

IFFCO
Kalol Unit

P & S Section
Maintenance Deptt.
Report No.9/1987

R E P O R T

O N

ANNUAL TURNAROUND - 1987
(12th April 1987 - 3rd May 1987)

INDIAN FARMERS FERTILISER CO-OPERATIVE LIMITED

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IFFCO
Kalol Unit

THE ANNUAL TURNAROUNDS AT A GLANCE

Sr No	Year	ANONIA PLANT PERIOD		Downtime in days	UREA PLANT PERIOD		Downtime in days	Reason if any
		From	To		From	To		
1	1975	06.05.75	21.05.75	-	06.05.75	21.05.75	16	Planned
2	1976	26.03.76	20.04.86	-	26.03.76	20.04.76	26	Planned
3	1976-77	05.12.76	22.01.77	49	05.12.76	24.01.77	51	101-JT Breakdown
4	1978	21.02.78	15.03.78	23	21.02.78	23.03.78	31	101-BJ Breakdown
5	1979	21.05.79	12.06.79	23	21.05.79	12.06.79	23	K-1101/2 3rd stage Cylinder
6	1981	12.04.81	10.05.81	29	08.04.81	12.05.81	35	101-B Headers
7	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

ANNUAL TURNAROUND - 1987

P R E F A C E

IFFCO Kalol Unit had taken a planned Annual Turnaround on 12th April 1987. This was the 9th planned shutdown. Some of the major jobs planned for this turnaround were replacement of 4 ATA L.P. Boiler's (112-C) Tubes, replacement of exhaust lines of 101-JT and 105-JT turbines; cleaning of coolers; overhauling of 102-J N.G. Compressors and its drive turbine; overhauling of Governors of 101-JT; 105-JT, 103-JAT and 105-JBT and repairs of Arch Roof in Primary Reformer in Ammonia Plant. Inspection services of M/s Stami-carbon on H.P. Carbamate Condenser, cleaning of various heat exchangers, evaporators and overhauling of some critical rotory equipments and their drive in Urea Plant.

The Turnaround had involved coordination of various external agencies for different jobs, such as tube bundle pulling out and boxing up, hydrojetting of coolers, supply of manpower etc.

The Turnaround was successfully completed as per schedule and the Ammonia production was started at 7.30 hrs on 03.05.'87 and Urea production on 18.15 hrs on 02.05.'87.

IFFCO
Kalol Unit

Maintenance Deptt.
P & S Section

ANNUAL TURNAROUND - 1987

GENERAL DETAILS

<u>Sr.No.</u>	<u>Category</u>	<u>Quantity</u>
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EQUIPMENT UTILISED

(a) IFFCO

65 T	H.M. Crane	01 No
15 T	Coles Crane	01 "
18 T	TATA Crane	01 "
03 T	Forklifts	02 Nos
02 T	Forklifts	01 No
	Truck	02 Nos
	Generator welding set	12 Nos
	Transformer welding set	03 "
	Diesel generator	01 No
	Air Compressor Centrifugal portable	01 "

(b) HIRED

NIL

r.No.	Category	Quantity
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MANPOWER

(A) IFFCO DEPARTMENTAL:

a) MECHANICAL

Technician	46 Nos
Rigger	04 "
Mazdoor	16 "

b) MECHANICAL SERVICES

Technician	25 Nos
Rigger	01 "
Mazdoor	16 "
MEO	05 "
Welder	08 "
Machinist	08 "

c) ELECTRICAL

Technician	29 Nos
Mazdoor	04 "

d) INSTRUMENTATION

Technician	24 Nos
Mazdoor	02 "

(B) HIRED

Sr.No	Category	Mandays
1	Mill-wright	126
2	Fitter	489
3	Fabricator-cum-grinder	121
4	Rigger	617
5	Welder	145
6	Mason	024
7	Carpenter	047
8	Mazdoors unskilled (from Time Office)	4000

Apart from above, manpower supplemented by trainees available during shutdown is quite relevant, we had about 57 Nos. of trainees of maintenance in various trades.

(7)

ANNUAL TURNAROUND - 1987

AMMONIA PLANT

MECHANICAL JOBS

Code No Description

1 01 01 AIR COMPRESSOR TRAIN (101-J)

01 DRIVE TURBINE - 101-JT

OVERHAULING OF GOVERNOR

Transamerica Delaval representative was called for overhauling of the Governors of 101-JT, 105-JT and 103-JBT.

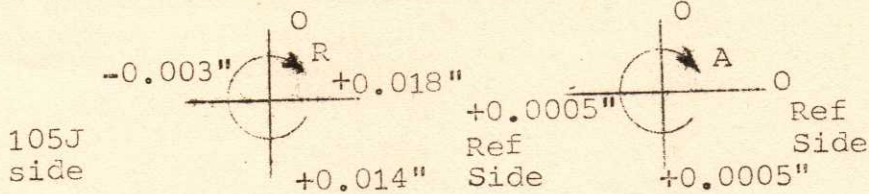
Governor was removed from its position and taken to maintenance shop. Checked the movement of the weight assembly and governor stem, found in good condition. Also checked the total travel of the servo piston, it was found to be $1 \frac{11}{16}$ ". Checked the pilot valve opening, it was found to be 0.037", this was well within the allowable range i.e. 0.032" to 0.050". The representative of M/s Delaval had given his opinion that this governor is in good condition and it does not require to dismantle it for overhauling/repair. But he had doubt that the Nozzle valve bar might not be functioning well. Found there was no up and down movement of the valve stem. Taken out the Nozzle valve assembly, checked for the oscillating motion of the lever and the main bar found jammed. Dismantelled, the end support brackets found, it was not properly lubricated, smoothed the bushings and fitted back.

Also checked both the valve stem, found little scratches, polished the same. Similarly, smoothed the valve stem, gland bushings. Assembled after properly cleaning and lubricating the moving parts. Also, adjusted the valve bar setting to a value of 5.584".

Fixed the nozzle valve assembly and fitted the governor in its position.

Also, checked the alignment between turbine and L.P. Case rotor after completion of modified exhaust line. The readings are given below.:

Code No Description



02 AIR COMPRESSOR - 101J HP CASE

Inspected both journal bearings and thrust bearing. Found in good condition, assembled the same. The values of diametrical clearances are given below:-

- O.B. Bearing (North side) : 0.005" to 0.006"
- I.B. Bearing (South side) : 0.005" to 0.006"
- Thrust of the rotor with thrust pads - 0.011"

Also modified the coupling lubrication line of HP Case as per the suggestions and drawing given by M/s Delaval with the new Nozzle supplied by M/s Delaval. Plugged the old oil tapping. Checked the total quantity of oil passes through the nozzle, it was found to be 7.5 litres/min. Tapping is taken from the oil pipe line going to the IB Journal Bearing.

03 LUBE OIL CONSOLE:

Removed the old lube oil from the console. Cleaned the console and filled up with new oil Servo Prime-57.

04 The Steam Exhaust Line of 30" Ø was replaced by new modified line 54" Ø. This job was carried out and completed by technical department.

1 01 02 N.G. COMPRESSOR - 102-J

Checked both the journal bearings and thrust bearing found in good condition. Assembled the same bearings.

CLEARANCES:

- i) Journal bearing (inboard) : 0.0055"
- ii) Journal bearing (outboard) : 0.005"
- iii) Axial thrust : 0.012"

Replaced the L.O. Filter elements on both the duplex filter.

1 01 03 N.G. COMPRESSOR TURBINE - 102-JT

Overhauling of the drive turbine of N.G. Compressor.

Decoupled the turbine from Compressor. Inlet and exhaust steam pipeline.

Code No

Description

were removed. Loosened the bolts of outer casing, bearing housing and nozzle valve assembly and lifted up. Then loosened the diaphragm bolts and lifted the top half. Rotor was found in good condition. Lifted the rotor for cleaning the internals. Rotor blades were cleaned by fine emery paper. Similarly all the internals and stationary blades are cleaned. Before lifting the rotor, the radial clearances of the labyrinths, total float etc. were measured and given on the separate sheet attached herewith.

After cleaning the rotor and internals, rotor assembly was put on its position, checked the nozzle clearance, found within the tolerable limit, again checked the labyrinth clearances, float and the side clearance between the stationary and rotary blades. All the readings which we have measured are given on the attached sheet.

Assembled the journal bearings with old bearing assembly itself, since it was found in good condition. Similar thrust bearing was also found in good condition, assembled the same bearing.

Top half of the outer casing was bored. Nozzle valve assembly was put on its position. Also, both inlet and exhaust pipe lines were fixed properly.

Before coupling the turbine, we were interested to check the overspeed tripping of the turbine. Since this turbine assembly should not run beyond 9500 rpm, (normal rpm) because the last stage rotor blades were fixed with 22 cr. MOV121 lacing wire. This is designed to operate for the speed range 9500 to 14400 rpm. But the turbine overspeed trip is beyond 15000 rpm so, we have decided not to go for overspeed tripping. Coupled the turbine with Compressor and handedover the machine for normal running.

1 01 04 SYN GAS COMPRESSOR TRAIN 103-J

01 HIGH PRESSURE TURBINE

Checked journal bearings and thrust bearing. Found in good condition. However, the rotor thrust was found more than the allowable limit i.e. thrust was measured as 0.016" (allowable is 0.008" to 0.012"). We removed the old thrust adjusting shim and provided a new shim. By doing this the thrust has come down to 0.0095". The diametrical clearance of the journal bearings is given below.

Ammonia (Mechanical)

Code No Description

- 1) Journal bearing towards LP Case side: 0.0065"
 - 2) Journal bearing towards 103-JBT side: 0.011"
- Also replaced the wornout earthing brush by new one.

02 LOW PRESSURE TURBINE

Inspected both the journal bearings and thrust bearings. Found in good condition. The diametrical clearances were checked found within the allowable limits.

- 1) Journal bearing towards 103-JAT side: 0.010"
 - 2) Journal bearing towards Gov. side : 0.010"
- Rotor thrust : 0.009"

03 OVERHAULING OF GOVERNOR

Governor assembly was lifted and taken to maintenance shop for dismantling. After dismantling, following were the observations.

- 1) Stem of single acting pilot valve was found sheared (it was in two pieces) (Part No. M-1822FG)
- 2) More wear & tear was noticed in guide plate (HC-271Jx1)
- 3) Similarly wear & tear was observed in pin (HC-295 5x1)
- 4) Bearings were also found unserviceable.

All the parts were thoroughly cleaned and the governor was assembled with following new items.

Sr No	Description	Item No	Symbol	Qty.
1	Pilot Valve	93	M-1822 FG	1 No
2	Guide Plate	86	HC-271Jx1	1 "
3	N.D. Ball bearing	97	315143	2 Nos
4	N.D. Ball bearing	115	H-20309x1A	1 No

04 SYN GAS COMPRESSOR 103-J LP CASE

Checked the float of the rotor, found to be 0.018". This was well within the allowable limit. Cleaned the couplings and coupled the LP Case rotor.

Ammonia (Mechanical)

Code No Description

05 SYN GAS COMPRESSOR 103-J HP CASE
Checked the float of the rotor, found to be 0.019". This was also found within the allowable limit, cleaned the couplings and coupled the HP Case.

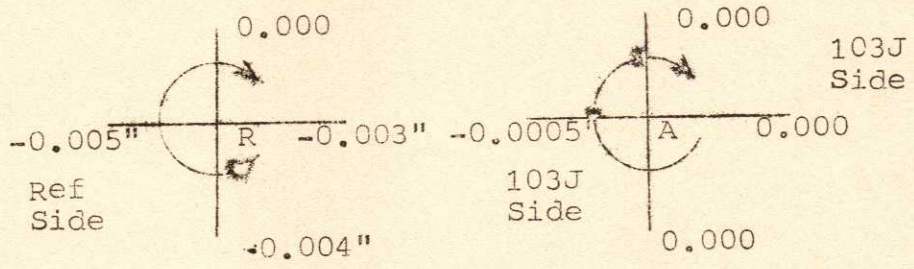
Replaced the L.O. Filter elements by new pieces on both the L.O. Filters.

1 01 05 REFRIGERANT COMPRESSOR TURBINE 105-JT

01 We checked the end play of the rotor, found to be 0.012". However, we have noticed that the thrust adjusting shim was not of correct size. Due to this we were getting wide difference in the measuring readings between instrument probes and by dial indicator. New shim was made, by doing this the difference between the two readings have come down to 0.003".

Axial thrust measured by dial indicator: 0.009"
Axial thrust measured by Instrument probe: 0.006"

Checked the alignment between the turbine and LP Case before and after installation of exhaust line, found not much difference given below the alignment reading after installing the exhaust line.



02 AMMONIA REFRIGERATION COMPRESSOR 105-J HP CASE

As per the inspection report, the O.B. Bearing of 105J HP Case was showing high vibration. This was shown only in I.R.D. Machine but not by Bently Nevada System. However, we have decided to inspect this bearing for any damage. Journal bearing was dismantled. Found in good condition checked its diametrical clearance. Found to be within the limit. But the end play of the rotor was found to be 0.014", this was little more than the allowable limit, it was made to 0.012" by putting new thrust adjusting shim, since the thrust pads were found in good condition.

Ammonia (Mechanical)

Code No	Description
	Diametrical clearance was measured as 0.005". Boxed up with the same bearings.
1 31 01	The steam exhaust line of 36" Ø was replaced by new modified line (54" Ø). This job was carried out and completed by technical department.
1 02 01	<u>B.F.W. PUMP 104-JA</u> Inspected both journal bearings. Found wear and tear on the white metal lining. Replaced the journal bearing by new one. Similarly checked the thrust bearing found in good condition. Boxed up the same. The measured clearances are given below: <u>CLEARANCE</u> 1) Diametrical clearance of I.B.Bearing:0.0055" 2) Diametrical clearance of O.B.Bearing:0.006" 3) Axial Thrust :0.022"
1 02 03	<u>B.F.W. PUMP DRIVE TURBINE (TERRY TURBINE)104-JAT</u> Inspected both journal and thrust bearings. White metal lining on the journal bearings was found in good condition, however the axial thrust was found more than the allowable limit. It was measured as 0.023". More wear and tear was noticed on the thrust bearing base ring. Replaced the thrust bearing assembly by new one. Also measured the diametrical clearance of the journal bearing. Found well within the limit. 1) I.B. Journal bearing : 0.006" 2) O.B. Journal bearing : 0.0055" 3) Axial thrust : 0.009" Cleaned the oil console tank and filled it with new oil. Also cleaned the lube oil filter elements. All the Governor Linkages were lubricated.
1 02 04	<u>MEA PUMP DRIVE TURBINE (MURRAY TURBINE)107-JAT</u> Inspected both journal and thrust bearings. Journal bearings were found in good condition and measured its diametrical clearances, found within the limit. Axial thrust was found to be more than the allowable limit i.e. it was measured as 0.014". Also wear and tear was found on the thrust pads. Replaced all the thrust pads by new one. The measured clearance readings are given below:- 1) I.B. Journal Bearing Clearance :0.006" 2) O.B. Journal Bearing Clearance :0.0065" 3) Axial thrust :0.010" Oil console was cleaned and filled it with new oil. Also cleaned the lube oil filter elements.

