



**KALOL UNIT**

P. & S. Section  
Maintenance Deptt.

REPORT

ON

ANNUAL TURNAROUND - 1978

( 21st February 1978 - 24th March 1978 )

1978

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REPORT  
ON  
ANNUAL TURNAROUND - 1978

Highlights

To put it plainly DECISION for the shutdown at the particular time is the Highlight of the event.

The Ammonia plant had been stopped at 0345 hrs on 21-2-78 due to failure of ID fan bearing. Thus when on February 21, 1978 it became apparent that repair work of ID Fan would take at least one week's time, the Annual Turnaround which had been earlier scheduled from 18th March, 78 was postponed by a month and started from the same day. i.e. Feb 21, 78. Based on the shutdown commencing from 18th March, we had prepared and circulated the activity list and activity charts. Although most of the preparations were underway, much more was awaiting finalisation. The sudden decision caught us unawares on certain aspects. The jobs had to be completed with utmost speed. Special teams were constituted and despatched to evaluate and decide on the spot regarding purchase of materials, fixing of contractors for manpower, boiler tube replacement, changing of catalysts, hire of mobile equipment etc.

Slowly but with determination the jobs were re-arranged, priorities were identified and planned for execution. The resources at our disposal were harnessed with the single purpose.

The Ammonia Plant which was shutdown at 0345 hours on 21/2/78 swung back to normalcy and ammonia was produced at 0200 hours on 16/3/78. Urea prills cascaded down the Tower at 1210 hours on 25-3-78.

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1. MANPOWER REQUIREMENT

Total manpower in terms of mandays deployed was as under :

(a) Permanent

			<u>Remarks</u>
Technician (Mech)	-	1530 *	
Technician (Ele)	-	680	Each manday of 12 hours
Technician (Inst)	-	710	
Welder	-	410	* Includes Technicians from Phulphur Project
Rigger	-	140	
Mazdoor	-	550	

(b) Hired

M.W. Fitter/Pipe Fitter	-	120
Electricians	-	90
Welder	-	60
Rigger	-	100
Mason	-	40
Carpenter	-	50
Mazdoor	-	6000

2. EQUIPMENT REQUIREMENT(a) IFFCO

65 Ton Mobile Crane	-	1
15 Ton Mobile Crane	-	1
3 Ton Forklift	-	1
2 Ton Forklift	-	1
Truck	-	1
Generator Welding Set	-	5
Transformer Welding Set	-	1
Air Compressor Centrifugal - portable	-	1
Diesel Generator	-	1

(b) Hired

15 Ton Mobile Crane	-	1
3 Ton Forklift	-	1
2 Ton Forklift	-	1
Trucks	-	2

▲ special mention about manpower supplemented by trainees available during shutdown is quite relevant. We had a large number of Bhulphur and Kalol Trainees (Mtec - 48) in various trades. They had been with us for more than one year and accordingly they knew what precious little was required of them. Additional manpower provided by trainees was timely

SOME IMPORTANT JOBS EXECUTED DURING TURNAROUND

Plant	Detail of Work	Period	Party executing the Job	
<u>AMMONIA</u>	1. I.D. Fan-101 RJ			
	a. Metalisation of damaged inboard bearing	8 days	M/s. Gleitlager, Bombay	
	b. Metalisation of damaged shaft journal & machining	6 days	By IFFCO under M/s.L&T Engrs supervision. Job was executed at Elecon works.	
	2. <u>Synthesis Gas Compressor 103J</u>	13 days	M/s. Bharat Heavy Electricals, Services Division Hyderabad	
	Overhauling of LP & HP Compressors & two turbines. This was done for the first time after the installation 4 years ago.			
	3. Turbines of Air Compressor and Refrigerent compressor 101JT and 105 JT overhauling of Turbines		M/s. Bharat Heavy Electricals, Services Division Hyderabad.	
	4. <u>Shift Converter 104 D</u>			
	Removal of old LTS catalysts and charging of the following new catalysts		5 days	M/s. Manhoar Construction co Baroda
	C-18 HC (ZN Cr Oxide) 307 Barrels			
	5. <u>Reformer D1-B</u>	Inspection, measurement & dye-check of catalyst tubes etc and repair of refractory lining		Departmental
	6. <u>Boilers 112C &amp; 101 F</u>	The system was tested at hydraulic pressure		Inspected and approved by CIB Gujarat
	112 - C	12kg/cm <sup>2</sup> g		112 - C 2-3-78
101 - F	125kg/cm <sup>2</sup> g		101 - F 3-3-78	

Plant	Detail of Work	Period	Party Executive Job
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REA HP Scrubber H 1203

Modification job

10 days

M/s. Anup Engg Ltd,  
Odhav AhmedabadStripper H 1201

Removal &amp; cleaning of ferrule &amp; checking of ID of stripper tubes by "PROBOLOG" instrument

3 days M/s. Stamicarbon Specialist  
for check- from France for checking  
ing & 4 ID of tubes. Removal &  
days for cleaning of Ferrules  
assembly departmentalBucket elevators

The existing product screen (M 1414) & bucket elevators (M1413 1 & 2) system was replaced by conveyor belt system. The prill tower conveyor M-1403 was extended by about 11 meters & additional conveyor was installed

1. M-1403

Make Dunlop  
Ply 4  
Width 800 mm  
Extended by 10.8 m  
Capacity normal 55.6 Te/hour

M/s. Konel Corpn, Bombay

2. M-1404

Make Dunlop Rubber Belt  
Ply 4  
Width 800 mm  
Distance between shaft centres 7.3 m.  
Capacity Normal 55.6 Te/hour

Boilers V-1501

System was cleaned, checked & Hydraulic test was conducted at pressure of 12.5 kg/cm<sup>2</sup> g

Inspected & approved on  
2/3/78 by CIB.

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Plant	Detail Work	Period	Party Executing the Job
	Modification of HP Scrubber & additional installation of LP Scrubber & connected pipings.		Modification of HP scrubber done by M/s. Anup's skilled personnel under IFFCO's supervision LP scrubber piping installation done by M/s. Unique Erectors Stanicarbon representative on site for commissioning.

OFFSHORESBoiler No. 1

Removal of existing superheater Primary & Secondary tubes & installation of new tubes supplied by BHEL Trichy 25 days

M/s. Simon Carves  
India Ltd Bombay  
Value 90,000/-

Boiler was tested at a pressure of  $85 \frac{kg}{cm^2}$

Boiler No. 2

Boiler inspection, refractory lining and hydraulic test at a pressure of  $93 \frac{kg}{cm^2}$

Inspected & approved on 3/3/78 & 23/3/78 respectively by CIB

Anion III & IV

Rubber lining of vessel Anion III & IV

M/s. Simplex Rubber Works, Ahmedabad.

B&MHPlant Transfer Conveyor M-2110

Changed conveyor belt

Make : Dunlop  
Ply : 4  
Width : 600 mm  
Distance between shafts : 70 M

Conveyor Belt & Servicing Co, Bombay

Fresh Urea Shuttle Conveyors M-1212 inside silo

Changed conveyor belt

Make : Dunlop  
Ply : 4  
Width between shaft: 219 M  
centre

Conveyor Belt servicing Co Bombay

AMMONIA PLANT  
SHUTDOWN REPORT  
MECHANICAL

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Sr.No. Description  
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A. ROTARY EQUIPMENTS

1. INDUCED DRAFT FAN 101 BJ

a. Fan

Our annual turnaround for the year of 1977-78 was planned from 18-3-78 for 18 days for Ammonia Plant and 23 days for Urea Plant. But it was preponed by one month due to consequent force breakdown on I.D. Fan 101 BJ

On 23rd January, 1978 inboard bearing of I.D. fan was showing very high temperature. On inspection it was found no oil in the pocket of ring oil lubrication system, very little burnt oil was retained and mixed with metal pieces. These metal pieces in the oil was suspected injuring on bearing lining.

As a running maintenance, drain the dirty oil, flushed and poured fresh oil. Again on 1st February, night the same bearing got failed with extensive damage to bearing. Journal portion of the shaft also got scored.

As we had no spare bearing other than a locally remetalised one (Remetalised by M/s. Zenith, Ahmedabad). This was not satisfactory to our desire and did not run for a long time.

Again on 16th February, 1978 the bearing lining failed, the unit was stopped and the locally metalised bearing was installed and it failed.

At last on 22nd February 78, it was decided to repair the journal of the shaft as well as to get good relining from elsewhere. Rotor was sent to M/s. Elecon for machining on 24/2/78 at 0730 hours since no other machine in Ahmedabad can take up that size rotor. Rotor was brought back on 1/3/78 at 0530 hours. The shaft journal was repaired by depositing of spray powder (Roto technic process) under the guidance of L & T engineers and they machined.

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Sr.No.	Description
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We have received the bearing on 4/3/78 at 0800 hours relined by M/s. Gleitlager India (P) Ltd Bombay.

The relined bearing was machined to make proper size in our workshop and then installed. The unit was ready for slow roll on 6/3/78. Bearings were checked again after 4 hours no load running. It was found to have some scoring due to some foreign particles which was flushed out. Found everything alright. It was put into service on 7/3/78 in constant operation.

b. Gear Box

- i. Checked journal bearings.
- ii. Checked gear backlash and endfloat
- iii Checked oil guard clearance
- iv Replaced oil (Tur-77)
- v Cleaned oil cooler
- vi Checked alignment of gear box and turbine.

c. Turbine

- i. Inspected bearings and checked the clearance. Replaced thrust bearing. Clearance O/B journal 0.011" I.B. Journal 0.0085" and Thrust
- ii. Replaced Woodward governor oil
- iii. Checked rotor and stuffing box seals
- iv. Checked over speed trip 5000 rpm.

2. 101 J Process Air Compressor

a. Compressor

- i. Checked the new HP rotor for positioning
- ii Checked alignment
- iii Checked bearing clearance
- iv Replaced bearing for governor fly weight.

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Sr. No. Description

b. Turbine

- i. Checked the rotor
- ii Checked bearing clearance
 

OB	0.006"
IB	0.007"
Axial	0.020"
- iii. Checked over speed trip 7750 RPM, Adjusted to keep a clearance of 0.120"
- iv. checked all seal clearances
- v. Checked alignment
- vi Greased the governor link mechanism and pedestal
- vii Checked clearance of over speed mechanism
- viii Replaced bearing for governor.

3. 103 J Syn. Gas Compressor

During the shutdown, there was an opportunity of about a fortnight from 26-2-78 to 10-3-78 for overhauling the Syn.gas compressor manufactured by Clark Brothers, USA

As per our service contract for the overhauling of high speed and high pressure equipment a team of six technicians and two engineers from M/s. BEEL were called to attend overhauling of this unit.

After removing the piping etc the LP case was brought to workshop, dismantled, checked and replaced the unserviceable parts and reassembled the case and then HP case accordingly. The observations and actions were taken in overhauling both the LP and HP cases are shown separately as under:-

a. LP Cases

- i. Accumulation of dust in the grooves of the gear couplings at either end.
- ii. The turbine side coupling was frozen to the shaft. It got released after considerable amount of force exertion by means of hydraulic press.
- iii. The portion where the coupling fits on the shaft was having a lot of rust marks.
- iv. The radial bearings on either end as well as axial bearing were found in good condition.

