

IFFCO
Kalol Unit

P & S Section
Maintenance Deptt.
Report No. 10/1988

R E P O R T

O N

P L A N T T U R N A R O U N D - 1988

(18th April 1988 - 14th May 1988)

INDIAN FARMERS FERTILISER CO-OPERATIVE LIMITED

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THE PLANT TURNAROUNDS AT A GLANCE

Sr. No.	Year	AMMONIA PLANT		Downtime in days	UREA PLANT		Reason if any
		PERIOD			PERIOD		
		From	To		From	To	
1.	1975	06.05.75	21.05.75	-	06.05.75	21.05.75	16 Planned
2.	1976	26.03.76	20.04.86	-	26.03.76	20.04.76	26 Planned
3.	1976-77	05.12.76	22.01.77	49	05.12.76	24.01.77	51 101-JT Breakdown
4.	1978	21.02.78	15.03.78	23	21.02.78	23.03.78	31 101-BJ Breakdown
5.	1979	21.05.79	12.06.79	23	21.05.79	12.06.79	23 K-1101/2 3rd stage Cylinder
6.	1981	12.04.81	10.05.81	29	08.04.81	12.05.81	35 101-B Headers
7.	1984	01.01.84	21.01.84	25	01.01.84	25.01.84	25 Planned
8.	1986	19.03.86	03.05.86	45	04.03.86	01.05.86	59 Reformer Revamping
9.	1987	12.04.87	03.05.87	21	12.04.87	02.05.87	20 Planned
10.	1988	18.4.88	14.05.88	27	18.04.88	13.05.88	26 Planned

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PLANT TURNAROUND-1988

P R E F A C E

IFFCO Kalol Unit had taken a planned Turnaround on 18th April 1988. This was the 10th planned shutdown. Some of the major jobs planned for this turnaround were replacement of catalyst for Primary Reformer and LTS, replacement of exhaust line of 103 JT, Overhauling of drive turbines for Air Compressor (101 JT), N.G.Compressor (102 JT), Refrigeration Compressor (105 JT), BFW Pumps (104 JT/JAT), MEA Pumps (107 JT/JAT), I.D.Fan (101 BJT) cleaning of heat exchangers and repair of refractory linings in primary reformer and auxiliary boiler, replacement of tube bundle of synthesis gas compressor after cooler 124-C and MEA cooler 108 C1- A in Ammonia Plant. Inspection services of M/s. Stamicarbon on H.P. Carbamate condenser H-1202, Auto clave reactor V-1201, H.P. Stripper H-1201, cleaning of various heat exchangers, evaporators and overhauling of some critical rotary equipments and their drive in Urea Plant.

The Turnaround had involved co-ordination of various external agencies for different jobs such as tube bundle pulling out and boxing up, hydrojetting of heat exchangers, supply of skilled manpower etc.

The Turnaround was completed successfully and the Ammonia Production was lined up on 14.05.88, Urea Plant was started at 10.00 hrs. on 13.05.88 but CO₂ centrifugal compressors turbine rotor was failed and plant was stopped immediately. Urea production was lined up on 18.05.88 after necessary repairs on turbine Q-1101-1.

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IFFCO
Kalol Unit

Maintenance Deptt.
P & S Section

TURNAROUND-1988

GENERAL DETAILS

Sr.No.	Category	Quantity
<u>EQUIPMENT UTILISED</u>		
(a) <u>IFFCO</u>		
	65 T H.M. Crane	01 No.
	15 T Coles Crane	01 No.
	18 T TATA Crane	01 No.
	03 T Forklifts	02 Nos.
	02 T Forklifts	01 No.
	Truck	02 Nos
	Generator welding set	12 Nos
	Transformer welding set	03 Nos
	Diesel generator	01 No
	Air Compressor Centrifugal portable.	01 No
	(b) HIRED	NIL

Sr.No.	Category	Quantity
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MANPOWER

(A) IFFCO DEPARTMENTAL :

a) MECHANICAL

Technician	46 Nos
Rigger	04 Nos
Mazdoor	16 Nos

b) MECHANICAL SERVICES

Technician	25 Nos
Rigger	01 No.
Mazdoor	16 Nos
MEO	05 Nos
Welder	08 Nos
Machinist	08 Nos

c) ELECTRICAL

Technician	29 Nos
Mazdoor	04 Nos

d) INSTRUMENTATION

Technician	24 Nos
Mazdoor	02 Nos

(B) HIRED

Sr.No	Category	Mandays
1.	Mill-wright	169.5
2.	Fitter	538.5
3.	Fabricator-cum-grinder	206.00
4.	Rigger	931.50
5.	Welder	165.00
6.	Mason	29.00
7.	Carpenter	34.00
8.	Electrician	45.00
9.	Mazdoors unskilled(From time office)	5400.00

Apart from above, manpower supplemented by trainees available during shutdown is quite relevant, we had about 45 Nos. of trainees of maintenance in various trades.

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TURNAROUND--APRIL-1988

AMMONIA PLANT

MECHANICAL JOBS

Code No.

Description

1 01 01

AIR COMPRESSOR TRAIN (101 J) :

The turbine was taken for overhauling. After dismantling the turbine, following were observed.

1. There was no deposition of silica on Rotor Wheels. The rotor is of stretched design. The rotor was cleaned manually.
2. Slight erosion was noticed on balance holes of 7th & 8th Wheel.
3. Slight erosion was noticed on Blade Roots of all the blades.
4. Slight erosion was noticed on balancing piece fitted on 8th wheel.
5. Slight erosion was found on steam inlet side blade edges on 7th-8th wheel.
6. Minor crack was noticed on the shroud of 5th wheel blade rivetting portion, which was repaired by TIG welding.
7. Silica deposition was found on 3rd, 4th and 5th diaphragms. Also erosion was found on the matching faces of both the top and bottom halves of these diaphragms, which was repaired by spray welding using chrom tech powder and finally levelling by filling. These diaphragms were also cleaned by sand blasting to remove silica deposition.
8. Erosion was also noticed on top and bottom faces of casing near 3rd, 4th and 5th diaphragm seating portion, this was repaired.
9. Journal bearings were found okay.
10. Wear & tear was noticed on thrust pads of 7"Ø centritch thrust bearing.
11. Labyrinth clearances found on higherside.

Code No. Description

PARTS REPLACED :

- 1. 4th Diaphragm (Modified) : 1 No.
PT No. KJ 52 DBH).
- 2. 5th Diaphragm after : 1 No.
providing additional
locking. S.S. Screw 3/8"
Ø 16 TPI UNC x 1/4" long
on moisture rings.
- 3. Complete set of Labyrinths : 1 Set
- 4. Thrust bearings : 1 Set
(Centritech- Make)
pads and Basing.

Clearances measured before & after overhauling are mentioned in attached Annexure-I. Turbine overspeed trip done at 7850 rpm.

1 01 02 01 SPEED INCREASER (101 J TRAIN) :

The speed increaser was dismantled and following were observed.

- 1. Teeth of gear and pinion found in good condition.
- 2. Journal bearing & thrust bearing found okay.

<u>Clearances</u>	<u>Gear shaft Bearing</u>	<u>Pinion shaft Bearing</u>
(L.P.Case side)	0.009"	0.010"
(H.P.Case side)	0.010"	0.010"
Axial float of thrust bearing on gear shaft.	0.018"	

02 H.P.CASE (101 J HP) :

The H.P.Case was opened. The general overhauling was carried out. After dismantling the top casing following were observed.

Code No.

Description

- 1) Rotor was found in good condition.
- 2) The clearances of all the labyrinths were found within the permissible limit.
- 3) Journal bearings and thrust bearings were found in good condition.
- 4) Wear and tear was found on both the end seals as well as on balance drum seal.

PARTS REPLACED :

1. Balance Drum seals : 1 No
(PT NO. AF 2041 S x 1)
2. End Seals (Coupling side) : 1 No.
(PT No. AF 2041 AR. U/L)
3. End Seal (Thrust brg. side) : 1 No
(PT No. AF 2041 BT U/L)

Clearances measured before and after overhauling are mentioned in attached annexure-II.

1 01 03

01

N.G. COMPRESSOR (102 JT)OVERHAULING :

Turbine was opened for overhauling on 21.4.88 and the following observations were made alongwith M/s. BHEL group.

1. Centering and alignment of turbocompressor was found to be in disturbed condition.
2. Steam chamber fins were damaged.
3. MOP gear in jammed condition.
4. Grooves were formed on the bottom surface of the front brg housing.
5. Spherical washer locking screws were fouling in the locating hole.
6. Rotor was found to have silica deposits on blades.

02 The following corrective actions were taken :

1. The rotor was replaced by a spare new rotor. The length of the spare rotor was cut short by 10 mm for accomodating in the assembly on the coupling end side.
2. Centering and alignment of turbocompressor was done as per BHEL standrads.

Code No. Description

- 3. Steam chamber new fins were assembled and proper clearance were maintained.
- 4. MOP gear was made free and proper beclashes were maintained.
- 5. Bottom surface of front bearing housing was machined and lapped.
- 6. Holes of spherical washer locking screws were enlarged to eliminate fouling problem.
- 7. Rectangular blocks on front brg housing were replaced with new ones.
- 8. Front steam gland modified according to design.
- 9. Overhauling of servomotor & amplifier were carried out. Set Values are given in the attached annexure-III

03

The following are the readings of rotor assy.
Total movement of rotor

+ Direction : 3.25mm
 - Direction : 1.20mm

Reference Dimensions :

- 1. Front casing to Balancing drum : 70.3mm
- 2. Fronthousing oil seal face to front casing. : 60.15mm
- 3. Thrust axial clearance : 0.23mm
- 4. Journal Brg. clearance : 0.16mm
 - i) Front journal : 0.17mm
 - ii) Rear journal
- 5. Diameter of journals : 79.84mm
 - i) Front : 99.83mm
 - ii) Rear
- 6. Axial clearances of oil glands:
 - i) Front : 1.50mm
 - ii) Rear : 4.10mm
- 7. Thrust Brg safety clearances
 - + 0.95mm
 - 0.95mm
 - Radial= 1.0 mm
- 8. Max.runout observed on the new rotor = 0.03 mm
- 9. Max. runout observed on both the journals = 0.005mm

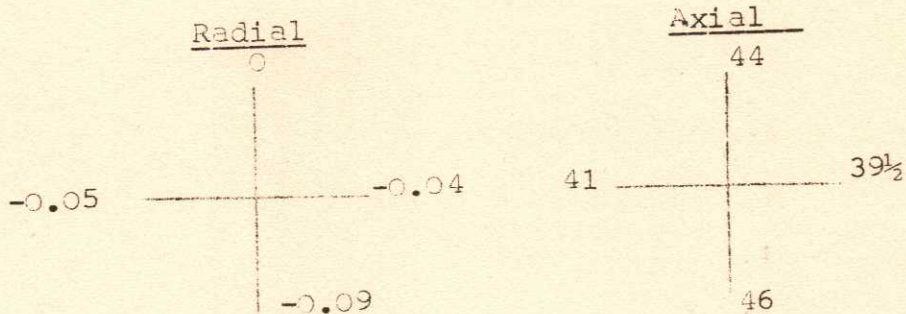
Code No.

Descriptions

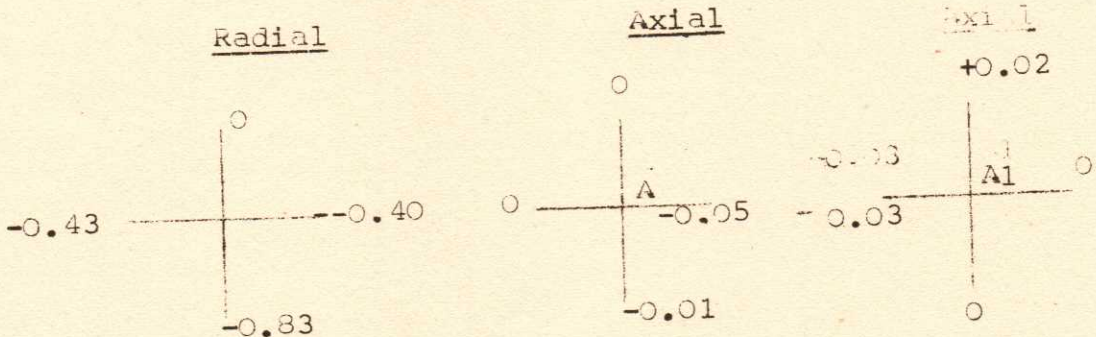
- 04 The centering values and outer centering values are shown in the attached annexure No.III.
1. All the glands radial clearances measured within limits. (0.25mm to 0.30mm).
 2. All moving blades and stationery blades of axial gaps measured within limits.
 3. All wheel radial clearances 3.50mm on both sides.
 4. Axial clearance = + 4.70mm
- 4.10mm

05 Alignment Values :

1. Between Turbine & MOP gear box (Fixture on turbine shaft & reading on MOP gear box)



2. Between Turbine & Compressor (Dial mounted on turbine, reading on compressor)



ANNEXURE
GOVERNING ADJUSTMENT VALVES

Ammonia (Mechanical)

Sr. No.	Inj. Status	Design HP	Value LP	Actual LP Before overhaul	Values LP After overhaul
1	M A X	-	1.50	1.50	1.50
2	M U M	-	1.83	1.83	1.83
3	I	1.50	3.14	3.25	3.16
4	N	1.82	3.41	3.65	3.43
5	J E C T	2.50	3.97	4.50	4.00
6	I O N	3.15	4.50	> 4.5	4.50
1	Z E R	1.50	< 1.50	< 1.50	< 1.50
2	R O	1.64	1.50	1.20	1.53
3	I	1.70	1.64	1.25	1.69
4	N	2.40	2.12	1.80	2.06
5	J E C T	3.0	2.65	2.40	2.61
6	I O N	4.5	3.84	3.30	3.84

Code No.	Description	Adjusting Screw Height in MM	CAM Angles
06	<u>SERVO MOTOR ADJUSTMENT VALUES</u>		
Sr. Servo Motor No.			
1.	Low pressure Servo motor (LEFT)	28.2mm	8.50°
2.	Low Pressure Servo motor (RIGHT)	17.7mm	6.0°
3.	High Pressure Servo motor.	27.5mm	9.0°

1 01 04

SYN.GAS COMPRESSOR TRAIN (103 J)

01 103 JAT (Back Pressure Turbine)

Following jobs were carried out.

1. Inspected thrust bearings, The thrust was found to be 0.018" which was more than allowable limit. Which was adjusted by necessary shim and replaced thrust pads & base rings.
2. Journal bearings were found in good condition.

PARTS REPLACED :

Thrust shoes and base rings. : 1 set

FINAL CLEARANCES :

Axial Thrust : 0.010"
 Journal Brg. (103 JBT side) : 0.012"
 Journal Brg. (L.P. Case side) : 0.007"

02 103 JBT (CONDENSING TURBINE)

Journal bearings and thrust bearings were inspected and found okay.

FINAL CLEARANCES :

- Axial thrust : 0.010"
 - Journal Brg. (103 JAT side) : 0.007"
 - Journal Brg. (Governor side) : 0.0095"

03 103 JLP/HP CASE :

The axial float of rotor of both the LP & HP case was checked & found okay.

FINAL CLEARANCES :-

Axial float of 103-JLP Case : 0.019"
 Axial float of 103-JHP case : 0.020"

Code No.

Descriptions

1 01 05

DRIVE TURBINE FOR REFRIGERATION COMPRESSOR TRAIN (105 JT) :

OVERHAULING :

The turbine was taken for overhauling. After dismantling the turbine, following were observed and accordingly corrective actions were taken.

- 1) There was no much deposition of silica on the rotor wheels. The Rotor was cleaned manually.
- 2) Silica deposition was noticed on 3rd, 4th, 5th and 6th diaphragm. Also erosion was noticed on matching faces of both top and bottom halves of above diaphragms. As spare diaphragms were available, it was decided to replace all the diaphragms by new set to save time.
While assembly of diaphragms, it was noticed that the 3rd diaphragm KJ 52 BBB was not properly seating into the casing because of dimensional variation so the removed old diaphragm was refixed.
- 3) Labyrinths clearances were found okay.
- 4) Governor side journal bearing clearance was found more than allowable limit. However coupling side journal bearing was found okay.
- 5) Wear and tear was found on thrust pads of thrust bearings.

PARTS REPLACED :

- 1) Diaphragms No. 1, 2, 4, 5 and 6 were replaced by new one. Necessary locking on moisture rings was provided on diaphragm No. 4 and 5.
- 2) Complete interstage & gland Labyrinths : 1 set for Diaphragm No. 5
- 3) Journal bearing (Governor side) : 1 set
- 4) Thrust pads : 1 set
- 5) Oil guard (Thrust side) : 1 No.
- 6) Servo piston & 'O' Ring for Governor. : 1 No.
- 7) Thrust bearing locating shims were replaced to adjust the shroud and blade clearances between diaphragms & Wheels.

Code No.	Descriptions
----------	--------------

THICKNESS & NEW SHIM :

Governor side 0.562" ; Journal bearing side = 0.290"

Clearances : Measured before and after overhauling are mentioned in attached annexure-IV

The turbine overspeed trip was done at : 7600 rpm.

1 02 01

BFW PUMP (ELLIOT TURBINE DRIVEN) (104 J)

The pump was taken for overhauling. The pump was dismantled and following were observed.

1. Condition of shaft, impellers, wear rings and diffusers were found okay.
2. The clearances between impeller wear rings and diffuser wearings were measured and found within the limit.
3. The pump was assembled with same rotor assy.

PARTS REPLACED :

1. Mechanical seal assembly - 2 Nos
2. Journal bearings (both ends) - 2 Nos

Following other jobs were also carried out :

1. L.O. Console was thoroughly cleaned and charged with fresh oil.
2. L.O. Coolers were cleaned
3. Seal Cooler was cleaned
4. All Cooling water pipings were cleaned.

Final Clearances :

- | | |
|-------------------------------|--------------------|
| Out board Journal bearing | - 0.008" to 0.010" |
| Coupling side Journal bearing | - 0.007" to 0.008" |
| Thrust | - 0.012" |

1 02 02

BEW PUMP (TERRY TURBINE DRIVEN) (104 JA)

Following preventive jobs were carried out

1. Bearings were checked and found okay. Brg. clearance = 0.0075"

Code No.

Description

1 02 03

- 2. L.O. Console was thoroughly cleaned & fresh Oil was charged.
- 3. L.O. Coolers were cleaned
- 4. Seal cooler was cleaned
- 5. All C.W. Piping were cleaned.

104 JT (ELLIOT TURBINE FOR BFW PUMP)

The above turbine was taken for overhauling. After dismantling the turbine, following were observed.

- 1. No Silica deposition was observed on the rotor
- 2. The casing partition plane near gland ring portion was found eroded due to steam leak. The same was repaired by metal spraying (Chrom tech powder) & then lapping.
- 3. The journal bearing clearances found on higher side than recommended.
- 4. Clearances of all the carbon rings found more.

PARTS REPLACED :

- The same rotor was reused
- Journal bearings - 2 Nos
- Rotor locating ball bearing - 1 No
- Carbon ring - 1 set

Final clearance measured are mentioned in attached annexure-V

Following other jobs were also carried out.

- 1. Overhauled Governor valve and Emergency stop valve.
- 2. L.O. Console cleaned and charged with fresh oil.
- 3. L.O. Cooler was cleaned

over Speed trip done at : 4150 rpm.

1 02 04

TERRY TURBINE FOR BFW PUMP (104 JAT)

The Er turbine was taken for overhauling. After dismantling following were observed.

- 1. Slight Silica deposition was found on the rotor blades which was cleaned by sand blasting.
- 2. Wear and tear was found on the interstage labyrinths

Code No.

Description

3. Clearances was found more than allowable limit on the carbon rings both on inlet as well as exhaust side.
4. Silica deposition was found on all the diaphragms, which was cleaned by sand blasting.
5. Journal and thrust bearings were found in good condition.
6. Wear & tear was found on coupling teeth.

PARTS REPLACED :

1. All interstage labyrinths : 1 set
2. Carbon rings (Inlet and Exhaust side): 1 set
3. Coupling (Hi Cliff make) : 1 set^{each}

Following other jobs were also carried out :

1. L.O. Console was cleaned and fresh oil was charged.
2. L.O Cooler was cleaned.
3. Fresh oil was charged in the woodward governor.
- Clearances measured are mentioned in attached annexure-VI.
- Turbine overspeed trip was done at 4200 Rpm and Governor was locked at 3800 Rpm.

The Governor setting speed at various input signal was calibrated as under :

0% (3 psi)	: 1850 rpm
25% (6 psi)	: 2000 rpm
50% (9 psi)	: 2500 rpm
75% (12psi)	: 3050 rpm
100% (15 psi)	: 3700 rpm

MEA PUMP TRAIN (MURREY TURBINE DRIVEN)

1 02 05

01 MURREY TURBINE-107 JT

The turbine was taken for overhauling. The turbine was dismantled and following were observed.

1. Silica deposition was found on Rotor. To save time, on sand blasting, a spare rotor was installed.

----- A-11 -----

Code No.	Description
1 02 05	<p>2. Clearances of all the carbon rings were found on higher side.</p> <p>3. Clearance of Governor side journal bearing was found more.</p>

PARTS REPLACED :

- 1. Spare Rotor was installed. : 1 No.
- 2. Complete carbon ring set. : 1 set.
- 3. Journal bearing (Governor side) : 1 No.

Final clearances are mentioned in attached annexure-VII

Following other jobs were also carried out :

- 1. Complete L.O. console was thoroughly cleaned and fresh oil was charged.
- 2. L.O. Cooler was cleaned
- 3. L.O. Filter was replaced by new one.

Overspeed trip done at : 4150 rpm

02 MEA PUMP (107 JA)

Both the pumps were overhauled before shutdown. Spare balanced rotor assemblies along with mechanical seal was installed.

1 02 06 01 ELLIOT TURBINE FOR MEA PUMP (107 JAT)

The above turbine was taken for overhauling. After dismantling following were observed.

- 1. The Rotor condition was found okay.
- 2. Both the journal bearings were found okay.
- 3. Clearances of carbon rings found more.

SPARE REPLACED :

- Carbon ring : 1 set

Following other jobs were also carried out.

- 1. Mechanical shaft governor was opened and found some of its internal parts damaged. The damaged parts which were not available in spares were made in workshop.

Code No.

Description

The Governor was then assembled.

2. Bearing oil was changed.

Overspeed trip done at 4200 rpm.

02 MEA P 4P-(MURREY TURBINE DRIVEN -107-J)

Both the pumps were taken for overhauling. Both the pumps were dismantled and their rotor assemblies, were taken out. The spare balanced rotor assemblies were kept ready before the shutdown. The same were assembled in position with new mechanical seals and bearings. Also the C.W. inlet and outlet line for the bearings were thoroughly cleaned and refixed.

1 02 07

CONDENSATE PUMP TRAIN (112 J/JT)

01 TURBINE FOR CONDENSATE PUMP (112 JT)

The turbine assy. was brought to workshop. Its top radial antifriction bearing was replaced as the condition of old bearing was not good. The proper greasing was then done on the bearings.

02 CONDENSATE PUMP - 112 J

The pump was taken for overhauling. After dismantling the pump, following were observed.

1. Clearance of bush bearing (Carbon bush) were found more than allowable limit.
2. No wear and tear was noticed on impeller neck-rings and bowl wear rings. The clearance of the same were found within limit.
3. The bottom shaft runout was found to be 0.06" (Max.)

PARTS REPLACED :

1. Bottom shaft : 1 No
2. Carbon bearing bush : 1 Set
3. Bowl (O' Ring) : 1 set

Final Clearances :

1. Carbon bush : 0.016" to 0.018"
2. Between Impeller neckring : 0.016" to 0.018"
and Bowl wear rings.

Code No. Description

1 03 01

I.D. FAN TRAIN :

The complete I.D. Fan train was taken for general overhauling.

01

I. .FAN -101 BJ :

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

- I.B. Bearing clearance : 0.012"

- O.B. Bearing clearance : 0.011"

02

GEAR BOX (SPEED REDUCER) :

All the four bearings were inspected, found in good condition. Checked the diametrical clearances, found within the allowable limit, hence the bearings were boxed up. Also checked the teeth of gear and pinion found in good condition. Lub oil filters were cleaned. Also cleaned the L.O. Cooler.

Bearing Clearance :

	<u>Gear shaft Bearings</u>	<u>Pinion shaft Bearing</u>
Turbine side	0.008"	0.007"
I.D. Fan side	0.008"	0.007"

1 03 02

I.D. FAN DRIVE TURBINE : (101 BJT)

After decoupling, we found the rotor axial float more than the normal value so, it was decided to take out the rotor assembly & replace the thrust bearing. Accordingly opened the top casing and taken out the rotor assembly. Replaced the thrust bearing by new one (SKF-6310) Then assembled the rotor with new journal bearings & carbon packings.

Bearing Clearance :

1. I.B. Bearing (New) : 0.010"
2. O.B. Bearing (Old) : 0.010"

Carbon seal clearance was maintained between 0.002" to 0.003"

Code No.

Description

TTV :

Opened the TTV assembly for checking its valve spindle bush. Found in good condition. Boxed up the same.

Turbine was taken for roll on 2.5.58 for checking its governor operation at various input signal. Given below the speed reading at various pneumatic input signal.

<u>Input Signal</u>	<u>Turbine Speed</u>
15 psi	1600 RPM
12 psi	2000 RPM
9 psi	2600 RPM
6 psi	3300 RPM
3 psi	4100 RPM
0 psi	4200 RPM

1 11 01

PRIMARY REFORMER CATALYST REPLACEMENT (101-B)

01 All the top tube plug of catalyst tubes were opened for catalyst removal and subsequently boxed up after new catalyst filling. For the above job necessary locking and resetting of spring hangers of all the tubes has been done. Also the end cover flanges of all gas inlet headers were opened for cleaning purpose and then boxed up.

02 HT/LTS SHIFT CONVERTOR (104-D)

It was planned to change the catalyst of LTS Convertor. Accordingly the vessel manholes were opened, necessary blinds were provided, screens were removed and other related arrangement were made for catalyst unloading and loading. The vessel was boxed up after the catalyst loading was over.