Code No Description

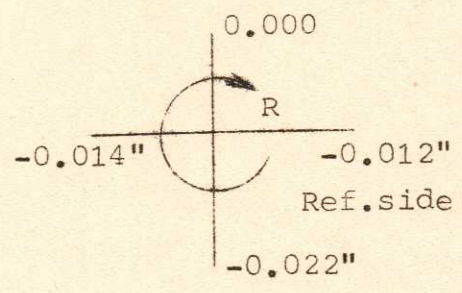
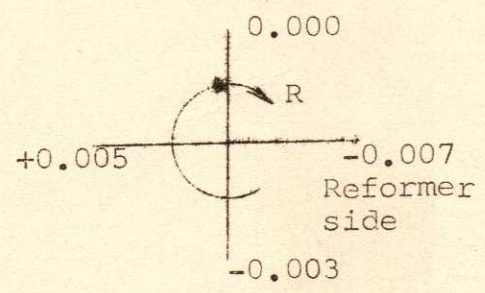
1 03 01 I.D. FAN 101-BJ

Inspected both the journal bearings, found in good condition. Checked the diametrical clearance, found within the allowable limit. Boxed up the same.

- 1) I.B. Bearings clearance : 0.012"
- 2) O.B. Bearing clearance : 0.011"

Also checked the alignment between Turbine to G.B. & G.B. to I.D. Fan. Readings are given below:-

Turbine to G.B. <u>Dial on Turbine shaft</u>	G.B. to I.D. Fan <u>Dial on Fan Shaft</u>
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1 03 02 I.D. FAN DRIVE TURBINE 101-BJT

01 Decoupled the Turbine and G.B. Found more damage on the teeth of both the coupling half. Removed the coupling hubs, found coupling journal dia in good condition on both, turbine rotor shaft and pinion shaft. As we do not have spare coupling assembly it was decided to use the MEA Pump coupling i.e. coupling between pump to pump. Little variation was found on the bore of both the coupling hubs. Machined the bore of one of the coupling hub to suit Pinion Shaft. The coupling hub, was rebuilt on its I.D. and machine to suit turbine shaft.

Inspected both the journal bearings, found in good condition. However, the diametrical clearance measured as 0.012" on both I.B. & O.B. bearings. So, we have decided to replace it by new bearings. After replacement the diametrical clearances are:-

- 1) I.B. Bearing clearance: 0.007" to 0.008"
- 2) O.B. Bearing clearance: 0.008"

Also replaced all the carbon seals by new one. Seal clearance was maintained between 0.002" to 0.003"

Ammonia (Mechanical)

Code No Description

Turbine thrust was found : 0.008"
Checked the oil ring clearances:
I.B. Oil ring (G.B. Side) : 0.007 to 0.008"
O.B. Oil ring (Governor side) : 0.009 to 0.010"

02 GEAR REDUCER

All the four bearings were checked, found in good condition. Checked the diametrical clearances, found within the allowable limit.

CLEARANCE

Table with 3 columns: Location, Gear shaft bearings, Pinion shaft bearings. Rows include Turbine side and I.D. Fan side.

Also, checked the teeth of gear and pinion, found in good condition. Lub. Oil filters were cleaned.

1 12 01 PRIMARY REFORMER 101-B

The following jobs were carried out.

- 01 Arch burners alignment carried out for 103, 110, 111, 112, 707, 708, 802, 803, 805, 901, 904, 908, and 909 burners.
02 Damaged ceramic fiber blankets for arch roof insulation was done near tube No. 110 & 111. This job was carried out by M/s Petron Engg. Pvt Ltd.,
03 The following 27 burner blocks were replaced by new ones i.e. Burner No. 101, 103, 105, 112, 207, 208, 303, 308, 409, 413, 414, 501, 502, 605, 607, 707, 708, 802, 803, 804, 806, 901, 904, 908, 909, 910, 911.
04 Attended the jacket water leakage, by properly welding the reinforcement angle piece on the transition pieces of riser No. 4, 5, 6, & 8.
05 Secondary air registers were made operative for burners 109, 110, 705 & 907.
06 Thermowell plate support of 4th & 5th bottom header was welded.
07 Patch work was done at the damaged points on outlet headers.
08 Replaced the damaged tunnel slabs by new one. Totally 122 new tunnel slabs were provided.
09 All the asbestos sheets of pent house roof were replaced.

Ammonia(Mechanical)

- Code No Description
- 10 Naphtha purging valves were replaced for the burners 311, 603, 612 & 801.
 - 11 Naphtha needle valves were replaced by new one for the burners 504, 308, 814 (both valves) and 207, 302, 514 (second valve)
 - 12 Atomising steam valves were replaced for the burners 301, 302, 303, 208, 311, 501, 603, 612 & 801.
 - 13 The following tubes top plug flange gaskets were replaced i.e. 407, 413, 421, 519, 520, 521, 522, 523, 525, 526, 530 & 626
 - 14 End flange gasket was replaced for the inlet manifold No.8.
 - 15 Radiant and convection zone refractory work was done as per the inspection report.
 - 16 All the five panels (near FRCV-12, Block valve) of Auxiliary Boiler were replaced with newly fabricated assembly.
 - 17 Supports of all the seven coils in HT & LT zones were checked.
 - 18 Damaged burner blocks of auxiliary boiler burner were replaced.
 - 19 Auxiliary boiler tubes thickness were measured.
 - 20 Waste Heat Boilers (101 CA/CB) jacket water over flow collection pot was modified to avoid water spillage.
 - 21 FRCV-2 (Steam to pri-reformer) down stream check valve was inspected. Found okay.
 - 22 Creep measurement of reformer tubes were carried out at random, reported under limit.
 - 23 Reformer Tubes and transfer line spring support, cold and hot balancing was done in presence of M/s Kellogg representative.
 - 24 Reformer tubes magnetic test was done on all the tubes and found okay (less than 0.2%) except the following tubes.
- | <u>Tubes No.</u> | <u>Ferrite Content</u> |
|------------------|------------------------|
| 528 | 12% |
| 537 | 3% |
| 736 | 4% |
- 25 Flue gas analysis tapping was taken from I.D. Fan discharge duct as per the requirement of Gujarat Pollution Control Board.

Ammonia (Mechanical)

Code No Description

1 12 02 CO2 STRIPPER 102 EA/EB
Loose flange joints were tightened. Similarly on missing bolts were provided the gas inlet distributor.

1 13 01 COOLERS/HEAT EXCHANGERS CLEANING
The following coolers/heat exchangers were cleaned by hydrojetting.

01 101-JCA/101-JCB (NEW AND OLD SURFACE CONDENSERS)

Both these condensers were cleaned on its tube side by hydrojetting.

02 105-CB MEA EXCHANGER.

Before this Annual Shutdown, we have observed minor gas leakage from the tube sheet bottom gasket joint. During this shutdown, we have decided to attend this leakage. Tube bundle was taken out. Found more pitting at the gasket seating position on shell side flange. Pittings were repaired by welding and filling. Then assembled the tube bundle with new gasket along with grafoil tap. On one of the tube, a deep cutting was noticed and same was plugged.

03 108-C MEA COOLERS (4 NOS)

Its tube side was cleaned by hydrojetting. Tube side was hydrottested at 7.5 kg/cm2. Total number of tubes plugged are 19 Nos.

04 109-C MEA SOLUTION EXCHANGERS

Before annual shutdown, we have noticed leakage on any one of the 4 exchangers of 109-C. So, we have decided to hydrottest the exchangers/all on its tube side. Both channel covers and floating head cover were dismantled and hydrottested at 42 kg/cm2g. Found there was no leakage on 3 of the exchangers, but the fourth one 109-CA, leaking badly due to damage on the floating head gasket seat and spacer ring face by corrosion of the metal. Metal filling was done on the eaten away portion and machined on the horizontal boring machine as per the required dimension. Then the floating head was positioned, found leaking at 30 kg/cm2. After two to three trial, we have noticed the welded metal at some of the portion, inside the floating head I.D. was not machined properly, this caused the

Ammonia (Mechanical)

Code No	Description
	improper seating of the floating head cover. After grinding the unwanted welded metal, it was set on its position. Boxed up the floating head with old spacer ring and new gasket and hydrotested at 42 kg/cm ² g. Found okay.
	No cleaning was done either by hydrojetting or manual.
05	<u>110-C CO₂ COOLER - 2 NOS</u> Hydrojetting was done on its tube side.
06	<u>115-C METHANATOR EFFLUENT COOLERS:</u> Tube bundle was taken out for cleaning the shell side by hydrojetting. Shell side was cleaned by hydrojetting. Five tubes were found very loose from the baffle, it may give leakage in future course of time. So, we have plugged those 5 tubes. Found minor leakage at the expansion joint on some of the tubes, and same was expanded. Shell side was hydrotested at 15 kg/cm ² g, found okay.
07	<u>116-C SYN GAS COMPRESSOR INTERSTAGE COOLER:</u> Tube bundle was taken out for cleaning the shell side by hydrojetting. Shell side was hydrotested at 16 kg/cm ² g. 5 tubes were plugged.
08	<u>124-C SYN GAS COMPRESSOR AFTER COOLER</u> Tube bundle was taken out for cleaning the shell side by hydrojetting. Shell side was hydrotested at 25 kg/cm ² g. 4 tubes were plugged.
09	<u>127-CA/CB AMMONIA CONDENSORS - 2 NOS</u> Tube side was cleaned by hydrojetting. Shell side was hydrotested at 22 kg/cm ² g. Total tubes plugged in 127-CA, 26 Nos and 127-CB, 12 Nos.
10	<u>129-JC AND 130-JC AIR COMPRESSOR INTERSTAGE COOLERS:</u> Opened the end covers of the shell side (air side) and flushed with D.M. Water. Tubes were cleaned by hydrojetting Boxed up the end covers.
11	<u>136-C SYN GAS/METHANATOR EXCHANGER:</u> Hydrotested, found one tube was leaking and minor leakage was also noticed at the tube expansion joint in all the tubes of bottom

Ammonia (Mechanical)

Code No	Description
	three rows. Plugged the leaky tubes and expanded all the tubes of bottom three rows. Then Hydrottested at 48 kg/cm ² g. Found okay.
12	<u>174-C BLOW DOWN COOLER:</u> Tubes were cleaned by hydrojetting.
13	<u>175-C UAG COOLER:</u> Tubes were cleaned by hydrojetting.
14	Gland condensers of Air Compressor, Refrigerent Compressor and Syn. Gas Compressor condensing turbines were cleaned from its tube side of hydrojetting.
15	Lube oil coolers of air compressor, N.G. Compressor and Syn Gas Compressor were cleaned from its tube side by hydrojetting.
16	E-7 Refrigerent Condenser or PGR Plant is cleaned from its tube side by hydrojetting.
17	All small coolers were cleaned by rod packing and water flushing.
1 14 01	Steam leaks were attended.
1 15 01	<u>112-C (L.P. BOILER)</u> We have decided for the complete retubing (920 Nos) of this boiler by new ERW C.S. Tubes. This job was handedover to M/s S.R. Engineering, Baroda. They have completed this job within nine days. Old tubes were removed by cutting the tubes from inside, leaving 4" to 6" length from the tube sheet inside face. Then the small left over tube pieces on tube sheet were removed with the help of tube puller. After removing all the tubes, tube sheet holes were cleaned and inserted new tubes carefully. Tubes were expanded at the tube sheets. Hydrottested at 16 kg/cm ² g. Found okay.
1 15 02	<u>BOILER FEED WATER SYSTEM</u>
01	Chemical cleaning flange gaskets of Auxiliary Boiler Coils A&B were replaced.
02	Steam drum was inspected, some of the loose bolts were tightened. Cleaned the inside surfaces with mark in cloth. Hydrotested at 145 kg/cm ² g on 24.04.87 and approved by boiler inspector.

Ammonia (Mechanical)

Code No Description

- 03 Steam drum RVs tested on line. The tested pressure reading are given below. Pressure recorded from the control room.

	<u>Popping Pressure</u>	<u>Reset Pressure</u>
Middle RV	117 kg/cm ² g	112.5 kg/cm ² g
North RV	115 "	107.0 "
South RV	114 "	111.5 "
Superheater RV	112 "	109 "
- 04 LP Boiler (112-C) retubing was done with new ERW Tubes (920 Nos) Hydrottested at 16 kg/cm² on 24.04.87 and cleared by boiler inspector. The retubing work was carried out by outside party. The complete work done for retubing of this boiler was given separately in details.
- 05 New Boiler Feed Water Coil RV was overhauled and tested and set at 90 kg/cm²g as popping pressure.
- 06 Deaerator (101-U) was inspected, Rewelded the outlet pipe of its stripping portion and some loose bolts were tightened.
- 07 Methanator effluent BFW Heater 114-C Tube Sheet leak attended and tube bundle was hydrottested at 118 kg/cm²g. Some minor leaks were persisted.
- 08 Glands of all the valves of steam drum were replaced.

1 16 01 CO₂ ABSORBER 101-E

This vessel was opened for inspection. Excessive pitting was observed on shell welding and shell plate. M-seal provided on it. One of the arms of gas inlet distributor was fallen down, refixed with new gasket.

Its demisting pad was repaired by providing strips on east and west sides of the periphery.

Gas inlet valve was replaced by a new motor operated valve.

1 17 01 FOLLOWING RV'S WERE OVERHAULED AND TESTED:

Sr No	I T E M	Tag.No.	Test Press-ure	Re-set Press-ure
1	Air Compressor Disch.	RV-101J	525PSI	490PSI
2	Ist stage Ref. Flash drum	RV-110F(A) 2 Nos	100"	90 "

Ammonia (Mechanical)

Code No Description

Sr No	I T E M	Tag.No.	Test Press-ure	Re-set Press-ure
3	Ist stage Ref.Flash drum	RV-110F(B)	100PSI	95PSI
4	3.5 kg/cm ² g steam header	RV-45-1	75 "	70 "
5	2nd stage Ref.flash drum	RV-111-F	90 "	85 "
6	3rd stage Ref.flash drum	RV-112F	90 "	80 "
7	Prime Amm.Separator	RV-107F(A)	270 "	250 "
8	Prime Amm.Separator	RV-107F(B)	270 "	250 "
9	New B.F.W. Coil	RV-BFW-1	1280"	1150"
10	Syn.Gas Compressor Turbine Exhaust	103JAT RV	48kg/cm ²	35kg/cm ²
11	LP Boiler	112C-A	150PSI	140PSI
12	LP Boiler	112C-B	150 "	135 "

02 Three RV's were tested by "TRIVTEST" i.e. keeping system in service.

- a) LP Boiler (RV-112-C/1&2) : Opened at 10.69kg/cm²g
Reset at 10.50kg/cm²g
- b) 38kg/cm² steam header (RV-MS) : Opened at 40.20kg/cm²g
Re-set at 35.8"
Popping pressure was readjusted to 40.06 kg/cm²

1 17 02 VALVE REPAIRS/REPLACEMENT/INSPECTION :

- 01 FRCV-2 (Steam to Pri-reformer) down stream check valve was inspected. Found okay.
- 02 LTS inlet line vent valve was passing. Lapped the valve seats and assembled. Found okay.
- 03 HCV-13 (LP Boiler gas inlet valve) overhauled and provided the valve opening pointer.
- 04 SP-4 (inlet valve) bypass valve gland and bonnet leaks were attended.
- 05 CO₂ Absorber gas inlet valve was replaced by a new motor operated valve.
- 06 Main steam (105 kg/cm²) inlet valve of 103-JAT was replaced by a new motor operated valve.
- 07 Cold NH₃ Pumps (118-J/JA) discharge check valves were passing. Lapped the seats and assembled. Found it was holding.

