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1998

MTC/REPORT/01

IFFCO
KALOL UNIT

PLANNING SECTION

MAINTENANCE DEPTT.

REPORT NO : 18 / 1998

REPORT
ON
PLANT TURNAROUND

(APRIL - MAY - 1998)

INDIAN FARMERS FERTILISER CO-OPERATIVE LIMITED

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I N D E X

PREFACE

Urea plant was stopped for plant turnaround on 20th April 1998 whereas Ammonia plant was stopped on 22nd April i.e. two days later.Several equipments were taken for routine overhauls as well as some critical modifications were carried out.

In Ammonia plant ,both the cases of Syn.Gas Compressor(103-JLP/HP) were taken for major overhauling.The lubroid plate modification was carried out under supervision of M/s BHEL 's engineer in N.G.Compressor drive turbine (102-JT) to avoid fretting in the front end bearing housing.Catalyst of Primary reformer(101-B) was replaced.Steam drum RV's were changed to flanged ones.Preventive maintenance of 101-J train,105-J train, 103-J train,101-BJ train,104-J train etc. as well as all critical lub.oil pump's drive turbines was carried out as per the schedule.Cleaning of heat exchangers was carried out by hydrojetting and finally boxed up after hydrotesting in some exchangers.Some of the critical RV's were also taken for overhauling through M/s Flotec Engineering Services,Surat.

In Urea plant preventive maintenance of GHH compresor drive turbine(Q-1001),Ammonia pumps(P-1102A/B) ,Carbamate pumps(P1201-A), HP flush water pump(P-1502),Prill tower I.D. fans(K-1401(1,2,3,4)) ,PCS fans K-1701 and K-1702 were carried out.Unwanted lines were removed from Ammonia pump drive turbine (Q-1102-A) and carbamate pump drive turbines(Q-1201-A/B).Inspection of HP stripper(H-1201),HP condenser(H-1202) and Autoclave(V-1201) was carried out by M/s Stamicarbon bv,Holland.Inspection of V-1101, V-1202, V-1206,V-1301,V-1351,V-1352,V-1501 and V-1503 was carried out departmentally.Critical RV's were overhauled and tested by M/s Moorco(I) limited.

In offsites plant BHEL boiler was taken for inspection by CIB.RAH was overhauled departmentally.Major overhauling of cooling water pump P-4401-B was carried out whereas cooling water pumps P-4401-C / D / E,drive turbines Q-4403,Q-4401-A,BFW pump P-5111,P-5112,BFW pump drive turbine Q-5111 and LSHS pump drive turbine Q-5113 were taken for preventive maintenance.

In Bagging and Material handling section reclaim machine and conveyors M-2110,M-2112,M-2117,M-2121,M-2122 and M-2137 were taken for preventive maintenance.

ELECTRICAL JOBS:

Preventive maintenance of transformers,feeder compartments and ACB's of Ammonia,Urea,Offsites and B&MH plants were carried out.Also certain critical motors were taken for overhauling.Preventive maintenance of 66 KV,11KV,OCBs,MOCBs and VCBs were carried out.

INSTRUMENT JOBS

Various critical control valves of Ammonia,Urea and Offsites plants were overhauled and various pressure transmitters were also calibrated.All control room instruments were cleaned and inspected.The old pneumatic control panel was removed from the Urea plant control room.

TECHNICAL DEPARTMENT JOBS:

In Ammonia plant a pressure control valve with by pass was provided on 112-C.Inlet/outlet line sizes for 128-C were increased to 10" NB.Discharge chute of silo shuttle conveyor M-2114 was replaced by a new modified discharge chute with enhanced cross sectional area.

PROJECT JOBS:

In Ammonia plant,36" check valve was installed in cooling water line near CG circulator.TP-25 blind was relocated to ground level.Various working platforms were installed.103-JAT exhaust line spring support was relocated.

In Urea plant, turbine and gear box of HP Carbamate pump P-1201-B were replaced by new LT motor and gear box.Carbamate pump common discharge line was increased from 3" x sch.80 to 4" x sch.160.Some of the critical control valves in Urea plant were replaced.

After completion of above jobs,auxiliary boiler in Ammonia plant was started and in the last phase of start up; on 12 th May1998,the refrigeration compressor(105-J) tripped on low governing oil pressure and as a result the catalyst in the Primary reformer(101-B) was damaged.

The plant was again shut down immediately for the replacement of the catalyst of all the reformer tubes.Catalyst replacement job of primary reformer was taken up on warfooting basis and finally the urea plant was started on 20th May 1998.

HDM/SDD/AGM

THE PLANT TURNAROUNDS AT A GLANCE

SR. NO.	YEAR	AMMONIA-PLANT PERIOD FROM	TO	DOWN TIME DAYS	DOWN TIME HRS	UREA-PLANT PRODUCTION FROM	TO	DOWNTIME DAYS	DOWNTIME HRS	REASON IF AN
01	1975	06-05-75	21-05-75	16	-	06-05-75	21-05-75	16	-	Planned
02	1976	26-03-76	20-04-76	26	-	26-03-76	26-03-76	26	-	Planned
03	76-77	05-12-76	22-01-77	49	-	05-12-76	24-02-77	51	-	101-JT
04	1978	21-02-78	15-03-78	23	-	21-02-78	25-03-78	31	-	101-BJ
05	1979	21-05-79	30-06-79	41	-	10-05-79	01-08-79	82	-	K-1101/ 3rd Stg Cylinde
06	1981	12-04-81	10-05-81	29	-	08-04-81	12-05-81	35	-	101-B (Headers
07	1984	01-01-84	25-01-84	25	-	01-01-84	25-01-84	25	-	Planned
08	1986	19-03-86	03-05-86	45	-	04-03-86	01-05-86	59	-	Reforme Revamp. Scrubbe
09	1987	12-04-87	03-05-87	21	-	12-04-87	02-05-87	20	-	Planned
10	1988	18-04-88	14-05-88	27	-	18-04-88	13-05-88	26	-	Planned
11	1990	05-02-90	05-03-90	29	688.67	31-01-90	07-03-90	35	829.0	Planned
12	1991	24-02-91	13-03-91	18	429.08	23-02-91	14-03-91	20	459.25	Planned
13	1992	03-11-92	03-12-92	30.6	734.91	03-11-92	04-12-92	31	744.75	Planned
14	1993	12-09-93	23-10-93	42	986.50	12-09-93	29-10-93	47	1120.58	Revamp-
15	1995	14-01-95	27-01-95	14	311.34	11-01-95	26-01-95	16	352.18	Scrubbe H-1203-
16	1996	14-06-96	13-07-96	30	712.00	13-06-96	13-07-96	30	694.25	Autocla V-1201 Leakage
17	1997	12-05-97	17-06-97	35.6	875.00	12-05-97	17-06-97	36.2	870.50	Planned
18	1998	22-04-98	19-05-98	27.5	660.00	20-04-98	19-05-98	30.0	720.00	Planned

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PLANT TURNAROUND - APRIL - MAY - 1998

G E N E R A L - D E T A I L S

SR.NO.	CATEGORY	QUANTITY
	EQUIPMENTS UTILISED:	
01	**IFFCO :**	
	55 T HM Crane	01
	15 T Coles Crane	01
	18 T Tata Crane	01
	03 T Forklift	02
	Truck	01
	HIRED :	
	85 T P & H TRUCK MOUNTED MOBILE CRANE	01
	03 T Forklift	01
02	**IFFCO - MANPOWER :**	
	a) Mechanical b) Mechanical Services c) Electrical d) Instrument e) Trainees in various trade	Existing strength

HIRED - CONTRACT MANPOWER

Sr.No.	Category	Mandays
01	Mill Wright Fitter	34
02	General Fitter	353
03	Rigger	852
04	S.S.Rigger	1768
05	Fabricator	157
06	Grinder	95
07	IBR Welder	15
08	Non-IBR Welder	135
09	Carpenter	18
10	Mason	15

HIRED - IFFCO TIME OFFICE

Labour unskilled 1400 Mandays

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MAINTENANCE JOBS CARRIED OUT BY OUTSIDE AGENCIES

SR. NO.	JOBS CARRIED OUT	CONTRACTORS NAME	W.O.NO. & DATE
01	HIRING OF SERVICE FOR OVERHAULING & MODIFI-CATION OF N.G.COMPRESSOR DRIVE TURBINE (102-JT)	M/S.BHEL,HYDRABAD	0302 16/04/98
02	HIRING OF SERVICES FOR OVERHAULING OF SYN.GAS COMPRESSOR HP & LP CASE (103-JLP/JHP)	M/S.GANGORTI,HYDRABAD	03136 04/04/98
03	STEAM DRUM RV REPLACEMENT	M/S.TECHNOCON PROJECT & ENGG.,BARODA	03268 25/03/98
04	REPLACEMENT OF 11 ATA PIPING.	M/S.GENERAL ENGG.WORKS BHARUCH	03132 31/12/97
05	ONSITE REPAIRING OF VALVES DURING TURNAROUND IN AMMONIA PLANT.	M/S.DANDY ENGG.CO AHMEDABAD	04250 30/07/98
06	OVERHAULING OF RV'S DURING TURNAROUND IN AMMONIA PLANT.	M/S.FLOTEC ENGG.SERVICE SURAT	03433 10/04/98
07	HYDROJECTTING OF VARIOUS HEAT EXCHANGERS.	M/S.USHA HYDRODYNAMICS NEW DELHI	E-6669 21/01/98
08	OPENING & BOX-UP OF HEAT EXCHANGER IN AMMONIA AND UREA PLANT.	M/S.GENERAL ENGG.WORKS BHARUCH	03229 06/04/98
09	HIRING OF SKILLED MAN-POWER FOR CARRYOUT VARIOUS MAINT.JOBS IN PLANT TURNAROUND.	M/S.GENERAL ENGG.WORKS BHARUCH	03203 06/04/98
10	HIRING OF 3 TON FORKLIFT FOR PLANT TURNAROUND.	M/S.REACH CARGO MOTORS & ENGG. VADODARA	03258 03/03/98
11	HIRING OF CRANE SERVICES FOR PLANT TURNAROUND.	M/S.J.H.PARABIA TRANSPORT P.LTD BARODA.	03246 01/04/98
12	SERVICES OF ONE SERVICE ENGINEER FOR OVERHAULING & TESTING OF RV'S IN UREA DURING PLANT TURNAROUND	M/S.FMC SANMAR LIMITED BARODA	03316 08/04/98

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MAINTENANCE JOBS CARRIED OUT BY OUTSIDE AGENCIES

SR. NO.	JOBS CARRIED OUT	CONTRACTORS NAME	W.O.NO. & DATE
13	SERVICES FOR INSPECTION OF AUTOCLAVE,HPCC AND HP STRIPPER.	M/S.STAMICARBON B.V. P.O.BOX NO.53, 6160 AB GELEEN, THE NETHERLANDS	AGREEMENT 16/04/98
14	DEPUTATION OF INSPECTION PERSONNEL.	M/S.KRIBHCO.	03216 18/03/98
15	AUTOMATIC ULTRASONIC SCANNING OF PRIMARY REFORMER TUBRES (101-B)	M/S.PDIL SINDRI	03214 23/04/98
16	INSITU METALLOGRAPHY EXAMINATION OF PIPING AND VESSELS.	M/S.PDIL SINDRI	03215 22/04/98
17	HIRING OF SERVICES OF NON DESTRUCTIVE TESTING TEAMS.	M/S.NDT SERVICES AHMEDABAD	03217 02/03/98
18	TO CARRY OUT RADIOGRAPHY DURING PLANT TURNAROUND	M/S.NDT SERVICES AHMEDABAD	04060 03/07/98
19	EPOXY PAINTING OF R.C.C. STRUCTURE & CEILING OF BAGGING FLOOR.	M/S.B.CHAUHAN KALOL	03292 09/04/98
20	PROVIDING & APPLYING EPOXY MONOLITHIC PLASTER & EPOXY PAINTING ON SLABS BEAMS & COLUMNS OF BAG-ING FLOOR & PACKER SCALE OF BAGGING PLANT.	M/S.SHREEJI CHEM ENTERPRISES,BARODA	03320 23/02/98
21	COVERING OF SUMP AND CHANNEL OF C.W.CELL NO.7 & 8.	M/S.ANANT BUILDERS AHMEDABAD	03400 09/03/98
22	BITUMASTIC LINING ON HOPPER FLOOR OF BAGGING PLANT,CONVEYOR GUANTRY W.T.PLANT,H2SO4 TANK NEAR COOLING TOWER AND S.P.C.NEAR AMMONIA PLANT AND UREA PLANT.	M/S.MADHUSUDHAN MFG. AHMEDABAD	03307 09/04/98

PLANT TURNAROUND - APRIL - MAY 1998

AMMONIA PLANT

MECHANICAL JOBS

JOB CODE	JOB DISCRIPTION

01 01 01 **AIR COMPRESSOR TRAIN - 101-J / 101-JT:**

All equipments of Air Compressor train were taken for preventive maintenance. Following jobs were done.

- All the machines were decoupled from each other and their bearings were inspected.
- The L.O.turbine bearings were greased and the governor oil was flushed.
- Both the oil filters were replaced.
- Following are the clearances recorded at the time of boxing up of the bearings.

101-JT - DRIVE TURBINE FOR 101-J:

Other than thrust end journal bearing	0.007"
Thrust end journal bearing	0.006"
Thrust bearing	0.013"

101-JLP CASE:

Other than thrust end journal bearing	0.006"
Thrust end journal bearing	0.0065"
Thrust bearing	0.009"
Total float	5.80 MM

101-JR - GEAR BOX:

Drive gear LP side journal	0.011"
Drive gear HP side journal	0.010"
Drive gear thrust bearing	0.014"
Pinion journal LP side	0.012"
Pinion journal HP side	0.011"

- Recording of gap between bearing housing where spherical washeres are in position on front end and rear end.

- Recording of axial float of rotor.

- Recording front bearing housing face front face of casing.

- Removal of H.P.carrier and LP carrier top half.

- Removal bearing bottom half and thrust half.

- Removal bottom bearing housing half.

- Front end bearing bottom half removed, drilled tapped for hardened plate fixing (M6 screw)

- Drilled tapped for hardned plate fixing on front bearing guide (M8 screw)

- Drilled tapped for locking plates of lubroid plates.

- Fixing of lubroid plates on pedestal under the seating area of bearing housing loose after blue matching.

- Removal spherical washer assembly from rear bearing housing bottom support.

- Fixed support plate under housing on rear end after blue matching

ASSEMBLY :

- Fixed bearings.

- Placed rotor and recentred the rotor by means of eccentric centring bolts.

- Recorded all readings as below.

a) Centering of turbine.
b) Carrier centring.
c) Axial blade clearances.
d) Fin/blade tip clearance.
e) Gland clearances.
f) Rotor run out.
g) Journal bearing clearance.
h) Thrust bearing clearance (float of rotor).
i) Alignment between turbine & compressor.
j) Alingment between tubrine & Governor.
k) Oil gland and trip lever clearance.

OBSERVATION :

1) The lub oil plates supplied by M/s.BHEL found to be higher thickness. All 2 lub oil plate and harded plate thrikcness reduced to centre the rotor.

2) Front end bearing found uneven loading marks changed with new one.

3) Casing internal sealing found Ok.

4) Blades of casings found deposit all over.

5) Rotor was found with deposit on L.P.stage.

6) Casing drain found choked.

7) Removed orifice and clearned choking.

8) Centering found slightly disturbed and it was rectified.

9) Induction steam survomotor found jam, cleaned and boxed up also governor system overhauling.

OVERSPEED TEST RUN :

Machine was rolled on 08/05/98. The Woodward governor was found coming in line at 8500 RPM. The overspeed governor tester oil test was conducted at 15500 RPM. The pin tripped at 0.35 Kg/cm2 test oil pressure. On over speeding the machine tripped at RPM - 16300 RPM in IRD machine. 16500 RPM - Reed tachometer.

GOVERNING SYSTEM VALUES AFTER MAJOR OVERHAULING
APRIL / MAY 98 - N.G.COMPRESSOR DRIVE TURBINE

	S.O.P. (KG/CM2)			LIFT (MM)		
	HP	LP1	LP2	HP	LP1	LP2
	1.50	3.15	3.15	000	12.0	12.5
	2.00	3.55	3.60	3.50	15.0	16.0
100% SIGNAL	2.50	3.90	4.00	7.00	18.0	19.0
100% INJECTION	3.00	4.30	4.40	8.50	20.0	21.0
REGULATED AIR SUPPLY	3.15	4.45	4.50	9.00	21.0	22.0
TO 2.5 KG/CM2	3.25	4.50	4.60	9.50	21.50	22.0
STROKE = 20 MM	(CUT OFF 0.80 KG/CM2)					
	4.60	4.10	4.2	18.00	20.00	20.00
	4.45	4.00	4.00	15.00	19.00	19.00
	4.00	3.60	3.60	11.00	17.00	16.00
ZERO SIGNAL	3.50	3.20	3.60	10.00	12.00	12.50
ZERO INJECTION	3.00	2.50	2.60	08.00	08.00	09.00
	2.50	2.20	2.20	06.50	04.50	05.00
	2.00	1.80	1.85	03.50	01.50	02.00
	1.65	1.45	1.50	00.50	00.00	00.00
	(CUT OFF 1.65 KG/CM2)					

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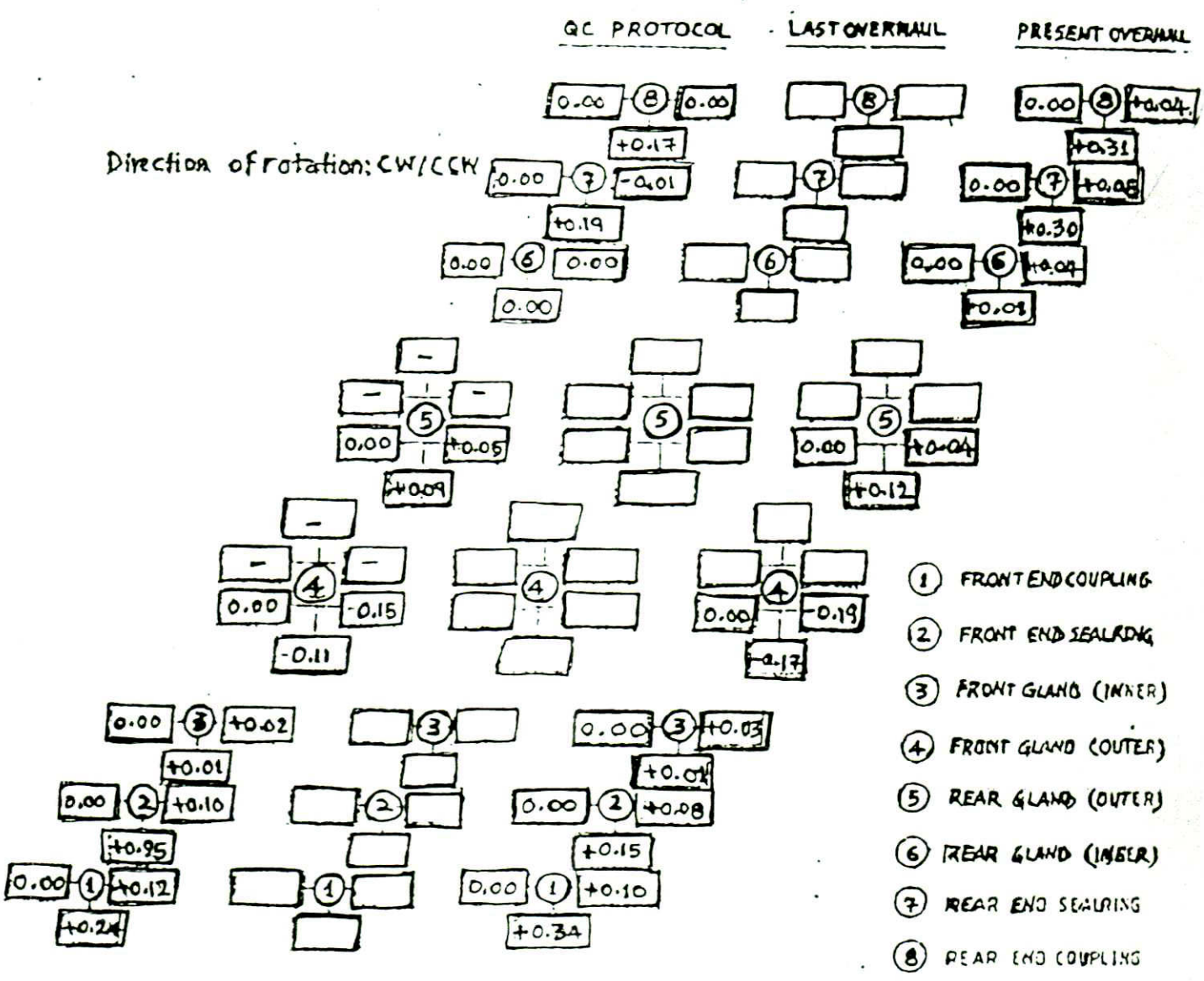
STEAM TURBINE MAINTENANCE — CENTERING OF TURBINE



COMMENTS:

INSPECTION REPORT

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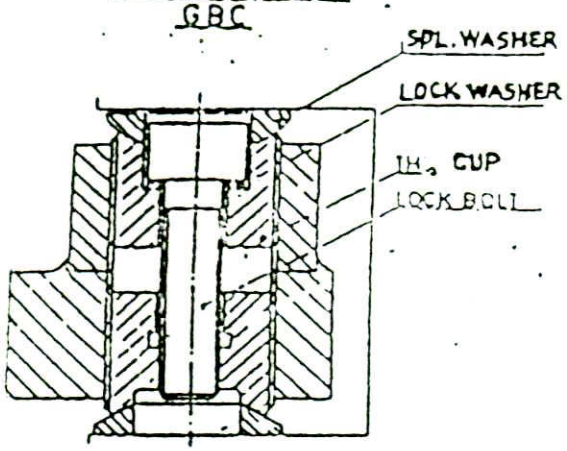
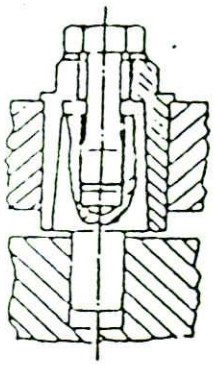
STEAM TURBINE MAINTENANCE — CARRIERS CENTERING

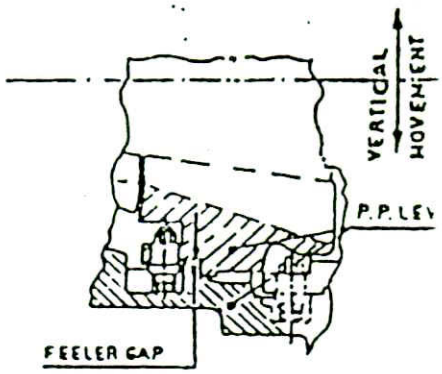
SUPPORT UNDER GBC



ECC. BUSH LOCKING



GUIDE BLADE CARRIER



- CENTERING OF CARRIERS SHALL BE CARRIEDOUT AFTER FINAL CENTRATION. AND LOCKING OF FIXING/ECCENTRIC BUSHES.
- AFTER COMPLEATE CENTERING ENSURE THE LOAD AND SEATING ON SPHERICAL WASHER.

CARRIER NO		1	2	3	4	5	6
FEELER GAP	LEFT	1.15	1.05	1.03	1.37		
	RIGHT	1.15	1.11	1.03	1.37		
PP LEVEL	LEFT	-0.19	-0.15	-0.25	+0.05		
	RIGHT	+0.11	-0.15	-0.25	+0.17		
VERTICAL MOVEMENT	TOP						
	BOTTOM						

COMMENTS:

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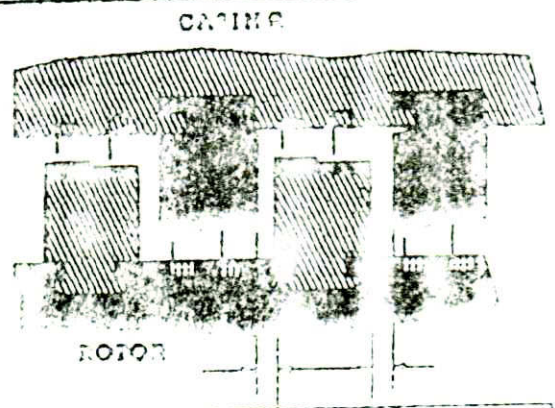
STEAM TURBINE MAINTENANCE — AXIAL BLADE CLEARANCES



NOTE:

1. ROTOR IN CENTER POSITION WITH ALL REFERENCE DIMENSIONS FIXED.
2. MEASURED WITH FEELER GAUGES.

STAGE	+ DIRECTION			- DIRECTION		
	L	R	NOM	L	R	NOM
A|1O4	3.50	3.60	3.50	2.50	2.65	2.50
10|11O	3.50	3.50	3.50	2.50	2.50	2.50
13|113	4.50	4.60	4.00	2.85	2.85	3.00
Casing						

STAGE	+ DIRECTION			- DIRECTION		
	L	R	NOM	L	R	NOM

ROTOR DISPLACEMENT	+ DIRECTION		- DIRECTION		TOTAL	
	NOM	ACT	NOM	ACT	NOM	ACT
LOWER PART						
LOWER PART & UPPER PART						
LOWER PART & UPPER PART WITH ALL INTERNALS						

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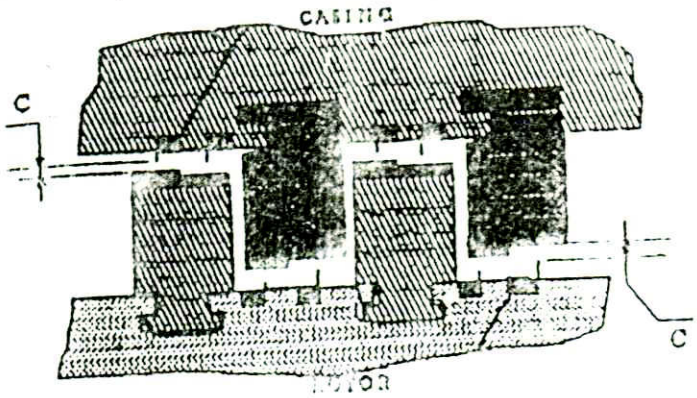
STEAM TURBINE MAINTENANCE — PIN/BLADE TIP CLEARANCES



1. ROTOR IN CENTER. POSITION WITH ALL REFERENCE DIMENSIONS FIXED.
2. MEASURED WITH FEELER GAUGES/ LEAD WIRE.

STAGE	NOMINAL	+,- RADIAL			STAGE	NOMINAL	+,- RADIAL		
		LEFT	BOTTOM	RIGHT			LEFT	BOTTOM	RIGHT
106	0.20 to 0.40	0.30	0.30	0.35			0.35	0.30	0.30
110	"	0.25	0.25	0.20			0.35	0.30	0.20
113	"	0.30	0.30	0.30			0.35	0.30	0.35

COMMENTS:

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INSPECTION REPORT

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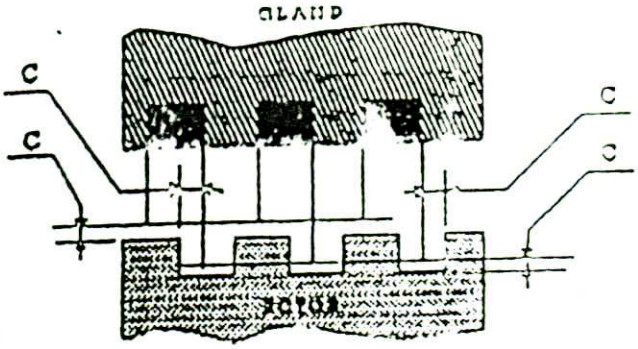
STEAM TURBINE MAINTENANCE — GLAND CLEARANCES



1. VALUES SHALL BE MEASURED AFTER FINAL CENTRATION OF ROTOR.
2. MEASURED WITH FEELER GAUGES/ LEAD WIRE AT RANDOM.

GLAND	RADIAL CLEARANCES				AXIAL CLEARANCES					
					+ DIRECTION			- DIRECTION		
	NOMINAL	LEFT	BOTTOM	RIGHT	L	R	NOM	L	R	NOM
FRONT	$0.30^{+0.0}$	0.30	0.25	0.25	2.20	2.20	2.25	1.65	1.65	1.50
		0.25	0.25	0.25						
B.PISTON	,,	0.30	0.20	0.20						
		0.30	0.30	0.35						
INTER-MEDIATE		0.30	0.30	0.25	3.85	3.85	$3.80^{+0.30}$	2.80	2.82	$2.80^{+0.30}$
		0.30	0.20	0.25						
REAR		0.35	0.35	0.35	4.00	4.00	4.00	2.25	2.25	2.25
		0.30	0.35	0.35						

COMMENTS:

INSPECTION REPORT

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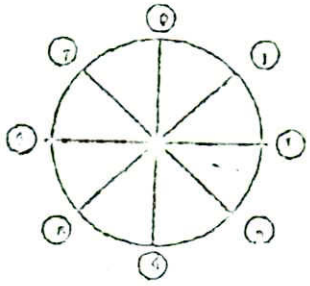
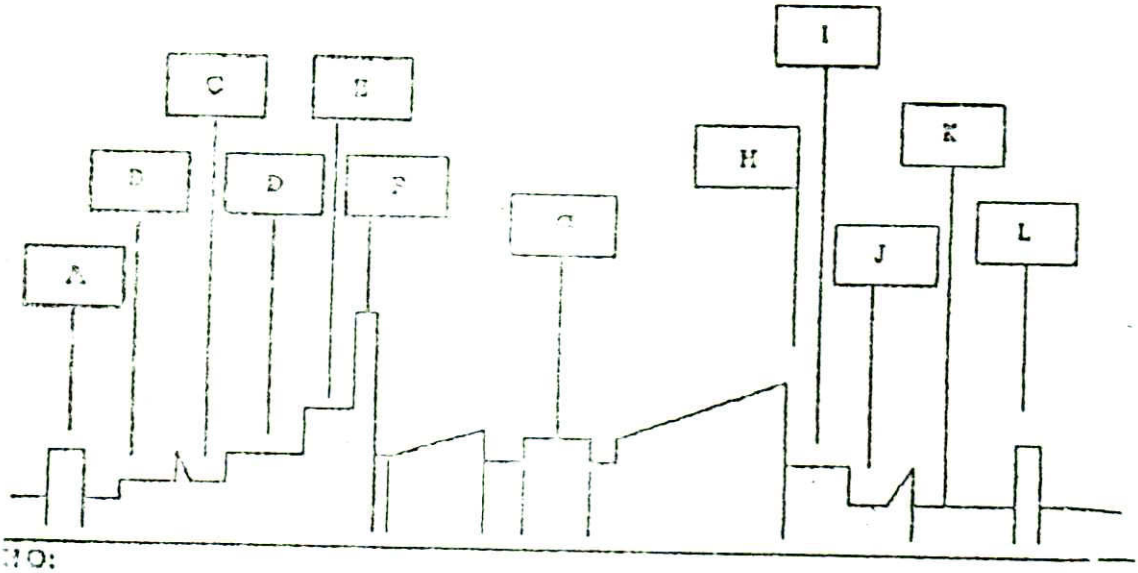
STEAM TURBINE MAINTENANCE

ROTOR RUN.