Sr.No.	Description
v.	No dowel pins were found in the bearing even mentioned in the drawing. On scrutiny it was found that only one hole was drilled in one housing cover the other was not having even the dowel hole.
vi.	Outer cover of the gas seal was having full of rusted coating.
vii	The outer seal (LP) was found the white metal in good condition.
viii	The inner seal (HP) was found with damaged white metal. The white metal had been scooped out from the steel ring.
ix	All 'O' rings fitted on the seals were found in good condition.
x.	The rust formation to suction side was more than the discharge side seal. But either side of HP seal had lost the white metal.
xi	The labyrinth rings fitted on the seals were found in good condition.
xii	There were 6 nos of steel wires of 1/8" dia and about 6" long were found in bend condition in the side of the peripheral hole. Presumed that the rods were used during the foundry work while casting, which got retained inside by some how.
xiii	The first impeller suction labyrinth was found eroded in some places.
xiv	There was a light polish mark at the back of the 9th impeller.
xv	<u>Replacement of spares</u>
a.	First impeller suction side labyrinth
b.	Balance piston sealing labyrinth. The thickness of the new spare and the old one was checked and found the new one was thicker by 0.25mm. The same was trimmed and then fitted so that after fitting there was no projection inside.
c.	Both the suction side and discharge side seals.
d.	All the 'O' rings and sealing gaskets.

Sr. No.

Description

b. H.P. Case

- i. The portion of the shaft where the coupling gets fitted was found to have the same accumulation of rusty deposition.
- ii The journal bearings thrust pads were found in good condition.
- iii No dowel pins were found even though mentioned in the drawing, moreover there were holes for pins only in one end but the other end was blind.
- iv.
  - a. The inside seal (HP) on both side suction as well as discharge was found in damaged condition. The white metal portion was completely scooped out.
  - b. The intermediate seal (middle) was also found damaged. The white metal had been chipped from one corner.
  - c. The float of the seal was found OK. The 'O' rings were intact though they got pressed. The labyrinth fitted on the seal were in good condition
- v. While pulling out the bundle it was noticed that oil and catalyst dust forming black paste. This was found on all the surface of the bundle.
- vi. The final impeller (8th stage) and the balance drum was having an uniform coating of the catalyst dust varying from 0.05mm to 0.10mm.
- vii The first impeller suction labyrinth was found to have slight erosion on ~~two~~ three places.
- viii Replacement of spares
  - a. 1st impeller suction side labyrinth
  - b. Both suction side and discharge side seals
  - c. All the 'O' rings and sealing gaskets
- ix. Spare labyrinth for 8th impeller suction was found to have more clearance than the old one hence only the old labyrinth was used.

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Sr. No. Description

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- x. One coupling key was found very loose even after fitting the coupling. Made a new key of proper size and replaced. The weight of the new key was kept same as the old one to a void unbalance.
  
- c. 103 JAT Non-Condensing turbine  
 Loosened the nut bolts from steam outlet flanges. Lifted the governor valves manifold and steamchest assembly. Lapped seating by carborandum paste to remove scratch and pitting mark. Rotor was checked found OK. Rectified exhaust isolation valve and its by-pass also. Two nos of screws fixing the inlet diaphragm of the first wheel was found erroded and found in tore condition. New SS one was made and fitted.
  
- d. 103 JBT Condensing Turbine
  - i. Opened the top cover.
  - ii. Cleaned and checked the rotor and all the diaphragms
  - iii. Checked journal and thrust bearing and labyrinth clearances.
  - iv. Checked the complete governing system
  - v. Checked overspeed trip 12000 rpm.
  
- e. Lub and Seal oil console
  - i. Cleaned the oil cooler.
  - ii. Replaced seal oil and lub oil filter
  - iii. On 13-3-78 at the time of starting the unit it was observed that the oil in the console had got brownship in colour. Tested in our laboratory the result obtained as follows:-
 

Viscosity	27.86 centipoise
Moisture	0.25%
Sediment	0.10%

Sr.No.	Description
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Suggested to run Voltamp oil filter for ten days 8 hours a day. Sample taken from the outlet of the filter machine having an excellent result as furnished below

Viscosity	29.84 centipose
Moisture	nil
Sediment	traces

4. Boiler Feed Water Pump 104J/JT

a. Pump 104 J

- i. The portion on the shaft where mechanical seal fits had got scored. Replaced the shaft rotor assembly.
- ii. Replaced both the mechanical seal assembly.
- iii. Both the shaft sleeve for mechanical seal assembly replaced.
- iv. Replaced both journal bearings
- v. Replaced thrust bearing.
- vi. Cleaned oil cooler and replaced oil.
- vii. Cleaned lub oil filter
- viii. Checked and repaired non return valve in the discharge line.
- ix. Checked suction strainer
- x. Checked alignment.

b. Turbine 104 JT

- i. Checked journal bearings
- ii. Replaced thrust bearing
- iii. Replaced carbon seats for both the stuffing box
- iv. Checked the steam inlet nozzle clearance
- v. Replaced the bush of trip throttle valve
- vi. Replaced the oil

Sr.No.	Description
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- vii. Cleaned the oil cooler.
- viii Replaced Woodward governor oil
- ix Checked over speed trip 4300 RPM
- x. Checked alignment

5. 104 JA Boiler FeedWater Pump Standby

a. Pump 104 JA

- i. Checked clearances of journal bearings & thrust bearing
- ii. Replaced both the mechanical seal assembly.
- iii. Replaced shaft sleeve out board mechanical seal.
- iv. Checked and repaired non return valve
- v. Replaced the reservoir oil
- vii. Checked suction strainer.

b. Turbine 104 JAT

- i. Checked all the bearings and replaced thrust bearing.
- ii. Replaced carbon seals of both the stuffing boxes
- iii. Checked oil guards
- iv Replaced reservoir oil
- v. Cleaned the oil cooler.
- vi. Checked trip throttle valve.
- vii Checked over speed trip 4300 RPM
- viii Checked alignment
- ix. Regreased and boxed up the coupling.

6. Turbine for 104 JT refrigerant Compressor

- i. Opened governor assembly.
- ii. Replaced thrust bearing 2 Nos.
- iii. Replaced servo piston 'O' rings

Sr.No. Description

- iv. Cleaned all couplings
- v. Greased all governor mechanism and padastal
- vi. Cleaned seal oil trap.

7. 106 J Quench pump

Rectified casing drain and discharge R.V. which were passing badly.

8. 2004 J D.M. Water storage pump

Made new foundation and replaced the base plate. Realigned with the overhauled motor.

172 JT Turbine for Lub/Seal oil pump

Governor bearing replaced 3 nos

B. Boiler, Reformer and Conversion Area

1. CIB Inspection offered on 2nd and 3rd march 1978 for the following:-

a. 1120 Low Temperature shift converter exchanger

- i. Inspected on 2nd March 78 at Hydraulic test at  $12\frac{1}{2}/\text{cm}^2$

b. 101-F Boiler Drum (GT1632) offered on 3-3-78

- i. Inspected the internals cleaned the inside. Hdraulic test was done at  $12\frac{1}{2}/\text{cm}^2$

- ii Lapped and reconditioned 3 nos R.V.

iii

	North R.V.		Middle R.V.		South R.V.		R.V. Steam Super heat	
	1st time	2nd time	1st time	2nd time	1st time	2nd time	1st time	2nd time
Opened at	112.5	112.5	118.00	117.00	115.00	115.00	111.00	111.00
Rest at	108.5	108.5	112.00	112.00	111.00	111.00	104.00	104.00

iv. Following new valves were welded

- a. PIC 13 A d/s drain
- b.  $3\frac{1}{2}$  header V/S of FRC 2
- c. 103 C inlet and outlet drain
- d. D/S of FRC - 2 drain

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Sr.No.	Description
2	<u>Primary Reformer</u>
	a. <u>Auxiliary Boiler Front End</u>
	i. Baffle wall was cracked on one side and its was tilted in the front side. Made new baffle wall with 6" deep foundation and increased the width of the wall by putting double bricks. ii. Right hand side wall inside the boiler was damaged in several places. New wall made Reinforced the same wall in embating the wall 6" inside the side wall. iii. Patch work was done in several places with air setting mortor and sodium silicate. iv. Made seven new peeping windows with covers v. Overhauled 5 nos of mixed bed fan burners.
	b. <u>Auxiliary Boiler Backend</u>
	i. Made 21 new holes of 15" dia on auxiliary ducting distribution plate to increase the rating of flue gas inlet to convection zone. Originally there were only 32 holes of same sizes. ii. Flooring was done by putting new layer of bricks on the existing refractory bed. iii. Patch work was done by using air setting motor in the walls at the places wherever refractory found damaged.
	c. <u>Radiant Zone</u>
	i. Replaced 10 nos of damaged burner block by putting new blocks supplied by M/s. M.H. Detricks, Calcutta ii. Replaced 4 nos of tunnel slabs as the existing slab were found cracked. iii. Kao wool filling was done in the gaps of wall joints

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Mech- Ann

Sr.No.	Description
iv.	2" thick layer of carborandum and light whytheat was layed at the old flooring inside the tunnel was damaged in three places.
v.	Repaired refractory around burner blocks on the roof in position.
vi.	Three sleeves had fallen down from riser tubes and cracks were found in the welding joints in the rest six. Put back the fallen sleeves in position and welded. Repaired the welding cracks for the rest six.
vii	New insulations was provided at the bottom header of reformer tubes where it was found damaged. The insulation was wrapped in incoly sheets.
viii	Overhauled all 126 burners and renewed 126 gaskets.
ix.	Repaired/replaced chocked and passing valves in the naphtha and automising steamlines to the burners.
x.	Provided pressure gauge tapping in the naphtha lines.
d.	<u>Convection Zone</u>
i.	Tightened the loose dampner plates
ii.	Lubricated dampner bearing and made them easy.
3.	<u>101 D &amp; 102 D Desulferiser</u>
i.	Replaced the gland of isolation valve and vent valve.
ii.	Rectified the passing vent and drain valve.
4.	<u>103 - D Secondary Reformer</u>
	Inspected the air nozzel.
5.	<u>104 - D Shift Converter</u>
	Removed old LTS catalyst and recharged fresh catalyst 294 barrals grade C-134 C Space 58.7M <sup>3</sup>
	<u>106 D Mathenator</u>
	6" Butterfly valve overhauled.

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Mech- Ann

Sr.No.

Description

C. HEAT EXCHANGERS

1. Opened cleaned with wire brush roded by electrical drill and boxed up the following coolers. 127 GA/CB, 128C, 129CJ, 130CJ, 173C, 113 C & 174 GA/CB
2. 116 C Synthesis gas compressor interstage cooler. Replaced the tube bundle.
3. 124 C Synthesis Gas Compressor After Cooler

- i. Replaced the diaphragm
- ii. Plugged following tubes

Two No from Bottom  
top Half

3

7

8

9

Tube No from Compressor Side

2

1

1, 3

1

5 Nos

Pressure test 17  $\frac{\text{kg}}{\text{cm}^2}$ 108 C MEA Solution CentresPressure test 5.5  $\frac{\text{kg}}{\text{cm}^2}$ . Tube plugged from 4th row 14th Nos from 101 E side.D. General

1. Attended all steam leaks.
2. O2 EA/S top solution distributor and distributor and demisters - inspected and repaired.
3. Cut the plate 12" x 12" below PCV 12 and 14 and provided bolted cover to the holes on the platform.
4. 109C (west bottom exchanger) inlet leakage of rich MEA through the weep hole of reinforcement pad. rectified.
5. Inspected CO<sub>2</sub> absorbers, and stripper inlet.