Ammonia (Mechanical)

Code No Description

- 08 Ammonia import line ball valve to 109F (Ammonia receiver) replaced with carbon steel gate valve, as it was passing.
- 09 Start up heater (102B) fuel line plug valve was overhauled. It was very hard to operate.
- 10 Condensate pump (112-JB) NRV was passing. Lapped its seat and assembled.

1 20 01 PIPELINE FABRICATION/REPAIR

- 01 Flue gas analysis tapping was taken from I.D. Fan discharge duct as per the requirement of Gujarat Pollution Control Board.
- 02 Before Annual Shutdown, gas leakage was noticed on HTS outlet line elbow at the welding joint. A crack of 1 1/2" length was found at the joint between the welding metal and base metal. Fire took place at this leaky joint. This was repaired by cold process i.e. Furmanite. Sealent was filled by providing a clamp. This was only a temporary solution, in order to keep the plant on line. While this annual shutdown this elbow joint was inspected by X-Ray and thickness measurement was done. Found welding joint was defective throughout the circumference. It was repaired by grinding and rewelding, X-Ray was taken. Found okay.
- 03 LTS, NG Heating line was replaced with new one as the old one was corroded and was leaking from the bends.
- 04 SP-74 (vent header on CO₂ Absorber) silencer 3/4" Ø drain line was replaced by a 2" line. Also, strengthen the vent header supports.
- 05 3.5 kg/cm² steam inlet header 12" size to 111-CA (MEA steam reboiler) T-joint pipe piece was replaced by new one. As the old one was damaged badly from its welding joint and its wall thickness has reduced to very low value.
- 06 Methanator inlet line, upstream of V-3 (Control valve) welding joint found defective by radiography. This joint was repaired by grinding and rewelding.
- 07 Vaccum flasher condensate inlet line was directly connected to surface condenser (101-JC) hot well.
- 08 New sealing steam tapping was provided on NG Comp. turbine (i.e. U/S of FIC-202)
- 09 103-JC: Air Comp. interstage cooler bottom condensate collecting pot was modified by providing a larger volume pot.

IFFCO
Kalol Unit

PLANT TURNAROUND - 1987

AMMONIA PLANT
INSPECTION JOBS

Code No Job Description

1 31 01 The following furnace and vessels were opened and offered for inspection. The observations are noted below:-

01 PRIMARY REFORMER RADIATION ZONE:

ROW No.1: Bottom header insulation was found damaged below 3rd, 6th, 13th, 41st and 42nd tubes. Insulation holding wires are broken between tube No.21-22 and tube No.35-36. The tightening strips are loose between tube No.15 and 16. Eight Nos. of tunnel slabs are broken 1, 2, 3, 4, 5, 6, 7, 12, 13, 14th burner blocks are damaged partly or fully.

ROW No.2: Bottom header insulation was found damaged below 4th 5, 9, 25, 26, 36, 38th tubes. It has got loosened between tube No.15-16 and 27-28. Total 9 Nos. slabs are broken 5, 6, 7, 8, 9, 12, 13th arch burner blocks are broken partly or fully.

ROW No.3: Bottom header insulation was damaged below tube No.3, 4, 25, 26, 33, 37th tube. On tube No.24, bottom insulation has damaged causing exposure of metal surface 2, 3, 8 and 10th Arch burner blocks are broken partly or fully.

ROW No.4: Insulating wool has come out from bottom header below 3, 4, 5, 6, 8, 23 and 24th tubes. Between 15 and 16, strips are broken resulting in loosened insulation. It has also damaged between tube No.27-28. Total 4 Nos. of tunnel slabs are broken. 9, 13, 14th arch burner blocks are damaged partly or fully.

ROW No.5: Outlet manifold insulation is damaged below 3rd, 24, 25, 26, 27, 28, 30th tubes. Between 15th and 16th tube the part of insulation has come out. Total 8 Nos. of tunnel slabs are broken. 1, 2, 3, 4, 6, 8 Nos. Arch burner blocks are damaged partly/fully. All other are cracked.

Ammonia (Inspection)

Code No	Job Description
	<p><u>ROW No.6:</u> Insulation on bottom header has damaged between riser and 22nd tube. Between 19th and 20th tube the enclosing wire has broken resulting in loose insulation. 2 Nos. of tunnel slabs are damaged. 5,7,8,10,12 Nos. arch burner blocks are broken partly or fully.</p> <p><u>ROW No.7:</u> Bottom header insulation is damaged below 6,16, 34th tube as well as on both the side of riser. On seventh tunnel, 8 Nos. slabs are broken, 4,5,6,7,8 and 11 Nos. burner blocks are broken partly/fully.</p> <p><u>ROW No.8:</u> Bottom header insulation is damaged below 1,2,13,14,15,26,32,33,34th tube and between 27-28 tubes. Total 3 Nos. slabs are broken in 8th tunnel 2,3,4,5,6,9 Nos. burner blocks are damaged partly/fully.</p> <p><u>TUNNEL No.9:</u> 10 Nos. of slabs are damaged. 1,2,3,4,6,7,8,9, 10,12,Nos. arch burner blocks are also damaged partly or fully.</p> <p>First tunnel west side wall has deflected towards east side which is required to be repositioned.</p> <p>All these findings were reported to shift engineer (Ammonia) for getting it rectified through concerned departments.</p>

02

FOLLOWING ARE THE OBSERVATION OF VISUAL INSPECTION IN LT & HT CONVECTION ZONE:

LT CONVECTION ZONE: LT zone south side coil panel wall insulation has damaged from many places from west side between 1st and 2nd column supports guniting has broken by around 2 meters x 3/4 meters area. Also on the wall between west end to 1st column guniting has become loose similarly between 2nd and 3rd column from west side wall insulation has broken/cracked.

On east side, near manhole 5 feet x 3 feet guniting has broken from inside surface of the coil panel wall.

Finned coils in LT zone including their supports are quite okay.

HT ZONE: From west side on 1st anchor support one number anchor has cracked which was also observed and reported during the last shutdown.

Code No	Job Description
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Guniting is to be done on north side wall (between radiant and HT zone) as the castable material has fallen down causing exposure of the metallic surface to flue gases in the arc of 2½' x 1½".

On eastside wall castable in 1½inch x 10 inches areas has fallen exposing the metallic wall to gases.

Outside the 5th and 6th row of tunnel the roof of HT convection zone castable has fallen down exposing the metallic reinforcement. Recasting is needed in many places of the roof.

Castable of vertical column supports has also broken at many places.

Just above the HT zone manhole guniting material layer has broken down which needs repair.

HT & LT ZONE TOP:

Topbracing supports of HT top coil are quite in position and they appear to be in good condition.

North wall insulation of HT convection zone top appears to be good except a few places where cerafelt packing was applied in earlier shutdowns. These areas need some more cerafelt insulation packing.

HT-LT top east and west walls appear to be in good insulated condition.

At the junction of Auxiliary boiler and HT-LT top tunnel the portion of the metallic wall of west wall of convection zone is exposed to flue gases which is needed to be covered with castables.

Tunnel between HT-LT zone top the vertical walls and roof castable material is full of cracks and they are very much uneven as such from some places the layess of castable has broken down. These walls including the roof need a castable plaster to ensure long operation life.

Forth bracket connecting the top tunnel walls of HT-LT convection zone has fallen down in some earlier occasion. Bracket from west side had also fallen down which had been taken out.

The LT zone north wall top metallic channel has exposed causing direct contact with flue gases. It needs to be burried in castable material.

The top supports angles between LT south wall and LT north wall two supports have broken. One was removed earlier and the another is lying loose inside.

Code No Job Description

Finned tube supports visible from the LT top are appearing to have got buckled at the centre by little.

West side wall of the first tunnel in radiant zone has got deflected by around six inches. It is needed to be repositioned.

Thickness measurements of the following coils in Hⁿ zone was carried out:

- 1) Mixed feed pre-heater coil
- 2) Steam super heater coil

The thickness readings which were taken at bend points are recorded.

In LT zone thickness measurement at bend points of the following coils was done:

- 1) Steam super heater coil
- 2) B F W coil (New)

Readings are recorded.

Auxiliary boiler water wall tubes thickness measurement done.

Ferrite content measurement in Primary Reformer Catalyst Tubes was carried out.

03

CO₂ STRIPPERS 102 EA AND 102 EB:

102-EA: Overall colouration of the vessel is grayish black. On east side branch of the distributor the tie rod between north-south supports has broken from north-side and has come out. 3 to 4 Nos. of bolts are found sheared off from the first flange of the inlet distributor i.e. on west side near shell. The gasket between the flanges has also torn out. Gasket is required to be replaced. Distributor flanges at the centre are seen with missing or loose bolts. On east as well as on west side cracks have been developed with maximum length upto 4 inch at around six places near the weldings of partition plates with non-perforated end plates. Few fasteners are seen lying loose on 2nd tray.

The overall condition of demister pad and its support welding with shell is okay.

Thickness measurement was carried out.

102-EB: Overall colouration of shell is blackish. On flange of inlet line with distributor, bolts are found loose. The gasket has tornout and is required to be replaced. Distributor west branch clamps are loose.

Code No Job Description

The tack welds of partition plate with non-perforated end tray of east side are cracked. (out of 6 tack welds, 4 tack welds are cracked.) The non perforated plate has also got cracked in around 4 inch areas. On west side the partition plate 1/3rd portion on north side has got deflected from position as all the tack welds of that side are broken. Remaining portion of the partition plate has also got broken/cracked tack welds.

Condition of demister pad is good except at some places the wires are required to be retightened to hold the pad pieces in position.

04 STEAM DRUM: 101-F:

101-F: Drum shell has assumed greyish black colouration. Overall condition of the shell surface is good except some pitting marks which were also observed during earlier shutdown. One number riser steam separator plate was found loose which was taken out and repositioned after cleaning. Few numbers of fastners were found loose inside the drum which were handed over to maintenance technician. Thickness measurement of shell was performed from inside of the drum.

05 DEAERATOR: 101-U:

STRIPPING PORTION: The shell and dished end has assumed redish colouration. Lot of milscaling is observed particularly on top dished end. The welding of vent pipe with tray enclosure top plate has broken. The plate has also teared by around 3 inch length. The side plate cover on north of the tray compartment (just in front of manhole) is found with missing nuts as well as loose bolts.

DEAERATOR STORAGE TANK: West side dished end and bottom 3/4th portion of the shell has assumed reddish colouration. Slight scaling and pitting is observed on east side dished end.

The welding of the overflow pipe with the east dished end is eaten away at around four places which is required to be repaired. The weld bead of circular seam with dished end is observed to have pin hole of around 4 mm Ø. Also third circular seam from east side is having weld imperfection and pin holes at two places. Rusting and scaling of welds of tie rods between three downtakes is observed. At one place through pin hole is seen scattered pitting is noticed on the shell top near west side dished end.

Code No. Job Description

06 CO₂ ABSORBER: 101-E:

Visual inspection of the internals of vessel was carried out. The detailed observations are mentioned below:

- 1) Above first tray: No significant corrosion or pitting was observed on shell surface.
- 2) Between first and second tray: On south side pitting in around 2 inch area at two places was seen.
- 3) Between second and third tray: The areas where M-seal was applied were checked. There was no further erosion or pitting on those areas was observed.
- 4) Between third and fourth tray: On north side shell surface scattered pitting of 1.5 mm max. depth was found in an area of around 4 inch by 2 inch.
- 5) Between fourth and fifth tray: No apparent further corrosion/erosion was observed.
- 6) Between tray No.5 and 6: The welding of the tray support plate with shell was found eroded which is required to be strengthened by application of M-seal.
- 7) Between tray No.6-7, 7-8, 8-9 no considerable addition to shell pitting is noted.
- 8) Between tray No.9 and 10: South east shell surface is observed to have erosion of around 1 mm depth at 3 places in around 6 inch dia total.
- 9) Between tray No.10 and 11: On south shell surface pitting of 1.5 mm depth in 1 inch area is observed.
- 10) Between tray No.11 and 12: No significant erosion or corrosion was observed except at welding joints of support plate where M-sealing is needed.
- 11) Between tray No.12 and 13: On west side shell surface slight erosion in an area of 24 inch x 3 inch and pitting of around 2 mm depth was noted. On north side at two places the metal has eroded in 1 foot x 2 feet and 1 foot x 1.5 feet area resulting in the thickness reduction of upto 1.5 mm. At four different places slight pitting was noticed.

Code No Job Description

- 12) Between tray No.13 and 14: Slight erosion is observed in the south side shell surface in the area of 24 inch x 2 inch. On east side also erosion and pitting is observed resulting in thickness reduction of around 1 mm.
- 13) Between tray No.14 and 15: Considerable erosion is noticed on west and south shell surface in the area of 6" by 2" and 12" by 2" respectively on north east side 1 mm to 1.5 mm deep erosion affected area of 24 inch by 8 inch and on south east side 1 mm deep erosion in the area of 1 foot x 2 ft. is noticed. The pipe for collecting sample in this area is seen to be badly corroded. This pipe flange has also got badly eroded, and few nut bolts are missing.
- 14) Between tray No.15 and 16: Pitting is noticed in north side shell surface in around 6 inch dia area. On north west side, M-seal has got removed which was applied during earlier shutdown which is needed to be reapplied. On north east side also in an area of 3 inch x 3 ft a thickness reduction of around 1 mm is noticed. East side shell surface has also got pitted at many places causing 1 mm to 1.5 mm reduction in shell thickness.
- 15) Between tray No.16 and 17 : There were pitting marks at three places on west side. Fillet weld of support plate was observed to have pitting in south east side in around 3 inch length.
- 16) Between tray No.17 and 18: Scattered pitting marks on around seven different places on north east side with 2 mm \varnothing and around 1 mm depth were observed. Erosion has also been observed in 12 inch x 2 inch area causing maximum around 1.5 mm thickness reduction. South west side of shell has also got eroded in the areas of 1 foot x 2 inch at two places.
- 17) Between tray No.18 and 19: Scattered pitting marks of around 1.5 mm depth on west side of shell were noticed. Considerable erosion corrosion was also observed at two places of 2½" and 1" dia. area causing maximum thickness reduction of around 2 mm.
- 18) Between tray No.19 and 20: Slight erosion was noticed at few places on north west side and east side of shell

Ammonia (Inspection)

Code No	Job Description
19)	Below tray No.20 : Just below the down comer erosion and pitting was noticed in the area of 4" by 2 inch shell south side has also got scattered pitting marks and erosion of 1 mm depth. Above findings were chalk marked and M-scaling was asked to be done on the affected areas. Thickness measurement of shell at different elevations was carried out. The report is recorded.

