was found in the oil sealing spindle bush.
   d) Assembled the ESV with the same parts.

6) Non return injection valve was not operating properly. In order to find out the problem dismantled the hand wheel coloumn assembly and found valve was in open condition its spacer piece was found seized. Also its single thrust ball bearing was found in damaged condition. Assembled the hand wheel coloumn with new thrust ball bearings and recitified the seizing problem of spacer. Thereafter the valve could be operated properly.

Code No. Description

1 01 03 REFRIGERATION COMPRESSOR DRIVE TURBINE 105-JT
TURBINE ROTOR REPLACEMENT

In Feb,1990 we we have installed a new spare turbine Rotor assembly after replacing the old damaged Rotor assembly.The damaged Rotor was sent to M/s.Delaval works at USA for necessary repair.After replacing the 5th row and 6th row blades and all other necessary minor repairs and dynamic balancing check, the rotor was received at our site.During this turnaround it was planned to install this repaired rotor assembly for checking its reliability and performance.Accordingly the following jobs were carried out on the turbine.

1) Removed the inlet and Exhaust pipe lines and all the oil pipe lines.

2) Removed the Governor assembly and top casing cover.

3) Rotor was found in good condition,checked the front and rear gland labyrinths and interstage labyrinths clearances

4) Rotor assembly was taken out.

5) Removed the 3rd Diaphragm (from steam inlet side) for cleaning the minor silica deposition. After cleaning both the diaphragm halfs it was put back on its position.There was no much deposit on remaining diaphragms.

6) Taken out the coupling hub from the removed turbine rotor.Checked for the taper contact of the coupling hub on the repaired rotor shaft, found to be 80% contact.Fitted the coupling hub on the repaired rotor keeping the proper stand off position.

7) Rotor was positioned on the bottom casing and checked the front & rear gland labyrinths and interstage labyrinths clearances once again before box up

8) Checked the inboard and outboard journal bearings and thrust bearing assembly. All were found in good condition assembled the same. Axial float was found to be 0.012 abd it was brought to 0.010" by putting new shim (old shim thick 0.125" new shim 0.127")

9) Positioned the top casing cover and tightened the casing bolts.

10) Nozzle bar assembly was taken out for setting the nozzle bar and make it to operate freely without any jamming. Unequal gap was noticed between steam chest face and bar face.It was rectified and maintained the gap as 5.552" Lubricated all linkages of nozzle bar assembly.

11) Positioned the Governor assembly, Exhaust & Inlet pipe lines. and all oil pipe lines.

Code No. Description

1 01 03 REFRIGERATION COMPRESSOR DRIVE TURBINE 105-JT
TURBINE ROTOR REPLACEMENT

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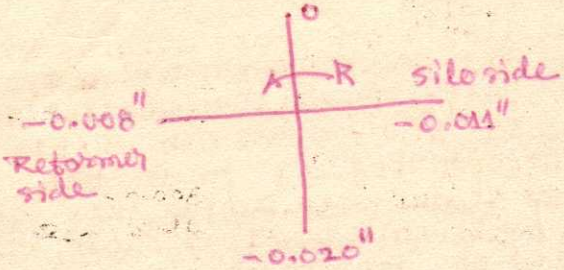
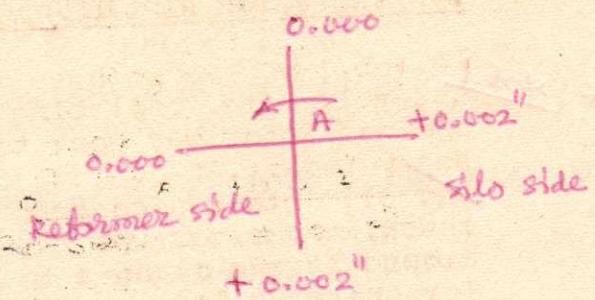
11) Positioned the Governor assembly, Exhaust & Inlet pipe lines. and all oil pipe lines.

Code No | Description

1 01 03 12) Checked the cold alignment between turbine to LP case compressor.





13) Checked for oil leakage after starting the lube oil circulation.

14) Turbine was checked for its OST and it was found to be tripped at 7800 RPM.

15) Checked the vibration levels of both Inboard and outboard bearings on load condition and found to be normal.

* Noted

1 01 04 SYN.GAS COMPRESSOR DRIVE TURBINE 103-JAT :

Thrust Bearing assembly was opened for checking its one of the proble,since it was showing wrong signal at control panel. Replaced the damaged probe and boxed up the thrust bearing top cover.

* Noted

1 02 01 STANDBY PUMP AND ITS DRIVE TURBINE 104-J/JT.

BFW PUMP 104-J

The following preventive maintenance check up was carried out.

- Inspected both inboard and outboard journal bearings. Bearings were found in good condition.Similarly thrust bearing was also found in good condition.Boxed up the same.

Bearing clearances :

Inboard Bearing	= 0.007"
Outboard Bearing	= 0.007"
Axial float	= 0.016"

* Noted

Cleaned the L.O.cooler and seal water cooler.Also cleaned the L.O.filters and L.O.console.Console was filled up with fresh oil.

1 02 02 BFW PUMP & ITS DRIVE TURBINE
MAIN PUMP & ITS DRIVE TURBINE (104-JA/JAT)
BFW PUMP (104-JA)

The following preventive maintenance jobs were carried out.

- Inspected both Inboard and outboard journal bearings.Bearings were found in good condition.Similalry thrust bearing was also found in good condition.Boxed up the same.The values of bearing clearances are as under.

Code No.	Description	
1 02 02	Inboard bearing Outboard bearing Axial float	= 0.0065" = 0.0055" = 0.012"

Cleaned the L.O.cooler and seal water coolers.Also replaced the L.O.console with fresh oil.Cleaned the L.O.filters.

1 02 03 DRIVE TURBINE (104-JT-ELLIOTT TURBINE)

During this turnaround it was planned to replace the existing rotor assembly by a spare repaired rotor.Spare rotor was repaired on its both the bearing journals by rebuilding by Arconomic Process and grinding to the final dimension.In Arconomic processrebuilding is carried out by sintering the molten metal,atomised particle on the surface under atmospheric pressure but at very high velocitiees and under cryogenic conditions of - 20°C to - 40°C thereby the job temperature not exceeding to 80 to 100°C and achieving hard and wear resistant properties.After machining and grinding,rotor was checked for its dynamic balacning.

The following job were carried out on this turbine.

- After opening the top casing cover, rotor assembly was taken out.
- Taken out the coupling hub, OST assembly etc from the removed rotor and installed on the repaired rotor.
- Rotor was positioned and replaced both the front and rear side gland carbon packing with new one.
- Old journal bearing was found in good condition. Boxed up the same.
- Cleaned the L.O.Console tank and filled up with fresh oil.
- Cleaned the L.O.filter element.

Bearing clearance values

Inboard & Outboard bearing	= 0.011"
Axial float	= 0.010"

While strat up checked the turbine speed at various Governor opening. The values are as under.

Pneumatic Psi	Speed RPM
30	1550
6	1800
9	2450
12	3200
15	3700

The OST was checked and it was found to be at 4150 RPM

Code No.	Description

1 03 01 ID FAN TRAIN 101-BJ

The complete ID fan train was taken for general check up as a preventive maintenance check.

(1) ID FAN :

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

- I.B.Bearing clearance = 0.012"
- O.B.Bearing clearance = 0.012"

* Noted

1 03 02 DRIVE TURBINE 101-BJT

Checked both journal bearings found in good condition. Boxed up the same bearings.

Journal bearing clearances (Both the side) = 0.011"

Axial float of the rotor = 0.010"

* Noted

1 03 03 GEAR BOX (SPEED REDUCER)

After opening the top cover all the four bearings were inspected, found in good condition. Checked the diametrical clearances found within the allowable limit. Also checked the teeth of gear and pinion. Found okay. Checked the Backlash of Gear and pinion teeths it was found to be 0.017" (Recommended 0.013" to 0.017") Cleaned the L.O. filter and L.O. cooler. Replaced the console oil of the gear box.

Bearing clearances

Gear shaft Bearing = 0.0065"
Pinion shaft Bearing = 0.0065"

* Noted

* 101-JR & 101-JAT was taken for maintenance & report of that equipment given in draft but not incorporated in this report.

Code No.	Description
1 11 01	Catalysts of all the Reformer tubes (336 Nos) were replaced.
02	VESSELS : HTS CONVERTER 104-D : 1) HTS converter catalyst was changed after 5 years of operation. Also replaced the Alumina balls at the converter bottom. Bottom portion SS 316 wire mesh (6 x 6 mesh) was found in good condition and boxed up the same. Replaced the top portion SS 316 wire mesh (2 x 2 x 0.063" ø) with new one. 2) In HTS 38' ata steam inlet distributor header was found loosened from most of the flange bolts and its supporting plates were also found damaged from its weld joints. Distributor header was assembled and tightened its flanges with SS 316 bolts. Also positioned the fallen supporting plates and tach welded properly.
1 12 01	1) Two Nos. of leaky tubes i.e. 508 & 825 were replaced with new one. Complete Reformer tubes were inspected by Automatic ultrasonic test & eddy current test same of the tubes were found defective which were replaced with new one. Totally 16 nos of tubes were replaced. Tube Nos 135, 212, 411, 502, 637, 804, 805, 810, 811, 815, 823, 828, 829, 832 & 835, 807. 2) Ultrasonic scanning was carried out by PDIL representative on following reformer tubes. Row No.1 Tube No. 101 to 114, 116, 121, to 125 - 20 tubes No.4 Tube No. 401 to 421 - 21 tubes No.5 Tubes No.501 to 542 - 42 tubes No.6 Tubes No.601 to 642 - 42 tubes No.7 Tubes No.701 to 742 - 42 tubes No.8 Tubes No.801 to 842 - 42 tubes All the eight riser tubes were checked by ultrasonic scanning test. 3) Eddy current testing was done by INTCO Kohla. Row No.1 Tube No. 115 to 142 - 28 tubes 2 Tube No. 201 to 242 - 42 tubes 3 Tube No. 301 to 342 - 42 tubes 4 Tube No. 401 to 442 - 42 tubes
1 12 02	1) Damaged insulation of the bottom headers were repaired. 2) Damaged tunnel slabe (Hollow type) were replaced with new one . Total number replaced 45 Nos. Indigenous make (MK Kumar dhobi Dhanbad) Tunnel slabs were put on the 9th row of the tunnel (ie Towards C.T. side) for checking its performance. 3) Damaged roof insulations were repaired at different places at Burner 214, 305, 307, 308, 401, 403, 601, 602, 603, 604, & 702. 4) Repaired the Damaged insulation on Gas inlet manifold, pigtails & Radiant zone wall etc. 5) 5 Nos of spring hangers were replaced by old spring hangers (used before revamp) after doing the load test. Since these springs were found along & damaged. The spring of following tubes were replaced 401, 402, 404, & 405, 403 (5 Nos)

Code No.	Description
1 12 02	(6) In HT convection zone, near mixed feed coil the face protection sheet (SS 310) of ceramicfibre lining got bulged at two places. This was fixed back in position by strai ghtening and tack welding.
	(7) The Liner joint of 101-CA Gas Inlet nozzle had found opened out from the welding on approx. length of 1 feet. The same was rewelded with Electrode Unibraze A to prevent further opening.
	(8) End plug of Transfer line (107 D) was opened and its liner was inspected. Near Riser tubes junction slight backing was noted otherwise the overall condition of the liner was found in good condition.
	(9) Following Reformer tube top plug flanges were repaired by welding and machining.
	136, 434, 416, 736, 734, 720, 708, 637, and 530, 709
	(10) Replaced the Gaskets along with studs and nuts in all the reformer tube top plugs. This was done to prevent any leakage of tube top plug while in running. Similarly replaced the gaskets alongwith studs & nuts in all the end cover of Inlet manifold headers (8 Nos)
	(11) PRIMARY REFORMER 101-B PENT HOUSE JOBS :
	Following major jobs were carried out during this plant turnaround period.
	Following atomising steam line unions were replaced.
	105, 106, 107, 112, 113, 114, 104 203, 206, 207, 208, 210, 212, 213, 214 305, 306, 307, 308, 309, 311, 313, 314 401, 402, 407, 408 513, 514 602, 605, 606, 608, 609, 613, 614 701, 703, 706, 712, 713, 714 801, 803, 807, 808, 809, 810, 811, 812, 814 904, 905, 906, 909, 913, 914
	Total No of Unions checked = 57 Nos
	(12) Following atomising steam valve gland leak were attended
	107, 110 202, 214 309 402, 407, 408, 414 507, 510, 511, 512 603, 608, 610, 614 709, 804, 901, 910
	Total no of valve of gland leaks attended 21 Nos.

Noted

Noted

Noted

Code No.	Description
1 12 02	(13) Following elbow leak was attended 612 Total = 1 No
	(14) Following AG burner tips & pipes were checked and replaced wherever required. 212, 308, 401, 402, 403, 407, 608, 614, 711, 714, and 914.
	(15) Following Gun gasket portions were repaired. 402, 404, 406, 413, 503, 609
	(16) Following Arch burner purging steam valves were replaced. 204, 307, 511, 404 & 901
	(17) Following naptha needle valves (first) were attended either for gland leak or for jamming. 408, 807, 905, 604.
	(18) Following Naphtha needle valves(second) were attended either for gland leak or for jamming. 313, 408, 509, 604
	(19) Following Naphtha Union leaks were attended 510, 511
	(20) Following atomising steam line chockings were cleared. 314, 605
	(21) Following purging steam line leaking were cleared. 801, 901

1 13 01 HEAT EXCHANGER/COOLERS JOBS :

(01) 104-C :

Removed both the end covers alongwith floating cover and expansion joint for checking the tubes for any blockage/plugging with freign materials. After opening it was found all the tubes were clean and found okay without any choking. Shell side hydrotest was carried out at a pressure of 6 Kg/cm2. Found okay. Boxed up the end covers. The gaskets of expansion joint and both the channel side gasket were replaced by new one.