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Sr.No.	Description
6.	Rectified MIC - 11 by pass valve bonnet leak.
7.	PRC 23 damper inspected.
8.	109-F RV replaced.
9.	110 - F tested the R.V.
10	101 - U tested the R.V.
11.	107-F provided one extra R.V. exhausting vessel shifted to new foundation and extended R.V. exhaust pipe upto the vessel.
12.	Cleaned the Restricted Orifices at the liquid ammonia inlet of 125-C and 126C
13.	121-C shell side outlet drain valve bonnet leaks rectified.
14.	Cleaned all ROs on the governor oil lines of 103JAT/JBT
15.	Provided drain valves in place of blind flange on HP/LP cases of 105-J
16.	Removed the box and provided new valve for the sample point at 123 C
17.	Removed box clamp and provided new valve on BFW outlet line from 114-C (quench connector to 1010A/CB)
18.	<ul style="list-style-type: none"> <li>i. Isolation valve gland of PRC 18 leak rectified.</li> <li>ii. TRC-10 sealing steam valve gland rectified.</li> <li>iii Rectified isolation valve gland on 38% steam to NG feed preheater.</li> </ul>
19.	Liner between secondary reformer and 1010 A/B found bulged. With hydraulic jack, it was tried to straightened but could not be doen. Then on the longitudinal seam $\frac{1}{4}$ " dia. S S rod were welded.

AMMONIA PLANT  
SHUTDOWN REPORT  
ELECTRICAL

Sr. No.	Description
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1. MCC-5  
 It was taken up for maintenance. This covers the following :

a. Ammonia Plant

Following important jobs were done.

- i. Maintenance of feeder trolleys.
  - ii. Maintenance of incoming breakers.
  - iii. Maintenance of busbar chambers - cleaning and checking of connections.
  - iv. Check, alignment of lyracontacts
  - v. Replacing damaged melamine bus supports
  - vi. Checking all size 8 contactors and replacing if necessary.
  - vii. Testing of relays and checking trip circuits.
- 2. 112-J Motor checking and terminal connections.
  - 3. Maintenance of Public Broadcasting system.
  - 4. Modification of 2004-J motor foundation bed.
  - 5. Measurement of earth resistance of all motors above 50 HP
  - 6. Taking meaggar values of all motors

-0-0-0-0-0-0-0-

AMMONIA PLANT  
SHUTDOWN REPORT  
INSTRUMENT

Sr.No.	Description
1.	All electronic recorders (Temp. Vibration analyser speed) were overhauled cleaned and calibrated. Also changed the damaged transformer for SR-1 and inking system was modified.
2.	All taylor recording & indicating type receivers and set point transmitters were overhauled and calibrated with standard mercury manometer. Replaced one defective shutter valve for FIC 17 S/P transmitter.
3.	All 'Transcope' controllers were resynchronised after cleaning its flapper, nozzle and booster relay.
4.	Taylor E/P convertors were overhauled and recalibrated plug in system also made alright.
5.	Checked all receiver Pr. switches in C/R found ok.
6.	Checked the receiver pr.gauges and found Ok.
7.	Control room air header filter regulators were overhauled.
8.	All D/P cells were cleaned and recalibrated.
9.	All local receiver and Pr. controllers (440 model) were overhauled and checked the calibration of measuring side-controller side also resynchronised.
10.	All field air filter regulators were overhauled and cleaned. Also thoroughly flushed complete instrument air header.
11.	<u>Fica-15 FIC 9, 10 11</u> Air supply modification was done. Also cleaned V/P & overhauled the hand wheel assembly.
12.	Air supply connection modification for 105-J discharge pr. transmitter was done.

Sr.No.	Description
13.	Overhauled all leveltrols and checked the performance found ok.
14.	Checked and cleaned all local pr. switches.
15.	Checked and cleaned all local level switches
16.	Attended LA. 179 union leakage.
17.	<p><u>PICa 13 A &amp; B</u>            Control valve positioner and relay were cleaned. Also changed the damaged rubber diaphragm for the relay C/V stroking was checked and found ok.</p>
18.	<p><u>FICa-3</u>            Control valve positioner output to diaphragm(through VS-2) tubing size increased from 1/4" to 3/8" hence reduced the full valve opening timing from 35 seconds to 7/5 seconds. Also shortened the route of tubing.</p>
19.	Cleaned all solenoid valves and checked the performance found ok.
20.	Shifted the location of 103-J lube oil switch. one junction box was also provided.
21.	Replaced the thermowell and T/Cof primary reformer TI-1-68 71,72,73 and of secondary reformer TI-1-85
22.	A junction box is welded for protecting relay for 105-J d/p switches. The wiring job is yet to be done.
23.	D.M. Tank level indicator inspection was carried out and found OK.
24.	<p><u>TR 6a-10</u>            Overhauled the control valve and its positioner. Also repacked the front and rear glands and greased its bearings, piping for steam sealing was also modified. Adjusted the stroke of the C/V.</p>
25.	Calibrated PI & PS of 101 BJT in lube oil system.
26.	<p><u>FIC 12 and FIC 14</u>            Both the control valves were completely overhauled, put new locking pins for plug and steam coupling. Also welding was done between plug and plug stem as their threads were found in damaged condition. Cleaned up both the positioner repacked the glands &amp; adjusted the stroke</p>

Sr.No.	Description
27.	Inspected the FIC 7,8,9,10 and 11 pitot verturies, and found OK
28.	Inspected the FRa-40 orifice plate checked its dimensions found OK.
29.	Overhauled and inspected the control valves of LC12,13,14,15,16, 18 and 19.
30.	Inspected and checked the performance of all speed indicators and their pick up probes found OK.
31.	Overhauled all trip switches. After doing the recalibration also checked the performance found OK. Checked all trip system found ok.
32.	Overhauled the FRCa-2- control valve. Also checked it's plug and seat, found ok. Put one welding tag on the junction of plug and plug-stem cleaned up the V/P and repacked the gland. Air supply tubing was also modified.
33.	Overhauled the FRCa-23 damper control valve.
34.	The hand wheel assembly and V/P were cleaned for all control valve.
35.	<u>PIC-13 Pr. Transmitter</u>
	First isolation valve on impulse line - leakage was rectified.
36.	Overhauled the rotameter of Instrument air flow. After cleaning, it was put back on L.T. shift convertor for reduction purpose.
37.	Overhauled the bailey positioner for PRC-9 and MIC-23. Also cleaned their air failure stay on relays.
38.	Plastic bowls were replaced by metallic boards for PRC 9 PRC12 and MIC23 air filter.
39.	Provided one terminal strip for metal temperature T/C of secondary reformer top. Also covered T/C wire swatch PVC flexible condnits.
40.	<u>Inst Air Dryer</u>
	Removed complete quantity of sorbids and alumina balls from both the chambers flushed both the chambers thoroughly with air and removed rust particals. Screened the sorbids and removed the powder and dust. Recharged back both the chambers & level was made up by adding new sorbids. Replaced one defective themowell for TI also checked the heater found OK



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Inst.

Sr. No.	Description
41.	Removed controller/transmitter front plate assembly from LC-20(104E) and interchanged with LC27 on 112 C. The arrangement was done to give high level alarm for 112C level. Laid the copper tubing from 112 C to control room. Mounted a receiver Pr. switch on back of the panel. and 112 C HI alarm was connected to Ann A.
42.	Put new themowell on 104-J for bearing THI.
43.	Removed all vibration probes for 103-J inspected and fitted back. Also checked the vibrations probes for 101-J point No.1,2, & 9 found ok.

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AMMONIA PLANT  
Shutdown Report  
Inspection

Sr. No.	Description
1.	<u>PRIMARY REFORMER</u>
a.	<u>Convection Zone</u>
i.	<u>H.T. Section</u> Refractory, finned tubes and tube supports in good condition.
ii.	<u>L.T. Section</u> Refractory, finned tubes and tube supports Ok.  The support of 3rd Boiler feed water coil from top (towards L.T. Side) was found in broken condition. It was repaired in position.
b.	<u>Radiation Zone</u>  No. of burner blocks had fallen down & some others are likely to fall. In all 10 burner blocks were replaced with new ones.  Riser tube insulation can had fallen down row No. 3, 5 & 7. On closer look it was found that welding of other cans had also eroded. Hence after grinding these were rewelded.  Inconel sheets and strips on bottom header are in bad shape/condition. Due to non-availability of sheets, extra strips were put on header to ensure that sheets remain in position.  Bottom brick work between tunnels is ok except for row no. 2, 6 & 8
c.	<u>Tunnels</u>  Erosion of bottom brick work has taken place in tunnel nos 2, 4 and 9.  Thermowell tips have burned away in 3 cases. In two cases it was found partially in burned state. All need to be replaced.
d.	<u>Weld Examination</u>
i.	<u>Dye Check</u>  In all about 440 butt welds of catalyst & riser tubes were inspected. The actual break up is as follows:-

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Sr.No.	Description
	<p>a. All middle butt welds of catalyst and riser tubes</p> <p>b. 6 numbers top and 6 numbers bottom butt welds in each row.</p> <p>ii. <u>Radiography</u></p> <p>4 numbers field welds of riser tubes were radiographed. No significant defect was observed.</p> <p>iii. <u>Remarks</u></p> <p>a. One pin hole was detected on riser No.1 field weld.</p> <p>b. One pin hole was detected on riser No.7 field weld.</p> <p>c. Cracks detected on last turnaround on top most weld of 21st tube (south side) in 6th row and top most weld on 5th tube (north side) in 8th row have slightly increased in length.</p> <p>e. <u>Creep Measurement</u></p> <p>All riser and catalyst tubes were subjected to this test. In general creep is below 1%</p> <p>f. <u>Ferrite Measurement and Magnetism test</u></p> <p>On the average six tubes in each row were subjected to this test. The ferrite content varies between 0.05 to 0.15%. The tubes are non-magnetic in nature.</p>
2.	<p><u>Vessels</u></p> <p>a. <u>Co2 Stripper</u></p> <p>i. <u>Co2EA (East)</u></p> <p>One bolt hole was found cracked in MEA solution inlet line flange. Number of bolts are missing. The gasket need to be replaced.</p> <p>In distributor 3rd butt weld (from inlet side) bottom portion has erroded. To be grinded and welded.</p> <p>Clamps have fallen away. To be put back in position. The wear plate was partially missing. To be replaced.</p> <p>113CA, 105CA and 111 CA nozzles are OK</p>

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Incp

Sr.No.	Description
ii. <u>CO2 EB (West)</u>	<p>Demister pad has partly broken.</p> <p>Distributor inlet pipe displaced from position. To be put back in position. MEA inlet nozzle gasket missing. To be replaced.</p> <p>Distributor pipe hanging on one bolt.</p> <p>West side wear plate to be tack welded. Clamps to be put back in position. 105 CB, &amp; 111 CB nozzles are ok.</p> <p>In 113 CB nozzle sleeve welding has erroded at one place. This area should be welded again.</p>
b. <u>Steam Drum 101 F</u>	<p>One clamp on separator plate has fallen away to be put back in position.</p> <p>The depth of pittings observed during the last tumaround has not increased.</p> <p>The shell and dished heads are in good condition.</p>
c. <u>Deaerator 101 U</u>	<p>Some bolts and nuts of coverplate of tray section are missing. To be replaced.</p> <p>Vortex Breaker has not been provided in suction line of 104 J/J<sub>in</sub>.</p>
d. <u>CO2 Reflex Drum 103 F</u>	<p>Lots of corrosion and pitting has taken place on the shell of the vessel. Co2 outlet nozzle welding has also been erroded.</p> <p>One of the longitudinal welding seam has corroded. Since this vessel does require post heat treatment. The welding jobs can be done with ease.</p>
e. <u>Raw Gas Separator (102 F)</u>	<p>Indications of pitting and corrosion on the sheel of the vessel are apparent. The gas inlet nozzle (from 106 C) welding has been erroded. To a void post heat treatment on the vessel it is suggested that epoxy paint should be applied on the vessel to check further damage of nozzel.</p>

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Sr.No.