07

Folloing pipe line joints were radiographed:

1. On 4 ata steam line newly fabricated Tec :5 joints
2. 105 ata steam inlet line to 103-JAT valve joints HS-4-12" :2 "
3. HS-4-12" line bend joints :3 "
4. PG-6-18" HPS outlet line (After grinding and rewelding of the cracked joint) :1 "
5. PG-18-12" 104-C outlet to 106-D (This joint was ground off and rewelded) :1 "
6. SG-33-14" 122-C to 123-C :1 (1 shot only)
7. 102-C outlet line :1 Joints
8. METHANATOR EFFLUENT COOLER: 115-C:
Thickness measurement of both the dished ends and shell was carried out. The report is attached.
9. REFRIGERENT CONDENSER: 127 CA and CB:
Thickness measurement was performed for shell and end covers. Report is attached h/w.
10. Condensate Stripper feed bottom exchanger 170 CA & 170 CB. Thickness of shell measured. Report is attached.
11. Synthesis Gas Compressor 3rd stage Separator: 105F. Thickness measurement for top and bottom was performed. Readings are recorded.
12. CO2 Stripper Reflux Drum 103-F: Shell thickness measured. Report is attached h/w.
13. Stripped Condensate Cooler 173-C: Shell thickness measured. Report is attached.
14. Methanator: 106-D: Thickness measurement of shell was carried out. Report is attached herewith.

Ammonia(Inspection)

- | Code No | Job Description |
|---------|---|
| 15. | Ammonia Convertor Inter Changer: 122-C
Thickness measured on shell side. Report is attached h/w. |
| 16. | The following pipe line weld joints were ultrasonically tested. Report is recorded. |
| a) | HS-4-12" : 105ata steam line inlet to 103JAT |
| b) | SG-33-14" : Convertor outlet to 123-C inlet |
| c) | SG-32-6" : Start up heater outlet to convertor inlet. |
| d) | PG-2-18" : 102-C outlet to HTS mixing orifice |
| e) | PG-3-18" : 102-C outlet downstream of mixing orifice to HTS. |
| f) | PG-S-14" : 102-C outlet to HTS mixing orifice |
| g) | PG-18-12" : Process Gas from 104-C shell outlet to Methanator inlet from top up vessel nozzle. |
| h) | PG-6-18" : HTS outlet from vessel nozzle 103-C inlet. |
| i) | SG-1-12" : Methanator outlet to 114-C. |

17 In addition to the above mentioned shutdown jobs, the following pipe lines thickness measurement was carried out.

- | | | | |
|-----|----------------|-----|--|
| 1) | BO-10H-2" | 26) | PW-1-6" |
| 2) | BO-11 H-2" | 27) | PW-4-2½" |
| 3) | BO-12H-2" | 28) | PW-17-4" |
| 4) | BO-13AH-2" | 29) | PW-8-1½" |
| 5) | BO-14H-2" | 30) | PW-19-4" |
| 6) | SG-6-12" | 31) | PW-31-12" |
| 7) | PG-11A-16" | 32) | MEA-1-12" |
| 8) | PG-11B-16" | 33) | MEA-2-4" |
| 9) | PG-21-20" | 34) | MEA-3-4" |
| 10) | PG-10-18" | 35) | MEA-20-12" |
| 11) | SG-11-10" | 36) | MEA-8-12" |
| 12) | SG-42-4" | 37) | MEA-21-12" |
| 13) | SG-13-12" | 38) | CO-25" |
| 14) | SG-33-14" | 39) | CO-1A-18" |
| 15) | SG-12-14" | 40) | CO-18-18" |
| 16) | SG-18-18" | 41) | FIC-7 kick back line |
| 17) | SG-21-14" | | LP case.SG-35-12" |
| 18) | SG-25-8" | 42) | SG-11-10" (43) SG-6-12" |
| 19) | SG-34-14" | 44) | Reboilers to 106-C |
| 20) | SG-23-12" | 45) | LCV-2 to 102-E |
| 21) | PG-6-18" | 46) | 109C A/B to CO ₂ Strippers |
| 22) | PG-18-12" | 47) | 102E to 109-C |
| 23) | PG-3-18" | 48) | CO ₂ strippers to Reboiler |
| 24) | PG-14-16" | 49) | 110 CA/B to CO ₂ knockout Drum |
| | 102-F to 106-C | 50) | 104-E to 107-J |
| 25) | PG-15-14" | 51) | Steam let down line 105 ata to 38 ata steam line |
| | 102F to 101-E | 52) | PW-5-50 (2") |

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AMMONIA PLANT

CIVIL JOBS

Code No	Description
1 51 01	01 Guniting of refractory in L T & H T Convection zone. Auxilary duct, the well (about 220 M ² area) was repaired.
	02 Refractory lining (casting of 5 Nos Pannel) of duct zone was carried out the Primary Reformer.
	03 R.C.C. supports for the 101-JT & 105-JT were strengthened.
	04 Top A.C. sheets of reformer (Pent House) were replaced.
	05 Cable trench in Ammonia Control Room for the instrumentation and Data Feeder attended.

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AMMONIA PLANT

ELECTRICAL JOBS

Code No	Description
1 61 01	01 Carried out preventive maintenance of all outdoor current transformers.
	02 Carried out preventive maintenance of all feeder compartments mounted on the following Mccs. Defective parts like busbar supports, lyra contacts, worn out contacts, damaged wiring etc. were replaced. (a) MC.-5 (b) MCC-5A/5B.
	03 Provided electrical power to instrument supply of Ammonia Control Room from MCC-5./5B change over supply.
	04 Carried out the checking and lightening of all motor terminal boxes above 30 HP installed at Ammonia, Urea, Offsites and B&MH Plants.
	05 Overhauled the following motor 121-J
	0 Commissioned 3 Nos. of Motor operated valves in Ammonia Plant.

In addition to above, temporary flood lights, hand lamps with 24-V transformers, switch boards, cables etc. were provided at Ammonia, Urea, Offsites, B&MH wherever were required.

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AMMONIA PLANT

INSTRUMENT DEPTT. JOBS

Code No	Description
1 71 01	01 <u>CONTROL ROOM JOBS</u>
	01 Two panel cutout were made, one for 1400 series Taylor Instruments and another for Antisurge control system Instruments of 101J Air Compressor.
	02 Following Instruments were shifted to new location. FRC-1, FRC-3, TRC-10, HIC-5153, PDFa-26, 34, 36.
	03 Following Instruments recording combined. LR-1 with FR-33 LR-88 with PRCa-25
	04 Provided new manual loader with high selection relay for PRC-18 control valve.
	05 Made a cable trench for data acquisition system.
	06 Made a door gap between control room and operators lockers room.
	07 Shifted voltage stabiliser to new room.
	08 Provided high speed alarm for 102-J.
	09 Calibrated all vibration monitoring panel indicators.
	10 Disconnected/removed and handedover total UPS system including 24 Nos of battery cells to the stores.
	11 General cleaning and checking of all 90J series Instruments was carried out.
	12 Provided manual loader for 101J speed governor.
	02 <u>FIELD INSTRUMENTS JOBS</u>
	01 Provided new moisture trap at the inlet of new Instrument Air Dryer.
	02 Installed new governor positioner for 101J speed control.
	03 PDI 55/53 (Pri-Sec.Reformer pressure drop)
	a) Mounted two transmitters at new location.
	b) Provided new Isolation valve with local PI indicator.

Ammonia(Instrument)

Code No Description

- c) Layed 1/2" S.S. Impulse tubing and 1/4" copper tubing for air supply and output.
- d) Provided local receiver gauge.
- e) Provided Isolation valves im impulse line near transmitter.

04 General overhauling of control valve positioner air regulator, replacing of gland packing and stroke checking of following control valves and same was adjusted wherever it was necessary.

FRCV-1, FRCV-2, FRCV-3, PICV-13A&B, LCV-13, LCV-14, LCV-16, LCV-18, LCV-19, PICV-14, TRCV:-142

05 FICV-12 & 14

Both valves were opened out from the bonnet, seat, plug, stem of FICV-12 was found alright but plug stem of FICV-14 was found slightly bent. Same was made straight in W/shop. Both valves were assembled put new gland packing and checked stroke found alright.

06 PICV-005

Valve was opened out from line. It was completely overhauled. Lapping was also done. Assembled, checked stroke and fixed back in line.

07 PICV-14-17-20

These valves were opened out from bonnet. Due to some passing problem lapping was done, Replaced packing, after general overhauling stroking was checked found okay.

08 TRCV-11

Since the positioner was obstruction in way its position changed by doing some modification at base plate. Checked stroke found okay.

09 MICV-13 to 16 (105D Inlet valves)

Overhauled all the valve positioners.
Replaced glandpacking
Checked all diaphragm
Replaced diaph.of valve No.13 & 15 by new one.

Ammonia(Instrument)

Code NO Description

10 TRCV-142

It was leaking from bonnet. One more gasket was put and tightened. Replaced gland packing, checked stroke. Valve opens full at 5 PSI only.

11 V-7 (MEA Pump Steam Valve)

While opening two Nos of studs were broken. Same removed in workshop. Stroke was not coming even without positioner. So it was adjusted with help of spring tension (positioner is reverse acting). Gland packing was replaced. Finally checked stroke. Now it is alright.

12 Following transmitters were calibrated.

FRC-1, 2, 3, 4, 5, 18, FIC-7, 8, 9, 10, 11, 12, 13, 14, 15, 18,

PRC-19, 23

LRC-4, FR-35, 40, 41

13 117-C & 118-C Thermowell were found punctured - Both replaced by new one.

14 LLA-141

Dearator Extra low level switch was found very much corroded. Replaced by new magnetic assembly.

15 EYE-HYE - Some of the wires insulation was found burnt out. They were replaced by new one.

16 PRC-18 - Old transmitter replaced by newly calibrated transmitter in range 80 to 120 kg/cm². Modified some tubing etc. Output of this transmitter is used for FRC-18 controller.

17 FR-4 - Pilot venturi was opened out for inspection. The tip of the venturi is exactly at the centre of the pipe line. Distance X was measured and found 10.45 inches. Gen.condition was found alright.

18 Vibration jobs on 101J, 102J, 103J & 105J

Most of all the vibration probes were disconnected for bearing inspection work. General condition of probes, Ext.cable, proximator etc. were checked. Gap was also adjusted wherever it was noticed more or less. Same were connected back when Mech. work was over.

Ammonia(Instrument)

Code No	Description
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All Compressors rotor are kept at centre zero while all turbines rotor are kept at extreme end in direction of active thrust.

Logic of following axial point is changed to read all axial probe in Normal while running:

- 101J # 10, 9 & E
- 105J # 10
- 103J # 10 & B

So total rotor Float will be observed in counter only.

19 New Tapping:

Provided some 1/2" nozzles with Isolation valves on N.G. Gas line, steam line and 101J outlet line for Antisurge & Microprocess control transmitters Instrument.

20 A platform near V-18 Extended for mounting of transmitters for Antisurge control system.

21 A perforated tray was prepared and same was welded on M.S. Angles from Air Compressor to FRC-3 transmitter & FRCV-2 Control valve for cable laying purpose.

22 Welded 2" pipe transmitters supports for transmitters mounting.

23 PGR's all process control valves stroke checking was done.

24 General cleaning of important leveltrol controllers was carried out.

25 Replaced some important local panel gauges of 103J lube oil console.

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AMMONIA PLANT

TECHNICAL DEPTT. JOBS

Code No Description -----

1 81 01 REPLACEMENT OF 101JT/105JT EXHAUST LINES
TO 54" DIA PIPE LINES

Existing 36 inches dia steam exhaust line from Air Compressor Turbine 101JT and 42 inches dia exhaust line from Refrigeration Compressor Turbine 105JT to surface condenser was replaced by a 54 inches dia pipe lines along with a expansion bellow which was imported.

A motor operated butterfly valve was also provided in 105JT Exhaust line replacing the existing 42" manual operated butterfly valve.

This modification job was carried out under the various energy saving schemes drawn out at Kalol Unit. The complete job of fabrication; removal of old pipe lines and installation of new lines along with expansion bellow and butterfly valve was awarded to M/s Newtech Engg. The contractor could not carry out the erection work to IFFCO's requirement which enforced our CPI section to take over the job from the contractor and execute the same departmentally. Various catagories of manpower was drawn from different sources and the job was taken up on war footing since this job was on the critical path.

The erection job was completed as schedule enabling restart of the plant in time.

HIGHLIGHTS

This modification carried out at a total cost of Rs 20 lakhs would result in a saving of 4 Ton/hour of steam of 105 kg/cm² resulting in a total saving of 6 Tons/day of Naphtha which is around Rs 40 lakhs/year.

Agencies worked: For Fabrication: M/s Newtech Engg
For Erection : CPI
Manpower Supply: M/s Techno Engg.

1 81 02 Motor operated valves for gas inlet to 101-E Absorber and Steam inlet to 103-JAT.

Existing manually operated valves were replaced by motor operated valves. The entire job was done departmentally.

Ammonia(Technical)

Code No	Description
1 81 03	V-161 Control valve piping in seal oil gas dine. Gas leakage through seal oil from L.P. Case of Syn Gas Compressor (103-J) and N.G. Compressor (102-J) were vented to air. For utilisation of gas mixture from seal oil traps of both the Compressor a system was designed and implemented by Technical Department. The recovered gas is fed into the header of fuel gas system to Primary Reformer. Total gas recovery from both the Compressors is estimated about 642 sm ³ /hr. Total Naphtha saving per year will be 1275 tons/year thereby monetary saving of Rs 27.40 lakhs/year.

Agency: Randhawa Construction Co.

ANNUAL TURNAROUND - 1987

UREA PLANT

MECHANICAL JOBS

Code No Description

2 01 01 CO₂ CENTRIFUGAL COMPRESSOR K-1101/1

Compressor was overhauled departmentally. After opening following were observations.

- 01 Top and bottom halves of casing were found without much rust formation or scaling.
- 02 More deposition were noticed on sealing area of the rotor.
- 03 Condition of the labyrinths, bearings and internals except sealing glands were found okay.

ASSEMBLY:

- Rotor was mechanically cleaned thoroughly.
- Gland seal leak of line and ejectors opened, cleaned and flushed thoroughly.
- Top and bottom casing with diffusers were cleaned mechanically.
- Rotor was put in position and final assembly carried out.
- For casing joint sealing, linseed oil was applied between top and bottom casing.
- Both suction lines were opened, inspected, cleaned, and boxed up.