(02) 103-C :

Opened the outlet channel cover for inspection the (repair was done during Oct, 90) weld joint was found okay. Boxed up the channel cover.

(03) :

Code No.	Description

1 13 01 (03) Methanator Effluent feed water Heater - 114-C :

* Noted Replaced the gasket of gas inlet channel cover, since it was leaked while stopping the plant.

(04) CO2 Stripper exchanger - 111 CA/CB :

The following jobs were carried out on both the MEA Reboiler to replace the shell side gasket of Top channel cover.

- Opened the top side channel cover
- Removed the bottom collecting header pipe
- Removed the Bottom side channel cover
- Lifted the tube bundle by 3" to 4" height with the help of crane and inspected the shell side gasket seat face. Dents and marking present on the Gasket flat face were repaired by cold welding compound.
- Tube bundle was kept on its position after putting new gasket.
- Boxed up the bottom side channel cover
- Put the test ring on the top side channel cover and done the shell side hydrotest at pressure 8.1 Kg/cm2 found okay.

* Noted - Removed the test ring and boxed up the top side channel cover with new gasket.

- Boxed up the bottom collecting pipe.

Code No. Description

1 15 01 BOILER INSPECTION BY CIB :

STEAM DRUM : 101-F

Open inspection of steam drum was done.Overall condition was found good however on one of the steam riser (East side)separator plate was found fallen from its position.This was put back on its position and tightened properly.At some places the existing fastner were replaced by SS 304 bolt.Also few number of fastners were found loosened same was tightened.In order to prevent the falling of separator plate ten Nos of angle piece of 15mm x 75mm made length of SS 304 was position horizontally on the top of supporting plate and tack welded.This was done on only one separator plate which was fallen as a trail of modification to avoid vibration and there by avoiding falling of the same..After cleaning the internals its end cover was boxed up.Open inspection was certified by Boiler Inspector.

Steam drum RV's (3Nos) were dismantled.Its disc insert seat and nozzle seat were lapped and boxed up.Steam super heater RV (1 No) was dismantled.Found its disc insert was jammed on the disc holder however nozzle seat was found in good condition Assembled the RV with new disc holder and disc insert lapping the nozzle seat.

Intermediate and continuous blow down line were partly replaced at the place of reduction in thickness as per dnspection report and with approval of Chief Inspector of Boiler.The sketch of the same is attached herewith.

Steam drum RV's and Superheater RV were tested on line.The set pressure readings are as under on 7/03/1991.

	Popping Pressure	Reset Pressure
a) North RV	116.0 Kg/cm2g	113.0 Kg/cm2g
b) Middle RV	115.0 Kg/cm2g	112.0 Kg/cm2g
c) South RV	113.0 Kg/cm2	110.0 Kg/cm2g
d) Super heater RV	111.0 Kg/cm2g	108.5 Kg/cm2g

A BOILER

Code No.	Description

1 15 02 L.P.Boiler (112-C) was hydrotested at 16 Kg/cm2 and was certified by Boiler inspector (dt.5/3/91) L.P.Boiler(112-C) RV's (2 Nos) were tested at the test bench.The set pressure readings are

	Set Pressure	Reset Pressure
RV 1	150 Psi	140 Psi
RV 2	150 Psi	140 Psi

Noted

Hydrotest Inspection of Boilers was carried out in presence of Chief Inspector of Boiler on 5/03/91.
101-F at 135 Kg/cm2, 112-C at 15 Kg/cm2.

1 16 01 129-JC : AIR COMPRESSOR INTERSTAGE COOLER NO.1

Tube bundle assembly was taken out for replacing the demister pad assembly. After removing the tube bundle and demister pad it was found that the perforated plate fixed above the demister pad was in damaged/rusted condition at various places.Damaged perforated plates were taken out and fixed the new SS 316 perforated plate (drilled to the size required) Fixed the new (imported spare) demister pad assembly and boxed up. Painted the outside cover plate of the tube bundle with Aluminum paint.Tube bundle was inserted into the shell and boxed up the channel cover.

Noted

1 16 02 130-JC : AIR COMPRESSOR INTERSTAGE COOLER NO.2

Tube bundle assembly was taken out after grinding the channel cover welding inorder to replace the demister pad assembly. After removing the tube bundle and demister pad it was noticed that the perforated plate fixed above the demister pad was in damaged/rusted condition at different places.

Damaged perforated plates were taken out and fixed the new SS 316 perforated plate (drilled to size required) fixed the new (Imported spare) demister pad assembly and boxed up.Painted the out side cover plate of the tube bundle with Aluminium paint.Tube bundle was inserted into the shell and boxed up the channel cover. During Air compressorsatartup, air leakage was noticed at few places of the channel cover (shell side) leakage was stopped by ~~xx~~ depositing the weld metal on complete circumference of the cover.

Noted

1 17 01 VALVE REPLACEMENT & STEAM LEAK JOBS :

Following valves and steam traps were replaced during this Plant turnaround.

01) Battery limit 38 Kg/cm2 steam trap, it's isolation valve and it's bypass valves were replaced (1/2" x 600 ≠≠ steam trap - 1 No 1/2" x 1500 ≠≠ C.S.gate valve - 2 Nos)

02) Steam to Air coil steam trap & its isolation valves were replaced.(1/2" x 600 ≠≠ ~~C.S.gate~~ steam trap - 1 No, 3/4" x 1500 ≠≠ Carbon steel valves - 1 No)

03) FRC-Steam trapand its isolation valve changed (1/2" x 600 ≠≠ steam trap - 1 No, 3/4" x 1500 ≠≠ Carbon steel valve - 1 No)

Code No.	Description
1 17 01	04) FRC-2 Drain valve changed (3/4" Ø x 1500 ≠≠ Carbon steel gate valve - 1 No)
	05) NG to LTS drain valve changed. (3/4" Ø 1500 ≠≠ C.S.gate valve)
	06) 104-JT steam inlet line steam trap changed (1/2" x 400 ≠≠)
	07) 103-JAT exhaust line drain valve changed (1" x 1500 ≠≠)
	08) 103-JAT exhaust line trap & its isolation valve replaced (1/2" x 600 ≠≠ steam trap - 1 No, 1/2" x 1500 ≠≠ C.S.gate valve 1 No)
	09) 103-JAT steam inlet by pass line valve changed (1" Ø x 1500 ≠≠ C.S. gate valve - 1 No)
	10) 103-JAT inlet drain valve changed(1" Ø 1500 ≠≠ C.S.gate valve 1 No)
	11) 107-JA/JB MEA inlet block valve bypass valve changed (3/4" Ø C 1500 ≠≠ C.S.gate valve - 1 No)
	12) 38 ata steam header drain valve above 108-J on the rack was replaced (1" x 1500 ≠≠ C.S.gate valve - 1 No)
	13) 107-JA/JB MEA inlet block valve bypass valve changed (3/4" x 600 ≠≠ C.S.gate valve - 1 No)
	14) 107-JA/JB drain valve changed (3/4" Ø x 000 ≠≠ C.S Gate valve 1 No)
	15) 151-C & 113-C steam condensate traps changed
	16) Steam Dram outlet box removed & provided with new reduced.
	17) 101-CB Riser chemical cleaning flange gasket was replaced
	18) Two valves with bleader point between the valves were xxxxxx provided on feed preheater coil outlet line for LTS heating.
	19) 113-C steam inlet valve gate valve was replaced with new one as old one was passing (size 3" Ø x 150 ≠≠ flanged end)
	20) PI-82 (101-F) isolation valve was replaced by new one 3/4 Ø x 1500 ≠≠ Globe valve.

1 17 02 RELIEF VALVE TESTING/REPLACEMENT :

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

Sr.	RV Description	RV Number	Set Prss.	Reset Press.
1	M.S.Header RV	RV-MS-9	600 Psi	540 Psi
2	Ist stage Refr. flash drum	RV-110F(A)	100 Psi	92 Psi
3	--- do ---	RV-110F(B)	100 Psi	91 Psi
4	3rd stage Refr. flash drum	RV-112F	90 Psi	85 Psi
5	One spring of 101-F RV (RV No.3 ie towards south side)was replaced by new one as the existing spring was found to have rusted having dents & reduction in spring diameter at some places.			

Code No. Description

19 01 VESSEL JOBS :

CO2 STRIPPER 102 EB/102 EB

During this turnaround, it was decided to open the top manhole and to see the effectiveness of modification done in the MEA Distributor header during last turnaround in Feb,1990. Accordingly after putting necessary blinds and purging the vessel top man hole was opened.

01 102 EA Reformer side stripper
Observation

1) All the bolts of MEA distributor pipe line flanges were found intact and no looseness was noticed.

2) Overflow plates of both the sides were found in good condition.

3) No looseness was found in the clamp bolts of distributor header.

4) The trays were not dismantled.Since the main object was to check the clamping of MEA distributor header only.

* Noted

5) Boxed up the manhole.

02 102 EB Silo side stripper
Observation

1) All the bolts of MEA distributor pipe line flange were found intact and no looseness was noticed.

2) Overflow plates of both the sides were found in good condition.

3) One of the clamp bolt of the distributor heade was found damaged.It was replaced by new one.

4) Similarly in this stripper also trays were not dismantled.

* Noted

5) Boxed up the manhole.

19 02 CO2 ABSORBER 101-E

During this turnaround CO2 Absorber was opened for its internal inspection and also to install one additional demister pad below the existing one inorder to avoid any carry over of MEA solution.

All the middle trays (20 Nos) were dismantled to inspect the internals.The general conditions were found to be satisfactory whether minor pitting/corrosion was observed on the shell,the same was patched up with M-seal compond.The condition of all the S.S.Trays were found okay.

In order to avoid carryover of MEA solution along with gas outlet,an additional 6" thick demister pad (Indegenous supply) was installed.below the existing demsiter pad with necessory supporting shell Ring and clits.The fig.I shows the dimensional details and assembly view of additional demsiter pad installed during this plant turnaround.

* Noted

Code No.		Description
19 01	(03)	SYN.GAS COMPRESSOR SUCTION SEPARATOR .104-F. This vessel was opened for visual inspection of demister pad and its internals magnetic particle test and thickness measurement was carried out.Demister pad was found in good condition.Vessel was boxed up after doing above inspection.
19 01	(04)	SYN.GAS COMPRESSOR INTERSTAGE SEPARATOR .105-F. This vessel was opened for visual inspection of demister pad pad and its internals.Thickness measurement was done from outside surface.Demister pad was found in good condition.Its old insulation was made of foam glass 50mm thick and it was removed and re-insulated the vessel with thermocole insulation of 100mm thick layer.

20 01 FABRICATION JOB :-

01) REPLACEMENT OF PIPING FROM 104-D to 103-C :

Crack was observed on 103-C Inlet channel cover during October 1990.The same was repaired by proper welding and necessary heat treatment.At this time it was decided to inspect the complete piping from 104-D to 103-C and its bypass line.The correspondence was also made with M/s.M.W.Kellog also.The necessory flexibility analysis was also carried out of the same piping.In the past also, the 2nd elbow from out let line of 104-D having size 16" NB(Material P.1 i.e C-1/2 Mo Composition)had a failure on weld-joint with 16" NB down coming pipe.This elbow also needed replacement.Hence it was decided to replace above piping with better material of P.11 grade (1¼ Cr. 1/2 Mo) and necessary procurement action was initiated and some of the fittingswere received before this shutdown.

In this turnaround accordingly portion of the piping was replaced departmentally with proper heattreatment.The detail of the piping and fitting replaced is shown in attached drg.No.01-CL

- Root Run was done by Tig welding using ER-515G filler wire
- Final filling was done with coated electrode E-801832
- Stress relieving was done

POST WELD HEATTREATMENT :

Uncrease the temperature of weld area as well as HAZ at the rate of 60°C to 90°C per hour up to 750°C by wrapping pipe with heating coils sock at 750°C for 2 hrs.Gradually reduce the temperature at the rate of 210° per hour up to 300°C.Cover the weld area as well as HAZ by asbestos cloth.

Switch of the heating coil and allow it to cool under insulation.

02) 111-CB Steam inlet pipe line (12" Ø x SLR - 40) was partly replaced alongwith elbow (12" Ø x Sch. 40) as the old elbow and part of the pipe line were damaged due to thickness reduction.

Code No.	Description
1 20 01	03) Replaced the 151-C steam trap with new trap assembly type spirax Ball float steam trap,model FT-20/21 (SLR) size 2" NB after rerouting the pipe lines.
	04) A strainer was provided at the U/S of LCV-8 (Syn.gas compressor suction separator 104-F) to avoid any damage and chokcing of LCV-8 control valve.
	05) Replaced the 113-C steam trap with new one model FT-20/21 -2" N.B(SLR) Spirax ball type.
1 31 01	HEAT EXCHANGER JOBS :
	HYDROJETTING OF COOLERS

End covers of following Heat Exchanger were opened for cleaning the tubes by hydrojetting.Boxed up the covers after Hydrotest.

Sr. No.	Cooler Number	Qty.	Shell side Hydrotest pressure	Remarks
1	101-JCA/JCB	1 No each	-	All the tubes were cleaned.No Hydrotes -ting.
2	129-JC	1 No		---- do ------
3	130-JC	1 No		---- do ------
4	175-C	1 No		---- do ------
5	101-J L.O.Coolers	2 Nos		---- do ------
6	102-J L.O.Cooler	2 Nos		-----do ------
7	103-J L.O.Cooler	2 Nos		----- do -----
8	103-JBT gland condenser			
9	110-CA/CB	2 Nos		---- do -----
10	128-C	1 No		---- do -----
1 31 02 11	108-C	4 Nos	6.0Kg/cm2	Hydrotesting was done on shell side.