Description

f. 101 E CO2 Absorber

Dimister pad is in good condition. Top nozzle are in good condition. In the bottom nozzle lot of corrosion pitting has taken place. The corrosion and pitting has covered entire circumfrances of the nozzle. But at two places the depth is about 4 to 5mm.

In fact, after this corrosion attack was revealed. It was decided to open the entire line (MEA-1-12") to inspect the other welds. As expected, all the welds in this line had experienced corrosion attack to various degress. All welds were cut and rewelded with back strip in position.

3. MEA Cooler 109 C (Top east)

- a. A deep corrosion pit running along the diameter has been formed. The rough dimension of the pit are width  $1\frac{1}{2}$ " depth  $3/4$ " to 1"

Channel (baffle plate) has been badly corroded.

b. MEA Outlet nozzle

The linear welding to the nozzle has been corroded. The corroded length is 4" circumferentially.

109 C (West)

The repaired welding on the channel has been corroded.

109C (West Bottom)

Main circumferential welding has been corroded at number of places. Number of pits have been found.

On channel number of corrosion pits have been formed. These are opposite to MEA inlet nozzle from 101 E

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AMMONIA PLANT  
SHUTDOWN REPORT  
CIVIL

1.

Sr.No.

Description

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1. Repair refractory in Primary Refomer in the following sections:
    - a) Auxiliary Boiler
    - b) Radiant Zone
    - c) Convection zone
  2. Made new foundation for D.M. Water Pump 2004 J.
  3. Made new foundation to shift the vessel 107 F for modification
  4. Painted silencer of  $\text{CO}_2$  absorber top
  5. Painted hot pipe lines & Coolers.

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AMMONIA PLANT  
SHUTDOWN REPORT

Technical

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Sr.No.	Description
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Following are some of the important jobs

1. UCAP Amine Guard System  
Provided additional tappings in MEA system.
  
2. N.G. line and associated gas lines near the metering station -  
tappings for flare stacks provided.

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UREA PLANT  
Shutdown Report  
Mechanical

Sr. No.	Description
1.	<p><u>CO<sub>2</sub> Centrifugal Compressor</u>  <u>K 1101-1</u></p> <p>a. Front rear and thrust bearings were checked, found normal  b. Compressor to turbine coupling was opened and cleaned.  c. Final discharge separator demister pads were changed.</p> <p><u>Spares Used</u>  SS Demister pads were installed</p>
2.	<p><u>Pignone Turbine</u>  <u>Q-1101-1</u></p> <p>a. Bearings were checked. Front bearing babbitt lining was found damaged. New bearing was installed. The rest was okay.  b. Changed governor oil  c. Cleaned filters  d. Rectified 60 Ata PI tapping leak.  e. Overhead tank was cleaned.</p> <p><u>Spares Consumed</u>  Front Journal bearing 1 No.</p>
3.	<p><u>PE Compressor</u>  <u>K1101-2</u></p> <p>a. <u>First Stage</u></p> <p>i. All cylinder valves changed  ii. All clearance iz between piston to cylinder bore, piston to head crosshead to guide recorded OK.  iii. New wiper packing installed</p> <p><u>Spares Consumed</u>  Valve plates, Damp-r Plates Spring, Wiper Packing set 1 No</p>



Sr.No.	Description
b.	<u>Second Stage</u>
i.	All cylinder valves changed.
ii.	All clearance recorded as in 1st age OK
iii.	<u>Spares consumed</u>
	Valve plates, Damper Plates, Spring.
c.	<u>Third Stage</u>
	<u>Complete overhaul of 3rd stage taken</u>
i.	Piston Rod at Rod Packing
	Area found undersized by 15 to 20 thou. Same rod installed. Liner condition Good. New piston Ring, Wearing pads installed. All clearances recorded.
ii.	Cylinder valves changed
iii.	Rod Packing and wiper packing changed in parts.
iv.	<u>Spares consumed</u>
	Piston ring set, Wearing pads, rod packing, Wiper packing
d.	<u>Crankcase</u>
i.	Crankshaft Axial play checked. OK
ii.	2 Main Bearing inspected. OK
iii.	Other intergap checked and found normal.
iv.	Crankcase oil drained & cleaned. Fresh oil changed.
e.	<u>F F Lubricator</u>
i.	Lubricator sump thoroughly cleaned. Lot of muck was there.
ii.	Sprocket for driving by hand in case of motor failure provided.
f.	<u>Relief Valves</u>
	All the 3 stages RV's checked up for popping/set pressure.
g.	<u>Gear Box</u>
i.	Gear Box cover opened for inspection Found OK
ii.	Bearing arrangement required Working OK now.
iii.	Holset coupling rubbers inspected. OK

Sr.No.	Description
4.	<u>Old Ammonia Pump and Turbine</u> P 1102 and Q 1102 a. Inspected the Crankcase and found everything normal. b. Crankcase oil changed. c. Gear box oil changed. d. Pump manifold valves, RVs changed. e. Governor oil changed. f. Turbine drain valve changed. g. Coupling changed with fresh grease.
5.	<u>Carbamate Pump A and Turbine</u> P 1201 A & Q 1201 A a. Pump completely overhauled. All the plungers, Tie rods, valves, cross heads, Main & crank pin Prg. pulled out for inspection. All found in good condition. Clearance recorded. New oil changed. New plunger packings provided. b. Governor oil changed.
6.	<u>All other Centrifugal Pumps</u> Bearing Housing oil drained, flushed and changed.
7.	<u>Relief Valves</u> a. LP system RV 1202 ABC b. HP system RV 1201 A, B, C. c. K 1101-1 Pignone compressor RV's d. K 1104-2 PB Compressor RV's e. All checked up for pop/Reset pressure.
8.	<u>Caustic Cleaning</u> Caustic cleaning was done in a big way in Urea Plant. The following system have been cleaned. a. Surface condenser H 1114 b. Pignone compressor inter coolers H 1115, H 1112 c. C-W header of PB compressor 1st, 2nd & 3rd stage. d. System I twin cooler - H 1296

Sr.No.	Description
e.	System II cooler -- H 1207
f.	Vent condenser - H 1502
g.	1st Evaporator condenser - H 1523
h.	C W header, coolers and Big housing for all the 3 Worthington Turbine
9.	<u>High Pressure Vessels</u>
	<u>H 1201</u>
	i. HP stripper opened for inspection. All the tube checked by STAC specialists with 'PROBOLOG'.
	ii. About 17 liquid divider assemblies changed because of excessive pitting and depotion.
	iii. New Teflon sleeve provided.
	iv. Bottom cover also opened by tube shut inspection by STAC Men
	<u>H 1202</u>
	HP condenser Top opened up for the repair of the gasket seat.
	The seat welded up by Tig welding and surface finished in position by hand. No tapping done. Joint working OK
	<u>H 1203</u>
	i. HP scrubber modified as per the STAC Drg.
	ii. HP scrubber taken in line.
10.	<u>V 1501</u>
	4 ATA Steam Drum/Boiler - inspected/checked by the Boiler Inspector offered on 2.3.78 approved test pressure at 12.5 kg/cm <sup>2</sup>
11.	Co <sub>2</sub> Knock out drum inspected OK.
12.	All check valves in HP system checked.
13.	HP Ammonia Pump Disch line modification completed.
14.	Ludco plug valves replaced with Globe valves in HP NH <sub>3</sub> line.
15.	NH <sub>3</sub> Pump Disch RV connected to suction.
16.	Vent stack repaired by putting an S S Pipe
17.	All steam leak as tagged rectified.
	OP-Op-Op-Op

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UREA PLANTShutdown ReportElectrical

Sr.No.	Description
1	<p><u>MCC-6</u></p> <p>It was taken up for maintenance. It covers the following area</p> <p>a. <u>Following inplant jobs were undertaken</u></p> <ul style="list-style-type: none"> <li>i. Maintenance of feeder trolleys.</li> <li>ii. Maintenance of incoming breakers</li> <li>iii. Maintenance of busbar chambers - cleaning and checking of connections</li> <li>iv. Checking, alignment of lyracontacts</li> <li>v. Checking connection at transformer end.</li> <li>vi. Testing of relays and checking all trip circuits.</li> <li>vii. Replacing one length of power cable 1 x 800mm<sup>2</sup> from Transformer 7A to MMC end.</li> </ul>
2.	Cleaning and painting of all light fittings.
3.	Maintenance of Public Broadcasting System.
4.	Measurement of earth resistance of all meters above 50 HP
5.	Taking megger values of all meters
6.	Commissioning and trial run of 330 HP Ammonia Pump motor newly installed.

O-p-O-p-O-p-O

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UREA PLANT  
SHUTDOWN REPORT

INSTRUMENTS

Sr.No.	Description
1.	All the temperature indicators (SERVOTRAN) were calibrated.
2.	All the temperature recorders and O <sub>2</sub> recorder were calibrated.
3.	All vibration monitors were calibrated. Replaced the damaged vibration probes by new ones.
4.	<ul style="list-style-type: none"> <li>a. All the hand jack systems of control valves were overhauled.</li> <li>b. The damaged hand jack mechanism of LICV - 1501 were repaired.</li> </ul>
5.	The thermocouple junction box JBII was shifted to 1st floor. Two new cables were laid.
6.	The essential thermocouple heads were replaced with Cast Aluminium heads.
7.	Replaced new orifice plate for FLA 1221.
8.	Replaced 4 ata & 23 ata pressure gauge isolation valves.
9.	LICV 1501 gland packing replaced.
10.	LCV-1502 A bottom split body was replaced as the original body was leaking.
11.	Shifted the location of 4 ata steam discharge pressure switches of carbamate pumps.
12.	PCV-1501 control valve was removed and fixed back after checking its plug seat.
13.	<p>Gas Chromotograph modification was carried out.</p> <ul style="list-style-type: none"> <li>a. Changing of tapping point</li> <li>b. Steam jacketing of the sample line.</li> </ul>

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Sr. No.	Description			
14.	O2 analyser was calibrated.			
15.	Recharging of batteries was completed. All batteries were opened out, cleaned, isolators replaced. Wherever necessary fitted with fresh acid and recharged.			
16.	All Parameter receivers in control room were calibrated.			
17.	All controllers of the receivers were calibrated.			
18.	Pressure switches mounted behind the instrument panel were calibrated.			
19.	The following control valves plug & seat were checked.			
	FRCV 1-1	Plug	OK.	
		Seat	OK.	
	FRCV 1421	Plug	Damaged	Rectified
		Seat	Damaged	Rectified
	PICV 1201	Plug	Damaged	Rectified
		Seat	OK.	
	HICV 1121	Plug	Slight damaged	Lapping was done
		Seat	OK.	
	HICV 1421	Plug	OK	
		Seat	OK	
	<del>FRCV</del> 1201	Plug	OK	
		Seat	OK	
	LRCV 1201	Plug & Seat Damaged Replaced new ones		
	HICV 1202	Plug & Seat Damaged Replaced new ones		
	HICV 1202	Handwheel mechanism has been removed.		
20.	Impulse lines of all pressure switches in compressor area were flushed out and calibrated. All the pressure switches and also trip system was checked.			
21.	<u>Pneumatic Junction Boxes</u>			
	Inspected all the junction boxes, cleaned and greased the fitting for preventing the corrosion.			