1. Record the runouts with thrust bearing lower half in position.
2. Runouts to be measured in meridic axis.



FORGE NO:

INDICATIONS	A	B	C	D	E	F	G	H	I	J	K	L
MAX. VALUE AT CIRCULAR PL.												
INDICATIONS VALUE IN MILS	0.01	0.01		0.01			0.01		0.01		0.01	

COMMENTS:

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INSPECTION REPORT

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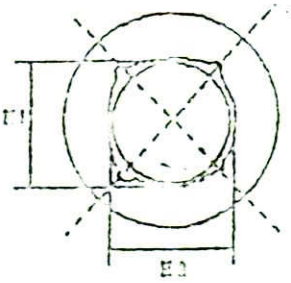
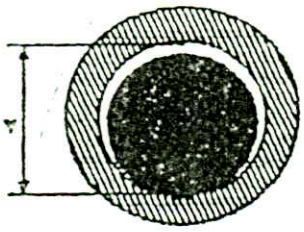
STEAM TURBINE MAINTENANCE — JOURNAL BEARING CLEARANCE

4 LOBE



2 LOBE



1. MEASURE HORIZONTAL (H1 & H2 FOR 4-LOBE BRGS) & VERTICAL (V FOR TWO BOTT BEARINGS) DIMENSIONS OF BEARING SHELL INNER DIA AT BOTH THE FRONT AND REAR ENDS.
2. BEARING HALVES MUST BE CLAMPED TOGETHER FOR MEASUREMENT.

4LOBED/2 LOBED BEARING (Measured with Micrometer).

LOCATION	BEARING DIA						JOURNAL DIA	CLEARANCE		
	H1		H2		V			ACTUAL		DESIGN
	FRONT	REAR	FRONT	REAR	FRONT	REAR		FRONT	REAR	
FRONT	79.90						80.02	0.15	0.17	
REAR	99.85						99.95			

2 LOBE BEARINGS-lead wire measurement.

LOCATION	M.DIA(mm)	Lead wire Diameter.	Shim thic. at P.P (A).	Lead wire thick after light.(B)	Clearance (A-B) in mm
FRONT					
REAR					

COMMENTS:

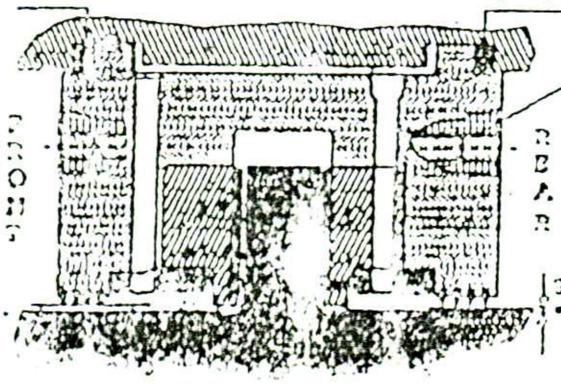
21

INSPECTION REPORT

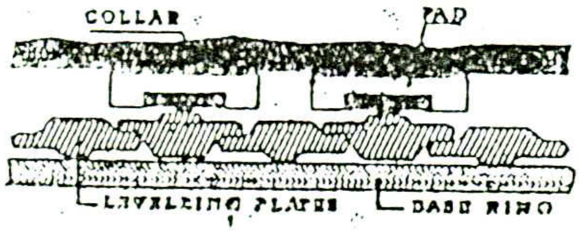
For field use only

STEAM TURBINE MAINTENANCE — THRUST BEARING ASSEMBLY

NOTE: 1. [illegible] adjusted and Rotor position fixed.
2. Shell with [illegible] shall not move more than 0.08mm.
3. [illegible] on pads shall be [illegible].



MITCHELL BRG.



KINGSBURY

S.NO	DETAILS	BEFORE CORRECTION	AFTER CORRECTION
1	[illegible]		
2	[illegible]		
3	[illegible] RTD/THERMOCOUPLE.		
[illegible]	NO OF [illegible] THERMOELEMENTS [illegible] CCW/NAS.		
[illegible]	[illegible] ACTIVE: NON ACTIVE:	15.97 15.88	
[illegible]	[illegible] FRONT REAR		
[illegible]	ROTOR FLOAT WITH THRUST BEARING TOTAL PHYSICAL MOVEMENT IN mm. TOTAL ON THRUST MONITOR IN [illegible]	0.27 mm	
[illegible]	OIL SEAL CLEARANCE (S).		
[illegible]	NO OF DRAIN OIL HOLES OPENED. ACTIVE SIDE: NON ACTIVE SIDE:		

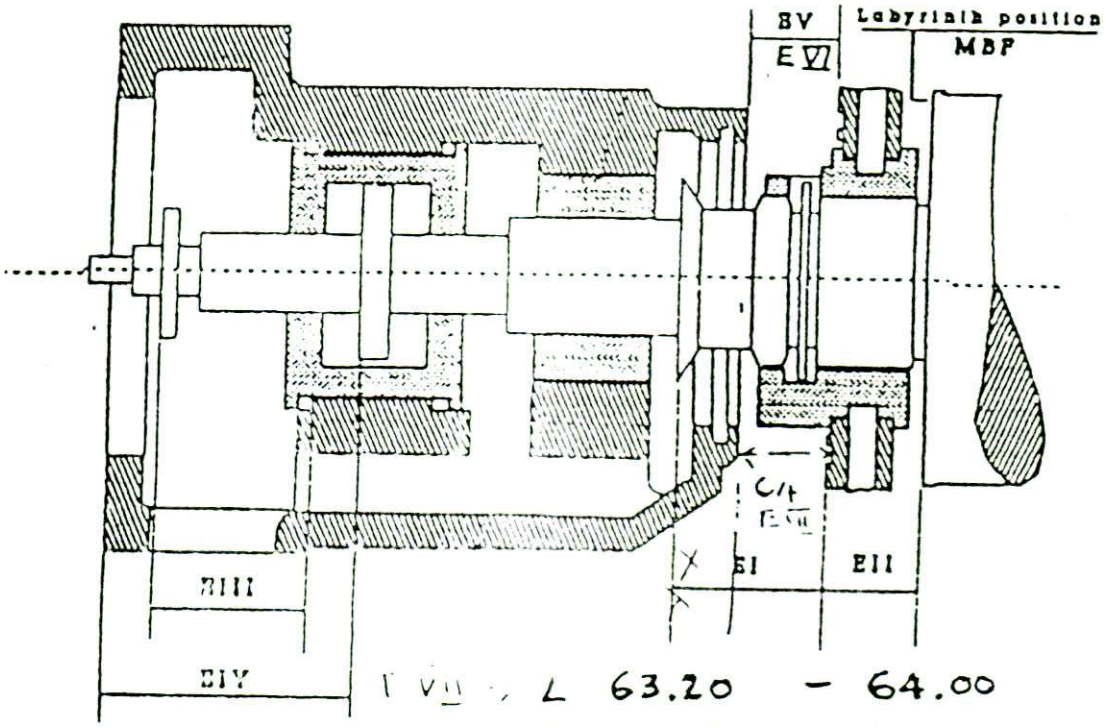
ROTOR FLOAT WITH OUT TH. BRG.+ Vc = , - Vc = [illegible] TOTAL =

COMMENTS: ______

INSPECTION REPORT

For Field use only

STEAM TURBINE MAINTENANCE — REFERENCE DIMENSIONS



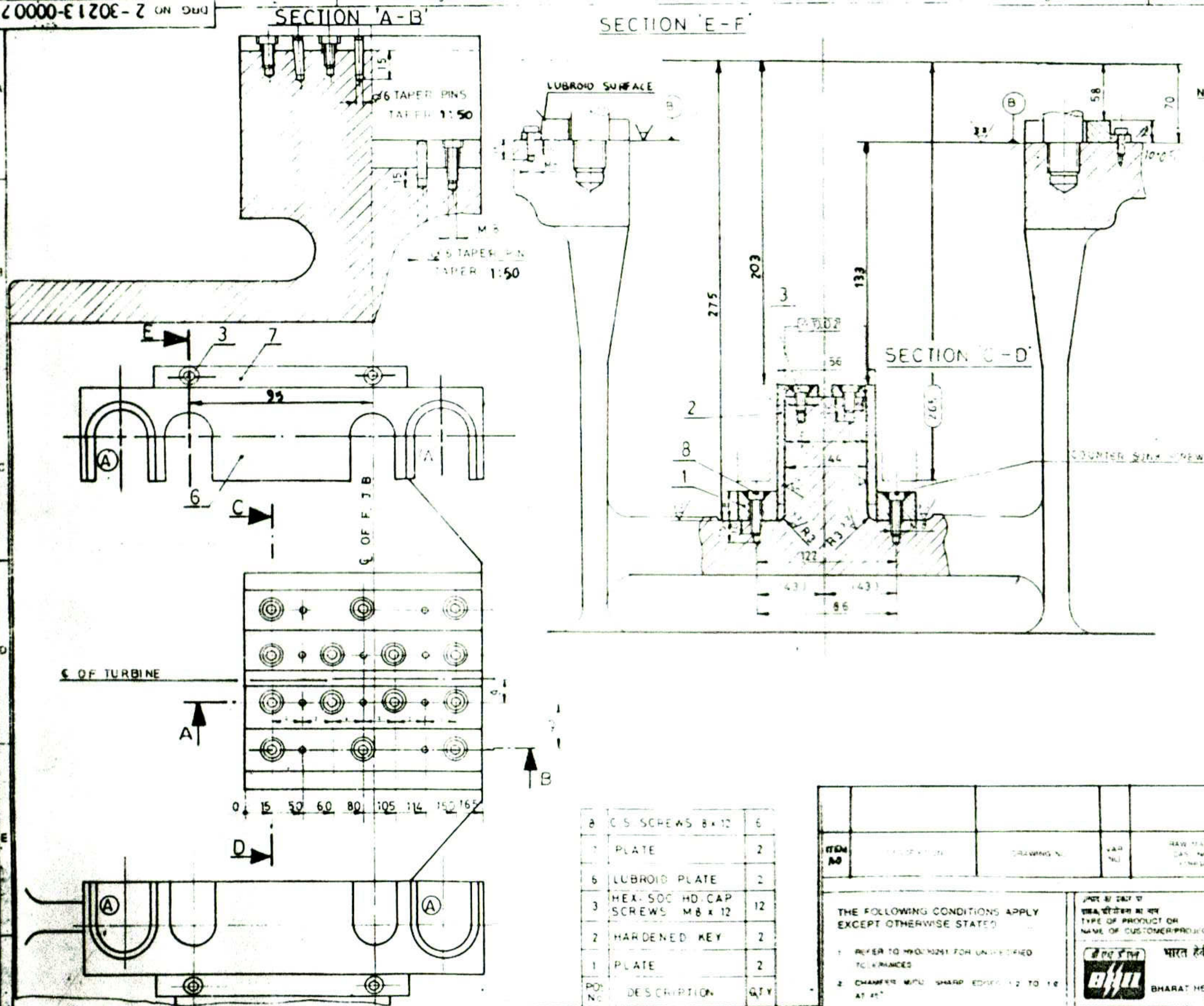
L 63.20 - 64.00

R 64.00 - 64.00

ADJUSTED DIMENSIONS	Perosa	ACTUAL
I FROM OIL SEAL RING TO FRONT SIDE OF OUTER CASING	60.20	60.20
II FROM FRONT SIDE OF OUTER CASING TO LABYRINTH PISTON/MBP	70.20	
III FROM FIRST DISK ON THE ROTOR TO THRUST BEARING GUIDE		
IV FROM FRONT SIDE OF FRONT BRG.HOUSING TO THRUST COLLER.		
V REAR BEARING HOUSING FRONT FACE TO CASING REAR FACE.		
VI REAR FACE OF FBH TO FRONT FACE OF CASING	35.64 34.79	35.90 34.74

COMMENTS:

DRG NO 2-30213-00002-00



NOTES :

1. SPHERICAL WASHERS COMING AT (A) ARE TO BE MACHINED OUTER DIA FROM ø44 TO ø38 AVOID BOWLING WITH LUBROID PLATE.
2. FOR RELEVANT NOTES, REF. TO CORRESPONDING COMPONENT DRGS ALSO.
3. MAINTAIN PLANARITY WITH IN 0.02mm ON SURFACE (B)
4. AFTER FINAL ASSEMBLY OF THE LUBROID PLATES, THE LUBROID SURFACE ALSO SHOULD HAVE A PLANARITY WITHIN 0.02 mm

LUBROID PLATE

ORIGINAL THK – 17·50MM

FAINAL THK – 10·05 MM

POS NO	DESCRIPTION	QTY
8	C.S. SCREWS 8×12	6
7	PLATE	2
6	LUBROID PLATE	2
3	HEX. SOC. HD. CAP SCREWS M8×12	12
2	HARDENED KEY	2
1	PLATE	2

ITEM NO	DESCRIPTION	DRAWING NO	VAR NO	RAW MATERIAL SIZE / CASTING DRG NO / FORGING DRG NO	MATERIAL CODE / MATERIAL SPECN	NET WT	GROSS WT
						QUANTITY	

THE FOLLOWING CONDITIONS APPLY EXCEPT OTHERWISE STATED

1. REFER TO HR0070251 FOR UNSPECIFIED TOLERANCES
2. CHAMFER MCD SHARP EDGES 1.2 TO 1.6 AT 45°
3. INTERNAL MCD CORNER ... TO 0.2
4. THE SURFACE ROUGHNESS WHEREVER NOT SHOWN SHALL BE TAKEN FROM THE SURFACE ROUGHNESS SHOWN OUT SIDE THE BACK SLASHES GIVEN AT THE TOP MOST RIGHT CORNER OF THE DRG

भारत हेवी इलेक्ट्रिकल्स लिमिटेड
हैदराबाद
BHARAT HEAVY ELECTRICALS LTD
HYDERABAD

DRN: V. Vijaya — 30-1-96

DEPT: LTD
CODE: 415

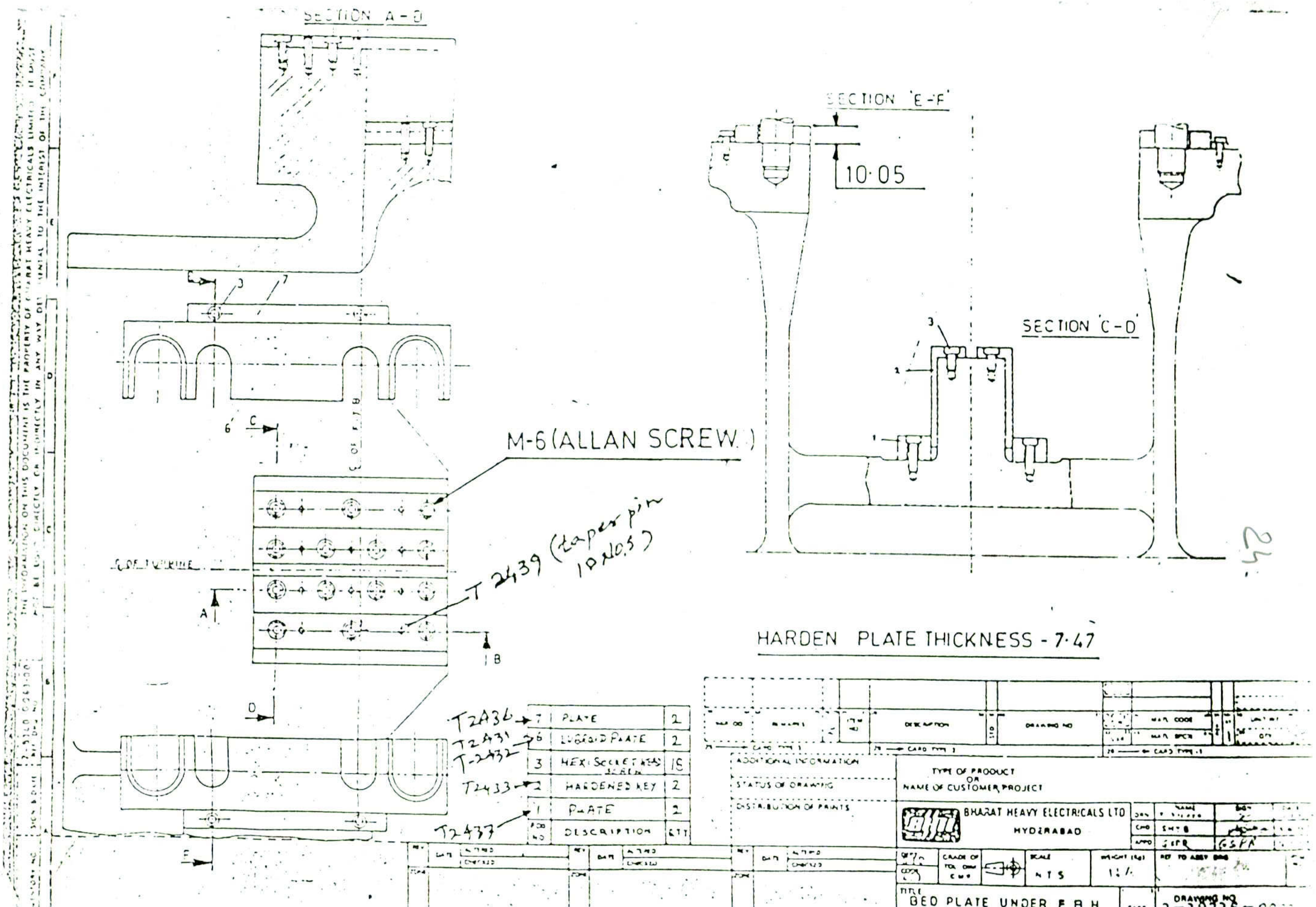
TITLE: BED PLATE UNDER F.B.H MODIFICATION 25

DRAWING NO: 2-30213-00002-00

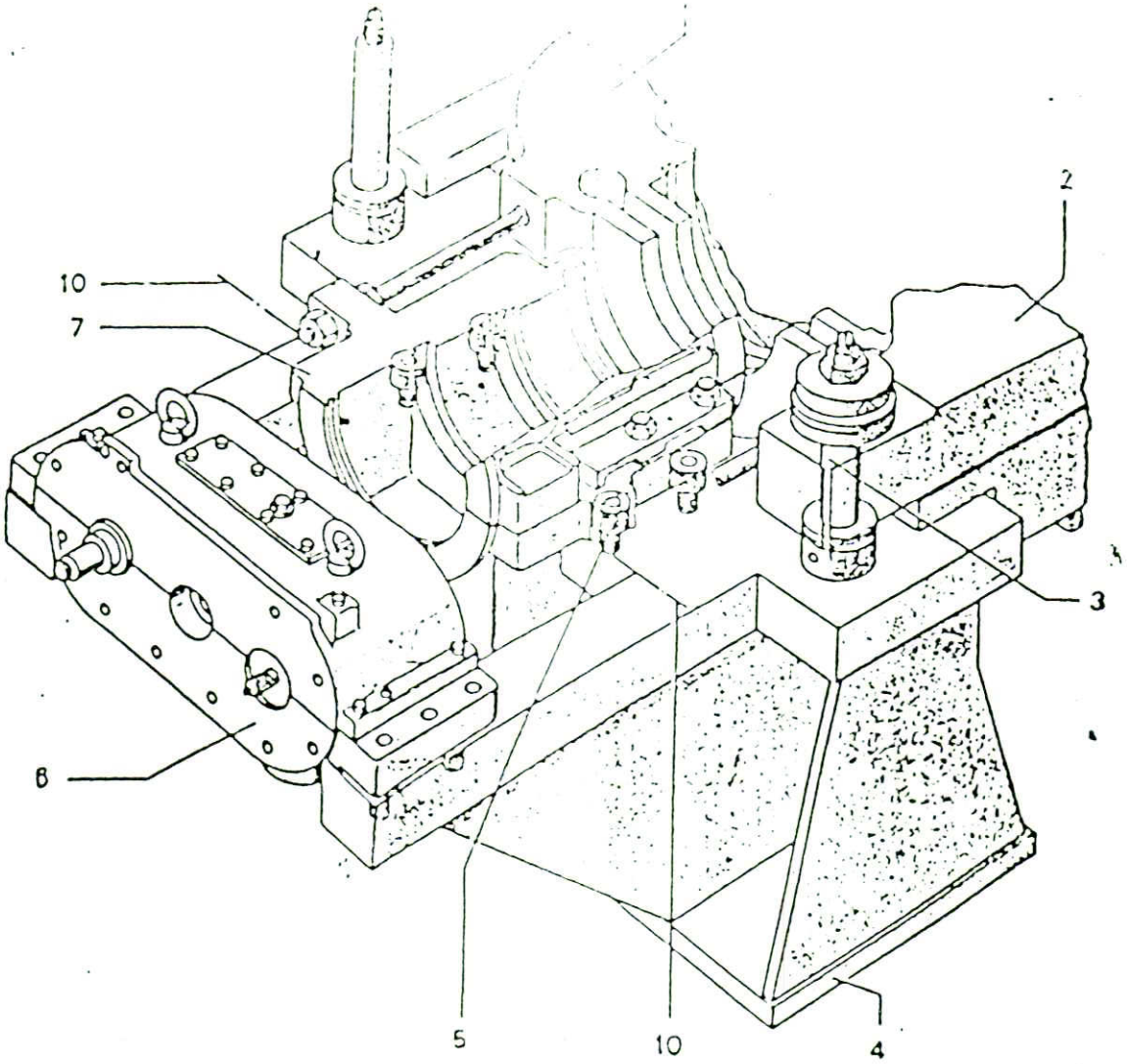
SHT NO 1

SIZE A2

23

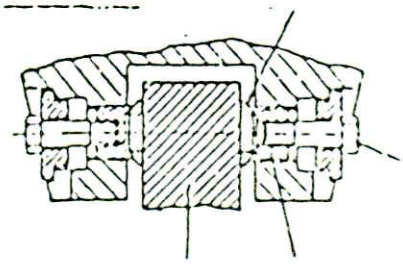


POS NO	DESCRIPTION	QTY	
7	PLATE	2	T2436
6	LUGRID PLATE	2	T2431
3	HEX. SOCKET HEAD SCREW	15	T-2432
2	HARDENED KEY	2	T2433
1	PLATE	2	T2437



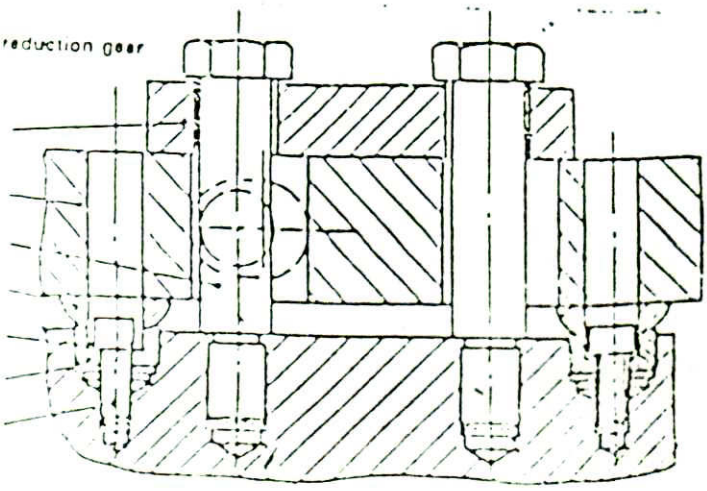
1 Turbine casing
2 Supporting brackets of outer turbine casing
3 Tie bolts of bearing housing
4 Casing support
5 Adjusting elements
6 Housing of pump reduction gear
7 Bearing housing
8 Cup springs
9 Spherical washer
10 Casing support without reduction gear

Fig. 1
Front suspension system



Guiding lug

OLD DESIGN



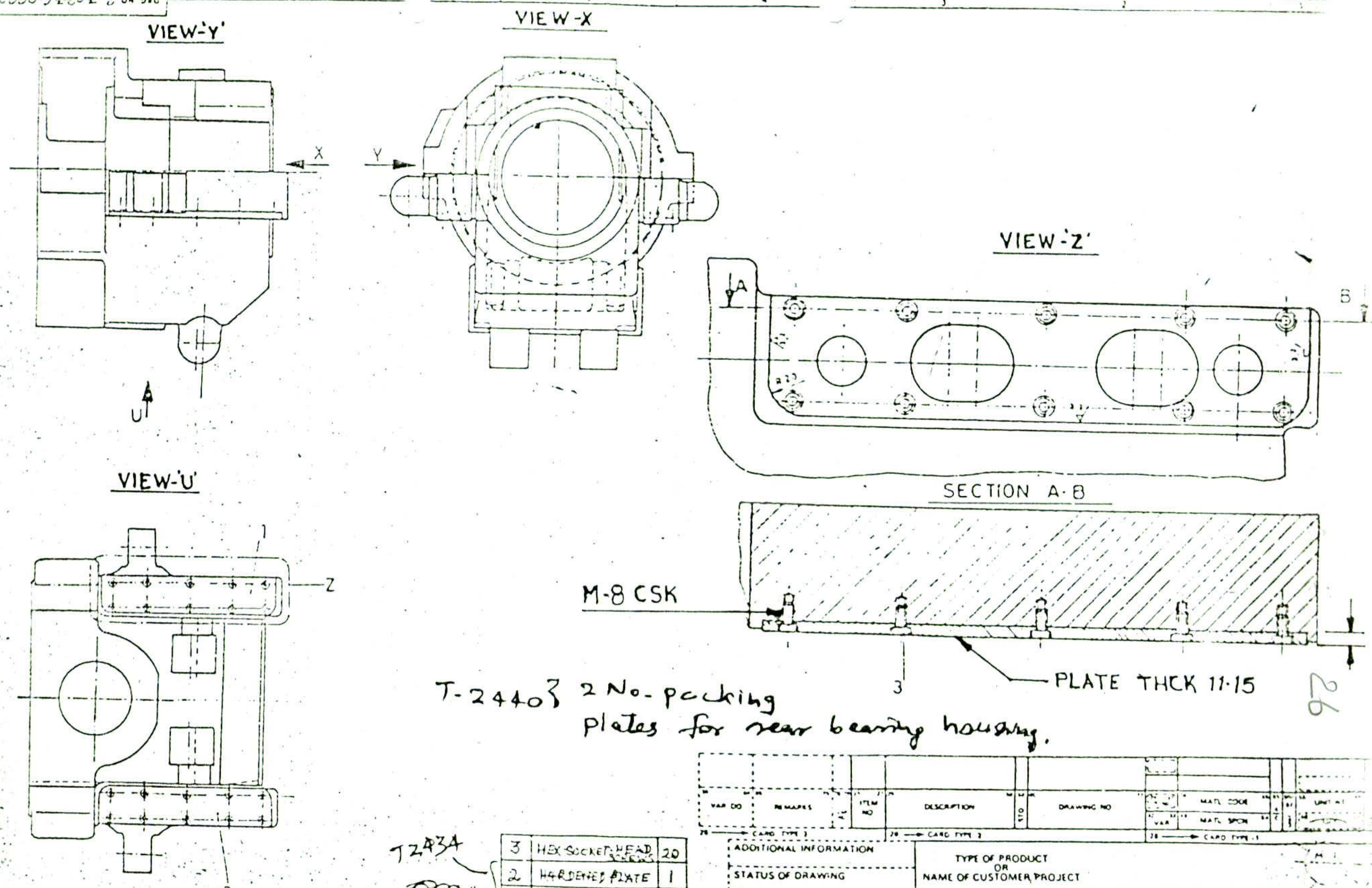
Guide between the bearing

Adjusting elements between bearing

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG NO 2-30236-00003



T-2440} 2 No.-packing plates for rear bearing housing.

26

POS NO.	DESCRIPTION	QTY
3	HEX SOCKET HEAD SCREWS	20
2	HARDENED PLATE	1
1	HARDENED PLATE	1

T2434

Drawn

T2435

ADDITIONAL INFORMATION

STATUS OF DRAWING

DISTRIBUTION OF PRINTS

TYPE OF PRODUCT OR NAME OF CUSTOMER PROJECT

BHARAT HEAVY ELECTRICALS LTD
HYDERABAD

SCALE NTS

WEIGHT (kg) NA

TITLE FRONT BEARING HOUSING MODIFICATION

DRAWING NO 2-30236-00

102-J NG COMPRESSOR :

Coupled and run with 25% injuction vibration level found normal. Start up vibration data recorded maximum vibration at 15000 rpm.

1) Front end bearing of turbine - 22 Microns.

2) Rear end bearing of Turbine - 24 Microns.

PREVENTIVE MAINTENANCE OF COMPRESSOR:

1) Coupling side bearings opened and checked. found in good condition clearance found to be 0.16 MM.

2) Thrust side bearing found damaged, babbit dislocated. Changed with new one. clearance found to be 0.17 MM.

3) Thrust bearings found in good condition. Float found to be 0.23 MM.

Note :- 1) The lubroid plates and hardened plate received from M/s. BHEL were higher thickness 15.5 MM and 12 MM thick respectivily & machined at our workshop. Final dimensions 10.05 MM & 7.92 MM respectively.

2) Rear housing packing plate supplied by BHEL was 12 MM thick. Final thickness after machining 11.30 MM.