Code No.	Description
1 12 01	<u>PRIMARY REFORMER - 101 B</u> <u>PENT HOUSE :</u>
01	Primary and secondary air resistors of burner assembly were thoroughly roused and greased.
02	Following Naphtha Needle Valves were replaced by new one 102,105,109,207,913.
03	Other Naphtha needle Valves which were not operatable, or leaking from the glands were attended as per the list.
04	Atomising steam line union and elbow leaks were attended as per the list.
05	Purging and Atomising steam Valves which were reported to be passing were attended as per list.
06	Reformer top tube plug flange were attended for leaking as per the list. Tube Nos.403,405,521, 618 & 718
07	Naphtha duplex strainers were cleaned.
08	Damaged roof insulation (pyroblock) on Row No.1,2 & 3 were replaced by new one.
09	Damaged outlet manifold insulations at various points were properly repaired.
10	Damaged insulations on gas inlet headers as well as pigtails were properly repaired.
11	End plug of transfer line (107-D) was opened for inspection and boxed up with new gasket.

1 12 02 PRIMARY REFORMER - 101 B
PENT HOUSE :

As per the report given by production department total 76 Nos of Burner Blocks were to be changed. Since the full quantity of Burner Blocks were not available, only 41 Nos. of following badly damaged burner blocks only could be replaced.

Row No.	Burner Block No.	Total
1.	3,4,6,7,11,14	6 Nos
2.	1,5,6,8,9,12,13	7 Nos
3.	7,9,10,13,14	5 Nos
4.	6,13,14	3 Nos

Code No.

Description

Row No.	Burner Block No	Total
5.	4,5,6,8,9,10,11,13,14	9 Nos
6.	6,7,8,11,13	5 Nos
8.	1,2	2 Nos
9.	3,8,10,12	4 Nos
	3,8,10,12	
	Total	41 Nos

1 12 03

AUXILIARY BOILER :

01 The badly burnt out ' CASING ' of Burner No. 4 was replaced by new one.

1 13 01

HEAT EXCHANGERS :

01 End covers of following Heat Exchangers were opened, cleaned the tubes by hydrojetting and boxed up after hydrotest.

Sr. No.	Equipment	Qty.	Shell side hydrotest pressure
1.	108 -C MEA Solution Cooler	4Nos	7Kg/Cm ²
2.	105 -C CO ₂ Stripper gas Exchanger	2Nos	43Kg/Cm ²
3.	111 -C CO ₂ Stripper Exchanger	2Nos	8.5Kg/Cm ²
4.	110 -C CO ₂ Cooler	2 Nos	-
5.	128 - C Refrigeration Compressor Interstage Cooler	1 No	-
6.	129 - JC Air Compressor Interstage Cooler.	1No	-
7.	130 - JC Air Compressor Interstage Cooler.	1No	-
8.	127 - C Refrigerant Condenser	2Nos	30Kg/Cm ²

Code No.	Description		
9. 101	JC/JCA Surface Condenser	2Nos	-
10. 175	C UAG MEA Cooler	1No	-
11. 173	C Stripped Process Condensate cooler.	1No	-
12. 174	C Blow down cooler	1No	-
13. 101	J Air Compressor L.O. Coolers.	2Nos	-
14. 103	J Syn Gas Compressor L.O. Coolers	2Nos	-
15. 101	JCA/JCB Old/New surface condenser Inter after condenser.	1No	- Each
16. 102	J NG Compressor L.O. Coolers.	2Nos	-
17. 101	JT/105 - JT -103 JBT Gland Condenser.	3Nos	-
18. 124	C Syn. Gas after Cooler	1No	15kg/Cm2

02 End covers of following Heat Exchangers were opened tube bundle was pulled out, cleaned the tube bundle by hydrojetting and boxed up after hydrotest.

Sr. No.	Equipment	Qty.	Shell side Hydrotest Pressure.
01	109 - C MEA Solution Exchanger.	4Nos	9kg/Cm2
02	115 - C Methanator Effluent Cooler	1No	15kg/Cm2

115.C :

Total 2Nos of Tubes were plugged.
As on date total 10 Nos of tubes are in plugged condition

109.C (101 E Side top)

4 Nos of tubes were plugged.
As on date total 5 nos of tubes are plugged.

Code No. _____
 Descriptions _____

03 108 - C, A MEA Solution cooler (Top one- towards Absorber side) was having 56 tubes plugged. The tube bundle of the same was replaced by a new spare tube bundle available with us, having 3 Rows of S.S. tube at top half of pheriphery.

04 Following tubes which were found leaking during hydrotest were plugged and welded.

127 - CA 127 - CB

<u>Row No</u> (Counting from top to bottom) (L to R) (Looking From old.T.building)	<u>Tube No.</u> (From Silo to C.T. side)	<u>Row No.</u> (From bottom to top, old, tech. building) (L to R)	<u>Tube No.</u>
9	1	4	27
13	1	40	38
19	17		
25	8		
28	9		
35	12		
39	25		
47	17		
Total	8 Tubes	Total	2 Tubes

Total Nos of tubes plugged as on date 33 Nos Total Nos of tubes plugged as on date 13Nos

Code No.	Description
1 13 02	<u>METHA ATOR FEED HEATER (104 - C)</u>
	The west side channel cover flanged joint was reported to be leaking. Hence the above joint was opened and noticed slight grooving on gasket seating face at bottom portion of the shell flange. The same was rectified by welding and grinding. Then the exchanger was boxed up with a new gasket.
1 13 03 01	<u>Replacement of tube bundle of Syn. Gas Compressor After Cooler (124 - C)</u>
	Due to recurring leakage problem in the existing tube bundle, the same was replaced by a new one procured from M/s. Kaveri Engineering, Triehirapally. The tube bundle was procured along with the channel.
	The old channel was removed by cutting at gas inlet and outlet pipe field weld joint. Then the new tube bundle along with the channel was put in position aligned with the inlet and outlet piping and welded.
	Root run of stub ends was done by Cito Tig T - 2 rod of Advani Overlikon. Radiography was done on the root weld. Final filling by suprathern elect ode.
	Radiographed after D.P. Test and finally these joints were stress relieved at a temprature of 5500 for 4 hours.
	The diaphragm was welded to the flange of Channel and after preheating to 200°C and the welding joint was D.P. Tested. The above job was completely carried out departmentally. The welding joint detail is shown in Annexure - VIII.

Code No.

Description

1 13 04

Syn. Gas - Methanator Feed Exchanger (136 - C)

Due to recurring leakage problem in the bottom portion of the tube bundle, it was decided to replace those C.S. Tubes with new ones in S.S. 304. So the total 169 tubes of the first 6 rows from the bottom were removed and replaced with new S.S. 304 tubes by rolling and expanding only. The above retubing job was carried out through M/s. S. R.. Engineers, Baroda.

Finally the hydrotest on shell side of this exchanger was carried out at 44 kg/cm^2 .

1 14 01

STEAM LEAK JOBS :

01 Following defective Valves were replaced by New one.

1. Drain Valve of 38 kg/cm^2 steam up stream of FRC - 2 ($1" \text{ } \phi$ 800 \neq C.S., Gate Valve - 1 No.)
2. New BFW Coil PI Isolation valve ($\frac{1}{2}" \text{ } \phi$ 800 \neq C.S., Gate Valve - 2 Nos.)
3. New BFW Coil by pass valve ($\frac{3}{4}" \text{ } \phi$, 1500 \neq C.S., Globe 1 No)
4. Naphtha atomising steam control valve up stream drain valve ($\frac{3}{4}" \text{ } \phi$ 800 \neq C.S.) Gate valve - 1 No.)
5. PRC - 12 Tapping root valve ($\frac{3}{4}" \text{ } \phi$ 800 \neq C.S., Gate valve)
6. Steam to air coil MICV - 61 orifice L P Side tapping root valve ($\frac{1}{2}" \text{ } \phi$, 800 \neq C.S., Gate Valve - 1 No.)
7. Steam to air coil control valve up stream drain valve ($\frac{3}{4}" \text{ } \phi$, 800 \neq C.S., Gate valve - 1 No.)
8. 2004 JT steam inlet V- 6 U/S drain valve bonnet replaced.

Code No.

Description

9. 104 - J V - 4 U/S drain valve
(1" ϕ , 800 ~~mm~~ C.S., Gate valve - 1 No.)
10. 104- J. V - 5 U/S Drain Valve and its trap.
($\frac{1}{2}$ " ϕ 800 ~~mm~~ C.S., Gate Valve - 1 No)
11. 38kg/cm² header battery limit by pass valve
($\frac{3}{4}$ " ϕ 800 ~~mm~~ C.S. Gate valve)
12. 3.5kg/cm² steam to FIC - 202 U/s. trap.
13. 102 JT 38kg/cm² steam Inlet Block valve
trap isolation valve.
($\frac{1}{2}$ " ϕ 800 ~~mm~~ C.S., Gate Valve)
14. Snuffing steam to SP - 74 header 1st isolation
valve bonnet replaced.
(2" ϕ 800 ~~mm~~ C.S., Gate valve)
15. V - 7 Block Valve down stream drain valve
($\frac{3}{4}$ " ϕ 800 ~~mm~~ C.S. Gate Valve - 1 No.)
16. 111 CA/CB shell side steam vent valve at
1st floor of stripper
($\frac{3}{4}$ " ϕ 800 ~~mm~~ C.S., Gate valve - 2 Nos.)
17. 38 kg/cm² header trap and valve near 119 F
(1" ϕ 1500 ~~mm~~ C.S. Globe valve - 1 No.)
18. PIC - 14 drain Valve
($\frac{3}{4}$ " ϕ 800 ~~mm~~ C.S., Gate valve - 1 No.)
19. 103 JAT casing drain valve
($\frac{3}{4}$ " ϕ 800 ~~mm~~ C.S. Globe Valve - 1 No.)
20. 105 JT Steam inlet block valve down stream
trap
($\frac{3}{4}$ " ϕ Size - 1 No.)
21. I. D. FAN TTV drain valve
($\frac{3}{4}$ " ϕ 800 ~~mm~~ C.S., Gate Valve)
22. 104 JT (ELLIOT TURBINE) TTV drain Valve
($\frac{1}{2}$ " ϕ 800 ~~mm~~ C.S. Gate Valve - 2 Nos.)
23. 125 - C Drain Valve Bonnet replaced.

Ammonia (Mechanical)

Code No.

Description

02 GLANDS OF FOLLOWING VALVES WERE REPACKED :

1. All Auxilliary boiler blowdown valve glands (14 Nos).
2. PRC - 18 tapping second isolation valve.
3. 104 JAT V- 5 upstream trap isolation valve.
4. 104 JAT Block valve by pass valve.
5. 2004 JT steam inlet rack valve.
6. FRC - 2 LP tapping second valve.
7. Atomising steam to auxilliary boiler burner No. 2 isolation valve.
8. M. S. Desuper heating station atomising steam control valve U/s 1st valve.
9. PIA - 82 tapping second valve.
10. TRC - 10 sealing steam ferrule leak.
11. V - 1 U/s Trap isolation valve.
12. HCV - 12 sealing steam valve.
13. 2004 JAT control valve U/s trap isolation valve.
14. PIC - 17 downstream line trap U/s union leak.
15. PIC - 13 A/B, M.S. Side Valve
16. Battery limit trap isolation valves.
17. 38 Kg/cm² steam line to L.O. pump P.I. isolation Valve.
18. FIC - 201 HP tapping Valve.
19. S. O. turbine of NG Compressor steam inlet PI isolation valve.
20. 3.5 Kg/cm² steam header trap near 119 - F leaking from union and trap thread.
21. V - 7 block valve u/s drain 1st and 2nd isolation valve.
22. v - 7 by pass valve.
23. 113 - C 11 Kg/cm² steam inlet valve.

Ammonia (Mechanical)

Code No.	Description
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- 24. 113 - C steam inlet flange U/S of isolation valve.
- 25. 300. Kg/cm² steam to ejector of 107 JAT isolation valve.
- 26. PIC 14 U/S main isolation valve.
- 27. PIC - 14 trap U/S of PIC 14 isolation valve
- 28. 103 JAT drain line down stream of TTV flange gasket replaced.
- 29. 105 Kg/cm² steam to 103 JAT block valve by pass valve.

1 15 01 ANNUAL INSPECTION OF WASTE HEAT BOILER (101 -CA/CB)

- 01. The open inspection and hydrotest of 101 - CA/CB Waste Heat Boiler (GT - 1632) along with BFW system was carried out by CIB on 28.04.88 at 140 Kg/cm² (g) pressure.
- 02. Also the popping of steam drum RV's were carried out as follows on 05.05.88.

Sr. No.	Item No.	Popping Pressure (Kg/cm ²)	Reset Pressure (Kg/cm ²)
1.	101 - F South RV	114	112
2.	101 - F Middle RV	119	115
3.	101 - F North RV	118	105
4.	Superheater RV	110	102
5.	M. S. Header RV	43.5	42.5

GT/1632

1 15 02 ANNUAL INSPECTION OF L. P. BOILER (112 - C)

- 01. Open inspection and hydrotest of L.P. Boiler 112 - C (GT 1632) was carried out by CIB on 28.04.88 at 16 Kg/cm² (g) pressure.
- 02. South side channel dome cover joint was reported to be leaking and hence the gasket of the same was replaced by new one.

Ammonia (Mechanical)

Code No.

Description

* 16 01

VESSELS INSPECTION01 Co2 ABSORBER (101 - E)

The absorber was opened for general inspection and replacement of Demister Pad.

All the middle 20 Nos. of trays were opened to inspect all the internals. The general conditions were found to be satisfactory. Wherever minor corrosion was observed on the carbon steel shell, the same was patched up with M seal. The condition of all the S.S. Trays were found okay. The dismantled 20 Nos. of trays were then fixed up.

The existing indogeneous Demister Pad was physically found alright. It was planned to replace the above demister pad due to high MEA carry over in the gas, reported by production department. Accordingly, a new Demister Pad was Procured from original supplier, M/s. KOTCH International Italy, and the same was installed.

02. CONDENSATE STRIPPER (104 - E)

The above vessel was opened for general inspection of internals and replacement of rashing rings for above job, manholes were opened, screen was removed and necessary blinds were provided. The condition of internals was found okay. The vessel was then boxed up after replacement of the rashing rings.

1 17 01

VALVE REPAIR/ REPLACEMENT :

1. ERC - 2 DOWN stroke check valve (12" ϕ 400 ~~mm~~ rating was opened for inspection and found its flapper detached from position. The same was refixed with modified attachment. The valve was then boxed up with a new gasket.
2. N. G. Compressor by pass of N. G. (Original Battery limit) valve was replaced by new one. (Size : 6" ϕ 300 ~~mm~~ C.S., gate valve flanged ends.)
3. Replaced by pass valve of New BFW Coil inlet & outlet by new one.
(Size $\frac{3}{4}$ " ϕ x 1500 ~~mm~~ C.S. Globe valve - 2Nos.)

Ammonia (Mechanical)

Code No.

Description

4. Replaced southside drain valve of 112 C (gas side) by a new one.
(1/2" Ø 1500 ~~≠~~ C.S. Globe valve 1 No.)
5. Re laced drain valve of 112 C (shell side) by new one.
(1" Ø 1500 ~~≠~~ C. S. Globe valve - 1 No)
6. Replaced the drain valve of 107 JT (Elliot turbine) steam inlet by pass valve by new one. (1/2" Ø 800 ~~≠~~ C.S. Gate valve 1 No)
7. Replaced the sealing steam valve of 107 JT (murrey turbine by) a new one. (1/2" Ø 800 ~~≠~~ C. S. gate valve 1 No. \$)
8. Existing hand operated LTS out let, block valve was replaced by a Motorised Valve (18" Ø 300 ~~≠~~ C.S. flanged end Valve 1 No)
9. A new drain valve was provided on LTS outlet by pass line (1" Ø 800 ~~≠~~ C.S. Gate valve)
10. Replaced the drain valve of MIC 22 U/s side and equalizing steam by new one.
(3/4" Ø 1500 ~~≠~~ G.S. Globe Valve - 2 Nos.)
11. Existing 10" & Butterfly valve on C.W. Outlet line of 124C was removed and a new gate valve of 10" Ø 150 ~~≠~~ C.S. flange ends was provided.
12. Existing butterfly valve of C.W. inlet and outlet line of 101 JC inter after condenser was replaced by a flanged end gate valve of 4" Ø 150 ~~≠~~ size - 2 Nos.
13. Existing butterfly valve of 6" Ø 150 ~~≠~~ on C. . outlet line of 131 JC was replaced by new butterfly valve.
14. A new valve (6" Ø 150 ~~≠~~ C.S. flanged end) was provided on C. W. Inlet line of 131 JC to facilitate replacement of the tube bundle of 131 JC in next opportunity.
15. FRC - 2, PI tapping isolation valve was replaced by new one (3/4" Ø 800 ~~≠~~ C.S. Gate valve)
16. A check valve of 118 JA was replaced by new one
17. Inspected check valve (8" Ø 300 ~~≠~~) of FRC - 1 down stream NG line. The flapper position was found intact and the valve was then boxed up.

Ammonia (mechanical)

Code No.	Description
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18. Butterfly valves of TRC -10 and SP - 39 were thoroughly overhauled for easy operation.

1 17 02

RELIEF VALVES :

The following relief valves were dismantled from the position and fitted back after testing in workshop. The test pressure of the same is mentioned below :

Sr. No.	Item Description	RV NO.	Set pressure	Reset pressure
01.	New BFW Coil RV	RV BFW-1	1280 psi	1150 psi
02.	Air Compressor discharge	RV 101 J	525 psi	490 psi
03.	1st stage refrigerant flash drum	RV 110F(A)	100 psi	90 psi
04.	1st stage refrigerant flash drum	RV 110F(B)	100 psi	95 psi
05.	3.5kg steam header	RV 45 - 1	75 psi	70 psi
06.	2nd stage refrigerant flash drum	RV 111 F	90 psi	85 psi
07.	3rd stage refrigerant flash drum	RV 112 F	90 psi	80 psi
08.	Prime Ammonia Saperator	RV 107F(A)	270 psi	250 psi
09.	Prime Ammonia Saperator	RV 107F(B)	270 psi	250 psi
10.	Syn Gas Compressor Turbine exhaust.	RV 103JAT	48kg/cm ²	35kg/cm ²
11.	L.P. BOILER (112 -C)	RV 112C(A)	150 psi	140 psi
12.	L.P. Boiler (112-C)	RV 112C(B)	150 psi	140 psi
13.	M S Header	M. S. 9	600 psi	-
14.	Polisher Unit	RV 2005 - U	125 psi	-
15.	HTS Inlet (104D)	RV 104D-1	471 psi	-
16.	Refrigeration Compressor Discharge	RV 109 F	270 psi	-

GT-1631

Code No.	Description
1 20 01	<u>FABRICATION JOB</u> :
	01. A jaket of 8" height made from 5 mm THK Carbon steel Plate was provided on existing water overflow jaket of 101 - CA/CB to avoid spillage. Also the same jaket was extended from both the ends by approx. 12" on periphery.
	Also the chequered plates of platform below the platform of this overflow jaket was found corroded. The same plates were replaced by new one.
	02. In Row No.4, Naptha and AG header were modified by interconnecting supply line to header end to equalise the pressure.
	03. Damaged and displaced coil supports of mixed feed coil F were removed. The present position of mixed feed coil F warrants for complete replacement of damaged intermediate tube supports and necessary leveling.
	04. A jaket was fabricated from 10mm THK M.S. Plate and was provided around the AG Knock out drum to facilitate heating of shell & easy draining of oil.
	05. Five numbers of carbon steel pannels were fabricated departmently for replacement of damaged pannels on Silo side. These new pannels were insulated with 'CERAWOOL' of 158 MM Thick. This insulation was tried first time and the same was supplied and installed by M/s. Orient Cerwool Bombay. Then, above 5 pannels were installed in position.
	06. Distributer plates (13 Nos) made of S.S. 304 material were installed in the H.T.S. convection sections just above the super heater coils for better flue gas distribution coming from auxilliary boiler.
	07. Repair work on damaged refractory burner blocks of all the five burners was carried out. Also the front wall lining was repaired.

Code No.	Description
1 20 02	<u>FIELD JOBS :</u>
01	<p>3.5 Kg/Cm² steam header to 111 CA/CB, Tee joint was badly damaged, so the same was pre-fabricated before shutdown. During this shutdown, existing 14" ϕ header along with 12" ϕ branch line with elbow was cut from the position. After inspection it was noticed that the 12" ϕ pipe beyond the elbow was also found eroded, so further 0.500 Meter pipe was cut. Finally the tee joint along with 0.500 Meter extra pipe was welded in position with four field joint at A, B, C & D, as shown in annexure-IX.</p> <p><u>ELECTRODE USED :</u></p> <ul style="list-style-type: none"> - Root by citotig T2 filler wire - Filling superatherm E - 7018 - Root and final joint were checked by D.P.Test.
02	<p>The existing dump valve of Murrey Turbine (107-JT) was open to drain. The same was diverted and connected to exhaust pipe line of the same turbine. (2" ϕ Sch. 80 C.S.pipe line with valve was provided.).</p>
03	<p><u>CO₂ ABSORBER (101-E)</u></p> <p>On inspection Rich MEA Solution outlet Elbow was found corroded, so, the elbow was cut by gas cutting and on further inspection, the line approx. 1.5 Mtr. from the elbow to flange joint of Rich MEA outlet valve was also found corroded from inside. It was finally decided to replace the elbow with pipe and new flange. The field joint (A) & (B) were made as per Annexure-X.</p> <p><u>ELECTRODE USED :</u></p> <p>Root and filling by S.S. 310 electrode. Root intermediate and final joint was checked by D.P.Test. Also final joint (A) & (B) were checked by radiography. Finally stress relieving of field weld joint (A) & (B) was done at 650 C.</p>
04	<p><u>SUPERHEATER RV :</u></p> <p>Existing superheater R.V. was reported to be passing. The spare R.V. was available which was having butt-weld ends. An arrangement was made for hydrotesting of the valve and the valve was tested accordingly.</p>

Code No.

Description

The existing valve from position was removed by cutting its inlet joint by D.P.T. Tool.

Then the spare tested R.V. was put in position and its inlet end (6" N.B. size) was welded with the header.

ELECTRODE USED :

- Root by TIG Welding: Citotig T2 filler wire.
 - Filling by stick welding : Supertherm E-7018
 - Root and final joint checked by D.P. Test and X-Ray.
 - Finally stress relieving of the weld joint was done at 650°C.
05. A new sample point was provided on CO₂ Absorber outlet process gas line to check MEA carry over.
06. About 1 Meter pipe piece (14" N.B.C.S. Pipe) from CO₂ stripperlean MEA Line downstream of block valve was removed for metallurgical analysis. A new pipe of 14" NB Sch. 40 conforming for ASTM A-105 was welded.

ELECTRODE USED :

- Root by Tig welding, Citotig T2 filler wire.
 - Filling by stick welding. Overcod - S
 - Root checked by D.P. Test.
 - Final joint checked by X - Ray.
07. A temporary 4" ϕ Sch 80 C.S. Pipe line was provided from up tream of SP - 3 valve, for flowmeasurement and Vent purpose of Antisurge System of 101 - J / installed by Instrument Department.
- For this a main tapping was taken from upstream of SP - 3 Valve with Weldolet and 4" ϕ 300 ~~W~~ WNR F C.S. Flange and the fabricated 4" ϕ line was bolted with the above flange. Afterthe antisurge system job was over, the temporary line was removed and a blind flange was provided on this tapping.
08. The existing union of bypass line of S.P. - 3 was removed and a new by pass line (2" ϕ C.S.) with a new 2" ϕ 800 ~~W~~ C.S. Globe valve with a flanged joint (2" ϕ 300 ~~W~~ SOR F Flange) was provided.

Code No.

Description

- 09. The existing by pass line with union of SP - 5 valve was damaged. So, the same was removed and a new 1 " \varnothing Sch 80 C.S. bypass line along with 1" \varnothing 800 \neq C.S. globe valve with a flanged joint was provided.
- 10. Instrument air line jump over (2" \varnothing C.S. PIPE) with valve was provided at old instrument air dryer to facilitate offsite air to line up new instrument air dryer in case of air compressor in shutdown.