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Sr. No.	Description
22.	<u>Air Regulators</u> Overhauled all the field regulators and control room as well as compressor panel air regulators. Instrument air pipe lines are flushed out.
23.	<u>Calibration</u> Overhauled and calibrated all the flow transmitters, level transmitters, pressure transmitters and some pressure gauges.
24.	<u>Control Valves</u> Overhauled the valve positioners made free the AUT/MAN switches cleaned and greased the valve stem and checked valve stroking of all the control valves.
25.	<u>PICV 1201</u> Mounted the air regulator on separate stand because of vibrations.
26.	<u>Instrument Air Line Drain Tappings</u> Provided the drain tappings at various points on all the floors. The two inch drain valves (two numbers) were provided, one in compressor area and second in second floor.
27.	Leak checking of all the pneumatic instruments and junction boxes were attended.
28.	<u>CO<sub>2</sub> Compressors K-1101-1 &amp; 2</u> Calibrated all the pressure gauges and temperature gauges. Replaced them wherever needed.
29.	Carbamate pumps and ammonia pumps P-1201 A/B & P-1102 A/B calibrated all the pressure switches and pressure gauges checked trip systems.
30.	Field controllers were overhauled and calibrated.
31.	<u>FIC 1203 &amp; FICV 1203</u> Changed the old float by new float for the flow range of 0.7 to 7 T/H in Brooke rotameter. Provided new scale. Changed seat & Plug of control valve by modified seat & Plug sent by Stamicarbon.

Sr.No.	Description
32.	<u>FRC 1101 Transmitter</u> Changed mounting location of transmitter and its pipe line route was changed. Made new tubings for impulse lines.
33.	<u>P-1102 B</u> New tubing work was done for oil pressure switches, NH <sub>3</sub> discharge line high pressure alarm switch and transmitter and for recirculation control valve.  a. P-1102 A pressure switch and pressure gauge installed in NH <sub>3</sub> discharge line.
34.	<u>PRCV 1201</u> Changed copper tubes by S.S. Tubes.
35.	<u>Zero Synchronisation</u> Synchronised the zero of all the pressure transmitters with panel indication (in receivers) after the completion of their calibration.
36.	<u>PRC 1201 TX</u> Calibrated and flushed the impulse lines.
37.	Changed air supply valves of the following instruments as the valves were defective.  LIC 1203 TX, LIC 1202 TX PIC 1202 TX
	<u>STAC Modification</u>
38.	<u>LICV 1203</u> Installed the control valve and S.S. tubing done for air supply and signal lines.
39.	<u>FICV 1202</u> Installed the control valve S.S. tubing done for air supply and signal lines.
40.	<u>HICV 1204</u> Installed the control valve S.S. tubing done for air supply and signal lines.



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Sr. No. Description

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- 41. PIC 1201  
New impulse line was provided as the main NH<sub>3</sub> discharge line was shifted.
- 42. All the trip system of new NH<sub>3</sub> pumps were provided.
- 43. All the necessary alarm were provided for new NH<sub>3</sub> pump.
- 44. LIC 1203  
Displacer type level transmitter was installed and purge connections provided with steam and Ammonia Water.
- 45. PIC 1202  
Pressure transmitter installed and steam purge provided.
- 46. FI 1203  
Orifice installed, impulse tubing done between orifice and transmitter.
- 47. TI 1225 TI-1226  
Thermocouples installed, compensating cables laid and converted to multipoint temperature indicator in panel.
- 48. PI 1210 A & PI 1210 B  
2 Nos. pressure gauges with volumetric seal provided on pump discharges.
- 49. Provided motor running lights in the main panel on the following pumps
 

<u>Pump Nos</u>		
a. 1210 A	c. 1304 A	e. 1131 B
b. 1210 B	d. 1304 B	f. 1132 B
- 50. Steam tracing provided for the following
  - a. LIC 1203 displacer chamber
  - b. PIC 1202 impulse line
  - c. PICV 1202 Control valve
- 51. Extension of air header  
Air header at top of prill tower extended by S.S. piping to provide air supply to instruments mounted on LP Scrubber.

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UREA PLANT  
Shutdown Report  
Inspection

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Sr.No. Description

1. H.P. SCRUBBER H 1203

All welding involved or done in connection with Stamicarbon modification work was subjected to Dye Penetrant test.

Apart from above examination, linear and nozzle welds and expansion loop welds were also examined by Dye Penetrant test.

Remarks

A pin hole was detected in one of the butt welds of expansion loop. This was repaired and tested.

2. HP CONDENSER - H 1202

The top dome cladding and welds are subjected to dye penetrant test. Two small cracks and a small length of lack of penetration was detected. These defects were repaired.

The gasket seat and face the top flange were eroded at one place. The metal deposit was subjected to Ferrite measurement test. It was found within limits.

The new sleeve was welded to facilitate tightening of top flange. This job involved two additional butt welds. These welds were subjected to Dye penetrant test. Subsequently 100% Radiography was done on them.

3. STEAM DRUM V 1501

Traces of corrosion was noticed in the shell and dish head. The shell and dish head had a brownish appearance.

Demister pad and grids were found in good condition.

Insp

Sr.No.	Description
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At number of places either nuts were loose or they had fallen away. These should be put back in position.

Thickness measurement was also carried out on shell and dish head.

4. CO2 Spray Cooler H 1104

Denister pad is in good condition. The portion of shell as approachable from top manhole was inspected. It was in good condition.

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UREA PLANT  
SHUTDOWN REPORT  
CIVIL

Sr. No.	Description
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1. Additions and alternation in conveyor belt system (breaking RCC wall & providing opening)
2. Strengthening of support for scrubber (H1203)
3. Bitumastic work of Prill Tower and Prilling room top and floor
4. F.R.P. repairing at scrapper floor.
5. Araldite painting of wall and beam on prill tower top.
6. Painting of HP Ammonia Pump and some other pumps and motors
7. Painting work at Prill Tower top M.S. Structure and chimneys.
8. Grouting of foundation bolts for new HP ammonia Pump (P1102/B) gear box and motor.
9. New concrete supports were provided for Ammonia pipings.

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UREA PLANT  
SHUTDOWN REPORT  
TECHNICAL

Sr.No.	Description
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Following are some of the important jobs done :

1. LP Scrubber  
In terms of STAC drawings, modification and additional pipings were provided. Contractor: M/s. Unique Erectoror.
2. HP NH<sub>3</sub> Pump  
P 110 1/2  
New Pump Hooking up with main line by providing valves was completed.
3. Tappings for STAC modification as per drawings were provided.

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OFFSITES PLANTShutdown ReportMechanical

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 Sr. No. Description  
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COOLING TOWER AREA1. C.T. Fans

- a. As a part of preshutdown job schedule, just before the start of Annual Turnaround all the 9 (nine) fans of Ammonia & Urea Cooling towers had been inspected, degree of angle checked, gear box condition seen and fresh lubricating oil had been charged.
- . C.T. Fan No.2 Gear box was replaced by reconditioned G.B. as oil was leaking from bottom cover of GB.
- b. All Guyrops of Urea side cooling tower fans (3 fans) were replaced by new one.

2. Cooling TowersH4401 and H 4402

- a. An important job on this was hooking up of Ammonia Cooling Tower to new cooling tower (under construction). This was done.
- b. Cooling towers basins of Ammonia and Urea were thoroughly cleaned and drained of water.
- c. Civil repair to the concrete portion where necessary were attended
- d. Damage to woodwork in the C.T. area was also attended.
- e. Area near the sand filter was excavated to attend FRP line for backwashing of sand filter.
- f. Painting of structural steel inside the cooling water submerged area was carried. This cannot normally be done during running plant
- g. All distribution of fan valves were overhauled.

3. C.T. Pump No.1 and TurbineP 4401/1 and Q 4401/1

- a. Pump casing was opened for inspection.
- b. Rotor condition was satisfactory. Rotor was cleaned thoroughly
- c. Non return valve was opened inspected and cleaned.
- d. New gland packings were repacked.

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Sr. No.	Description				
4.	<p><u>C.W. Pump No.2 and Turbine</u>  <u>P 4401/2 and Q 4401/2</u></p> <p>The unit was giving excessive vibration above 5500 Rpm. The following jobs were done on the Turbine (Q 4401/2)</p> <ol style="list-style-type: none"> <li>a. Rotor was changed by a new balanced and repaired one.</li> <li>b. Both under size bearings were changed.               <table data-bbox="446 638 1061 728"> <tr> <td>Bearing clearance</td> <td>0.004 to 0.005"</td> </tr> <tr> <td>Thrust</td> <td>0.010"</td> </tr> </table> </li> <li>c. G.B. Bearings Clearance 0.0055" to 0.006"</li> <li>c. New carbon rings were changed.</li> <li>d. Fresh oil was charged (Turbine 17)</li> <li>e. Oil Coolers were cleaned.</li> <li>f. Filters of oil tank were inspected and cleaned.</li> <li>g. N.R.V. was opened and checked. Condition was satisfactory.</li> <li>h. Quick shutoff valve, throttle valve overhauled</li> <li>i. Governor were overhauled</li> <li>j. Gear box bearings were checked found ok</li> <li>k. Turbine trip speed set at 6500 rpm.</li> </ol>	Bearing clearance	0.004 to 0.005"	Thrust	0.010"
Bearing clearance	0.004 to 0.005"				
Thrust	0.010"				
5.	<p><u>C.W. Pump No.3</u>  <u>P-4402</u></p> <ol style="list-style-type: none"> <li>a. Opened non return valve. Its condition was all right.</li> <li>b. New gland packings were repacked.</li> </ol>				
6.	<p><u>C.W. Pump No.4 &amp; Turbine P 4403 and Q 4403</u></p> <ol style="list-style-type: none"> <li>a. Non return valve was opened and inspected. Originally, of the 4 flappers one flapper was blinded. Another one had given way and fallen down obstructing the third flapper also and kept it in open condition. Accordingly two flappers remained in open position. All broken flappers were repaired by proper fixing of lever arm with flapper by pin arrangement.</li> <li>b. New concrete foundation for lub oil tank and oil pump was provided. The oil tank and pump were shifted. Piping was re-routed to suit the modification.</li> </ol>				

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 Sr. No. Description -----

- c. Gear box foundation was strengthened by concreting.
  - d. Butterfly valve was overhauled and new packing was fitted.
7. P 4401/1
- a. New gland packings were repacked
  - b. New return valve opened, inspected repacked.
8. An isolation valve from C.W. system to after cooler of inert gas compressor was provided. The existing valve was suspected passing.