01 01 03 SYN.GAS COMPRESSOR TRAIN (103-J):

All equipments of Syn. Gas Compressor train were taken for preventive maintenance.Following jobs were done.

a) All the machines were decoupled from each other and their bearings were inspected.

b) Following are the clearances recorded at the time of boxing up of the bearings.

103-JAT BACK PRESSURE TURBINE:

- Other than thrust end Journal bearing	0.007"
- Thrust end journal bearing	0.009"
- Thrust bearing	0.010"

103-JBT CONDENSING TURBINE:

- Other than thrust end Journal bearing 0.0095"
- Thrust end journal bearing 0.010"
- Thrust bearing 0.011"

Both the compressors of this train were taken for major overhauling.Their overhauling details are as under. :

103-JLP/JHP OVERHAULING OF SYN.GAS COMPRESSOR:

Syn.Gas compressor was to be taken for major overhauling job on both the LP and HP case of compressors.The last overhauling done on both the compressors were in Nov'92.Hence almost six years had passed and both the compressors were due for major overhauling.Also the HP case of 103-J was showing very high axial displacement of the order of 19/20mils while in operation and the plant load was restricted due to fear of tripping of the compressor on "High Axial Trip".

The complete overhauling job was planned for total 15 days on round the clock basis(only jobs like cleaning,loosening,tighetening etc. were taken up in the night shift).The contract for overhauling job was given to M/s. Gangotri Turbotec Engineering Services,Hyderabad.

The machine was stopped in the morning shift on 22nd April 1998 and was made available for maintanance by 2.00pm.

Following jobs were done during overhauling of the compressors.

1) Blinds were provided in the shortloop as well as in 103-JAT exhaust (for faster cooling of the turbine so that L.O. circulation can be stopped.)

2) All instrument probes connected to bearings and coupling guards were removed.

3) All the coupling guards were removed.

4) The axial float of the coupling was measured and the compressor all the machines were decoupled. The couplings were inspected and found to be O.K.

5) Axial float of the compressor was checked with thrust bearing in position.

6) Total float of both the rotors was recorded without thrust bearing in position.

7) Alignment readings of 103-JAT/JLP AND 103-JLP/JHP were checked and recorded.

8) All connecting piping connected to both the compressor barrels were removed.

10) Piping connection to compressor casing like suction, discharge,recycle etc with the help of new hydraulic bolt tighetening device RSL-14.(spanner sizes 50 &55mm)

11) Compressor barrel foundation bolts of both LP and HP compressors were removed.

12) Both the compressor barrel assemblies were removed with the help of HM crane from their position and taken to the work shop near planning building in IFFCO truck.The same were unloaded by EOT crane in the workshop and kept on the stands fabricated for them.

13) Two separate groups were engaged for overhauling of LP nad HP compressor cases.Following jobs were done in overhauling both of them.

13.1 Both the journal bearings and thrust bearing were removed.

13.2 Seal assemblies at both the ends were removed.

13.3 Coupling hub(on both the ends in case of LP compressor) was removed from the rotor.

13.4 Inlet head was removed with the help of EOT crane and with the help of jacking studs.

13.6 The Inner Bundle Assembly was pulled out with the help of Fork Lift,Hook chuck etc. from inlet head side and kept on the fabricated stand. Measured and recorded the overall total length of the Inner Bundle Assembly.

13.7 Intake ring was removed and upper and lower half of the diaphragms were separated from each other.

13.8 Rotor assembly was removed and kept on the rotor stand.

13.7 The guide vanes and interstage labyrinths were removed from upper and lower halves of the diaphragms. The guide vanes were cheked by Dye penetrant (DP) checking for cracks.No cracks were found.

13.8 Both the rotors were cleaned thoroughly.

13.9 Both the rotors were checked for the rotor run-out.The same was found to be O.K.in both the rotors.

13.10 Blue matched rotor with the coupling hubs to be fitted.

13.11 All the thrust pads as well as journal bearing pads were changed in both the compressor cases.

13.12 All the internal components of the Inner Bundle Assembly were cleaned thoroughly with kerosene and jet of air.

13.13 All the labyrinths including balance piston labyrinths were replaced with new one.

13.14 Assembled the top and bottom halves of Inner Bundle assemblies seperately consisting of diaphragms, guide vanes and labyrinths.

13.15 The Rotor was kept on dummy labyrinths one by one in Upper half and Bottom half of Inner Bundle assembly and labyrinth clearances were recorded.

13.16 The upper half and bottom half of Inner Bundle assembly were joined together with required fastners and Intake Ring was also assembled.

13.17 The overall length of assembled bundle was measured and compared with the one measured before dismentling.

13.18 "O" Ring and Back up ring were then assembled on the Intake ring.

13.19 Insert the Inner Bundle assembly in the Barrel with proper fixtures.

13.20 Inlet head as well as Outlet head were asembled with the Barrel with new gaskets.In case of LP case suction inlet guide ring wsa found having an overlap of about half inch over the opening in the barrel for gas inlet.The inlet guidering was taken out and was ground and its mismatch between barrel inlet opening was removed.

13.21 Lower halves of Dummy bearings were put in the bearing housings at both the ends.

13.22 The Rotor was checked for its free rotation and total float of the rotor was checked.

13.23 All the oil seal assemblies of suction end and discharge end were prepared after replacing all rubber components and all inner/middle/outer rings.

13.24 Both suction and discharge end oil seal assembles were installed in their respective positions.

13.25 The thrust bearing was assembled after installing the hydraulically fitted thrust disc.While fitting Hydraulical Thrust disc for 103-JLP case rotor;it was found that the original O-ring for the thrust disc was smaller than the required and hence same could not be fitted .A little higher size o-ring was found from the stock of Instruments spares(100mm X 105mm) in stores and thrust disc was installed with help of it.

Also the thrust collar locknuts for both the thrust collar were replaced as the lockscrew for both the locknut was required to be removed by drilling while removing.

13.26 Assembled the thrust bearing assembly on the shaft and rechecked the rotor position. Also checked the runout of thrust disc.

13.27 Finally assembled both the journal bearings and thrust bearing assemblies

13.28 The removed coupling hubs were reinstalled on the rotor after obtaining sufficient blue match .

13.29 Both the compressor barrel assemblies were taken to site in IFFCO truck and put on their respective foundations.

13.30 All pipings were conneted to the barrel except suction and discharge pipings which were kept loose for alignment purpose.

13.31 Aligned both the compressor barrels with adjacent machines.

13.32 The suction & discharge piping were connected and the alignment was rechecked and found to be within the limits.

13.33 Finally connected and set instrument probes for axial displacement of rotor.

13.34 Coupled the compressor with adjacent machines and measured the axial float of all the couplings.The coupling assembly was kept approximately in the centre of total coupling float.

13.35 The position of the coupling lubricating pipe was checked and finally the coupling guard was assembled.

13.36 The lube oil circulation was started and the machine was handed over for alarm and trips checking.

The compressor was started after plant shutdown and after its running for about one week ; when checked with explosivemeter ;all the four end covers of both the compressors were found leaking.The leakage from LP case discharge end cover was more and could also be felt in form of a jet at one place.

All the four end covers were tightened with the help of RSL14 tooling or extended pipe in some studs where it was not possible to mount RSL14 spanner.As a result suction end covers of both the compressors stopped leaking.However discharge end cover leak from LP as well as HP case got minimised to explosiveness at some points.

On start up, the axial displacement of the HP case compressor also increased starting from 15/16 mils to 20mils at 100% load.No change was observed in other related operating parameters. like differential pressure across the balance piston which was zero,housing vibrations,thrust bearing oil outlet temperature which was found to be 78/79 deg.C.

It was decided to run the machine with constantly observing its these parameters.

OVERHAULING OF SYNTHESIS GAS COMPRESSOR (103-J)

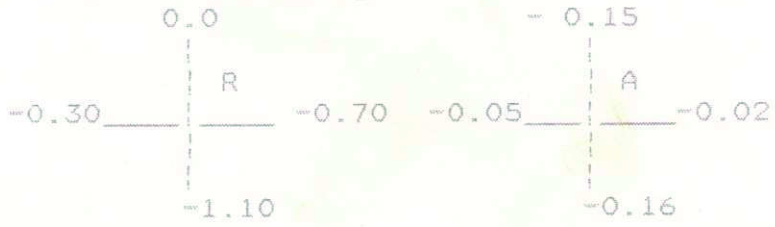
(A) Coupling Details :

	Before O/H	After O/H
1) L.P.Case : Float Shaft End to End	7.45 MM	5.2 MM
2) H.P.Case : Float Shaft End to End	4.77 MM	6.8 MM

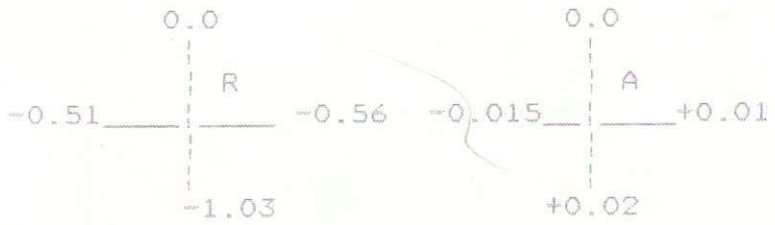
(B) Alignment Reading :

1) L.P.Case : to 103-JAT (Dial on Turbine)

(a) Before overhauling

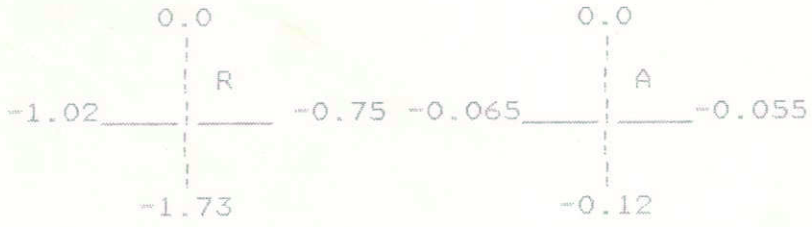


(b) After overhauling

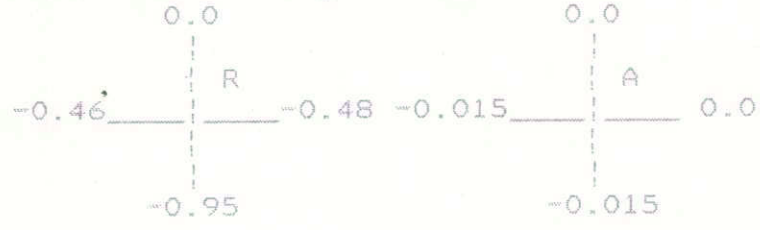


2) H.P.Case: to L.P.Case (Dial on LP)

(a) Before overhauling



(b) After overhauling



(C) L.P.Case Details :

	Before O/H	After O/H
1) Axial Float :(0.38 - 0.55MM)	0.39 MM	0.40 MM
2) Total Float :(0.175" Min)	6.3 MM	6.6 MM (7.5 MM w/o top half)

3) Journal Bearing Clearances : (0.11 - 0.19 MM)

Thrust end : 0.13 MM

Opp.Thrust end: 0.15 MM

4) Labyrinth clearances :

		OD of shaft	Laby. ID	Clearance
Stage : 1	-			
	Large			
Stage : 2	Small (0.20 - 0.30 MM)			0.20
	Large (0.30 - 0.40 MM)			0.30
Stage : 3	Small			0.20
	Large			0.30
Stage : 4	Small			0.20
	Large			0.30
Stage : 5	Small			0.20
	Large			0.30
Stage : 6	Small			0.20
	Large			0.30
Stage : 7	Small			0.20
	Large			0.30
Stage : 8	Small			0.20
	Large			0.30
Stage : 9	Small			0.20
	Large			0.30
Balance Drum (0.25 - 0.36 MM)		241.30 MM	241.58 MM	0.28

5) Suction Oil Seal Clearances :

	OD of shaft	Laby. ID	Clearance
Inner labyrinth : (0.20 - 0.27 MM)			0.245
Inner Seal Ring : (0.05 - 0.08 MM)			0.055
Outer Seal Ring : (0.15 - 0.18 MM)			0.16

6) Discharge Oil Seal Clearances :

	OD of shaft	Laby. ID	Clearance
Inner Labyrinth : (0.20 - 0.27 MM)			0.21
Inner Seal ring : (0.05 - 0.08 MM)			0.055
Outer Seal Ring : (0.15 - 0.18 MM)			0.155

(E) H.P.Case Details :

	Before O/H	After O/H
1) Axial Float :(0.38 - 0.60MM)	0.37 MM	0.40 MM
2) Total Float (0.175" Min) Shaft end to end	6.9 MM	7.50 MM (7.85 MM w/o bottom half & I/L guide)

3) Journal Bearing Clearances : (0.11 - 0.19 MM)

Thrust end:	0.13/0.15	0.12
Opp.Thrust end:	0.13/0.15	0.13

4) Labyrinth clearances :

		OD of shaft	Laby. ID	Clearance
Stage : 1	Large (0.30 - 0.40 MM)			
Stage : 2	Small (0.20 - 0.30 MM)			0.20
	Large			0.32
Stage : 3	Small			0.20
	Large			0.15
Stage : 4	Small			0.20
	Large			0.31

Stage : 5	Small	0.20
	Large	0.28
Stage : 6	Small	0.20
	Large	0.30
Stage : 7	Small	0.20
	Large	0.30
Stage : 8	Small	0.18
	Large	0.32
Stage : 9	Small	0.20
	Large	0.25
Balance Drum		247.06MM 247.54 MM 0.48

5) Suction Oil Seal Clearances :

	OD of shaft	Laby. ID	Clearance
Inner labyrinth : (0.20 - 0.30 MM)			0.31
Inner Seal Ring : (0.05 - 0.07 MM)			0.09
Middle Seal ring: (0.14 - 0.16 MM)			0.16
Outer Seal Ring : (0.10 - 0.13 MM)			0.13

6) Discharge Oil Seal Clearances :

	OD of shaft	Laby. ID	Clearance
Inner Labyrinth : (0.20 - 0.30 MM)	142.87	143.18	0.31
Inner Seal ring : (0.05 - 0.07 MM)	114.27	114.36	0.09
Middle Seal Ring :(0.14 - 0.16 MM)	114.28	114.45	0.17
Outer Seal Ring : (0.10 - 0.13 MM)	114.29	114.41	0.12

01 01 04 REFRIGERATION COMPRESSOR TRAIN (105-J):

All equipments of refrigeration compressor train were taken for preventive maintenance.Following jobs were done.

a) All the machines were decoupled from each other and their bearings were inspected.

B) Following are the clearances recorded at the time of boxing up of the bearings.

105-J DRIVE TURBINE (105-JT):

- Other than thrust end Journal bearing	0.007"
- Thrust end journal bearing	0.006"
- Thrust bearing	0.013"

105-J LP CASE (105-JLP):

The journal bearing clearances for this machine were checked by checking lift of the shaft within the bearing.

- Other than thrust end Journal bearing	0.006"
- Thrust end journal bearing	0.007"
- Thrust bearing	0.012"

105-J HP CASE (105-JHP):

- Other than thrust end Journal bearing	0.004"
- Thrust end journal bearing	0.005"
- Thrust bearing	0.010"

01 02 01 BOILER FEED WATER PUMP DRIVE ELLIOT TURBINE (104-JT):

This turbine was found hunting during start up hence following jobs were done on the same :

- Its governor oil was flushed.
- The governor was protected from heat by providing sheet against leaking steam from the turbine.
- Leaking emergency trip valve upstream flange was attended.

On 12 th May when the plant was stopped for attending the Primary Reformer catalyst; this turbine was taken for complete overhauling and following jobs were carried out.

- the gland sealing labyrinths were replaced with new one.

- the antifriction thrust bearing was replaced with new one.
- journal bearing clearances were checked and found to be O.K.
- the governing valve and stem assembly was replaced with spare one to avoid stucking up of the valve and to minimise passing.
- corroded shell of the lub oil cooler was removed by cutting and new shell of SS was patch welded to the same.
- all the corroded lub oil lines were replaced with S.S.lines.

Also both the existing as well as standby governors of the turbine were calibrated in decoupled run and the results were as follows:

Installed Governor:

Signal	Speed
0	1300rpm
25%	1970rpm
50%	2550rpm
75%	3140rpm
90%	3480rpm
95%	3610rpm
100%	3850rpm

Spare Governor:

Signal	Speed
0	1450rpm
25%	1680rpm
50%	2380rpm
75%	3060rpm
100%	3800rpm

OST at 4250rpm(4300 by IRD)

01 02 02 PREVENTIVE MAINTENANCE OF BFW PUMP (104-JA):

The Boiler Feed Water Pump was decoupled from its drive turbine for the purpose of preventive maintenance.Following jobs were done during its preventive maintenance.

1) Journal bearings at both the ends were inspected and their clearances were checked.

3) The coupling was regreased and after coupling the pump again with the turbine

- the antifriction thrust bearing was replaced with new one.
- journal bearing clearances were checked and found to be O.K.
- the governing valve and stem assembly was replaced with spare one to avoid stucking up of the valve and to minimise passing.
- corroded shell of the lub oil cooler was removed by cutting and new shell of SS was patch welded to the same.
- all the corroded lub oil lines were replaced with S.S.lines.

Also both the existing as well as standby governors of the turbine were calibrated in decoupled run and the results were as follows:

Installed Governor:

Signal	Speed
0	1300rpm
25%	1970rpm
50%	2550rpm
75%	3140rpm
90%	3480rpm
95%	3610rpm
100%	3850rpm

Spare Governor:

Signal	Speed
0	1450rpm
25%	1680rpm
50%	2380rpm
75%	3060rpm
100%	3800rpm

OST at 4250rpm(4300 by IRD)

01 02 02 PREVENTIVE MAINTENANCE OF BFW PUMP (104-JA):

The Boiler Feed Water Pump was decoupled from its drive turbine for the purpose of preventive maintenance.Following jobs were done during its preventive maintenance.

1) Journal bearings at both the ends were inspected and their clearances were checked.

2) Thrust bearing clearance was checked and found to be O.K.

3) The lubricating oil in the sump was drained and oilsump was filled with fresh oil.

4) The leaf type lub. oil filter in the lubricating oil pump's common discharge line was replaced .

5) The coupling was regreased and after coupling the pump again with the turbine .

6) Both the seal coolers were cleaned.

The pump was started on 18-05-98 at 7.00hrs. The pump was running normal with normal vibration levels and operating parameters. On 20.5.98 at 21.55 hrs., the low lubricating oil pressure alarm appeared for this pump on DCS and subsequently on visual inspection at site, oil was found coming out from the stationery oil baffle (Part No.48) of thrust end journal bearing. The auxiliary oil pump was also found running. Immediately the oil level was made-up in the oil sump and the pump was stopped. Simultaneously, the standby BFW Pump (104-J) was taken in line at 22.00 hrs.

Both coupling end as well as thrust end journal bearings and thrust bearing were opened for inspection. All other auxiliaries were also opened for inspection. Following observations were noticed :

01) The thrust end journal bearing was found completely damaged and the shaft journal was also found to have deep grooving of about 5 to 6 mm.

02) The stationery oil baffle (Part 48) as well as seal plate (Part 674) were also found damaged on their ID. The shaft in these areas was also found having deep grooving of about 2 to 3 mm.

03) The thrust bearing pads were found to have rubbing marks.

04) The coupling end journal bearing was also found to have rubbing marks.

05) The main oil gear pump was found jammed and on dismantling found to have wear and tear and increased clearances.

06) Thrust collar was also found to have rubbing marks on both the faces.

07) Mechanical seals on both the ends of the pump were found damaged.

Looking to the above damages, it was decided to dismantle the complete pump.Accordingly the complete pump barrel was taken out and taken to workshop for overhauling.

The assembly of the pump was carried out using spare reconditioned rotor assembly which was made out of old impellers(except suction impeller) and new spacers and shaft.The pump was ressembled after replacing the damaged components. The spares consumed are attached at Annexure-I.

The pump was restarted on 24.5.98 at 21.45 hrs. and its running was normal.However the horizontal and axial vibrations in the coupling end bearing of the pump were high(12-13mm/sec.velocity)and steady with predominant vibrations occuring at 3.6times the RPM.

The pump was again stopped on 27/05/98at 8.00AM for locating the cause for the vibrations and following jobs were done.

1) Both end bearings were checked for clearances and found to be O.K.(.004"at coupling end and 0.006" at thrust end)The clearance at the coupling end was increased to 0.006". Both the bearings were also found with minor scratches.

2) The stopper plates in the coupling were removed and the coupling was regreased.

3) The blue contact on the shaft for the coupling end journal bearing was checked and was improved from 50% to 75%.

4) The pinch on the coupling end journal bearing was checked and found to be .003" which was reduced to 0.001" by putting oil paper on the partition plane.

5) The oil sump was checked for oil quality and oil was found having brass particles.Hence the oil pump assembly was removed and dismentaled.The drive shaft gear was found loose on the shaft.Hence the oilpump was replaced with the removed oil pump assembly which was reconditioned using drive shaft made in our workshop and with 0.004"clearance in its bearings and 0.003" axial float.

6) The ARV of the pump was found passing and hence the same was replaced with the spare one as complete ARV/NRV was not replaced because of time limitation. However the passing is still there.

After replacing above; the pump was again restarted om 28-05-98 morning. The vibrations have marginally reduced to 10-11mm/sec. However the same are consistent. The oil quality in the drain has also improved and there is no threat to the bearings anymore.

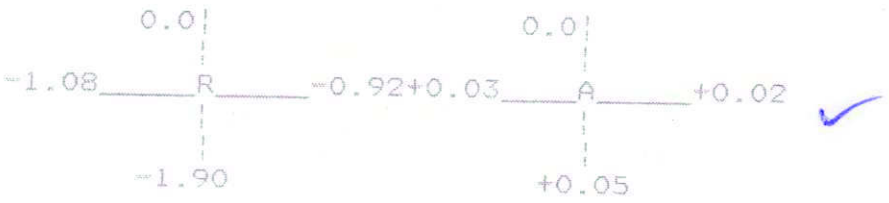
1 Annexure - I Details of Sapres consumed.

Following are the clearances and other records which were finally maintained during this overhaul.

- Thrust end bearing clearance 0.006-0.008"
- Coupling end journal bearing clearance 0.006"
- Axial float 0.014"
- Total float 11mm
- Coupling float (with plate 8.45mm)
  (without plate 17.8mm)

- Alignment reading :

Dial on pump



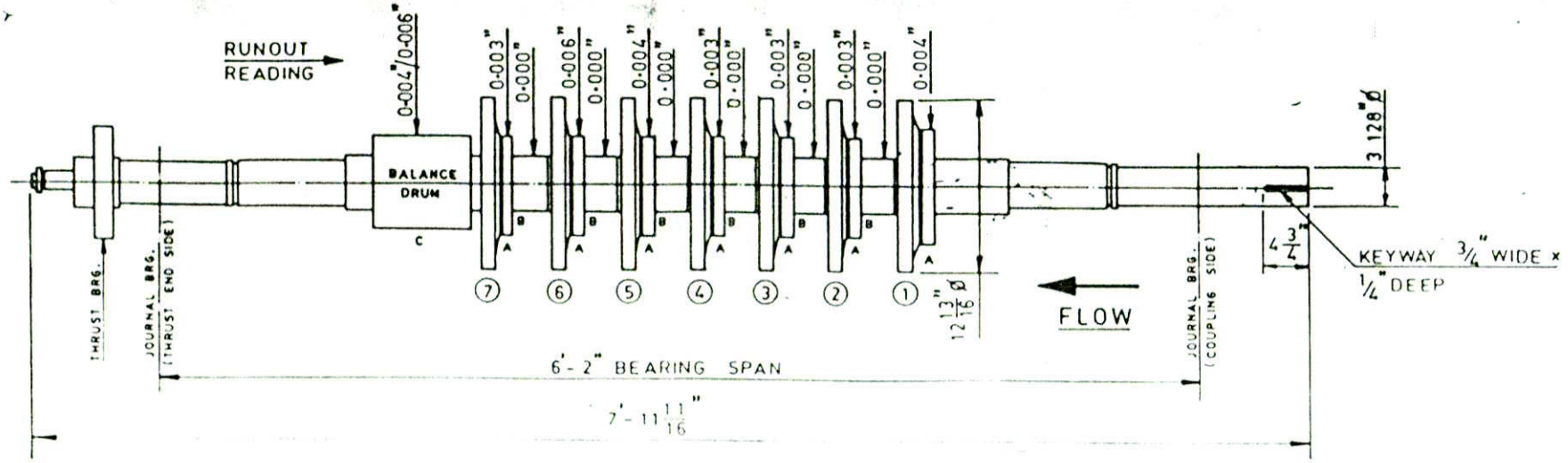
ANNEXURE-I

DETAILS OF SPARES CONSUMED FOR REPAIR OF BFW PUMP (104-JA)

SR. NO.	STORE CODE NO.	DESCRIPTION	PART NO.	QNTY. NO.	REMARKS
01	105302001	PUMP SHAFT	1	01	New in assemb
02	105302007	DEFLECTOR RING	7	02	
03	105302022	HEAD GASKET	22	01	
04	105302025	IMPELLER KEYS	25	06	
05	105302031	IMPELLER SPACER SLEEVE	31	06	
06	105302048	STATIONARY OIL BAFFLE	48	01	
07	105302051	BEARING SLEEVE, THRUST (THRUST END JOURNAL BEARING).	51	01	
08	105302057	THRUST COLLAR	57	01	
09	105302063	BEARING SLEEVE, RADIAL (COUPLING END JOURNAL BEARING).	63	01	
10	105302091	MAIN OIL PUMP ASSEMBLY CONSISTING OF PART NOS.91,93,94,95,96,99 100, 101,102 & 206.		01 SET	Reconditi
11	105302006	MECHANICAL SEAL ASSEMBLY.	--	02 SETS	Jhon crane
12	105302054	THRUST BEARING SHOES	--	12	
13	105302111	PACKING HOUSING GASKET	111	02	
14	105302238	IMPELLER LOCK NUT, SUCTION.	238	01	
15	105302112	IMPELLER KEYS, SUCTION.	112	01	

104-J/JA BFW PUMP CLEARANCES DATA

DATE : APRIL 1998



	IMPELLER NECK RING CLEARANCE (A)			INTERSTAGE BUSHING CLEARANCE (B)			BALANCE DRUM CLEARANCE (C)		
IMPELLER NO.	WEAR RING I.D. SUC. 8·500" INT. 7·375"	NECK RING O.D. SUC. 8·485" INT. 7·362"	CLEARANCE SUC. 0·015" INT. 0·013"	BUSH I.D. 4·000"	SLEEVE O.D. 3·988"	CLEARANCE 0·012"	BUSH I.D. 6·875"	BALANCE DRUM O.D. 6·868"	CLEARANCE 0·007"
1	8·504"	8·480"	0·024"	4·000"	3·988"	0·012"			
2	7·383"	7·360"	0·023"	4·000"	3·988"	0·012"			
3	7·383"	7·360"	0·023"	4·000"	3·988"	0·012"			
4	7·383"	7·360"	0·023"	4·000"	3·988"	0·012"			
5	7·383"	7·360"	0·023"	4·000"	3·988"	0·012"			
6	7·383"	7·360"	0·023"	4·000"	3·988"	0·012"			
7	7·383"	7·358"	0·025"						
BALANCE DRUM							6·878"	6·868"	0·010"

1. JOURNAL BRG. CLEARANCE + (COUPLING SIDE) 0·006"
2. JOURNAL BRG. CLEARANCE + (THRUST END SIDE) 0·006" – 0·008"
3. THRUST BRG. CLEARANCE + 0·014"
4. TOTAL FLOAT + 11 MM.
5. COUPLING FLOAT + WITH PLATE - 8·45 MM. W/O PLATE - 17·80 MM.

NOTE :
1. R.P.M. – 3550
2. ROTOR WEIGHT – 223 Kg.
3. SIZE & TYPE – 6" LL BFIC

01 02 03 BOILER FEED WATER PUMP DRIVE TERRY TURBINE (104-JAT)

Terry turbine was decoupled from pump for preventive maintenance and following jobs were carried out.

a) Its' both journal bearings were opened for clearance checking.Clearance were found to be O.K.

b) End float of the rotor was also checked and found to be O.K.

c) The oil console was drained and fresh oil was charged to the same after thorough cleaning of the console.Its oil cooler was cleaned from the tube side by rod poking.

d) Vaccum ejector in the the casing drain was manufactured in workshop and replaced.

e) Governor was replaced with spare calibrated governor.

f) To protect the governor from overheating,asbestos sheet/aluminium sheet was put for avoiding direct impingement of steam on the governor.

During start up of plant the turbine was found tripping frequently at a particular speed of 3200RPM.Hence turbine was decoupled from the pump and again tripping speed was checked which was found to be the same.The spring tension on the OST trip bolt was increased by 2-1/2 turns but still tripping value did not change.Finally trip bolt and spring were replaced with newone however no response was obtained.The tappet and ball assembly was found little damaged at the ball hence it was made in our workshop from aluminium. and proper setting was done. However the new spring was also found not giving any response and turbine was tripping on the same 3200RPM.

Finally one more spring was drawn from the store and the same was used for setting of tripping.This time during first trial;the spring was fully compressed and turbine did not trip even at 4700RPM. The spring tension was then reduced by 1-3/4 turns in stages and turbine tripped at 4300RPM.The turbine was then coupled with the pump.

On start up of the turbine again foolowing problems were noticed.

- Governing valve's gland started leaking heavily.
- Oil level in the governor was going down during running.

- Governor was hunting initially.Governor speed did not increase beyond 3400RPM.

On 12th May, plant was again stopped for attending the reformer catalyst problem .During these period following jobs were again done on the turbine:

- The gland bush of the governing valve was made in work shop and the same was replaced in the governing valve bonnet.

- For speed restriction problem,instrument signal line coming from control room was traced and the same was found leaking at one place causing loss of signal due to which the speed of the turbine was not increasing beyond 3400RPM.

- The both the governors of the Terry turbine were tested on the test bench and were rechecked on the turbine in decoupled condition.