SPARES CONSUMED

- 01 2 sets of gland sealing labyrinths.
- 02 1 No inter stage sealing labyrinths (No.6 labyrinths from coupling side)
- 03 Inboard and outboard journal bearings.
- 04 Thrust bearing pads (both active and passive)

FINAL CLEARANCES:

- 01 Journal bearing clearance inboard :0.18 mm
- 02 Journal bearing clearance outboard :0.17 mm
- 03 Total float without thrust bearing :3.90 mm
- 04 Axial thrust pads :0.20 mm

OVERSPEED TRIP TESTED = 7150 RPM

Urea(Mechanical)

Code No Description

LABYRINTH CLEARANCE (K-1101/1)

After opening cover on 14.04.87			During assembly of the cover 18.04.87	
0.1	0.15	E	0.10	0.20
1.65	2.65	F	0.15	0.20
0.20	0.35	O	0.20	0.30
0.25	0.30	H	0.25	0.30
0.25	0.30	O	0.25	0.30
0.20	0.20	H	0.25	0.30
0.25	0.30	O	0.25	0.30
0.20	0.20	H	0.20	0.20
0.30	0.30	O	0.30	0.30
0.20	0.25	I	0.20	0.30
0.30	0.35	N	0.30	0.30
0.15	0.30	G	0.15	0.30
0.40	0.30	M	0.40	0.30
0.25	0.35	G	0.25	0.35
0.40	0.50	L	0.40	0.50
0.15	0.20	F	0.15	0.20
0.20	0.20	E	0.20	0.20

RECOMMENDED CLEARANCE:

E = 0.35	0.55	N = 0.95	1.25
F = 0.40	0.60	G = 0.50	0.70
O = 0.85	1.10	M = 1.00	1.30
H = 0.45	0.65	L = 1.10	1.40
I = 0.50	0.70		

2 01 02

DRIVE TURBINE FOR CENTRIFUGAL COMPRESSOR

Q-1101/1

- 01 Journal bearings were opened for inspection.
- 02 Thrust bearings opened for inspection.
- 03 All the lubricating oil lines and governing oil lines were dismantled, cleaned thoroughly and boxed up.
- 04 Power piston assembly of PGPL Governor opened, cleaned boxed up.

Urea (Mechanical)

- Code No Description
- 05 Starting device overhauled.
 - 06 LP, HP relay cylinder bottom cover and inspection covers removed, cleaned, and boxed up after thorough flushing.
 - 07 Governing linkages were lubricated properly.

SPARES CONSUMED:

- 01 In board journal bearing
- 02 Oil level glass of PGPL Governor.

<u>CLEARANCES</u>	<u>BEFORE</u>	<u>AFTER</u>
Journal bearing rear end	0.24-0.25mm	0.18-0.17mm
Journal bearing front end	0.18-0.19mm	0.18-0.19mm
Thrust bearing clearance	0.30 mm	0.28 mm

4 ATA QUICK SHUT OFF VALVE FOR Q-1101/1

Hydraulic operation system of 4 ata quick shut off valve opened, inspected. Proper clearances was made in brass bush which was found with improper clearance. Boxed up after flushing and cleaning.

2 01 03 P.B. CO₂ RECIPROCATING COMPRESSOR (K-1101/2)

- Main bearings were opened and inspected. Condition of the bearings found okay.
- Big end bearings of 3rd stage connecting rod was inspected and found okay.
- Crank case was thoroughly cleaned. Crank case lube oil was reused after thorough centrifuging.
- Coupling pads opened, inspected and replaced by new set of coupling pads of active side only i.e. 45 shores - 16 Nos.

CLEARANCES:

- Main bearing clearance from fly wheel end
 - 1) 0.23 - 0.30 mm
 - 2) 0.21 - 0.20 mm
 - 3) 0.20 - 0.21 mm
 - 4) 0.23 - 0.24 mm
- 3rd stage big end bearing clearance
- Axial float

Urea(Mechanical)

Code No Description

SPARES CONSUMED:

Coupling pads of 45 shores - 16 Nos.

2 01 04 DRIVE TURBINE FOR PB CO2 COMPRESSOR Q-1101/2

- Decoupled.
- Inboard, Outboard journal bearings were opened for inspection, coupling side journal bearing clearances found above normal.
- Thrust bearing opened, cleaned, boxed up.
- Governing oil and lubricating oil lines were opened, flushed, cleaned, boxed up.
- Starting device overhauled.
- Governing valve relay cylinder was flushed, cleaned, boxed up.
- Governing linkages were lubricated.

SPARES CONSUMED: JOURNAL BEARING(COUPLING SIDE)

CLEARANCES:	Before Opening	After Opening
Journal bearing coupling side	0.18-0.19mm	0.15-0.16mm
Journal bearing front end	0.16-0.15mm	0.16-0.15mm
Axial thrust	0.20mm	0.20mm

2 01 05 DRIVE TURBINE FOR AMMONIA PUMP 'A' Q-1102-A

Top half casing lifted and inspected the internals, and checked clearances.

CLEARANCES:

Journal bearing coupling side	: 0.13 mm
Journal bearing Governor side	: 0.13 mm
Nozzle clearance	: 0.057"
Oil guard labyrinth Clearances	{ coupling side 0.0045" - .005" governor side:0.004"-0.005"
Sealing gland carbon ring clearances	{ Steam inlet 0.005" 0.004" 0.005" 0.005" 0.005"
	Exhaust side 0.003" 0.003" 0.003" 0.004" 0.004"

Urea(Mechanical)

Code No Description

Axial float without thrust bearing = 3.35 mm

Gap between coupling hubs = 0.143"

SPARES CONSUMED

- Gland seal carbon rings = 4 Nos
- Journal bearing = 2 "
- Thrust bearing (SKF-6311) = 1 No
- Casing joint sealing = Graphoil tape 1/4" width
- Quick shut off valve, throttle valve overhauled.
- Woodward Governor oil flushed.

Overspeed trip assembly opened, cleaned and assembled.

Overspeed trip = 4600 RPM

Low lube oil trip checked = okay

Urea(Mechanical)

Code No Description

2 01 06 AMMONIA PUMP 'B' P-1102/B

- Coupling between motor and gear box opened inspected, cleaned and boxed up with fresh oil.
- Coupling between gear box and pump opened cleaned, boxed up with fresh grease of MP-2.

2 01 07 DRIVE TURBINE FOR CARBAMATE PUMP Q-1201/A

Opened top casing.
Rotor assembly taken out.
Casing and rotor cleaned thoroughly. Leakage between the casing joints noticed.
Clearance of gland seal, carbon rings found okay.
Journal bearings found okay.
Sealing strips of graphoil 1/4" width was used along with linseed oil for casing joint sealing.
Broken trip finger assembly was repaired by replacing new trip finger strip.
Throttle valve, quick shut off valves overhauled.
Governor drive shaft coupling locking pin was replaced by new one to minimise salckness.

SPARES CONSUMED:

- Graphoil strips of 1/4" width - 1 Roll
- Trip finger strip - 1 No

CLEARANCES:

Journal bearing coupling side 0.12-0.13mm
Journal bearing governor side 0.16 mm
Gland seal carbon rings | steam inlet : 0.0035"
side 0.0035"
0.004"
0.004"
0.004"
exhaust side: 0.0035"
0.0035"
0.0035"
0.004"
0.004"

Overspeed trip - 4600 RPM
Low lube oil pressure trip was checked and found okay.

Urea(Mechanical)

Code No Description

2 01 08 CARBAMATE PUMP 'A' P-1201/A
All bolts of crankcase internals were checked with torque wrench and found okay. Crankcase lube oil replaced by fresh oil, coupling between gear bc and pump was cleaned and lubricated with fresh grease.

2 01 09 DRIVE TURBINE FOR CARBAMATE PUMP 'B' (Q-1201/B)
- Opened top cover.
- Removed the rotor, overspeed trip cup found damaged. Threaded portion machining overspeed trip cup of the rotor was also found damaged.
- Dynamically balanced rotor (Balancing was carried out by our inspection department) assembly along with new over speed cup assembly was installed in turbine casing. Carbon seals were replaced by set of new.
- Quick shut off valve, overhauled completely. Grafoil tape 1/4" width was placed between the casing joints, and linseed oil was also used.
- Throttle valve assembly overhauled.
- After final assembly all tripping arrangements were checked.

SPARES CONSUMED

- Turbine rotor assembly - 1 No
- Over speed trip cup - 1 No
- Gland seal (Carbon) - 1 Set
- Journal bearings
 - a) Inboard - 1 No
 - b) Outboard - 1 No
- Ball bearing (Thrust) - 1 No
- Oil Guard labyrinth - 2 Nos

CLEARANCES:

	Old <u>Rotor</u>	New <u>Rotor</u>
Nozzle clearance	0.082"	0.065"-0.070"
Gap between coupling halves	0.088"	0.090"
(Coupling area) shaft dia	-	50.85 mm
Coupling I.D.	-	50.81 mm

Code No	Description	Urea (Mechanical)	
		Old	New
	Sealing rings	Rotor	Rotor
	a) Set clearances -		1) 0.004"
			2) 0.003"
			3) 0.003"
			4) 0.003"
			5) 0.003"
	b) Set clearances -		1) 0.004"
			2) 0.003"
			3) 0.003"
			4) 0.003"
			5) 0.003"
	Total float with- out thrust bearing	-	0.130"
	Oil labyrinth	0.005"-0.007"	0.0035"
	Journal bearing		
	Inboard	-	0.12-0.13mm
	Outboard	-	0.15mm
	Overspeed trip	--	4600 RPM

GEAR BOX FOR Q-1201/B

Opened top cover of the gear box for inspection of internals. High speed gear with shaft intermediate, gear with shaft, output shaft with gear found okay. All the roller bearings of intermediate shaft and output gear shaft found okay. High speed gear shaft journal bearing coupling side found okay and other end bearing found damaged which was replaced by new one while assembling.

	<u>Coupling end</u>	<u>Other end</u>
High speed shaft journal bearing clearance	0.12-0.15mm	0.12-0.14mm

SPARES CONSUMED:

High speed shaft journal bearing-1 No. Gear Box lube oil replaced by fresh oil.

2 03 01

BUCKET CHANGING MECHANISM M-1401

Bucket changing mechanism column top and bottom bearings were thoroughly lubricated. Mechanism chains were cleaned properly and then lubricated

Urea (Mechanical)

Code No Description

2 03 02 PRILL TOWER I.D. FANS K-1401/1 to 4

Following jobs were carried out.

- 01 Cleaned fan blades with steam and inspected them.
- 02 Removed bearing covers, checked the condition of the bearings. Bearings found okay. Bearings were boxed up after proper cleaning lubricated with fresh grease.
- 03 Alingment of the fan with motor was checked/rectified wherever required.

Existing IAEC make anti corrossion air blower was removed and in its place new SLM Maneklal lobe type Compressor was installed. Suitable bypass pipeline modification was also carried out. Discharge line was fabricated and connected to the old existing discharge line system. Blower was comissioned successfully.

Existing centrifuge connected to lube oil console of centrifugal compressor was removed and in its place a higher capacity new centrifuge was installed with suitable suction discharge line and bottom tray centrifuge was commissioned successfully.

- C.S. 1½" NB 40 schedule seam less pipe - 2 Mtrs.
- C.S. Unions - 1½" size - 2 Nos
- C.S. SORF Flange 1½" x 150 # 2 Nos.
- C.S. 1" NB Seamless pipe 40 shedule - 7 Mtrs.
- C.S. 1" Union Joints - 2 Nos

2 14 01 Steam leaks as per the list were attended.

2 15 01 4 ATA STEAM DRUM V-1501

BOILER INSPECTION BY CHIEF INSPECTOR OF BOILER

Suitable necessary blinds were provided to all inter-connecting pipings including R.V. to hydro-testing of the vessel. Riser cover plates found fallen inside the vessel. All new bolts were tack welded and the plates were refixed in its place.

Hydrotesting of the vessel was done at 11.0 kg/cm² by chief inspector of boilers on 18.4.87. The same day open inspection of the vessel was also carried out by Chief Inspector of Boilers. All the blinds were removed and manholes were boxed up with new gaskets.

Urea(Mechanical)

Code No Description

2 16 01 NH3 FILTER V-1102
Replaced the filter cloth by new one and boxed up with new gasket.

2 16 02 INTER COOLER AND AFTER COOLER SEPERATOR FOR (K-1101/1) - V-1111 AND V-1112

01 INTER COOLER SEPERATOR V-1111
Opened the top cover and removed demister pads. Demister pads were found damaged. Replaced the demister pad by new one. Boxed up after thorough inspection inside the vessel.

02 AFTER COOLER SEPERATOR V-1112
Opened the top cover. Found damister pad badly damaged. D.P. Test was carried out inside the vessel to detect any defect. But found okay. Boxed up after replacing the demister pads by new one.
Inlet nozzle was reported leaking. So complete nozzle was overlapped by one more nozzle made in two pieces. Reinforcement pad also provided extra on the vessel nozzle joint. Material used is S.S.304.

2 17 01 RELIEF VALVES REPAIR/REPLACEMENT AND TESTING

01 By TREVENI Test procedure following relief valves were tested on line.

- 1) RV-1504 9 ATA Saturator : 12.8kg/cm^2
2) RV-1503 23 ATA Saturator : 23.37kg/cm^2

02 Following relief valves were dismantled and assembled after overhauling. Testing was carried out at required pressure:

Table with 2 columns: VALVE and TEST PRESSURES. Lists 10 relief valves and their corresponding test pressures in kg/cm^2 and PSI.

Urea(Mechanical)

Code No Description

2 17 02 REPAIR/REPLACEMENT OF NRVs

- 01 CO2 to HP Stripper (H-1201)
- 02 NH3 to HP Condenser (H-1202)
- 03 NH3 to autoclave (V-1201)
- 04 Carbamate to HP Condenser
- 05 Carbamate to HP Scrubber
- 06 4 ATA steam to desorber.

2 19 01 H.P. CONDENSER H-1202

Top and bottom covers were opened along with inter connected pipings Rashing rings were taken out. Liquid distributor tray and basket were removed. Top gasket seating was inspected and found no corrosion effect.

The previous inspection of H-1202 by M/s Stamicarbon was conducted in April 1986 during planned shutdown. The inspection of that time revealed that unallowed corrossion had taken place to the tubes in two areas of top sheet, more or less opposite to the strip gas inlet nozzle. M/s Stamicarbon personnel advised to plug 28 tubes located in both mentioned areas because of reduction in wall thickness to 1.9 mm or below.

As a possible measure to avoid the observed local corrossion in the tubes M/s Stamicarbon advised to install a S.S. 316L ring of 1753 mm OD x 5 mm thick at 100 mm above the liquid distributor tray on liquid deviding basket to reduce the high gas velocities. M/s Stamicarbon advised to inspect H-1202 after one more year of operation to check whether the taken measure is successful.

On 26-27 April 1987. Stamicarbon personnel conducted the inspection and results are as under:-

RESULTS OF THE INSPECTION:

Using an Eddy current technique the top 1.5 metre of all the tubes was checked for wall thickness reduction.

Wall thickness of 29 tubes found reduced to 1.9mm or below. M/s Stamicarbon advised to plug these tubes as per the procedure adopted to plug 28 tubes during April 1986. 28 Tubes plugged during April 1986.and proposed 29 tubes to be plugged this time is shown in Annexure-I.

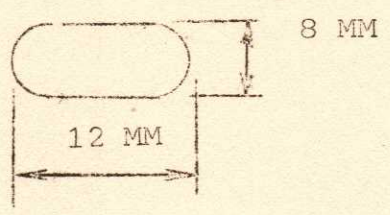
All the tubes with a wall thickness reduction to 2.3 mm or below (shown in Annexure-II) are located opposite the gas inlet.