RAW WATER AREA

1. Raw Water Pumps P 4401 A/B
- a. Overhauled both pumps
  - b. Changed both bearings
  - c. New gland packing was provided.
  - d. NRVS of both pumps were checked cleaned.
  - e. Suction valve of pump A was holding satisfactory.
  - f. Suction valve of pump B was found passing. This was left unattended due to shortage of time.
2. A leak was found on the raw water line from raw water pump discharge sand filter. FRP coating was applied and leak stopped.
3. Raw water line near Fire Pump House was found leaking and this portion was excavated. This could not be attended as the leakage was observed from cover sleeve pipe across the road between raw water pump area and W.T. Plant.
4. Provided jump over from Raw Water supply system to construction line near compressor house.
5. One 4"  $\phi$  isolation valve on raw water supply system near acid storage tank 3 was shifted from underground to above ground. The abstracting structure were all rearranged. More area for movement became available.
6. One 4"  $\phi$  isolation valve was provided for isolating raw water header of W.T. Plant keeping all compressors of effluent pumps and storage area equipments in running condition.
7. One 3"  $\phi$  isolation valve was provided new R.W. header in compressor house so that fire water can be hooked up to supply water to all offsites aries in the event raw water pumps are under maintenance and raw water header in the W.R. Plant is not available.



Sr. No.	Description
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WATER TREATMENT PLANT

1. FRP coating was given on almost all the drains in W.T. Plant.
2. Bitumastic coating was applied in all the remaining area where not done previously.
3. One HCL measuring tank .I was replaced.
4. Cation-I
  - a. Cation had developed a slight tilt and foundation was observed weak. After removing resin it was lifted up, the foundation was concreted and levelled.
  - b. Outlet laterals No.5 and 8 had been earlier blinded. These were repaired.
  - d. Service outlet laterals No 3rd and 9th and 18th were rectified.
5. Cation II  
The valves mentioned below were passing, these were attended.
  - a. C II V<sub>3</sub> Bearing changed
  - b. C II V<sub>18</sub> H and wheel had become loose it was tightened.
6. Cation III  
The valves mentioned below was passing. These were attended as under
  - a. C III V<sub>11</sub> Hand wheel bearing changed
  - b. C III V<sub>4</sub> Pneumatic valve provided.
  - c. NRV of air inlet was passing rectified.
7. Cation IV  
Following jobs were done
  - a. C IV V<sub>1</sub> Hand wheel bearing changed
  - b. Peep glass towards Anion IV was changed.
8. ANION I.
  - a. A I V<sub>1</sub> Hand wheel bearing replaced.

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 Sr. No. Description  
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9. Anion II

- a. A II V<sub>1</sub> Valve was joined made free
- b. A II V<sub>9</sub> Valve was jammed made free

10. Anion III

Damaged old rubber lining was completely removed. New lining was provided. The contract was assigned to M/s. Simplex Rubber Works, Narol, Ahmedabad.

Activity chart and job schedule had been drawn up and circulated and efforts were made to conform to the schedule. Accordingly strict watch was kept on the progress of work by the contractor.

For the contractor's scope of work from Sand blasting to the full curing of new rubber lining a period of 9 days was estimated. The contractor took 15 days for this work. The difficulty during the job related to difficult position of material (provided by party. Raw material like rubber etc did not reach the site as per schedule. However the continuous watch over the progress helped to minimise the time lag.

Rubber lining of Anion involved activities are listed below. The following table throws light on estimated schedule visa-a-vis the actual time taken.

Job No.	Activity	Time	Time in	Remarks
		in Hours Estimated	Hour Actuals by Contra-	
1.	Scaffolding	12	-	Deptt
2.	Opening of Anion, removal of resin	24	24	"
3.	Removal of lateral	12	12	"
4.	Removal of rubber	84	96	"
5.	Shot blasting	24	24	Simplex
6.	Resin coat	24	24	Rubber
7.	Laying of new rubber	72	192	"
8.	Spark test and repair	24	24	"
9.	Filling steam for curing	24	24	"
10.	Half curing	12	12	"
11.	Spark testing & harness test	24	24	"
12.	Full curing	12	12	"
13.	Fixing back laterals PVC welding	36	36	Outside party & Deptt.
14.	Spark test and repair	12	12	Deptt
15.	Resin filling and box up	24	24	"

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Sr. No.	Description
11.	<p><u>Anion IV</u></p> <p>Existing rubber lining was removed and new one provided. The job was assigned to M/s. Simplex Rubber Works, Narol Ahmedabad.</p> <p>Against the period of 9 days estimated the contractor took almost the same as that for Anion II for completion of rubber lining of this vessel. This vessel was required to be put to service before Anion III for the startup of plants and was made ready first.</p> <p>The schedule of activities for Anion III above goes for Anion IV also.</p>
12.	<p><u>P.M.B.I</u></p> <p>a. PMI V<sub>12</sub> Passing rectified.</p> <p>b. Broken laterals were repaired.</p>
13.	<p><u>PMB II</u></p> <p>a. PM III V<sub>4</sub> Diaphragm of valves was changed</p> <p>b. PM III V<sub>9</sub> Made free the wheel.</p>
14.	<p><u>SMB I</u></p> <p>a. Repaired broken laterals.</p>
15	<p><u>SMB II</u></p> <p>a. Repaired broken laterals.</p>
16.	<p><u>SMB III</u></p> <p>a. SM III V<sub>2</sub> Attended the wheel. Made free</p> <p>b. SM III V<sub>6</sub> Diaphragm of valve was changed</p>

STEAM GENERATION

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 Sr. No. Description  
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1. Boilers - 2 Nos

F-5101 A & B

Offered for inspection to Chief Inspector of Boiler Government of Gujarat.

a. Boiler No.2

Test Pressure	93 $\frac{1}{2}$ /cm <sup>2</sup> g
Date	3-3-78

b. Boiler No.1

Test Pressure	85 $\frac{1}{2}$ /cm <sup>2</sup> g
Date	23-3-78

2. For Both Boilers

- i Put blinders to isolate boiler from main steam header, blow down header, feed water header gas lines etc. Removed boiler mountings.
- ii Opened the manholes of furnace air heater, air duct and cleaned thoroughly the tubes of furnace.
- iii. Opened manholes of steam and mud drum, cleaned mud drum, boiler drum and its internal.
- iv. Repaired refractory lining.
- v. Cleaned all burners, checked relief valves safety valves of steam drum and superheater. Lapped seats of the valves properly. The valves were tested at the rated pressure.
- vi Attended steam leaks jobs as per the list.
- vii Steam test of Boiler No.2 was given on  
The pressure settings of safety valves were as under:-

	<u>Popping pressure</u>	<u>Reset Pressure</u>
For safety valve	71.2	70
Rear safety valve	70.0	69
Superheater safety valve	67	65

- viii Cleaned Deaerator tank cleaned the head and checked thickness checked all trays.
- ix Both the nozzles of attemperator springs were inspected found ok.

Sr. No. Description

3. Super Heat Coils of Boilers

- a. It had earlier been decided to hand over the work of replacement of Primary and Secondary Superheater coils of both boilers to M/s. ISGEC John Thompson of Calcutta. The boiler tubes ( $1\frac{1}{2}$  CR  $\frac{1}{2}$  MO) had been received in stores from BHEL, Trichi, Madras. They had been duly inspected. As the shutdown was preponed by a month and the work had to be started immediately a sufficiently advance intimation demanded by IJT could not be given and they declined to accept the job at a short notice. Alternatives were considered and it was decided after detailed discussion to change the tubes of one boiler only and award the work to M/s. Simon Carves India Ltd.
- b. We had estimated a period of 18 days for the job to be over completely. It took 26 days from 26/2/78 to 24/3/78. We were perhaps too optimist with regard to the welding part of the job. We had given 5 days for the welding of all the coils while it took exactly  $12\frac{1}{2}$  days (1800 hours on 10-3-78 to 0300 on 23/3/78).
- c. Boiler No.1 was offered for inspection to Boiler Inspector. It was tested at a hydraulic pressure of  $85\frac{1}{2}$  /cm<sup>2</sup>

Scheduled activities for replacement of superheater coils had been prepared and circulated and it was discussed with Simon Carves India Limited. This is indicated below:-

Sr. No.	Activity	Time in hrs estimated
1.	Removal of lagging from side walls	6
2.a	Removal of plates	24
b	Removal of refractory of side walls	6
c.	Removal of steam headers	24
d	Removal of soot blowers & Plates for refractory	12
e	Removal of FD Fan ductings, platforms etc	12
3.a	Separate Pr. & Sec. manifolds from existing coils	24
b	Remove Pr & Sec. manifolds from position	4
4.a	Make platform to pull out old coils	12
b	Remove coils after cutting of tubes	72
5.a	Cleaning of superheater zone area	12
b	Patching of refractory of bank tubes	8
6	Arrangements for inserting new coils	16
7	Inserting of new coils & refractory in between tubes	120/300
8	Putting Primary & Secondary headers in position	8
9.a.	Welding of tubes with Pr & Seco headers	96
b	Radiography for weld joints	48
c	Putting of soot blowers in position	12
d	Welding of main headers	24
10	Hydraulic pressure test & Inspection by CIB	24

MODIFICATIONS

1. Flue gas analysis sampling point at boiler No.B has been provided as desired by Tech Department.
2. Provided a jump over 40mm Ø to supply drinking water thru fire pump on raw water supply system near Fire Pump House at first hydrant point.
3. Provided a jump over from raw water supply system to construction line near compressor house.
4. One 4" Ø isolation valve on raw water supply system near acid storage tank No.3 was shifted above ground. The obstructing structure was rearranged and more space for movement is available.
5. One 3" Ø isolation valve has been provided near raw water header in compressor house, so that fire water to all offsites auxiliaries, in case raw water pumps are under maintenance and raw water header in W.T. Plant is not available.
6. One isolation valve from cooling water service system to after cooler of I.G. Compressor has been provided as the present valve was suspected passing.
7. One isolation valve 80 mm Ø has been provided at downward of after cooler of instrument in Compressor so that cleaning of aftercooler can be done with two other Compressors in running condition.
8. One isolation valve 80 mm Ø has been provided at the bottom of drain of sludge tanks in chromate removal tanks instead of blind provided earlier.
9. Instrument air line tapping ½" Ø taken for additional mix bed units
10. Provision to hook up HDPE pipeline for weak effluent disposal pipe was made
11. Provision to hook up SPC outlet with degaser was made
12. One orifice has been provided to meter the D M water inlet to deaerator.
13. In F.D. fan turbine No.1 (Q 5101/1) perviously 6 + 2 overload nozzles were there. Tow of them (1st and 2 no) were plugged to reduce steam consumption Now 4 + 2 (overload) nozzles are there.

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Mech

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Sr. No.	Description
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j. F.D. FanF.D. Fan Turbine Q 510 1/2

a. Cleaned oil coolers filoters strainer etc.

6. Steam & Valve leaks

Attended the leaks tagged.

7. Steam Leaks

Some of the important steam leaks attended were as follows:-

- a. Superheater drain valves bottom one of both the boilers (one in each) were replaced by new one.
- b. Soot blower drain valves of both the boilers were replaced by new one
- c. By pass valve of soot blower main steam valve of boiler no.2 was replaced.
- d. Soot blower main steam valve glands were repacked of both the boilers
- e. Attemperator gaskets (Elliptical) claded types of Boiler No.2 replaced
- f. Superheater vent valve of boiler No.2 replaced by new one.
- g. Retractable type soot blower No.1 of boiler no.1 was overhauled.