Following are the calibrations obtained on both the governors:

Installed Governor:

Signal	Speed
0	1450rpm
25%	2030rpm
50%	2580rpm
75%	3150rpm
95%	3250rpm
98%	3650rpm
100%	3740rpm

Spare Governor:

Signal	Speed
0	1500rpm
25%	2050rpm
50%	2570rpm
75%	3160rpm
80%	3270rpm
90%	3530rpm
95%	3690rpm
100%	3900rpm

Finally it was concluded that the hunting in the turbine was mainly due to faulty air signal because of the air leakage in the tubing,due to passing of ARV and due to heating of governor housing by leaking steam from the turbine.

01 03 01 I.D.Fan(101-BJ):

I.D. fan was taken for preventive maintenance and following jobs were done.

- Clearances of turbine as well as fan journal bearings were checked and found to be O.K.
- Gear box was opened for inspection and found to be O.K
- Both the couplings were degreased and fresh grease was applied to them
- Gear box oil was replaced
- Turbine governor was replaced with calibrated one recieved from M/s Wood ward(I)
- oil cooler was cleaned with rod poking.

After completing above jobs fan was started during start up.However severe hunting was noticed as the new governor duly calibrated at M/s Wood ward(I),Ballabhgarh,Haryana came in line.The governing valve was opened and checked for its bent stem.However every thing was found in order.Finally the old governor was reinstalled and the problem was solved.

01 12 01 PRIMARY REFORMER (101-B):

PRIMARY REFORMER CATALYST CHANGING:

Following activities carried out:-

1.Blindings for isolation of primary reformer
2.Insulation removal from plug
3.spring hangers locking
4.opening of plugs in tubes and header
5.Removal of catalyst by vaccume blower
6.cleaning of tube from inside
7.Filling of new catalyst
8.Differential pressure measurment through catalyst
9.Box up
10.Spring hangers unlocking.
11.Leak test.

Old catalyst was changed with new catalyst during annual turnarround in April/May 98. After start up of plant during plant operation catalyst deteriated since stoppage of MP steam to primary reformer. While running 105-J train tripped on low governor oil pressure, which raised MP steam pressure in the line and RV popped contineously.

Pressure raised beyond control, to reduce the MP steam pressure PRC 12 lowered to zero to cut off MP steam production, after restoring the MP steam a drastic pressure drop was observed in NG flow after the primary reformer. Transfer line checked found no bulging. One of the reformer tube plug opened and found the catalyst become powder form. It was decided to change the catalyst in all tubes. All pluge gasket also changed with new one. Transfer line gasket also changed with new one.

Following mechanical jobs carried out in primary reformer during Annual Turnaround April / May - 98.

PRE-SHUTDOWN ACTIVITIES:

Vaccum blower suction filters changed with new one which were procured from M/S VINDI VAK PVT LTD. Ahmedabad. The clamps and springs were modified with SS 304 material.

New cooling water line for sealing provided.Initially 2 1/2 inch nipples for suiting the flexible hose for unloading the catalyst made ready but after words 1 1/2 inch nipples also supplied to prodution. The solid metal pegs which are used for loosening the catalyst found not serving the purpose instead it was jamming the catalyst in the tube. 40NB pipe of 12" long having conical sharp ends served us well to solve the problem.

Insulations on plug removed on 23/04/98. clearance for plug opening given On 24/04/98. Spring hangers locking started immediatly.After locking of springs, pluge opening started.Plug bolts were foud hard to loose because of extra long bolts. All plugs removal completed by 26/04/98.

Cleaned all tube inside for free of catalyst.Catalyst filled and differential pressure checked by production staff.

After filling catalyst clearance for box up was given on 01/05/98. Boxed up all flanges with new gaskets and handed over the reformer on 05/05/98 at 19.40 Hrs. (Gasket size 3 1/2 in x 600# flexittalic and stud size 7/8"UNC x 5 1/2"long with 2 nuts).

16 Nos fork spring hangers unlocked during DP measuring through catalyst were refitted. Locking of spring hangers released.

107-D transfer line end plug was opened for inspection. Minor bulgings on inside liner was observed. boxed up with new gasket 30" x 300# flexittalic.

Repaired damaged catalyst tube flange serrated portion while unloading catalyst Flange face repair done as per welding procedure as below:-

- Matching the deformation by grinding
- Preheating flange face upto 200 degree c
  Depositing the under cut by welding with electode E-8013/2B
- Grinding the weld deposit to flush and finished by filing.
- DP tested built up surface for defects and found OK.
- Flanges repaired are as follows:-

Row No.	Catalyst Tube No.
01	112, 113, 116
03	327, 329, 330, 332
05	504, 506, 508, 509, 510,511, 512
07	704, 706, 711, 712, 716
08	817

PENT HOUSE JOBS:

All burner guns removed checked with air and those chocked are cleaned. 108 Nos.problematic Gate valves in both steam line and naphtha line to burners were replaced by ball valves(AUDCO make).

After welding these valves all welds were DP tested and some minor repairs attended. Pneumatic testing at 5kg/cm2 carried out and found OK.

Following repaires carried out in primary reformer roof insulation:-

Tunnel No.	Tube Raw No.	Location of bottom header insulation	Location of roof insulation
04	04	Tube No.18-19,21-23 25-28,41-42	Burner No.1 & 2 tube 40 - 41.
05	05	Tube no.5-9, 15-17 36-37. weldolet 39-41,41-12	around burner 03
06	06	Tube no. 21-23, 25,27-31,38-40	Burner no.9,10 & 13
07	07	Tube 20-24,34-35, 38 & 41	
08	08	Tube 21-23,27-29, 37-42.	Tube 38-42

01 13 01 HEAT EXCHANGERS AND COOLERS HYDROJET CLEANING:

(I) Following heat exchangers were opened for pulling out the tube bundle and hydrojetting of tubes were carried out. Tube bundle and channel covers were boxed up. Hydrotest was carried out as mentioned below.

Sr. No.	Equip ment.	Qty. Nos.	No.of Tubes	Retu- bing	Tube side Kg/cm2		Shell side Kg/cm2		Hydro -jet clean -ing
					Design Prss.	Hydro tested	Design Prss.	Hydro tested	
1	115-C	01	649"U" Tube	-	29.9	-	10.6	16	Tube & shell side
2	116-C	01	300"U" Tube	-	73.1	-	10.5	16	- Do -
3	124-C	01	775"U" Tube		158	-	17.6	25.5	- Do -
4	131-JC	01	690	25 Pluged	17.58	-	05.25	08.5	- DO -

JOB CODE JOB DISCRIPTION 51

(A) SYNTHESIS GAS COMPRESSOR AFTER COOLER -124-C:

124-C Cooler was opened for pulling out the channel cover and hydrojetting of tube bundle and shell was carried out. Tube bundle and channel cover was boxed up. Main cover was opened. Diaphragm was cut for visual inspection of shell side hydrotest through tubes. Shell side hydrotest done at 25.5 Kg/cm2. No leakage was observed. Diaphragm was welded and cover was boxed up.

(B) THIRD STAGE AIR COMPRESSOR INTER COOLER-131-JC:

131-JC Cooler was opened for pulling out the tube bundle and hydrojetting of tube bundle and shell were carried out also tubes were cleaned from inside. tube bundle was boxed up and provided test rings for hydrotest. Shell side hydrotest was carried out at 8.5 kg/cm2. The following tubes were found leaking, which were plugged. Total 25 Nos of tubes were plugged. The position of plugged tubes are shown in sketch.

(C) METHANATOR FEED HEATER-104-C:

It was observed that steam was coming to shell side in 104-C during previous start up.Hence a leakage was suspected from tube side to shell side in the same.

The exchanger was taken for hydro test and following operations were carried out.

- Tubeside outlet dome was removed.
- Test ring was fixed to test joint no.4(refer attached sketch)
- Hydro test was carried out at 41 kg/cm2g.to ascertain any tube leakage .No tube was found leaking.
- A blind was provided at joint no.2 with a provision of nipple and valve for hydrotest.DM water was filled through the blind flange at a line pressure of 7 kg/cm2g to find out the leakage through expansion bellow and floating head joint no.1.
- During the hydrotest ,the expansion bellow was not arrested for it's axial movement hence the same got elongated as soon as the pressure was built.
- The complete discharge end floating head alongwith the expansion bellow was removed and taken to the work shop.The expansion bellow was brought back near to it's normal shape on the hydraulic press.

- The floating head was again refitted for the hydrotest.

- A blind was provided at joint no.2 and this time proper fixing of bellow was done to ensure that the same do not expand during hydro test.

- Hydro test was carried out with DM water at a pressure of 7.0 kg/cm2g and no leakage was noticed at expansion joint however the the floating head gasket at joint no.1 was found leaking.The same was replaced and the hydrotest was carried out again.No leakage was found.

- One more blind flange was made and hydro test was carried out by putting the same at joint no.3 to ascertain the leakage at joint no.2.No leak was detected.

- Finally all the piping connections were done and the exchanger was boxed up.

(II) Following heat exchangers & coolers were opened & boxed up after hydrojetting from tube side.Exchangers were also hydrotested after assembly.

Sr. No.	Equip ment.	Qty. Nos.	No.of Tubes	Retu- bing	Tube side Kg/cm2		Shell side Kg/cm2		Hydro -jet clean -ing
					Design Prss.	Hydro tested	Design Prss.	Hydro tested	
01	104-C	01	1275	-	34.1	-	30.6	46.00	-
02	108-CA/CB	04	1415	-	05.27	07.00	05.27	07.00	Tube & shell side
03	110-CA/CB	02	763	-	05.60	-	05.27	-	Tube side
04	111-CA	01	2790	-	05.27	STATIC	05.27	07.50	-
05	127-CA	01	3100	-	05.60	-	21.10	31.50	Tube side
06	127-CB	01	3516	-	05.60	-	21.10	31.50	-DO-

Sr. No.	Equip ment.	Qty. Nos.	No.of Tubes	Retu- bing	Tube side Kg/cm2		Shell side Kg/cm2		Hydro -jet clean -ing
					Design Prss.	Hydro tested	Design Prss.	Hydro tested	
07	128-C	01	--	--	--	--	--	--	--DO--
08	129-JC	01	--	--	--	--	--	--	--DO--
09	130-JC	01	--	--	--	--	--	--	--DO--
10	172-C	01	--	--	--	--	--	--	--DO--
11	173-C	01	294	--	10.60	--	05.30	--	--DO--
12	175-C	01	222	--	3.2	--	--	--	--DO--
13	176-C	01	--	--	--	--	--	--	Tube & shell side

(III) Following lube oil coolers were opened, cleaned by Hydrojetting and boxed up.

1) 101-JLC / 1,2 & 3 Lube oil cooler (3 Nos)
2) 102-JLC / 1 & 2 Lube oil cooler (2 Nos)
3) 103-JLC / 1 & 2 Lube oil cooler (2 Nos)
4) 105-J Lube oil cooler (2 Nos)
5) 801-JLC 1 & 2 Lube oil cooler (2 Nos)
6) 802-JLC Lube oil cooler (1 No)
7) 803-JLC Lube oil cooler (1No)

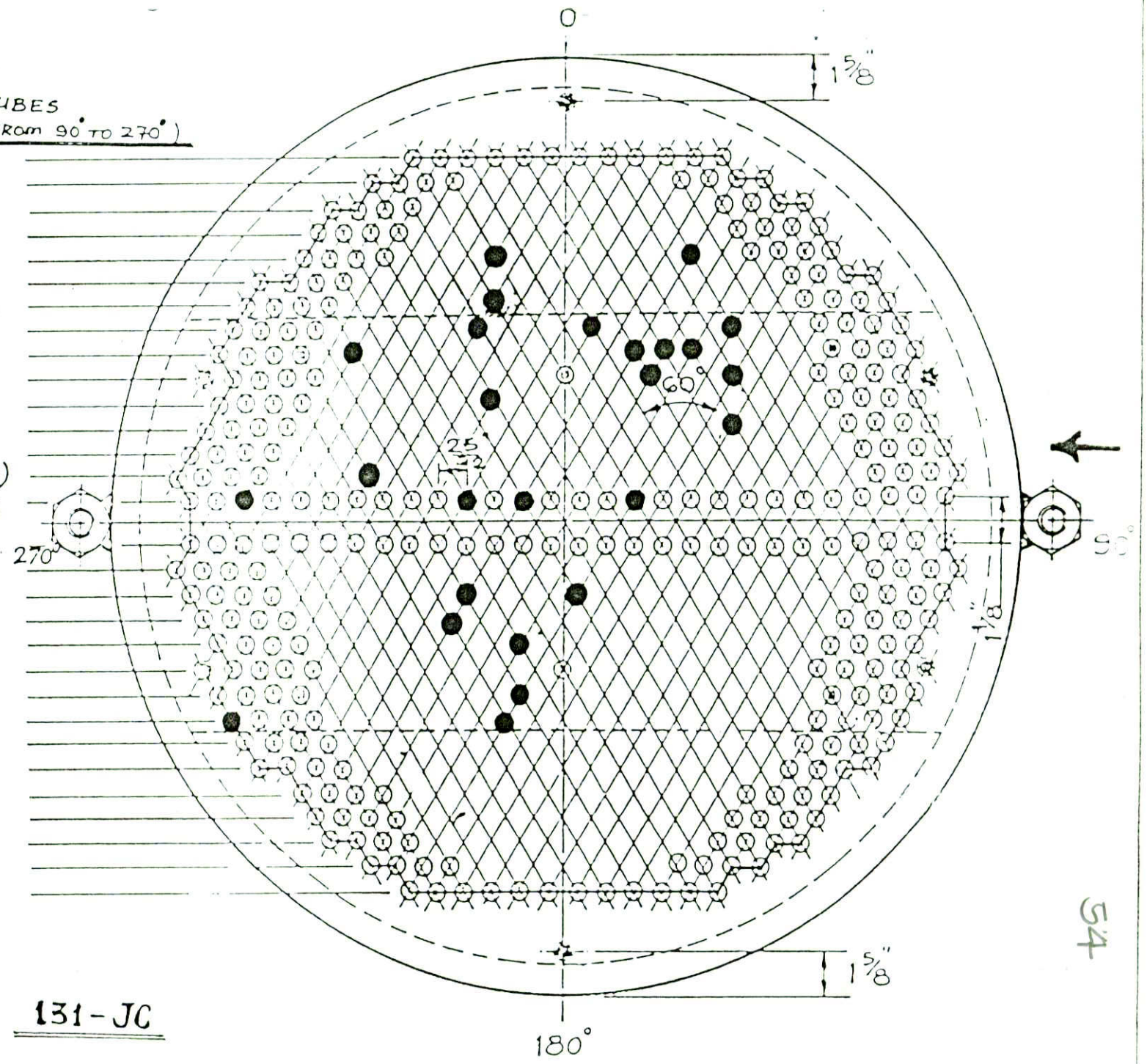
(IV) Following Lube oil coolers were opened & cleaned by rod pocking and boxed up.

1) 101-BJ Lube oil cooler (3 Nos)
2) 104-J Lube oil cooler (5 Nos)
3) 107-J Lube oil cooler (2 Nos)

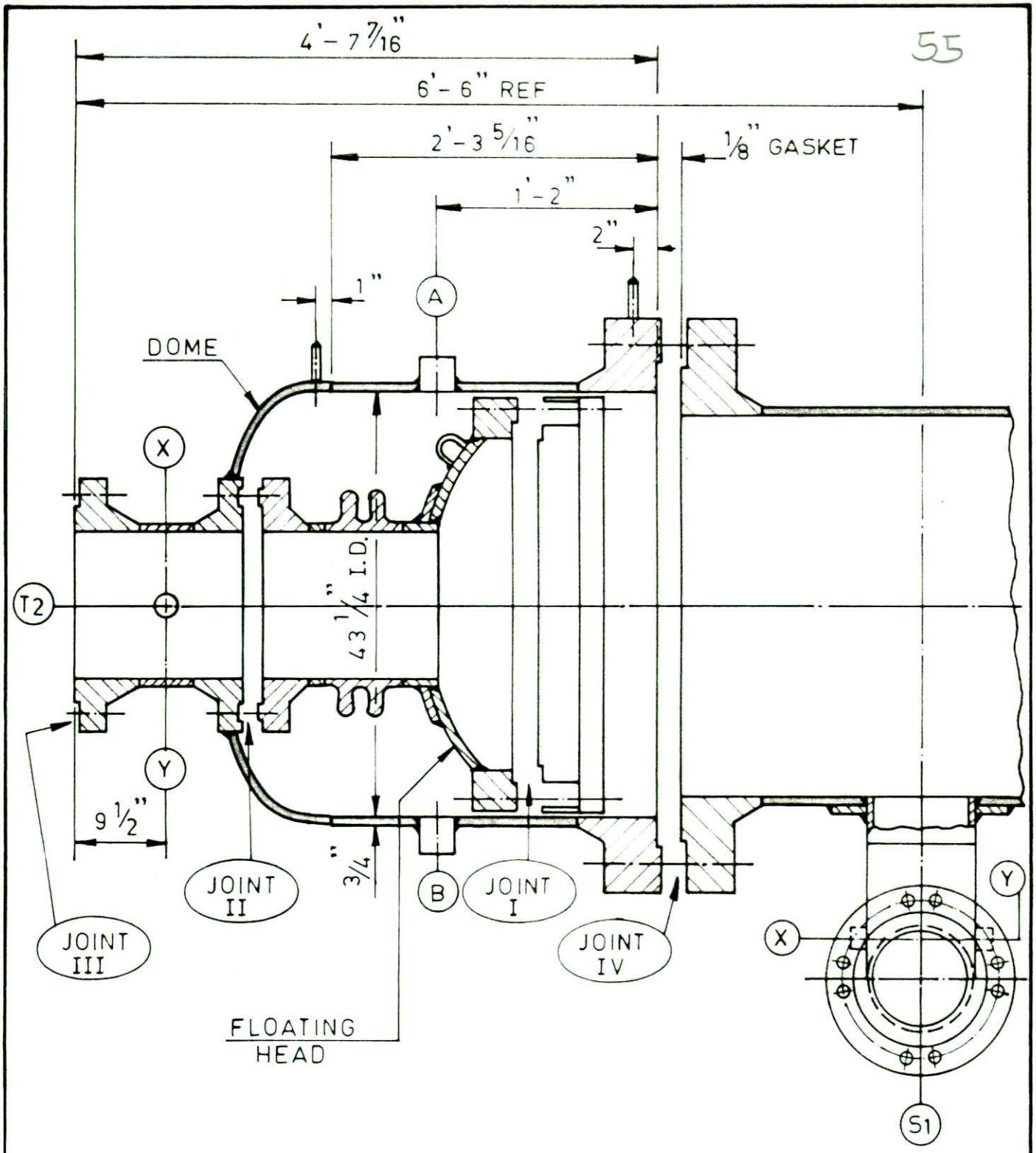
(V) Following gland condensers were opened, cleaned by hydrojetting & boxed up.

1) 101-JCA/ JCB Surface condenser (2 Nos)
2) 101-JCA I/A Cooler (2 Nos)
3) 101-JCB I/A Cooler (1 No)
4) 101-J Gland condenser (1 No)
5) 103-J Gland condenser (1 No)
6) 105-J Gland condenser (1 No)
7) 800-J Gland condenser (1 No)
8) 851-C I/A Cooler (2 Nos)

ROW NO.	NOS. OF TUBES	NOS. OF TUBES PLUGED (FROM 90° TO 270°)
15	12	
14	15	
13	18	
12	19	
11	20	6, 13
10	23	
9	24	15
8	25	7, 12, 16
7	26	9, 10, 11, 21
6	25	7, 10
5	26	16
4	27	8
3	28	
2	29	22 (OLD ONE)
1	28	12, 16, 18, 26
1	28	
2	29	
3	28	14, 18
4	27	18
5	26	15
6	25	
7	26	15
8	25	15, 25
9	24	
10	23	
11	20	
12	19	
13	18	
14	15	
15	12	



131 - JC



TUBE SIDE INLET END OF 104-C

01 14 01 STEAM LEAK JOBS:

Various critical steam leak jobs were also attended as per Production Department list.

01 15 01 BOILER INSPECTION:

(A) OPEN INSPECTION:

Open inspection of following boilers were carried out on 29/04/1998.

a) GT-1631 (112-C) (b) GT-1632 (101-F)

(B) HYDROTEST:

Hydrotest of GT-1631 (112-C) carried out on 02/05/98 and GT-1632 (101-F) carried out on 04/05/98. Test pressure were as under.

a) GT-1631 (112-C) : 15 Kg/cm2
b) GT-1632 (101-F) : 145 Kg/cm2

(C) BENCH TEST:

Bench test of 112-C safety valves done on 20/9/04/98 and readings are as under.

	Popping Pr.	Reset Pr.
RV No.1 (Front)	10.5 Kg/cm2	9.5 Kg/cm2
RV No.2 (Rear)	10.0 Kg/cm2	9.5 Kg/cm2

(D) R.V.FLOATING:

Steam test of new installed flanged end safety valves of boiler No.GT-1632 (101-F) as well as Superheater R.V.were carried out on 08/05/98 and the readings are as under.

Pressure Kg/cm2	SAFETY VALVE			
	North	Middle	South	Superheater
Popping	115.5	117.0	120	112
Reset	110.0	111.6	116	110

JOB CODE JOB DISCRIPTION

01 17 01 **VALVES REPAIR / REPLACEMENT JOBS:**

Followig valve repair/replacement carried out during shut down.

01) Absorber inlet Motor operated valve changed.

02) Aux.coil blowdown valves glands repacked.

03) 103-JT steam inlet main isolation valve gland repacked.

04) LC-13 control valve U/s as well as D/s plug valves (both) greased to stop glang leakage.

05) 123-C RV U\S Flange leake rectified by changing gasket.

06) MS line steam Trap inlet valve gland repacked.

07) Steam to NG coil isolation valve gland repacked.

08) 2004-JT MS inlet valve gland repacked.

09) 103-JAT strainer drain first two isolation valves gland repacked.

10) 112-JAT steam inlet first isolation valve gland repacked.

11) 102-J SO turbine steam inlet line PI valve gland repacked.

12) 38 ata drain line trap near blow down drum U/S isolation valve gland repacked.

13) Snuffing steam to SP-75 (Absorber vent) 1st isolation valve gland repacked.

14) 104-JT steam inlet block valve pass valve changed with new valve.

15) 102-JT condensate drain valve D/S flange gasket changed(Second isolation from tech.building).

16) 101-J/105-J LO turbine steam inlet block valve U/s drain line 1st isolation valve gland repacked.

17) MIC-61 U/s drain valve gland repacked and its trap isolation valve gland repacked.

18) MS drain and trap common isolation valve C.W.Jump over valve (old) gland repacked.

19) 181-C steam inlet PI isolation valve gland repacked

20) FRC-2 transmitter LP & HP tapping both the isolation valve gland leak and its bypass valve galnd leake attended.

21) 105-JT steam inlet line drain valve gland and trap both isolation valve gland attended.

22) MIC-22 By-Pass and drain valves 4Nos gland repacked.PIC-13A By-pass drain valve gland also attended.

23) PICV-14 by pass valve gland and u/s isolation valve gland leak attened.

24) 181-C steam condensate 2nd isolation valve bonnet gasket changed.

25) 103-J LO/SO Turbine MS Inlet isolation valve and its U/S drain valve gland leak attended.

26) 101-JT TTV drain valve gland leak(2 NoS) attended.

27) 112-JT steam inlet trap 1st isolation valve gland leak attended.

28) 102-J L.O turbine steam inlet 1&2 block valve gland leak attended.

29) 102-J L.O turbine steam inlet PI isolation valve gland leak attended.

30) V-5 u/s block valve by pass valve gland leak attended.

31) Row No:7 At.Steam header (North Side) isolation valve gland leak attended.

32) 104-JT Exhaust valve gland leak attended.

33) 105-JT Gland condencer ejector steam inlet valve gland leak attended.

34) Induction steam to 102-JT,ESV drain valve bottom side flange gasket changed.

35) 151-C trap u/s isolation valve gland leak attended.

36) 112 JT exhaust valve gland leak attended.

37) 102 J L.O turbine exhaust line PI isolation valve gland leak attended.

38) 3.5 Kg/cm2 steam to 102 JT line NRV d/s flange gasket changed.

39) 150-C LS inlet iso.valve gland leak attended.

40) 101-J LO Turbine exhaust valve gland leak attended.

41) C.W return line from dryice to 101-JCB out let valve is made operable

42) 112JT steam inlet trap 1st I/V gland leak attended

43) 105J steam inlet I/V gland leak attended.

44) C.W. valve of 108 CA changed with new one (12"Butterfly valve).

45) 120-C drain valve bonnet gasket changed.

46) LC-13 level troll top isolation valve bonnet gasket changed.

47) 101-CB (NS) riser flange gasket changed.

48) 800-JT hooging jet steam top block valve u/s flange (silo side) gasket changed.

49) HCV-12 Sealing steam valve gland leak attended.

50) 108-J suction line drain valve replaced.

51) Offsite BFW coil outlet line drain valve bonnet gasket changed.

52) 103-JBT MS sealing steam valve replaced as this is passing.

53) Pre-Reformer MS header FIC-1016 block valve U/S steam trap inlet valve & bypass valve changed with new one.

54) MS header drain valve near fuel pump (Pre-Reformer) changed.

55) 104-JAT TTV U/s drain valve changed.

56) 101-J / 105-J LO turbine TTV U/s drain valve changed.

57) PRC-12 transmitter tapping root valve changed.

58) PRC-25 impulse line root valve changed.

59) 101-JT steam inlet line drain 1st valve and trap isolation valve 2nd drain valve changed.

60) PIa-81 tapping isolation valve changed.

61) Auxillary Boilor Burner 1 & 2 purging steam valve for AG changed.

62) PICV-15 u/s isolation valve U/S drain valve changed.

63) 151-C condensate trap by pass valve changed as bonet moves during operation.

64) Atomising Steam for Header No 7 & 8 drain valve changed as seat is disengaged.

65) L.S header drain valve of Pre-Ref. both valve changed as bonets are leaking.

66) 103-J,L.O Cooler(BOttom) isolation valve changed as it is not operable.

67) FT-1016 Orifice H.P tapping nipple and valve changed as is leaking.

68) PT-1013 Tapping root valve changed as bonet is leaking.

69) MS line elbow changed as pin hole leak (pre-reformer).

70) 103-JBT Steam inlet by pass valve changed for gland and bonet leakage.

71) 103 JAT strainer drain first two isolation valves gland repacked as it leaks.

72) PIC-14 By pass drain valve gland repacked.

73) PIC-14 U/s trap station shifted at safe place to avoid damage of nearby instruments.

74) PIA-81 tapping isolation valve changed since bonnet is leaking.

75) LS to 110-A/B steam trap first isolation D/s elbow changed since pin hole leak.

76) 104-JAT steam ejector D/s line changed with new line and work shop made ejector as it is leaking.

77) CW line PI tappings provided at :

110-CA inlet,110-CB inlet,129-JC outlet,130-JC outlet, 103-J LO cooler inlet & outlet,101-J,105-J L.O. Cooler inlet & outlet,E-102-J LO cooler inlet/outlet.

78) 110 CA/CB CW vent line extended upto ground floor with valve.

79) LCB-3 line replaced for thickness reduction as per inspection report.

80) 102-JT inlet drain valve replaced.

81) 102-J L.O. turbine exhaust valve replaced.

01 17 02 SUPER HEATER COIL RV:

This job was attended by M/s.Flotec Engineering Service. It was dismentled in position, nozzle ring was found in jammed condition. It was also seen that seating portion completly damaged and no further margin for lapping. On line testing carried out at set pressure 111.8 Kg/cm2.It is proposed for replacement of this RV with flanged design RV in next annual turnaround.

01 17 03 RECYCLE GAS PILOT OPERATED RV OF 105-D:

This RV dismentled for overhauling and found all rubber "O" ring damaged. These "O" rings and teflon gaskets changed with spare available in its kit. Hydrotested at our test bench and found okay.

JOB CODE JOB DISCRIPTION

01 17 04 **RV'S OVERHAULING AND TESTING:**

Following RV's were removed, overhauled and tested at our test bench by M/s.Flotec Engineering Services, Surat against W.O.No.3433 Dt.17/02/98 and installed back in its position.

SR.No.	TAG No.	Services	Req.Set kg/cm2	Act.Set kg/cm2	Actl.Reset kg/cm2
01	RV-104-D2	LTS Inlet (157F)	34.10	34.10	31.00
02	RV-120-J	102-J DIS.	44.00	44.00	38.00
03	RV-104-F	103-J SUCTION	29.9	30.00	27.00
04	RV-105-D	REC.GAS FROM 105-D (PILOT RV)	152.9	153.00	137.00
05	RV-107-F2	107-F VESSEL	19.5	19.5	17.00
06	RV-107-F1	107-F INLET	19.0	19.0	16.5
07	RV-101-J	AIR COMP.DIS.	36.9	36.9	–
08	RV-104-JT	104-JT EXH.	5.3	5.2	4.3
09	RV-MS-9	38 STEAM HEADER	42.2	42.2	38.5
10	RV-S7	11 STEAM HEADER	14.8	14.8	–
11	RV-2004-JA	2004-JAT EXH.	5.3	5.2	4.3
12	RV-102-JL/ JT-1	102-J L.O.TUR. EXH.	4.0	4.0	3.5
13	RV-102-JL/ JT-2	102-J S.O.TUR. EXH.	4.0	4.0	3.5
14	RV-107-JT	107-JT EXH.	0.35	(OVERHAULED) NO PROVISION FOR TESTING	
15	RV-801-JLJ-1/2	800-J L.O. DIS.	4.5	4.5	3.5
16	RV-112-C	112-C VESSEL	F 10.5 R 10.0	10.5 10.0	9.5 9.3

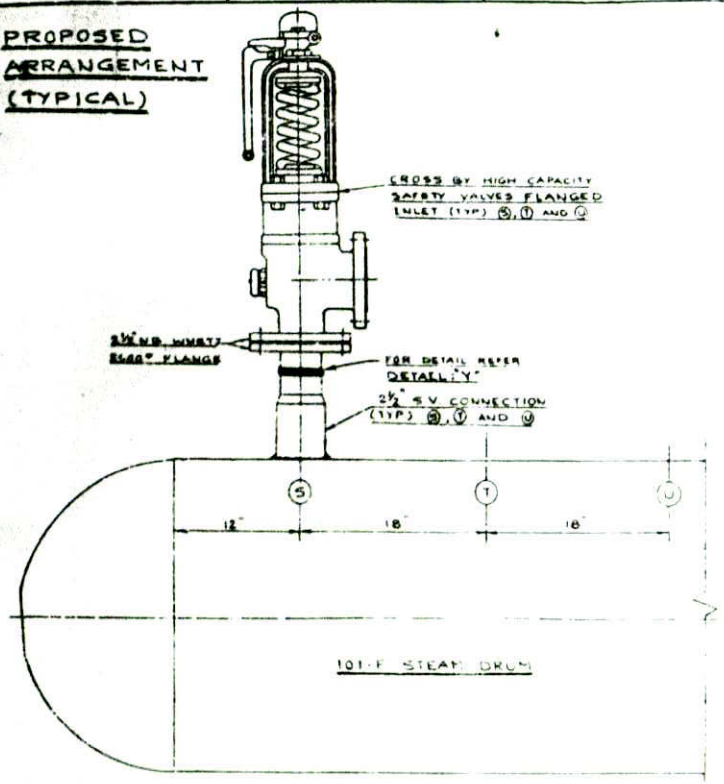
01 17 05 STEAM DRUM (101-F) WELDED RV REPLACEMENT:

Welded safety relief valves of 101-F steam drum were replaced with flanged one. Job was carried out by M/S Technocon Baroda against W.O. no.3268 dt.13/01/98.