B	0.007	0.005	K	0.110	0.120	TOTAL DESIGN END PLAY • 0.180	LOOKING FROM GOVERNOR END	LOOKING FROM GOVERNOR END
C	0.015	0.021	T	0.008	0.012			
E	0.013	0.019						

AFTER	BEFORE	FINAL		STEAM FLOW OIL RING A THRUST BRG. T OIL RING A BRG. B OIL GUARD C E E E E E E	FINAL		BEFORE	AFTER	
		SHROUD	BLADE		BLADE	SHROUD			
0.014"								0.010"	
0.002"								0.007"	
0.002"								0.006"	
0.003"								0.013"	
0.003"								0.013"	
0.002"								0.013"	
0.003"								0.012"	
0.003"								0.014"	
0.003"								0.013"	
0.8"				NOZZLE J WHEEL-1 DIAPH. LABYRINTH E J WHEEL-2 DIAPH. LABYRINTH E J WHEEL-3 DIAPH. LABYRINTH E J WHEEL-4 DIAPH. LABYRINTH E J WHEEL-5 DIAPH. LABYRINTH E J WHEEL-6 DIAPH. LABYRINTH E K WHEEL-7 DIAPH. LABYRINTH E K WHEEL-8a DIAPH. LABYRINTH E K WHEEL-8b DIAPH. LABYRINTH E E E E E OIL GUARD C BRG. B COUPLING I					
0.055"								0.008"	
0.008"								0.008"	
0.005"								0.007"	
0.004"								0.005"	
0.004"								0.004"	
0.004"								0.004"	
0.006"								0.004"	
0.014"								0.022"	
0.008"								0.006"	
0.012"								0.004"	
0.0022"								0.003"	
0.004"								0.005"	
0.004"								0.005"	
0.003"								0.006"	
								0.008"	

101J.T

Total Endplay
0.183"

ANNEXURE - I

RECOMMENDED CLEARANCES

REF.	CLEARANCE	BETW
A	0.002" TO 0.004"	OIL GUARD (60)
B	0.013" TO 0.016"	BEARING H5G (5)
C	0.004" TO 0.007"	BEARING PAD (40)
D	0.015" TO 0.022"	OIL GUARD (6)
E	0.008" TO 0.011"	RING (7) (8)
G	0.008" TO 0.011"	RING (9)
K	0.040" TO 0.044"	RING (42, 46, 50)
M	0.040" TO 0.044"	BUSH (45)

Annexure II

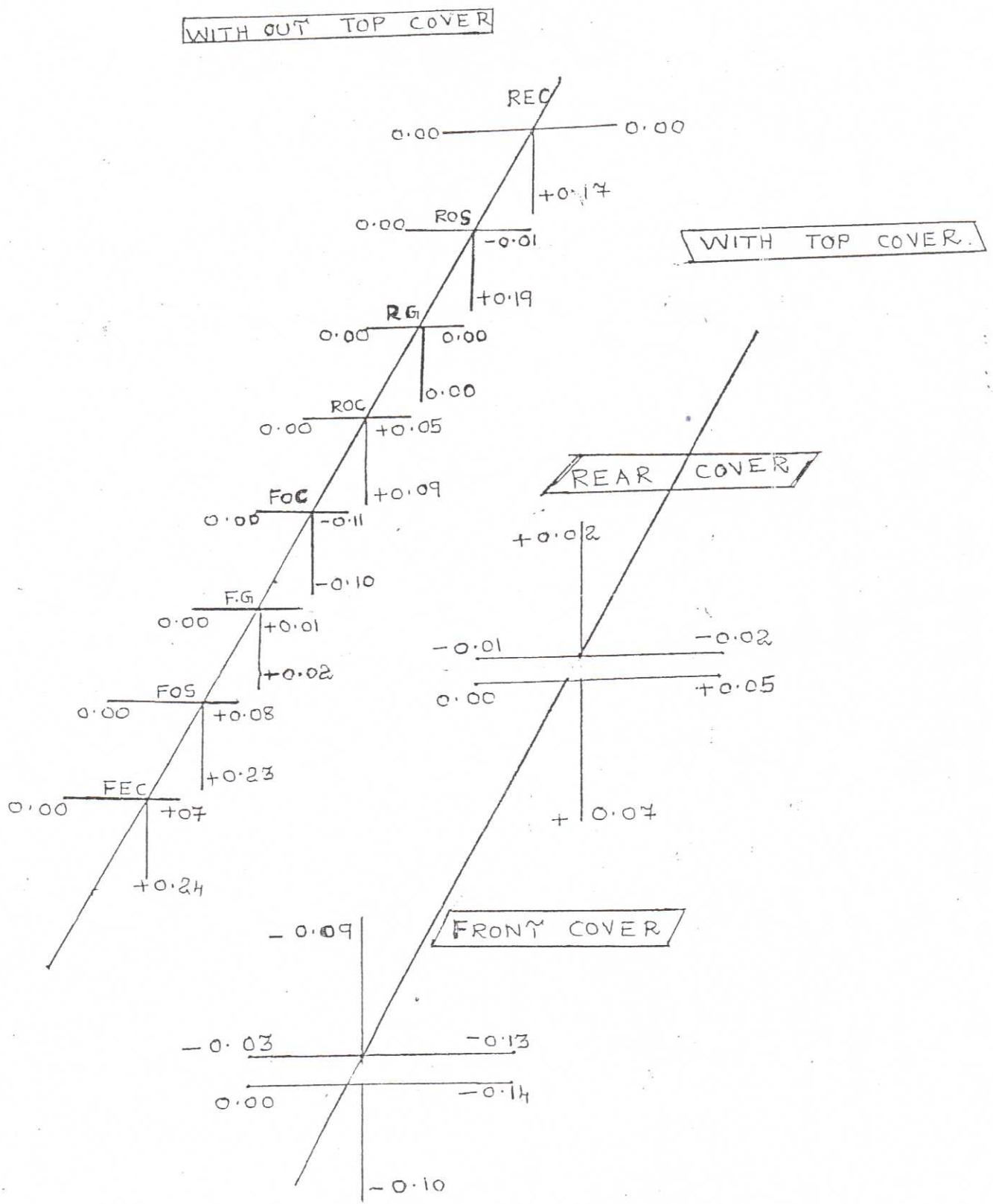
		AFTER	BEFORE		BEFORE	AFTER
		0.002"	0.002"	OIL GUARD (60)-A	0.002"	0.002"
				THRUST BEARING END PLAY 0.008" TO 0.012"	0.008"	0.008"
		0.002"	0.002"	OIL GUARD (60)-A	0.002"	0.003"
				JOURNAL BRG C AND B CLEARANCE 0.004" TO 0.007"	0.005"	0.005"
					to 0.006"	0.006"
		0.010"	0.010"	OIL GUARD (6)-D	0.010"	0.010"
(NEW)		0.004"	0.006"	RING (7)-E	0.007"	0.005"
(NEW)		0.005"	0.010"	BALANCE DRUM RING (9)-G	0.010"	0.005"
		0.022"	0.022"	WHEEL (67)		
		0.022"	0.022"	CASE RING (50)-K	0.020"	0.020"
				DIA. BUSH (45)-M	0.018"	0.018"
		0.022"	0.022"	WHEEL (67)		
		0.019"	0.019"	CASE RING (30)-K	0.022"	0.022"
				DIA. BUSH (45)-M	0.010"	0.020"
		0.019"	0.019"	WHEEL (11)		
		0.020"	0.020"	CASE RING (30)-K	0.019"	0.019"
				DIA. BUSH (45)-M	0.020"	0.020"
		0.020"	0.020"	WHEEL (21)		
		0.019"	0.019"	CASE RING (30)-K	0.019"	0.019"
				DIA. BUSH (45)-M	0.019"	0.019"
		0.020"	0.020"	WHEEL (25)		
		0.020"	0.020"	CASE RING (46)-K	0.022"	0.022"
				DIA. BUSH (45)-M	0.020"	0.020"
		0.022"	0.022"	WHEEL (25)		
		0.019"	0.019"	CASE RING (46)-K	0.022"	0.022"
				DIA. BUSH (45)-M	0.019"	0.019"
		0.022"	0.022"	WHEEL (30)		
		0.022"	0.022"	CASE RING (42)-K	0.018"	0.018"
				RING (8)-E	0.008"	0.004"
		0.005"	0.006"	OIL GUARD (6)-D	0.010"	0.010"
		0.010"	0.010"			
				JOURNAL BRG C AND B CLEARANCE 0.004" TO 0.007"	0.005"	0.005"
				OIL GUARD (6)-D	0.010"	0.010"
		0.011"	0.011"	COUPLING		

DRAWING NO.	SCALE-	APD.	CHD.	DRN.	INDIAN FARMERS FERTILISER CO-OP. LTD. KALOL	S.N.O.	QTY.	DES.	SIZE	MATERIAL	
				KAM		NAME					
				173.BC		DATE					
						PLANT					
RUNNING CLEARANCES OF BEARING LABYRINTH BEFORE A AFTER OVERHAULING OF 101-I											
H.P. CASE											
PLANT FORM RUBBER SHEET											
01 02 07 06 8 1 1											

PND 53

ANNEX - A B III

Centering values and outer centering values are as follows :-



© Annexure. (Photocopy)

CLEARANCES

D2 = 0.006" TO 0.010"

B2 = 0.001" TO 0.0035"

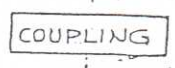
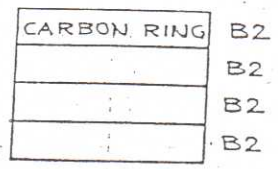
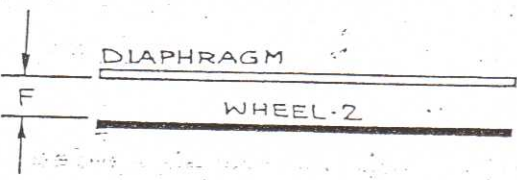
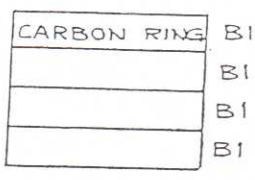
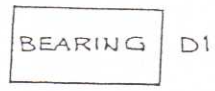
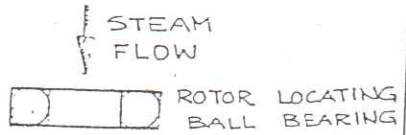
F = 0.093" TO 0.095"

AFTER

BEFORE

BEFORE

AFTER



P. NO
42

0.013"

0.004"

"

"

"

0.094"

0.004"

"

"

"

0.013"

104-JT ELLIOT TURBINE

AFTER	BEFORE	AFTER	BEFORE		BEFORE	AFTER	BEFORE	AFTER
				STEAM FLOW		P.NO 43		
				JOURNAL AND THRUST BRG A			0.008"	0.008"
				CARBON RING			0.018"	0.018"
								0.008"
								0.009"
								0.007"
								0.008"
				NOZZLE				
				WHEEL-1			0.060"	
0.010"				GLAND C				0.010"
				DIAPHRAGM				
				WHEEL-2			0.059"	
0.010"				GLAND C				0.012"
				DIAPHRAGM				
				WHEEL-3			0.060"	
0.011"				GLAND C				0.012"
				DIAPHRAGM				
				WHEEL-4			0.061"	
0.011"				GLAND C				0.010"
				DIAPHRAGM				
				WHEEL-5			0.062"	
0.009"				GLAND C				0.012"
				DIAPHRAGM				
				WHEEL-6			0.065"	
				CARBON RING				0.004"
								0.005"
								0.005"
								0.005"
				BEARING D2			0.006" to 0.007"	0.006" to 0.007"
				COUPLING				

ANNEXURE - XI

BZ = 0.0044 TO 0.007
 A = 0.007" TO 0.013"

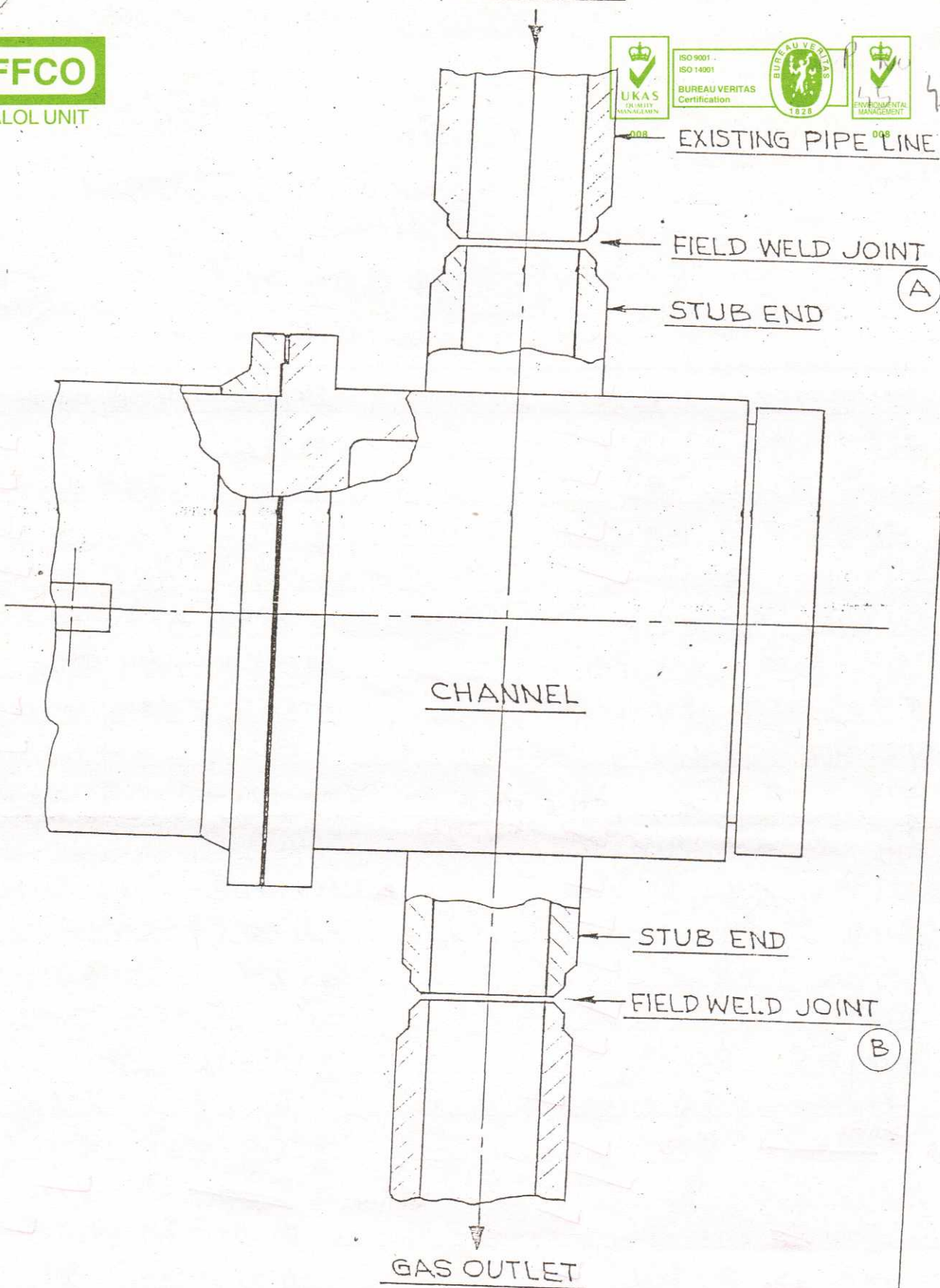
E = 732
 F = 1/16

✓

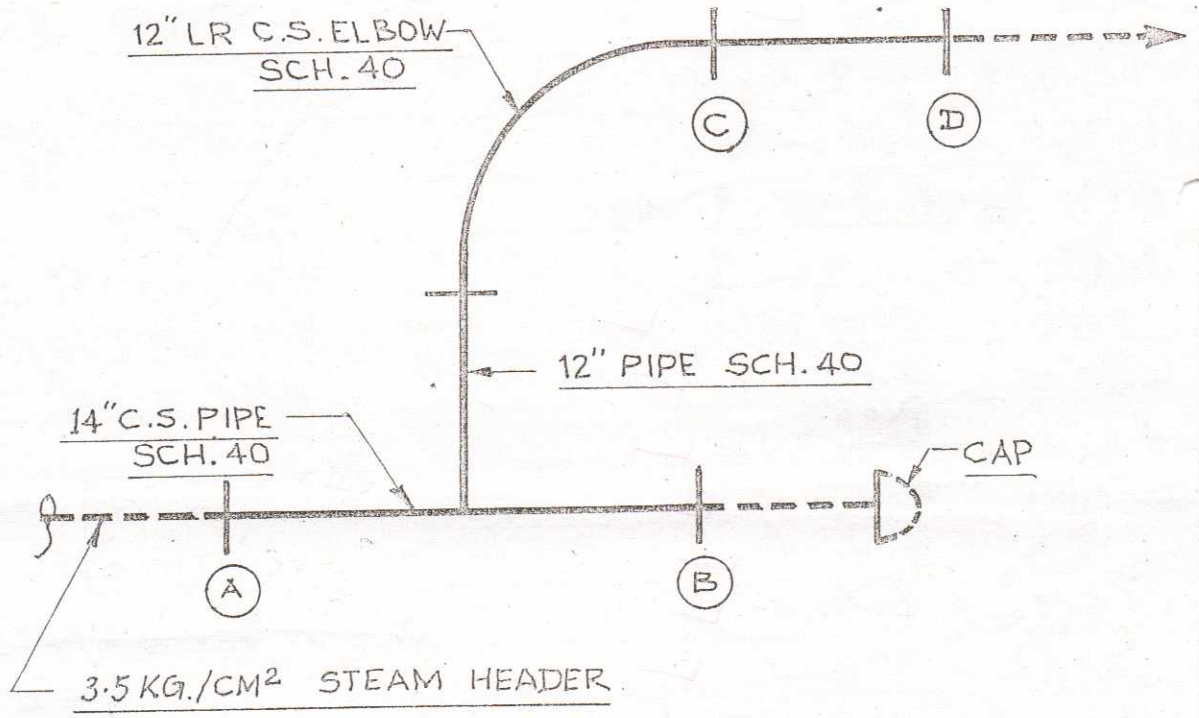
AFTER	BEFORE	AFTER	BEFORE		BEFORE	AFTER	BEFORE	AFTER
				STEAM FLOW ↓				
				THRUST BRG. A		P. NO 44		0.011
				BEARING D1				0.055
				CARBON RING B1				0.007
								to
								0.010
								"
								"
								"
								"
				NOZZLE				
				F ↓				
				WHEEL-1				
				↑				
				WHEEL-2		0.062"		
								0.012'
								to
				DIAPHRAGM C				0.016'
				E ↓				
				WHEEL-3		0.093"		
								"
				DIAPHRAGM C				
				E ↓				
				WHEEL-4		0.093"		
								"
				DIAPHRAGM C				
				E ↓				
				WHEEL-5		0.093"		
								"
				DIAPHRAGM C				
				E ↓				
				WHEEL-6		0.093"		
								"
				CARBON RING B2				0.004"
								to
								0.007'
								"
								"
								"
								"
								"
								"
				BEARING D2				0.006'
				COUPLING				

107-II MURPHY TURBINE

ANNEXURE -VII



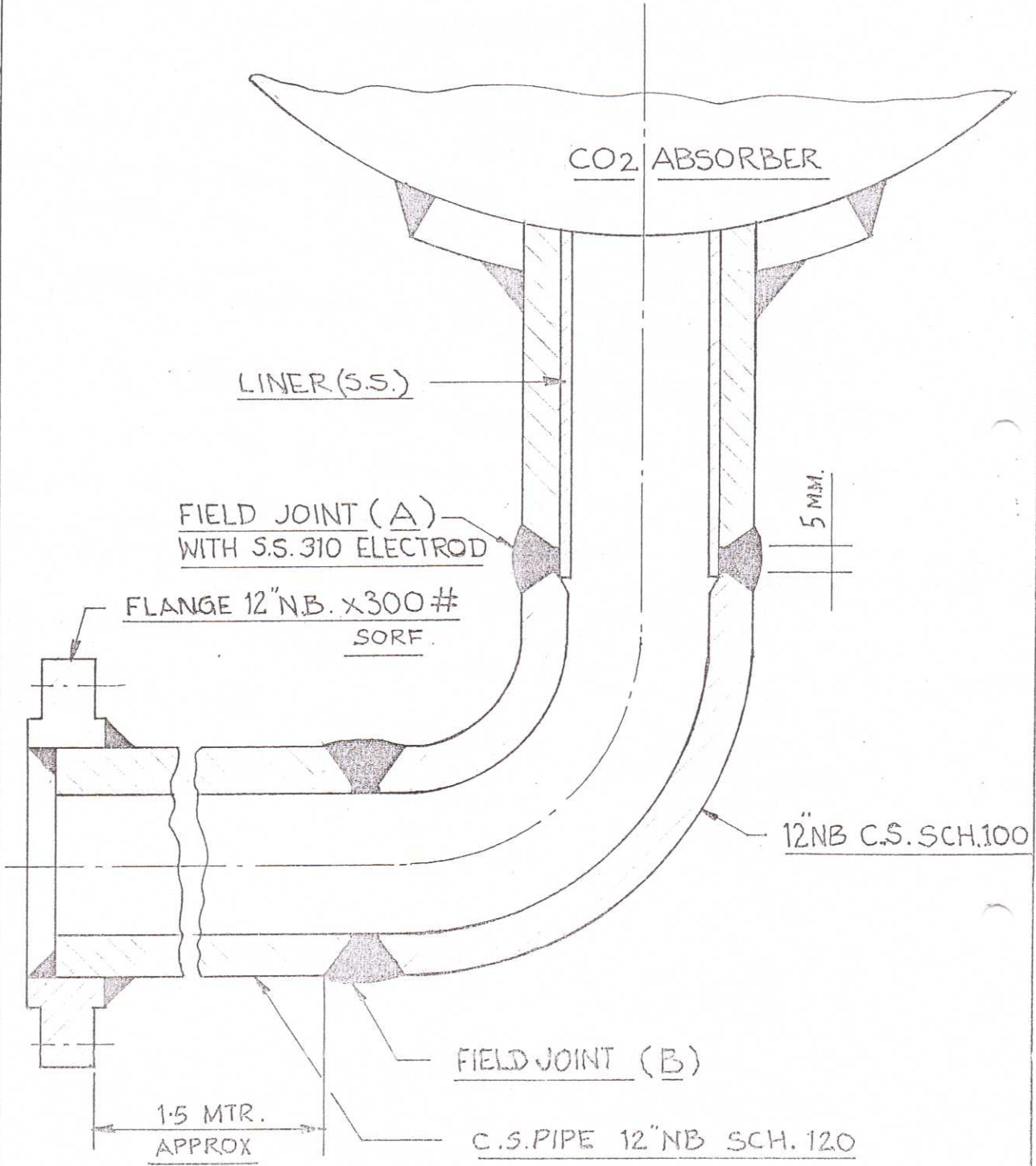
124 C SYNGAS COMPRESSOR
AFTER COOLER,



3.5 KG/CM² STEAM HEADER
TEE JOINT REPLACEMENT.

(APRIL - 88)

ANNEXURE - IX



CO2 ABSORBER-101 E BOTTOM
ELBOW REPAIR DETAIL.

(APRIL - 88) ANNEXURE - X.

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PLANT TURNAROUND APRIL 1988

AMMONIA PLANT

INSPECTION JOBS

Code No.	Description
1 31 01	<p>The following furn ces and vessels were opened and offered for inspection. The observations are noted below :</p>
01	<p><u>PRIMARY REFORMER RADIANT ZONE :</u> Bottom manifold insulation, burner blocks, tunnel slabs, reformer wall and roof refractory were visually inspected. The corrective actions were taken wherever required.</p> <p>Besides visual inspection, the following tests were carried out on reformer tubes in radiant zone :</p> <ol style="list-style-type: none">1. AUTOMATIC ULTRASONIC Scanning (A.U.S.) was carried out for the tubes in row No. 4,5,6,7, & 8 and for tube No. 142 of first row by P. D. I. L. engineers. All the inspected tubes were reported to be free from midwall cracks.2. Ferrite content measurement in all reformer catalyst tubes was carried out.3. Creep measurement for all reformer catalyst tubes was carried out.4. Creep measurement on outlet headers at several places, in particular near the butt weld joints was also carried out.5. Catalyst tube Nos. (1) 507 (2) 512 (3) 535 & (4) 537 were radiographed at 'C' weld joint.6. 'C' and 'D' weld joints of all eight risers were D. P. tested.7. Measurement of 'bow' was performed for some suspected reformer tubes. The report is attached.8. Spring hanger readings, drain line readings were taken in cold condition before locking the catalyst tubes.

Code No.

Description

9. Cold balancing of catalyst tubes was carried out before start up.
10. VISUAL INSPECTION OF TRANSFER LINE 107 D
 The internal visual inspection was carried out. Slight bulging of the liner was noticed particularly in the areas around the risers opening. The overlap joints between the lining segments were seen to be stretched resulting in direct access to backing refractory. Maximum gap observed was about 10 mm.
 Some bulged areas were photographed for future reference.
02. H. T. & L. T. CONVECTION ZONE :
 H. T. , L. T. Convection zones, Auxiliary boiler furnace were visually inspected.
 Thickness measurement of Auxiliary boiler furnace tubes, Steam superheater coil and Mixed feed preheat coil in High temp. convection zone, steam superheater coil, B.F.W. heater coils in L.T. Convection zone was carried out.
03. L. T. S. - 104 D :
 Internal inspection was carried out visually and no abnormality was observed. Condition of wiremesh screens was found to be satisfactory. The shell was found to have assumed blackish colouration in around 2 feet length from the top. The rest of the area was observed to be greyish brown coloured.
04. CONDENSATE STRIPPER - 104 E :
 In general the shell has assumed greyish brown colouration. All the support grills of both the beds were found intact in position. No abnormality was noticed. The internal surface of the shell was found to be free from erosion/corrosion.
05. D. M. WATER TANK :
 Thickness measurement was carried out for the tank shell.

Ammonia (Inspection)

Code No.

Description

06. STEAM DRUM :

Internal inspection was carried out. One No. baffle plate was found completely displaced from its position. Number of nuts and clamps were found loose and lying scattered inside the shell. Silica like white deposits were found at right top portion at the middle length of shell having area of $1\frac{1}{2}$ " x 2".

07. CO₂ ABSORBER (101 - E):

Thickness measurement of the shell was carried out. The detailed report is attached herewith. Visual inspection was also carried out and the observations are noted below :

1. Above tray No. 1 :- No significant corrosion or pitting was observed on shell surface.
2. Between Tray 1 & 2 :- Bottom side of the shell has assumed blackish and upper side of shell has assumed reddish colouration. No significant corrosion/erosion was noticed.
3. Between Tray No. 2 & 3 :- On West wall, pitting at two places in around 3" and 4" area was noticed having a depth of around 1.5mm. On east side, M Seal is required to be applied on side supports. The shell coloration was blackish on bottom part and reddish on upper part of the compartment.
4. Between Tray No. 3 & 4 :- At two places, pitting marks were noted of appx. 1.5mm depth. Colouration was same as between 2 & 3.
5. Between Tray No. 4 & 5 :- East side tray support plate with shell was found eroded, colouration was same as between 3 & 4.
6. Between Tray No. 5 & 6 :- On upper east side support welding tacks were found cracked from its ends. At two places pitting marks of 1.0 to 1.5mm depth were observed. Colouration was same as between 4 & 5.
7. Between Tray No. 6 & 7 :- Some erosion marks were noticed in South West Zone in an area of 18" x 2" having silver white colouration. At five places pitting was observed with a depth of 1 to 1.5mm. The colouration was blackish on

Code No.	Description	Ammonia (Inspection)
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- Bottom side and silver white cum reddish on upper side. Around 6" dia area was noticed to have yellowish colouration.
8. Between Tray No. 7 & 8 :- Pitting on tray fixing support on west side was observed erosion marks on shell were also noticed with silver white colouration in the areas of 18" x 1/2" and 24" x 6". At five different places pitting marks were noticed with 1.0 to 2.0mm depth. Colouration was blackish on bottom side and white cum reddish on upper part.
 9. Between Tray No. 8 & 9 :- Blackish deposits were observed near the North East side support. On east side erosion was noticed in areas of 12" x 3", 18" x 12", 24" x 12" and 24" x 3" particularly on North West region. Colouration was blackish on bottom side and reddish on upper side of the compartment.
 10. Between Tray No. 9 & 10 :- Two welding tacks of East side support welding were found cracked. Complete compartment was found to observe reddish colouration. M-Seal applied previously was found to have come out at some places. Erosion was seen on east side in the areas of 12" x 3" and 30" x 6" as well as on West side in areas of 18" x 10", 18" x 6", 18" x 6" 18" x 3". On North wall, some pitting marks were observed. On north west side sample marks were observed. On north west side sample collection line flange was found bent from bottom side.
 11. Between Tray No. 10 & 11 :- Almost all areas of shell had erosion marks. Blackish deposits were observed near side supports on North wall. Pitting marks were also seen at various places. Tray supports side area was blackish in colouration and the remainder area was reddish cum silver whitish.
 12. Between Tray No. 11 & 12 :- Blackish deposits were observed on North side of shell. Old M-Seal was found to have opened out at various places particularly at its end joints. Erosion and pitting marks were observed at several places on shell. The shell has assumed dark reddish colouration in this area.