108-CA = No leak

108-C2A = 3 Nos of tube were plugged

Row No.(From top)	Tube No.(from silo side)
4	5
6	6
Last Row	2

108-C1B = 36 tubes were plugged

3	13
4	14
10	16
11	25,26,27,28
12	10,23,25
13	29
14	20,30
15	20,24,25
16	23,26
17	20,21
18	23,26,29
19	19,24
20	27,28,31

Code No	Description	
1 31 02	Row No.(From top)	Tube No.(From silo side)
	22	27
	22	28
	23	27
	25	28
	27	27,29,30
	29	19

103 C2 B = 4 Nos.of tubes were plugged

Row Nos(from top)	Tube Nos
4	18 (from silo side)
19	23 (---- do ----)
21	20 (---- do ----)
13	02 (from cooling tower side)

1 31 03 124-C :

Shell was removed for cleaning the tube bundle (shell side) by Hydrojetting.After Hydrojetting boxed up the shell assembly shell side Hydrotest was carried out at 15 Kg/cm2g.Found okay

1 31 04 115-C :

Tube bundle was pulled out,cleaned the tube bundle by hydro-jetting and boxed up Shell side Hydrotest was done.Found tube to tube sheet joint leakage (tube expansion joint) on 33 tube, finally it was decided to re-expand all the tubes for uniform expansion.Accordingly all the tubes were expanded by the representative of M/s.Anup Engg,Ahmedabadand shell side Hydrotest was carried out at 15 Kg/cm2s. Found okay.

1 31 05 105-CA/CB :

The following jobs were carried out on both the MEA Reboiler (105-CA/CB) to replace the shell side gasket of top channel cover.

- Opened the top side channel cover
- Removed the bottom collecting header pipe with the help of crane.
- Removed the bottom side channel cover.
- Lifted the tube bundle by 3" to 4" height and inspected the shell side gasket seat face.Dents and markings present on the gasket seat face were repaired by cold welding compound.
- Tube bundle was kept on its position after putting new gasket if the bottom side channel cover.
- Put the test ring on the top side channel cover and done and the shell side hydrotest at a pressure of 44.0Kg/cm2 found Ok.
- Removed the test ring and boxed up the top channel cover with new gasket
- Boxed up the bottom collecting headerpipe.

PLANT TURNAROUND - 1991

AMMONIA PLANT

INSPECTION JOBS

Code No.	Description

During plant turnaround Febraury - March 1991, inspection of various vessels, furnaces, equipments and pipe lines was carried out. The details of observations made during visual inspection & other tests are as under.

1 41 01 PRIMARY REFORMER

(A) RADIANT ZONE :

i) Visual Inspection:

The radiant zone refractories outlet manifold insulation, roof insulation etc. were visually checked for any damage cracking or lossening etc. The findings were reported to concerned shift/Maint.Engrs. for necessary repairs.

The two nos. leaky tubes in 5th row and 8th row were identified in visual inspection to be tube No.508, & 825. These were asked for replacement.

ii) Automatic Ultrasonic Scanning of the Catalyst tubes was carried out for the followings by two teams of PDIL:

Row No.1 - Tube No.101 to 114, 116, 121 to 125
Row No.4 - Tube No.401 to 421
Row No.5 - Tube No.501 to 542
Row No.6 - Tube No.601 to 642
Row No.7 - Tube No.701 to 742
Row No.8 - Tube No.801 to 842

The Ultrasonic Scanning of the above tubes revealed midwall fissures and cracks in the following tubes, which were radiographed in effected zones, and were confirmed to be serious defects. These tubes were also recommended for replacement. The tubes subsequently replaced are :

Row No.4 - Tube No.411
Row No.5 - Tube No.502 (In addition to Failed tube No.508)
Row No.6 - Tube No.637
Row No.8 - Tube No.804, 805, 807, 810, 811, 815, 823, 828, 829, 832 and 835 (In addition to failed tube No.825)

All eight risers were also scanned by PDIL. No defect was revealed. Copy of the site report submitted by PDIL team has already been given to Maint.&Prod.Department.

iii) Eddy current scanning for the the following tubes was performed by IFFCO, Aonla Teams.

Row No.1 : Tube No.115 to 142
Row No.2 : Tube No.201 to 242
Row No.3 : Tube No.301 to 342
Row No.4 : Tube No.401 to 442

Code No.	Description

Eddy current test by : Aonla team revealed tube No.135 and 212 defective in 1st and 2nd harp assemblies respectively. As was already revealed by PDIL Ultrasonic test the tube No.411 to the severely defective, which was also confirmed in Eddy test by Aonla team. These tubes were radiographed at the affected locations marked. Radiography confirmed the presence of severe fissures and cracks. These were also recommended for cutout and replacement.

Hence, total eighteen catalyst tubes were replaced during the Feb-March, 1991 Shutdown. The comprehensive list of replaced tubes is :

1) 135 (2) 212 (3) 441 (4) 502 (5) 508 (6) 637 (7) 804 (8)805 9) 807 (10) 810 (11) 811 (12) 815 (13) 823 (14) 825 (15) 828 16) 829 (17) 832 (18) 835.

iv) Ferrite measurement on catalyst tubes at random was carried out. The detailed report on Ferrite measurement is recorded. The percentage of Ferrite was found to be as high as 25 % in indigenous tubes and very low in imported tubes.

v) Creep measurement of outlet manifold was carried out at six different vulnerable locations. The detailed report of measurement is recorded. Maximum creep was 2.7% found in the bottom collector header(i.e outlet manifold)

vi) The clearance between bottom floor and outlet manifold was measured at the ends of manifold on either side of the field Butt Weld joints (2 Nos) and also on either side of riser tubes weldolets. The measurement data is recorded.

vii) DP Testing of the reachable top weld joint (L' joint) of the catalyst tubes in row Nos 3,4 and 5 was carried out for tubes No.36 to 42. No defect was observed.

viii) At random creep measurement of catalyst tubes was carried out with Go-No.Go gauge. The catalyst tubes in 4th row (ie. 405 to 410 in which tube No.406/407/408 were observed red hot at top peep hole elevation due to flame impingement from leaky tube No.508) were scanned with GO-No Go gauge and also the creep measurement at this elevation was carried out with micrometer. Redings are recorded.

ix) DP test of Bottom manifold field butt weld joints(16 joints) was carried out. No defect was observed. Radiography of field weld joints of bottom manifold of 7th and 8th row was carried out. No service defect was observed in any of the weld joints.

Code No. Description

x) All the catalyst tubes which were replaced were inspected as per the following sequence and procedure :

(a) DP test of edge preparation and ID of catalyst tube and weldolet.

(b) DP test of root run of weld joint.

(c) DP test of final run

(d) Radiography of final weld joint.

* Defect observed were rectified by grinding and rewelding followed by DP test.

xi) Five nos of catalyst tube spring hangers(Spring nos.401 to 405) were asked for replacement as those had lost their resilience due to exposure to fire flame in the past.14 Nos of spring hangers from the lot taken out during revamping in April,1986 were tested for their reusability.From the tested lot the replacement was done.

41 01 01 (B) H.T.CONVECTION ZONE :

The ceramic fibre blanket covering thin SS sheets were found to have badly warped due to heat.However, the studs holding the sheet with the wall are intact in position. The sheet is comparatively in good condition at the mixed feed coil(Bottom most coil)level on south wall of H.T.zone.The first tube sheet at west side for mixed feed coil which was observed to have got cracked between first second third tube hole from South End in third row from bottom was repaired by welding during previous shutdown has again got cracked between second third tube hole.Rest of the support tube sheet were found to be intact in position and in good condition.

41 01 01 (C) L.T.CONVECTION ZONE :

The East (metallic)wall on East wall and the South wall of L.T.Zone were found exposed at different locations including junctions below between two plate segments. These were attended in approachable areas by applying gunniting material and by filling cerafelt between junctions.Debries of gunniting materials were observed inside the casing of I.D.fan which were got removed through Civil section.

The I.D.Fan impeller was observed to have same refractories deposits on it.This was reported for cleaning prior to box up to concerned Sr.Engr.(Ammonia).

Code No.		Description
1 41 01	(D)	SECONDARY REFORMER BOTTOM CHAMBER :

The bottom plug manhole of the secondary reformer was opened for inspection of refractory. The followings are the observations of visual inspection.

1) Liner flange is slightly bent at south side.

2) welding of North-west side gas outlet connection to line(inlet to 101-CB) has got cracked in approx 8" length.

3) Castable refractory above and behind the North-West Flange/Sleeve is partially damaged.

4) At about 2.5 meter inside the gas outlet line(inlet to 101-CB) the incolloy liner has got buckted at one location from the joint in 20 inch length which needs straightening and tack welding.

5) Some refractory debries have been collected at the other end of the outlet line(close to 101-CB)

6) The arch refractory bricks at many places have got cracked and partly damaged due to spalling.

7) SS liner in the bottom chamber just below arch of roof has got slightly bent at some locations. The welding joints of the liner are in general in good condition.

8) Gas outlet line on SW side (i.e inlet to 101 C/E) is comparatively in good shape than the other. Althought at some locations slight bulging and buckling of the liner have taken place.

9) The castable refractory below this liner flange (Sleeve) is slightly damaged in 8" length.

10) A few holes in the arch roof have been choked by broken alumine balls.

All the above findings were communicated to Sr.Engineer (Ammonia) and maintenance engineer for necessary corrective maintenance.

Code No.	Description

1 41 01 (02) STEAM DRUM 101-F :

Visual Inspection of the steam drum internals and ultrasonic thickness measurement of the shell and dish ends was carried out.The followings are the observations of visual inspection.

i) The shell has assumed greyish black colouration.

ii) The seperator bottom plate just above the auxiliary boiler risers on East side South end of the Steam drum was observed to be displaced from the its position.

iii) The intermittent blow down line was observed to be cholked due to debries and rusts etc.This was asked to be cleaned thoroughly before boxing up.

iv) Three nos of clamps bolts were found missing from the seperator plates on East side.

v) Mild erosion of fillet welds of steam strainer supports with shell was observed.

vi) The BFW line extending clamps,supports etc.were found in good condition.

vii) Scattered dent marks like pits and marks of dis-ledged mill-scales were observed on shell as well as on the dished ends some of which were from fabrication stage.

Code No. Description

viii) Supporting clamps and fillet welds of Phosphate dosing line and continous blow down line were found to be in good condition.

ix) Thickness measurement on shell and both the dished ends was carried out.The report was prepared and has been sent for submission to Inspector of boilers.

All the observations noted above were informed to the concerned Shift Engineer for necessary corrective actions.

(03) SYNGAS COMPRESSOR SUCTION DRUM 104-F

Visual Inspection and fluorescent magnetic particles testing of the weld joints was carried out.The following are the observations.

i) The shell and bottom dished end had assumed greyish black colouration.

ii) The weld joints & shell internal surface were found free from any corrosion/erosion or pitting.

iii) The demister pad was observed to be in good condition.

iv) The shell butt welds manhole welds and various fillet weld joints of shell e.g.level controller, level alarm relief valve etc.were examined by fluorescent magnetic particles testing, No defect was found.

v) In general the overall condition of the vessel was quite good.

vi) Thickness measurement from inside was carried out.

(04) SYN.GAS COMPRESSOR INTERSTAGE SEPARATOR 105-F

Visual inspection and fluorescent magnetic particles testing was carried out.The followings are the observations.

i) The shell had assumed grayish-black colouration.

ii) Scattered marks of broken mill scales/some shallow dents were observed on North side of the shell and also at the South-East side just below demister pad.

iii) The demister pad at the top was found to be in good condition.The pad segments were intact.

iv) The weld joints of syn.gas inlet nozzle covering basket(Inlet hood baffle) were in good condition.

v) Fluorescent magnetic particle testing of the shells Dished End But weld joints,Manhole joint and other fillet welds of nozzle-connections,demister pad supporting clit tack welds etc.was carried out.No defect was found in any of the weld joints.

Code No. Description

vi) Thickness measurement of the top dished end and shell was carried out from outside the vessel after removal of the cold insulation of the vessel which was renewed.

vii) The bottom dished end insulation was not removed and hence, not renewed.

viii) In general, the vessel condition was quite satisfactory.

(05) HIGH TEMPERATURE SHIFT CONVERTOR 104-D :

The HTS vessel was taken for 100% Magnetic particle testing and visual inspection.Complete cleaning of all weld joints and heat affected zones after removal of interanl fittings was carried out by sandering.All the shell,Butt weld joints,manhole weld joint,steam inlet piping joint etc.were examined by fluorescent magnetic particle testing.No defect was observed.The followings are the observations of visual inspection.

i) The shell and dished ends have assumed greyish black colouration.

ii) The bottom outlet nozzle covering wiremesh assembly (outlet collector)was in good condition.

iii) The gas inlet distributor at the vessel top was also observed to be in fairly good condition.

iv) Seven nos of support clits welded to dish ends for holding the distributor branches from steam header had got detached.

Some of the clits were found cracked/bent (3 nos) These were asked for replacement repair.

v) The steam inlet header/distributor flange bolts had got sheared.The branch line was also observed to be displaced from its position.These were asked for rectification and refitting.

The vessel internal condition was quite good.No sign of corrosion,erosion or pitting was observed.

vi) Thickness measurement from inside the vessel was carried out.The detailed thickness report is recorded.