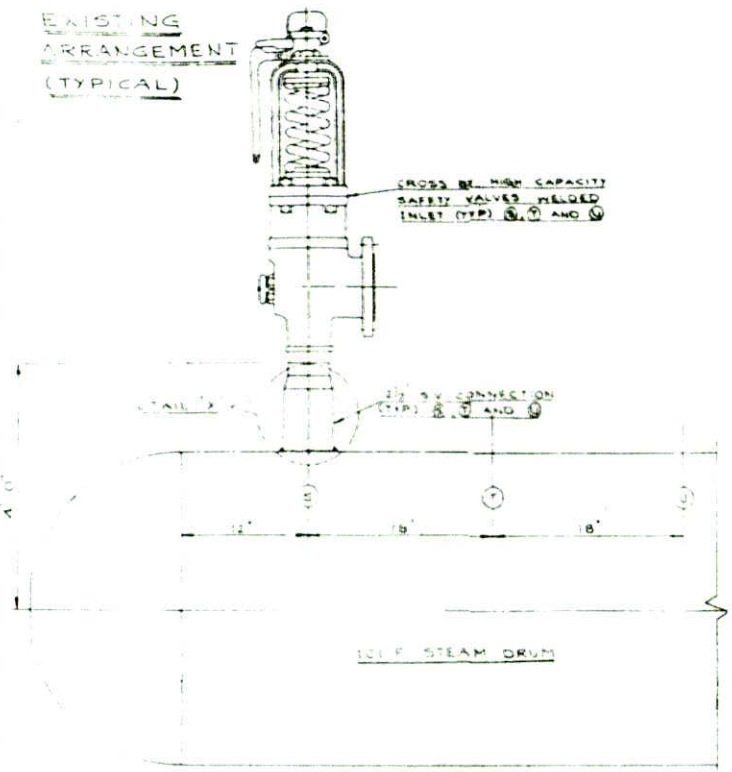
All three flanged safety relief valaves along with companion flanges were procured from M/S FMC Sanmar ltd. Madras. with the same as old valves. Maintenace of welded valves were not feasible due to worn out in seatings and facing passing and on line setting problems. Both the flanges and valves were IBR approved as per specification sheet attached. Welding of flanges were carried out as welding procedure and drawing (01/CS/13056) attached. M/S Technocon reported on 23/04/98 and completed the job by 03/05/98. Inspection carried out by our inspection staff with 100% radiography. Minor weld repair like porosity was carried out in all three joints. Stress relieving carried out on 02/05/98. Finally on line setting was done by Engineer of M/S FMC Sanmar. Settings are given as below.

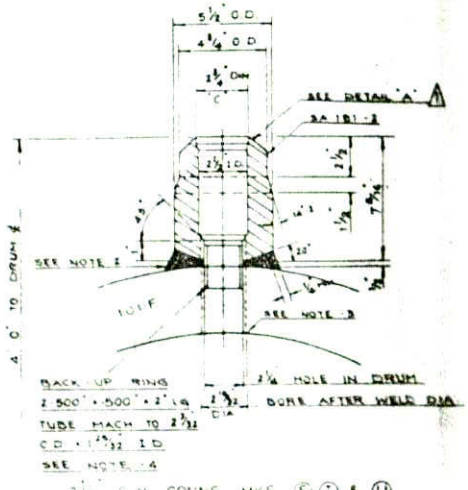
Sr.No.	Set Pr. Kg/cm2	Reset Pr. Kg/cm2	Blow down Percent.	Nozzle Ring	Guide Ring
South	120	116	3.30	-10	+30
Middle	117	111.6	4.60	-10	+30
North	115.5	110	43.76	-10	+37

PROPOSED ARRANGEMENT (TYPICAL)

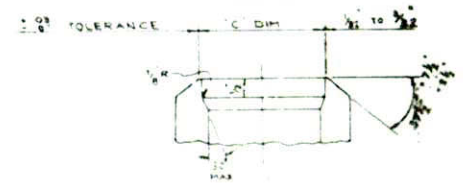


EXISTING ARRANGEMENT (TYPICAL)

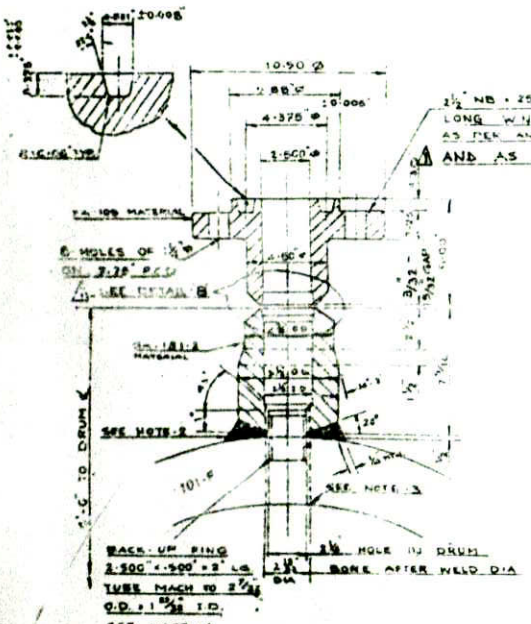




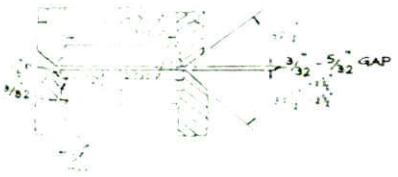
2½" S.V CONNS. MKS Ⓢ Ⓣ & Ⓤ
DETAIL - 'X'



TYPICAL WELD END
DETAIL - A
⚠ FIG. 28 (IX) (a)



2½" S.V CONNS. MKS Ⓢ Ⓣ & Ⓤ DETAIL 'Y'



TYPICAL WELD END AS PER FIG. 28 (IX) (c)
DETAIL - B

NOTE:
1. CENTRE DISTANCE BETWEEN TWO SAFETY VALVES = 18" (TYP)
2. THIS SURFACE AND WELD TO BE MAGNETIC PARTICLE TESTED.
3. ⚠ BUTT WELD JOINTS TO BE 100% RADIOGRAPHED
4. EDGES TO BE ROUNDED TO APPROX. ⅛" RADIUS.
5. BACKING RINGS TO BE REMOVED AFTER FULL PENETRATION WELDING AND GRIND SMOOTH.
6. ⚠ ALL MATERIAL TO BE USED SHALL BE WITH FORM-III-A AND III-C CERTIFICATE

BOILER DETAILS: WORKING PRESSURE: 105 KG/CM²g
REG. NO. GT-1632 WORKING TEMP : 400°C

REF DRGS
1. M/S BABCOCK & WILCOX CO. DRG NO 173801-E
2. M/S BABCOCK & WILCOX CO. DRG NO 173803-E
3. M/S CROSBY VALVE & GATE CO. DRG NO D 44555
4. M/S CROSBY FMC SANMAR LTD. DRG NO MIL-2043

S. NO	DATE	ZONE	BRIEF RECORD	BY	CHD	APD
⚠	21-3-98		MISC. CHANGES	HVG		

S. No	QTY	DES	SIZE	MATERIAL

INDIAN FARMERS FERTILISER CO-OP. LTD. KALOL

	NAME	DATE
DRN	KAM	12.2.98
CHD		
APD		

PLANT | EWR No.

PROPOSED AND EXISTING ARRANGEMENT OF 101-F STEAM DRUM SAFETY VALVES

SCALE : N.T.S

DRAWING No. PLANT 01 FORM CS NUMBER 13058 SHEET OF 1 1 REV. 1

FMC SANMAR LIMITED

SAFETY/RELIEF VALVE SPECIFICATION SHEET 65

Customer: INDIAN FARMERS FERTILISER COOPERATIVE LIMITED
PO.No. :01334/GBT/440 dt.03/04/97
Qtn.Ref :QM/BR/112
F.O.No. :VM-5296
Spec Sheet :VM-5296/001 REV 0
Consultant :
Inspection :IBR
Project/Plant:

ASSY.No : S1271-002-0000 Serial Number : 97-4467
Spring No : X01671 Range : 1585-1754 PSIG

1. Quantity				1 No(s)
2. Tag No.				
3. Size-Inlet Orifice Outlet				2.50" | K2 | 6.00"
4. Style				HC-75-IBR-SPL
5. Connection- Inlet Outlet				Flanged | Flanged
6. Rating/Type- Inlet Outlet				2500# ANSI B16.5 | 300# RF ANSI B16.5
7. Flange Finish-Inlet Outlet				RTJ | Serr. Finish
8. Type | Nozzle				Conventional | Full Nozzle
9. Disc Type				Two-piece
10. Orifice Area ACTL | EFF | CALC				2.545 | | | Sq.Inches
11. Bonnet				Open Spring
12. Cap | Hydro Test Unit				Screwed | Test Gag
13. Lifting Lever				Plain
14. Set Pressure				115.330 Kg/cm2G
15. Relieving Temperature				320.78 deg.C
16. Back Pressure				Atmosphere
17. Spring Setting				115.33 Kg/cm2G [1639.99 PSIG]
18. C.D.S.P.(Cold Differential Set Pr.)				115.33 Kg/cm2 G
19. Fluid | Testing Medium				SATURATED STEAM | VAPOUR
20. SG | MW	CP/CV	CXK		| | |
21. KB | KV	KSH	Z		| | |
22. Capacity Rated | Reqd | Units				89909 | | Kg/hr
23. Over Pressure | Sizing Code				3% | IBR
24. Material of Construction				Spring : CARBON STEEL H.R. ALUMINIUM PAINTED

Body /Cylinder	: A216 Gr WCB	Disc Holder	: S MONEL	Adj.Bolt	:	A479 Tp 410
Bonnet	: A216 Gr WCB	Bellows	: ---	Gaskets	:	---
Cooling Spool	: ---	Guide	: S MONEL	Studs	:	A193 Gr B7
Cap	: CARBON STEEL	Nozzle ring	: A351 Gr CF8M	Nuts	:	A194 Gr 2H
Nozzle/Base	: A182 F316	Guide ring	: A351 Gr CF8M	Adapter In	:	---
Disc Insert	: SS422	Setscrew	: A479 Tp 316	Adapter Out	:	---
Resilient Seal	: ---	Spindle	: A479 Tp 410	Flange	:	---

25. Remarks
GOVERNMENT RING SHALL BE PROVIDED
VALVE SHALL BE SUPPLIED WITH LONG WN COMPANION FLANGE, GASKETS & FASTENERS.

Rev.No	Line	Was	Date	By

GA Reference	GA-3912-1 REV 0	
Prepared by	VB	Approved By

Customer Approval

MAKER'S NAME AND ADDRESS

FMC SANMAR LIMITED
(formerly Moorco (India) Limited)
89/4, Vadugapatty Village
VIRALIMALAI, TAMILNADU

66

TC No. CV 5069
Date 24-05-97

(Certificate of manufacture and test of Boiler Mountings and Fittings)

1. Name of the Part : SAFETY VALVE
2. Drawing Number : GA-3912-1 REV 0
3. Nominal Dia : 45.72 (Minimum Nozzle Bore Dia)
   a. Inlet : 63.50 mm
   b. Outlet : 152.40 mm
4. Hydraulic Test Pressure at Room Temperature :
   a. Body : 80.00 Kg/Cm² (G)
   b. Nozzle : 178.30 Kg/Cm² (G)
5. MATERIAL SPECIFICATION : Material test certificates are enclosed.

IDENTIFICATION AND SERIAL NUMBER(S) OF VALVE(S)

Melt No (s)	Sl. No (s)		Melt No (s)	Sl. No (s)
BODY : C5646 NOZZLE: 23672	97-4467			

Total No. of Valve(s) : 1 [ONE]

Certified that the Particulars entered herein by us are correct. The part has been designed and constructed to comply with the Indian Boiler Regulation for a working pressure of **** Kg/sq cm (g) and satisfactorily withstood a Hydraulic test using water ~~or Kerosene or with any other suitable liquid~~ in accordance with the provisions of clause (a) of regulation 290 on the day of 22 ND MAY 97 in the presence of our responsible representative whose signature is appended herein under*.

IDENTIFICATION MARKS : The parts have been stamped with the Inspecting Authority's [illegible] on the outlet flange

**** BODY : 53.30 Kg/Sq Cm (g)
NOZZLE : 118.84 Kg/Sq Cm (g)

S. RAVICHANDRAN,
Executive Manager,
Quality Control,
FMC SANMAR LIMITED
Maker's Representative's
(Name and Signature)

P. G. GURUSAMY PANDIAN
Manager [illegible]
MAKERS FMC SANMAR LTD
VIRALIMALAI

We have satisfied ourselves that the valve has been constructed and tested in accordance with the requirements of the Indian Boiler Regulations 1950. We further certify that the particulars entered herein are correct.

Asst. Inspector of Boilers,
BHEL Circle,
Name and signature
of the Inspecting Officer
who witnessed the test

Inspecting Officer.
Deputy Chief Inspector of Boilers

A. M. MOHANRAJ.
Name and signature
Chief Inspecting Authority

D. C. I. B. / Tiruchirapalli

CHIEF INSPECTOR OF BOILERS
13 JUN 1997

Place
Date

*Strike out which is not applicable.

NOTE : IN CASE OF VALVES [illegible]
APPENDIX 'A' PARTICULARS

67

MAKER'S NAME AND ADDRESS
FMC SANMAR LIMITED
(formerly Moorco (India) Limited)
89/4, Vadugapatty Village,
VIRALIMALAI, TAMILNADU

(Test Certificate as per Item 11 of Form III of IBR 1950)

DETAILS OF SAFETY VALVES AND TEST RESULTS

T.C. NO. CV- 5069
Date 24-05

VALVE DETAILS :
Maker's Type : 2-1/2 K2 6 HC-75-IBR-SIL
Sl. No. 97-4467

Drawing No GA-3912-1 REV 0
Lift 11.43 mm

VALVE BODY
Material : A216GRWCB
Opening at Neck : 80.23 mm
Opening at Outlet: 152.40 mm

VALVE SEAT :
Material : A182GRF316
Flat/Bevel : Flat
Diameter of Seat: 45.72 mm

SPRINGS
Material of spring : CARBON STEEL
Spring No : X01671
Process of mfg & chemical composition : As per TC No. L 78135 Dt. 16-04-97 enclosed

DIMENSIONS :
Outside Diameter 157.20 mm
Section of wire 38.20 mm
Number of coils 7.00
Free length of coils 292.20 mm

TEST RESULTS
Date : 24-05-97
Place of test : Viralimalai
Closing down pressure : 109.60 Kg/cm g

REMARKS
Does the valve Chatter? NO
Does the Valve seat leak? NO
Blow off pressure 115.33

TYPE OF VALVE AND EXTRACT OF TEST RESULTS

Type of Valve : FULL LIFT SAFETY VALVE

Place of test : Mettur
Date 04 05 89

Constant 'C' by test results : 0.48 & Capacity of valves for intended blow off pressure 89909 Kg/Hr

IDENTIFICATION MARKS

(TI ED) (AMM)

South
Mounted in North instead of South.

Capacity:- 89909 Kg/Hr
ASSY. M :- S1271-002-0000
6 B'D :- 31.

Ring Setting
Before Floating NR -10 GR +20
Checked on 5/5/98

S. RAVICHANDRAN,
Executive Manager,
Quality Control,
FMC SANMAR LIMITED
Maker's Representative
(Name and Signature)

P.G. GURUSAMY PANDIAN
Manager-Production
FMC SANMAR LIMITED
MAKERS

Asst. Inspector of Boilers,
BHEL Circle,
Tiruchirapalli.
Name & Signature
the Inspecting Officer
who witnessed the test.

Inspecting Officer,
Deputy Chief Inspector of Boilers
BHEL Circle
Tiruchirapalli

CHIEF INSPECTOR OF BOILERS
3 JUN 1997

A. M. MOHANRAJ.
Chief Inspector of Boilers
Name and Signature
of the Inspecting Authority

FMC SANMAR LIMITED

SAFETY/RELIEF VALVE SPECIFICATION SHEET

Customer : INDIAN FARMERS FERTILISER COOPERATIVE LIMITED
PO.No. : 01334/GBT/440 dt.03/04/97
Qtn.Ref : QM/BR/112
F.O.No. : VM-5296

Spec Sheet : VM-5296/002 REV 0
Consultant :
Inspection : IBR
Project/Plant :

ASSY.No : S1271-002-0000
Spring No : X01671

Serial Number : 97-4468
Range : 1585-1754 PSIG

1. Quantity	1 No(s)
2. Tag No.	
3. Size-Inlet Orifice Outlet	2.50" | K2 | 6.00"
4. Style	HC-75-IBR-SPL
5. Connection- Inlet Outlet	Flanged | Flanged
6. Rating/Type- Inlet Outlet	2500# ANSI B16.5 | 300# RF ANSI B16.5
7. Flange Finish-Inlet Outlet	RTJ | Serr. Finish
8. Type | Nozzle	Conventional | Full Nozzle
9. Disc Type	Two-piece
10. Orifice Area ACTL | EFF | CALC	2.545 | | | Sq.Inches
11. Bonnet	Open Spring
12. Cap | Hydro Test Unit	Screwed | Test Gag
13. Lifting Lever	Plain
14. Set Pressure	**117.000 Kg/cm2G**
15. Relieving Temperature	321.88 deg.C
16. Back Pressure	Atmosphere
17. Spring Setting	117.00 Kg/cm2G [1663.74 PSIG]
18. C.D.S.P.(Cold Differential Set Pr.)	**117.00 Kg/cm2 G**
19. Fluid | Testing Medium	SATURATED STEAM | VAPOUR
20. SG | MW | CP/CV | CXK	| | |
21. KB | KV | KSH | Z	| | |
22. Capacity Rated | Reqd | Units	91202 | | Kg/hr
23. Over Pressure | Sizing Code	3% | IBR
24. Material of Construction	Spring : CARBON STEEL CADMIUM PLATED

Body /Cylinder	: A216 Gr WCB	Disc Holder	: S MONEL	Adj.Bolt	: A479 Tp 410
Bonnet	: A216 Gr WCB	Bellows	: ---	Gaskets	: ---
Cooling Spool	: ---	Guide	: S MONEL	Studs	: A193 Gr B7
Cap	: CARBON STEEL	Nozzle ring	: A351 Gr CF8M	Nuts	: A194 Gr 2H
Nozzle/Base	: A182 F316	Guide ring	: A351 Gr CF8M	Adapter In	: ---
Disc Insert	: SS422	Setscrew	: A479 Tp 316	Adapter Out	: ---
Resilient Seal	: ---	Spindle	: A479 Tp 410	Flange	: ---

25. Remarks
GOVERNMENT RING SHALL BE PROVIDED
VALVE SHALL BE SUPPLIED WITH LONG WN COMPANION FLANGE, GASKETS & FASTENERS

Rev.No	Line	Was	Date	By

GA Reference	GA-3912-2 REV 0	Approved By
Prepared by	VB	

Customer Approval

MAKER'S NAME AND ADDRESS

FMC SANMAR LIMITED
(formerly Moorco (India) Limited)
89/4, Vadugapatty Village
VIRALIMALAI, TAMILNADU

1 69

FORM I

TC No. CV 5070
Date : 26-05-97

(Certificate of manufacture and test of Boiler Mountings and Fittings)

1. Name of the Part : SAFETY VALVE
2. Drawing Number : GA-3912-2 REV A
3. Nominal Dia
   a. Inlet : 45.72 (Minimum Nozzle Bore Dia) mm
   b. Outlet : 63.50 mm
   : 152.40 mm
4. Hydraulic Test Pressure at Room Temperature :
   a. Body : 80.00 Kg/Cm² (G)
   b. Nozzle : 178.30 Kg/Cm² (G)
5. MATERIAL SPECIFICATION : Material test certificates are enclosed

IDENTIFICATION AND SERIAL NUMBER(S) OF VALVE(S)

Melt No (s)	Sl. No (s)		Melt No (s)	Sl. No (s)
BODY : C5633 NOZZLE: 23672	97-4468			

Total No of Valve(s) : 1 (ONE)

Certified that the Particulars entered herein by us are correct. The part has been designed and constructed to comply with the Indian Boiler Regulation for a working pressure of **** Kg/sq cm (g) and satisfactorily withstood a Hydraulic test using water ~~or Kerosene~~ or with any ~~suitable liquid~~ in accordance with the provisions of clause (a) of regulation 290 on the day of 22 ND MAY 97 in the presence of our responsible representative whose signature is appended herein under.

IDENTIFICATION MARKS : The parts have been stamped with the Inspecting Authority's stamp (T2) (AMM) on the outlet flange

**** BODY : 53.30 Kg/Sq Cm (g)
NOZZLE : 118.84 Kg/Sq Cm (g)

S. RAVICHANDRAN,
Executive Manager,
Quality Control,
FMC SANMAR LIMITED,
VIRALIMALAI.
Maker's Representative
(Name and Signature)

P.G. GURUSAMY PANDIAN
Manager-Production
MAKERS FMC SANMAR LIMITED
VIRALIMALAI 622 102

We have satisfied ourselves that the valve has been constructed and tested in accordance with the requirements of the Indian Boiler Regulations 1950. We further certify that the particulars entered herein are correct.

Asst. Inspector of Boilers,
BHEL Circle,
(Name and Signature
of the Inspecting Officer
who witnessed the test

D. C. I. B./Tiruchirappalli

Place
Date

Inspecting Officer
Deputy Chief Inspector of Boilers
Trichy

A. M. MURUGARAJ
Deputy Chief Inspector of Boilers
Coimbatore Boilers Circle,
Tamilnadu.

CHIEF INSPECTOR OF BOILERS
13 JUN 1997

FMC SANMAR LIMITED

(Formerly Modipon (India) Limited)
89/4, Vadugapatty Village,
VIRALIMALAI, TAMILNADU.

DETAILS OF SAFETY VALVES AND TEST RESULTS

TC. NO. CV- 5070

Date 70 26-05

VALVE DETAILS :

Maker's Type : 2-1/2 K2 & HC-75-IBR
Sl. No. 97-4468

Drawing No. : GA-3912-2 REV A
Lift : 11.43 mm

VALVE BODY

Material : A216GRWCB

Opening at Neck : 80.23 mm
Opening at Outlet: 152.40 mm

VALVE SEAT :

Material : A182GRF316
Flat/Bevel : Flat
Diameter of Seat: 45.72 mm

SPRINGS

Material of spring : CARBON STEEL
Spring No : X01671
Process of mfg & chemical composition : As per TC No. L 78135 Dt. 16-04-97 enclosed

DIMENSIONS :

Outside Diameter : 157.20 mm
Section of wire : 38.20 mm
Number of coils : 7.00
Free length of coils 292.20 mm

TEST RESULTS

Date (26-05-97
Place of test : Viralimalai
Closing down pressure 111.20 kg/cm.g

REMARKS

Does the valve Chatter? NO
Does the Valve seat leak? NO
Blow off pressure 117.00 ✓ kg/

TYPE OF VALVE AND EXTRACT OF TEST RESULTS

Type of Valve FULL LIFT SAFETY VALVE

Place of test : Mettur
Date 04.05.89

Constant 'C' by test results : 0.40 & Capacity of valves for intended blow off pressure 91202 Kg/Hr.

IDENTIFICATION MARKS

TR AMM

Middle

Capacity; 91202 Kg/Hr
Blow Down :- 3%

Ring Setting

Before Floating NR −10
after Floating GR +20

GR Assy. No: S1271-002-20000
Checked on 5/5/98

S. RAVICHANDRAN,
Executive Manager,
Quality Control,
FMC SANMAR LIMITED
Maker's Representative
(Name and Signature)

P.G. GURUSAMY PANDIAN,
Manager-Production
FMC SANMAR LIMITED
MAKERS

Asst, Inspector of Boilers,
BHEL Circle,
Name & Signature
the Inspecting Officer
who witnessed the test.

Inspecting Officer,
Deputy Chief Inspector of Boilers,
BHEL Circle,

A.M. MOHANRAJ,
INSPECTING AUTHORITY,
Chief Inspector of Boilers,
Tamilnadu.
Name and Signature
of the Inspecting Authority

CHIEF INSPECTOR OF BOILERS
19 JAN 1997

D. C. I. B./Tiruchirappalli
No: 343

FMC SANMAR LIMITED

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SAFETY/RELIEF VALVE SPECIFICATION SHEET

Customer : INDIAN FARMERS FERTILISER COOPERATIVE LIMITED
PO.No. : 01334/GBT/440 dt.03/04/97
Qtn.Ref : QM/BR/112
F.O.No. : VM-5296

Spec Sheet : VM-5296/003 REV 3
Consultant :
Inspection : IBR
Project/Plant :

ASSY.No : S1271-002-0000
Spring No : X01671

Serial Number : 97-4469
Range : 1585-1754 PSIG

1. Quantity	1 No(s)		
2. Tag No.			
3. Size-Inlet Orifice Outlet	2.50"	K2	6.00"
4. Style	HC-75-IBR-SPL		
5. Connection- Inlet	Flanged		
Outlet	Flanged		
6. Rating/Type- Inlet	2500# ANSI B16.5		
Outlet	300# ANSI B16.5		
7. Flange Finish-Inlet	RTJ		
Outlet	Serr. Finish		
8. Type	Nozzle	Conventional	Full Nozzle
9. Disc Type	Two-piece		
10. Orifice Area ACTL	2.545	EFF	CALC
	Sq.Inches		
11. Bonnet	Open Spring		
12. Cap	Screwed	Hydro Test Unit	Test Gag
13. Lifting Lever	Plain		
14. Set Pressure	**118.840 Kg/cm2G**		
15. Relieving Temperature	323.09 deg.C		
16. Back Pressure	Atmosphere		
17. Spring Setting	118.84 Kg/cm2G [1689.90 PSIG]		
18. C.D.S.P.(Cold Differential Set Pr.)	**118.84 Kg/cm2 G**		
19. Fluid	SATURATED STEAM	Testing Medium	VAPOUR
20. SG	MW	CP/CV	CXK
21. KB	KV	KSH	Z
22. Capacity Rated	92621	Regd	Kg/hr
Units			
23. Over Pressure	3%	Sizing Code	IBR
24. Material of Construction	Spring : CARBON STEEL CADMIUM PLATED		

Body/Cylinder	: A216 Gr WCB	Disc Holder	: S MONEL	Adj.Bolt	: A479 Tp 410
Bonnet	: A216 Gr WCB	Bellows	: ---	Gaskets	: ---
Cooling Spool	: ---	Guide	: S MONEL	Studs	: A193 Gr B7
Cap	: CARBON STEEL	Nozzle ring	: A351 Gr CF8M	Nuts	: A194 Gr 2H
Nozzle/Base	: A182 F316	Guide ring	: A351 Gr CF8M	Adapter In	: ---
Disc Insert	: SS422	Setscrew	: A479 Tp 316	Adapter Out	: ---
Resilient Seal	: ---	Spindle	: A479 Tp 410	Flange	: ---

25. Remarks

GOVERNMENT RING SHALL BE PROVIDED
VALVE SHALL BE SUPPLIED WITH LONG WN COMPANION FLANGE, GASKETS & FASTENERS

Rev.No	Line	Was	Date	By

GA Reference	GA-3912-3 REV 0	
Prepared by	VB	Approved By

Customer Approval

FMC SANMAR LIMITED
(formerly Moore (India) Limited)
89/4, Vadugapatty Village
VIRALIMALAI, TAMILNADU

FORM

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TC No. CV 5071
Date : 26-05-

(Certificate of manufacture and test of Boiler Mountings and Fittings)

1. Name of the Part : SAFETY VALVE
2. Drawing Number : GA-3912-3 REV 0
3. Nominal Dia : 45.72 mm (Minimum Nozzle Bore Dia)
   a. Inlet : 63.50 mm
   b. Outlet : 152.40 mm
4. Hydraulic Test Pressure at Room Temperature :
   a. Body : 80.00 Kg/Cm² (G)
   b. Nozzle : 178.30 Kg/Cm² (G)
5. MATERIAL SPECIFICATION : Material test certificates are enclosed

IDENTIFICATION AND SERIAL NUMBER(S) OF VALVE(S)

Melt No (s)	Sl No (s)		Melt No (s)	Sl No (s)
BODY : C5644 NOZZLE : 23672	97-4469			

Total No. of Valve(s) 1 [ONE]

Certified that the Particulars entered herein by us are correct. "The part has been designed and constructed to comply with the Indian Boiler Regul... for a working pressure of **** Kg/sq cm (g) and satisfactorily withstood a Hydraulic test using water or Kerosene or with any suitable liquid in accordance with the provisions of clause (a) of regulation 290 on the day of 22 ND MAY 97 in the pre... of our responsible representative whose signature is appended herein under"

IDENTIFICATION MARKS The parts have been stamped with the Inspecting Authority's stamp (TN BR) (AMM) on the outlet f...