Code No.

Description

- 13. Between Tray No. 12 & 13 : Old M -seal found to be opened out at its ends. Blackish deposits were observed on east side. Tray fixing support was observed corroded. Almost all areas of shell has erosion marks. At middle portion on west side pitting was observed at various places with aprx. 1.0 to 2.0mm depth. Eroded areas were found silver whitish in colouration. Middle portion was blackish and support side area was reddish in colouration.
- 14. Between Tray No. 13 & 14:- Most of the shell area has observed erosion. On North west side 36" x 12" area and on South West side 36" x 18" area as well as East side shell surface are affected with erosion marks. Lower portion of about 3" of tray support welding with shell has got detached by cracking. Scattered pitting marks were observed on shell.
- 15. Between Tray No. 14 & 15 :- At several places, pitting and erosion marks are observed. Slight rusting was also observed on East side shell. on east side 3mm deep horizontal undercut was observed in the area of 6" x 1/4". East side tray supports are found corroded. In the middle portion of west side approx. 6" wide area was observed to have undercut of 1 to 1.5mm depth.
- 16. Between Tray No. 15 & 16 :- On South West wall of shell 2.0 to 2.5mm deep undercut was observed in the areas of 4" x 1" and 4" x 1/2". Tray fixing supports were found corroded. North West side support welding joints has pitting at four places having 2mm depth. East side of shell has got erosion marks. The overall colouration is reddish, white and dark blackish.
- 17. Between Tray No. 16 & 17 :- At various places pitting and erosion marks were observed. Pitting was also observed on the bottom side of tray fixing upper support. Previously applied M - Seal has detached from serveral places from its ends.

Ammonia (Inspection)

Code No.

Description

18. Between Tray No. 17 & 18 :- Tray fixing support plate is observed to have thinned down. Lot of erosions (1 to 2.5mm deep) at various places on shell side were observed. South West side top side support welding was found cracked at approx 2½" length. Pitting marks were noticed on shell at various places. On North West side 12" x 6" area was found eroded with a depth of 2mm approx. at one place and at another place 1" x 4" metal erosion of approx. 1.5mm depth was observed. Previously applied M - seal was found opened out at its ends.
19. Between Tray No. 18 & 19 :- Shell side has got lot of erosion. Pitting was also observed at several places. Previously applied M - seal has also come out from its place. Bottom support circumferential welding joint tack welds are either detached or pitted at six different places. On upper side support, at some places tack welding has got removed and approx. 0.5mm gap between shell and support plates was observed. Upper side of shell has assumed, yellowish and blackish colouration, middle has reddish and some places have brownish colouration. Previously applied M - seal has come out from several places.
20. Between Tray No. 19 & 20 :- South West side tray fixing support was observed highly corroded. Shell surface has got erosion at several places. Previously applied M - seal has come out from its ends. Colouration was dark green, yellowish at top side and remainder area was of reddish colour.
21. Almost in every compartment of the vessel needs M - seal filling to arrest purging of fluid along the shell, also to prevent further corrosion and erosion. On bottom dish end central outlet line previously applied M - seal was found removed. An undercut was also observed with a depth of approximately 1.00 to 2.00mm.

Ammonia (Inspection)

Code No. Description

08. FOLLOWING PIPE LINE JOINTS WERE RADIOGRAPHED :

1. Superheater RV - 2 joints
2. NG - 7 - 8" line joint No. 7 - 1 joint
3. PG - 6 - 18" line joint No. 3 - 1 joint
4. Absorber bottom elbow joints - 2 joints
(before ; after repair)
5. PG - 8 - 18" line joint No. 17 - 1 joint.
6. 124 - C top and bottom line joints - 2 Nos.
Root of channel nozzles with pipings +
2 Nos. final.
7. NG - 9 - 12" line joint No. 1 - 1 Joint
8. NG - 9 - 12" line joint No. 5 - 1 joint
9. NG - 8 - 12" line joint No. 7 - 1 joint
10. 14" MEA line joint - 2 Nos. (before &
after repair)

09 FOLLOWING PIPE LINE JOINTS WERE ULTRASONICALLY TESTED :

- | | | |
|--------------------------------|---|-----------|
| 1. New N. G. line | : | 29 joints |
| 2. NG - 8 - 12" | : | 7 joints |
| 3. NG - 7 - 8" | : | 9 joints |
| 4. NG - 9 - 12" | : | 5 joints |
| 5. NG - 11 - 6" | : | 17 joints |
| 6. PG - 8 - 18" | : | 6 joints |
| 7. PG - 10 - 18" | : | 3 joints |
| 8. A - 21 - 12" | : | 3 joints |
| 9. 124 C Nozzle before welding | : | |
| 10. LTS top line | : | 2 joints |
| 11. HS - 105 ATA line - 12" | : | 19 joints |

Ammonia (Inspection)

Code No.	Description
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10. THICKNESS MEASUREMENT OF THE FOLLOWING PIPE LINES WAS CARRIED OUT :

- | | |
|-----------------------|---------------------|
| 1. 102 - E to 109 - C | 30. PG - 15 - 14" |
| 2. MEA - 1 - 12" | 31. PW - 01 - 6" |
| 3. MEA - 2 - 4" | 32. PW - 17 - 4" |
| 4. MEA - 3 - 4" | 33. PW - 4 - 2½" |
| 5. PG - 10 - 18" | 34. PW - 19 - 4" |
| 6. BO - 10 - 2" | 35. PW - 31 - 12" |
| 7. BO - 11 - H - 2" | 36. MEA - 1 - 12" |
| 8. BO - 12H - 2" | 37. MEA - 2 - 4" |
| 9. BO - 13AH - 2" | 38. MEA - 3 - 4" |
| 10. BO - 14H - 2" | 39. MEA - 20 - 12" |
| 11. SG - 6 - 12" | 40. MEA - 8 - 12" |
| 12. PG - 11A - 16" | 41. MEA - 21 - 12" |
| 13. PG - 11B - 16" | 42. CO - 1A - 18" |
| 14. PG - 21 - 20" | 43. CO - 1B - 18" |
| 15. PG - 10 - 18" | 44. SG - 35 - 12" |
| 16. SG - 11 - 10" | 45. SG - 11 - 10" |
| 17. SG - 42 - 4" | 46. SG - 6 - 12" |
| 18. SG - 33 - 12" | 47. PG - 13 - 16" |
| 19. SG - 33 - 14" | 48. PG - 12AB - 14" |
| 20. SG - 12 - 14" | 49. PG - 26 - 18" |
| 21. SG - 18 - 18" | 50. MEA - 25 - 3" |
| 22. SG - 34 - 14" | 51. MEA - 26A - 2½" |
| 23. SG - 21 - 14" | 52. MEA - 26B - 2½" |
| 24. SG - 23 - 12" | 53. MEA - 9A - 8" |
| 25. SG - 25 - 8" | 54. MEA - 9B - 8" |
| 26. PG - 6 - 18" | 55. MEA - 7 - 10" |
| 27. PG - 18 - 12" | 56. MEA - 61 - 12" |
| 28. PG - 03 - 18" | 57. MEA - 11 - 14" |
| 29. PG - 14 - 16" | 58. MEA - 12 - 12" |

Ammonia (Inspection)

Code No.	Description
59. MEA - 12 12"	61. PW - 20 - 6"
60. CO. Strippers to reboilers lines.	62. Steam let down lines 105 Ata to 38 Ata.

11. FOLLOWING D.P. TEST JOBS WERE PERFORMED :

1. 105 - JT rotor on vanes and shrouds.
2. 104 - JT rotor " "
3. Riser weld joints (C & D) in primary reformer.
4. Flanged valve (super-heater RV) near auxilliary boiler.
5. Absorber bottom elbow weld joints.
6. 124 - C top and bottom channel nozzle welding.
7. 124 - C Diaphragm welding.
8. 14" MEA line joints.
9. 101 - J H.P. case rotor.
10. 124 - C drain line weld joint.

12. Magnetic field measurement on 101 J HP case, 103 JAT, 105 JT, 102 JT was carried out.

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PLANT TURNAROUND APRIL - 1988

AMMONIA PLANT

CIVIL JOBS

Code No.	Descriptions
1 sf 01 01	For Primary Reformer and H.T. L.T. Zone, necessary pressure guiniting and Refractory lining for ceiling and wall portion done (Area 140 M ²)
02	For auxiliary boiler portion, replacement of pre-cast burner blocks for burner nos. 1,3, 4, 5, done.
03.	Approx 145 nos of tunnel slabs replaced for primary reformer. Damaged Tunnel slabs were replaced by new one (total 127 Nos.) - In Row No. 8 the tunnel slabs were placed vertically. - In Row No. 1 half of tunnel slabs were placed vertically.
04.	Entrance manhole for primary reformer and auxiliary boiler repaired. Damaged portions of covedtion section castable refractory lining were repaired by L.H.V. Compound.
05.	For item Nos. 124 - C. repairing of foundation done.
06.	Strenthening of supporting pedestals for various pipelines done.
07.	G.I. Pipe line connection for safety showers provided.
08.	New PVC vinyl, Carpet (Flooring) provided to NH ₃ Control room, shift engineer's office and passage including removal of old PVC tiles.

PLANT TURNAROUND APRIL - 1988

AMMONIA PLANT
ELECTRICAL JOBS

Code No	Description
---------	-------------

- | | |
|---------|--|
| 1 61 01 | <p>01 Carried out preventive Mtce of TMG/SIEMENS LT ACBS installed at various MCCS & replaced damaged parts & wornout contacts.</p> <p>02. Carried out preventive mtce of all feeder compartments mounted on the following Mccs. Defective parts like busbar, supports, isolators, fusebases, lyra contacts, wornout contacts damaged wiring etc. were replaced.</p> <p>a) MCC - 5</p> <p>03. Carried out modification on following feeder compartments in Mccs with insulating protective guard on isolators.</p> <p>MCC - 5 :-for Nos. 103 J, 112 J, 101 J, 2004 J A/c unit temporary connection feeder.</p> |
| 1 61 02 | <p>01 Overhauled the following motors.</p> <ol style="list-style-type: none"> 1. 112 - JM 2. 103 - J Lub oil seal oil pump motor. 3. PGR Compressor <p>02 Carried out checking and tightening of following terminal boxes of motors.</p> <ol style="list-style-type: none"> 1. 2004 J 2. 123 J 3. 112 J <p>In addition to above temporary flood lights, hand lamps with 24V transformers switch boards, cables etc. were provided wherever required.</p> |

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PLANT TURNAROUND APRIL - 1988

AMMONIA PLANT

INSTRUMENTATION JOBS

Code No.

Descriptions

F 71 01

CONTROL ROOM JOBS :

1. One panel cut out was made for microprocessor based control instruments viz; FRC - 1, 2 LIC-1 & AKC - 3.
2. Installed Electronic controllers for CCC Control system of 101 J air compressor.
3. Calibrated 3/N vibration monitoring panel indicators of all four compressors.
4. Installed 15 points x 2 Nos power distribution boxes behind control panel and removed old boxes and rewired the system.
5. Installed one 110 V AC switch board behind control room panel for S/valves to transfer new electronic control system to old pneumatic system and visavarsa.
6. Installed two more electrical Junction Boxes behind panel for new electronic control system.
7. Checked complete wirings for CCC system.
8. Calibrated all Honeywell electronic recorders for Temp., vibration etc.
9. CCC control system of 101 J air compressor put in service very successfully by Mr. John, Expert from USA within four-five days from testing to commissioning.

1 71 02

FIELD INSTRUMENTS JOBS :

- 01 General cleaning, overhauling and calibration jobs of most of the important flow & pressure transmitters were carried out.
- 02 General overhauling and calibration of following leveltrols were carried out and adjusted wherever it was required. LC -14, LC -13, LC -16 - 18 - 20, LC - 15, LC - 2, LC - 12.

Code No.

Description

03 Hydraulic (Passing) test of following control valves were carried out by removing the C/valves from lines (Test carried out upto 1.5 times of its working pressure)

F I C V - 7, 8, 9, 10, 11, 15

FRCV - 3, PRCV - 4, PICV - 5, PICV - 005,

- Only PUCV - 005 was found passing which was made alright after lapping - Rest all control valves were found alright.

- Their valve positioners were cleaned and checked stroke.

- Replaced all the flange gaskets by new one.

04 General cleaning of valve positioners, stroke checking and replacing of gland packing of following control valves were carried out.

TRCV - 10, 11, 12, 142

FRCV - 1, 2, 3 FICV - 12, 14

PRCV - 1, 28, 181, 18, PICV - 13A&B, 17, 20, 25

V - 3, 4, 102, MIC - 61, MICV - 13 to 16.

05 TRCV - 10 Control Valve :

- a) Replaced one bearing of north side
- b) Replaced actuator stem since it was found bent.
- c) Replaced gland packings on both sides.
- d) Checked stroke. Found OK.

06. FRCV - 3 - It was removed from line and brought to the W/Shop.

- Complete valve was disassembled.
- Overhauled its various parts. Assembled & checked stroke.
- Tested for hydraulic leak test upto $50\text{kg}/\text{Cm}^2$ found OK.
- Fixed back in line with new gaskets.
- Its accessories like booster, S/valve regulator etc. were fixed. Checked stroke which found 3 Sec. from full close to full open.

07. FICV - 205 : was found jam. Stems also were found opened out made them straight assembled & checked stroke and put back.

Code No.

Descriptions

08 PICV - 005 :

- Complete overhauling was carried out in Inst. W/shop Since passing was observed. Lapping was carried out and it was retested. found OK. It was reassembled, checked stroke and fixed back.

09 FRCV - 1 :

- while checking stroke, its diaphragm was found punctured.
- Replaced by new one imported diaphragm. Checked stroke and found alright.

10 FRCV - 2 :

- General cleaning of positioner etc. was carried out and checked stroke, found alright.

11. FICV - 12 - 14 :

- Bottom flanges were opened out for inspection purpose found OK.
- Replaced gaskets.

Overhauled positioners, checked stroke found OK.

12. LCV - 14 : Complete overhauling & stroke checking was carried out in w/shop found OK.

13. PRCV - 18 : was opened out from bnnnet, seat/plug etc. were found OK. Stroke checking was done found OK.

14. Replaced all wiring of EYE - HYE.

15. Checked Hi - Lo alarm switches of steam drum, found OK.

16. HT - LT shift convertor D/P transmitters part of the impulse tubings were replaced by new one.

17. 103J compressor local panel shifted to new location.

- New 3/8" SS tubing was done.
- Calibrated all gauges and put back.
- Shifted dump trip switch and SI back.
- Fabricated & welded suitable platform for panel,
- Got painted.

Code No.

Description

- 18 FIC - 7-8-9-10 & 11 All Kick - back controllers shifted to new location and retubing was done as per requirement.
- 19 105J compressor local gauge panel's position changed. New $\frac{1}{2}$ " \varnothing SS impulse tubing was done as per requirement.
20. Replaced 3 nos of thermowell assembly at Tonnel out.
- 21 Replaced PIC - 13 pressure transmitter by new one. Replaced some of the impulses tubing also as per the requirement.
- 22 PS - 81 calibrated at site and changed setting from 34.5 to 35.5 kg/cm² as per requirement of P/P.
- 23 Fabricated 1* size air header for MICV - 24 to 32 Naptha control valve and installed in pri-reformer with about 20 Nos of $\frac{1}{4}$ " tapping for air supply.
24. Installed new valve positioners on MICV - 24 to 32 with regulators tubing etc. and adjusted stroke as required.
25. Most of all vibration probes of all four compressors were removed. They were checked physically.
 - Replaced wherever it was required.
 - Most of all number ferrules were replaced.
 - After mechanical jobs were over, our probes were fixed back with proper stand off gape adjustment.

PLANT TURNAROUND APRIL - 1988AMMONIA PLANTTECHNICAL DEPTT. JOBS

<u>Code No.</u>	<u>Descriptions</u>
1 81 01	Replacement of existing 600mm \varnothing Exhaustline of 103 JBT by 1050mm \varnothing .
1 81 02	Installed A.G. Supply pipeline to Auxilary boiler.
1 81 03	Installation of Orifice flow meter for I.D. Fan Turbine.

TURNAROUND - APRIL-1988
UREA PLANT
MECHANICAL JOBS

Code No.

Description

2 01 01

K- 1101/1 Pignone Centrifugal Compressor:

Front and rear journal bearings were opened.
Thrust bearing also opened for inspection,
condition of the all bearings found good.

Coupling side journal bearings clearance =
0.22 mm

Free end journal bearing clearance: 0.23 mm
Thrust bearing clearance (Axial float): 0.35 mm

Bearings were boxed up after thorough cleaning. All casing drain pipes with isolation valves were fabricated and replaced.

MATERIAL:

- 1) C.S. 1" NB x 40 Sch Seamless pipe = 36 mtr.
- 2) C.S. 1" x 800 // gate valve = 6 Nos.

2 01 02

Q - 1101/1 DRIVE TURBINE FOR CO2 CENTRIFUGAL COMPRESSOR:

De-coupled the turbine with compressor. Journal bearings were opened, inspected, clearances of journal bearings when opened = Rear = 0.20mm
Front = 0.25mm

The front end journal bearing was replaced by new one = 0.19mm clearance.

Thrust bearing was opened for inspection, condition of the thrust bearing was good.

Axial float before opening the thrust bearing = 0.012"

Axial float after boxing up the thrust bearing = 0.012"

The woodward governor was taken out, dismantled completely and reassembled after cleaning and inspection. The condition of the Woodward Governor was OK Governor drive and starting devices was dismantled, cleaned and boxed up.

L.P. Relay cylinder was dismantled, inspected and found okay. Reassembled after through cleaning.

H.P. relay cylinder was dismantled completely. Taper cone operating the bell crank lever was

found badly worn out causing problem in acceleration of the turbine. Taper cone along with matching wedge was replaced by new one. Boxed up the

H.P. relay cylinder. All lubricating points in governing valve linkages were inspected lubricated.

Code No.	Description
	<p>Over speed trip was checked. Turbine tripped at 7090 RPM speed. Turbine was in operation for about 20 hours after completion of the annual turnaround. The turbine was stopped to attend the defective drain trap of the compressor. When re-started 45 minutes after the stoppage, high vibration on inboard bearing was noticed at 3000 RPM. The turbine was stopped immediately and both journal bearings were opened for inspections. The front journal bearing found damaged. The rear journal bearing clearance was also increased. The front and rear journal bearings were replaced by new one.</p> <p>Front journal bearing clearance = 0.14 mm Rear journal bearing clearance = 0.15 mm</p> <p>Thrust bearing was inspected and found okay. The turbine was started and at 2000 RPM vibration level was found normal. But when accelerated the speed at 3500 RPM once again high vibration was observed. It was decided to open the turbine cover and inspect the rotor assembly and do needful.</p> <p>All the interconnecting pipings were disconnected. HP, LP relay cylinder were delinked.</p> <p>Opened the front, rear, thrust bearings and condition of the bearings were found okay.</p> <p>Axial float was checked with and without thrust bearing in position.</p> <p>Top half of turbine casing was lifted. During the inspection of the rotor in bottom half casing it was confirmed that turbine rotor was rubbing with seal labyrinths and intermediate stage labyrinths, Rotor was taken out and runout of the rotor was checked. Rotor was found bent by 0.11 mm . It was decided to replace the rotor and damaged labyrinths by new ones.</p>

Code No.

Description

New rotor and coupling half were brought from the Stores, coupling half was fixed on the rotor. Front rear stem seals oil guard labyrinths were replaced in top and bottom casings. Rotor was placed in position inside the bottom casing. All labyrinths clearances were checked. Float with and without thrust bearing in position was checked. Top casing was put in position. Linseed oil was applied in between casing jointing. The old bearings (Journal and thrust) were reused.

While heating the turbine continuous barring was done. During barring action it was felt that oil guard labyrinths were rubbing with turbine shaft. So clearance between the oil guard labyrinths & the rotor was increased to 0.008" in front end and 0.006" in rear end. The turbine was put in slow roll and then speeded up. Vibration levels measured was in normal limits. Overspeed trip was checked.

Turbine tripped at 6800 RPM
 Turbine was coupled with compressor. When due compressor was taken in line the performance and vibration of the turbine was found normal.

2 01 03

Q - 1101/2 STEAM TURBINE FOR PB RECIPROCATING COMP.

Float was checked before opening the front and rear end journal bearings.

- All these bearing condition was good.
- front end journal bearing clearance = 0.24mm
- Rear end journal bearing clearance = 0.24mm
- Axial float (Thrust bearing) = 0.20mm

Oil guard 'O' ring seal was replaced by new one. Starting device, Relay cylinder was taken out for overhauling. Servo piston stem guide holder plate bolt found sheared inside the control relay cylinder. Broken piece was drilled out and new bolts were used while boxing up and reinstalled the relay cylinder and starting device in position. Steam chest valve linkages were thoroughly lubricated. All existing bearings were boxed up.

Over speed trip was checked. Turbine was tripped at 9600 RPM

Urea (Mechanical)

Code No.	Description
2 01 04 01	<p><u>Q - 1001 DRIVE TURBINE FOR GHH CO2 REC. COMPRESSOR :</u></p> <p>Turbine decoupled. Axial float was checked. opened front and rear journal bearings. Thrust bearing was also taken out for inspection. Condition of both the journal bearings and thrust bearings were okay.</p> <p>Front journal bearing clearance = 0.008" Rear journal bearing clearance = 0.008" Axial float (Thrust clearance) = 0.009"</p> <p>Same bearings were put back in position. Starting device woodward governor drive, control relay cylinder chest valve linkages were opened, cleaned, inspected and found okay. Boxed up with proper lubrication wherever required. Overspeed trip was checked. Turbine tripped at 9850 RPM.</p>
02	<p><u>K- 1001 GHH RECIPROCATING COMPRESSOR :</u></p> <p>Foundation bolts of 1st and 2nd stage accumulators were found sheared. So the accumulators were taken out from its position. The existing foundation bolt size was 5/8" ϕ. It was decided to fix 1" ϕ foundation bolts. So total foundation was recasted with 1" size foundation bolts. 8mm thick plates were welded on the legs of the accumulators and new holes of 1 1/8" dia. were drilled to suit the foundation bolt pitches.</p>
2 02 01 01	<p><u>Q - 1201/A DRIVE TURBINE FOR CARBAMATE SOLUTION PUMP:</u></p> <p>Journal bearings, thrust bearings were opened and inspected. Condition of the bearings found okay. Boxed up the same bearings. Steam throttle/trip valve assembly overhauled. Over speed trip assembly was replaced by new one. Woodward Governor was flushed and filled with fresh oil. Coupling between turbine to gear box and gear box to pump were thoroughly cleaned, inspected, lubricated with fresh grease and boxed up.</p>

Code No.

Description

02 Q - 1201/B DRIVE TURBINE FOR CARBAMATE SOLUTION PUMP :

Journal bearings, thrust bearings were opened and inspected. Condition of the journal bearing was good. Same journal bearings were boxed up alongwith new thrust bearing (Deep groove ball bearing). Woodward Governor was flushed, cleaned and filled with fresh oil. Throttle/trip valve assembly was dismantled, overhauled and boxed up. Couplings between turbine to gear box and gear box to pump were opened, cleaned, inspected and boxed up with fresh grease.

2 02 02 01 Q - 1102/A DRIVE TURBINE FOR AMMONIA FEED PUMP:

Front and rear journal bearing were opened, inspected.

Front journal bearing clearance = 0.0055"
Rear journal bearing clearance = 0.008"

Since the clearances of rear journal bearing was more new reconditioned bearing was used with 0.0055" clearance. Thrust bearing (Deep groove ball bearing) was replaced by new one.

Steam throttle valve trip valve assembly was dismantled, overhauled and boxed up with new gaskets. Woodward governor was flushed and filled with fresh oil.

02 GEAR BOX BETWEEN TURBINE AND AMMONIA FEED PUMP:

Top cover lifted. (High speed shaft, input shaft) bearings were taken out for inspection. Heavy rearing on the bearing was noticed. Driven end bearing clearance was increased to 0.009". So high speed shaft was polished thoroughly and both journal bearings were replaced.

Drive end bearing clearance = 0.005"
Drive end bearing clearance = 0.005"

Intermediate shaft, output shaft roller bearings were cleaned, inspected and found okay. Some pitting on gear teeth were noticed on intermediate and output shaft gears. These gear teeth were polished by using oil emery stones. Fresh oil was filled after thorough cleaning of the gear box and internals.

Coupling between turbine to gear box and gear box to pump were cleaned, lubricated and boxed up.