Code No	Description
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It is observed that the installed ring on top of liquid deviding asket shows no improvement of the corrossion behaviour of the tubes in the affected area. Distance between ring and vessel wall was measured and found to 20-25 mm.

Inspection of the drilled holes in the liquid deviding basket shown a clear difference in shape and dimensions for the affected area and remaining part.

In affected area holes were found oval with dimentionis from 8 to 12 mm.



In remaining part shape was cylindrical dia 8 mm.

As per the recommendations received by M/s Stamicarbon following jobs were carried out. The oval shaped liquid holes located in the affected area was welded by 1915 H electrode and ground flushed. New 8 mm dia holes were drilled at changed positions. The installed ring in April 1986 was extended that way by using additional ring resulting in minimum clearance of 5 mm offer between ring and vertical vessel wall. M/s Stamicarbon advised to inspect the condition of H-1202 during next annual turnaroud planned during 2nd half of 1988.

As per recommendations of M/s Stamicarbon personnel 29 tubes (As shown in Annexure-I) were plugged. On top tube sheet all 29 tubes were drilled to a depth of 30 mm with suitable drilling jig using 25 mm Ø drill bit. Suitable plug made from 25:22:2 Cr.Ni.Mo were welded to plug these tubes using filler wire of 19/15 H. by tig welding. Since no reduction in wall thickness of the tubes in observed in bottom tube sheet portion and drilling was also not feasible, tubes were simply plugged using filler wire 19/15 H by tig welding.

Boxing up top and bottom covers with new gaskets by using hydraulic bolt tensioning device at 500 kg/cm².

Urea (Mechanical)

Code No Description

DRAWINGS ATTACHED

- 01 02 - ES - 05039 Tube plugging details.
- 02 02 - DS - 04052 Tray modification
- 03 Annexure-I showing tubes plugged during April-1986 and tubes plugged during April-1987.
- 04 Annexure-II showing the tubes with wall thickness reduction to 2.3 mm of below.

2 19 02 VESSEL AND TANKS INSPECTION/REPAIR:

- 01 CO₂ KNOCK OUT DRUM V-1101
Opened man-hole for inspection of the demister and its internals. Demister condition was found good. Boxed up the same after completion of painting inside and complete inspection.
- 02 RECTIFYING COLUMN V-1202
Top dished end along with nozzle was taken out. Internals of the vessel was inspected and found everything alright. Boxed the dished end with new gasket. All the steam tracing lines were joined by welding.
- 03 LP ABSORBER V-1203
Top and bottom man-holes were opened and removed rashing rings for inspection. Liquid inlet nozzle on the top was found bent. Nozzle was taken out, provided suitable supports after straightening the bent portion. Vessel was inspected before boxing up the man-holes after refilling the rashing rings. All the gaskets were replaced by new ones.
- 04 23 ATA SATURATOR V-1502
Manhole were opened and boxed up after inspection and cleaning of vessel.
- 05 9 ATA SATURATOR V-1503
Opened the manhole for inspection. Inspected 23 ATA inlet distributors and its supports. Found everything okay. Boxed up the manhole with new gasket after thorough inspection inside the vessel.
- 06 UREA SOLUTION FILTER V-1409 A&B
Opened the top cover. Found filter cloth torn. Minor damage was observed in filter cage and the same was repaired by welding.

Urea (Mechanical)

Code No	Description
07	<u>CO₂ SPRAY COOLER H-1104</u> Spray Cooler sump was drained. After thorough cleaning, inspection of the sump the same was painted with 2 coats of epoxy paint inside the sump.
08	<u>STEAM CONDENSATE TANK T-1501</u> Manhole covers were opened for inspection and cleaning.
09	<u>NH₃, H₂O TANK T-1301</u> Opened the manhole for inspection and cleaning. All inter connecting pipings including drain points were provided with blinds. During whole shutdown period MEA from Ammonia Plant was stored in this tank for isolation purpose of the strippers and CO ₂ Absorber as per Ammonia Plant requirement. All the blinds were removed after the MEA was transferred to Ammonia Plant. Tank was thoroughly cleaned before final boxing up the manholes. One numbers 3" Ø nozzle with flange and isolation valve was provided on the tank for future programme of connecting leak of line of Ammonia Plunger Pump with NH ₃ , H ₂ O Tank.
10	<u>UREA SOLUTION TANK T-1401</u> Manholes were opened for general inspection and cleaning. Bottom plate was found to be uneven. Cavity between tank base and foundation was suspected. But it was decided to fill the cavity by grening from outside the tank surface.
11	<u>FIRST EVAPORATOR SCRUBBER V-1423</u> Opened the manhole for inspection. Removed one piece each of every set of tray and found some clamping bolts missing. Provided new bolts to clamp the trays in position. One demister pad piece was not in its position. So extra clamp was provided to protect it by shifting its position. Minor welding jobs were carried out to weld clits for supports of trays. Boxed up with new gaskets to the manhole.
12	<u>2ND EVAPORATOR H-1424</u> Manhole was opened. Inspected the internals and boxed up.

Urea(Mechanical)

Code No Description

- 13 V-1206
Manhole was opened and same was boxed up after inspection.
- 14 DESORBER V-1301
Top and bottom manholes were opened for inspection.
- 15 CCS - I WATER COOLER H-1206
Cooling Water inlet pipe was removed. Strainer was taken out, cleaned and boxed the strainer and cooling water inlet pipe with new gaskets.

2 20 01 FABRICATION JOBS:

- 01 4 ATA steam header pin hole leak on rack near Urea Control Room. TEE of 16" 40 schedule 1 meter long pipe by 8" schedule pipe with flange was fabricated with suitable reinforcement pad provided on tee joint and replaced in the 4 ATA steam header leakage portion.

MATERIAL CONSUMED:

- a) 16" 40 schedule C.S. pipe - 1 meter long - 1 No
- b) 8" 40 schedule C.S. pipe 300 mm long-1 No
- c) 8"x150 #C.S. SORF Flange - 1 No
- d) Rinforcement pad 10 mm thick - 1 No.

- 02 Replacement of 4 Nos. elbows in steam and condensate lines.

MATERIAL CONSUMED:

- a) C.S. Elbow 90° B.W. - 2 Nos
- b) C.S. Elbow 90° B.W. - 2 Nos.

- 03 On v-1502 relief valve tail pipe direction was changed as desired by production department.

- 04 Direction of relief valve tail pipes of all 3 stages of PB Compressor were changed.

- 05 Passing and damaged isolation valves were replaced by new one in steam lines.

- C.S. 1" x 800 # S.W. Gate valve - 3 Nos
- C.S. 3/4" x 800 # S.W. Gate Valve - 9 "
- C.S. 3/4" x1500 # S.W. Globe Valve - 1 No
- C.S. 1/2" x 800 # S.W. Gate Valve - 4 Nos

Urea(Mechanical)

Code No	Description
06	PB Compressor K-1101/2 3rd stage suction seperator outlet nozzle of 6" NB S.S.-321 40 schedule was replaced by 6" 80 schedule.
07	V-1111, V-1112 Trap outlet pipe were fabricated and were connected to spray cooler sump independently.
08	CO ₂ to H-1203 drain valve 1"x1500 # globe valve replaced be new one and provided suitable supports.
09	Condensate drain out let to spray cooler sump replaced by new one.

MATERIAL CONSUMED:

- C.S. ¾" NB 40 Sch. pipe - 2 mtr.
- C.S. 1½"NB 40 Sch. pipe - 3 mtr.

10 3" NB 6" long S.S. 304 nozzle with S.S. 3" 150 # SORF Flange and 3"x150 # S.S.304 Gate valve provided on T-1301.

11 M-1403

Chute from scraper to M-1403 Conveyor was provided with 20 Nos. 5½"x1½" x 6mm thick angles of suitable width.

12 FABRICATION JOB CARRIED OUT BY CONTRACTOR M/s SMITHA NENGINEERING CO.

(A) 2" NB 40 schedule pipe tappings were taken from supply and return lines of cooling water headers leading to Malathion Plant for proposed new Dry Ice Compressor.

- C.S. 2 NB S.L. Pipe :5 Mtr.
- C.S. 2" 150#SORF Flange :2 Nos
- C.S. 2" NB 150# S.W Gate Valves :2 "
- C.S. 2" NB 40 Sch.90° Elbow S.W. :4 "

(B) 4 Nos. tappings were provided on cooling water header in Urea Plant.

- C.S. 4" NB Sch.pipe :1 Mtr
- C.S. 3" NB 40 Sch.pipe :1 "
- C.S. SORF 4" 150# flange :2 Nos
- C.S. SORF 3" 150# flange :2 "
- C.S. 4" NB 150# flanged Gate Valve :2 "
- C.S. 3" NB 150# flanged Gate Valve :2 "

Urea (Mechanical)

Code No Description

(C) K-1401/2 PRILL TOWER I.D. FAN
Modification was carried out as per drawing No.

Enclosed Drg.No.

Material consumed:

M.S. Plate 5 mm thick: S.S.

M.S. Angle 40mm x 40mm x 5mm =(on)

2 41 01 HEAT EXCHANGER CLEANING

Required end covers along with interconnecting pipings of following coolers were dismantled and same were boxed up after cleaning by high pressure water jetting with new gaskets wherever required.

Hydrojetting job was carried out by M/s Usha Hydro dynamics Ltd., New Delhi.

- i) H-1421 Flash tank condenser
- ii) H-1423 Ist stage evaporator/condenser
- iii) H-1425 2nd stage evaporator/condenser
- iv) H-1426 2nd stage evaporator 2nd condenser
- v) H-1114 Steam Condenser
- vi) Vent Condenser /H-1123
- vii) /Crankcase Lube Oil Cooler of PB Compressor
- viii) Lube oil coolers of Carbamate Pumps P-1201 A/B
- ix) Lube oil coolers of Ammonia Pumps P-1102 A/B

2 41 02 PAINTING JOBS

Prillino tower top area structure, counted walls HP Scrubber structure, LP Absorber Structure, I.D. Fans lift room outside and surrounding walls, spray cooler sump, prill tower room inside upto 2 mtr. height, scraper, scraper wall upto 1½ mtr. height conveyor structure of M-1403 and M-1419 were painted with dark gray epoxy paint.

2 41 03 INSULATION JOBS

Following turbines were insulated with magnesium silicate.

Q-1102/A Ammonia faced pump turbine

Q-1201/A/B Carbamate pump turbines.

Insulation on high pressure piping and other miscellenious pipings were removed for maint. work and were reinsulated after completion of maintenance work.

IFFCO
Kalol Unit

PLANT TURNAROUND - 1987

UREA PLANT
INSPECTION JOBS

Code No Job Description

2 31 01 The following vessels and tanks were opened and offered for inspection in Urea Plant observations are mentioned below:-

01 V-1101: CO₂ KNOCK OUT DRUM:

Visual inspection and thickness measurement are done.

Observations:

- 1) The vessel inside epoxy coating was good except some 3 ft x 10 meters area, where some blister formation in the form of pitting off of the coating was observed.
- 2) Carbon steel frame of the demister pad found to have some rusting
- 3) Condition of demister pad was good.
- 4) Thickness measurement reading recorded.

In general, the shell is in good condition, However the detached painting coat should be reapplied.

02 H-1104: CO₂ SPRAY COOLER:

Immersed portion of shell has been inspected from outside and thickness measurement were done from outside.

- 1) Old epoxy paint has been eaten away by water and rust formation in 1 1/4 meter of shell outside was observed.
- 2) Lot of deep pittings were found in the immersed portion of shell. Depth of big pitting ranging upto 3 mm.
- 3) Water inlet pipe bottom side had some rusting.
- 4) Top and bottom manholes were opened. Entry from bottom manhole was not possible as the rasching ring (packings) were not removed.
- 5) Top compartment shell inside painting was intact.

Urea (Inspection)

Code No	Job Description
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- 6) Demister pad (S.S.) was also in good condition.
- 7) One nut also found loose and an other nut was found missing in the top box type distributor.
- 8) Lot of wooden pieces were found accumulated outside the open box tray in the perforated tray.
- 9) The thickness measurement of the shell was performed. The thickness report is recorded.

In general, the vessel accessible portion was found good. Production people were informed of the above findings.

03 V-1502: 23 ATA STEAM DRUM (SATURATOR):

Visual inspection of internals and thickness measurement of the vessels were carried out from inside the vessels. The observations are as follows:-

Observations:

- 1) Inlet line and its supports found to be in tact.
- 2) Top distributor for steam outlet found to be okay.
- 3) The shell and dish ends assumed blackish brown colouration.
- 4) Steam inlet nozzle (vertical) found to be okay.
- 5) No trace of corrosion/erosion was found.
- 6) All weld joints were found to be defect free including fillet joint of bottom inlet nozzle, with shell.
- 7) The thickness measurement of the shell and dish end were taken from inside the vessels. The thickness report is recorded.

04 V-1503: 9 ATA STEAM DRUM:

Visual inspection of internals and thickness measurement of the vessel were performed. The observations are as follows:-

Observations:

- 1) The shell has assumed reddish colouration after cleaning with wire brush.

Urea (Inspection)

- | Code No | Job Description |
|---------|--|
| | 2) Dust has accumulated in the drum which is required to be removed before box up. |
| | 3) Little amount of milscaling is observed in North side dish end. At two places pitting marks are observed which seems to be since early stage. |
| | 4) Condition of the steam inlet line, condensate inlet lines, shell welds and dished end weld is okay. |
| | 5) The clamp on the steam inlet line at south end is not having nut on one end and loose nuts on the other end, required to be retightened. |
| | 6) In general the vessel condition was good. |
| | 7) Thickness report is recorded. |

05 H-1424: SECOND EVAPORATOR:

TOP:The shell has assumed blackish colouration in around 2 feet length from vapour outlet end. The overall condition of vessel internals is good. North-east side support angle of cone is found with missing nut bolts at the shell end. The general condition of the urea solution side tube bundle tubes inside face seen from top seems to be good.

06 V-1423: FIRST EVAPORATOR SCRUBBER:

The shell has assumed redish colouration. The demister pad pieces are lying in tact in position though a few numbers, of holding clamps were found loose. A few demister pad pieces are seen distorted. All the three sieve trays are of redish colour. A few numbers of fastners of their supports are seen loose. Thickness measurement of shell was carried out.

07 H-1422: FIRST EVAPORATOR:

TOP:The welding of the east and south side cone supporting angles with cone plate are cracked. The inside surface of the tube top portion seems to be free from any corrosion.

08 V-1421: FLASH TANK SCRUBBER:

vessel shell has assumed reddish colouration. Demister pad piece on south side seems to be displaced upwards. The pall ring bed covering netting is observed to be broken by 1 foot length.

Urea (Inspection)

Code No Job Description

09 V-1206: LP VENT SCRUBBER :
The condition of the vessel top is good. Demister pad fasteners and pad pieces are in tact in position. The wire mesh grill above PP Pall rings has got few bolts loose which are required to be tightened.