**** BODY : 53.30 Kg/Sq Cm (
NOZZLE : 110.84 Kg/Sq Cm

(RAVICHANDRAN,
Executive Manager,
Quality Control,
FMC SANMAR LIMITED,
Makers Representative's
(Name and Signature)

P.G. GURUSAMY PANDIAN
Manager-Production
MAKERS FMC SANMAR LIMITED
VIRALIMALAI

We have satisfied ourselves that the valve has been constructed and tested in accordance with the requirements of the Indian Boiler Regulations 1950. We further certify that the particulars entered herein are correct

Asst. Inspector of Boilers,
BHEL Circle,
Tiruchirapalli.
Name and signature
of the Inspecting Officer
who witnessed the test

Inspecting Officer,
Deputy Chief Inspector of Boilers,

A. M. MOHANRAJ

D. C. I. B./Tiruchirappalli
350 /97-98

CHIEF INSPECTOR OF BOILERS

...hich is not applicable

DETAILS : Type: 2-1/2 K2 6 HC-75-1102 — STL; No: 97-4469	Drawing No: GA-3912-3 REV 0; Lift: 11.43 mm
VALVE BODY — Material: A216GRWCB; Opening at Neck: 80.23 mm; Opening at Outlet: 152.40 mm	VALVE SEAT : Material: A182GRF316; Flat/Bevel: Flat; Diameter of Seat: 45.72 mm
SPRINGS — Material of spring: CARBON STEEL; Spring No: X01671; Process of mfg & chemical composition: As per TC No. L 78135 Dt. 16-04-97 enclosed	DIMENSIONS : Outside Diameter: 157.20 mm; Section of wire: 38.20 mm; Number of coils: 7.00; Free length of coils: 292.20 mm
TEST RESULTS — Date: 26-05-97; Place of test: Viralimalai; Closing down pressure: 112.90 Kg/cm²	REMARKS — Does the valve Chatter? NO; Does the Valve seat leak? NO; Blow off pressure: 118.84

TYPE OF VALVE AND EXTRACT OF TEST RESULTS

Type of Valve: FULL LIFT SAFETY VALVE	Place of test: Mezer; Date: 04.05.89

Constant 'C' by test results 0.48 & Capacity of valves for intended blow off pressure 92621 Kg/Hr

IDENTIFICATION MARKS

(AIM)

North

(a) Mounted in South instead of North. Blow Down 3%

Capacity 92621 Kg/hr

Assy NO S1271-002-0000

S. RAVICHANDRAN,
Executive Manager,
Quality Control,
FMC SANMAR LIMITED
Maker's Representative
(Name and Signature)

P. G. GURUSAMY PANDIAN
Manager-F...
FMC SANMAR LTD
MAKERS VIRALIMALAI

Ring Setting

	NR	GR	
Before Floating	-10	+20	Checked on 5/5
after Floating.			

Asst. Inspector of Boilers,
BHEL Circle,
Tiruchirapalli.
Name & Signature
the Inspecting Officer
who witnessed the test.

Inspecting Officer,
Deputy Chief Inspector of Boilers,

CHIEF INSPECTOR OF BOILERS

A. M. MOHANRAJ.
INSPECTING AUTHORITY
Chief Inspector of Boilers
Name and Signature
of the Inspecting Authority

D. C. I. B./Tiruchirappalli
PLACE: 3567
DATE:

74

Phone 583511
Fax : 079 589142

UNITED

Industrial Radiography Systems

Radiography ☆ Ultrasonic Test ☆ Thickness Measurement by Ultrasonic M/c; Stress Relieving ☆ Dye Penetration Test.

2nd Jagannathpuri Shopping Centre, Opp Bharat Matha Society,
G.I.D.C. Vatva P.O., Ahmedabad-382 445

HEAT TREATMENT REPORT

Report No. UIRS-SR-FCO1-98-99 Date 3-5-98

Client M/S Technocon

Site IFFCO, Kalol

Recording Device : Sictex

Thermocouples :

WELD JOINT DETAILS

Job Description 2.5"Q" Softy Valve

Identification Mark [illegible]

Material Specification Carbon & Alloy Steel

Section Thickness 25 mm.

HEAT TREATMENT CYCLE

Started On : 1-5-98 At 6.45 PM

Completed On : 2-5-98 At

Heating Rate 90°C °C/Hr. Above 300 °C

Cooling Rate 60° °C/Hr. Up to 200 °C

Soaking Temp. 600°C Soaking Time 60 minutes

THERMOCOUPLE LOCATIONS

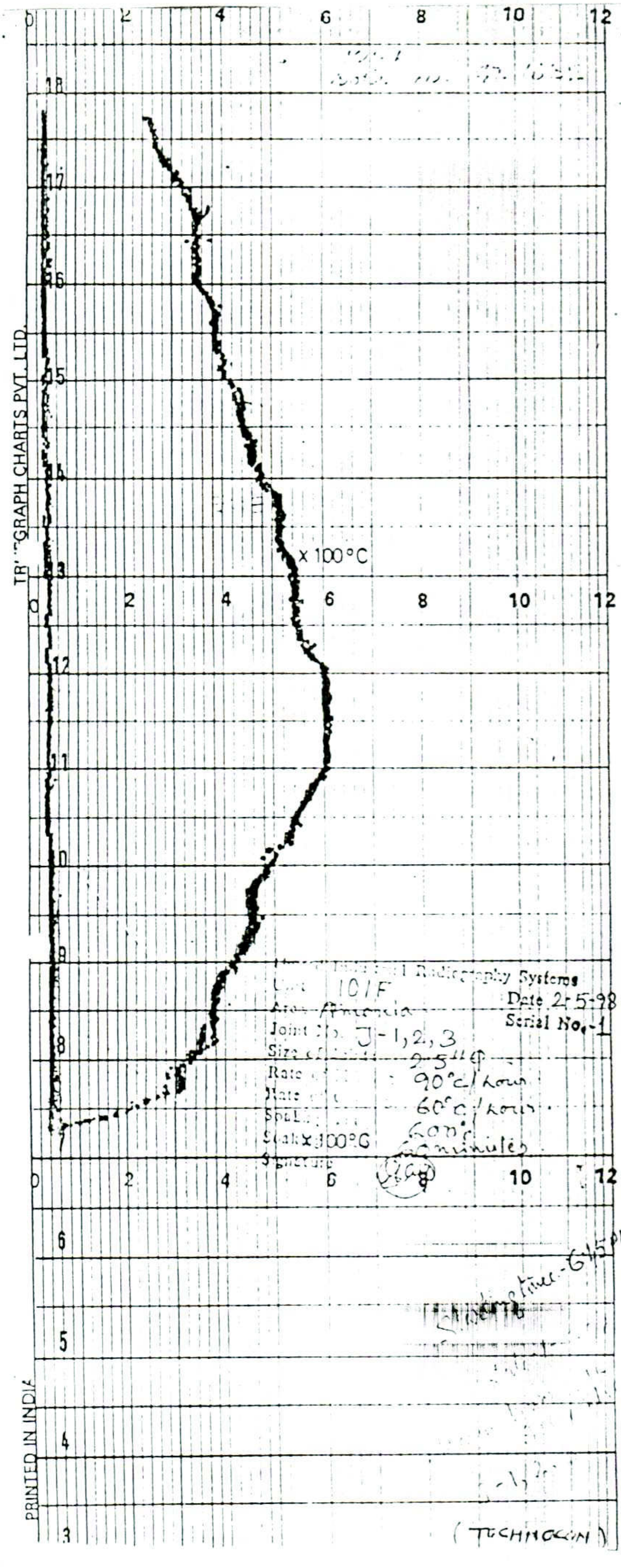
1. Black – J-2
2. Red – J-1
3. Violet
4. Green – J-3
5. Blue
6. Brown

Time Temperature Graph is attached.

For, UNITED INDUSTRIAL RADIOGRAPHY SYSTEM

Received by :

For


PRINTED IN INDIA
x 100°C
Radiography Systems
Date 2-5-98
Serial No.-1
101F
Joint No. J-1,2,3
90°c/hour
60°c/hour
600°c
(TECHNICIAN)

JOB CODE JOB DISCRIPTION 76

01 18 01 STEAM TRAPS AND GAS TRAPS:

Following steam / gas traps were replaced with new ones as per energy survey carried out by " M/s.Forbes Marshall ".

SR.NO.	TAG NO.	DESCRIPTION	MAKE	OLD	NEW
01	MP-10	104-JA INLET	SPIRAX	TDS-50	TD-3
02	MP-12	NEAR FRC-2 U/S	SPIRAX	TDS-50	TD-3
03	LP-18	NEAR PRC-2	ESCO	CD-3	TD-3
04	MP-15	ID FAN TURBINE INLET	ESCO	CDS-50	TD-3
05	LP-23	NEAR 101-CA/CB	REX	CDS-50	TD-3
06	LP-24	REFORMER CT SIDE	SPIRAX	TDS-50	TD-3
07	LP-33	NEAR CG CIRCULATOR	SPIRAX	TD-3	TD-3
08	LP-46	ON 150-C (50 NB TRAP)	RIFOX	IB	TD-3
09	LP-47	ON 150-C (50 NB TRAP)	SPIRAX	FT 10H	TD-3
10	LP-48	ON 171-C (50 NB TRAP)	SPIRAX	TDS-50	TD-3
11	MP-22	STEAM HEADER TO O/S	SPIRAX	TDS-50	TD-3
12	MP-24	STEAM HEADER TO O/S	SPIRAX	TDS-50	TD-3
13	LP-49	PRIMARY REF.CT SIDE	SPIRAX	TDS-50	TD-3
14	MP-25	ON 181-C(50 NB TRAP)	SPIRAX	IB/623/8	TD-3
15	LP-51	NEAR 104-D	SPIRAX	TDS-50	TD-3
16	MP-17	102-JT BLOCK VALVE			TD-3
17	MP-19	102-JT INLET	SPIRAX	TDS-50	TD-3
18	MP-20	102-J LO TURBINE INLET	SPIRAX	TDS-50	TD-3
19	LP-37	INDUSCTION STEAM TO 102-JT			TD-3
20	LP-38	102 JLO TANK HEATING COIL	SPIRAX	TDS-50	TD-3
21	MP-21	102-J SEAL OIL TURBINE I/L	SPIRAX	TDS-50	TD-3
22	LP-39	102-J SO TURBINE EXHAUST	SPIRAX	TDS-50	TD-3
23	LP-40	102-J LO TANK DEGASSIFIER	ESCO	ED-81	TD-3
24	LP-41	E-6 INLET LINE	SPIRAX	TDS-50	TD-3
25	LP-42	E-6 CONDENSATE OUTLET	SPIRAX	TD-3	TD-3
26	LP-9	NEAR 113-C	SPIRAX	TD-3	TD-3
27	MP-5	FRC-5 UP STREAM	SPIRAX	TD-3	TD-3
28	LP-13	AT 101-E			TD-3
29	MP-7	PICV-5 D/S	SPIRAX	TD-3	TD-3
30	LP-55	NEAR 113-C LP STEAM HDR.	SPIRAX	TDS-50	TD-3
31	LP-3	103-J LO TURBINE EXH.	SPIRAX	TDS-50	TD-3
32	MP-1	103-JAT EXHAUST	SPIRAX	TDS-50	TD-3
33	LP-8	LP HDR NEAR 105-J	SPIRAX	TD-3	TD-3
34	LP-35	NEAR 103-J OPP POST-B			TD-3
35	MPS-5	NEAR 103-FDESUP U/S	SPIRAX	TDS-50	TD-3
36	MPS-6	NEAR 103-FDESUP D/S	SPIRAX	TDS-50	TD-3
37	MPS-28	PIC-5 SILENSER	SPIRAX	TDS-50	TD-3
38	MP-29	NEAR 103-F	SPIRAX	TD-3	TD-3
39	LP-57	PIC-20 U/S	SPIRAX	TD-3	TD-3
40	MP-30	107-JAT	SPIRAX	TD-3	TD-3
41	LP-58	ON 113-C (50 NB TRAP)		FT	TD-3

01 19 01 CO2 ABSORBER (101-E):

CO2 absorber was inspected for any abnormalities during the shutdown.However no much abnormalities were found except that the ceramic compound which was provided between trays 19 th and 20th and below was found getting detached from the wall.However the earlier welding done underneath the ceramic coating was found intact and hence no repairs were done.

After completing above jobs the absorber was boxed up, blind were removed and the vesel was handed over to production.

01 19 02 CO2 STRIPPER (102-EA):

CO2 stripper was inspected after blinding and purging.On completion of the inspection minor kind of repairs were required which were done as under.

- Tack welding of U-clamps provided at centre of liquid distributer pipe was found sheared which was repaired.
- The deflector plate provided towards west side of distributor pipe was found detached which was rewelded.
- 1" supporting pipe which was found sheared from the support plate was rewelded.

After completing above jobs the stripper was boxed up, blinds were removed and the vesel was handed over to production.

01 19 03 CO2 STRIPPER (102-EB):

After putting blinds in connected lines to the stripper 102-EB the vessel was opened for inspection and lot of damages were found inside to the distributor and its' supporting system.Following repairs were carried out on the same.

- Inlet distributor pipe connected with the header was found detached from the weld joint between the incoming pipe and the header T-joint.
- The distribution header was also found cracked near the center and at many other places.
- Cross channel support was also found cracked at several places.
- The deflector plate towards eastside was found sheared in about 2-1/2 feet length.

- U-clamps for the distribution header were found damaged.

- Slip on flange connected to the vessel flange inside the vessel was found loose and bent.Also its threaded holes were found damaged.

All above defects found were rectified by repalacing the damaged piece of the distribution header, U-clamps, Slip on flange and repairing the supporting system.

After completing above jobs the stripper was boxed up, blinds were removed and the vessel was handed over to production.

01 20 01 FABRICATION JOBS:

Following LP steam lines replaced during annual turn arround for thinning and leakage in many places. Job carried out by M/S General engg. Baruch. against W.O. No.3132/GC 10/04/98 as per drawing no. 01/CL/13055 Sheet 1 of 1 Rev 0.

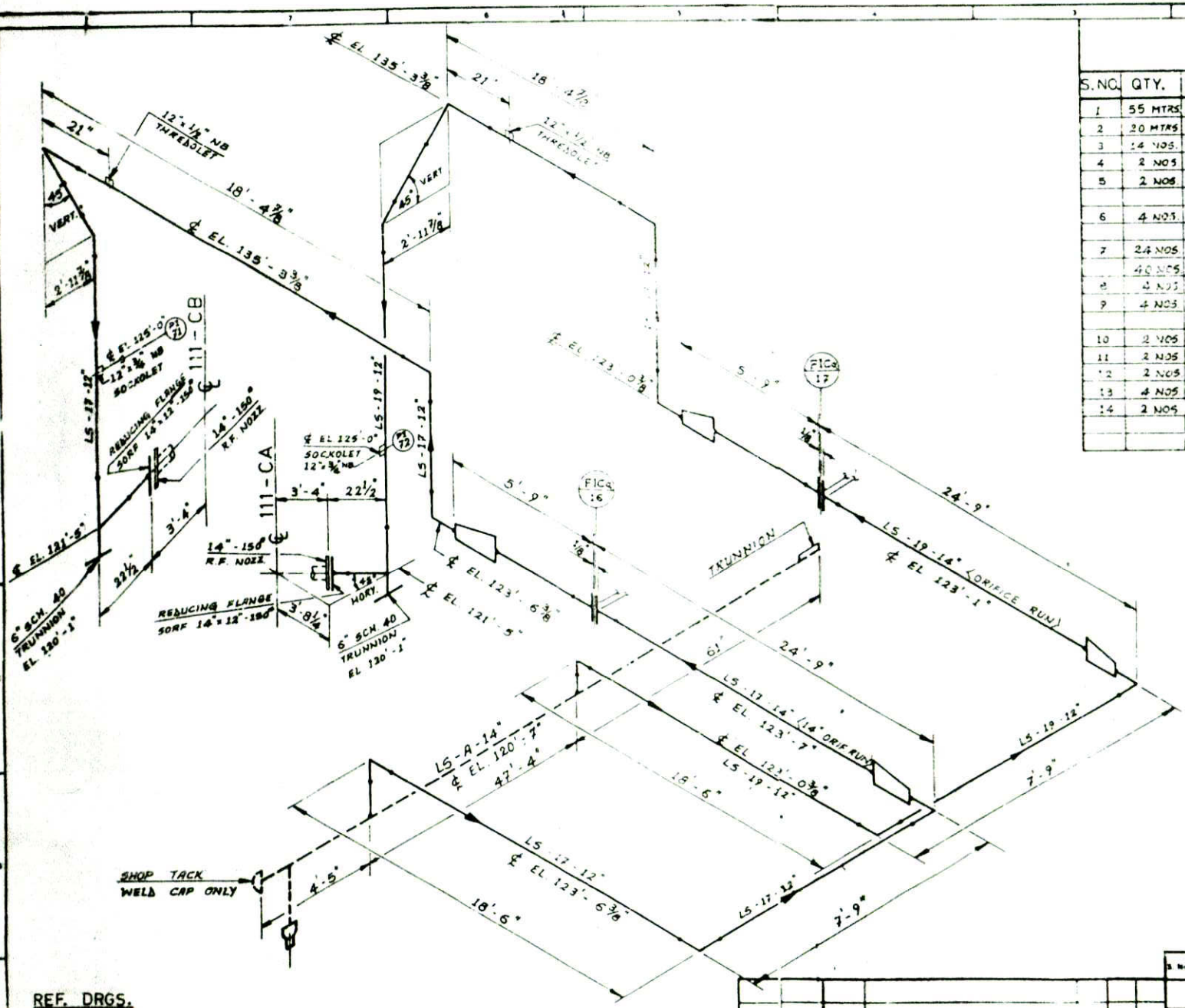
LP steam header LS-4-14" from trunion to cap 43 feet replaced. LP steam from LS-4-14" to 111CA/CB line replaced Nos.are as follows :

Line No. LS-17-12"
Line No. LS-17-14"
Line No. LS-19-12"
Line No. LS-19-14"

01 20 02: Following fabrication jobs were carried out :

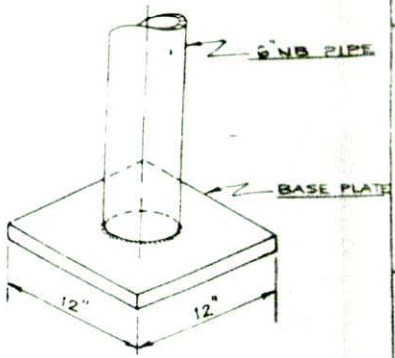
1) 104-J NRV was replaced.
2) 104-C Outlet line was provided with a flange.
3) Patches were welded to the cooling water lines coming out of ground at following places for protection against further corrosion :

- Inlet & outlet of 129-JC and 130-JC
- CW inlet and outlet of 101-J lub oil coolers.
- CW line and its bypass at west side of 101-JCB surface condensor.
- CW lines at 108-C inlt and outlet
- CW lines at 109-C inlet and outlet.



BILL OF MATERIAL

S.NO.	QTY.	DESCRIPTION	SIZE	MATERIAL
1	55 MTRS	SMLS PIPE	12" NB × SCH-20	A-106 Gr. B
2	20 MTRS	SMLS PIPE	14" NB × SCH-10	A-106 Gr. B
3	14 NOS.	BW LR	12" NB × SCH-20	A-234 WPB
4	2 NOS	BW ELBOW 45°	12" NB × SCH-20	A-234 WPB
5	2 NOS	FLEXITTALIC	14" NB - 150#	
		GASKET		
6	4 NOS	FLEXITTALIC	14" NB - 300#	
		GASKET		
7	24 NOS	STUD BOLT	1" × 5" - 150 RF	STUD : A-193 Gr. B7
	40 NOS	STUD BOLT	1⅛" × 7¼" - 300 RF	NUT : A-194 Gr. 2H
8	4 NOS	ORIFICE FLANGE	14" NB × SCH-10 - 300#	WNF A-105
9	4 NOS	REDUCER BW ECN	14" NB × SCH-10 X 12" NB × SCH 20	A-234 WPB
10	2 NOS	THREDOLET	12" NB × ½" NB - 3000#	A-105
11	2 NOS	SOCKOLET	12" NB × ¾" NB × SCH-80	A-105
12	2 NOS	BASE PLATE	12" × 12" × ½"	C.S.
13	4 NOS	TRUNNION	6" NB × SCH-40	A-53 - A-B
14	2 NOS	REDUCING FLANGE SORF	14" NB × 12" NB - 150#	A-105



TYPICAL TRUNNION

REF. DRGS.

1. DRG. NO. 607-51-B 112 - M.W. KELLOGG
2. DRG. NO. 607-51-B 113 - M.W. KELLOGG
3. DRG. NO. 660-E1-B 168 - M.W. KELLOGG
4. DRG. NO. 660-E1-B 169 - M.W. KELLOGG
5. DRG. NO. 660-E1-B 114 - M.W. KELLOGG

LEGEND :

—— LINE TO BE REPLACED

----- 14" LS HEADER (EXISTING)

S. No.	DATE	BRIEF RECORD	BY	CHD	APD

S. No.	TY	DES	SIZE	MATERIAL

INDIAN FARMERS FERTILISER CO-OP. LTD. KALOL

	NAME	PLAN	EWR No.
DRN	H.V.G	8-12-97	
CHD		26/12/97	
APD			
SCALE	N.T.S.		

PIPING DRG. OF 111-CA/CB REBOILER STEAM INLET LINE FROM 14" LS HEADER

DRAWING No. PLANT FORM NUMBER SHEET OF REV.

0 1 C L 1 3 0 5 5 1 1 0

PLANT TURNAROUND - APRIL - MAY 1998

80

AMMONIA PLANT

INSPECTION JOBS

JOB CODE JOB DISCRIPTION

01 41 01 **INSPECTION JOBS:**

1) Automatic ultrasonic scanning of Primary Reformer Tubes.

2) Insitu metallography of selected equipments.

3) Thickness measurement of pipelines.

4) Ultrasonic flaw detection of weld joints of critical pipelines.

5) Miscellaneous jobs like qualification tests of welders employed by contractors, Dye Penetrant examination of weld joints, visual internal inspection of furnaces and vessels, DP test of 103J HP case Rotor etc.

The detailed observations and recommendations for individual equipment are given below:-

(A) **PRIMARY REFORMER : RADIANT ZONE:**

1) **VISUAL INSPECTION:**

Visual inspection of furnace refractory, tunnel slabs, arch burner blocks, catalyst and riser tubes, insulation of bottom (outlet) header was carried out. The dtailed observations on the same were recorded and handed over to Amm. Shift Incharge, Civil Engineer and Maint. Engr. for taking up necessary repair action. The following observations were made.

Tunnel Row No.	Tube Row No.	No. of damaged Tunnel slabs	Location of bottom header insulation damage	Loc. of Roof insulation damage
1	1	2	Between tube No. 27-28,29-31, 20 - Riser	-

JOB CODE JOB DISCRIPTION 81

On west wall, one refractory brick each from two spots has fallen down. This is to be replaced. Vertical cracks on refractory were observed at two places having 1.5 to 2.0 metre length have been observed. 15 to 20 mm gap was observed between the brick panel joints in complete wall height, located near burner No. 9 and 10. This has to be filled up.

Tunnel Row No.	Tube Row No.	No. of damaged Tunnel slabs	Location of bottom header insulation damage	Loc. of Roof insulation damage
2	2	-	Between tube no. 15-16,27-28 below tube no 32	East side of burner no.11 it is loose
3	3	2	Between tube No.38-41 below 21-25, 14-16, 2-3.	-

Erosion of 10 to 15 mm depth was noticed on North wall refractory bricks at tunnel slab elevation of row No. 2 and 3.

4	4	-	Between tube No. 18-19,21-23, 25 to 28,41-42	Between bruner 1&2, between tube No.40 & 41
5	5	-	Between tube No.5-9, 15-17,R-28,36-37 Weldolet insulation of 39 to 41,41-42	Around burner block No. 3, gap is obser-ved all around.
6	6	-	Between tube No.21-23,25,27-31,38-40	Between burner No. 12&13

Burner blocks No. 9,10 and 13 are partially damaged.

7	7	-	Between tube no 20-24, 34-35,below tube No. 38-41	-
8	8	-	Between tube No.21-23,27-29,37-42. Between 37 to 42, the bottom header got exposed.	From both side of tube No.38 to 42, roof insulation blocks have fallen.

Erosion of 10 to 15 mm depth was noticed on North wall refractory blocks at tunnel slab elevation of row No. 7 & 8.

Note:

1) 8th row canister insulation at Riser top had come out.

2) The cover plate at bottom of canisters of riser No.1 and 2 had got detached. However, insulation is intact.

3) Thermowells and header drain insulation for all the rows had been found either loose or slipped out. These need to be repaired.

4) On tubes No.35 to 42, powder deposits were observed in 1 to 1.5 metre length at bottom peephole elevation for all the eight rows of catalyst tubes at North end. These were equired to be cleaned.

5) On south wall bottom at tunnel slab elevation, below the pyro block modules, the horizontal metallic plate had got exposed to flue gases.Approx. 4" gap had been observed between pyroblock bottom and top of tunnel wall at south wall. These needed to be repaired.

6) Erosion of refractory bricks in 0.5 metre x 1 metre area between row No.3 and 4 at top elevation below pyroblock modules had been noticed.

7) Gap of approx. 2 to 3 inch had been observed at four different locations on pyroblock insulation of south wall in front of tunnel row No.4 and 5. These gap required to be filled up using cerafelt to protect metallic wall plate.

8) The refractory bricks, in front of row No.6, on south wall had got loosened which required to be strengthened.

9) East wall refractory bricks segment had got projected inwards causing gap between metallic wall and bricks. Stability shall be checked through civil section and accordingly action may be taken.

(2) NDT ACTIVITIES:

a) Automatic ultrasonic scanning of reformer tubes (catalyst and riser tubes) was carried out with the help of M/s PDIL, Sindri. No abnormalities/service defects were recorded to be unacceptable.

b) Insitu metallography of catalyst tube No. 129 and 831 was carried out. No major abnormalities were reported during the examination.

c) DP test of 16 Nos. field weld joints of outlet headers was carried out to detect any service defects. No defects were observed.

d) Creep measurement of catalyst tubes was carried out using GO-NOGO Gauge. Max. creep was recorded to be within tolerance limits.

e) Bottom header clearance between floor and header bottom was measured. No abnormalities were observed in the header position.

f) DP test of catalyst tubes to weldolet and weldolet to Outlet headers joint for tubes Nos. 816, 834 to 842 was carried out as the insulation was found badly damaged in this region causing direct exposure of header and weldolets to heat. No defects were detected. Header dimensions were checked but no abnormality on creep was noticed.

g) DP test on 'D' weld of randomly selected two catalyst tubes in each row was carried out. No defects were detected.

h) Creep measurement of outlet header was carried out. No creep was found.

i) Spring hanger readings of catalyst tubes, transfer line and outlet header drain readings in cold condition were taken.

Subsequently during startup, due to failure of steam supply to reformer tubes, overheating was noticed on catalyst and riser tubes. In order to assess the condition of the tubes, various tests like Creep Measurement, Random Radiography of parent metal and weld joints, DP test, and visual examination were carried out in the radiant section.

RECOMMENDATIONS :

a) The bottom header insulation's overall condition is not good. It is suggested to replace the header insulation with new one.

b) The refractory wall particularly EAST wall needs to be reviewed for relining in view of gap observed between the brick lining and the backing plate. The reliability on condition of wall refractories needs to be studied by Civil group and necessary action may be taken up during next opportunity.

CONVECTION ZONE:

Visual inspection of HT and LT convection zones was carried out. The findings were reported to Ammonia Shift Incharge and maintenance Incharge for taking necessary corrective action. The following observations were made:

HT CONVECTION BOTTOM :

1) A gap had been observed in @ 1 to 1.5 mtr. length on East side panel bottom joint.

2) Metallic sheet covering insulating blanket found fallen away at the following locations.

@ 1.5 mtr. x 2 mtr. area on west wall bottom portion.

@ 1 mtr x 2 mtr area on south wall bottom at west side.

@ 1 mtr x 0.5 mtr. area on East wall bottom.

3) The brownish deposition/scaling observed on mixed feed coil mounted at bottom.

4) A gap of about 2 to 3" had been observed at the junction of radiant section tunnel slab elevation and ceiling of HT section bottom in about 60% of its length. Also cracking of castable refractory at tunnel junction was observed.

5) Thermowell pipe for tunnel burner No.7 was found burnt away completely.

6) On West wall peeling off of refractory plaster was observed in @ 2 mtr. x 3 mtr. area.

HT CONVECTION ZONE TOP :

1) Metallic sheet covering insulation found detached at three spots in HT zone to Aux. boiler ducting.

2) Out of six supports at top of LT steam super heater coil five supports were found burnt away from the top and support No.1,2 & 3 and 4 counting from east had got sheared on south side bracket which has resulted in sagging of coil on south side.

3) At the top of LT steam super heater coil, fins of one tube found damged in @ 1' x3" wide area at two sports on third tube counting from north side.

LT CONVECTION ZONE :

1) Refractory debris were observed on the floor at both the suction ducting of I.D. Fan and below new BFW Coil area.

2) Fins of first tube counting from south of old BFW coil found covered with refractory material/dust. Cleaning of the same was recommended.

3) Refractory material found loosened from the north wall partition plate, resulting in gap between metallic plate and refractory.

RECOMMENDATIONS :

a) The condition of supports and intermediate tube sheets of the LT steam super heater coil located at the top of LT section is not good. It is suggested to review replacement of the coil and its supports at the earliest to avoid catastrophic failure which may affect the other coils located below this coil.

b) The metallic cover plates over the fiber blanket insulation on HT zone bottom portion walls had got burnt out. These have badly buckled and at some places fallen down. These cover plates shall be reviewed for replacement with better material of construction i.e. Inconel/Incolloy sheets.

01 41 02 AUXILIARY BOILER FURNACE:

Visual inspection of the furnace was carried out.The detailed observations are given below.

1) The castable refractory covering the header on north wall coil bottom had got badly damaged causing exposure of header portion. Same was recommended for repair.

2) At south end of west wall at about 20 feet adjacent to 3rd bruner counting from bottom, insulating bricks had come out from its position, recommended for repair.