Code No.	Description
2 02 03	<p><u>Q - 1113 DRIVE TURBINE FOR LUBE OIL PUMP:</u> Decoupled, top half casing lifted, rotor was taken out. Inspected the rotor and found okay. Replaced the bearings by new ones and boxed up the turbine. The mechanical governor was completely dismantled and replaced the control valve steam. The turbine was checked for overspeed trip. The turbine was tripped at 1900 RPM. The turbine running speed was set at 1550 RPM.</p>
2 02 04	<p><u>CARBAMATE PUMP 'A' P - 1201/A/B :</u> Crank case Covers removed. All the crank case internals were checked. All the bolts of the crank case internals were checked by torque wrench and found okay. Crank lube replaced by fresh oil. Coupling between pump and gear box was cleaned and lubricated with fresh grease. Suction, discharge main fold valves were replaced by reconditioned set.</p>
2 03 01	<p><u>BUCKET CHANGING MECHANISM:</u> Bucket changing mechanism top and bottom bearings were thoroughly lubricated. Mechanism chains were cleaned, inspected, lubricated. Prill bucket shaft assembly of 'B' bucket was dismantled, bearings replaced by new ones. Oil seal and oil seal ring were replaced by new ones. Assembled after lubrication. Prill bucket 'A' was taken to the workshop and was dynamically balanced by our inspection dept. staff. Both variators oil drained, flushed with flushing oil and fresh oil was filled.</p>
2 03 02	<p><u>PRILL TOWER I.D. Fans. K - 1401/1 to 4 :</u> Following jobs carried out.</p> <ol style="list-style-type: none"> 1) Fan blades were cleaned with steam and inspected. Condition of the blades was good. 2) Removed the bearing top half covers, bearings were cleaned and inspected. Bearings found okay. 3) Bearings were boxed up after lubricated with fresh grease. 4) Alignment of the fans with the motors was carried out after overhauling of motors.

Urea (Mechanical)

Code No.	Description
2 03 03	<u>M - 1402 PRILL TOWER SCRAPPER :</u> Flushed the oil of Scraper gear box and fluid coupling.
2 13 01	<u>FOLLOWING COOLERS/HEAT EXCHANGERS TUBES WERE CLEANED BY HYDROJETTING:</u> 1) Surface condenser : H-1114 2) Circulation system cooler : H-1207 3) Flash tack condenser : H-1421 4) Ist evaporator condenser : H-1423 5) IInd evaporator 1st conde nser. : H-1425 6) IInd evaporator 2nd conde nser. : H-1426 7) Vent condenser : H-1502 8) Recirculation heater : H-1204 9) Main lube oil cooler : H-1113 10) Lube oil cooler : H-1123(K-1101/2) 11) Crank case lube oil cooler: H-1052 A/B for K -1001 12) Lube oil coolers for P - : 1102 A/B 13) Lube oil coolers for : H-1201 A/B
2 13 02 01	<u>H.P. STRIPPER H - 1201 :</u> Interconnecting pipings to the top and bottom covers were removed. Top and bottom cover bolts were loosened by using bolt tensoning device at 450 - 500 kg/Cm2 pressure. Tack welds joining ferrules to the false tube sheet were removed by grinding. False tube sheet made in 6 pieces was taken out. All 2098 ferrules were also removed and delta pressure was carried out. All the tubes have been measured for wall thickness over a length of about 3 meters from the top by M/s. Stami-Carbon personnels.

Urea (Mechanical)

Code No.	Description
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Results are as under :

1 tube	3.20mm	Wall thickness
12 tubes	3.15mm	Wall thickness
103 tubes	3.10mm	Wall thickness
403 tubes	3.05mm	Wall thickness
651 tubes	3.00mm	Wall thickness
439 tubes	2.95mm	Wall thickness
198 tubes	2.90mm	Wall thickness
164 tubes	2.85mm	Wall thickness
123 tubes	2.80mm	Wall thickness
3 tubes	2.75mm	Wall thickness
1 tubes	2.70mm	Wall thickness

The average wall thickness calculated is 2.97mm.
 The average wall thickness in April, 1986 was 3.08mm.
 Average corrosion rate 0.06mm/Year based on eff.
 on streamtime of 637 days.

Wall thickness measurement of the overlay welds
 by PERMASCOPE :

Top	: Cylindrical part liquid phase
Bottom Cylindrical part	: 9-10mm
Item spperied part	: 9-10mm
Cover	: 8.5-9.5mm

TUBE SHEET CHECK :

Both tube sheets (top 100% & Bottom 50%) have been checked for corrosion. In the bottom cover level indicator was modified as recommended by M/s. Stamicarbon. See the drg. No. O2-DS-10117.

Existing radioactive source indicator block was removed by grinding necessary slots as recommended, were made by machining in our workshop, then indicator block was rewelded by using thermanit 19/15. electrodes.

16 Nos ferrules (liquid dividers) were repaired in workshop by blocking the existing holes by welding using 19/15 H/electrodes and redrilling 3 Nos. of holes of 2.3mm \varnothing 60° apart from each existing holes.

Average delta pressure of these 16 Nos of ferrules was found to be 200mm of water. All the tubes were cleaned by DM Water. Out of 2098 existing ferrules 2072 ferrules were reinstalled in its position.

Code No. Description

16 Nos ferrules repaired in Workshop were installed on the location shown in the Fig.No.1. False tube sheet was placed in its place. All 2098 teflon seal sleeves were replaced by new ones. After installing all the ferrules and false tube sheet delta H checked in its position by the production dept.

All the ferrules (liquid divider) were tack welded with false tube sheet by TIG welding by using 19/15 H DEW Thermanit.

Top and bottom covers were boxed up with new gaskets bolts were tightened by using bolt tensioning device at pressure of 450 Kg/Cm². All interconnecting pipings and steam tracing lines were boxed up.

02 H.P. CONDENSER (H-1202) :

Interconnecting piping including steam tracing lines were removed from top and bottom covers. Top and bottom cover bolts were loosened by using bolt tensioning device at pressure of 480Kg/Cm².

OBSERVATION AFTER OPENING THE TOP AND BOTTOM COVERS :

Observations during visual inspection are as below :

- In the top channel the manual overlay welds were roughened at places where no oxide layer was present.
- The cylindrical liner part was smooth in the area under the gas inlet and slightly roughened opposite the gas inlet.
- The tube sheet overlay welds and tube to tube sheet welds were grey and smooth. The protruding tube ends of the main part of the tubes were rather smooth. The tube ends of some tubes in the affected areas were heavily corroded.
- Inside many tubes in these areas an oxide layer could be seen. So no proper liquid distribution has taken place.
- The overlay welds of the top cover were smooth.
- In the bottom the manual overlay welds and tube to tube sheet welds were grey and smooth. Some protruding tube ends showed a slight cross cut end attack.
- Some tubes showed selective attack at the heat affected zone at the inside of the tube.

Urea (Mechanical)

Code No.	Description
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- Plugged tube No. 128 was found leaking.
- The liquid inlet nozzle bottom position was found cracked from its welding.
- Wall thickness measurement of the liner at top and bottom parts were 4.9 - 5.1mm and 5.1 - 5.3mm respectively.
- Wall thickness measurement of the tubes :-
(Some tubes have been measured over the entire length as have been done in April, 1986)

27 tubes	2.60mm
15 tubes	2.55mm
9 tubes	2.50mm
3 tubes	2.45mm
Average wall thickness.	2.51mm
Average wall thickness in April, 1986 was	2.53mm

- Wall thickness measurement of all tubes in the tube sheet area of the top tube sheet was carried out.
Another 29 tubes have been found with a wall thickness of 1.90mm or less in the top tube sheet. For the location see tube sheet lay out Annexure-I. Complete inspection of the high pressure vessels area carried out by the stamicarbon Inspectors. They recommended to carry out the following repairs.
 - 1) Leaking plugged tube No. 128 in the bottom of high pressure carbamate condenser by drilling out both plug and tube and weld a new plug in to the tube sheet as per stamicarbon recommendation.
 - 2) Plug the tubes in the Carbamate Condenser with a wall thickness of 1.90mm or less (29 tubes).
 - 3) In order to improve the liquid distribution in the top of HP Condensor, following modifications were recommended by Stamicarbon.
 - a) Remove the baffle and the half pipe piece of the gas inlet pipe in the top channel. Install by means of 4 rigid support strips a baffle of dia 300mm at a distance of 150mm from the outlet of gas inlet pipe. the angle

Urea (Mechanical)

Code No.	Description
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of this baffle should be such that no gas can hit directly the main distributor tray.

- b) Drill 150 additional holes dia 8mm, equally devided over the surface of the tube distributor tray in the pall ring basket, starting from the outer periphery of the tray.
- 29 Nos tubes were plugged. On the top tube sheet, tubes were drilled out and plugs were welded into the tube sheet as shown in 'A' of Annexure-III. In the bottom same tubes were plugged by putting the plugs inside the tube and then by welding as shown in 'B' of Annexure-III (TIG welding by using 19/15H DEW Thermanit.
- The leaking tube (Tube No.128) was drilled out from the bottom tube sheet and new plug was welded into the tube sheet as shown in 'A' of Annexure-III (Tig welding by using 19/15H DEW Thermanit.)
- The gas inlet pipe modification was carried out as recommended by Stamicarbon using Thermanit 19/15H electrodes (See Annexure -IV).
- Drilled 150 additional holes of 8mm dia on the surface of tube distributor tray in the pall ring basket, (See Annexure- VA, V3).
- A new liquid distributor tray was fabricated in our workshop was installed inside the top channel. Gap between the shell and the liquid distributor tray was maintained between 3-5mm.
- Liquid inlet nozzle weld crack was repaired by grinding the cracked area and rewelding by using Thermanit 19/15 H electrode.
- Top cover was boxed up with new S.S.+ asbestos layer gasket after fixing the fall ring basket with rashing rings in its position. Top cover was tightened at 450Kg/Cm² pressure by using bolt tensioning device.
- Bottom cover was boxed up with new alluminium gasket and bolts were tightened at 450Kg/Cm² pressure by using bolt tensioning device.
- All interconnecting pipings were fixed along with steam tracing lines. Where the vessel was pressurised to 145Kg/Cm² no leakage was observed.

Code No.

Description

03 V-1201 REACTOR (AUTO CLAVE) :

Top cover and interconnecting piping was removed (Both were loosened at 480Kg/Cm² pressure by using bolt tensioning device

One piece of liquid distribution tray each from 10 compartments were removed. Hand lamps and ladders in every compartment was provided for entering the vessel for inspection.

Wall thickness of measurement of the liner was carried out on compartment No. 1 5, and 9 (From top to bottom).

READING :

Comp. No. 1	Min 5.2	Max 5.6mm	AV-5.4mm
Comp. No. 5	Min 5.2	Max 5.7mm	Av-5.45mm
Comp. No. 9	Min 5.1	Max 5.5mm	Av-5.3mm

The decrease in thickness since last inspection varies from 0.07mm in the top, 0.10mm in the middle and 0.06mm in the bottom. Max. corrosion rate is about 0.05mm/year.

Some clamps had severe corrosion. Some U-clamps to liner welds had defects which need to be repaired.

In the bottom compartment some pinholes were present in the circum ferential weld and in the weld of the down comer nozzle.

Weld defects such as pin holes, lack of fusion etc. of the 'U' clamps to liner welds in the auto-clave were carefully ground and was rewelded by TIG welding was not possible, in such places repairing was carried out by arc welding by using Thermanit 19/15 H welding electrode.

Sieve trays were boxed up. Top cover was boxed with new alluminium gasket. Cover bolts were tightened at 450Kg/Cm² pressure by using bolt tensioning device.

2 13 03 01

Opening of the channel covers, interconnecting pipings and box up the same of following heat exchangers were carried out by the contractor :

- 1) H - 1421
- 2) H - 1423
- 3) H - 1425
- 4) H - 1426

Urea (Mechanical)

Code No.	Description
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02	Some tubes in the following heat exchanger were found partially or completely choked.
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- 1) H-1421
- 2) H-1423
- 3) H-1425
- 4) H-1426

The above heat exchangers are U-tube heat exchanger installed vertically at the height of approx. 20 meters. Cleaning or clearing the partially or completely choked tubes was very difficult task at its position. So it was decided to bring the tube bundle of H - 1426 to the ground and try to clear the choking tubes in horizontal position. If succeeded in this heat exchanger all other tube bundles can be brought to the ground floor and can be tried for clearing the choked tubes.

It was not succeeded to clean the choked tubes in horizontal position. So the tube bundle was put back in its position.

H-1425 Exchanger Tubes were externally cleaned by Hydrojetting through the opening made in impingement plate.

2 14 01

STEAM LEAKS JOBS WERE CARRIED OUT AS PER THE JOB LIST :

Material Consumed :-

- | | |
|---------------------------------|------------|
| 1) C.S. x 800 # ½" gate valve | : 10 Nos |
| 2) C.S. x 800 # ½" globe valve | : 6 Nos. |
| 3) C.S. x 800 # ¾" gate valve | : 6 " |
| 4) C.S. x 800 # 1" gate valve | : 6 " |
| 5) C.S. x 1500 # 1" globe valve | : 2 " |
| 6) C.S. x 600 # 1½" gate valve | : 3 " |
| 7) C.S. x 600 # 2" gate valve | : 4 " |
| 8) Steam traps ½" size | : 4 " |
| 9) Steam traps ¾" size | : 2 " |
| 10) C.S. Pipe ½", NB 40 Sch | : 12 Mtrs. |
| 11) C.S. Pipe ¾" NB 40 Sch | : 6 Mtrs. |

Code No.	Description
2 15 01	<p><u>4 ATA STEAM DRUM V-1501 :</u> <u>BOILER INSPECTION BY CHIEF INSPECTOR OF BOILERS:</u> Manholes of steam drums were opened. Thoroughly cleaned inside the boiler drum. 2 nos. of riser cover plate were found fallen inside the vessel by shearing all holding bolts. All new bolts were tack welded and the plates were refixed in its place. Thickness measurement of boiler drum was carried out by inspection section condition of the boiler drum inside was found okay. All the interconnecting piping, bands to the boiler drum were checked for thickness reduction and found no abnormality.</p> <p>Suitable necessary blinds were provided to all inter connecting pipings including R.V. to facilitate hydrotesting of the boiler drum. Hydrotesting of the boiler drum was done at 9.8 Kg/Cm² by chief inspector of boilers on 28.4.88. The same day open inspection of the boiler drum from inside was also carried out by chief inspector of boilers.</p> <p>All the blinds were removed and manholes were boxed up with new gaskets.</p> <p>Both relief valves were tested and reinstalled.</p>
2 16 01	<p><u>NH₃ FILTER V-1102 :</u> Opened the filter cover and filter cloth were inspected and found okay. Boxed up with new gasket.</p>
2 16 02	<p><u>INTER COOLER AND AFTER COOLER SEPARATORS :</u> <u>FOR K -1101/1, V-1111 and V-1112 :</u></p>
01	<p><u>Inter cooler Separator V-1111 :</u> Opened the top cover and the demister pad was taken out. First layer of wires on demister pads was found damaged. During 1987 shutdown new demister pad was installed made from SS 316 material.</p> <p>This time new demister pad made from SS 321 material was installed. Boxed up after thorough inspection inside the vessel by inspection department.</p>
02	<p><u>After Cooler Separator, V-1112 :</u> Opened the top cover and the demister pad was taken out for inspection and found okay. During 1987 Turn-around demister pad was installed made from SS 316 material. Inspected inside the vessel and boxed up with existing demister pad.</p>

Urea (Mechanical)

Code No.	Description																
2 17 01	<p><u>VALVES RECONDITIONING AND REPAIRING :</u></p> <ul style="list-style-type: none"> - Ammonia to HP condenser flow indicator and isolation valve replaced by new one. C.S. 1" size x 1500 # globe valve - 1 No. - C.S. 1" size x 1500 # globe valve spindle with bush was replaced. - Ammonia pump 'B' suction line 4" x 600 # C.S. gate valve bonnet opened, gate lapped and boxed up - 1 No. - Ammonia pump 'B' discharge line isolation valve 4" x 900 # was replaced by reconditioned one - 1 No. - NH₃ to pre-heater isolation valve bonnet opened. spindle with bush replaced. - High pressure isolation valves were overhauled. <table style="margin-left: 40px; border: none;"> <tr> <td>1) Carbamate pump discharge line</td> <td style="text-align: right;">: 4 Nos.</td> </tr> <tr> <td>2) Carbamate pump recycle valves</td> <td style="text-align: right;">: 2 Nos.</td> </tr> <tr> <td>3) H.P. Condenser - Carbamate to condenser.</td> <td style="text-align: right;">: 3 Nos</td> </tr> <tr> <td>4) H.P. Condenser- NH₃ to condenser</td> <td style="text-align: right;">: 2 Nos</td> </tr> <tr> <td>5) Carbamate to H.P. Scrubber</td> <td style="text-align: right;">: 2 Nos</td> </tr> <tr> <td>6) CO₂ to HP Scrubber</td> <td style="text-align: right;">: 2 Nos</td> </tr> <tr> <td>7) High pressure flush water line</td> <td style="text-align: right;">: 8 Nos</td> </tr> <tr> <td>8) NH₃ to autoclave and its by pass valve.</td> <td style="text-align: right;">: 2 Nos</td> </tr> </table> 	1) Carbamate pump discharge line	: 4 Nos.	2) Carbamate pump recycle valves	: 2 Nos.	3) H.P. Condenser - Carbamate to condenser.	: 3 Nos	4) H.P. Condenser- NH ₃ to condenser	: 2 Nos	5) Carbamate to H.P. Scrubber	: 2 Nos	6) CO ₂ to HP Scrubber	: 2 Nos	7) High pressure flush water line	: 8 Nos	8) NH ₃ to autoclave and its by pass valve.	: 2 Nos
1) Carbamate pump discharge line	: 4 Nos.																
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7) High pressure flush water line	: 8 Nos																
8) NH ₃ to autoclave and its by pass valve.	: 2 Nos																
2 17 02	<p><u>REPAIR/REPLACEMENT OF NRV'S :</u></p> <p>NRV'S were dismantled, seats machined wherever required, lapped and boxed up with new gasket.</p> <ol style="list-style-type: none"> 01. CO₂ to HP Stripper (H-1201) 02. NH₃ To HP Condenser ((H-1202) seat machined 03. Carbamate to HP Condenser (H-1202) seat machined 04. NH₃ to Auto Clave (V-1201) 05. Carbamate to HP Scrubber (H-1203) seat machined. 																
2 17 03	<p><u>RELIEF VALVES REPAIR/REPLACEMENT AND TESTING :</u></p> <p>Following relief valves were dismantled and assembled after overhauling. Testing was carried out at required pressure.</p> <table style="margin-left: 40px; border: none;"> <thead> <tr> <th style="text-align: center;"><u>VALVE</u></th> <th style="text-align: center;"><u>TEST PRESSURE</u></th> </tr> </thead> <tbody> <tr> <td>1) RV - 1201 A/B/C HP System</td> <td style="text-align: right;">161.0 Kg/Cm²</td> </tr> <tr> <td>2) RV - 1202 A/B/C LP System</td> <td style="text-align: right;">86 psi</td> </tr> </tbody> </table>	<u>VALVE</u>	<u>TEST PRESSURE</u>	1) RV - 1201 A/B/C HP System	161.0 Kg/Cm ²	2) RV - 1202 A/B/C LP System	86 psi										
<u>VALVE</u>	<u>TEST PRESSURE</u>																
1) RV - 1201 A/B/C HP System	161.0 Kg/Cm ²																
2) RV - 1202 A/B/C LP System	86 psi																

Urea (Mechanical)

Code No.

Description

	<u>VALVE</u>	<u>TEST PRESSURE</u>
3)	RV - 1203 Carbamate Pump	3.5 Kg/Cm ²
4)	RV - 1204 Suction line	8.5 Kg/Cm ²
5)	RV - 1205 Carbamate pump	161.0 Kg/Cm ²
6)	RV - 1206 Discharge line	161.5 Kg/Cm ²
7)	RV - 1102 Ammonia suction vessel	31.5 Kg/Cm ²
8)	RV - 1108 Cold Ammonia line	31.0 Kg/Cm ²
9)	RV - 1110	31.0 Kg/Cm ²
10)	RV - 1st Stage of K-1101/2 (PB Comp.)	
11)	RV - 2nd Stage of K-1101/2 (PB Comp.)	
12)	RV- 3rd Stage of K-1101/2 (PB Comp.)	161.5Kg/Cm ²
13)	RV-Ist stage of K-1001/ (GHH Comp.)	41.0Kg/Cm ²
14)	RV-IIInd stage of K-1001 (GHH Comp.)	81.0 Kg/Cm ²
15)	RV-IIIrd Stage of K-1001 (GHH Comp.)	158.0 Kg/Cm ²
16)	RV- 1501 X (4 ata steam	92 PSI
17)	RV- 1502 X drum)	92 Psi

GT-1664

Urea (Mechanical)

Code No.

Description

2 19 01

VESSEL AND TANKS INSPECTION/REPAIR :

01 CO₂ KNOCKOUT DRUM V-1101 :

Opened the manhole for inspection of the demister pads and internals. Condition of the demister was found okay. Epoxy paint was applied inside the knockout drum. Boxed up after complete inspection inside by inspection dept.

02 RECTIFYING COLUMN V-1202 :

Top dished end along with nozzle was taken out. Internals were inspected and found okay. Boxed up the dished end with new gasket. All steam tracing lines were replaced by new ones around the dished end.

03 LP ABSORBER V-1203

Top and bottom manholes were opened, condition of the rashings bed support, liquid inlet nozzle was found alright. Boxed up the manholes with new gaskets after inspection inside the vessel by inspection department.

04 DESORBER V-1301 :

Top and bottom manholes were opened. Inspected the 1st and last set of Trays found the condition of the trays normal. No bolts were found loose. Boxed up the manhole with new gasket.

05 UREA SOLUTION FILTER V-1409 A&B :

Opened the top covers. Taken out the cage along with the filter cloth. In 'A' filter cage tack weldings were found crack. Repaired the cage and boxed up the covers by installing new filter cloth and new gaskets.

06 FIRST EVAPORATOR SCRUBBER V-1423 :

Opened the manhole for inspection. Removed one piece each of every set of tray and inspection was carried out. Some tray holding bolts found loose were tightened. Condition of the demister pad was okay. Refixed the tray pieces and manhole was boxed up with new gasket.

07 23 ATA SATURATOR V-1502 :

Manholes were opened and boxed up with new gaskets after cleaning and inspection inside. Thickness measurement of the vessel was also carried out.

Urea (Mechanical)

Code No.	Description
08	<u>9 ATA SATURATOR V- 1503 :</u> Opened the manhole for inspection. Inspected 23 urea inlet distributors and its supports. 2 Nos. 'U' clamps found loose. Supports clamps were tightened. Thickness measurement was carried out by inspection dept. Boxed up the manhole with new gaskets.
09	<u>NH₃, H₂O TANK T- 1301 :</u> Opened the manhole for inspection and cleaning. All inter-connecting pipings, drains, manholes were provided with blinds. During whole shutdown period MEA from ammonia plant was stored in this tank for isolation purpose of the strippers and CO ₂ absorber as per ammonia plant requirement. All the blinds were removed after MEA was transferred to Ammonia plant. Tank was thoroughly cleaned by hot condensate before final boxing up the manholes.
10	<u>UREA SOLUTION TANK T-1401 :</u> Manholes were opened for general inspection and cleaning. Boxed up after thorough cleaning and inspection by the inspection dept staff. No abnormality found inside the tank.
11	<u>STEAM CONDENSATE TANK T-1501 :</u> Manhole covers were opened for cleaning inspection and thickness measurement.
12	<u>2ND EVAPORATOR H - 1424 :</u> Manhole was opened and inspected the internals. Boxed up with new gasket.
13	<u>1ST EVAPORATOR H - 1422 :</u> Manhole was opened, inspected the internals. Rashing bed was okay. Boxed up the manhole after carrying out inspection inside by inspection department.
14	<u>L.P. VENT SCRUBBER V-1206</u> Manhole was opened for inspection and same was boxed up with new gasket, Condition of the vessel was okay.
15	<u>CO₂ SPRAY COOLER H - 1104 :</u> Spray cooler sump was drained. After thorough cleaning, inspection of the sump; same was painted with 2 coats of epoxy paint inside the sump.

Urea (Mechanical)

Code No.

Description

16 CCS- I WATER COOLER H-1206 :

Cooling water inlet pipe was removed, strainer was taken out, cleaned and boxed up the strainer and cooling water inlet pipe with a new gasket.

17 CCS-II COOLER H-1207 :

Cooling water inlet and outlet pipes were removed, Channel cover was also taken out. Tube bundle was totally pulled out from the shell. Gasket seating surfaces on the tube sheet and shell were found with radial cuts through which condensate was leaking. All the radial cuts were repaired by welding and were ground smooth.

New aluminium gasket of 3mm thick was made in our workshop was installed between tube sheet and shell flange, replacing the jacketed asbestos gasket. Asbestos style 51 gasket 1.5mm thick was used between tube sheet and channel cover. Boxed up channel cover, cooling water pipings. No leakage was found after putting the exchanger in service.

18 DESORBER COOLER H - 1301 :

The plate type heat exchanger was installed during annual turnaround of April 1986. After 14 months of its service exchanger started leaking from its gasket placed between each plates. It was observed that gasket material (Nitrile rubber) were getting swollen and was coming out from its position. Everytime the leakage was stopped by applying fast curing M-seal compound on leaking area. New gaskets were procured (Material AL-EDPM) as recommended by the exchanger supplier.

Complete exchanger was dismantled. All the existing gasket were removed, plates were thoroughly cleaned by nylon wire brush and then by diluted hydrochloric acid. New gaskets were pressed on the plates using gasket compound and were stacked one on another and weight was put on the stack for 18 Hours. Then the plates along with stuck gasket were assembled and tightened in the system.

Code No.

Description

103mm gap was maintained between exchanger holding plates. Ammonical water side was hydrotested at 14Kg/Cm² process water side was hydrotested at 18Kg/Cm² found Okay.

19 VENT CONDENSER H-1502 :

Channel cover was opened. 'U' tubes were cleaned by hydro-jetting. The exchanger tubes were hydro tested at 6 Kg/Cm² pressure. and found no leakage from any tube. Boxed up the channel cover and cooling water lines.

20 2ND STAGE EVAPORATOR / CONDENSER H-1425 :

Spool piece connecting booster ejector with 2nd stage evaporator/condenser was removed. About 6" height layer of material like tribrat was found deposited between impingement plate and shell. That material was removed by hydro jetting.