(06) TRANSFER LINE 107-D :

Visual inspection of transfer line was carried out.The followings are the observations.

i) Bulging in the reinforcement pad placed over the liner around the 1st,2nd,4th,7th and 8th risers was observed.The bulged portion of the reinforcement pad was observed to be obstructing the smooth flow passagefrom the riser stub end to transfer line.The areas affected were chalk marked for necessary repair action in order to avoid further bulging by entry of gas flow end to avoid erosion of refractory material beneath the liner around the stub ends.

Code No.	Description
1 41 01 (Contunued)	ii) Between tray nos 1 to 8, the extent of erosion/ pittings on the shell internal surface, tray supports fillet weld joints is quite less.
	iii) All the SS sieve trays are found to be intact in position and in very good condition.
	iv) The areas of weld joint and shell surface which were covered with M-seal during previous shutdown were thoroughly checked. At various locations particularly from edges of the welds and in shell surface M-seal was observed to have come out. These were marked and showed to maintenance crew for reapplication of M-seal prior to boxing up.
	v) The extent of erosion/pittings in shell surface and weld joints was found increasing after 9th tray toward bottom most tray. The fillet welds of tray supporting clits were observed to have considerably pitted and eroded including the shell surface. Some of the areas were marked where surface roughening were observed for application of M-seal to avoid further erosion/pitting of the weld joints/shell surface.
	vi) Between trays No.10&11 on we side and between tray No.14 and 15 on East side, a 2" ø sample collecting points are provided. The pipes and their weld joints have badly corroded. The flange has not bent. Since these are not being used for any purpose no repair action was taken.
	vii) Thickness measurement of the shell from inside the vessel was carried out. The readings were recorded

CO2 STRIPPER 102-E :

(09) 102 EB .

01) Top Compartment : The followings were the observations of visual inspection of the stripper 102 EB (Westside)

(a) The shell had assumed blackish gray colouration due to deposit all over the surface.

(b) East side weir plate's tack welds with support plates were found to be cracked in 3/4the length of the weir plate.

(c) The nozzle connection from shell to the MEA distributor header inlet by slipon flange of which weld metal has got corroded.

(d) Weir plate on top tray in West side was in good condition.

(e) The demister pad was also found in good condition.

Code No.	Description
	BOTTOM COMPARTMENT :
	(a) The shell and Bottom dished end had got grayish black colouration.
	(b) The wear plates were covered with thick deposites. All the wear/impengement plates were intact in position.
	(c) All the weld joints of dish end, shell thermowell level controller nozzle etc. were covered with depositers. Hence these could not be inspected visually.
	All above observations were informed to Sr.Engr.(Ammonia) for necessary action.
	(09) CO2 STRIPPER 102-E :
1 41 01	(02) 102-EA :
	Top compartment : The shell was visually inspected. The followings were the observations;
	a) The shell had assumed blackish colouration.
	b) East side MEA distributor branch North End support clamp bolt had come out from position.
	c) Inlet distributor supporting pipe (1"Ø) on East branch had sheared off at North corner.
	d) West side weir plate tack welds with bottom plate were observed cracked causing loosening of the weir plate.
	e) Distributor East branch supporting pipe which got sheared at North end had casued damage(dent like impression) on main distributor pipe bottom surface which seems to be due to repeated hammering during operation. The depth of dent would be 1.5mm/2.0mm.
	f) The demister pad was in good condition.
	Bottom Compartment : Visual inspection and Ultrasonic thickness measurement of the bottom dished end and shell was carried out. The followings are the observation.
	a) Bottom shell and dished end had assumed blackish colouration. Thick sealing of MEA over the dish end and shell surface was found.
	b) All the weld joints were found to be covered with thick scales of MEA.
	c) The wear/impingement plate were also covered with thick coacing, However, these were intact in position.
	d) Thickness measurement report is attorded.

Code No.	Description

1 41 02

01) MEASUREMENT OF RESIDUAL MAGNETSUM :

On 101-JT, 102-JT and 105-JT rotors gauss measurement was carried out.Communicated to Maintenance Engineers.

02) Magnetic Particles Testing of the followings was carried out.

i) 108-C Channel cover weld joints.

ii) 104-F Syn.Gas Compressor Suction Drum.

iii) 105-F Syn.Gas Compressor Interstage Seperator.

iv) 104-L High Temperature Shift Covertor.

v) Reducer weld joints of down comers of steam drum.

03) Ultrasonic Flow Detection of the following lines weld joints was carried out.

i) HTS inlet Down comers and risers weld joints e.g. line numbers :

a) BW-21H-18"	(b) BW-32H-12"	(c) BW-33H-12"
d) BW-34H-12"	(e) BW-22H-12"	(f) BW-23H-12"
g) BW-24H-12"	(h) BW-3H-12"	(i) BW-25H-12"
j) BW-4H-10"	(k) BW-28H-12"	(l) BW-6H-18"
m) BW-30H-12"	(n) BW-7H-10"	(o) BW-31H-10"
p) BW-26H-8"		

All the above line joints upto the elevation of 101-B roof were tested.No service defect was observed, in any of the above weld joints which were scanned by ultrasonic flaw detector USM-2

04) Radiography of the field welds & shop welds of the partly replaced continuous blow down line and intermittent blow down line from the steam drum was carried out. The weld joints were also L.P.tested after root run as well as after final weld run.Defective joints were asked for repairs/rectification and were cleared after radiography D.P.test.

05) Thickness measurement of the following pipe lines and vessels was carried out.

VESSELS :

a) High Temperature Shift Convertor, 104-D

b) Steam Drum 101-F

PLANT TURNAROUND - 1991

AMMONIA PLANT

CIVIL JOBS

Code No.	Description
1 51 01	AUXILIARY BOILER : (a) Perforated target well (b) Header lining (c) Refractory repair work on burner face
1 51 02	RADIANT ZONE : (a) Breaking wall for the replacement of tubes. (b) Re-builting brick wall with refractory bricks and Air setting motor. (c) Removing damaged tunnel slab & Refixing 46 Nos of tunnel slabs. (d) Removing debris (e) Removing & refixing AC sheets of pent house for the replacement of tubes.
1 51 03	HT & LT ZONE : Insulating refractory lining & patch work with LHV & Insulite -9 on pannel walls.
1 51 04	Breaking concrete & opening cooling water lines for measuring thickness & Bitumen coating & raping work. Sand filling & concreting the same.

PLANT TURNAROUND-1991

AMMONIA PLANT

ELECTRICAL JOBS

Code No.	Description
1 61 01	01 Carried out preventive maintenance/cleaning of all feeder compartment mounting on the MCC-5, 5A, 5B.
	02 Carried out preventive maintenance of TMG make LT ACBs installed at MCC-5.
	03 Overhauled the following motors. 108-JA, 106-J, 123-J, 118-J, 118-JA 101-BJT, 104-JA, 102-J, 121-JA, 121-J
	04 Carried out checking of terminal boxes of motors above 50 HP for tighteness of terminals & measured IR values.
	05 Carried out testing and calibration of EL make protective relays mounting on panel of MCC-5.
	06 Preventive maintenance carried out on transformer TR-6 for ... a) Checked & tightened connections at primary & secondary and incoming of MCC switchgear. b) Replaced silicagel in dehydrating breathers. c) Carried out testing of oil. d) Checked trip alarm ckt. and cleaned all emergency trip boxes.
	In addition to above provided tamperary connections of flood light, hand lamps, hydrogetting pump & Chemical dozing pump motors in the plant.

PLANT TURNAROUND -1991

AMMONIA PLANT

INSTRUMENTATION JOBS

Code No		Description
1 71 01	01	Genral overhauling, cleaning, positioners checking, gland packing and greasing of the following control valves were carried out. MICV-61, PICV-131, PRC-18, LC-13, 14, 15, 16, 18, 19, 20, 27 FRC-1, 2, 3, 5, 7, 8, 9, 10, 11, 15, 18, PICV-13A/B, MIC-22, 14, 17, 20 PRC-4, 5, 25, V-27, 102, PGR Valves, NG Compressor valves.
	02	General checking of following leveltrols were carried out. LC-2, 12, 13, 14, 15, 17, 18, 20, 27, 19.
	03	General checking of FRC-1, 2, 3 was carried out
	04	T/CJB No.3 replaced by a new one. Complete rewiring has done.
	05	PGR temperature selector switch, RTD type has replaced by a new one after cutting the control room panel.
	06	FR-95 impulse line tubing has done. Checked the pitot tube.
	07	FR-4 transmitter made up side down and tubing has been made. This is to avoic any water particles, accumulation in the impulse line.
	08	Funnel thermowells 2, 3, 8, 9 were found damaged. Replaced by new one of indigeneous, General Instruments make.
	09	FRCV-12 control valve replaced by ~~xx~~ a new one. Checked the stroke and found Okay.
	10	Valve positioner of FICV-14 has been replaced by that of old FICV-12 and calibrated.
	11	TRCV-10 stroke increased by adjusting the stopper and opening to 80 to 85°.
	12	Pneumatic/Electronic changeover S/V for LIC-1 put new.
	13	The controller for PRC-4 were calibrated.
	14	LCV-16 taken to Instrument workshop and replaced its plug seat and gasket by new one, since the valve was passing.
	15	PRC-28 plug has been replaced by new one.
	16	PRC-23, PDI-20 draft tapping has been made independent by retubing.
	17	Turbine rotor for both 101-JT, 105-JT replaced by Old repaired one by Mech.maint. All the probes for these m/c were taken out and put back. Governor valve positioner has been put by a new one for 101-JT after calibration. 105-JT valve positioner calibrated and put in line. 101-J Point No.3 probes (both V & H) has been replaced by new one as there were damages in the probes.

Code No.	Description
18	103-J probes for point No.B (axial displacement)replaced by new one as they were found damaged.
19	103-J all probes were taken out and put back.Pad thermocoup -les were put in the compressor side.
20	Trip switches for 102-J,101-J,105-J,103-J checked.
21	02 analyser overhauled and calibrated.
22	Steam drum leveltrols, PRC-18,Pressure transmitters calibrated.High & low level switch checked.
23	UPS system,battery discharged,charged.Checked the entire system.Overall cleaning of the system has been done.
24	NG trip bypass valve provided and connected with trip system.
25	AG Separator AP level transmitter installed and high level alarm receiver switch provided in ~~CR~~ C/R.Alarm contact is connected to PGR annunciator W.No.16.
26	New instrument air dryer indication lamps provided.
27	PRC-9 transmitter location changed.
28	Controller of NG Compressor FIC-200 indication was remaining beyond range.Transmitter calibration was changed from 0-3000 mm of water to 0-5000 mm of water with a new multiplication factor 2450.

PLANT TURNAROUND-1991

AMMONIA PLANT

TECHNICAL DEPTT.JOBS

Code No		Description
1 81 01	01	Installed 2 Nos 200 NB valves in NG line for LTS catalyst heating.
	02	Reorientation of Arch burners in Primary Reformer.
	03	A.G.Separator piping installed in ONGC metering station area.

PLANT TURNAROUND - 1991

UREA PLANT

MECHANICAL JOBS

Code No.	Description

2 01 01 CO2 CENTRIFUGAL COMPRESSOR (NP) K-1101/1

BEARING INSPECTION

*Noted

Inspected the bearings. Found bearings in good condition. Assembled the bearings after thorough cleaning. Thrust was adjusted by suitable plate.

2 01 02 CO2 CENTRIFUGAL COMPRESSOR TURBINE Q-1101/1
REPLACEMENT OF ROTOR

Rotor which was in operation since May, 1988 was replaced with repaired rotor. Following jobs were carried out.

*Noted

1) Decoupled the turbine
2) Removed Governing system(Servo Cylinders)
3) Lifted the cover
4) Pulled out the rotor
5) Removed coupling half from the rotor
6) Installed coupling half on the rotor to be installed
7) Repaired the casing at exhaust end by M seal
8) A plate aprox 1 feet x 2 feet which fell down at the expansion joint of casing was brought out and new S.S.plate was welded.
9) Placed the rotor after cleaning
10) Measured seal clearances
11) Assembled top casing half
12) Tightened the casing bolts
13) Checked bearing clearances (New bearings)
14) Overhauled relay cylinders
15) Assembled relay cylinders
16) Run the turbine in decoupled condition.

Note : In decoupling condition turbine was showing high rotor displacements in axial and redial modes on Bently Nevada indicators on panel. However vibrations were within limits checked by IRD vibration analyser. Adjusted these panel readings.

17) Turbine was not tripping at 7600 RPM (designed)
18) Its overspeed trip assembly was replaced and turbine tripped at 7140 RPM.
19) Coupled the turbine with compressor.

2 01 03 CO2 RECIRROCATING (PB) COMPRESSOR - K-1101-2

1) 3rd stage cylinder cover 'O' ring replaced.
2) Replaced shore 49 coupling pads with new, having hardness 50 to 55 shore of 2nd 3rd stage coolers. C.W.isolation valve made operable.