10 V-1301: DESORPTION COLUMN:
TOP: The trays are in good condition. Tray fasteners are lying tact in position. Little amount of scaling is observed on the south side of shell inner surface as well as on blind nozzle (Approx. 3" size) bottom inner face. The condition of weld joints is good i.e. free from any corrosion.
BOTTOM: The bottom shell of the vessel has assumed brownish red colouration. The bottom tray fasteners, chaplets are in tact in position. No signs of rusting or pitting on the trays as well as shell surface. Thickness measurement readings of shell are recorded.

11 V-1202: RECTIFYING COLOUMS:
BOTTOM: The bottom shell of the vessel has assumed brownish red colouration. The overall condition of the weld joints and shell surface is good. The weld joints of bottom nozzle vortex breaker are also in good condition.
TOP: The vessel top cover was lifted up. The shell inner face has assumed greyish black colouration. The overall condition of vessel internals seems to be good.

12 V-1203: L.P. ABSORBER:
TOP: The top cover of the vessel was opened up. The shell face in the length of around 3 feet from top was accessible on which the colouration/blackish. The condition /is of weld joints is good.
BOTTOM: The shell on the bottom side has assumed dark black colouration. The welding of the pall ring bed supporting ring with shell seems have not been done on south west side.

Urea(Inspection)

Code No. Job Description

13 V-1111: INTER STAGE SEPARATOR:
The vessel was opened. Demister pad was taken out. It was inspected visually. No apparent corrosion or pitting was found on shell surface.

14 V-1112: AFTER STAGE SEPARATOR:
This vessel was also opened and visually inspected. No apparent corrosion or pitting was observed on shell surface and its weld joints.

15 H-1202: H.P. CONDENSER:
Inspection of the vessel including all the tubes in around 1½ meter length from top were inspected by stamicarbon expert. Assistance was provided to the expert for carrying out the inspection. Thickness measurement of S.S. liner was also done. Just above the manhole in around 3 inch length.

16 T-1501: CONDENSATE TANK:
Thickness measurement was done. The readings are recorded.

17 H-1502: VENT CONDENSER:
Thickness measurement done. The readings are recorded.

18 THICKNESS MEASUREMENT OF THE FOLLOWING PIPE LINES WAS CARRIED OUT:

- | | |
|-----------------|--|
| 1) PR-1201-8" | 15) PR-1214-12" |
| 2) PR-1226-2" | 16) PR-1219-8" |
| 3) PR-1230-6" | 17) PR-1223-4" |
| 4) PR-1202-10" | 18) PR-1224-3" |
| 5) PR-1203-8" | 19) GA-1112-6" |
| 6) PR-1204-8" | 20) GA-1203-1" |
| 7) PR-1205-6" | 21) GA-1202-1" |
| 8) PR-1205-8" | 22) Suction line for P-1102 A&B |
| 9) CA-1201-6" | 23) Discharge line for P-1102 A&B |
| 10) PR-1206-6" | 24) CO ₂ knock out drum to CO ₂ cent. comp. inlet. |
| 11) PR-1207-14" | 25) K-1101-1 first stage outlet to separator. |
| 12) PR-1208-4" | 26) From cooler to cent.comp. 2nd stage inlet. |
| 13) PR-1212-4" | 27) K-1101-1 2nd stage separator to P.B. Compressor. |
| 14) PR-1215-16" | |

All the findings during the inspection of vessels, tanks, pipe lines were informed to concerned shift engineer.

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UREA PLANT

CIVIL JOBS

Code No	Description
2 51 01	01 Prill Tower top floor water proofing treatment was provided.
	02 Prill Tower scraper floor slab epoxy injection treatment was done.
	03 Urea Plant ground floors all joints of Mandana flooring was repaired.
	04 Foundation of various pumps were repaired with epoxy plastering.

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UREA PLANT

ELECTRICAL JOBS

Code No	Description
2 61 01	01 Carried out preventive maintenance of all outdoor current transformers.
	02 Carried out preventive maintenance of all feeder compartments mounted on the following MCC. Defective parts like busbar supports, lyra contacts, worn out contacts, damaged wiring etc. were replaced. MCC-6
	03 Carried out the checking and tightening of all motor terminal boxes above 30 HP installed at Ammonia, Urea, Offsites & B&MH Plants.
	04 Overhauled the following motors. 1) M-1402/1 2) M-1402/2 3) P-1124 4) P-1408 5) M-1419 6) M-1403
	05 Replaced the following Push botton stations 1) M-1403 2) M-1419 3) M-1205A 4) M-1205B
	06 Replaced/Repaired lighting fittings installed on all conveyors.
	07 In addition to above, temporary flood lights, hand lamps with 24-V transformers, switch boards, cables etc. were provided.

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UREA PLANT

INSTRUMENT DEPT. JOBS

Code No	Description												
2 71 01	<p>01 Cleaning and calibration of following main panel and compressor panel Instruments.</p> <p>1) All Taylor Receivers</p> <p>2) All Taylor Controllers</p> <p>3) All Taylor Setpoint transmitters</p> <p>4) Air header regulators.</p> <p>02 Cleaning and calibration of following field Instruments.</p> <p>1) Flow transmitters</p> <p>2) Level transmitters</p> <p>3) Pressure transmitters</p> <p>4) Level switch of over head lube oil console.</p> <p>03 Overhauling and checking of following Control Valves.</p> <p>a) HICV-1122: Valve was reported passing. Seat was damaged due to presence of metal piece in the trim area. Replacement of plug and seat was done, also replaced the valve positioner.</p> <p>b) PICV-1128: Valve was opened as operation was sluggish. Checked and found plug was damaged badly. Replacement of plug and seat with internals was done.</p> <p>c) HICV-1201: Valve was suspected passing. Valve was opened and found no damage. Replacement of plug and seat was done.</p> <p>d) LICV-1501: Control Valve gland was leaking badly. Valve was overhauled.</p> <p>04 Cleaning of valve positioner Pilot, stroke checking of following valve was carried out.</p> <table border="0"> <tr> <td>1) HICV-1201</td> <td>7) LCV-1201</td> </tr> <tr> <td>2) PRCV-1201</td> <td>8) PICV-1129</td> </tr> <tr> <td>V/P Replaced due to signal leakage</td> <td>9) FRC-1-1</td> </tr> <tr> <td>3) PICV-1201</td> <td>10) HICV-1121</td> </tr> <tr> <td>4) LRCV-1421</td> <td>11) LCV-1502B</td> </tr> <tr> <td>5) HICV-1422</td> <td>12) HICV-1204</td> </tr> </table> <p>Prill divert</p>	1) HICV-1201	7) LCV-1201	2) PRCV-1201	8) PICV-1129	V/P Replaced due to signal leakage	9) FRC-1-1	3) PICV-1201	10) HICV-1121	4) LRCV-1421	11) LCV-1502B	5) HICV-1422	12) HICV-1204
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V/P Replaced due to signal leakage	9) FRC-1-1												
3) PICV-1201	10) HICV-1121												
4) LRCV-1421	11) LCV-1502B												
5) HICV-1422	12) HICV-1204												

Urea(Instrument)

Code No	Description
05	P.B. Compressor soleniod was suspected not working properly. The solenoid was replaced.
06	Trip circuit of following equipments was checked. a) Centrifugal Compressor. b) Reciprocating Compressor c) Carbamate Pumps d) Ammonia Pumps
07	Calibration of LR-1201 Model III was carried out. Calibration was set at 900 counts to compensate effect of source decay.
08	Checking of Battery charger No.I & II was done. Charger No.III was out of order. It was repaired and kept ready for use.
09	Complete overhauling and checking of FS-1101 the Oval flow meter was done.
10	TR-1133 Inspection of thermowell was done.
11	Oil filling in PRC-1201 impulse line was done.
12	FRC-1201 - The impulse line of transmitter were modified and removed old transmitter.
13	Two new Junction boxes were provided. 1) For Local wiring of P.B. Compressor turbine solenoid 2) For Bearing thermocouples for P.B. Compressor turbine.
14	FRCV-1102A - Location was shifted to common discharge vent consequent upon the installation of new blower. Provided necessary tubing and checked the stroking and operation of the valve.
15	Removed and reinstalled following instruments on centrifugal compressor and Reciprocating Compressor to facilitate machanical maintenance jobs. a) All the pressure gauges b) All the temperature gauges and Bearing and other thermocouples. c) Tachometers d) All the vibration probes.

Urea (Instrument)

Code No Description

- 16 Checking and calibration of vibration system for centrifugal compressor and Reciprocating Compressor was done following probes were calibrated.
 - a) VM-1151 e) AX-1151
 - b) VM-1152 f) AX-1152
 - c) VM-1153 g) VM-1155
 - d) VM-1154 h) VM-1156
- 17 PIC-1128 and PIC-1129 - Two Nos. of Taylor 334 Model Pneumatic transmitters were installed. Modified the impulse lines and output lines as required.
- 18 LRC-1421 Transmitter performance was suspected. Replaced the transmitter.
- 19 Two Nos. of new thermocouples were fixed in the bearing pads of reciprocating Compressor Turbine.
- 20 Replaced the faulty cable for Ammonia Pump trip circuit power supply.

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OFFSITES PLANT

MECHANICAL JOBS

Code No Description

NEW BOILER JOBS

- 01 Annual inspection of new boiler.
- 02 F.D. Fan Turbine bearing check up and clearances measurement. Bearings found okay and clearances within specified limits.
- 03 Oil Cooler cleaning of the F.D. Fan.
- 04 Changed oil of the F.D. Fan clutch both sides. Replaced damaged coupling pad of the turbine side coupling of the F.D. Fan.
- 05 Checked internals and measured clearances of the Regenerative Air Preheater.
- 06 Flushed bearing oil of the Regenerative Air Preheater. Provided 4" Ø tapping with 4"Ø 150 # Gate Valve down the Regenerative Air Preheater in flue gas ducting.
- 07 Gland packing of all valves.
- 08 Repaired or changed passing valves.
- 09 Gland packing of all soot Blowers.
- 10 Repaired damaged refractory and baffle wall.
- 11 Repaired passing super heater safety valve parts used: (a) Spindle
(b) Disc.
(c) Spring
- 12 Gland packing of all soot blowers.
- 13 Cleaning and checking of steam and mud drum.
- 14 Inspection of dearator and its internals.

WATER TREATMENT PLANT

- 01 Replaced damaged acid outlet support of Cation-V and rerubber lined.
- 02 Provided orifice in Raw Water Header near cation Blowers.
- 03 Gland packing of all raw water valves.
- 04 Inspection of D.M. Buffer Tank.
- 05 Replacement of Cooling Water make up diversion line from HDPE to S.S.

Code No Description

COOLING TOWER

- 01 Gland packing of all Cooling Water Pumps.
- 02 Checking and Greasing of sump isolation gate.
- 03 Overhauling of all distribution valves.
- 04 Overhauling of all NRV's
- 05 Overhauling of both discharge valve of pump P-4401 C&D.
- 06 Replacement of corroded bolts of basin drain valve.
- 07 Steam leak job as per production list.
- 08 Q-4401 A casing leaks and steam leaks as per list.
- 09 Q-4403 steam leaks as per list.
- 10 Steam leaks as per production list.
- 11 Inspection of coupling of all cooling water pumps.
- 12 Cooling Water Return Header Strengthening by providing patch.
- 13 Extension of trap drain line for avoiding corrosion.
- 14 Painting of cooling water distribution header.

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OFFSITES PLANT

INSPECTION JOBS

Code No Description

T-3301-B NAPHTHA STORAGE TANK - B

Visual inspection of internals and thickness measurement of the tank were carried out from inside. The observations are as follows:-

- 01 Foam seal joint leak from east side of the tank. (Polyurethane core enveloped in strong woven nylon fabric is damaged).
- 02 Vent with flame arrester one pipe line broken from inside the tank.
- 03 Pontoon found dislocated from its position.
- 04 Pontoon guide rollers are not moving in its guide plates.
- 05 Rolling deck ladder's pully shaft and wheel damaged wheel is not in position.
- 06 Ladder bottom first and second steps are damaged.
- 07 One vent line plate from top of roof bent.
- 08 Roof water drain line rusted and corrosion from inside. It has got lot of rust and debries accumulated which required cleaning.
- 09 Naphtha outlet line welding joint are in good condition.
- 10 Naphtha outlet low level water small weld joint found good condition.
- 11 Inlet pipe with float seems to have got bent towards west side. This resulting in shifting of the float wheels away from the guide track.
- 12 Top roof has got lot of rusting.
- 13 Shell has lot of rust permission.
- 14 Roof has some of the loose milscale which need cleaning.
- 15 Bottom floor dressing rust and mud layer accumulation.
- 16 Pitting corrosion has been found in Naphtha inlet pipe and rain water drain pipe line.
- 17 Roof top has lot of dust and debries accumulation, these need proper cleaning and then painting

Offsites (Inspection)

Code NO Description

18 Thickness report is attached herewith.
Production people were informed of the above findings.

NEW BOILER

01 STEAM DRUM OF NEW BOILER

Visual inspection of steam drum was carried out and following are the observations.

- i) The shell has assumed brownish black colouration.
- ii) The supports of feed water inlet pipe were tact in position. There was no apparent corrosion or pitting on the pipe.
- iii) There was no pitting or corrosion on shell inside the surface.
- iv) Fillet weld of separator as well as all the inlet and outlet pipes fillet weld joints were free from pittings/corrosion.
- v) Thickness measurement of drum shell was performed. The report is attached.

02 MUD DRUM

Visual inspection and thickness test of the drum was carried out. The observations are mentioned below:-

- i) The colouration of the drum was brownish black.
- ii) The inside surface of the shell seems to be free from any pitting/corrosion.
- iii) All the water wall tubes protruding ends in the drum shell were checked from inside and found to be free from corrosion or pitting.
- iv) Shell weld joints were also observed to be free from any corrosion.

Thickness measurement report is attached herewith.

03 D.M. WATER BUFFER TANK IN WATER TREATMENT PLANT (Date of inspection : 21.04.1987)

Spark testing of the vessel rubber line and its hardness measurement was carried out. The rubber line was found to be okay in spark testing. The hardness of the rubber lining was found to be ranging from 65 to 78 shore P-4209/B suction line elbow rubber line was found to have two cracks each of one inch length. DM water inlet line was found collapsed inside the tank which was taken out.

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OFFSITES PLANT

CIVIL JOBS

Code No	Description
3 51 01	01 Bitumastic flooring was provided to the water treatment plant.
	02 All drains and joints of the drains were repaired with epoxy.
	03 Man-hole cover was provided to the cooling water make up tank.
	04 All Cooling Tower risers were filled with sand filling at the excavated area.
	05 Necessary foundations for the new check valves in the cooling tower sump area were provided.
	06 All wooden structures, breaker and spreader were repaired in the Cooling Tower.
	07 BHEL Boiler refractory provided in convection zone and super heater portion.
	08 Naphtha Storage Tank XPM partition made.
	09 Cable trench for the instrument panel and electrical panel for the new tank form room provided.