3) Refractory surrounding the Burner fans had got damaged particularly around Burner fan No.1,2,4 & 5 counting from bottom. Same was recommended for repair.

4) Deposition of scales on burner fans observed on all five burners.

5) Black thin nonsticky scale deposition observed on North wall tubes and also on west wall tubes.

01 41 03 VESSELS :

The Visual inspection and Ultrasonic thickness measurement of the following vessels was carried out.

(1) DEAERATOR : 101-U:

I) Dearetor Head (Stripping portion):

1) Stainless steel baffles about 2 1/2 feet long with channel shaped of top row and bottom row contained in tray enclosure found loose i.e. dislocated from its position and also 4 Nos. S.S. baffles found fallen down and lying on bottom dished end of deaerator head.

2) West side vertical plate of bottom portion of tray enclosure found dislocated from its position and observed fallen down.

3) Boiler feed water spray nozzles, distribution headers and other fittings found okay.

4) Shell has assumed brownish colouration.

5) Ultrasonic thickness measurement of shell carried out.

II) Dearetor Drum (Storage Tank):

1) Shell has assumed brownish colouration.

2) Condition of longitudinal and circumferential weld joints was found satisfactory.

3) Down comer pipe/down takes and stream equaliser pipe were found intact in position.

4) Nozzles welding was also found in good condition.

5) Scattered minor pittings were observed throughout the shell surface.

(2) CO2 ABSORBER (101-E):

Visual inspection of CO2 absorber shell was carried out after removal of Single segment on each tray. The observations are as under:

1) The colouration of shell was found blakish grey.

2) The condition of demister pad at top of the vessel was found satisfactory.

3) The liquid distributor at the top found intact in position, however its east and west side pipe required to be fastened properly as a gap of about 6 to 8 mm had been observed between its clamping plate on north side.

4) The shell surface was free from corrosion in top half but some roughening had been observed after 10th tray up to the bottom.

5) The ceramic compound provided previously from tray no. 17th upto the bottom of 20th tray found intact in position except between 19th and 20th tray and below.It has started getting detached from the areas of repair weld done earlier.However, the condition of repair weld below it seems to be satisfactory and free from any corrosion.

6) Erosion of M-seal provided on shell between from tray no. 14 to 17 was observed.

7) The condition of gas distributor and it's support was found satisfactory.

8) Ultrasonic thickness measurement was carried out.

(3) CO2 STRIPPER - 102-EA:

1) Demister pad at top was found intact in position.

2) Liquid distributor was found intact in position.

3) Tack welding of U-clamps provided at centre of liquid distributor pipe were got sheared on south side nut.

4) All the four stitch weld at south side of deflector plate provided below west end of distributor pipe were got cracked.

5) 1" dia supporting pipe provided between support plate of liquid distributor at west side got teared off alongwith it's supporting plate at its south end.

6) Greyish black scaling was observed on all the trays and shell. This was found more predominent on the bottom half of the vessel.

7) Lot of scaling-debris were found collected in bottom seal Pan.

8) From 9th to 12th tray cracking of the edge of tray segments was observed at six different places which were marked for repairs.

9) Ultrasonic thickness measurement was carried out.

(4) CO2 STRIPPER - 102-EB:

TOP COMPARTMENT :

1) Liquid inlet pipe located on south east side connected with flange on its one end inside the vessel and other end connected to distribution I-Header had completely sheared/teared off from its Tee junction weld i.e. V profile weld joint as well as some portion from its parent metal. It was also disconnected from its flange joint on south east side and had fallen aside just near the top manhole of vessel.

2) Distribution I-Header had also cracked at many places particularly near its centre weld joints with liquid inlet pipe. Same was marked for repair.

3) Cross channel support(located at south east to North west direction) of distribution I-header had also cracked at 3 to 4 places on its vertical and horizontal cross sections / surface.

4) Cross channel support which were bolted with distribution header support plate bolts (3 Nos) were found loosened. The se were required to be tightend.

5) Vertical SS guide plate (3mm thick) is stitch welded with trays on east side and west side to guide the flow. East side plate had teared off/sheared off from its centre length of about 2 1/2 feet length.

6) V-shaped ring support of distribution header at its centre position had also cracked on south side.

7) C-clamp washer provided beneath locnut had also cracked.(Clamp provided between distribution I-header and cross channel support.)

8) Slip on flange of liquid inlet pipe nozzle of shell had got bent/deformed and its threaded holes also got deformed and its threaded portion of holes got damaged.

9) No abnormalities were noticed on the trays of the stripper.

10) Ultrasonic thickness measurement was carried out.

(5) <u>SYN GAS CCOMPRESSOR IST STAGE SEPARATOR-105-F</u>:

1) Brownish black colouration was observed inside the vessel.

2) Bottom dished end surface was found satisfactory.

3) Condition of welding joints inside the vessel was found satisfactory.

4) One bolt of circular holding strip for demister pad was found missing, however this was also observed in past.

5) Scattered minor pittings were observed on shell surface.

6) Condition of demister pad was satisfactory.

7) All nozzles inside the vessel were in good condition.

Thickness measurement was carried out.

(6) STEAM DRUM - 101-F:

Visual inspection of the internals and ultrasonic thickness measurement was carried out. The following observations were made:

1) The shell was found to have greyish black colouration.

2) All the internals viz. separator plates, Primary and Secondary mist eliminators etc., were found intact.

3) In general, the equipment is found in good condition. Some mill scales and scattered shallow pittings were observed on shell and dished end which are not harmful for service at present.

4) Ultrasonic thickness measurement was carried out.

01 41 04 MISCELLANEOUS JOBS:

1) WELDER'S QUALIFICATION TESTS:

a) Performance qualification test of 15 Nos. welders of M/s General Engg. Co. was carried out. Out of these, Nine welders were qualified and allowed to perform welding jobs in the Plant for miscellaneous requirements.One welder was qualified for TIG Root and SMAW fillup for LS - Steam Pipeline replacement job.

b) Performance qualification test of 8 Nos. welders of M/s DCPL was taken. Only four welders were qualified for carrying out welding jobs on the piping replacment/modification jobs in the plant.

c) Performance qualification test of 3 Nos. welders of M/s Technocon Projects, was taken. Two Nos. welders were qualified out of which one welder for 101-F steram drum RV Nozzles job and one for cooling water line modification job in Ammonia Plant.

RECOMMENDATIONS :

It is suggested to offer the welders for performance qualification tests at least one or two weeks before commencement of the job so that work does not suffer during shutdown and delays can be avoided.

2) CRANE LOAD TEST:

Load test at 12 T was carried out on the crane hired from M/s J. Parabia, Baroda. Various problems observed during load test were rectified including replacement of pulley blocks. Finally the crane was found to be acceptable after necessary rectifications.

RECOMMENDATIONS :

The party may be asked to offer the overload test at our site/their site well in advance.

3) D.P.Test:

a) Dye Penetrant test was carried out on the bevel edges, root run and on final weld joints of various pipelines fabricated and installed viz. cooling water pipings, pre-reformer piping modification work, 112-C piping modification work, 101-F steam drum RV Nozzles, 104-J discharge line NRV joints, LS-17-12" & LS-19-14" steam line joints was carried out. Fit ups of all the joints were also checked for DCPL jobs.

b) 103-J LP and HP case rotors, diaphragms were inspected by DP test. No defects were observed.

c) 103-C expansion bellow was DP tested. No defects were observed.

4) RADIOGRAPHY :

1) Arrangements were made to carry out departmental radiography work for the following fabrication jobs as per the scope given.

a) LS-25-200 - 10% Radiography.

b) LS-17-12" - 10% Radiography.
LS-19-14" - 10% Radiography.

c) 103-C connected piping - Full

d) 104-J Disch. NRV - Full

2) Radiography work was arranged by M/s DCPL for their fabrication work as per the scope of W.O. Necessary repairs were done to rectify the joints wherever required as per radiography films review report. Radiography and DP test on repairs were reviewed at different stages.

GAUSS MEASUREMENT :

Measurement of residual magnetic field on LP & HP case rotors of 103-J Syn.Gas Compressor was carried out. The folowing are the readings.

a) 103-J LP Case Rotor:

1) on shaft Journal	(coupling end)	Less than 3 Gauss
2) on "	(Thrust end)	
3) On Thrust Collar		

b) 103-J HP Case Rotor:

1) On shaft journal	(coupling end)	Less than 3 Gauss
2)	(Thrust end)	
3) On Thrust Collar		

6) INSITU METALLOGRAPHY WORK :

In order to assess the condition of the selected equipments and pipelines, insitu metallography examination was performed. Services of M/s PDIL, Sindri, were availed for this examination on the following equipments and pipings:-

1) 106-F Ammonia Separator
2) 105-D Synthesis Convertor.
3) 101-D Desulphuriser.
4) 102-D Desulphuriser.
5) 157-F Process Gas knockout drum
6) 103-C Primary Shift Effluent waste heat boiler.
7) 104-C Methanator Feed Preheater
8) 103-D Secondary Reformer Bottom Dome.
9) 106-D Methanator
10) HT Steam Superheater coil inlet header Cap.
11) Primary Reformer Catalyst tubes No. 129 & 831.
12) SG-14-10" 124-C to 117-C pipe line.
13) HS-4-12" High Pressure (105 ATA) steam header.
14) NG-9-12" Steam and NG to Primary Reformer.
15) BF-21H-18" Boiler Feed Water line from steam
BF-7-18" drum to 101-CA/CB.

16) PG-5-14" Process Gas from 102-C to HT Shift Converter.
17) BF-2H-6" BFW Coil outlet pipe.

In general, all the equipments and pipelines were reported to be serviceable except the pipeline PG-5-14" which showed complete decomposition of perlitic areas and also carbide precipitation on grain boundaries. This pipeline between 102-C to Mixing Tee may be considered for replacement at the earliest opportunity.

7) HARDNESS MEASUREMENT :

Hardness measurement was carried out on 101F RV flange joints, 104-J discharge line NRV joints, 104-C channel cover, NG-9-12" pipeline etc. The followings were the hardness values.

a) 101F RV flange joints. (After Stress Relieving)

1) On Weld Metal - 214 to 215 BHN
2) On Heat Affected Zone - 195 to 200 BHN
3) On Parent Metal - 170 to 175 BHN.

b) 104 J Discharge NRV Joints. (After Stress relieving)

1) On weld metal - 190 to 195 BHN
2) On Heat Affected Zone - 184 to 185 BHN
3) On Parent Metal - 155 to 160 BHN

c) 104-C Channel cover (west side) - 197 to 222 BHN

d) NG-9-12" Pipeline - 153 BHN

01 41 05 ULTRASONIC FLAW DETECTION :

Ultrasonic flaw detection at approachable weld joints of the following pipelines was carried out.

	Line No.	From	To	No. of Joints tested
1)	BW-1H-14"	101 CA	101 F	2
2)	BW-5H-14"	101 CB	101 F	2
3)	BW-36H-14"	101 CB	101 F	2
4)	BW-35H-14"	101 CA	101 F	2
5)	BW-15-6"/ BF-1H-6"	123 C	101-B	14
6)	PG-18-12"	104 C	106 D	6
7)	PG-8-18"	104 C	112 C	4
8)	PG-35-18"	112 C	157 F	3
9)	SG-1-12"	106 D	114-C	9

No recordable indications/service defects were observed on any weld joints.

01 41 06 ULTRASONIC THICKNESS MEASUREMENT:

(a) PIPELINES:

In all, 112 pipe loops were examined for thickness including process air, boiler feed water, boiler water(BW), Carbon dioxide, Demin water, Hot water, LP steam, MEA, Medium pressure steam, Natural Gas, Ammonia, Process gas, Process water, Relief valves connected, steam condensate, synthesis gas and coolng water lines. The detailed report on thickness measurement has been sent separately to the concerned departments for taking necessary action on replacement. The folloiwng lines were recommended for replacement in view of the thickness reduction/external corrosion.

Sl.No.	Line No.	From	To	
1.	CO-6A-18"	110 CA	CO-7	
2.	CO-7-24"	HEADER	103-F	
3.	DM-1-8"	106-C	101-U	
4.	NH-87-3"	106-F	NH-50	
5.	PG-8-18"	104-C	112-C	(Calculated minimum required thickness may be reviewed by Tech.Deptt)
6.	PG-9-18"	157-F	104-D	--do--
7.	PG-10-18"	104-D	PG-21	--do--
8.	PG-16-12"	101-E	136-C	
9.	PG-35-18"	112-C	157-F	
10.	PG-5- 2 "	106-J	PG-10	
11.	SC-17-3"	156-F	SEWER	
12.	SC-17-2"	LC-21	CVA	
13.	SC-44-2"	171-C	STS-45	
14.	SC-53-2"	151-C	STS-53	
15.	SC-51-2"	150-C	STS-51	
16.	SG-53-3"	SG-22	EVPT-DISCH	

b) HEAT EXCHANGERS :

Thickness measurement of shell of the following equipments was carried out.

1) 176-C 2) 131-JC 3) 115-C 4) 127-CA
5) 127-CB 6) 173-C 7) 116-C 8) 124-C
9) Naphtha Preheater Coil
10) Naphthe Super heater Coil
11) BFW Coil (Ammonia Plant)

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AMMONIA PLANT

CIVIL JOBS

JOB CODE	JOB DISCRIPTION

01 51 01 CIVIL JOBS:

A) AUXILIARY BOILER:

1) Burner face Refractory patch work on burner No.1,2 & 4.

2) Header complete casting job done.

3) Target wall repairs.

4) Inspection man-hole repairs and cera felt.

5) Manhole box up on 04/05/1998 roll cocking in joint at 15.0 Hrs.

6) Concrete breaking and excavation for inspection and maintenance of cooling water pipe line near 104-JA, 108-CA, 108-CB,128-C LAH-161,101-JCA.

B) H.T.ZONE:

1) Insulyite lining on east side near manhole job done.

2) East side near pannhels.

C) L.T.ZONE:

1) Refractory patch work near I.d.Fan done.

D) RADIANT ZONE:

1) Replacement of tunnel slab - 2 Nos

2) Cleaning of Radian zone.

3) Cera felt cocking in Exp.joint and cracks.

4) Manhole two nos box up on 04-04-1998 at 21.0 Hrs.

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AMMONIA PLANT

ELECTRICAL JOBS

JOB CODE	JOB DISCRIPTION

01 61 01 ELECTRICAL JOBS :

01) Preventive maintenance of TMG make LT ACBs carried out damaged parts and worn out contacts replaced.

02) Preventive maintenance of L`T make ACBs in Sec.A of MCC-16 carried out.

03) Preventive maintenance carried out on all feeder compartments mounted on following MCCs :

MCC-5, MCC-5A, MCC-5B, MCC-5C, MCC-16 SEC.A

04) Overhauling of following motors was carried out.

101-BJT, 107-JAT, 104-JA, 102-J LOP, 102-JA SOP

05) Preventive maintenance of all motor operated valves,local control panels carried out.

06) Terminal boxes of motors above 20 HP were checked for loose connections, burning of cables etc.

01 61 02 MOTOR TERMINAL BOX CHECKING :

EQUIPMENT NO.	FAULT OBSERVED AND RECTIFICATION
101	OK
105	OK
112-J	OK
112-JB	OK
103-J	OK
180-JM	OK
106-J	OK
121-J	OK
121-JA	OK

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AMMONIA PLANT

INSTRUMENTATION JOBS

JOB CODE	JOB DISCRIPTION

INSTRUMENT JOBSC:

01 71 01 CONTROL VALVE:

Following control valve maintenance carried out.

1) FRCV-2 : Replaced the broken actuator, Positioner, air regulator by repaired one. General cleaning, gland packing and overhauling were carried out and checked stroke.

2) LCV-3B : Opened the control valve , c/v body was damaged , it was repaired in Mech workshop. General overhauling were carried out . reassembled and installed. Checked stroke.

3) V-15 : Control valve was dropped from bonet, plug and seat inspected , reassembled after lapping. General cleaning, gland packing and overhauling were carried out and checked stroke.

4) LCV-13 : Control valve was dropped , inspected and installed. General cleaning were carried out and checked stroke.

5) MICV-61:Gland Packing and general cleaning were carried out and checked stroke.

6) V-5 : Gland Packing and general cleaning were carried out and checked stroke.

7) LCV-17: Gland Packing and general cleaning were carried out and checked stroke.

8) FRCV-5: Gland Packing and general cleaning were carried out and checked stroke.

9) FRCV-15: Gland Packing and general cleaning were carried out and checked stroke.

10) PICV-865 : Control valve was dropped, bonnet leakage attended and reinstalled.General cleaning overhauling were carried out and checked stroke.

11) FRCV-1009 : Control valve was dropped , plug seat & cage machining was done and reinstalled. General cleaning overhauling were carried out and checked stroke.

12) PICV-846 : General cleaning overhauling were carried out and checked stroke.

13) LCV-10 : After line flushing and mechnical work , it was installed.

14) KV-120-1 & KV-120-5: Operation cheacked pneumatically.

15) PV-804 : Control valve yoke direction was rotated.

16) TRCV-10 : Diaphgram changed, general cleaning overhauling were carried out and checked stroke.

17) PICV-20 : Diaphgram changed, general cleaning overhauling were carried out and checked stroke.

18) FRCV-1016 : General cleaning was carried out, c/v positioner stroke adjusted and checked stroke.

19) FRCV-14 : Gland Packing was done. General cleaning were carried out and checked stroke.

20) PIC-16 : Gland Packing was done. General cleaning were carried out and checked stroke.

21) LC-23 : Gland Packing was done. General cleaning were carried out and checked stroke.

22) FRCV-3: Diaphgram changed, general cleaning overhauling were carried out and checked stroke.

23) General cleaning overhauling were carried out and checked stroke of the following control valve:-

MIC-22, PIC-13A, PIC-13B, FRC-1, FRC-3, FIC-7, FIC-8, FIC-9, FIC-10, FIC-11, FICV-12, FICV-13, FICV-18, PRCV-18, PRCV-4, TRCV-11, TRCV-12, ARCV-3, MICV-12, MICV-23.

01 71 02 <u>COMPRESSOR HOUSE</u>:
<u>101J:</u>

a) General cleaning, overhauling of governor positioner were carried out and checked stroke.

b) Following probes were opened and refixed to facilitate Mechanical maintenance job:-

Probe point nos. : 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, E, C, D & KEY PHASOR.

c) 101J/105J lube oil console PCV cleaned, overhauled and changed the spring.

105J:

a) General cleaning, overhauling of governor positioner were carried out and checked stroke.

b) Following probes were opened and refixed to facilitate Mechanical maintenance job:-

Probe point nos. :4, 5, 6, E, C, D & key phasor.

c) HP case differential seal PCV overhaulled, changed diaphgram, o-ring and spring.

103J:

a) General cleaning, overhauling of PRC-12 & MIC-23 were carried out and checked stroke.

b) Axial probe no. BA & BB was changed.

c) Following probes were opened and refixed to facilitate Mechanical maintenance job:-

Probe point nos. : 3, 4, 5, 6, 7, 8, 9, B, A.

800J:

a) General cleaning of whole panel.

b) One new axial probe installed at NG booster.

c) RTD were opened & refixed to facilitate Mechanical maintenance job.

d) Changeover of CEP standby pump from Motor driven to Turbine driven is carried out as per EWR.Now standby pump is turbine driven.

e) Seperator leveltrol gasket was changed.

102J:

a) 102J burnt PLC cables were checked & rerouted.

b) All tempreture element of thrust bearing and journal bearing were checked.TR-3-33, TR-3-34, TR-3-35 were found broken, they were soldered and refixed.

c) Following probes were opened and refixed to facilitate Mechanical maintenance job:-

Probe point nos. : 2, 3, 5, 6, 7, 8.

JOB CODE JOB DISCRIPTION 101

01 71 03 FIELD INSTRUMENTS:

1) 103J package pump auto start prime switch PSL-22 was replaced by new one.

2) FIC-200, PIC-300 controller was replaced with 91k series of Taylor unit.

3) MIC-76 mannual loader was replaced by Moore make mannual loader.

4) Reformer tubing and PI was provided for catalyst loading and unloading as per requirement of p/p people.

5) Job related with boiler inspection was completed. Provided std. PI at 112C & 101F to measure pressure.

6) LC-8 direction was rotated by 180 deg as per requirement of Project.

7) TI-102E RTD was replaced by new one.

8) Test push button & annunciator bulb were changed in prereformer.

9) 104J & 107J : Removed and refixed the instrument for Mechanical jobs.

10) 104J : Provided mannual loader to check the operation of 104J as per requirement of p/p people.

11) All instruments of 101F(Eye-Hye, PRC-18, LRC-1) were cleaned and checked.

12) LRC-1 controlling operation made independent from pneumatic.

13) H-110 main gas valve was droped. It was cleaned & overhauled and remounted.

14) Provided PIs to M/M for hydrotest for different equipment.

15) Field air header was flushed.

16) PI-104 electronic tx. was taken in line.

17) AG to Offsite flow Tx. was taken in line.

18) FIC-16 & FIC-17, its impulse lines were cleaned and back flushed by air.

19) PIC-25 Tx. impulse tube was flushed by air.

20) PRC-12 Tx. impulse tube was flushed by air.

21) FT-1016 Tx. impulse tube was flushed by air.

22) PT-1013 Tx. impulse tube was flushed by air.

23) 131 JC float switch was opened from flange, found internally stuck up , it was rectified.

24) Dearator leveltrol was checked and cleaned.

25) FR-4 flow element was cleaned and inspected, found o.k.

26) CEP steam inlet thermowell flange gasket was replaced.

01 71 04 CONTROL ROOM JOB:

1) Speed indicators of 101J, 102J, 103J, 105J were shifted in left side of panel.

2) FI-005 NG to AG letdown flow indication was shifted behind control room panel and provided indication in DCS.

3) Aplab power supply was isolated.

4) Power supply to GC, field analyser and existing running instruments were given from FUJI UPSS.

5) Eye-Hye level indicator alongwith junction box was shifted in left side of panel.

6) General cleaning of vibration panel was done.

7) PH meter was shifted in left side of panel.

Notes : All the startup jobs of main plant, PGR and prereformer were carried out.

01 71 05 PROJECT JOBS:

A) PLC:

1) Following trip system were taken in PLC:- 101J, 103J, 105J, 102J, Auxillary boiler, PGR.

2) Following motor operated valves operation were taken in PLC:- SP1 , SP70 , SP3, SP4, SP5.SP71, SP151, SP152, SP158, SP159.

3) Following pump operation were taken in PLC : P1, P2, 101J AOP, 103J AOP, 103J PACKAGE 118J, 118JA, 121J, 121JA.

4) PLC to DCS communication was established. (MOD bus).

B) DCS:

1) Common alarm for vibration & compressors (101J, 103J,105J) were taken in DCS.

2) PGR drum programmer (SEMI DCS) was taken in DCS.

3) All P to I convertor point of P to I panel were calibrated in 3-15 psi.

4) Running indication of following pumps were given in DCS : 101J AOP, 180J, 103J AOP, P1, P2, E4, 106JM, 113J, 103BJT, 170JM, 170JAM, 121JM, 121JAM, 102J LO, 102JSO.

5) MIC-22 operation was taken in DCS.

C) TDM:

1) TDIX was installed behind control room panel.

2) Provided power supply distribution box to give power supply to TDIX. Cabling was done from Distribution box to TDIX. Power supply was given from FUJI upss.

3) Some modification was done in vibration cards which required for TDM.

4) Wiring was done in vibration panel and from TDIX to vibration panel.

5) TDIX for 101J, 105J, 102J & 103J is not working due to the loading by TDIX hence taken out of for these M/Cs. For 800J it is ok and in line.

D) FUJI UPSS:

1) Common alarm of UPS was provided in DCS.

2) General cleaning & service were done of UPS by I/L Engr.

3) Urea power supply was seperated from ammonia power supply.

PLANT TURNAROUND - APRIL - MAY 1998

AMMONIA PLANT

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TECHNICAL & PROJECT DEPARTMENT

JOB CODE	JOB DISCRIPTION

01 81 01 TECHNICAL DEPTT. JOBS:

a) Installed pressure control valve (CPIV) with bypass on steam outlet of 112-C to maintain shell side pressure at about 6 Kg/cm2g. Also BFW from polisher unit terminated and hooked up from 112-J. JA/JB upstream of control valve LC-2/2A.

b) 50 N.B. S.S. line installed in place of 25 N.B. S.S. line from 107-F to 110-F for maintaining 110-F level so that urea plant can run at higher load.

c) Oil draining system for NG Booster Compressor :

The drain points of NG Suction K.O.drum, AG Suction K.O. drum and NG discharge K.O.drum (25 N.B size) were connected to the existing pit near 176-F through underground 25 N.B.pipe lines and common header of 80 NB size.

d) Modification in cooling water line :

- The inlet and outlet cooling water lines of 128-C were replaced by 10" NB size.

- Earlier, the CW supply to inlet line of 115-C was drom the header CW-23-350. Now, this has been disconnected and a new tapping has been provided from main header CW-5-1400 through an underground line.

e) The height of vent pipe (4" NB) at the downstream of LC-3B was increased to 9 meters from the ground level.

01 81 02 PROJECT JOBS:

a) Installation of 36" check valve in C.W.line No.36"-CW-176.02-B 20

b) Relocation of 14" x 900 # spectacle blind from line No.14"-PG-160.01-G36 to line No.14"-PG-1103.01-G36 for ease of maintenance.

c) Installation of 12" x 300 # flange joint in line No.12"-PV-160.01-B 24 in Pre-Reformer battery limit.

d) Replacement of one meter pipe peice in 12" vent line from Pre-Reformer to flare stack at leakage point.

e) Installation of various working platforms for easy valve operation.

f) Installation of 2nd plateform of 123-C.

g) Relocation of one spring support of 103-JAT Exhaust line in line No.16"-SM-160-02-F 24 S

h) Erection of distillation column C-1 shell in Ammonia Recovery section.

PLANT TURNAROUND - APRIL - MAY 1998

UREA PLANT

106

MECHANICAL JOBS

JOB CODE	JOB DISCRIPTION

02 01 01 **CO2 CENTRIFUGAL COMPRESSOR (K-1801 HITACHI):**

Position of outlet of final discharge vent silencer is changed towards top.

02 01 02 **GHH COMPRESSOR TURBINE (Q-1001) :**

Turbine is isolated by providing blinds in following steam lines.

a) 60 ata orifice blind.
b) 23 ata exhaust line.
c) 40 ata steam line to lube oil pump's turbine.
d) 4 ata steam line.

02 02 01 **AMMONIA PUMP (P-1102-A):**

Following jobs were carried out.

a) Pump decoupled from gear box and coupling checked after cleaning, found Ok. Greasing of the coupling done.

b) Crank case cover opened and cleaned.

c) Thrust bearing opened,cleaned and checked, found OK. Thrust measured found 1.1MM.

d) Journal bearing clearance measured found 0.25 MM.

e) Big end bearing opened,cleaned and checked, found in good condition. Bearing clearance taken found 0.006".

f) Cylinder block replaced by new one.

g) D.P.test of tie rods were done found Ok.

h) Three nos plunger were replaced by new one.

i) Plunger packing replaced.

j) Suction/Discharge manifold valves replaced and boxed up with new "O" rings.

k) Pump coupled with gear box and handed over to production department.

02 02 02 AMMONIA PUMP TURBINE (Q-1102-A):

Unwanted steam line,fittings and supports were removed.

02 02 03 AMMONIA PUMP (P-1102-B):

Following jobs were done.

a) Pump decoupled from gear box. Coupling checked. Coupling grid found damage and the same was replaced by new one. Greasing of coupling done.

b) Gear box opened,cleaned and checked. internals found Ok and then boxed up.

c) Crank case cover opened.

d) Thrust bearing opened,cleaned and checked found OK. Thrust measured, found 0.5 MM.

e) Big end bearing clearance checked found : 0.1 MM.

f) Journal bearing clearance checked found : 0.18 MM.

g) Crank case cover boxed up.

h) Suction/discharge manifold valve opened,checked and boxed up with new "O" ring.

i) Pump coupled with gear box and handed over to production department.

02 02 04 CARBAMATE PUMP (P-1201-A):

Following jobs were carried out.

a) Pump was decoupled from gear box.

b) Crank case cover opened.

c) Thrust bearing opened,cleaned and checked. Thrust bearing found damaged and the same was replaced by new one.

d) Journal bearing and big end bearing clearance checked, found Ok.

e) Plunger packing replaced.

f) H.P.barrel "O" ring of 1st plunger replaced.

g) Suction / discharge manifold valves checked and boxed with new "O" rings.

h) Suction and discharge strainer of the pump were opened,cleaned and checked found Ok.

02 02 05 DRIVE TURBINE FOR CARBAMATE PUMP (Q-1201-A):

Unwanted steam line,fittings and supports were removed.

02 02 06 CARBAMATE PUMP (P-1201-B):

Suction and discharge strainers were opened,checked and boxed up after cleaning.

02 02 07 DRIVE TURBINE FOR CARBAMATE PUMP (Q-1201-B):

Unwanted steam line,fittings and supports were removed.

02 02 08 RAW WATER PUMP (P-1402) :

New frame for raw water pump was fabricated.

02 02 09 H.P.FLUSH PUMP (P-1502):

Overhauling of pump and gear box done. The following jobs were carried out.

a) Gear box decoupled from motor and pump.

b) Gear box was opened,cleaned and checked. Two nos. oil seal of gear box (NDE side) replaced by new oil seals and gear box boxed up.

c) Crank case cover opened.

d) Journal bearing opened,cleaned and checked, found Ok. Journal bearing clearance measured found (0.08 to 0.1 MM)

e) Big end bearing opened,cleaned and checked. One no. bearing (1st from coupling side) found damage and the same was replaced by new one.

f) Gudgian pins and connecting rods were removed and checked. All the three gudgian pins and bush found damage. The damaged gudgian pins bushes were replaced by new one.

g) Suction and discharge manifold valves opened,cleaned checked and boxed up with new "O" rings.

h) Gear box coupled with pump and motor with new coupling bolts and handded over to production department.

02 03 01 PRILL TOWER ID FANS (K-1401/1 TO 4):

Following jobs were carried out.

a) Cleaned Fan Blades.
b) Removed bearing cover,checked the condition of the bearing and boxed up with fresh grease.

c) Alignment of fan with motor checked/rectified wherever required.

d) Damaged belts of fan No.3 replaced by new set of belts.