*Noted

Code No.	Description
2 01 04	PB CO2 COMPRESSOR DRIVE TURBINE Q-1101-2
	Inspected the bearings.Cleaned the bearings.Boxed up after taking clearances.Overhauled relay cylinder.
2 01 05	CO2 RECIPROCATING COMPRESSOR (GHH) K-1001
	Lapping of valve seats of cylinders of 2nd stage and 3rd stage.
2 01 06	CW1 COMPRESSOR DRIVE TURBINE Q-1001
	Inspected the bearings.Cleaned the bearings.Boxed up after taking clearances.Overhauled relay cylinder.
2 02 01	LUBE OIL PUMP TURBINE Q-1113
	Replaced both the ball bearings. Overhauled mechanical governor.
2 02 02	CARBAMATE PUMP DRIVE TURBINE Q-1201 A/B
	Overhauled steam inlet valve (tripping assemblies)
2 02 03	HP NH3 PUMP P-1102
	Replaced 2nd and 5th plunger packings.
2 02 04	CARBAMATE PUMP P-1201/A
	Pump overhauled since jammed.
2 02 05	H.P.NH3 PUMP DRIVE TURBINE Q-1102
	Inspected bearings.Replaced the governor. Overhauled steam inlet valve (Tripping assembly)
2 02 06	P-1202 A
	Overhauled the pump since its mechanical seal was leaking. Assembled sealol seal.
2 03 01	PRILL BUCKET CHANGING MECHANISM M-1401
	Overhauled the bucket changing mechanism
2 03 02	PRILL TOWER FANS K-1401 1 to 4
	All the bearings were cleaned, inspected and greased.Cleaning of rotors done.
2 03 03	PRILL COOLING SYSTEM INLET AIR FAN K-1701
	Removed covers of both bearings. Drilled holes for thermo couples.Refixed covers.Put back fan bolts.Aligned, Charged the oil in bearings.
2 03 04	PRILL COOLING SYSTEM EXHAUST AIR FAN K-1702
	Checked bearings foundation bolts, and cover bolts for looseness.
2 03 05	PREVENTIVE MAINTENANCE OF CONVEYORS
	Checked oil of M-1409 & M-1421 G.B.

Code No.	Description
2 03 06	Rectified M-1421 conveyor joint.Removed old joint with 10 feet conveyor. Add new piece of conveyor.
* Noted	
2 13 01	Desorber cooler (Plate Heat Exchanger) H-1301 :
* Noted	Lismantled the plate Heat Exchanger.Gaskets were found damaged, End plate also found damaged.Replaced end plate and gaskets.
2 13 02	CCS-I Water Cooler plate Heat Exchanger- H-1206 :
* Noted	Dismentl ed the plate Heat exchanger.Found gaskets in good condition.Removed the debris.Cleaned plate.Boxed up.Hydrotest it.Cleaned C.W.inlet strainer.
2 15 01	4 ATA STEAM DRUM V-1501 BOILER INSPECTION BY CIB :
* Noted	4 ata steam drum V-1501 was tested at a pressure of 11 Kg/cm2 in the presence of Boiler Inspector.Steam drum was also offered for open inspection.Both relief valves were also offered for inspection to Boiler Inspector(after overhauling of RVs.) Following jobs were carried out. 1) Opened the manhole. 2) Removed the relief valves 3) Provided blinds 4) Cleaned the steam drum 5) Fixed back the fallen plates at southend risers. (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 7.5Kg/cm2 and reset at 6.5 Kg/cm2 in presence of boiler inspection on test bench. 9) Open inspection and hydrotest carried out at pressure of 11 kg/cm2 in the presence of Boiler inspector. 10) Boxed up manholes, removed blinds & assembled RV s
2 15 02	Following RV s were overhauled Replaced after testing 1) RV 1201 A/BC - Overhaul ed 2) RV1202 A/B/C - Overhaul ed 3) Ammonia suction vessel RV 4) RV 1501/1502 Steam drum RVs 5) Ammonia system RVs (Low pressure system) replaced.
2 15 03	Following NRVs were repaired 1) CO2 to H 1201 2) NH3 to H 1202 3) Carbamate to H 1202 4) Carbamate to H-1203 5) NH3 to V-1201 6) CO2 to H-1203 7) P-1501 & P-1506 discharge NRV s

Code No.	Description
2 17 01	Following valves were Replaced/Reconditioned
	1 60 ata inlet to Q-1101-2 2nd isolation valve and its bypass valve.Isolation valve seat lapped replaced.Bypass valve inspected.
	2 P-1204/A Discharge valve - Replaced
	3 Ammonia preheater outlet valve.Replaced broken bush and overhaulled valve.
	4 4 ata NRV for Q-1101-1
	5 Ammonia pump discharge isolation valve (P-1102) - 2 Nos
	6 HICV-1201/A mechine cut was taken on the nozzle at stripper and on the body of HICV(This joint was leaking in running plant.)
	7 P-1202/A Suction isolation valve replaced
	8 P-1501/P-1506 NRV's rectified
	9 PRCV-1202 Bypass valve gland replaced
	10 V-112 trap Bypass valve replaced
	11 PI-1127 and PI-1128 I/V repacked
	12 Oil leakage from Q-1101 quick shut off valve rectified.
	13 P-1102/A Discharge drum I/V 1st valve replaced.
	14 V-1409/A Inlet and outlet valve gland repacked
	15 P-1401/A/B Repacked gland of discharge valves
	16 V-1301 vaccume brether attended for passing
	17 P-1302/A/B, P-1304 A/B, I/V gland repacked.
2 17 02	Following valves of H.P.Systems were rectified.
	1 Discharge Isolation valves for P-1201 A/B
	2 Ammonia to H-1202 and Carbamate to H-1202 and NRVs
	3 V-1201 unloading and seal valve attended for passing
	4 CO2 to H-1201 bypass valve replaced
	5 Repacked gland of K-1001 final header 1st isolation valve.
	6 VH2 to V-1201 1st isolation valve made free to operate
	7 Rectified gland leak of H-1202 FR 1202 bypass valve
	8 P-1102/A I recyle valve replaced sine passing
	9 P-1102/B Suct.I/V repacked gland
	10 P-1201/A II discharge I/V made operatable
	11 P-1201/A recycle valve taken out in seat.

Code No.	Description
2 19 01	Following vessels were opened inspected and boxed up after necessary repairs.

01 CO2 CENTRIFUGAL COMPRESSOR INTERSTAGE SEPARATOR K-1101

Opened the vessel cleaned the vessel. Inspected. Replaced demister pad and boxed up.

02 CO2 CENTRIFUGAL COMPRESSOR AFTER COOLER SEPARATOR V-1112

Opened the vessel. Cleaned. Inspected, Replaced the demister pad and boxed up.

03 23 ATA STEAM SATURATOR V-1502

Opened, cleaned, inspected boxed up.

* Noted

04 9 ATA STEAM SATURATOR V-1503

Opened, cleaned, inspected boxed up.

05 RECTIFYING COLOUMN V-1202 :

Taken out the top dished end cover. Inspected internals. Boxed up.

06 L.P.ABSORBER V-1203

Top and bottom manholes were opened. Condition of the bed support liquid inlet nozzle was found okay. Boxed up after inspection.

Code No.	Description
2 19 0107	ABSORBER V-1301
	Top and bottom manholes opened. Trays were in good condition. Boxed up.
08	EVAPORATER SCRUBBER V-1423
	Opened manhole. Checked demister pad. Boxed up.
09	AMMONIA WATER TANK T-1301
	Opened the manhole. Checked it, Provided blinds of transfering MEA from Ammonia plant. After re-transfering of MEA to Ammonia plant opened manhole for cleaning, removed blinds, Boxed up.
10	CONLENSATE TANK T-1501
	Opened the manhole. Checked. Inspected, Recitified crack (which was observed in running plant at north, west support) Boxed up.
11	CO2 SPRAY COOLER H-1104
	Opened top manhole. Inspected. Painted from inside. Boxed up
12	CO2 KNOCKOUT DRUM V-1101
	Opened top manholes for inspection of internals and demister. Found okay. Boxed up.
13	NH3 SUCTION FILTER V-1102
	Ammonia system suction vessel for P-1102 and strainer opened cleaned and boxed up. Chenged filter cloth of suction vessel.
14	CARBAMATE CONLENSER H-1205
	Leakage through the reinforcement pads of jack bolts were repaired by grinding and welding.

Code No.	Description

2 19 02 INSPECTION OF HIGH PRESSURE VESSELS :

This year inspection of HP Carbamate condensor H-1202 was carried out by M/s.Stamicarbon engineers.Also visual inspection of HP Stripper was carried out.Stamicarbon engineers report is attached as Annexure-I.Brief job description and inspection report is as below.

01 H.P.Carbamate Condensor H-1202 :

* Noted

1) Removed top and bottom covers
2) Removed internals of inlet channel
3) In the top chamber the three areaswith oxide scaling in the tubes observed in 1990 were found now free of oxite scaling due to the modified gas inlet(ring line)
4) 2 tube were found with wall thickness 1.85mm
5) 12 tubes were found with wall thickness 1.9mm
6) 32 Nos of tube showed signals of stress corrosion
7) 1 tube was pulled out to confirm results of stress corrosion measurements.
8) 60 Nos of tubes were repaired.
9) Top tube sheet and bottom tube sheet were found in good condition.
10) 16 weld defects were observed in the top chamber Repaired.
11) Boxed up after inspection and repair (Fixed internals fix bottom cover, top cover and pipings)

2 19 02 02 H.P.Stripper H-1201 :

* Noted

1) Removed top and bottom covers after removal of connected pipings.Removed HICV 1201
2) Grind off the tack welds of ferrules with false tube sheet
3) Removed the ferrules
4) Cut open the liquid inlet divider plate
5) Overall condition of the vessel is good
6) The nozzle inlet which was repaired by IFFCO in July 1990 was found in good condition.No weld defect could be seen.
7) Checked the ~~false~~ ΔP of the ferrules after cleaning
8) Weld the inlet nozzle divider plate
9) Assembled ferrules false
10) Assembled tube sheet
11) Boxed up bottom cover
12) Measured ΔP of ferrules
13) Tackweld ferrules with false tube sheet
14) Boxed up top cover and piping, HICV-1201

66

Code No.	Description
2 20 01	Fabrication Jobs :
	1 T-1501 Tank crack repaired
	2 V-1205 off gas line replaced
	3 Steam tracing wherever corroded/pin holes replaced
	4 Defective steam traps and valves replaced
	5 Plat form for repair of support for piping parallel to prill tower.
	6 Modified HPF line at 2½ floor to facilitate valve operation.
2 31 01	CONTACT JOBS
	(A) Following coolers were opened, hydrojetting was done and boxed up.
	1 H-1423 first eveporater condensor
	2 H-1425 2nd stage evaporator condensor
	3 H-1204 Recirculation Heater
	4 H-1207 CCS-II cooler
	5 H-1111 Surface condenser
	(B) Following coolers were cleaned manually
	1 P-1102 A/B Lube oil coolers
	2 P-1201 A/B Lube oil coolers
	3 Q-1001 & Q-1101-2 lube oil coolers
	4 GHH Compressor & Drive turbine lube oil coolers
	5 P.B.Compressor crankcase lube oil coolers.

* Noted

PLANT TURNAROUND - 1991

UREA PLANT

INSPECTION JOBS

Code No.	Description
2 41 01	INSPECTION OF VESSELS : The following vessels and tanks were opened & offered for inspection in Urea plant. Visual inspection & thickness measurement etc. were carried out. The observations are given below.

01) CO2 SPRAY COOLER H-1104 :

1 Inside expoxy paint of vessel was found to be okay.

* Noted 2 Demister pad was found to be in good condition.

3 All fittings were intact.

4 Thickness measurement readings are recorded.

02) CO2 KNOCK OUT DRUM V-1101 :

* Noted 1 Condition of the demister pad was found to be satisfactory.

2 Slight peeling of epoxy paint was observed on the south side of shell.

3 Thickness measurement readings are recorded.

03) INTER STAGE SEPARATOR V-1111 :

1 No corrosion or pittings was observed on shell surface.

2 Colouration of the shell inside was reddish brown.

3 Thickness measurement readings are recorded.

04) 1 Shell internal surface was found to be free from corrosion erosion and pittings.

2 Some scattered pittings of approx upto 0.5mm deep were observed in bottom dished end.

3 Colouration of the shell was reddish brown.

4 Thickness measurement readings are recorded.

05) RECTIFYING COLUM V-1202 :

* Noted 1 The condition of the vessel top chamber internals was found to be satisfactory.

2 The shell inside has assumed blackish brown colouration.

3 Thickness measurement readings are recorded.

Code No.	Description

06) L.P.ABSORBER V-1203 :

1 No corrosion or erosion was observed in the shell.

2 The colouration of the shell was blackish.

3 Grills were found to be intact.

4 Thickness measurement readings are recorded.

07) LLSORBER V-1301 :

BOTTOM :

1 The bottom shell of the vessel has assumed reddish brown colouration.

2 Bottom tray and tray supports were found to be in good condition.

TOP :

1 The colouration of the shell was observed to be greyish black.

2 Trays were found to be intact.

3 Thickness measurement readings are recorded.

08) FLASH TANK SCRUBBER V-1421 :

1 Thickness measurement of the vessel was done from outside.

2 Demister pad and shell inside was in good condition.

09) FIRST LVAPORATOR SCRUBBER V-1423 :

1 The colouration of the shell inside was observed to be reddish brown.

2 Demister pad has got displaced from its position on the west side.

3 Trays were found to be intact.

4 Thickness measurement readings are recorded.

10) 4 AFA STEAM LRUM V-1501 :

1 The colouration of the shell was observed to be blackish.

2 Slight pittings were observed on the dished ends of the vessel.

3 Condition of the demister pads was good.

4 Some bolts of riser plates were found missing.

5 Thickness measurement readings are recorded.

Code No. Description

11) 23 ATA STEAM DRUM V-1502 :

* Noted

1 The vessel has assumed brownish black colouration.

2 Top distributor for steam outlet found to be okay.

3 One support of inlet line was found to be loose, which was informed to MM(U).

4 Mill seal marks was observed on east side dish end.

5 Magnetic particles testing of all the weld seams and fillet welds of all the nozzle was carried. Interface of the nozzle sleeve and fillet weld joint inside contained lack of fustion about 6 inch circumference which was revealed by MPT and was shown to maintenance engineers. The extent of lack of fusion was checked by ultraonic test.