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ANNUAL TURNAROUND - 1987

OFFSITES PLANT

ELECTRICAL JOBS

Code No	Description
3 61 01 01	Carried out preventive maintenance of all transformers installed at 66KV switch yard and MCC for (a) Checked and tightened all connections at primary, secondary and at incoming of MCC/Switch gear. (b) Replaced the insulating oil in marshalling boxes on primary/secondary of transformers. (c) Reactivated the silicagel in dehydrating breathes of all transformers.
02	Replaced the stop arms and carried out alignment of all poles of 66KV Tie Isolator at yard.
03	Carried out preventive maintenance of all outdoor current transformers.
04	Carried out preventive maintenance of 11KV switch gear (GEC/TMG/Kirloskar) installed at MPSS and replaced worn out/damaged parts and insulating oil. Tightened the busbar connections.
05	Rectified the faulty potential transformer and reinstalled in the system at MPSS.
06	Replaced defective ampere meters on 11KV panels.
07	Provided trip indication and Alarm near Operator Cabin of Urea Cooling Water Pump 1350HP Motor.
08	Carried out overhauling of AMF Set and its busbar chamber and control panel.
09	Carried out modification on all CT Fan and Air Compressor feeder compartments with 400 A busbar contract.
10	Carried out the checking and tightening of all motor terminal boxes above 70 HP installed at Ammonia, Urea, Offsites & B&MH Plants.
11	Overhauled the following motors.
	1) P-4203 2) P-3302
12)	In addition to above, temporary flood lights, hand lamps with 24V transformers, switch boards, cables etc. were provided.

ANNUAL TURNAROUND-1987
OFFSITES PLANT
INSTRUMENT DEPTT JOBS

Code No	Description
3 71 01	<u>BHEL BOILER JOBS</u>
01	<u>BURNER MANAGEMENT SYSTEMS</u>
	01 Checking of internal wiring for BMS panels & Main Control Panel.
	02 Checking of trip interlocks, logic circuits & replaced the defective contactors.
	03 Crimping of insulated lugs on cable terminals.
	04 Calibration of receiver recorder & indicators on Main Control Panel.
	05 Calibration checking of all integrators.
	06 Calibration of square root Extractor, E/P Converter, Receiver Pr Switch & Multipoint Tempr. recorder.
	07 Calibration of receiver Pr.gauges on the main panel.
	08 Annunciators checking.
	09 Draft gauge calibration checking.
	10 Calibration of 'Servotran' Tempr. Indicators.
02	<u>FIELD JOBS</u>
	01 Overhauling of control valve, shut off valves for Burners and stroke checking of these valves.
	02 Removed (2 Analyser, cleaning and calibration & mounted back.
	03 Removed the Target meter, cleaned, calibrated & mounted back.
	04 Overhauling of dampers Greasing and stroking.
	05 Calibration checking of all flow transmitter, level transmitters & their regulators.
	06 Calibration checking of all Pr.transmitters for LSHS service & other services. Flushing of LSHS seal system with steam and refilling of Glycol in the seal-pot.

Offsites(Instrument)

Code No	Description
	07 Replacement of 210 Type Pr.Transmitter with Taylor 300 series transmitter for Master Pressure, necessary change in tubing was carried out.
	08 Calibration checking of Pr.switches for furnace pressure & Ignitor D/P switches. Flushing of Ignitor tapping points, hose & Pr.switch impulse line.
	09 Dearator Level switch checking.
	10 Dearator Level control loop & Pr.control loop checking & calibration of these instruments.
	11 Replacement of 'Eye-Hye' defective Electrodes & cleaning.
	12 Cleaning of flame scanner viewing points & checking the performance of Flame scanners.
	13 Flushing of all Draze gauge tapping.
	14 All other Pneumatic Transmitters, control valves, solenoid valve or calibrated these instruments.
	15 Worked on charger Inverter Battery for UPS System.
	16 LSHS Day Tank - level indicator attended.
	17 F.D. Fan Pr.gauge calibrated.
	18 Replaced the Gasket for Desuperheater control valve and Feed water control valve and stroking of the valve is done.
	19 BFW coil bypass valve gland leakage is attended.

3 71 02 WATER TREATMENT PLANT

01	<u>D.M. PLANT CONTROL ROOM JOBS</u>
	01 All flow recorders are recalibrated.
	02 Defective solenoid valves are replaced.
	03 All Flow integrators are recalibrated.
	04 Necessary wiring modifications were carried out on back of the panel.
	05 Raw water to D.M. Plant recorder taken back in line.
	06 Conductivity meters are checked.

Offsites(Instrument)

Code No	Description
02	<u>FIELD JOBS</u>
01	A new rack has been provided near control room for all the cables coming to control room. A new support also provided for this rack.
02	Raw Water to D.M. Plant - Orifice flanges are welded by Mechanical Department. New transmitter Impulse line tubing, Air supply & Orifice plate are provided by us.
03	All level control loops were checked and all controllers are realigned.
04	Checked the stroking of control valves.
05	Silica Analyser: Complete overhauled and stand is painted.
06	New sample points are provided for SMB for Lab.purpose.
3 71 03	<u>COOLING TOWERS:</u>
01	HICV-5153 = Repairing of Gland & Stroking of control valve.
02	HICV-5154 = Attended the gland leakage & stroke of control valve was checked.
03	Pr.Switch for Lube Oil were checked and Encloser is provided for all the three turbine for cooling water pump.
04	4 Nos. of New Pr.gauges provided on discharge lines of cooling water.
05	Cooling water make up control valve cleaning and checking.
3 71 04	<u>OLD BOILERS</u>
01	PICV-5151 = Control valve gland packing was done and positioner was cleaned. Stroke checking was carried out.
02	Leakage for Boiler feed water control valve attended for Boiler No.2
3 71 05	<u>STORAGE AREA</u>
01	A new 300 series Taylor transmitter is provided for PIC 3101.
02	PHCO-3101 - Pr.swltch is overhauled and checked.
03	Level indicator for Naphtha Storage tank is attended.
04	LSHS Tanks (A,B&C) - Controller, Control valve & regulator complete overhauling is done.

Offsites(Instrument)

Code No	Description
05	ESLV-3101 = Control valve overhauled and checked the performance.
06	Flash cooler leveltrol overhauled, cleaned and calibrated.
3 71 06	<u>AMF SET</u> All Temp. switches and Pr.Switches were recalibrated after cleaning. 2 Nos. of new Pr.gauges were provided.
3 71 07	<u>CHROMATE PLANT</u> Level control for stormwell: Control valve, controller etc. are overhauled for this loop.

ANNUAL TURNAROUND-1987

OFFSITES PLANT

TECHANICAL DEPTT. JOBS

Code No	Description
3 81 01	<p>01 Replacement of check valves and sluice valves in discharge headers of P-4401/A&B and P-4402. 600 mm size check valves and sluice valves in discharge headers of above C.W. Pumps have been replaced by 900 mm motor operated sluice valves and C.S. Fabricated check valves at total cost of 10 lakhs. It has been estimated that due to pressure drop reduction of the order of 0.2 kg/cm²g acrosss the valves, there will be saving to the power cost upto Rs 5 lakhs/year. The 03 Nos. sluice valves with actuators were supplied by M/s Indian Valves Pvt.Ltd., Nasik. The 03 Nos. check valves were designed by Technical Department IFFCO, and fabricated by M/s Triveni Engineers, Ahmedabad. All the six valves were erected at site M/s S.M. Engineers, Ahmedabad.</p> <p>02 Providing 600 mm \varnothing sluice valves in return headers in Ammonia Cooling Towers. The 600 mm size valves replaced from discharge headers of pumps. P-4401/A&B and P-4402 were provided on the return header of Ammonia Plant Cooling Tower (between old & new) for flow control purpose.</p>

ANNUAL TURNAROUND-1987

B&MH PLANT

MECHANICAL JOBS

Code No	Description
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4 02 01	<u>NAPHTHA UNLOADING PUMP P-3301 A&B</u>
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Complete overhauled.

Distance of the top shaft face from the face of coupling half:

Before dismentling : 4.8 mm

After Assembly : 2.00 mm

Clearance of Thrust Collar

Before dismentling : 1.3 mm

After Assembly : 0.030"

GENERAL OBSERVATIONS:

- i) Impeller shaft found 0.08 mm out.
- ii) Top shaft was okay.
- iii) Both shaft found scored at bush area badly.
- iv) Bushes also found scored.
- v) Impeller neck ring and board area found scored badly.
- vi) Lock nut of shaft coupling was found missing, and nut was found loose.

Shaft coupling Marking found okay.

Shaft Marking Bush area found scored.

Spare parts replaced/repared:

- i) Impeller shaft : 1 No
- ii) Top shaft : 1 No
- iii) Shaft inter connecting coupling with lock ring : 1 No
- iv) Mechanical seal (changed to Dura from Crane) : 1 No
- v) Flouro sent bush of bowl : 3 Nos
- vi) Flouro sent seal housing : 2 Nos
- vii) Bearing 7213 : 1 No

REMARKS

The clearance between neck ring of impeller and bowl is observed to be between 0.026" to 0.020", which is more, compared to the required of 0.013" to 0.015" but it is kept as it is in view of the requirement. This will required to change in the next overhauling

(B&MH (Mechanical))

Code No Description

4 02 02 NAPHTHA FEED PUMP P-3302 A&B

Distance of the top shaft face from the face of coupling half:

Before dismentling : 4.8 mm

After assembly : 9.1 mm

Clearance of thrust coolar:

Before dismentling : 0.030"

After assembly : 0.025" to 0.030"

General Observations:

i) Shaft (impeller) found worn off one side deeply at bush positions.

ii) Top shaft key way found twisted.

Spare parts replaced/repairod

i) Impeller shaft

ii) Top shaft

iii) Flouro sent bush of bowl and seal housing.

iv) Mechanical seal

v) Bearings - 7213 W
6208 ZZ

vi) Gun Metal labyrinth (seal ring) of bearing housing.

vii) Shaft lock coupling with lock rings.

viii) Bowl 'O' Rings : 15 Nos

ix) Seal housing 'O' Rings 71-ID, 77-OD.

x) Leak off line 'O' Rings : 2 Nos

REMARKS

i) First suction bowl does not have two nuts of the studs.

ii) Clearance between Gun Metal seal ring and spindle of the bearing housing
0.018"

3.127" - 3.145"

4 03 01 PREVENTIVE MAINTENANCE CONVEYOR JOBS

01 PLANT TRANSFER CONVEYOR M-2110

1) Gear Box overhauled - cleaned and oiling
coupling bush changed rotar and pulley.

Code No Description

- 2) Gravity pulley changed with new bearing 338700062 of 60 Ø bearing
- 3) Return roller : 10 Nos
- 4) Carrying roller : 10 "
- 5) Selfaligning roller frame - 5 Nos. with guide rollers.

02 FRESH UREA SHUTTLE CONVEYOR M-2112

- 1) Gear Box overhauled cleaned and oil changed. Both motor and drum pulley coupling bush changed.
- 2) Return rollers : 6 Nos
- 3) Carrying rollers : 7 "
- 4) Self aligning frame with new rubbers changed : 1 No
- 5) Tail pulley changed - 60 mm bearing.
- 6) Two fastner joints changed to vulcanised joints.

03 CONVEYOR BELT M-2117

Tail pulley changed with new bearings 75 mm Ø

Bearing end were damaged and shaft was out at bearing portion.

04 CONVEYOR BELT M-2121

- 1) Conveyor belt changed. Approximately 75 mtrs. old belt was used, rest is new.
- 2) Head end pulley changed with new bearings and coupling half. Bolts (4 Nos) of coupling between drum pulley and Gear Box changed. All bushes of motor and pulley coupling changed.
- 3) Gear Box oil changed.
- 4) Impact rollers changed : 6 Nos
- 5) Return rollers changed : 6 "
- 6) Carrying rollers : 5 "
- 7) Skirt rubber changed
- 8) Bend pulley changed with old bearings.

Code No Description

05 CONVEYOR BELT M-2122

- 1) Conveyor belt changed completely.
- 2) Skirt rubber changed.
- 3) Gear box overhauled - clean and oil changed.
- 4) Carrying roller changed : 9 Nos
- 5) Return roller : 4 Nos
- 6) Tripper unit gear box overhauled.

4 03 03 SLAT CONVEYOR:

- No.1 (i) Gear box overhauled, worm wheel shaft bearings changed.
- (ii) Tail sproket shaft bearings 2 Nos changed with new. Coupling bush of gear box changed.
- No.4 Gear box overhauled (a) worm wheel, set of oil seals, worm shaft changed. Coupling bush changed. Platform conveyor Gear Box overhaul worm wheel with worm shaft, worm wheel, shaft bearings, worm shaft land, coupling bush changed.
- No.2,3,7,8 Gear Box overhaul coupling bush changed.
- No.7 Sticking machine poles overhauling done.

4 20 01 01 RECLAIM MACHINE:

- 01 Travelling, hoisting, swing gear box oil changed, oil of gear train for elevator and scrapper changed.
- 02 Brake shoe of hoisting changed.
- 03 Coupling of travelling, swing hoisting gear boxes changed.
- 04 Complete greasing is done.
- 05 Link conveyor rollers (idler) changed : 4 Nos.

02 CHUTES

Checked all revolving chutes : 8 Nos.
 changed 5 rollers of revolving chute.
 No.7 checked all rollers and found okay.
 In No.1 revolving assembly bearings were found damaged.
 In rest of the chutes preventive maintenance done.

B&MH(Mechanical)

Code No Description

4 20 02 NEPTHA TANK

- 01 Drain line completely changed with new one and gland packing of all suival joint changed.
- 02 Gland packing of suival joint of suction line of Neptha feed pump changed.
- 03 Suction line put again on supports.
- 04 Vacuum cum breather valve attended. Cleaning and rubber gasket replaced.
- 05 Foam and rubber seal repaired.
- 06 Staircase wheel shaft replaced and wheel bush new fitted. One step replaced with new.

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BAGGING PLANT

CIVIL JOBS

Code No	Description
4 51 01	01 A.C. Sheets for the west side platform were replaced.
	02 Hoppers bolts were grouted.
	03 Silo - Conveyor gantry 17 painted with epoxy paint.
	04 Reclaim machine cabin is repaired.

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B&MH PLANT

ELECTRICAL JOBS

Code No	Description
4 61 01	01 Carried out preventive maintenance of all outdoor current transformers.
	02 Carried out the checking and tightening of all motor terminal boxes above 30 HP installed at Ammonia, Urea, Offsites & B&MH Plants.
	03 Overhauled the following motors. 1) M-2110 2) M-2112 3) M-2122 4) P-3301A
	04 Replaced/Repaired lighting fittings installed on all conveyors.
	05 Commissioned new distribution board provided for Electric Weighing Machines and Air Circulators on Bagging Platform.
	06 Provided vibrators on hoppers at B&MH Plant.
	07 In addition to above, temporary flood lights, hand lamps with 24V transformers, switch boards, cables etc. were provided.

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B & MH PLANT
INSTRUMENT DEPTT. JOBS

Code No	Description
4 71 01	01 All the packer scales control panel were cleaned thoroughly and solenoid valve box is cleaned.
	02 U-Switch modification for bottom flapper is provided for one packet scale.
	03 Air Lubricators are overhauled for all the packer scales.