An octagon (24" flat to flat) was cut from the impingement plate just in front of the gas inlet nozzle connection. This modification was suggested by M/s. Stamicarbon to improve gas distribution and better condensation. This octagon shaped piece was removed by grinding. It was also suggested to provide 4 Nos. 1" ϕ weep holes just near the bottom weld joint between shell and impingement plate. 4 Nos. weep holes of 1" hole 90 apart was provided by using arc cut rods and grinding.

Production department suggested to provide 4 Nos. 1" nozzle connection 45" apart from each weep hole to facilitate condensate flushing during every prill shutdown. Accordingly 4 nos. 1" nozzle were welded on the shell as shown in figure and all 4 nozzles were interconnected with 1½" ϕ pipe header with 1 no. isolation valve, 9 ata steam connection with reducer to 1½" valve was also fabricated.

During 1987 annual turnaround booster ejector nozzles were removed as desired by production department. Along with the 2nd stage evaporator/condenser modification it was also desired to reinstall the booster ejector nozzles and to have the trial of booster ejector operation.

After booster ejector was put in the operation. 2nd stage evaporator/ condenser vaccum was achieved 740mg of water. Trial was carried out by keeping the booster ejector out of service and the vaccum achieved in evaporator condenser was 710mg of water.

Code No.

Description

21 L.P. CARBAMATE CONDENSER H-1205 :

1. L.P. Carbamate condenser was leaking from shell due to the cracks on shell just below the supporting lugs at two different places, just opposite to each other. Both lugs were removed by gas cutting. Reinforcement pad was removed by grinding. Crack on the shell was ground and checked by D.P. Test. Then cracks were repaired by welding. New reinforcement pad was also welded. Supporting lugs were newly fabricated and welded.
2. Before the annual turnaround very high vibration of complete condenser was noticed. During the analysis it was found that baffle plates were chattering heavily with shell causing reduction in thickness of the shell in baffle plate areas. Bottom most two baffles area on the shell was more damaged. Carbamate started leaking from those areas. So it was decided to lock the baffles to prevent further damage to the shell.

Reinforcement patch plate was welded on the area where bottom most two baffles were coming in contact with the shell. On each patch plate at equal distances 4 Nos. holes were made through shell just coinciding the baffle location. 200mm x 100mm x 25mm thick SS 304 plate with threaded holes of 1" BSW were welded on those areas so that jack bolts fixed in 25mm thick plates were passing through patch plate and shell and pressing the baffle. Hence by locking the baffle and preventing chattering with shell.

Existing bottom locking arrangement for preventing shell swinging action was reinforced by regrouting them using aralidate. One more locking point was provided apart from existing 4 nos. when the condenser was put into service the swinging action of the exchanger shell and chattering of the baffle were found minimised.

MATERIAL CONSUMED :

- a) SS 304, 12mm thick : 1 No.
Plate 6000mm x 200mm
- b) SS 304, 25mm thick : 8 No.
plate 200mm x 100mm
- c) SS 304, bolt with nut : 8 No.
1" BSW x 150mm long

Urea (Mechanical)

Code No.	Description	
	d) SS 304, plate 400mm x 300mm	: 2 Nos
	e) C.S. Plate 15mm thick 500mm x 500mm	: 4 Nos.

2 20 01

FABRICATION WORK CARRIED OUT THROUGH CONTRACTOR :

01 Heavily corroded pipes connecting to condensate tank, 23 ata to 9 ata steam drum and in other areas of urea plant were fabricated and replaced by the contractor :

Material Consumed :

- | | | | |
|----|---|------------|--|
| 1. | 3/4" C.S. Pipe | 6.2 Mtrs. | |
| 2. | 1/2" C.S. Pipe | 3.0 Mtrs. | |
| 3. | 1" C.S. Pipe | 40.0 Mtrs | } Condensate lines
} connecting with
} condensate tank |
| 4. | 1 1/2" C.S. Pipe | 9.0 Mtrs | |
| 5. | 2" C.S. Pipe | 33.0 Mtrs. | |
| 6. | 3" C.S. Pipe | 9.8 Mtrs. | |
| 7. | 4" C.S. Pipe | 41.0 Mtrs. | 23 ata to 9 ata |
| 8. | 3/4" C.S. Pipe | 36.0 Mtrs. | L-1101/1 casing
drain lines. |
| 9. | Necessary elbows, valves and tees were also replaced. | | |

02 Modifications carried out during previous year on I.D fan covers were removed by gas cutting.

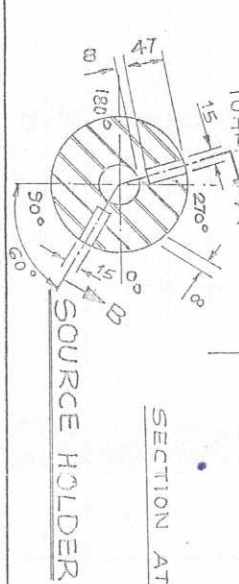
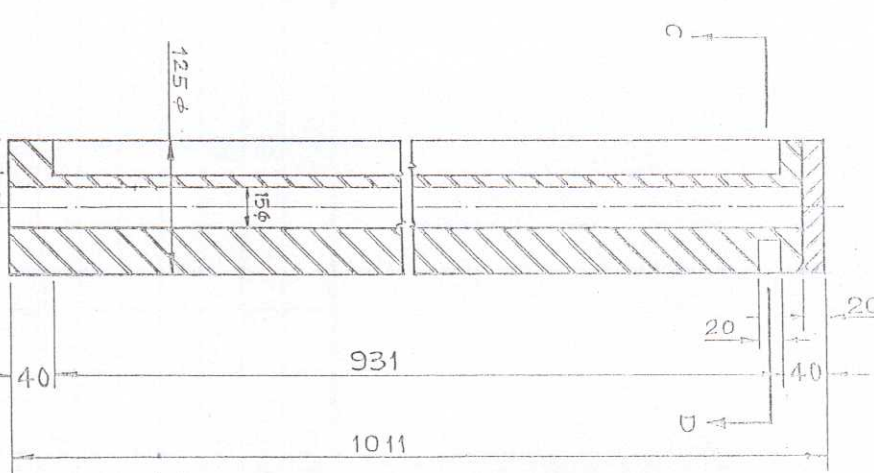
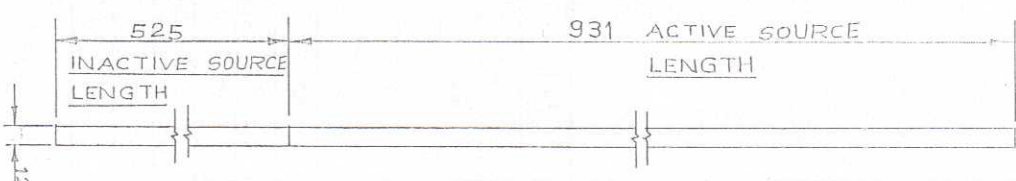
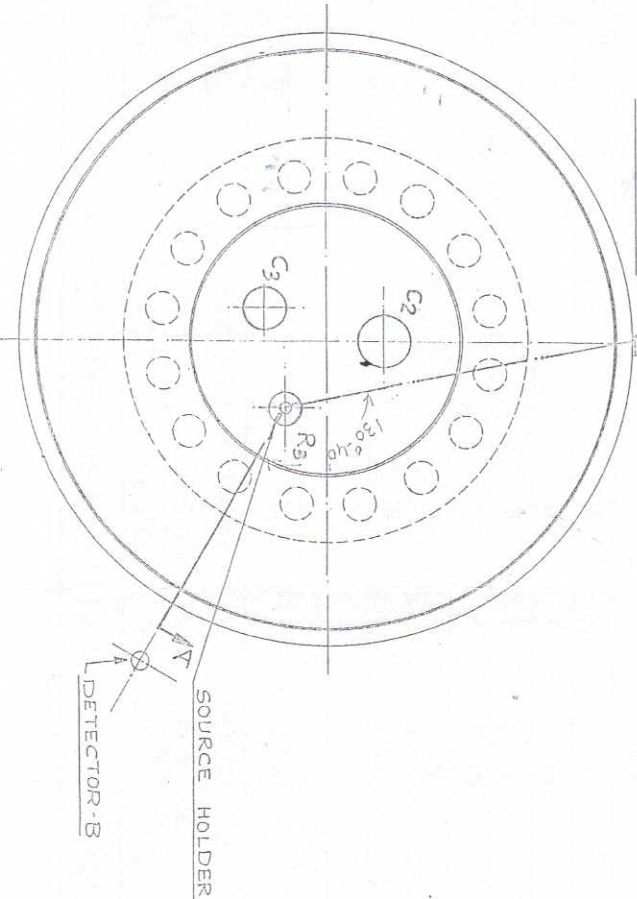
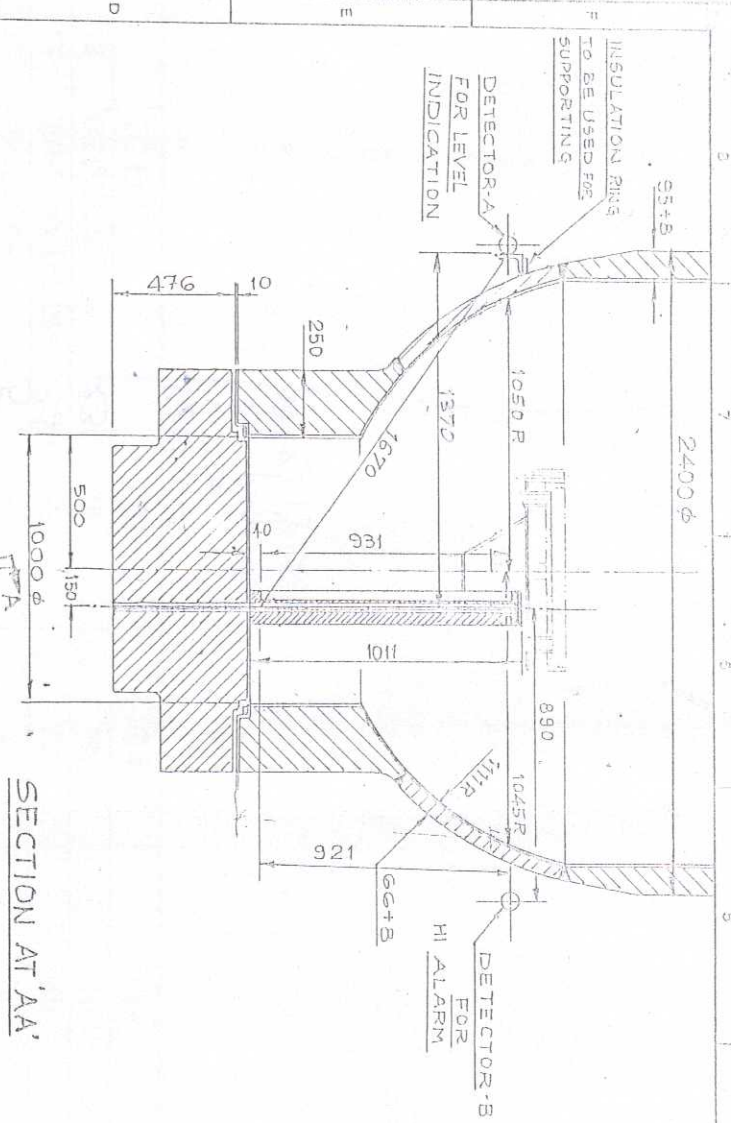
2 21 01

01 JOB CARRIED OUT BY THE CPI DEPARTMENT, M-1403 :

01 Conveyor was modified to suit the requirement of prill cooling system. Existing 3mm thick skirtboard plates were cut by 6" and new 6mm plate was welded. Conveyor belt was replaced by new one. The existing drive system was modified by new higher capacity gear box with motor was installed. In the other end reversible drive gear box with motor was installed.

02 M - 1419 :

- Skirt rubber was replaced.
- Gear box oil flushed out and filled with fresh oil.
- Worn out 2 Nos. return rollers replaced.
- Conveyor belt was inspected and found okay.

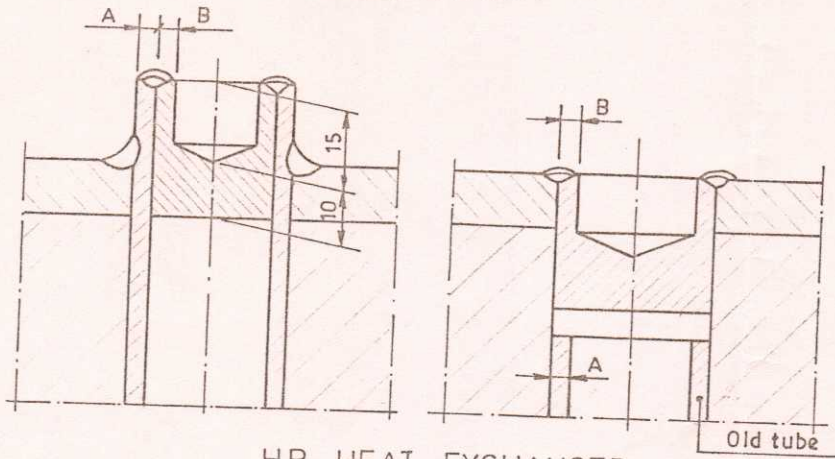


DRAWING NO.		PLANT		NUMBER		SHEET	
INDIAN FARMERS FERTILISER CO-OP. LTD. KALOL		RADIO ACTIVE LEVEL INDICATOR FOR STRIPPER		H - 1201		OF	
NAME	DATE	PLANT	EWB No.				
DRN	4/13/4.4.81						
CHD	22/05/81						
APD	11-7-81						
SCALE:-							

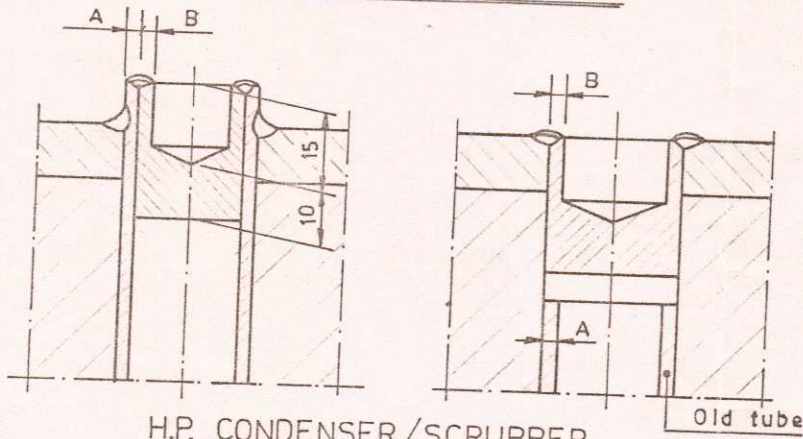
P. NO 87

88

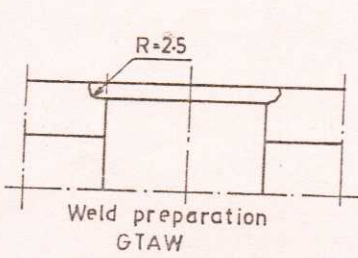
A equal to B
Dimensions in mm



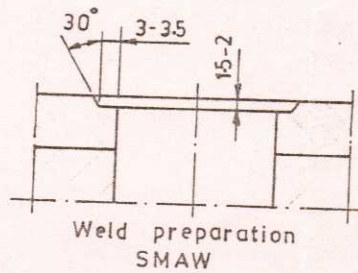
H.P. HEAT EXCHANGER



H.P. CONDENSER/SCRUBBER



Weld preparation
GTAW



Weld preparation
SMAW

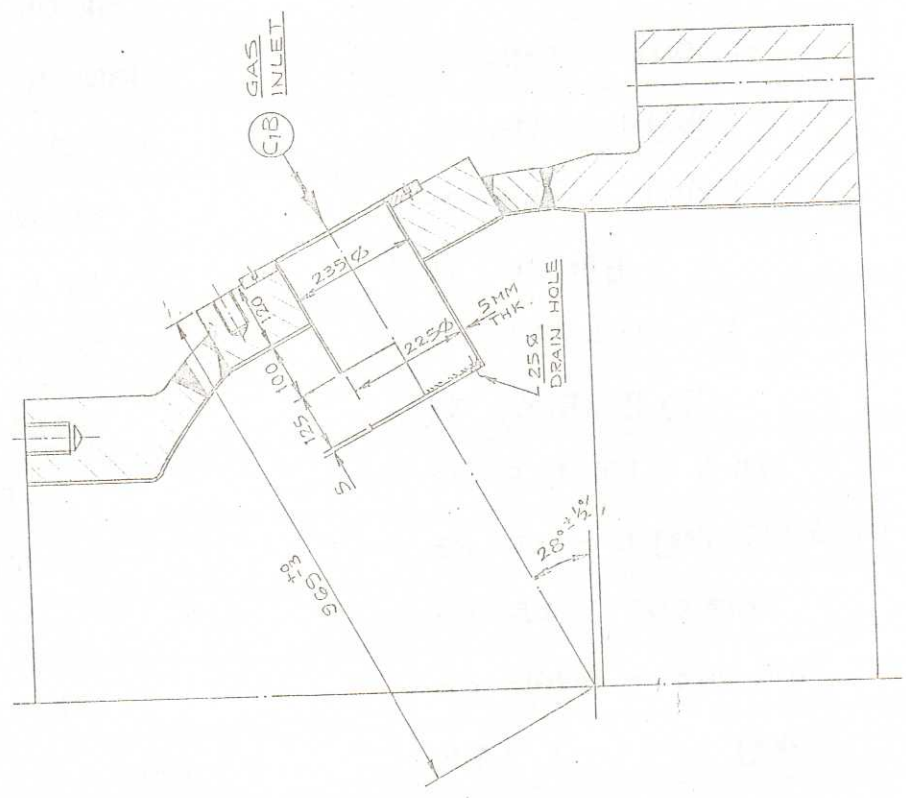
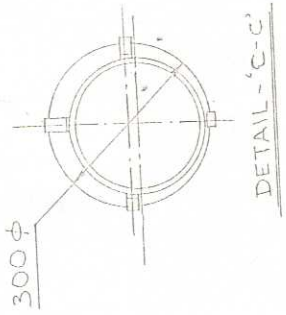
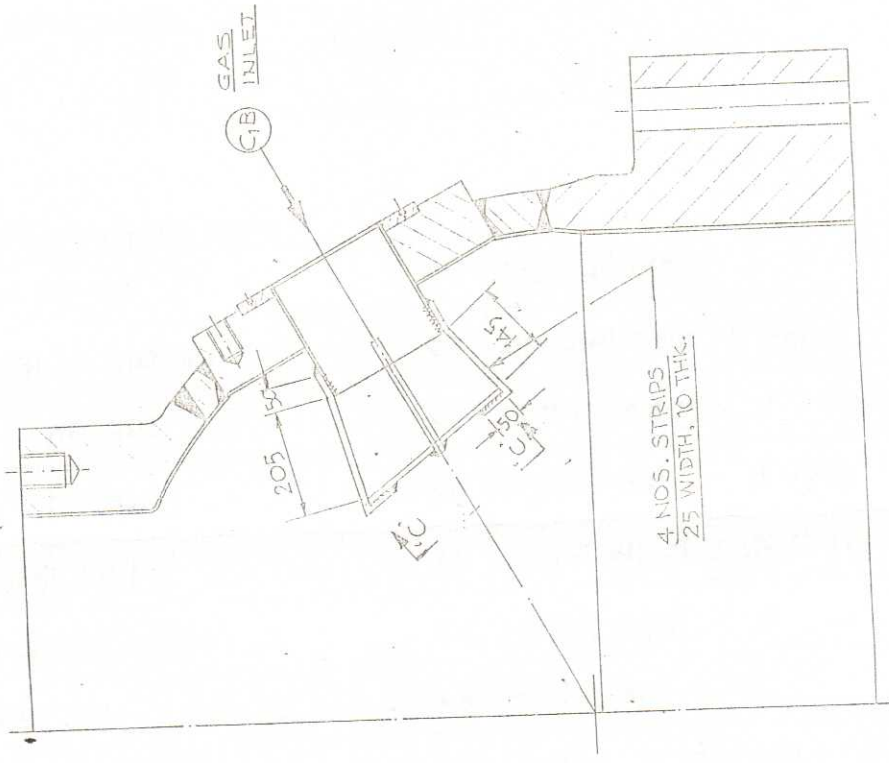
METHOD: 'A'

METHOD: 'B'

ANNEXURE - III.

DRN	KAM	TITLE :- TUBE PLUGGING DETAILS FOR H.P.		EWR No.	
CHD		HEAT EXCHANGER/CONDENSER/SCRUBBER			
APD		DRAWING No.	PLANT	FORM	NUMBER
SCALE	NTS		02	ES	05039
					SHEET OF 11
					REV 0

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GAS INLET MODIFICATION (APRIL-88)