6 Thickness measurement readings are recorded.

12) 9ATA STEAM DRUM V-1503 :

* Noted

1 The internal colouration of the vessel was observed to be brownish, black, in general.

2 No corrosion or erosion was observed in the vessel.

3 All internal fittings were found intact and in good condition.

4 Thickness measurement readings are recorded.

13) FIRST EVAPORATOR SEPARATOR H-1422 :

* Noted

1 The shell inside has assumed brownish black colouration.

2 Other internal fittings were found to be intact.

3 Thickness measurement readings are recorded.

14) SECOND EVAPORATOR SEPERATOR H-1424 :

* Noted

1 No corrosion or erosion was observed in the vessel.

2 The colouration of the shell was observed to be blackish.

3 All fittings were found to be intact.

4 Thickness measurement readings are recorded.

15) UREA SOLUTION TANK T-1401 :

* Noted

1 All weld joints were found to be from corrosion and erosion.

2 Bottom plates of the tank were found to have build up approx.by half inch in centre.

3 Thickness measurement readings are recorded.

Code No. Description

16) CONDENSATE TANK T-1501 :

1 The colouration of the vessel was observed to be brownish black.

2 The condition of the vessel internals is satisfactory.

3 Lye penetrant testing and magnetic particle testing at the repair area were carried out.

17) H.P.STRIPPER H-1201 :

Visual inspection of the stripper top chamber, particularly the repaired portion of liquid inlet nozzle was carried out. The followings are the tests performed.

a) Ferrite content measurement was carried with feritscope, which indicated nilferrite in the repaired portion.

b) D.P.test in and around the weld deposit, including of the interface of the repaired area was done. The test revealed no surface defect.

A pin hole was observed in the seal welding of the rod which was repaired and then D.P.tested. Ferrite content measurement revealed no ferrite on this repair.

18) H.P.CONDENSER H-1202 :

1 D.P.test after first run and final run of seal welding of all the stretched tubes in the condenser was done. The seal welding of all the stretched tubes from the bottom, was also D.P.tested and found to be okay.

2 Ferrite content of the seal weldings of all the stretched tubes, was measured to be 0.1% max.

2 41 02 THICKNESS MEASUREMENT OF PROCESS LINES :

The following lines were tested by ultrasonics for thickness:

1. PR-1205-6"
2. PR-1206-6"
3. PR-1207-14"
4. PR-1208-4"
5. PR-1212-4"
6. PR-1215-16"
7. PR-1214-12"
8. PR-1219-8"
9. ST-5151-8"
10. 23 ata exhaust line of Q-1101-2
11. ST-1104-6"
12. 60 ata steam line to Q-1101-1
13. SO-1504-4"
14. 4 ata steam header from V-1501
15. ST-1502-8"
16. ST-1503-12"
17. SC-1507-3"
18. SC-1506-4"
19. SC-1502-3"
20. SC-1501-4"
21. Risers of H-1202
22. PR-1223-4"
23. PR-1224-3"
24. GA-1112-6"
25. MA-1201-3"
26. MA-1203-4"

Code No.	Description
2 41 03	INSPECTION OF MODIFICATION PIPE LINE OF C.C.S : Radiography of one shot each of 6 Nos.joints of 4" NB line and 10" NB joints of CCS modification was carried out. Radiographs revealed no significant defect in any of the weld joints.

PLANT TURNAROUND - 1991
UREA PLANT
CIVIL JOBS

Code No.	Description
2 51 01	SCRAPER FLOOR : (a) Removing & Relaying Acid/Alkali proof Brick lining with FRB Lining on Top. (b) Epoxy painting of conveyor gantry & slab bottom of scrapper floor i.e. ceil ing of MCC-6.
2 51 02	(a) Bitumastic lining new Bucket-elevator area and P.T.Top. (b) Grouting of Railings at P.T.Staircase. (c) Closing window gap by Alluminium sheet of Lift room.
2 51 03	Red mandana floor repairs and painting work Ground floor Urea.
2 51 04	Making 4 Nos of RCC column for GHH Compressor.
2 51 05	Replacement of Wooden louvers of Prill Tower Scrapper floor.

PLANT TURNAROUND - 1991

UREA PLANT

ELECTRICAL JOBS

Code No.	Description
2 61 01	01 Overhauled the following motors : P-1408, P-1401-A, P-1401-B, P-1231-B, P-1232-A, P-1232-B P-1231-A, E-1053, P-1051, P-1132-A, P-1131-A. 02 Carried out checking of terminal boxes of motors above 50 HP for tightnees of terminals & measured IR valves.
2 61 02	Preventive maintenance carried out on transformers TR-7-A, 7-B, 17 for - a) Checked & thightened connections at primary and secondary and incoming of MCC switchgear. b) Replaced silicagel in dehydrating breathers. c) Carried out testing of oil. d) Checked trip alarm ckt & cleaned all emergency trip boxes.
2 61 03	Carried out preventive maintenance/cleaning of all feeder compartments mounting on the MCC-6 and MCC-14.
2 61 04	Carried out preventive maintenance of TMG/SIEMENS make L.T. ACBs installed at MCC-6, & MCC-14.
2 61 05	Carried out testing & calibration of EE make protective relays mounting on panel of MCC-6 and 14.
	In addition to above provided temporary connections of flood light, hand lamp, hydrojetting pumps & chemical dozing pumps in the plant.

PLANT TURNAROUND - 1991

UREA PLANT

INSTRUMENTATION JOBS

Code No.	Description

2 71 01 01 Field Transmitters & Controllers :

Cleaned, overhauled and calibrated the following Instruments.

LC-1123, LC-1501(23 ata), LC-1502, LIC-1501(4 ata), LIC-1203 FIC-1203, FRC-1423, LI-1421 (Zero checking)

02 The following control valves are attended for necessary overhaulling/checking and replacement etc.

a) LCV-1502 A :

The old valve body was punctured for two to three times due to errosion by flashing fluid. Procured complete I/L Palghat make new control valve. Removed old valve and fixed the new valve in place of old serck valve.

b) PICV-1128 :

The abnormal sound was observed from body during running of the plant. Opened the valve body and removed all internal parts like seat, cage etc. for inspection. All the parts are found alright. Provided additional shims and replaced the bonnet gaskets and also added the gland packings and checked the valve stroke. Defective pressure gauges of Air Regulator and valve positioner are also changed.

c) HICV-1205 :

Valve was reported passing badly. Removed valve from line and changed butterfly sealing ring by new one. Overhauled the valve, valve positioner and fixed it back Checked handjack operation and also checked the storke.

d) HICV-1201 :

Removed from line. Inspected seat and plug and found alright. Taken a fine machine cut on convex portion of body to suit for lense gasket toward stripper side by mechanical w/s as some leakage was observed during running of plant. Overhauled valve positioner, valve positioner transmitter, air sets etc and given tubing connections. Checked valve stroke. The lense gasket is replaced by brand new one.

e) LCV-1123-A:

Was reported passing in close position. Removed seat, plug for inspection and found them alright. Slight lapping of seat and plug is done. Fixed back the valve. Replaced old valve positioner by new one and checked the valve stroke.

Code No.	Description
2 71 02	f) PRCV-1504 : was reported passing the steam in close position. Removed bonnet and plug alongwith actuator from valve body. Taken out the cage xxxx and seat rings from body. The guide portion of top ring was found damaged. The gasket below the bottom seat ring was not found. Prepared a new gasket for bottom ring and provided M-Seal on the small cuts observed on the supporting area of bottom ring Fixed internal assemblyby providing necessary thin shims at bottom & top seat rings to match the gap between seat ring and plug provided new gaskets for bonnet and fixed back. Checked stroke after connecting the tubes.
	g) Overhauling/checking of handjacks, cleaning flushing of Air sets stroke checking and AUT/MAN operation of the following control valves are carried out and rectified the faults wherever observed LICV-1201, PICV-1130/1131, PRCV-1501, TRCV-1201, HICV-121 A/B, FICV-1102, LRCV-1421, PICV-1129, HICV-1222 A/B.
	h) General cleaning, checking, greaseing, overhauling of valve positioners and stroke checking are carried out for the following control valves. PRCV-1201, HICV-1202, PICV-1202, HICV-1421/22, FIC-1204, FRCV-1201, TRCV-1421/22, FRCV-1421, PCV-1501(H.P.Flush) LRCV-1201, LCV-1501, HICV-1121/1122, FRCV-1-1, HICV-1022 HICV-1101, PRCV-1202 etc.
	i) Provided new gland packings for following steam/condensate control valves. PRCV-1501, LCV-1501 (23ata), PICV-1129, PICV-1128, PRCV-15
	j) Painted the most of the control valves and two junction boxes.
2 71 03	Battery Room : Provided new power distribution box in battery room for 230V AC power distribution in place of separate isolators of LR-1201, P-1201 A/B Sol. Valves etc. Cleaned the charger panel and other boxes including batteries.
2 71 04	Main Panel & Compressor Panel Instruments :
	a) TRC-1422 : Provided new duplex thermocouple and connected two pair cable upto junction box. Removed pneumatic temp. recorder controller and mounted YEW digital indicating controller. One point of T/C is connected to digital controller, second point of T/C is connected to I/P convertor. The output of I/P is connected with Second (Blue) pen of TRC-1421. Disconnected TIL-1422 digital alarm indicator and given alarm from digital controller Laid out the signal cable from controller to I/P converter near control valve. Mounted Rosemount make I/P converter in field near control valve and output of I/P is connected to the valve positioner of TRCV-1422.

Code No	Description

The controller output to I/P cover is 4 to 20 mA dc (i.e. 0 to 100%)..t 4 mA valve is full close and at 20 mA valve is full open.

b) TIH-1702 A/B (Prill Cooling ID Fan Bearing Tempr.):

Provided new cutout suitable to G.P.digital TIH-1702B (South Bearings)Connected T/C wire of TIH-1702A (North Bearing) to G.P.digital TI (original location of TIL-1422, TIL-1422 T/C wire are connected to TI-1 PttNo.35)

c) TRs :

Overhauled and checked all the multipoint Temp. Recorders of both the panels.

d) Panel cleaning & flushing of Air Sets :

Cleaned all the panels and panel Instruments.Flushed out the panel air headers and air regulators.

05 LH-1121 : Replaced the repaired float switch assembly by new one.

06 PL-1165 : Overhauled the nozzel flow switch as it was not responding properly.

07 VIH-1151 : Oil leakage was observed from probe entry at main casing.Sealed it properly and rectified the fault.

08 P-1102A : Shifted the solenoid valve at convenient location and changed the impulse line by 3/8" SS tube.Also provided union on punctured tube of P-1201B sol.valve impulse line.

09 Removed and reinstalled the following instruments of centrifugal compressor, P.B.Compr.and GHH Compr.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) Techometers/speed probes etc.

d) All the vibration monitoring probes.The probes were fixed back after calibration.

e) Q-1101-1 Rotor Replacement(Related jobs)

The turbine rotor was replaced by repaired rotor.At the time of over speed trip test checking, the doubt was taken on speed Indicator SI-1121.Provided DISATAK preamplifier and speed Indicator (analogue)in parallel of Beacon Digital S.I. for cross checking through selector switch at local indicator.High vibrations on monitor were observed due to electrical/mechanical run out.Meter readings were corrected as per the readings of LVF-2.

Code No. Description

10 Jobs related with H.P.Stripper :

a) Removed Radioactive source from stripper and kept in lead container upto the completion of mechanical jobs. Fixed back the source.

b) Ferrule test sets were made ready and given necessary tubing/connections from air source.

c) Removed the Wet leg set alongwith d/p transmitter of LRC-1202 and fixed back the complete set after completion of mech.jobs.

d) The source detector unit of level monitoring system and thermocouples were also removed for stripper inspection work.Fixed back them.

11 FRC-1421 :

Rotameter transmitter mounting was shifted at higher elevation due to CCS-II second phase facility.

12 JB-3 JB-4 :

The multitube bunches were punctured near Junction Boxes due to spray of hot condensate given for removing the chocking from 1" CO2 line (at FI-1202 TX) to H.P.Scrubber shifted JB-3 at first floor below JB-7/8. New tubings are provided. Defective multitube bunch piece was cut and then connected. The tubes of JB-4 are incorporated in JB-5 & JB-6 by connecting the related tubes. All tubes were checked for identification from field to control room and leakage test was also carried out.

13 JB-A5 of P-1102B :

The old box was rusted,hence replaced it by new Aluminium alloy box.Provided new glands and terminal strips.Terminated all the wires as per original diagram with slight change.

14 LR-1201 :

Autoclave source detector pad was inspected for sealing and protective measures.It is found O.K.Covered it.

15 Conductivity meter for condensate going to New Boiler Deaerator:

It is shifted from new boiler plant to Urea plant and mounted near FR-1503 TX.Made arrangement for necessary impulse line of condensate ~~xxxxx~~ cooling water and also laid out the necessary cables from new boiler cont.room to Urea plant and 6" ON-OFF valve to Urea Cont.room for condensate diversion valve open alarm.

Code No.	Description

16 Solenoic Valves of Q-1101-1 & Q-1101-2 :

Dismentaled the solenoid valves for overhauling and inspection of internal parts.The internal kit of Q-1101-1 (Centrifugal Compr.Turbine) was replaced by new one as it was found damaged.

17 Switches :

The following field/received switches are overhauled and calibrated.PHA-1140 original setting was 0.95Kg/cm2.New setting for the same is made at 35" H2O as per plant requirement. PLCO-1145, PL-1145, PLCO-1124, PHCO-1126/ 1127.

18 Jobs Related with H.P.Condenser :

Removed and refixed the related thermocouples and weap hole connection tubings at the time of condenser inspection by Stamicarbon.