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OFFSITES PLANT  
Shutdown Report  
Electrical

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Sr.No.	Description
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1. 66 KV Switch yard maintenance  
 It was taken up for maintenance. It covers the entire plant.  
 Only emergency power was provided thru AMF set.  
 The following jobs were done.
- i. Cleaning of transformer bushings.
  - ii. Cleaning of bus support insulators
  - iii. Maintenance of all isolators
  - iv. Cleaning of OCB and testing and replacing of oil.
  - v. Testing of all protective relays & checking trip circuits.
  - vi. Cleaning and painting of PTS and OCBS
  - vii. Maintenance of 11 KV switch gears in 66 KV switch room.
  - viii. Replacing bottom valves of OCB tanks.
  - ix. Maintenance of CRP panel.

2. MPSS
- i. Maintenance of 11 KV Panels
- The following jobs were done
- a. Opening busbar chambers, cleaning and connection checking.
  - b. Replacing oil of all breaker tanks.
  - c. Testing of all relays and checking trip circuits.
  - ii. Rectifying healthy trip circuit defect of MCC-5 breaker.
  - iii. Fresh charging of MPSS battery after discharging.
  - iv. Maintenance of battery charging panel
  - v. Modification of speed control cap tightening arrangement.



Sr. No. -----  
Description -----

3. MCC-1

It was taken up for maintenance. It covers the area as under.

1. C.T. Area
2. Drinking water sumps
3. Canteen
4. Fire & Safety
5. Security Office.

The following important jobs were done

- i. Maintenance of feeder trolleys.
- ii. Maintenance of incoming breakers.
- iii. Maintenance of busbar chambers - cleaning and checking of connections.
- iv. Checking, alignment of lyracontacts and replacing damaged melamine bus supports.
- v. Checking connection at transformer end
- vi. Modifications in the control circuit of N/E change over panel.
- vii. Testing of relays and checking of trip circuits.

4. M.C.C.2

It was taken up for maintenance. It covers the areas as under :

1. Compressor Area
2. W.T. Plant
3. Workshops - Mechanical and electrical
4. Stores
5. Training Centre
6. Inspection office
7. Workshop Offices
8. Technical building.

Sr. No.	Description
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The following important jobs were done.

- i. Maintenance of feeder trolleys.
- ii. Maintenance of incoming breakers
- iii. Maintenance of busbar chambers - cleaning checking of connections etc
- iv. Checking, alignment of lyracontacts and replacing damaged melamine bus supports
- v. Checking connection at transformer end
- vi. Testing of relays and checking trip circuits

5. MCC-2A

It was taken up for maintenance. It covers the Boiler Area.

The following jobs were done.

- i. Maintenance of feeder trolleys.
- ii. Maintenance of incoming breakers.
- iii. Maintenance of busbar chambers - cleaning and checking of connections.
- iv. Checking, alignment of lyracontacts
- v. Replacing damaged melamine bus supports
- vi. Testing of relays and checking all trip circuits.

6. MCC-2B/2E

It was taken up for maintenance. It covers the following area.

1. W.T. Plant.

Following important jobs were undertaken :

- i. Maintenance of feeder trolleys.
- ii. Maintenance of incoming breakers.
- iii. Maintenance of busbar chambers, cleaning and checking of connections.
- iv. Checking, alignment of lyracontacts.
- v. Replacing damaged melamine bus supports.

Sr.No.	Description
7.	<p><u>MCC-7</u>            Taken up for maintenance. It covers following area</p> <ol style="list-style-type: none"> <li>1. Administration Building.</li> </ol> <p>The following jobs were done.</p> <ol style="list-style-type: none"> <li>i. Maintenance of Transformer and distribution panels.</li> </ol>
8.	<p><u>MCC-8</u>            It was taken for maintenance. It covers the following area</p> <ol style="list-style-type: none"> <li>1. A.M.F. Set</li> </ol> <p>The following important jobs were done.</p> <ol style="list-style-type: none"> <li>i. Maintenance of feeder trolleys.</li> <li>ii. Maintenance of incoming breakers.</li> <li>iii. Maintenance of busbar chambers - cleaning and checking of connections</li> <li>iv. Maintenance of AMF set and its control panel.</li> </ol>
9.	130 HP motor flushing and checking of bearing condition.
10.	New termination cables for lube oil pump motor of 350 HP motor
11	300 HP BFW motor overhauling.
12.	Measurement of earth resistance of all meters above 50 HP
13.	Taking megger values of meters.
14.	Maintenance of public broadcasting system.
15.	Providing new earthing connection for effluent pumps

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OFFSITES PLANT

SHUTDOWN REPORT

INSTRUMENTS

Sr.No.

Description

1. BOILERS

i Panel Instruments

- a. All recorders, set point transmitters and controllers were taken out one by one. Its general cleaning of flapper, nozzle, restriction and various parts were carried out checked calibration, adjustment was done wherever it was necessary.
- b. All computing, derivative, ratio and summation relays were also taken out one by one. After general cleaning its calibration was carried out and fixed it back.
- c. Air filter regulators of main air header in control room were removed, overhauled and fixed back. One complete regulator set was replaced by new one.
- d. Removed all panel receiver gauges and speed indicators calibrated and fixed back.
- e. Overhauled all temperature indicators recorders and calibrated.

ii. Peabody Panels

- a. All twelve block valves were removed from line, overhauled completely checked throughly and fixed back.
- b. All solenoid valves for gas block valves and oil shut off valves, cleaned, tightened all connections in junction box.
- c. Provided extra low drum level and low oil pressure indication in control room Peabody panel.
- d. All relay trays were taken out and general cleaning was carried out. Some important trip relays were replaced.
- e. Provided d/p cell and receiver pressure switch in place of low air direct acting pressure switch.
- f. Extra low drum level switches were removed cleaned contact etc and put back replaced.
- g. Replaced impulse lines of both low oil pressure switches by  $3/8"$   $\phi$  S.S. tube and filled new glycol.

Sr.No.

Description

h. Cleaned air and gas orifices of all ignitors.

iii. PICV-5151

This valve was opened out from bonnet and brought to the instrument workshop for inspection purpose. Following jobs were carried on it.

- a. Stem and plug was rewelded as welding was found cracked.
- b. Replaced bottom guide bush
- c. Replaced grease nozzle
- d. Overhauled valve positioner and replaced gauges
- e. Gland was packed with graphited asbestos reinforced by S.S. wire.
- f. Checked complete stroke and fixed in line after painting.

While putting in line at low load valve was not opening from its rest position due to tight shut off. So plug was replaced by new one and about 1/16" gap bet plug and seat was adjusted by taking plug up for smooth operation of valve while putting in line.

iv. Field Instruments

- a. Overhauled all air filter regulators and air shut off valves. Supply gauges and filters were replaced wherever it was necessary.
- b. Calibrated both oil flow transmitter and filled new glycol. Stem tracing tube replaced for transmitter No.1.
- c. BLR-1 three element level transmitter's manifold modified with 3/8"  $\phi$  S.S. tube and valves. Both transmitters were calibrated.
- d. Both feed water control valves were removed, completely overhauled, replaced gland packing, painted and stroke was checked after fixing in line.
- e. Feed water flow transmitter 2/3 model of Boiler No.2 was replaced by 303 D/P transmitter and calibrated for 100" h<sub>2</sub>O. Spare gas flow S.Q. root. Extractor used for feed water flow and retubing was done. F.W. flow transmitter of to BLR-1 calibrated and found OK

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Inst

Sr.No.	Description
f.	De-superheating control valve of boiler No.1 was taken out and following jobs were carried out.
i.	Body threads were found worn out so it was rethreaded
ii.	Plug was replaced
iii	Gland packings were replaced
iv	Body was rewelded in line and stroke was checked.
g.	De-superheating control valve of BLR-2 was also taken out all parts were found alright. Gland packings were replaced fixed in line and checked stroke.
h.	14 ata control valve removed, overhauled, fixed back and checked stroke.
i.	Both air flow D/P transmitters general cleaning was carried out and calibrated in field. LP impulse line routing of transmitter No.2 was changed.
j.	Master pressure transmitter & 40 ata pressure transmitter removed from field, its relay, restriction, flapper nozzle etc were cleaned. Both were calibrated on dead weight tester and refitted back.
k.	Superheated steam & drum pressure transmitters taken to shop after general cleaning both were calibrated on dead weight tester and refixed back.
l	Both 60 ata steam flow transmitters overhauled and calibrated in field.
m	Dearator level transmitter controller, pressure controllers, general cleaning was carried out and both were calibrated in field checked stroke of both valves also.
n	FR 4202 installed new D/P for boiler feed water make up flow necessary impulse lines and air supply tubing was done. Provided 3 pen recorder in control room for recording purpose.

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Inst

Sr.No.

Description

- o. Overhauled and calibrated all field pressure switches of F.D. fan and feed pump.
- p. All field pressure gauges were removed overhauled and calibrated.

2.

COMPRESSOR HOUSEi. Inst. Air Dryer

Silica-gel from both chambers were taken out, sieved it separated activated alumina and filled R.H.S. chamber with same silica-gel, while other L.H.S. chamber was filled with new indigenous white silica-gel. Also its four way change over valve was overhauled and fixed back.

Limit switches and Timer also were cleaned and fixed back,

ii Instrument air and plant air compressor

Following jobs were attended.

- a. Loading and unloading press switch cleaning & calibration
- b. Loading & unloading solenoid overhauling
- c. Lube oil alarm and trip switches contacts cleaning and calibration.
- d. Air receiver pressure gauges were checked and fixed back.

3.

COOLING TOWER AREA

- i. Speed indicators of all turbines were cleaned, calibrated and fixed back.
  - ii. Lube oil pressure low alarm and trip switches for all turbines were overhauled and calibrated.
  - iii. Cooling water sump level make up controller was taken out, calibrated and fixed back.
  - . D/P cell for above, was taken out calibrated and fixed, at new location near control valve.
- Control valve hand jack mechanism was replaced with new one overhauled and fixed back. Also valve stroke was checked and made alright.

Sr.No.	Description
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- iv. All control valves were cleaned and greased and checked performance.
- v. All air regulators of this area were overhauled and fixed back.
- vi. pH meter for Urea & Ammonia were calibrated and given in line.

4. WATER TREATMENT PLANT

- i. Following level and pressure controllers were taken out, overhauled and calibrated, also its control valve were checked and stroke made alright.
  - a. Degasser level controller
  - b. Buffer Tank level controller.
  - c. Raw-water pressure controller
  - d. Cooling water sump level controller.
- ii. HCL measuring tank level dip tube was checked and fixed back also one d/p cell was provided in place of 270 indicating transmitter for better performance. Also its HLCO 4 LCO switches were calibrated and fixed back.
- iii. All control valves were checked for gland leakage and leakage were stopped and put new gland packing, wherever it was necessary.
- iv. General cleaning, checking and calibration was carried out of all transmitters and recorders
- v. Air header isolating valve was replaced on de-gasser and cooling water sump level controller air line.
- vi. One air supply tapping was provided in D.M. control room for new instrument panel for SMB & PMB additional unit.
- vii. Air regulator station for 50 PSI and 30 PSI  
Both station air regulators were cleaned and their isolating valve manifold were refitted and stopped air leakages.
- viii. All air regulators of this plant were cleaned, overhauled and fixed back.
- ix. All rotameters were taken out one by one and overhauled and fixed back.
- x. C-62 contractor was replaced by new one as old one was not working normally.