89

ANNEXURE - II

GAS INLET EXISTING

7

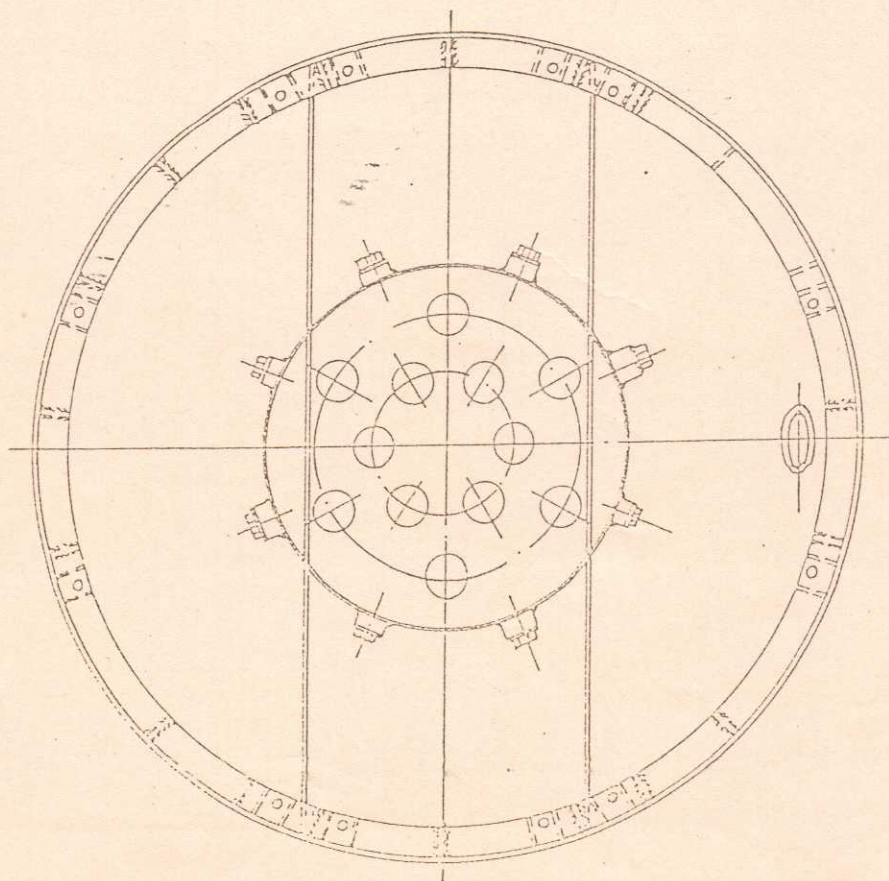
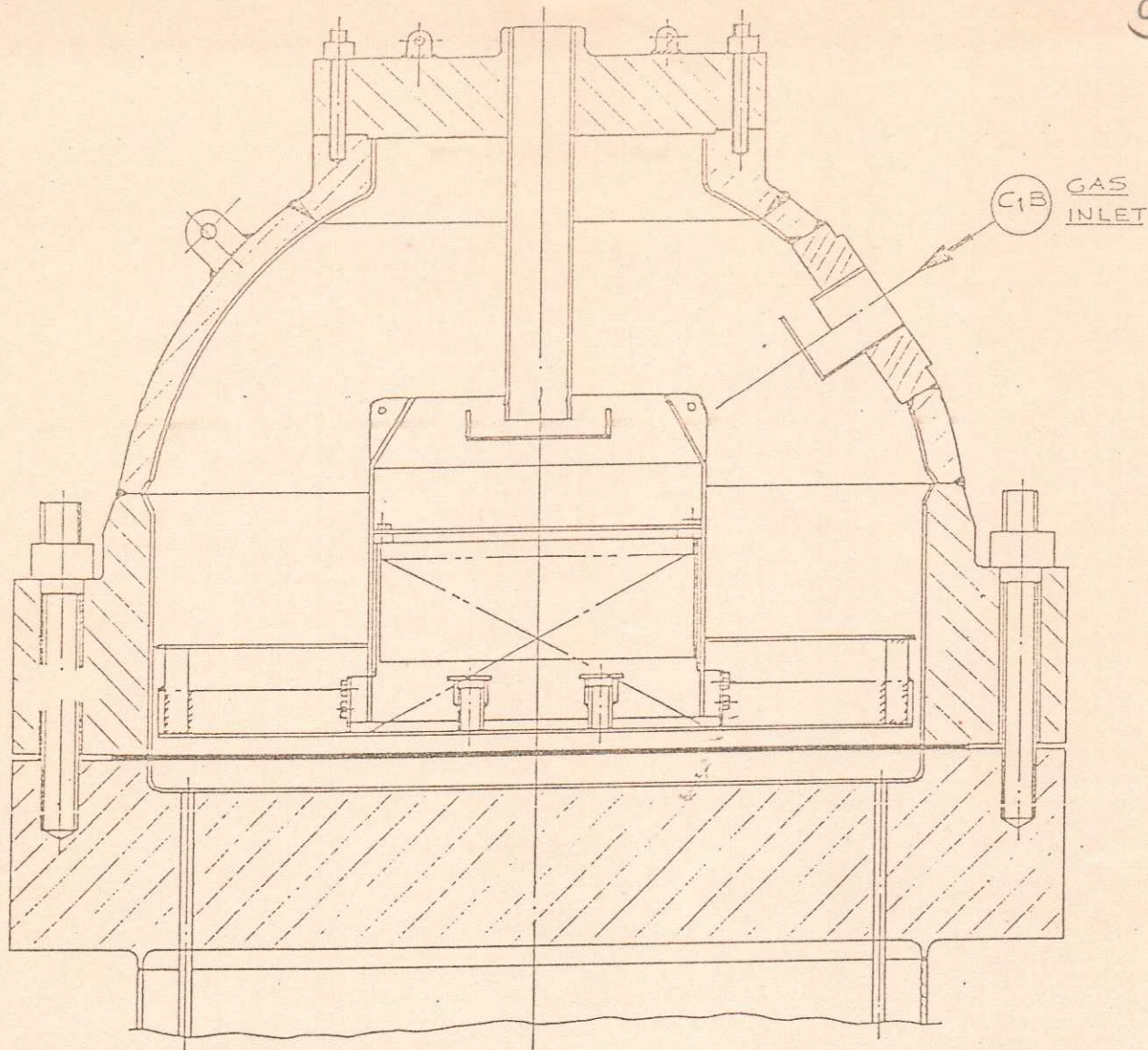
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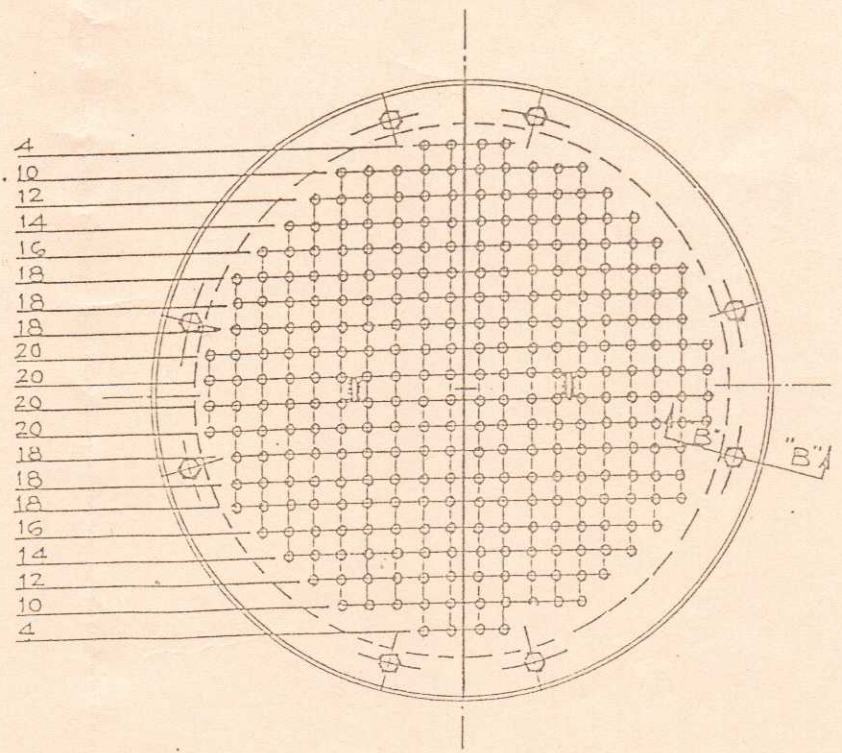
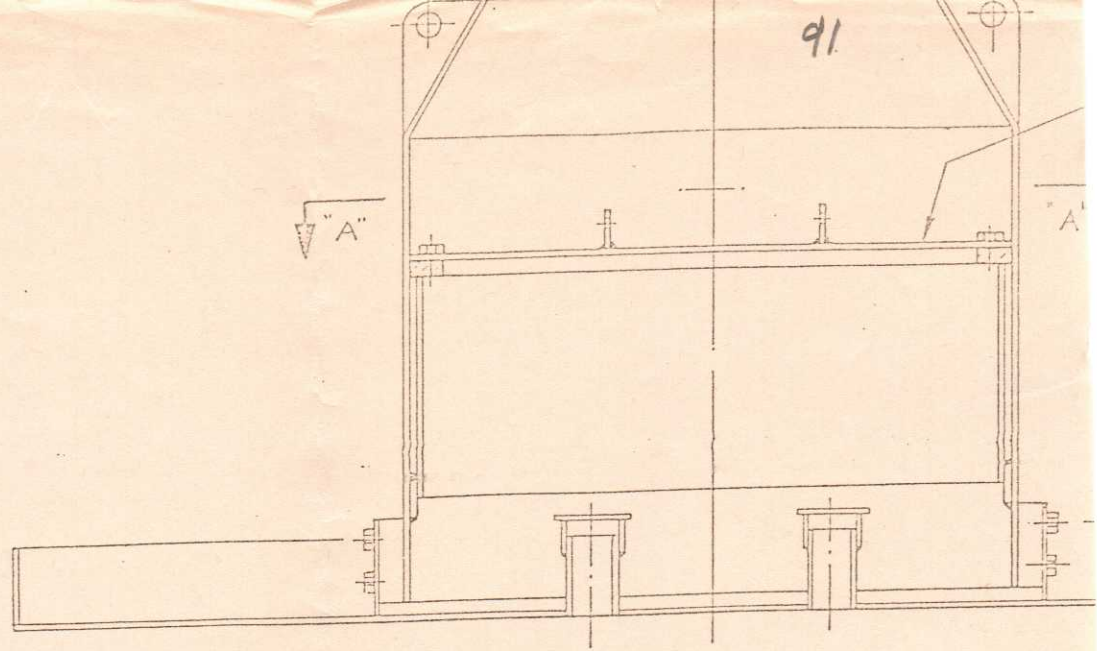
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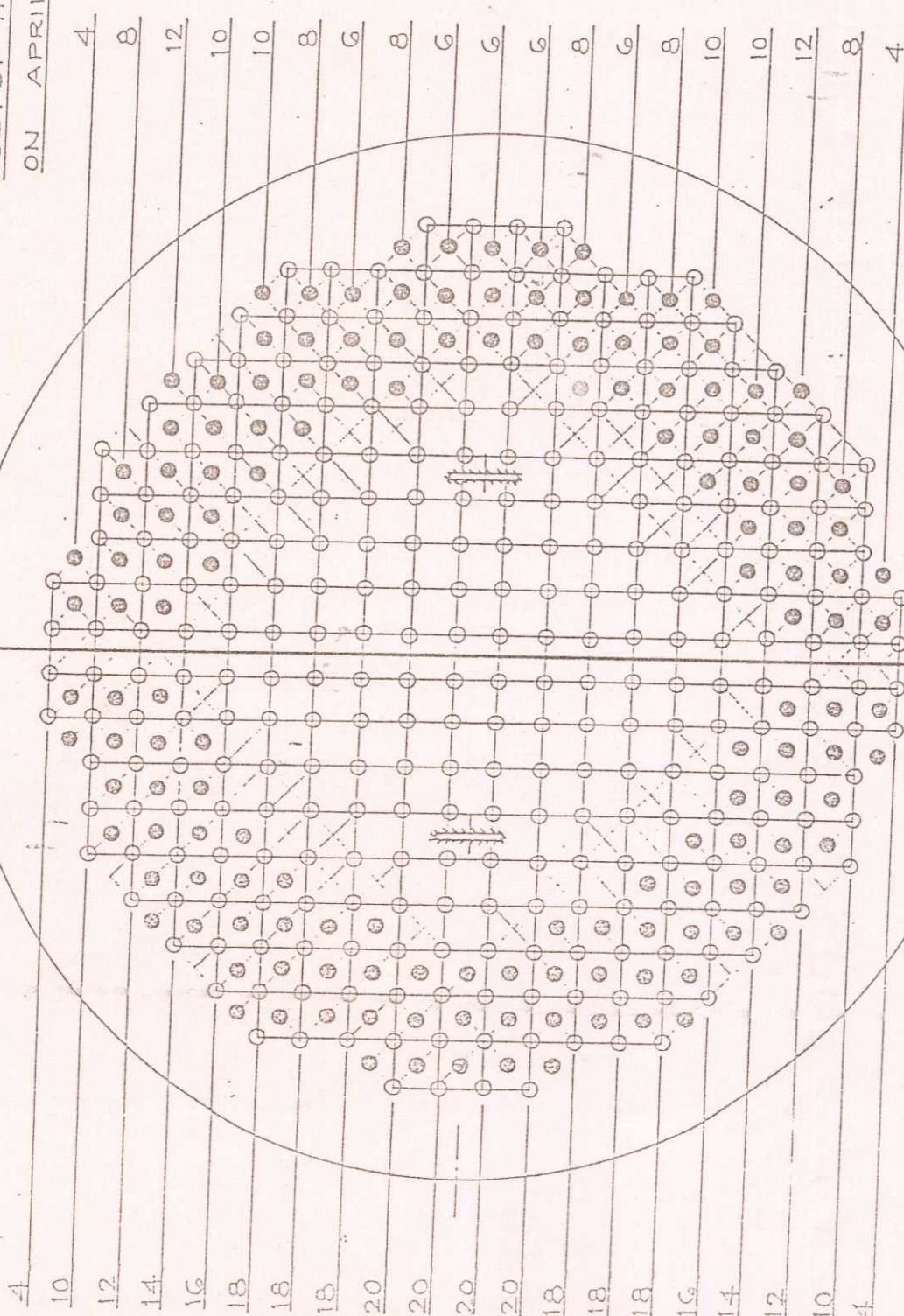


SECTION: "A-A"

ANNEXURE - ∇A

NOS. OF HOLES DRILLED

ON APRIL-1988 TOTAL:150 NOS



ANNEXURE-VB

TOP PLATE MODIFICATION (APRIL-88)
EIZV9E0067-VW

TURN AROUND, APRIL-1988
UREA PLANT
INSPECTION JOBS

Code No.	Description
2 31 01	The following vessels and tanks were opened and offered for inspection in 'Urea Plant'. Visual inspection and thickness measurement were carried out and the observations are given below :
01	<u>H.P. STRIPPER (H-1201) :</u> This vessel was offered for inspection to stami-carbon people. Necessary assistance was provided for probolog inspection of tubes.
02	<u>H.P. CONDENSER (H-1202) :</u> This vessel was offered for inspection to stami-carbon people. Necessary assistance was provided for probolog inspection of tubes.
03	<u>AUTO CLAVE (V-1201) :</u> <ol style="list-style-type: none"> 1. Ultrasonic thickness measurement of liner was carried out. 2. Ferrite measurement of weld joints of liner was done. 3. D.P. test of tray-supports welds was done and wherever defects were found, was rectified by welding and re-checked by D.P.test and found to be okay. 4. Top dish end has assumed grey coloration. 5. Some tray segment fixing bolt were found loose. 6. At some places the tray support clit weld bead was found to be detached from clit support of some trays. It was informed to Urea Maintenance and was repaired by welding.
04	<u>CO₂ KNOCK OUT DRUM (V-1101) :</u> <ol style="list-style-type: none"> 1. The inside epoxy coating of vessel has peeled off from several portions and production people were informed to provide paint coating on bare areas. 2. Condition of demister pad was good. 3. Thickness measurement readings are attached.

Urea (Inspection)

Code No.

Description

- 05 CO₂ SPRAY COOLER (H-1104) :
 1. Top and bottom manholes were opened. Entry from bottom manhole was not possible as the rashing rings were not removed.
 2. Condition of Demister pad was found good.
 3. Epoxy paint had peeled from some places.
 4. Distributors were okay.
 5. Thickness measurement readings are attached.
- 06 23 ATA STEAM DRUM (V-1502) :
 1. The vessel has assumed brownish black coloration.
 2. Inlet line and its supports found to be intact.
 3. Top distributor for steam outlet found to be okay.
 4. Rusting was observed on both dished ends.
 5. Thickness measurements readings are attached herewith.
 6. All weld joints were found to be okay.
- 07 4 ATA STEAM DRUM (V-1501) :
 1. The shell has assumed blackish coloration.
 2. Two riser baffles plates were not in position.
 3. Some bolts of riser plates were found to be missing.
 4. Condition of demister pad was good.
 5. Thickness measurement readings are attached her with.
 6. Slight pitting was observed on the dished end.
- 08 SECOND EVAPORATOR (H-1424) :

The shell has assumed brownish black coloration. The overall condition of vessel internals is good. Thickness measurement readings are attached herewith.
- 09 FIRST EVAPORATOR SCRUBBER (V-1423) :
 1. The shell has assumed reddish brown coloration.
 2. Demister pad was found to be damaged at various places. Some holding clamps of demister pad were loose.

Urea (Inspection)

Code No.	Description
	3. All supports of demister pad and trays were found okay.
	4. Thickness measurements readings are attached herewith.
10	<u>FIRST EVAPORATOR (H-1422) :</u> The shell coloration is brownish black, All weld joints were found to be okay. Thickness measurement readings are attached herewith.
11	<u>FLASH TANK SCRUBBER (V-1421) :</u> The shell has assumed brownish coloration. Grill fittings were intact. Demister pad is okay. Thickness measurement readings are attached herewith.
12	<u>L.P. VENT SCRUBBER (V-1206) :</u> The condition of the vessel top is good. Demister pad is okay. Grill fittings were intact. Thickness measurement readings are attached herewith.
13	<u>DESORPTION COLUMN (V-1301) :</u> The bottom shell of the vessel has assumed brownish red coloration. Bottom tray and tray supports were found to be intact. Thickness measurement readings of shell are attached.
14	<u>RECTIFYING COLUMN (V-1202) :</u> Bottom : The bottom shell of the vessel has assumed brownish red coloration loose Mill scale was observed just below the separator on the shell about one foot wide circular area. The weld joints of bottom nozzle vort braker are also in good condition. Top : The shell inside has assumed blackish colouration. The overall condition of vessel internals seems to be good.
15	<u>(L.P. ABSORBER (V-1203) :</u> Bottom : Coloration was found to be black. Grills were intact. Slight buckling of shell was observed near manhole. Top : Coloration was brownish black. Grills were found to be intact. Thickness measurement readings are attached herewith.

Urea (Inspection)

Code No.	Description
16.	<u>CONDENSATE TANK (T-1501) :</u> 1. The shell has assumed reddish brown coloration. 2. All weld joints are found to be okay. 3. Thickness measurement readings are attached herewith.
17.	<u>INTER STAGE SEPARATOR (V-1111) :</u> Colouration of the shell was brownish. No corrosion or pitting was observed on shell surface and its weld joints. Thickness measurement readings are attached.
18.	<u>AFTER STAGE SEPARATOR (V-1112)</u> Colouration of the shell was brownish. Demister pad was taken out and was found to be good. No corrosion or pitting was found on shell surface. Thickness measurement readings are attached.
19.	<u>9 ATA STEAM DRUM (V-1503) :</u> 1. The shell has assumed brownish black coloration. 2. Formation of loose mill scale was observed on some places on south dished end. 3. One clamp was found loose, which was informed to production people. 4. Thickness report is attached herewith.
20.	<u>UREA SOLUTION TANK (T-1401) :</u> The shell has assumed brownish coloration. All weld joints were found to be okay. Thickness measurement readings are attached herewith.

Urea (Inspection)

Code No.	Description
2 31 02	Thickness measurement of following pipe lines was carried.
1.	PR - 1201 - 8"
2.	PR - 1226 - 2"
3.	PR - 1202 - 10"
4.	PR - 1230 - 6"
5.	PR - 1202 - 8"
6.	PR - 1204 - 8"
7.	PR - 1205 - 6"
8.	PR - 1205 - 8"
9.	SA - 1201 - 6"
10.	PR - 1206 - 6"
11.	PR - 1207 - 14"
12.	PR - 1208 - 4"
13.	PR - 1212 - 14"
14.	PR - 1215 - 16"
15.	PR - 1214 - 12"
16.	PR - 1219 - 8"
17.	PR - 1223 - 4"
18.	PR - 1224 - 3"
19.	GA - 1212 - 6"
20.	GA - 1203 - 1"
21.	GA - 1202 - 1"
22.	Suction line for P - 1102 A/B
23.	Discharge line for P - 1102 A/B
24.	MA - 1106 - 4"
25.	MA - 1201 - 3"
26.	MA - 1203 - 4"
27.	Condensate return header of P - 1505 A/B discharge from & to L.T. Top.
28.	P - 1505 A/B suction line.
29.	ST - 1407 - 12"

Urea (Inspection)

Code No.	Description
30.	ST - 1409 - 4"
31.	SC - 1504 - 4"
32.	S - 1210 - 10"
33.	P - 1204 A/B suction line from H-1203
34.	60 ata Steam line to Q - 1101 - 1
35.	60 ata steam line to Q - 1101 - 2
36.	60 ata steam line on the pipe rack
37.	23 ata exhaust line of Q - 1101 - 2
38.	PICV -1129 & its by pass valve's U/S 23 ata header d/s 4 ata header.
39.	23 ata line to V - 1502
40.	ST - 1119 - 2"
41.	4 ata exhaust of Q-1113/A
42.	40 ata header to Q-1201 A/B
43.	40 ata header to Q-1102/A
44.	4 ata exhaust of Q-1201 A/B
45.	ST - 1102 - 8"
46.	4 ata Steam header to Q-1101-1
47.	4 ata steam line to ejectors - P-1421, P-1422, 1423, 1424 & P-1425.
48.	P-1501/P - 1506 discharge line to V-1503/V-1501
49.	P-1501/P-1506 suction line from T-1501
50.	Down comers & risers of H-1202
51.	9 ata/4 ata steam supply header of V-1301
52.	H-1201 shell side condensate outlet to V-1502 & V - 1503
53.	H - 1204 condensate outlet header to T -1501
54.	Condensate to melt return line U/S of H I C V - 1422.

Urea (Inspection)

Code No. Description

2 31 03 01 ULTRASONIC FLAW DETECTION :

Ultrasonic Flaw detection of 30 joints of 60
ata Steam line was carried out and were found
to be in satisfactory condition of weld soundness.

02 RADIOGRAPHIC TEST :

The weld joints in T - connection of the carba-
mate discharge line which was replaced after repe-
ated failure were radiographed. One defective
joint was repaired and radiography of the same
was carried out to reveal its soundness.

03 D.P. TESTS :

- 1. H - 1205 shell patch welds.
- 2. H - 1425 Four No. patches & 1½" line weld joints.
- 3. Condenser plug welds.
- 4. H.P. Stripper - bottom covers.
- 5. Carbamate line T - joints.
- 6. Autoclave - support clites, liner metal.

TURNAROUND, APRIL-1988
UREA PLANT
CIVIL JOBS

Code No.	Description
2 51 01	01 For GHH Compressor for seal oil units new pockets made and epoxy grouting done for new foundation bolts.
	02 IPS Flooring behind GHH Compressor area done.
	03 Old foundation of air blower broken and reflooring done.
	04 Dismantling of RCC foundation for melting pump for excess length portion done and necessary flooring and plastering done.
	05 Wooden blocks for plugging of effluent line near HP Ammonia pump area provided for diverting strong effluent water to strong effluent tank portion.
	06 Epoxy painting for flooring of GF area of Urea plant done and painting of equipment foundations done by epoxy painting.
	07 Epoxy pressure grouting for scrapper floor area.
	08 For scrapper floor area, necessary epoxy painting to AR bricks done.
	09 For prilling room necessary IPS flooring alongwith epoxy painting done.
	10 Existing aluminium door shutters of scrapper floor modified by new S.S. Jali.
	11 Cement + Sand mortar pressure grouting for prill tower vertical area near bucket elevator system and bottom slab of conveyor gallery near Urea Plant done (approx. area 75 M ²)
	12 New PVC vinyl carpet flooring provided to Urea control room. Shift Engineer's office including removal of old PVC tiles.
	13 Necessary strengthening of equipment foundations at GF, FF & SF area done by epoxy grouting system for equipment item Nos. HP flush to FICV -1204, H-1022, H-1424, H-1226, H-1205, T-1501 valve support of H- 1207, H-1201, H-1204 and LRC - 1201, outlet line etc.
	14 Aluminium ventilators for prill tower bucket room provided, including removal of old M.S. windows.

TURNAROUND, APRIL-1988
UREA PLANT
ELECTRICAL JOBS

Code No.	Description
2 61 01	01 Carried out preventive maintenance of TMG/SIEMENS LT ACBS installed at various MCCS and replaced damaged parts and wornout contacts.
	02 Carried out preventive maintenance of all feeder compartments mounted on the following MCCS. Defective parts like isolators, fuse bases, busbar supports, lyra contacts, wornout contacts, damaged wiring etc. were replaced. a) MCC- 6
2 61 02	01 <u>OVERHAULED THE FOLLOWING MOTORS :</u> 1. M- 1408 2. K- 1401/1 3. K- 1401/2 4. K- 1401/3 5. K- 1401/4 6. M- 1401/A 7. M- 1401/B
	02 Carried out checking and tightening of following terminal boxes of motors. 1. P- 1113/B 2. P- 1106/A,B 3. P- 1202/A,B 4. P- 1204/A,B 5. P- 1302/A,B 6. P- 1102/B
2 61 03	Installed and commissioned 11 KV KIRLOSKAR Breaker Panel at new MPSS for the purpose of grill cooling system. In addition to above temporary flood lights, hand lamps with 24V transformers switchboards, cables etc. were provided wherever required.

TURNAROUND, APRIL-1988
UREA PLANT
INSTRUMENTATION JOBS

Code No.	Description
2 71 01	The following Instrumentation jobs were carried out during plant turnaround from 18-4-1988 to 10.5.1988.
01	<p>Installation of New Radio Active Type Level monitoring system for STRIPPER :</p> <p>a) Fabricated and welded the detector/scintillation counter mounting stand near stripper.</p> <p>b) The source holder pipe (position 634) was removed and made the slots on it as per the drawing and refixed it. Made the punch marks on stripper bottom flange for seeing the direction of slots towards detectors.</p> <p>c) Mounted the source and scintillation counter in presence of service engineer from M/s.Concord Inst. P.Ltd., Madras, Mounted the level monitor inside the control room.</p> <p>d) Laid down the 7- Core special cable and connected it with monitor to detector.</p> <p>e) Performance test was carried out by filling up the water in the stripper.</p> <p>f) One I/P convertor is fixed behind control room. Monitor output is given in it and pneumatic output from convertor is connected with LRC-1201 second (blue)pen.</p>
02	<p><u>REPLACEMENT OF L&T ANNUNCIATOR :</u></p> <p>Replaced L&T annunciators AU-1, AU-2, AU-3 & AU-4 by IIC make annunciators by modifying the cutouts as per requirement. All the new AUs are tested.</p>
03	<p><u>LR - 1201 MODEL -III :</u></p> <p>No major change in radiation was observed due to source decay after one year. So again calibration was set at 900 counts (0'mv) to compensate the effect of source decay. Both Zero and span were slightly adjusted.</p>
04	<p><u>BATTERY CHARGERS :</u></p> <p>Complete 24V DC load is connected with both the charger units (i.e. charger I,II and Charger IV) through selector and isolator switches. Now complete load can be selected either from chargers I & II or from Charger IV.</p>

Urea (Instrumentation)

Code No.	Description
05	<p>The following main control panel jobs were carried out with necessary new cut-outs and changes.</p> <ul style="list-style-type: none"> a) Digital speed Indicators for Q-1101-2, P-1201 A/B and Q-1101-1 were mounted on panel, in place of analog speed indicators. b) Ribbon type manual loaders for HICV-1421 & HICV-1422 were mounted together. c) LR-1201- Negative pulse counter and TI-1 digital indicator are mounted on front face of panel. d) 110V AC- New power supply distribution box was mounted behind the panel. Power supply for new AUS and new level gauge for stripper is given from this box. e) 220V AC d/b was shifted from existing locations to new location (i.e.) behind section B&C). f) Removed unwanted cables, instruments, tubes etc. from the back side of panel. g) Painted rear panel frames and also done the touching on front face of panel wherever required. h) PBS of P - 3102 A/B shifted to new cut-out. i) FLCO- 1065 (Alarm) : Provided additional alarm connection from GHH panel to AU-1 Window No.6 as requested by Senior Manager (Urea).
06	<p>L&T AUS power supply boxes : Removed supply units of AU-4 and AU-1, 2, 3, 6, 7, & 8. Supply for AU-6 is taken from supply box of AU-9, 10, 11, and 12.</p>
07	<p>PT -1133 : (Surface condenser vacuum transmitter) Transmitter mounting location is changed. Now it is mounted on the compressor floor near turbine (Q-1101-1).</p>
08	<p>FRC-1102 (Transmitter) : The three valve manifold valves were not operatable. Changed the manifold by new one.</p>
09	<p>Overhauling and checking of following control valves were carried out.</p> <ul style="list-style-type: none"> a) PRCV-1201 : Removed seat & Plug for inspection. Plug found eroded, so took machine cut for finished seating surface and assembled it. Checked stroke.

Code No.

Description

- b) LCV-1101 : was reported not opening after reaching full close position. Opened actuator dom and found the piston loose. Cup- 'O' ring were also found damaged. Provided new 'O' rings and fixed the piston rigidly. Assembled fixed back and checked stroke.
 - c) LICV-1301 : Changed valve positioner and opened dom. Provided necessary lubrication and fixed back.
 - d) PRCV-1504+ Was reported passing at full close position. Gland leakage was also observed. Opened dom, overhauled, changed defective 'O' rings, provided new packings, overhauled V/P Air set etc. and adjusted the plug.
 - e) PICV-1128 :- Removed gland packings and observed internal parts. Provided new packings and adjusted plug for full close position. Provided support to the pipe line near valve to reduce the vibrators.
 - f) HICV-1022 : Replaced old set of seat, plug, etc. by the complete new modified set of trim components like seat, plug, gasket rings, spring washers, cage etc. Assembled and fixed back and checked stroke.
 - g) HICV-1202 : Changed Actuator diaphragm by new one. Overhauled, cleaned, painted and checked the stroke.
 - h) HICV-1221B - Removed from line to inspect the butterfly disc. Found it OK. Also opened the dom and overhauled it. Overhauled h/j unit, V/P Air Set, A/M switch etc. Checked valve stroke.
 - i) Following control valves were attended for cleaning, hand jack operation, A/M operation, V/P cleaning and stroke checking. TRCV-1201, TICV-1201, HICV-1221A.
 - j) Provided new gland packing and checked stroke of the following control valves.
LCV-1504, PCV-1221.
- 10 General checking and stroke checking was carried out for the remaining control valves like HICV-1201, LRCV-1201, PICV-1130, PICV-1131, PICV-1201, FRCV-1201, HICV-1204, FRC-1-1, HICV-1122, HICV-1422, PICV-1202, LRCV-1421, ICV-1502A/B, PRCV-1501, LCV-1201, (23 ata) LICV-1501 (4⁴ata) etc.