19 Misc.Jobs :

a) Boiler (4 ata drum) Inspection : During the visit of Boiler Inspector - calibrated,checked and fixed the required Instruments like Boiler Press.gauge etc.

b) Flushed out the Instrument air lines & main headers.

c) Painted most of the control valves, some filed junction boxes,impulse lines,air lines etc.

d) Flushed out some impulse lines before startup and also carried out the compressors trip system checking.

e) Provided two new thrmocouples on bearings of F.D.Fan in prill cooling system.

f) Q-1101-1 governor oil pressure gauge route and mounting are changed.

g) Replaced the 24 VDC Relays from CPTRB and main panel Trip Relay Box by new ones for all trip variables.

PLANT TURNAROUND-1991

UREA PLANT

TECHNICAL JOBS

Code No.	Description
2 81 01	Minor modification for reverting 04 Nos. canopies of Prill Tower I.D.Fan was carried out departmentally.

* Noted

PLANT TURNAROUND - 1991

OFFSITE PLANT

MECHANICAL JOBS

Code No.	Description
3 02 01	COOLING WATER PUMPS P-4401/A, P-4401/B & P-4403 P.M.Was carried out 01 Decoupled the pump and removed casing. 02 Inspected rotor condition,casing and neck rings,found Ok. 03 Cleaned casings,gasket area and rotor manually. 04 New gasket of 1.5mm thickness champion style-20 provided and boxed up casing. 05 New gland packing (25mm Sq.) provided. 06 Bearings were checked and found Ok. 07 Flushed gland cooling lines. Bearing clearances measured are as under.

* Noted

	P-4401B	P-4403
Inboard Bearing	0.15mm	0.20mm
Outboard Bearing	0.23mm	0.22mm

3 02 02 DRIVE TURBINE FOR COOLING WATER PUMP OVERHAULING Q-4401/A

01 Decoupled the turbine and removed casing.

02 Governor relay cylinder,stop valves,nozzles checked, found Ok.

03 Checked the condition of rotor,carbon rings and oil gaurds Rotor condition found Ok.Carbon rings found damaged, replaced with new rings.

Carbon ring clearances

Steam Inlet End		Steam Exhaust End	
Carbon ring No.	Clearance	Carbon ring No.	Clearance
1 & 2	0.30mm	1 & 2	0.25mm
3	0.25mm	3,4 &	0.20mm
4 & 5	0.20mm	6 & 7	0.15mm
6 & 7	0.15mm		

* Noted

Code No.	Description

3 02 02 04 Bearing clearances maintained as under.

Journal bearing (Governor side)	0.20mm
Journal bearing (Coupling side)	0.20mm
Thrust bearing before overhauling	0.40mm
Thrust bearing after overhauling	0.25mm

Nozzle clearance 0.097"

Oil labyrinth clearance

Governor side	0.007"
Gearbox side	0.006"

Overspeed Trip speed set to 6500 RPM

Steam inlet shaft dia(Big)	106.88mm
(small)	96.88mm
Steam outlet shaft dia(Big)	106.90mm
(small)	96.89mm

05 Gear Box

01 Opened the top casing half.
02 Checked the pinion & gear found Ok and boxed up
03 Bearing clearance maintained as under
High speed pinion shaft

Journal Brg.clearance (Coupling side)	0.14mm
Journal Brg.clearance (Pump side)	0.15mm
Thrust clearance	0.022"

Gear wheel (Drive shaft)

Journal Brg.clearance (Turbine side)	0.18mm
Journal Brg.clearance (Coupling side)	0.13mm

Oil guard clearance 0.0045" to 0.006"
0.007" to 0.0085"

3 02 03 DRIVE TURBINE FOR C.W.PUMP Q-4401-B & G.B:

01 Opened bearing housing and checked the bearings - found OK

02 Bearing clearances maintained are as under

Journal Brg.clearance (Governor side)	0.14mm
Journal Brg.clearance(Coupling side)	0.18mm
Thrust of turbine (before P.M.)	0.016"
After adjustment	0.012"

Code no		Description

3 02 03 02 Gear Box :

Checked bearing and clearances maintained are as under

High speed pinion thrust	0.020"
Back lash	0.50mm
Journal Brg. clearance (Pump side)	0.15mm
Journal Brg.clearance (Coupling side)	0.17mm

* Noted

Gear wheel (Drive shaft)

Journal Brg.(Coupling side)	0.13mm
Journal Brg.(Governor side)	0.22mm

3 02 04 COOLING WATER PUMP P-4402 :

OVERHAULING

01 Decoupled the pump and removed casing

02 Inspected rotor condition, casing and neck rings. Both the shaft sleeves are worn out badly. It was decided to replace the rotor with new one.

03 New neck rings made rotor jam, so replaced with old neck rings.

04 Changed the journal bearings as the white metal portion was damaged at one place.

05 New Gasket of 1.2mm thickness, champion style-20 provided and boxed up the casing.

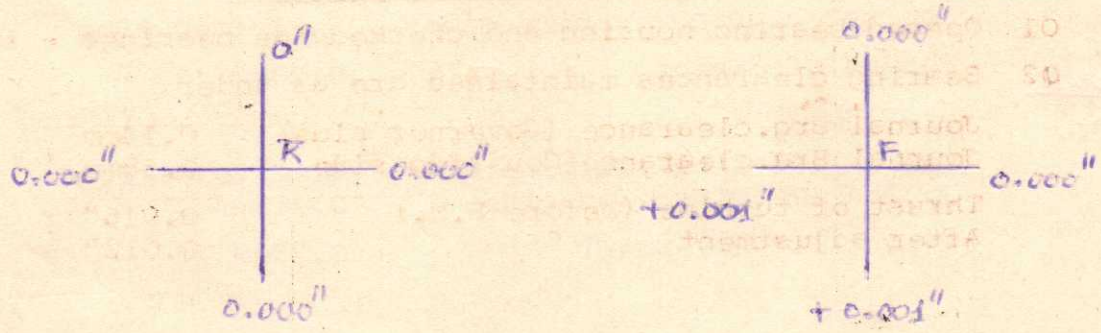
06 New gland packing (25mm Sq.) Provided.

07 Flush gland cooling lines.

08 Checked alignment with motor. Realigned pump and motor and coupled it with fresh grease.

Alignment readings maintained are as under.

* Noted

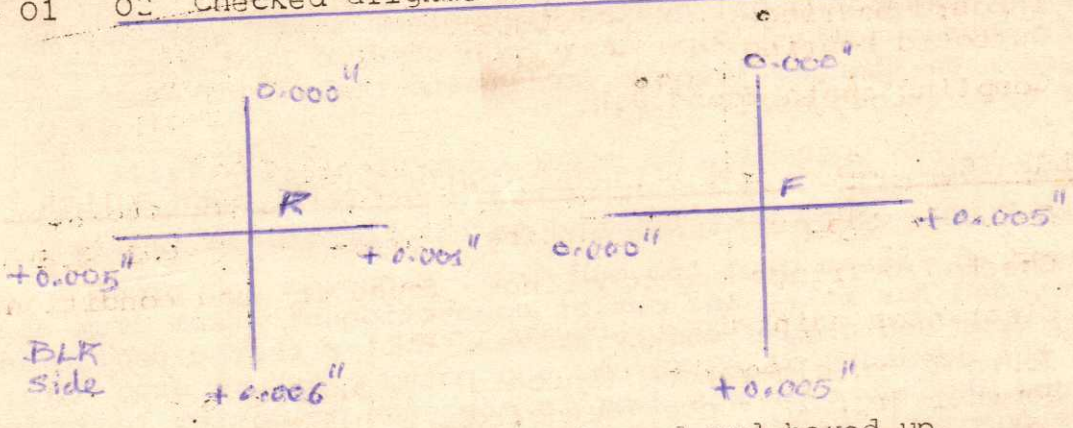


Also replaced the journal bearing

Code No.	Description
3 02 04	08 Journal bearing clear ances are as under. Inboard bearing - 0.009" Outboard bearing - 0.009" Coupling teeth found O.k.
3 02 05	BOILER FEED WATER PUMP (TURBINE DRIVE) P-5111 (NEW BOILER) 01 Decouple the pump from Turbine. 02 Checked bearings and couplings found in good condition. Clearances maintained are as under Journal Brg.clearance (Inboard) 0.12mm Journal Brg.clearance (Outboard) 0.12mm Total pump float 0.022mm 03 Boxed up the bearing covers and coupled. 04 Oil coolers opened and cleaned. 05 Changed console oil Q-5111
3 02 06	BOILER FEED WATER PUMP (MOTOR DRIVE) P-5112 (NEW BOILER) : 01 Decoupled the pump from gear box 02 Checked bearings and coupling. Found in good condition. 03 Boxed up bearings and coupled with motor. 04 Oil cooler opened and cleaned.
3 03 01	F.D.FAN K-5113 AND TURBINE Q-5113 (NEW BOILER) : 01 Checked the bearings of fan and found Ok. 02 Checked bearings of gear box and found in good condition Clearances maintained are as under. Pinion shaft Journal bearing (Fan side) 0.12mm Journal bearing(Turbine side) 0.11 to 0.13mm Thrust of pinion 0.20mm Gear shaft Journal bearing (Turbine side) 0.11 to 0.125mm Journal bearing (Fan side) 0.115mm Thrust of Gear wheel 0.23mm

Code No	Description

3 03 01 02 Checked alignment (Needle on fan shaft)



03 Opened oil cooler, cleaned and boxed up.

04 Cleaned filter and oil strainer, charged fresh oil.

* Noted 05 Clutch oil changed.

3 04 01 LUBE OIL CONSOLE :

* Noted Lube oil console of Q-4401 A/B & Q-4403 drained and cleaned. Charged with fresh Servo prime - 68 oil.

3 13 01 HEAT EXCHANGERS :

* Noted Q-4401 A/B and Q-4403 Oil coolers opened, cleaned and boxed up.

3 14 01 STEAM LEAKS :

Steam leaks as per list given by production deptt. were attendd.

3 15 01 BOILER INSPECTION GT-2068 (BY CIB) :
BHEL BOILER -F-5111

01 Steam drum/mud drum :

Opened manhole of steam drum and mud drum and cleaned both the drums from inside. Also got inspected by our inspection department for corrosion, pitting and wall thickness. Found in Ok. Boxed up the manholes for hydrotest.

R.V. Floating done on start up. Reading are as follows.

Code No.	Description
02	L.S.H.S.Pump and oil heater area steam leaks attended as per Shutdown list. Pipe line connected to heat exchangers were made flanged jointto facilitate removal of tube bundle of heat exchangers.
03	All valves connected to steam drum front side frist and rear side area were attended and gland replaced.All first isolation valves were changed to new bonnetless vlaves.
04	Boxed up steam drum and mud drum. Manholes and blind provided for inlet and outlet connection of steam drum and mud drum and gagged safety valves. Boiler tested departmentally at the pressure of 90 Kg/cm2 and noted pressure drop rate. Found Ok.Same test was done in presence of Boiler Inspector for inspection. Afterwards open inspection of steam drum/mud drum was carried out by Boiler Inspector.Found Ok.

3 15 02 REGENERATIVE AIR HEATER (RAH) :
H-5111 OVERHAULING :

01 Service Engineers from BHEL Ranipet were engaged for overhauling of complete RAH. Job was carried out as under.

02 Both the hot end and cold end bearings were opened,cleaned, inspected and found Okay. New oil filled.

03 One of the eroded hot end outboard basket repaired.

04 Hot end radial seal gap checked and corrected as per stipulation.Cold end radial seal clearance checked and found satisfactory.

05 Air motor dismantled,serviced and boxed up.

06 Sootblower travel checked and found okay.

07 Air heater trial run conducted for 30 minutes on 1/3/91 by air motor and found in good performance.

3 15 03 SOOT BLOWERS K-5112 (1 to 8)

All six Rotary soot blowers checked for operation and gland repacked.

Two L.R.S.B. were checked for operation, movement etc and cleaned thoroughly. One of the soot blower lance and cap found eroded and melt. Old lance with inner pipe was replaced by new lance and inner pipe.Glands were repacked in both LRSB.

Code No.	Description
3 15 04	BHEL BOILER DEAERATOR : Deaerator head was opened and inspected from inside. Bottom three trays were affected and found fell down. Two supporting angles had fallen down. Refitted the trays in proper position with support angles placed and welded. * Noted
3 18 01	TRAPS : All trap which were leaking were repaired and replaced wherever necessary. AOP & MOP suction and discharge strainers of C.W.Pump turbines were cleaned.

PLANT TURNAROUND -1991

OFFSITE PLANT

CIVIL JOBS

Code No.	Description
3 51 01	WATER TREATMENT PLANT (1) Acid/Alkali proof brick lining on HCl storage tank I & II. NaoH loading pump. Weak effluent drain near CATION 2 & 3 (2) Araldite/Hardner (epoxy)painting & lining on drains. pump founcation & manholes of weak & strong effluent drain. (3) Bitumatic lining near Anion area. (4) RCC flooring & floor grouting near cooling water make up sump.
3 51 02	EFFLUENT TREATMENT PLANT : (1) Acid/Alkali proof brick lining on floor of weak-Eff.tank-A, wall near inlet side, Inlet sump & Misc. Maint. (2) Pointing work in weak efflunet B & Strong Efflunet tank A.
3 51 03	Cooling Towers : Replacement of plank on roof for covering sump and channel of cooling towers.
3 51 04	Steam Polisher condainsers(SPC) Bitumastic lining on both the S.P.C.plant ie for IG plant & Ammonia plant.
3 51 05	S.G.Plant : a) Refractory lining in combustionarea Super heater area. Burner face. b) Baffle wall partition in Superheater area with S.S. Reinformcement & 9" thick insulating bricks.