OFFSITE PLANT  
SHUTDOWN REPORT  
INSPECTION

Sr.No.	Description
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Report of N D T Job done in offsite plant during annual shutdown February-March 1978

1. Spark test

Spark test was carried out in the following rubber-lined vessels:

- a) Cation No.1
- b) Anion No. 3 & 4

Results

a) In cation No.1 three defective spots were found in shell lining and several defects were found in lateral supports. It was decided to repair those defects by araldite and F R P. Therefore, Spark testing after repair was not possible.

b) Anion No.4 new rubber line was spark tested before and after half curing. Defective spots were found in half cured lining. Which were repaired by rubber-sheets of high electrical conductivity. Hence spark testing after repair and after full curing could not be done.

In Anion No.3 all the lining was made with "high electrical conductive" rubber sheet which was giving continuous spark from defect free lining also.

Therefore spark-testing failed to distinguish defective spots from defect free areas of the rubber lining. Finally both the tanks (Anion 3 & 4) were visually inspected and after some repair found OK.

Equipment Used

High frequency high voltage spark tester.

2. Visual Inspection

Visual inspection was carried out on the following vessels:

- a) Mud drum of boiler No. 1 & 2
- b) Steam drum of boiler No. 1 & 2

Sr.No.

Description

ResultsBoiler No.1

- a) Lot of pitting was observed on shell of Mud Drum. It is not very deep.
- b) Some of the clamps fixed to keep Desister pad in position had become loose. The shell of the Steam Drum OK.

Boiler No.2

- a) Slight pitting was observed on shell of the Steam Drum.
- b) Slight pitting was observed on shell of Mud Drum.

3. Thickness Survey

Thickness measurements were carried out on the following pipe lines and vessels:

- a) Super heater tubes in boiler No.2
- b) Boiler tubes at straight portion around furnace and also at out side bends at random in boiler No. 1 & 2.
- c) Super heated steam line from boiler to 60 Ata steam header in both the boilers.
- d) Cation Tanks 1,2,3 & 4.
- e) Anion Tanks 1,2,3, & 4.
- f) Hydrochloric Acid Tanks 1,2,&3.

Results

Equipments used: IMECO, UTG - 101 and Ultrasonic Flow Detector, FD- 301

## 4. D.P. test and Radiography test carried out for changing of Super heater coil in boiler No.1.

- a) Dye Penetrant test: All the 144 field weld joints in the Super heater tubes and 4 header butt welds have been tested by dye-penetrants at the root-run.

Results:

Defects revealed by this test were ground off, the spots were rewelded and again checked by dye-penetrant. Finally accepted when defect free.

Sr.No.	Description
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b) Radiography test

100% of the 4 header butt joints and ten per cent of the 144 weld joints in the super heater coil were radiographically tested as per the requirement of I B R (Indian Boiler Regulation).

Results

- a) Header welds contained some defects which were repaired and found OK.
- b) Some of the super heater weld joints contained slight slag and porosity.

These defects are within permissible limits.

OFFSITES

SHUTDOWN REPORT

CIVIL

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Sr.No.	Description
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1.     Cation No. 1
  - a) Levelling and strengthening of foundation.
  - b) Bitumastic floor lining in Water Treatment Plant.
  
2.     a) FRP lining in weak and strong effluent channel, manholes and catch pits in Anion side.
- b) FRP lining in DM Water storage Tank in floor and vertical walls up to one foot of height.
  
3.     Repair of manhole for modification of G I Pipeline.
  
4.     Replaced HCI Measuring Tank with new. Provided new acid andalkaline proof lining for flooring and also repaired the damaged acid proof joints.
  
5.     Repair of wooden structure and painting of the same in cooling tower.
  
6.     Painting done on motors and propeller in all C T Fans.
  
7.     P 4402  
 Provided a strong RCC foundation for the gear box of pump (P 4402) and relocated the lub oil tank below the gear box. This modification was to minimise the vibration on the gear box.
  
8.     Connection for new HDPE effluent pipe line for modification.
  
9.     FRP connection for new HDPE effluent pipe line for modification.
  
10.    F/5101/A  
 Offsites Boiler No. 1
  - a) The damaged flooring was removed and provided new flooring.

Sr.No.	Description
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- 10.
  - b) Provided bottom flooring of super heater side after replacing of tube bundles.
  - c) Filling up all the gaps of super heater tube as well as in combustion chamber side.
  
- 11. F 5101/B
  - a. Repaired the damaged flooring of combustion chamber
  - b) Patch work was done in burner blocks
  - c) Filling up all the gaps super heater tubes.

Op-Op-Op-Op

TO :  
OFFSHORE PLANT  
SHUTDOWN REPORT  
TECHNICAL

Sr.No. Description

Following are some of the important jobs

1. Cooling Towers

Tappings for new cooling towers (Ammonia) under construction were provided.

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B & MHANNUAL SHUTDOWN REPORTMECHANICAL

Sr.No.	Description
1.	<u>M 2110 PLANT TRANSFER CONVEYOR</u>
	<ul style="list-style-type: none"> <li>a) Belt replaced</li> <li>b) Replacement of diffective rollers and skirt rubber</li> <li>c) Checked gear box, bearings &amp; coupling.</li> <li>d) Replaced gear box bearings and oil seal</li> <li>e) Replaced oil</li> </ul>
2.	<u>M 2112 FRESH UREA SUTTLE CONVEYOR</u>
	<ul style="list-style-type: none"> <li>a) Replacement of Conveyor Belt</li> <li>b) Checked the tripper</li> <li>c) Repaired Skirt rubber</li> <li>d) Replaced the deffective rollers</li> <li>e) Checked gear box-bearings and coupling</li> </ul>
3.	<u>M 2116 RECLAIM MACHINE</u>
	<ul style="list-style-type: none"> <li>a) Checked bucket elevator</li> <li>b) Checked scraping chain</li> <li>c) Replaced the belt conveyor rollers</li> <li>d) Checked lubrication throughly</li> <li>e) Checked coupling.</li> </ul>
4.	<u>M 2117 RECLAIM CONVEYOR</u>
	<ul style="list-style-type: none"> <li>a) Repaired damaged joints</li> <li>b) Replaced the deffective Rollers</li> <li>c) Checked gear box and coupling</li> </ul>
5.	<u>M 2121 BAGGING BUILDING FEED CONVEYOR</u>
	<ul style="list-style-type: none"> <li>a) Checked gear box</li> <li>b) Replaced the deffective rollers</li> <li>c) Replaced the skirt-rubber</li> <li>d) Repaired the joint of conveyor</li> </ul>



Sr.No.	Description
6.	<u>M 2122 BAGGING BUILDING HOPPER CONVEYOR</u>
	a) Checked coupling b) Checked gear box c) Replaced the deffective rollers d) Repaired the skirt-rubber
7.	<u>M 2111 TWO WAY FEED HOPPER</u>
	a) Checked diverted flapper and made free b) Checked lubrication
8.	<u>M 2101 BAGGING MACHINE</u>
	Overhauled Packer scales.
9.	<u>M 2124 SLAT CONVEYER</u>
	Completely overhauled the slat conveyors
10.	<u>DELUMPER</u>
	a) Replaced Pulley b) Checked the bearings c) Charged fresh grease in the bearings
11.	<u>K 3101 REFREGARENT COMP:ESSOR</u>
	a) Replaced Crancase oil b) Checked suction and discharge valves c) Checked Couplings
12.	<u>P 3103 B NH<sub>3</sub> CIRCULATION PUMPS</u>
	a) Opened and inspected the shaft b) Checked mechanical seal
13.	<u>V 3101 AMMONIA COOLER</u>
	Cleaned NH <sub>3</sub> Cooler.

B & M H PLANT  
Shutdown Report  
Electrical

Sr. No.	Description
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1. MCC-3

It was taken for maintenance. Following areas are covered by it.

- 1. Naphtha and Fuel Oil Storage
- 2. Ammonia Storage Tank
- 3. Ammonia Loading Pumps

Following important jobs were done.

- i. Maintenance of feeder trolleys
- ii. Maintenance of incoming breakers.
- iii. Maintenance of busbar chambers - cleaning and checking of connections.
- iv. Checking, alignment of lyracontacts
- v. Checking connection at transformer end.
- vi. Modifications in the control circuit of incoming ACB's. for starting of 330 HP Ammonia Pump motor.
- vii. Replacing damaged melamine bus supports
- viii. Testing of protective relays and checking all trip cts
- ix. Replacing one length of power cable 1 x 800mm<sup>2</sup> between MCC and transformer 4 B LT terminal box
- x. Termination of cable at transformer end (transformer 4 B) with welded legs.

2. MCC 4

It was taken up for maintenance. It covers the following areas.

- 1. B M H Plant

Following important jobs were done.

- i. Maintenance of feeder trolleys.
- ii. Maintenance of incoming breakers.
- iii. Maintenance of busbar chambers - cleaning and checking of connections
- iv. Checking alignment of lyracontacts
- v. Checking connection at transformer end.

Sr. No.	Description
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- vi. Checking and calibrating temperature indicator of transformer 5 B
- vii. Testing of relays and checking all trip circuit.

3. MCC-4A

It was taken up for maintenance. Following important jobs were done.

- i. Maintenance of feeder trolleys.
- ii. Maintenance of incoming breakers
- iii. Maintenance of busbar chambers - cleaning and checking of connections
- iv. Checking alignment of lyracontacts.

- 4. Cleaning of all distribution boards
- 5. Cleaning of all conveyor motors
- 6. Maintenance of reclaim machine motor and panel
- 7. Replacement of conveyor lights
- 8. Overhauling of Delumper motor
- 9. Overhauling of packer scale control panel and all magnets
- 10. Shifting and relocating of junction boxes of all packer scales
- 11. Replacement of all emergency switches of stitching machines
- 12. Measurement of earth resistance of all motors above 50 HP
- 13. Taking megger values of all motors.

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B M H PLANT  
SHUTDOWN REPORT  
INSTRUMENT

Sr.No.	Description
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1. AMMONIA STORAGE AREA

- i. All switches, transmitters and controllers were checked for performance and cleaned and calibrated wherever it was necessary
- ii. Circulating pump discharge flow D/P cell and its switches were taken out, calibrated and fixed back.
- iii. Ammonia tank level indicator was isolated for general checking and cleaning. After attending it was given back in line.
- iv. One extra D/P cell was provided for level measurement of T-3101 ESDV control valve.
- v. Refrigeration compressor  
Its loading - unloading system instruments were cleaned and fixed back also its full load, half load and no load setting was done as per requirement.
- vi. ESDV 3101 s/v solenoid performance was checked.
- vii. Base temperature indicator and controller calibration was carried out, also all the T/C head terminals were cleaned and tightned.
- viii. All air regulators of this area were cleaned and fixed back.

2. BAGGING PLANT

- i. All solenoid valves and air lubricators and regulators were cleaned, overhauled and fixed back.
- ii. All solenoid junction boxes were cleaned and painted.
- iii. All Avery Scales were cleaned, painted and calibrated.