Urea (Instrumentation)

Code No.	Description
11	Calibration of the following temperature Indicators, Recorders was carried out. TI-1,2, TR-1,2,3,4,5.
12	LEVELTROLS : General checking, cleaning, Relay cleaning of the following leveltrol was carried out. LIC-1203, LC-1502, LC-1501, LC-1123 and LIC-1501 (4 ata). Changed Relay of LC-1502.
13	Removed and reinstalled following instruments on centrifugal compressor, P.B. & GHH reciprocating compressors to facilitate mechanical maintenance jobs. a) All the pressure gauges. b) All the temperature gagues and thermocouples including bearing thermocouples. c) Tachometers. d) All the vibration probes; The vibration probes were fixed back after calibration.
14	Trip circuits of the following equipment were checked. a) Changed 22 Nos old OEN relays by new relays in CPTRS of K-1101-1 & 2. b) Trip system of K-1101-1 & 2 checked after replacement of relays. c) Trip system of GHH Compressor was checked.
15	LRC-1201- Pneumatic transmitter impulse lines and dip tube were removed to facilitate the stripper job. Refined the same.
16	FE-1122- The needle valves on impulse lines were not holding properly. Replaced them by new valves.
17.	PRC-1201- Flushed out the impulse line and filled up the water in it.
18.	FS-1101- Opened the extension piece for inspection. Provided lubricant on magnetic coupling.
19.	Prill bucket speed Indicator : Removed defective selector switch by rotary type switch.

Urea (Instrumentation)

Code No.	Description
20	Field transmitters : Opened most important transmitters and cleaned the flapper nozzles and pilot relays.
21	FRC-1421- Rotameter transmitter was removed from line to inspect float and magnet assembly. Found it O.K. Fixed back and calibrated.
22	Field Junction Boxes : Opened the electrical & pneumatic junction boxes for inspection. Cleaned and sealed the covers properly.
23	Extra Air Tapping on Prill Tower Top : Provided new air tapping on the top floor (Ref. HICV-1202) of the prill tower to connect safety equipment like Air masks.
24	Radio Active Source on Autoclave was removed to facilitate the autoclave inside jobs. Fixed in back.

DRY ICE : Heater Temperature Control System for Dehydrator & Purifier :

The old J - type based temperature controllers were defective. Replaced both the controllers by new Servotran Controllers which are suitable for chrome-Alumel (K-type) thermocouples. Changed original Iron constantant (J-type) thermocouples and compensating cables by K- type thermocouples and compensating cables.

TURNAROUND, APRIL-1988
UREA PLANT
TECHNICAL DEPARTMENT JOBS

Code No.	Description
2 81 01	Extension of Prill tower conveyor M-1403 to feed new fluidised bed cooler for prill cooling system.
2 81 02	Tapping for various utilities for prill cooling system.
2 81 03	200 NB line for condensate diversion for 1st stage Evaporator to Dearator of new steam generation plant.

TURNAROUND, APRIL-1988
OFFSITES PLANT
MECHANICAL JOBS

Code No.	Description
3 02 01	01 <u>OVERHAULING OF CWP - P 4401 A :</u> Activities carried out :- - Removed casing and boxed up. - Inspected Rotor Condition. - Replaced gland packings. - Inspected gear coupling. - Inspected bearings.
3 02 02	01 <u>OVERHAULING OF CWP - P- 4401B :</u> Activities carried out :- - Opened casing and boxed up - Replaced damaged rotor assembly by new rotor assembly. - Inspected bearings. - Repaired casing covers top & bottom half both. - Replaced gland packing. - Re-aligned the pump & Turbine.
	02 <u>PREVENTIVE MAINTENANCE OF CWP-P 4402 and P-4403</u> Activities carried out :- - Replaced gland packing - Inspected bearings. - Inspected coupling.
3 02 03	<u>OVERHAULING OF CWP TURBINE - Q 4401 A :</u> Activities carried out :- - Removed casing & Boxed up - Inspected rotor - Replaced carbon rings. - Overhauled Governor, relay cylinder, over speed trip valve, main isolation valve, extra nozzle valve. - Replaced console oil. - Cleaned cooler.
3 02 04	<u>PREVENTIVE MAINTENANCE OF CWP TURBINE Q-4403 :</u> - Overhauled Governor, Throttle valve relay cylinder, over speed trip valve and its linkage, main steam stop valve.

Offsites (Mechanical)

Code No. Description

3 03 01 - Cleaned cooler.
- Also cleaned cooler of Q - 4401 B
DRIVE TURBINE FOR F.D.FAN Q-5113 :

Overhauling of Q - 5113 :

Activities :-

- Inspection of bearings.
- Inspection and cleaning of strainer.
- Replaced console oil.
- Checked clutch oil.
- Cleaned oil cooler

3 17 01 COOLING TOWER AREA :

- 01 Overhauling of all distribution valves.
- 02 Inspection of all sump isolation gates.
- 03 Fan Cylinder Repairs.
- 04 Tower Repairs by M/s. Paharput Cooling Tower Pvt.Ltd. Bombay.
- 05 Cooling water system gland leakages as per list.
- 06 Steam leaks as per list.

WATER TREATMENT PLANT :

1. Cation -I

- Replaced damaged acid outlet lateral support.
- Repaired sight glass.
- Replaced damaged 14 Nos. service outlet nozzles.
- Re-rubber lining

2. Painting of Water Treatment Plant by M/s Colour Coat, Bombay.

3. Replacement of damaged acid outlet lateral support and partial rubber lining of Cation-III.

STEAM GENERATION PLANT, (BHEL BOILER) :

- 1. Annual inspection of BHEL BOILER.
- 2. Installation of modified clutch for F.D. Fan motor side.

Offsites (Mechanical)

Code No.

Description

3. Inspection of Regenerative Air Preheater.
4. Inspection of De-aerator.
5. Inspection of Strainer of BFW Pump P-5111 & P - 5112.
6. Inspection of coupling of P-5111 & P-5112.
7. Cleaned & Replaced console oil of Q 5112.
8. Steam leaks as per list.
9. Repaired orifice flange joint BFW line.

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OFFSITES PLANT

INSPECTION JOBS

Code No.	Description
3 31 01	01 Thickness measurement of 60 ata Steam line from old boiler No. 1 to Steam header was carried out. The report is attached herewith.
	02 Radiography of new boiler BFW line orifice joint (6" line) was carried out after root run as well as after full welding.
	03 D.P. test from inside and outside on patch welding in cation-III vessel was carried out. Weld filling was also done on parent metal of shell which was also D.P. tested. Defects observed were further ground off and welded followed by final D.P. testing.
	04 Rubber lining of cation I was spark tested and hardness measurement was also performed. Defective spots were got repaired and spark tested finally for confirmation of defect free lining.
	05 Rubber lining at the patch weld areas in cation-III was inspected by hardness tester and spark testing.

TURNAROUND, APRIL-1988OFFSITES PLANTCIVIL JOBS

Code No.	Description
3 51 01 01	For water treatment, bitumastic flooring repaired near cation I, II and Anion III, IV, area.
02	For strong effluent drain, epoxy lining done and new precast slabs provided.
03	For weak effluent drain, epoxy painting done.
04	C.I. Grills fixed for water treatment plant.
05	For BHEL boiler necessary refractory lining for burner face, drum area, super heater, flooring, baffle walls etc. done.
06	New pockets for motor and gearbox of F.D.Fan of BHEL Boiler done and grouted.
07	New manhole for diverting Urea side effluent to strong effluent system provided.
08	Repairing of Acid resisting bricks work done for weak effluent tank No. 1,2 and strong effluent tank No. 1 & 2 including repairing of RCC wall by new plastering etc.
09	For chromate tank outlet portion, new two nos.of channels and necessary flooring done by replacing/removing of old F.R.P pipes.
10	Replacement of water proof plywood for vault chamber of cooling tower of NH ₃ SIDE No. 4,5,6 and Urea side No. 1,2,3, done, including necessary painting.
11	Repairing of wooden platform of C.T. sump and channels area done.
12	Strengthening of wooden staircases of cooling towers done by nailing and bolting.
13	AR brick work for HCL & NaOH measuring tank portion done.
14	G.I. Jali between two Naphtha storage tanks provided.

TURNAROUND, APRIL-1988

OFFSITES PLANT

ELECTRICAL JOBS

Code No.	Description
3 61 01	01 Carried out preventive maintenance of TMG/SIEMENS LT ACBs installed at various MCCs and replaced damaged parts and wornout contacts.
	02 Carried out preventive maintenance of all feeder compartments mounted on the following MCCs. Defective parts like isolators, Fuse bases, Busbar supports, Lyra contacts, Wornout contacts, damaged wiring etc, were replaced.
	1. MCC - 1 2. MCC - 2 3. MCC - 2A 4. MCC - 2B/2E 5. MCC - 2F/ 6. MCC - 3 7. MCC - 8 8. MCC - 10 9. MCC - 11
	03 Carried out modification on following feeder compartments in MCCs with insulating protective guard on isolators.
	MCC - 1 : For Nos. 15,17,18,19,20,24,26,27,29.
	MCC - 2 : For Nos. 3,10,32,47,15,16,24,27. Extr : 1,2,3,4,
	04 Carried out modification in MCC-2F providing interlocking in Bus coupler and Emergency incoming breaker to avoid parallelizing.
	05 Replaced Kirloskar contactor with SIEMENS 3TB-56 contactor on feeder of K 5305 New instrument Air Compressor.
	06 Hooked up 40HP feeder compartment for Blower in MCC-10.
	07 Carried out checking and tightening of following terminal boxes of motors installed at offsites. P-4101/A, P-4104/B, P-3701, K-5301, K-5302, K-5401 P-3302A, P-3302B, P-4204A, P-4204B, K-3101, P-3102A, P-3102B, P-3201A, P-3201B, H-4401/1 to 3, H-4402/1 to 3.

Code No.

Description

08 Carried out preventive maintenance of MLDB's and LDB's installed at various plant areas and replaced burnt out fuse bases and wiring.

3 61 02

66KV SUB STATION :

01 Carried out servicing of 66KV OCB/MOCBs and replaced wornout contacts, insulating oil, silica gel with breathers and lubricated the mechanism.
Carried out servicing of isolators and lubricated the mechanism.

Carried out preventive maintenance on CRP panel, cleaned, checked and tightened relay connections, replaced broken PF meter and rectified earth leakage of DC system.

02 Carried out inspection and maintenance of OLTC provided on 12.5 MVA VOLTAMP Transformer.

03 Carried out testing, calibration and adjustment of English Electric make protective relays installed at 66KV S/S, 11KV S/S and at all Motor control centres.

04 11KV SUB-STATION :

Carried out preventive maintenance of 11KV Switch gear (GEC/TMG/Kirloskar) installed at MPSS and 66KV substations and replaced wornout/damaged parts and insulating oil. Cleaned and tightened the busbar chamber and connections.

05 Carried out preventive maintenance of following unit transformers for :

- a) Removal of old transformer oil, flushing the core and windings with new oil and refilling of new transformer oil after carrying filtration.
- b) Replaced insulating oil in marshalling boxes on Primary and Secondary of transformers.
- c) Reactivated the silica gel in dehydrating breathers.
- d) Tightened the bushings and secondary connections.

- TR-2A TR-6
- TR-2B TR-7A
- TR-3A TR-7B
- TR-3B TR-8
- TR-4A TR-9
- TR-4B TR-10

Offsites (Electrical)

Code No.	Description
06	a) Carried out overhauling of AMF set and its busbar chamber and control panel. b) Mod. fication carried out on SSP Panel with toggle switches for by passing MCC failure signal. In addition to above, temporary flood lights, hand lamps with 24V transformers, switch boards, cables etc, were provided wherever required.

TURNAROUND, APRIL, 1988

OFFSITES PLANT

INSTRUMENTATION JOBS

Code No.	Description
3 71 01	<u>NEW BOIL R :</u>
01	<u>CONTROL ROOM JOBS :</u>
	<ol style="list-style-type: none"> 1. General cleaning, overhauling and calibration of pneumatic panel mounted instruments were carried out. This includes controllers, recorders, sq. root extractors, E/P convertors temp. indicators, receiver guages, receiver switches were carried out. 2. Cleaned all the contacts of the contactor in the BMS panel. 3. General checking of inverter, charger, static switch & batteries of UPS were carried out.
02	<u>FIELD INSTRUMENT JOBS :</u>
	<ol style="list-style-type: none"> 1. General cleaning & overhauling and calibration of all flow transmitters, pressure transmitters and level transmitters were carried out. 2. General cleaning, overhauling and calibration of all pressure switches were carried out. 3. General cleaning & checking of all electrical & pneumatic jn. boxes were carried out. 4. General cleaning of control valve positioner were carried out. Stroke checking of control valves, gland packing change were carried out. 5. General checking of TICV-1 and provided a new gaske for this and checked the seat & plug. 6. For 14 ata control valve, gland packing and greasing were carried out. 7. General checking of EYE HYE electrode & wiring were carried out. 8. Checked the drum level switches (high level) alarm, low level alarm and extra low level trip switch). Replaced low level alarm switch. 9. Checked dearator level high and low switches. 10. Provided a new thermocouple for furnace temp. measurement.

Offsites(Instrumentation)

Code No. Description

- 11. Provided an extra tapping for orifice for measuring oil flow.
- 12. Painted all transmitters stands and control valve body and electrical and pneumatic jn. boxes.
- 13. General checking of the ignitor system were carried out.
- 14. Checked FD fan damper operation and cleaned damper cylinder.
- 15. Impulse lines of all draft gauges were flushed with air.
- 16. Provided 2 lamp holders for ignitor ON indication in the field.
- 17. General checking and testing of new viscosity transmitter for LSHS in the workshop.
- 18. Refilling of glycol in LSHS pressure transmitters. pressure gauges and switches were carried out.
- 19. General cleaning and overhauling of oil day tank direct level indicator.

3 71 02

DM PLANT JOBS :

- 01 Provided a pneumatic recorder in place of FR1, FR2, FR3 in the control room.
- 02 In acid tank 1 & 2, provided a level indicator pulley & float and put it in line.
- 03 Calibrated all flow and pressure transmitters.
- 04 General checking and cleaning of silica analyser were carried out.
- 05 General checking and cleaning of raw water control valve were carried out.
- 06 General checking and cleaning of panel wiring and cleaning the contacts of the contactor were carried out.

3 71 03

COOLING TOWER :

- 1. RTDs were provided for new cooling water pump motor.
- 2. Calibration of all pressure gauges were carried out.

Offsites (Instrumentation)

Code No.	Description
3 71 04	3. General checking and cleaning of all tachogenerators were carried out. 4. Stroke test and general cleaning were carried out for PICV 5153 & 5154 control valves. <u>OLD BOILER :</u> 1. Impulse lines for oil flow transmitters, oil switches and pressure gauges were filled with glycol. 2. Stroke checking and general cleaning of PICV-5151 were carried out. 3. General cleaning and checking of burner panel were carried out. 4. Reliance control panel were removed from old boiler. 5. Electrical & pneumatic jn. boxes, control valves were painted.
3 71 05	<u>IG PLANT :</u> 1. General checking and cleaning of both drayers were carried out. 2. Removed the calorific analyser from IG plant. 3. Electrical panel for cracker were painted.
3 71 06	<u>CHROMATE REMOVAL PLANT :</u> 1. Removed unused electrical wires from panel. 2. Provided a new metal box for strong PH meter.

TURNAROUND, APRIL-1988OFFSITES PLANTTECHNICAL JOBS

Code No.	Description
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3 81 01	Three nos. orifice flow meters for turbines.
3 81 02	Piping for new viscosity meter in new S.G.P.

TURNAROUND, APRIL-1988

B&MH PLANT

MECHANICAL JOBS

Code No.	Description:
4 03 01	<u>BAGGING SIDE :</u>
01	<u>Belt Conveyor M-2121 :</u>
	<ul style="list-style-type: none"> i) Complete belt changed with new all nylon 3 ply belt. The approximate length used is 250 MTS. Reason - The old belt was cut from centre, lengthwise in approximately half length. Fastener joint - 1 No made. ii) Skirt rubber and thin rubber changed completely. iii) Gear box overhauled and oil and broken coupling bush changed with new. iv) Return roller - 2 Nos and guide rollers - 4 Nos changed as old were jam. v) Complete greasing of all padestle bearing and oiling of all throughing and return roller done.
02	<u>Belt Conveyor M-2110 :</u>
	<ul style="list-style-type: none"> i) Coupling alignment of motor and Gear box done and bush changed as the coupling was misalinged and all bushed were found cut. Gear box oil changed. ii) Chute at inlet of the belt widen by 6" 75mm and skirt rubber changed. iii) Throughing rollers - 10 Nos and idler roller - 3 Nos changed as they were jam or not functioning properly. iv) Complete greasing of all padestle bearings and oiling of throughing and idler rollers done.
03	<u>Conveyor Belt M-2117 :</u>
	<ul style="list-style-type: none"> i) Gear box overhauled, oil and broken/worn off coupling bushes changed. ii) Greasing of all padestle bearings and oiling of all throughing and return rollers.

Code No.	Description:
04	<u>Conveyor Belt M-2112 :</u>
	<ul style="list-style-type: none"> i) The gravity was jam in the guide ways since long. This was rectified by adjusting the pipe column. Also on opening the gravity the weight (Stones) were found one side and so the gravity was also one side. The stones then made uniformly distributed in the gravity and belt centering done. ii) Main gear box and triper gear box overhauled. oil and coupling bush changed with new. iii) Return rollers - 27 Nos change as either they were jam or rubber worn off or they were not functioning properly. iv) Greasing of all padestle bearing including of tripper and oiling of all throughing and return rollers done. v) Repairing of vulcanised joint done.
05	<u>Conveyor Belt M- 2122 :</u>
	<ul style="list-style-type: none"> i) Gear box (main) and tripper overhauled. Oil changed and coupling bushes, which were broken or worn off, changed with new. ii) Tripper chain cleaned and greased. iii) Greasing of all padestle bearing including tripper and oiling of all throughing and return roller done.
06	<u>Pay Loader Conveyor M - 2113 :</u>
	<ul style="list-style-type: none"> i) Conveyor belt changed with 750mm wide belt. Belt centring done and chute modified.
4 03 02	01 <u>Reclaim Machine- 2116 :</u>
	<ul style="list-style-type: none"> i) Each bucket provided with MS strip of 40mm wide - 8 Nos across width keeping a gap of 100mm to avoid lump going on the conveyor. Bucket No. 39. ii) Scrapper loader gear box, slening gear box, hoisting gear box oil changed. iii) Complete greasing of the machine done.
4 03 03	01 <u>Slat Conveyor of P.S.No.8 :</u>
	<ul style="list-style-type: none"> i) Slat conveyor (Wooden slats and chain) changed with new as the roller and slats were worn off badly.

Code No.

Description

ii) Greasing of all bearings in slat conveyor done.

02 Packer Scale No.8 :

i) Gate assembly changed as rough gate broken.

03 Vibrating Screen System :

i) Portable conveyor straight rollers removed and throughing rollers installed.

ii) Old vibrating screen and portable conveyor put outside silo and hopper installed on pay loader conveyor.

iii) Payloader conveyor belt centring done by providing shims in the rollers head pulley.

iv) Second pay loader conveyor installed and fines chute modified accordingly.

04 Sewage Pump Near B&MH Maintenance :

i) New pump installed as old pump needed overhauling.

4 41 01

HANDLING SIDE :

01 Naphtha Tank - B :

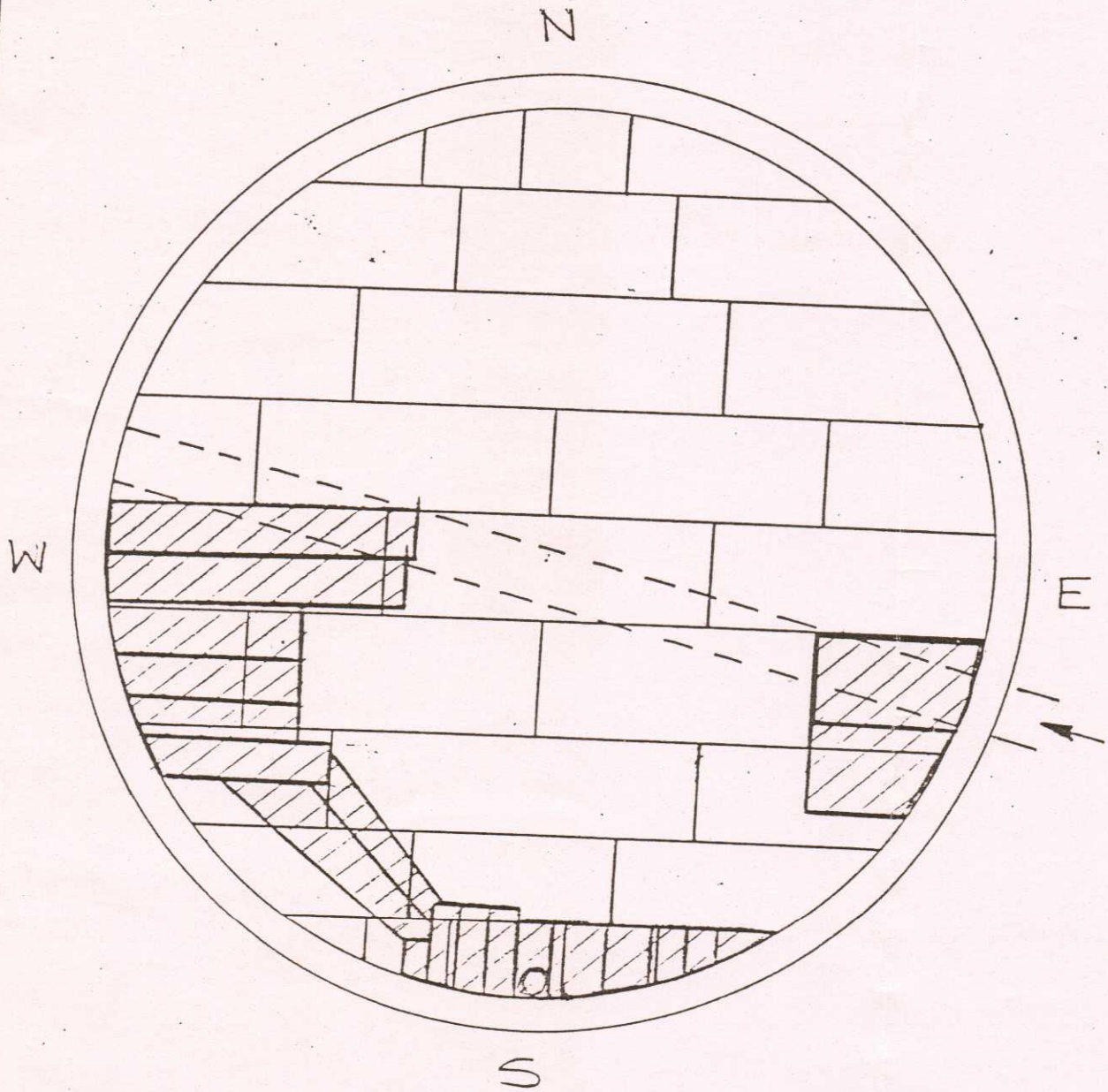
i) Foam seal (polyurethene foam and nitrile rubber) of the tank changed with new as the old seal was damaged and naphtha was insible and open to atmosphere.

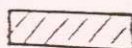
ii) Corroded plates of naphtha tank floating roof changed with new plates as holes were developed on the roof and naphtha was coming out.

iii) Roof painting done by first sand blasting and then painting by polyurethene paint.

02 Road Tanker Ammonia Filling Platform :

i) Flexible mettalic hose changed with new as the working hose started leaking.



 TOTAL PLATE CHANGED = 38.05 MT²

DRN	KAM	TITLE:- REPLACEMENT OF CORRODED ROOF		EWR No.	
CHD	AK	PLATE OF NAPHTHA TANK T-3301/B			
APD	110	DRAWING No.	PLANT	FORM	NUMBER
SCALE		03	ES	16016	SHEET OF 11
					REV 0

TURNAROUND, APRIL-1988

B&MH PLANT

CIVIL JOBS

Code No.	Descrip ion
4 51 01	01 Epoxy painting for handrailing and suspender precast beams of conveyor belt gantry No.17 done.
	02 Epoxy painting to RCC columns of B&MH Plant platform area done.
	03 Concrete patch work for walkway of conveyor belt No. 21 done.
	04 Making necessary opening for fixing/installing of Urea screen conveyor belt at GF of Silo tower done.
	05 Providing and fixing of wooden door for west side of hopper floor at Bagging Plant.

TURNAROUND, APRIL-1988

B&MH PLANT

ELECTRICAL JOBS

Code No.	Descriptions
4 61 01 01	<p>Carried out preventive maintenance of TMG/SIEMENS LT ACBs installed at various MCCS. DEFECTIVE PARTS like isolators, fusebases, busbar supports, lyra contacts, wornout contacts, damaged wiring etc. were replaced.</p> <p>MCC-4 MCC- 4A MCC-9</p>
02	<p>M- 2112 feeder compartment shifted from MCC-4 section- B to Section-A.</p>
03	<p>Repaired/replaced of lighting fittings installed on all conveyors.</p>
4 61 02 01	<p>Overhauled the following motors.</p> <p>M - 2110 M - 2112 M - 2117 M - 2121 M - 2122</p> <p>In addition to above temporary flood lights, hand lamps with 24V transformer, Switch boards, cables etc. were provided wherever required.</p>

TURNAROUND, APRIL-1988

B&MH PLANT

INSTRUMENTATION JOBS

Code No.	Description
4 71 01	<p>01 Shifting of new control panel to control room all instruments were transferred from old panel and wired the new panel with ferruling numbers. After completion of jobs trip checking were carried out.</p> <p>The old panel was shifted to a new location and switches like emergency shutdown switch, receiver switches were installed and checked.</p>
	<p>02 Checking of other field instruments were carried out. Calibration of pressure controller, level controller and control valves were also carried out.</p>
	<p>03 Calibrated all pressure switches and receiver switches.</p>
	<p>04 General cleaning of leveltrol switch were carried out.</p>
	<p>05 SS tubing was carried out for PIC-3101, Ammonia tank pressure transmitter.</p>