PLANT TURNAROUND - 1991

OFFSITE

ELECTRICAL JOBS

Code No.	Description
3 61 01	01 Carried out preventive maintenance/cleaning of all feeder compartments mounting on the following MCCs. MCC-1, 2, 2A, 2B/2E, 2F, 3,8, 11. 02 Carried out preventive maintenance of TMG/SIEMENS make L.T. ACBs installed at MCC-1,2, 2A, 2F, 3,8,11.
3 61 02	FIELD JOBS 01 Carried out servicing of 66KV MOCB/OCB of BHEL make, installed at 66KV sub station for : a) Replaced oil level gauge glasses & gaskets b) Inspection of fixed and moving contacts, closing and tripping mechanism. c) Replaced insulating oil duly filtered. d) Lubricated the mechanism and carried out adjustments for proper operation. e) Replaced the silicagelin dehydrating breathers. Carried out servicing of HHE make onload tap changer(OLTC), cleaned the contacts, replaced the oil & lubricated the machanism. 02 Preventive maintenance carried out on transformers - TR-8 TR-1A, TR-1B, TR-2A, TR-2B, TR-3A, TR-3B, TR-4A, TR-4B, TR-9, TR-11, TR-12, TR-13, TR-14 for ; a) Checked and tightened connectors at primary and secondary and incoming of MCC switchgears. b) Replaced silicagel in dehydrating breathers. c) Carried out testing of oil. d) Checked trip alarm circuit and cleaned all emergency trip boxes. 03 Carried out preventive maintenance of 11KV switchgear, (GEC, TMG, KIRLOSKAR installed at 66 KV S/S and MPSS). Cleaned, tightened bus bar connections and replaced oil, worn out contacts and defective parts. 04 Replaced lead acid batteries of 110 Nos installed at MPSS. 05 Carried out filteration of oil of TR-13 of MCC-2F & TR-4A of MCC-3. 06 Carried out preventive maintenance of 66KV isolators, checking of alignment for proper opening, closing and lubricated the mechanism.

Code No.		Description
3 61 02	07	Carried out preventive maintenance of potential transformers for checking of oil and cleaning of bushings etc.
	08	Cleaned and tightened the connections in D.C.distribution panel and CRP panel.
	09	Carried out preventive maintenance of AMF set and its control panel.
	10	Overhauled the following motors. K-5303, P-3202/B, P-5115/A, P-5115/B, P-3202/A P-4206/A.
	11	Carried out checking of terminal boxes of motors above 50 HP for tightness of terminals and measured IR values.
	12	Carried out testing & calibration of English Electric make protective relays installed at 66 KV S/S, MPSS and above motor control centres.
		In addition to above provided temporary connections of flood light, hand lamps in Boiler and W.T.Plant.

PLANT TURNAROUND - 1991

OFFSITE

INSTRUMENTATION JOBS

Code No.	Description
3 71 01	NEW BOILER
	01 Cleaning ar checking of all field limit switches was done.
	02 Cleaning and checking of Ignitor gun and Ignition system was done.
	03 Inspection of Lye hye Electrodes (drum level indicator)was done. One electrode was replaced.
	04 Flushing of all draftgauges points was done.
	05 Refilling of glycon in all LSHS, flow pressure, instruments was done.
	06 General checking and cleaning of O2 Analyser was done.
	07 Cleaning and checking of all dampers I trument side was done.
	08 Calibration and cleaning of all flow, level, pressure transmitters was done.
	09 Calibration of all pressure switches was done.
	10 Calibration, cleaning of all valve positioners, air regulators, glands of all solenoid and control valve was done.
	11 Checking of all furnace T/Cs was done.
	12 Checking of all tank level indicators was done.
	13 Cleaning and checking of all annuciators was done.
	14 Checking and cleaning of all BTVs, shut off valves was done. Opened BTV-3 for steam for inspection.
	15 Checking of FL Fan bearing temp, alarm and trip circuit was done.
	16 Checking of F.D.Fan L.O.Pressure Switch was done.
	17 Removed the F.D.Fan instruments to facilitate maintenance job and fixed back.
	18 Checking and fixing of speed probe for F.D.Fan was done.
	19 Checking of internal wiring of BMS panels and replacement of defective contactor was done.Also cleaning of the contactors was done.
	20 Calibration, cleaning and checking of all Main panel instruments like Receiver recorder, controller, receiver gauges, square root extractor, E/P converter, computing relays, ratio relays, derivative relays and other pneumatic instruments was done.
	21 Calibration and cleaning of all temperature recorders, Indicators, was done.
	22 Cleaning and checking of UPS charger, Inverter, Static switch, aplab stabilizer was done.

Code No.		Description
3 71 01	23	Checking of batteries, discharging, ~~Inverter~~, and charging of batteries was done.
	24	Calibration and checking of all field controllers was done.
	25	Calibration of drum pressure gauge for boiler inspection was done.
	26	Checking of drum High and low level alarm and low level trip switches was done also replaced Micro switch in high level alarm switch.
	27	100% BFW valve was opened, dropped and material was build in below seat ring area, valve was reinstalled after repairing.
	28	30% BFW valve was opened and fixed back.
	29	All the control valveson gas line were checked.
	30	60 to 14 ata letdown valve was opened and fixed back.
	31	Checked the control valves in LSHS area and deaerator area.
	32	Opened the 14 ata valve and fixed back after inspection.
	33	Checking of trip system of Deaerator and BFW pumps was done. Also calibration of all pressure and level switch was done.
	34	Flushing of air header was done.
	35	Checking and cleaning of all Thermociples and Thermocouple junction boxes, pnemmatic junction boxes was done. Also painting of all junction boxes was done.
	36	Painting of Instrument panel near wash basin area and conductivity panel was done.
	37	Overhauling of control room regulators was done.

3 71 02 AMMONIA STORAGE AND LSHS AREA :

01 Calibration and cleaning of all panel pneumatic and electronic instruments was done.

02 Calibration and checking of all field pressure switches was done.

03 Trip system checking of Ammonia refrigeration compressor was done.

04 Checking of loading and unloading system of refrigeration compressor was done.

05 Calibration of all pressure gauges was done.

06 Flushing of air header was done.

07 Checking and cleaning of lead wire, replacement of defective terminal strip was done, for Mean base temperture Thermocuples.

Code No.	Description

3 71 03 OLD BOILER AREA :

01 Calibration of all panel and field Instruments was done.

02 Stroke checking of all control valves after cleaning of V/P, air regulator etc.was done.

03 BFW valve was dropped as it was stuck up. Mechined the gland bush installed it.

04 Cleaning and checking of all JB s was done.

05 Checking of trip circuit and wiring was done.

06 Cleaning and stroke checking of PICV-5151 was done.

07 Flushing of air header and overhauling of control room regulators was done.

08 Cleaning and checking of Peabody interlock panel was done.

3 71 04 L.M.PLANT :

01 Overhauling of Silica analyser was done.

02 Overhauling of valve positioner, air regulator, and stroke checking of all butterfly valves was done.Also replaced one defective positioner.

03 Calibration and cleaning of all panel Instruments like receivers, recorders, controllers, flow integrators, receiver switches, timer etc was done.

04 Calibration of all fiel flow, level pressure transmitters controllers was done.

05 Calibration of all conductivity meter and checking of all detectors

06 Checking of all contactors, panel wiring, replacement of defective contactors, solenoid valves, panel switches bulbs was done.

07 Replacement of two nos of pneumatic junction boxes was done.

3 71 05 WEIGH BRIDGE :

Cleaning and painting was done.

AMF SET

Calibrated Sw 1, Sw 2, Sw 3, Temp. and pressure switches.

ode No.	Description

71 06 COOLING TOWER :

01 PICV-5153 valve was opened, plug and seat were replaced as plug was found cracked.

02 PICV-5152 did overhauling of the valve and replaced the diaphragm.

03 LIC-5152 - Overhauling of the control valve was done.

04 Removed all the instruments of turbine and refixed to facilitate the mechanical jobs.

05 Checking of all the techogenerator of cooling water pump was done.

06 Calibration of all panel instruments was done.

07. Checking and calibration of all PH meter was done.

08 Flushing of air header and all regulator points was done.

3 71 07 CHROMATE & EFFLUENT TREATMENT PLANT :

01 Calibration of all panel instruments was done.

02 Calibration of all field transmitters controllers was done.

03 Calibration and cleaning of all control valves was done.

04 Calibration and cleaning of all pH meters was done.

05 Calibration of all field pressure gauges was done.

PLANT TURNAROUND - 1991

OFFSITE PLANT

TECHNICAL DEPARTMENT JOBS

Code No.		Description
3 81 01	01	Minor modification for the use of rain water at C.T. make up was completed departmentally.
	02	Minor modification for the addition of raw water to the bulk effluent header was completed departmentally.

PLANT TURNAROUND - 1991

B&MH PLANT

MECHANICAL JOBS

Code No.	Description
4 02 01	NAPHTHA FEED PUMP P-3202 : Ball valve of suction of naptha feed pump (4" N.B, 150 #) was changed as the existing was badly passing.Naphtha feed pump strainer assembly changed (both running and standby) as the body was badly damaged. * Noted
4 21 01	CONVEYOR M-2122 : BAGGING BUILLDING HOPPER CONVEYOR i) As the condition of the belt was very bad i.e. the edges of the belt were damaged, it was torn from the centre lengthwise etc.So the conveyor belt was changed with all nylon belt.The joint was made by vulcanizing. ii) Gear box cover was opened,Bearings,gear and shaft checked,found okay.Coupling bushes which were worn off, changed and gear box oil changed.Coupling alignment checked. * Noted iii) Skirt rubber of triper was changed. iv) Idlers and return rollers which were jam,changed. v) Flap valve of 7 & 8 nc hopper repaired and handle fabircated new.
4 21 02	SLAT CONVEYORS : Gear box cover was opened, Bearings gear & shaft checked, Found okay. Coupling bushes which were worn off,changed and gear box oil changed. Coupling alignment checked. * Noted

Code No.	Description
4 21 03	CONVEYOR M-2117 : RECLAIM CONVEYOR
	i) Gear box top cover was opened.Bearings gear and shaft checked, found okay.Coupling bushes which were worn off, changed and gear box oil changed.Coupling alignment checked.
	* Noted
	ii) Idlers and return rollers which were jam, changed.
4 21 04	CONVEYOR M-2110 : PLANT TRANSFER CONVEYOR
	i) Conveyor belt joint was cracking so this joint was opened and redone.As the belt was short in gravity a piece of 6 MTS belt was added and hence, two vulcanized joints were done.
	ii) Gear box top cover was opened.Bearings, gear and shaft checked, found okay.Coupling bushes which were worn off changed and gear box oil changed.Coupling alignment checked.
	iii) Skirt rubber changed.
	* Noted iv) Idlers and return rollers which were jam, changed.
	v) Painting of the conveyor done.
4 21 05	CONVEYOR M-2112 : FRESH UREA SHUTTLE CONVEYOR
	i) Gear box top cover was opened.Bearings gear and shaft checked, found okay.Coupling bushes which were worn off, changed and gear box oil changed.Coupling alignment checked.Triper gear box also opened checked and oil changed.Chain was checked, cleaned and greased.
	* Noted
	ii) Skirt rubber changed.
	iii) Idlers and return rollers which were jam, changed.
4 21 06	CONVEYOR M-2121 : BAGGING BULLING FEED CONVEYOR
	i) Gear box top cover was opened, Bearings, gear and shaft checked, found okay.Coupling bushes which were worn off, changed and gear box oil changed.Coupling alignment checked.
	* Noted
	ii) Skirt rubber changed.
	iii) Idlers and return rollers which were jam, changed.

PLANT TURNAROUND - 1991

B&MH PLANT

CIVIL JOBS

Code No.	Description
4 51 01	Epoxy (Aradite & Hardner) painting work on east & north wall of Silo Ground floor.
4 51 02	Bitumastic Lining on top floor (Hoper floor)

PLANT TURNAROUND - 1991

B&MH PLANT

ELECTRICAL JOBS

Code No.	Description
4 61 01	01 Preventive maintenance carried out on transformers TR 5A/5B for -- a) Checked & tightened connections at primary & seconcary and incoming of MCC switchgears. b) Replaced the gasket of main tank & rectified the fault of No.L.T.C. of TR-5B. c) Replaced silicagel in dehydrating breathers. d) Carried out testing of oil. e) Checked trip alarm ckt and cleaned all emergency trip boxes. 02 Carried out preventive maintenance of TMG/SIEMENS make L.T. ACBs installed at MCC-4, 9; 03 Overhauled the four motors. M-2121, M-2110, M-2112, M-2122. 04 Carried out preventive maintenance/cleaning of all feeder compartments mounting on the MCC-4, 4A, 9. 05 Carried out testing & calibration of EE make protective relays mounting on panel of MCC-4,9. 06 Preventive maintenance carried out on Reclim m/c.control panels, and tripper cable drum installed at silo. 07 Carried out painting of motor control centre panel of MCC-4. 08 Replaced/repaired light fittings installed on all conveyors.

PLANT TURNAROUND - 1991

B&MH PLANT

INSTRUMENTATION JOBS

Code No.		Description
4 71 01	01	Overhauling, cleaning of all solenoid valves timers etc was done in all control panel.
	02	General checking of wiring of control panels was done.
	03	Cleaning, painting and calibration of all Libra electronic scales was done.
	04	Calibration of machine No. 1, 2, 4, 3 electronic weighing machines was done.
	05	Painting of all panels was done.
	06	Calibration of Belt weighing system on Reclaim was done.