02 03 02 PRILL COOLING SYSTEM FANS (K-1701 & K-1702):

a) Bearings of inlet air fan (K-1701) opened, cleaned and checked. Bearings found in good condition and then boxed up.

b) Bearings of K-1702 opened, cleaned and checked. Bearings found in good condition and then boxed up.

02 13 01 HYDROJET CLEANING OF HEAT EXCHANGER:

1) Flash Tank Condenser (H-1421):

Top cover of the exchanger was opened and boxed up with new gasket after hydrojet cleaning.

2) 1st Evaporator (H-1422):

Manhole cover of the evaporator was opened and boxed up with new gasket after hydrojet cleaning by D.M.water.

3) 1st Evaporator Condenser (H-1423):

Top cover of the evaporator condenser was opened & boxed up with new gasket after hydrojet cleaning.

4) 2nd Evaporator 1st Condenser (H-1425):

Top channel cover of the condenser was removed. Two nos manholes were fabricated (modification) in bottom cover. Hydrojet cleaning of the exchanger was done and boxed with new gasket.

5) 2nd Evaporator 1st Condenser (H-1426):

Top cover of the exchanger opened and boxed up after hydrojet cleaning.

6) Recirculation Heater (H-1204):

Top and bottom channel cover of the recirculation heater was opened and boxed with new gasket after hydrojet cleaning by D.M.water.

7) C.C.S. II Cooler (H-1207) :

Channel cover of the cooler was opened and boxed up with new gasket after hydrojet cleaning.

8) New Surface Condenser (H-1815):

Manhole cover of Surface Condenser was opened. Some debris were found in channel and the same were cleaned, however no deposite found inside the tubes. Manhole cover of the condenser boxed up without hydrojet cleaning.

9) Pre Evaporator Condenser (H-1419):

Top and bottom cover of the pre-evaporator condenser was opened. Some debris found in inlet side of the channel cover & the same was cleaned, however no deposite found inside the tubes. Top and bottom cover of condenser boxed up with new gasket.

10) Lube oil cooler of P-1102-A/B & P-1201 A/B :

Lube oil coolers were opened and boxed up after hydrojet cleaning.

11) Main Lube oil cooler (H-1814-A/B):

Channel cover of main lube oil coolers opened. Visual inspection of the tubes were done. No deposite found inside the tubes. Channel cover boxed up with old gasket without hydrojet cleaning.

02 13 02 H.P.STRIPPER (H-1201):

Top and bottom cover of H.P.Stripper was opened. False tube sheet and ferrules were removed after grinding the tack weld between false tube sheet & ferrules and the stripper was handed over to M/s.Stamicarbon for inspection. After completion of inspection the following repair works, recommended by M/s.Stamicarbon were carried out.

1) Repair of tube to tube sheet welds to overlay weld of tubes No.834,880,929,1902,1936,1969 (see enclosure - 1) in top tube sheet.

2) Two nos.slotted holes were made in the liquid inlet box as indicated in enclosure-2.

Delta P measurement & repairing of ferrules were done as a parallel activity. After completion of repairing work the new welding were passivated by 4% HNO3. The ferrules were fixed in position with new sleeve gasket. False tube sheet put back in position and tackwelding of ferrules with false tube sheet done. Precaution was taken to entrance of any foreign particle inside the stripper.Delta P measured by production department.Stripper cover boxed up with new gasket after getting clearance from production department CO2 inlet line , urea solution outlet line and off gas outlet line boxed up. Steam tracing line rewelded and stripper was handed over to production department.

02 13 03 H.P.CARBAMATE CONDENSER (H-1202):

Top and bottom cover of H.P.Carbamate condenser was opened for inspection by M/s.Stamicarbon. After completion of inspection the following repair work recommended by M/s.Stamicarbon were carried out.

1) Top channel : One pinhole in channel cover marked by M/s.Stamicarbon was repaired by grinding and welding followed by D.P.test.

2) Bottom Compartment : Grinding and welding of pinhole marked for repair was carried out followed by D.P.check.

Top and bottom cover of the H.P.Carbamate condenser was boxed up with new gasket after completion of repair work. Steam tracing line rewelded and equipment was handed over to production.

02 13 04 CO2 SPRAY COOLER (H-1104):

Manhole cover of the cooler was opened for inspection. Loose tray clamping bolts tightened and manhole cover boxed up with new gasket.

02 13 05 2ND STAGE EVAPORATOR (H-1424):

Manhole cover of the evaporator was opened for inspection. The gasket of top nozzle found damaged and the same was replaced by 3 MM thick asbestos gasket. The manhole cover boxed up after final inspection.

JOB CODE JOB DISCRIPTION

02 13 06 **FLUIDISED BED COOLER (H-1701):**

- The damaged portion of the fludised bed cooler repaired.
- New bolts provided in place of missing bolts.

02 14 01 **STEAM LEAK JOBS:**

Various steam leak jobs carried out as per list given by Production Department.

02 15 01 **BOILER INSPECTION:**

4.5 ATA STEAM DRUM BOILER TEST (V-1501):

(A) **OPEN INSPECTION:**

Open inspection of boiler No.GT-1664 (V-1501) was carried out on 29/04/98.

(B) **HYDROTEST:**

Hydrotest of Gt-1664 (V-1501) carried out in the presence of IBR inspector on 04/05/98. the test pressure was 12.00 Kg/cm2.

(C) **BENCH TEST:**

Both the R.V.replaced by new one. bench test of both RV's done and readings are as under.

	Popping Pr.	Reset Pr.
R.V.No.1501	7.0 Kg/cm2	6.5 Kg/cm2
R.v.No.1502	7.0 Kg/cm2	6.5 Kg/cm2

DETAILS OF NEW RV INSTALLED ON V-1501:

Tag No. : RV-1501 / RV-1502
Make : FMC SANMAR LIMITED
Valve Sr.No. : 97-4154 / 97-4155
Valve Model No: 8.T.10, HS-25-IBR
Set Pressure : 7.5 Kg/cm2
Relieving Temp. 167 Deg.C
Spring No. : X 01785

JOB CODE JOB DISCRIPTION 113

02 17 01 VALVE REPAIR/INSPECTION/TESTING/REPLACEMENT:

01) V-1201-Ist isolation valve of NH3 to A/C replaced as existing valve was passing.

02) V-1205-Flange gasket of downstream I/V of offgas line to V-1206 replaced.

03) Gland packing of PRCV-1202 Control valve down stream I/V replaced.

04) H-1202-I/V of Carbamate to HPCC replaced.

05) H-1203-I/V of CO2 to H-1203 replaced by new valve.

06) P-1102-C Drain cap between two I/V replaced.

07) HICV-1422 bypass I/V replaced.

08) P-1304 A/B - Suction I/V gland replaced.

09) P-1202 A/B - Overhauling of check valve done.

10) P-1304 A/B - Loop of discharge line near P-1102-C suction line was removed and valve was shifted to 1st floor near N/L meter.

11) V-1203- Gasket of all three flanges of impulse line of PIC-1202 replaced by new one.

12) P-1102-B gland packing of both the discharge valves replaced.

13) H-1102-Replaced gland packing of outlet valve.

14) H-1205-Replaced flange gasket of 2nd I/V of 4 ata steam line near H-1202.

15) H/V-1418-Replaced gland packing of I/V above tank.

16) V-1351-Replaced flange gasket of the RV.

17) FICV-1381-Replaced gland packing and gasket of the I/V.

18) Replaced flange gasket of the vent stack header near (H-1205)

19) Preventive maintenance of rotary valve M-1701-1,2 & 3 done.

20) 2 Nos plug valves of Ammonia pump (P-1102-C) replaced by 4" x 900 # globe valves.

JOB CODE JOB DISCRIPTION 114

02 17 02 RV'S OVERHAULING AND TESTING:

Following RV's were removed.overhauled and tested at our test bench by M/s.FMC SANMAR LTD,Baroda against W.O.No.03316 dtd.08/04/98 and installed back in its position.

Sr. No.	Tag. No.	Size and style	Make	Set.Pr. Kg/cm2g	Reset Pr.Kg/ cm2g	Tested and Witnessed by Urea
1	RV-1301	6 R 10 JO-36-S-G	CROSBY ENGLAND	6.0	5.5	OK
2	RV-1130	4 P 6HS 26	-- DO --	25.0	23.0	OK
3	RV-1504	4 P 6JO 25-C-STM	-- DO --	12.0	11.4	OK
4	RV-1503	4M6 JO35 C-STM	-- DO --	25.0	23.8	OK
5	RV-1202B	6R10J036 S-G	-- DO --	6.0	5.3	OK
6	RV-1102	2G3 JOS	-- DO --	31.0	28.5	OK
7	RV-1103A	1 X1 JRCA	CROSBY ENGLAND	25.0	22.5	OK
8	RV-1103B	1X1 JRCA	-- DO --	25.0	22.5	OK
9	RV-1501	6R10 JO-36 S-G	-- DO --	7.5	7.2	OK
10	RV-1502	6R10 JO-36 S-G	-- DO --	7.5	7.2	OK
11	RV-1202A	6R10 JO 36-S-G	-- DO --	6.0	5.6	OK
12	RV-1202B	6R10 JO 36-S-G	-- DO --	6.0	5.6	OK

Sr. No.	Tag. No.	Size and style	Make	Set.Pr. Kg/cm2g	Reset Pr.Kg/ cm2g	Tested and Witnessed by Urea
13	RV-1202C	6R10 JO 36-S-G	-- DO --	6.0	5.6	OK
14	RV-1201A	3J4JO-66 A-SPL	CROSBY ENLAND	2350	2200	OK
15	RV-1201B	3JAJO-66 -S-A-SPL	CROSBY FMC	2350	2200	OK
16	RV-1201C	3J4JO-66 S-A-SPL	-- DO --	2350	2200	OK

17 RV OF V-1351/V-1352/V-1301 3.5 Kg/cm2

18 C.W.RETURN HEADER RV REPLACED - 6 ATA

19 R.V.OF AMMONIA SUCTION VESSEL - 31 Kg/cm2

20 COLD AMMONIA LINE RV-1108 & RV-1110 - 31 Kg/cm2

21 K-1801 IVTH stage suction RV removed from the position & dismantled,valve was repaired,boxed up, tested at 110 Kg/cm2 on test bench and finally fixed back in their position.

22 P-1502 Discharge RV replaced by spare R.v.

02 17 03 <u>INSPECTION/REPAIR/REPLACEMENT OF CHECK VALVES</u>:

1. CO2 TO H-1201
2. NH3 TO H-1202
3. NH3 TO V-1201
4. CARBAMATE TO H-1202
5. CARBAMATE TO H-1203
6. CO2 TO H-1203
7. 4 ATA STEAM TO V-1301
8. 23 ATA STEAM TO V-1351
9. CO2 TO HYDROLYSER - 2 NOS

02 18 01 CLEANING / SERVICING OF LEVEL GAUGES:

Cleaning/servicing of following level gauges done.

1) 4 Ata steam drum - 2 Nos (V-1501)
2) 23 Ata steam saturator (V-1502)
3) 9 Ata steam saturator (V-1503)
4) Rectifying column (V-1202)
5) L.P.Condenser Separator (V-1205)
6) 2nd desorber (V-1301)
7) 1st evaporator separator (V-1423)
8) Steam condensate tank (T-1501)
9) 1st Desorber (V-1352)
10) Reflux level tank (V-1353)

02 19 01 AUTOCLAVE (V-1201):

Top cover of Autoclave was opened for inspection by M/s.Stamicarbon. The following jobs recommended by M/s.Stamicarbon were carried out.

A) All old tray supports of Tray No.2 were replaced by new (modified) tray support.

Tray Supports replacement procedure:

1) Old Tray support removed by grinding without any damaged to liner.

2) Old weld material removed from the shell liner.

3) D.P.check of the liner surface carried out.

4) The new tray supports put in position and tack welded with shell liner.

5) The root run completed by TIG welding using 25-22-2L Mn filler wire.

6) D.P.check of root run done.

7) Remaining weld pass completed by using 25-22-2L Mn filler wire.

8) D.P.check of final run done and found to be Ok.

9) The new weld claned and passivated by washing with 4% HNO3.

B) COMPARTMENT - 6:

Two pin holes marked for repair were repaired by grinding and welding followed by D.P.test. The new weld were passivated by 4% HNO3.

C) COMPARTMENT NO.12:

1) A pinhole in weld of central nozzle was repaired by grinding.

2) A baffle plate with diameter of 2 times the diameter of the gas inlet line & at a distance of 0.5 times the dia of gas inlet line was installed at gas inlet line from H.P.C.C.(See enclosure - 3)

02 19 02 CO2 KNOCKOUT DRUM (V-1101):

Manhole cover of CO2 knockout drum was opened for inspection. After completion of inspection by inspection department the following jobs recommended by them were carried out.

1) Demister pad repaired and holding bracket fixed back in their position.

2) Complete epoxy painting of the shell internal surface and bottom dished end internal surface was carried out.

Manhole cover boxed up with new gasket.

02 19 03 RECTIFYING COLUMN (V-1202):

- Top cover of rectifying column was opened.
- Rasching ring of the rectifying column replaced by new one.
- Rectifying column bottom outlet line (from reducer to first welding point in horizontal portion) was replaced.

02 19 04 L.P.VENT SCRUBBER (V-1206):

Manhole cover of L.P.vent scrubber opened for inspection. Demister pad found displaced from its position. Demister pad fixed back in position and manhole cover boxed up with new gasket.

02 19 05 SECOND DISORPTION COLUMN (V-1301):

The manhole cover of 2nd disorption column opened for inspection. The first tray from the top has got dismantled and dislocated from its position. The dismantled tray fixed back in their position and tightened with new clamping bolts. The loose clamping bolts of remaing trays were tightened.

JOB CODE JOB DISCRIPTION 118

02 13 06 HYDROLYSER COLUMN (V-1351):

Manhole cover of hydrolyser column were opened for checking of the trays. Trays from 1 to 14 found collapsed due to which trays segments were bend,clamps and bolts were found damaged /missing.

All the segments of the trays No.1 to 14 were taken out by motor operated winch. Bend trays were brought back to their original shape in workshop. The trays were fixed back in their position. The damaged/missing trays clamps and bolts were replaced by new one. Hydrolyser was cleaned completely after completion of tray fixing job. The manhole cover boxed up with new gasket.

02 19 07 FIRST DESORBER (V-1352):

Top and bottom manhole cover of the desorber opened for checking of sieve tray's condition. One segment of each tray from top to 3rd tray opened and condition of tray support, clamping bolts etc. checked and found to be Ok. Tray's segment boxed up. Manhole cover boxed up with new gasket.

02 19 08 9 ATA STEAM DRUM (V-1503):

Opened manhole cover for and handed over to inspection department after cleaning. Loose bottom header clamp was tightened and one no. new clamp nut provided in place of missing nut.

02 20 01 FABRICATION JOBS:

1) H-1420 Barometric leg of H-1420 relocated.

2) V-1421 Nozzle pad of NH3/H2O inlet line repaired by grinding and welding followed by D.P.test.

3) U/S Drain line provided in CO2 to Hydrolyser rotameter line.

4) Urea Solution Heater (H-1422-A):

A bypass line provided to by-pass urea solution heater. Blind is provided in inlet and outlet line of urea solution heater as it is to be removed.

02 21 01 BELT CONVEYORS:

1) M-1701:

Conveyor belt replaced by new belt of 800 MM width.

JOB CODE JOB DISCRIPTION 119

2) M-1403:

Conveyor belt replaced by new belt of 800 MM width.

- Rollers repaired/replaced and greasing done.
- Skirt repaired.

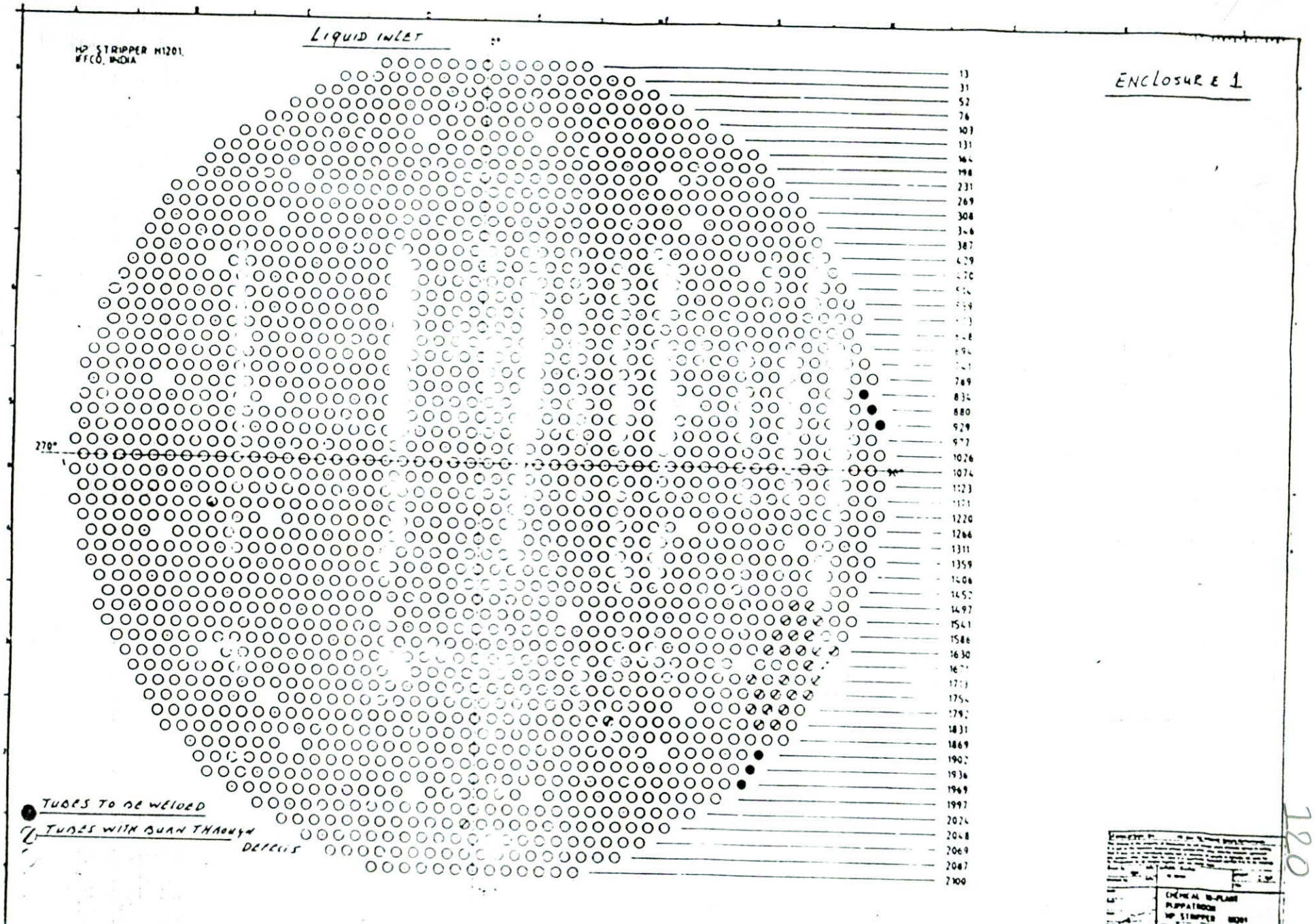
3) M-1419:

Conveyor belt replaced by new belt of 800 MM width.

- Rollers repaired / replaced.
- Skirt repaired.

4) M-1421:

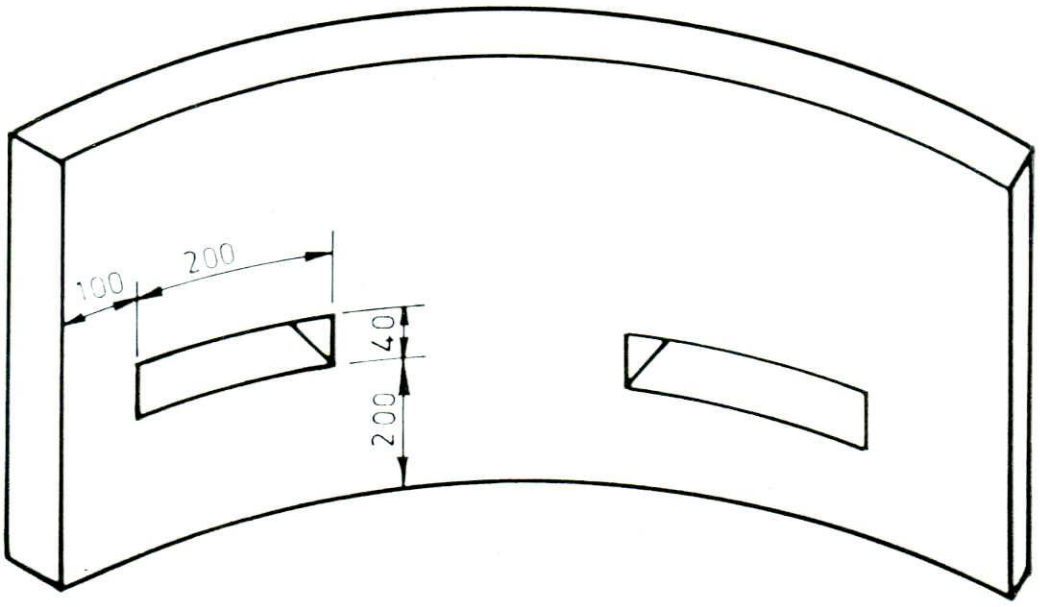
Modification of chute done.



ENCLOSURE 1

120

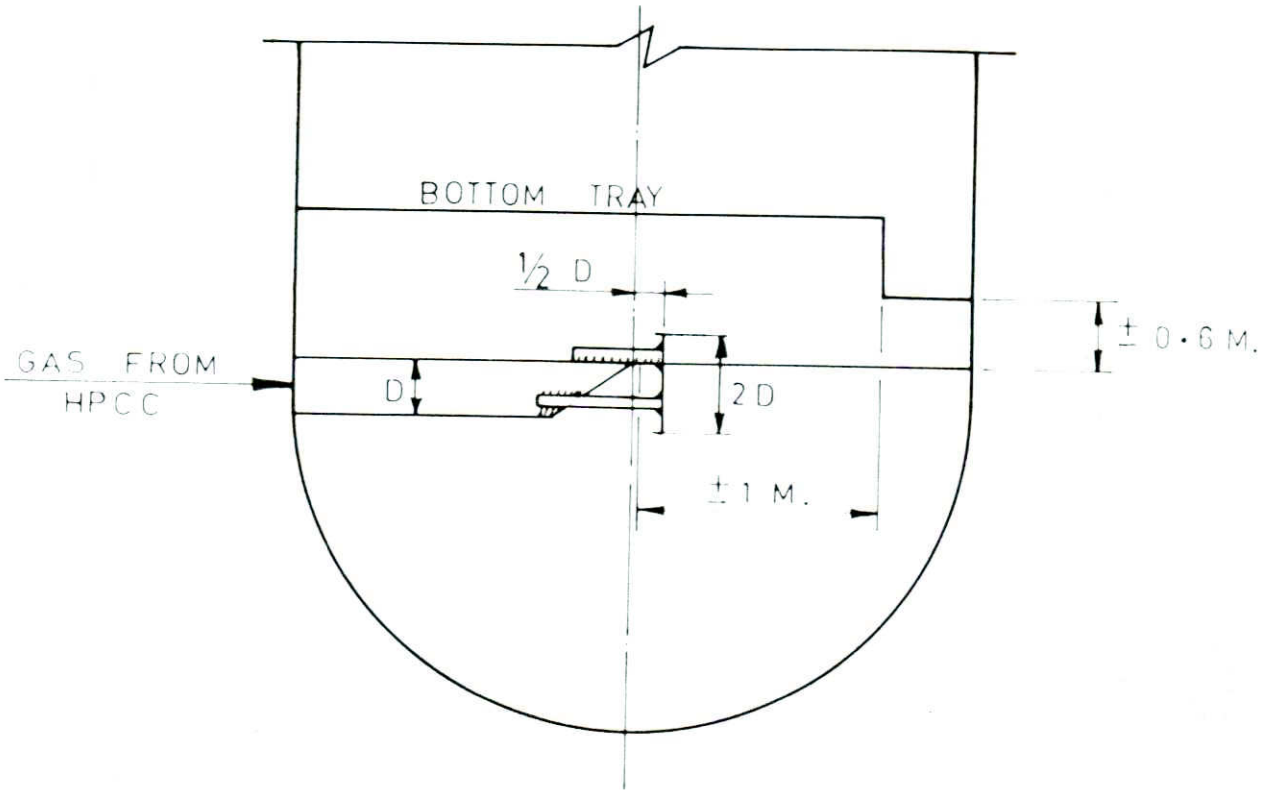
ENCLOSURE-2



2 HOLES TO BE MADE IN BAFFLE

STRIPPER IFFCO KALOL

ENCLOSURE - 3



REACTOR BOTTOM IFFCO KALOL

PLANT TURNAROUND - APRIL - MAY 1998

UREA PLANT

INSPECTION JOBS

JOB CODE	JOB DISCRIPTION	123

02 41 01 During this Shutdown, the following major inspection activities were performed.

Inspection of High Pressure Equipments viz; (a) HP Stripper, H-1201 (b) HP Condenser-H-1202 and (c) Autoclave V-1201. HP Scrubber, H-1203 was not opened for inspection.

Fit up check, DPT of root and final welds and 100% radiography review on Carbamate Pump discharge line from Common T-junction to HP Condenser. The pipeline replacement was done by M/s DCPL, Delhi.

Visual inspection and ultrasonic thickness measurement of various vessels, tanks etc.

DPT & radiography of modified/replaced pipelines.

HIGH PRESSURE VESSELS :

[1] AUTOCLAVE V-1201 :

(a) VISUAL INSPECTION :

Visual inspection was carried out alongwith the Stamicarbon personnel. The following observations were made :

i) In general, the corrosion on the liner was low but the liner welds showed some what higher rate of corrosion which was more at the bottom as compared to top section.

ii) The insert liners showed higher corrosion rate as compared to parent liner.

iii) The down comer which was replaced during last shutdown showed hardly any corrosion. The trays were also replaced during last Shutdown and did not show any sign of corrosion.

iv) The tray supports (old design) were found in bad condition due to severe uniform corrosion and crosscut end attack. All the old tray support clits were recommended for replacement.

v) Observations for all the compartments were recorded during visual inspection.

Repairs were recommended at the following locations.

Compartment 6 :

Two nos.pinholes were marked for repair.These were ground off upto 3 mm depth, DP tested followed by fill up using GTAW welding method. DPT on repaired area was carried out. Ferrite was found 'NIL'.

Compartment 12 :

One no. pinhole was observed in the central nozzle during DP test. This was rectified as above. Gas inlet nozzle was modified as per Stamicarbon recommendation.

(b) ULTRASONIC THICKNESS MEASUREMENT :

The liner thickness was checked in different compartments. The readings are given below :

TOP SECTION (Compartment 1)

Min. thickness - 5.0 mm.
Max. thickness - 5.5 mm
Avg. thickness - 5.2 mm

MIDDLE SECTION (Compartment 5)

Min. thickness - 5.2 mm
Max. thickness - 5.6 mm
Avg. thickness - 5.5 mm

BOTTOM SECTION (Compartment - 9) :-

Min. thickness - 4.9 mm
Max. thickness - 5.3 mm
Avg. thickness - 5.0 mm

INSERT LINER PLATES:

Compartment 3 : Min. thickness - 7.0 mm
Max. thickness - 7.2 mm (New liner replaced in 97)

Compartment 4 : Min. thickness - 3.6 mm
: Max. " - 4.2 mm

Compartment 8 : Min. " - 4.3 mm
: Max. " - 4.9 mm

Compartment 9 : Min. " - 4.8 mm
: Max. " - 5.3 mm

Compartment 10: Min. " - 4.8 mm
: Max. " - 5.3 mm

NOTE :

During this Shutdown, all the old clits of the second tray were replaced. The weld joints were DP tested after first run and final welding (TIG) followed by Ferrite measurement which was found 'NIL'.

[2] HP STRIPPER, H-1201 :

(a) VISUAL INSPECTION :

Visual inspection of top cover, top channel, top and bottom tubesheets, bottom channel and bottom cover was carried out. In general, the condition was found to be satisfactory on top cover, top channel, bottom tubesheet, bottom channel and bottom cover. On top tubesheet, the overlay welding showed severe corrosion. Undercuts on tube to tubesheet seal welds were observed. Around 6 tubes, these were very severe and were marked for repair. These were rectified by grinding/welding by GTAW method followed by DP test and Ferrite measurement. Some tubes showed burn through defects.

(b) EDT SCANNING OF TUBES :

All the tubes in top 3 metre length were checked for min. wall thickness. Min. wall thickness was found to be 2.10 mm on 3 tubes. Average wall thickness was 2.44 mm. Average corrosion rate on tubes was calculated to be 0.06 mm/year.

(c) TOP AND BOTTOM TUBESHEETS EDT SCANNING:

The top and bottom tubesheets were checked 100% by Eddy Current for corrosion of the carbon steel surrounding the tubes at the transition of carbon steel and SS. No voids were detected in the bottom tubesheet. Top tubesheet was observed to have voids surrounding tube Nos. 1712, 1669, 1711 and 1670. There was no change in size of these voids as compared to previous inspection done in 1997.

(d) INTERNAL SCALING IN TUBES :

During 97 Shutdown, chemical cleaning was done. The scaling in the bottom of stripper tubes was found to be less than 0.5 mm.

(e) OVERLAY WELD THICKNESS:

The thickness of the overlay welds was examined in the top and bottom sections. The following readings were measured:-

TOP SECTION :

Cover - 9.7 to 13.5 mm
Manway - 9.9 to 14.5 mm
Dome - 8.2 to 12.5 mm
Gas Phase of Cylinders - 8.8 to 14.0 mm
Liquid phase of Cylinder - 6.8 to 10.3 mm

BOTTOM SECTION :

Cover - 9.2 to 11.1 mm
Manway - 10.2 to 11.5 mm
Dome - 9.5 to 12.0 mm
Cylinder - 9.9 to 11.8 mm

NOTE :

As a part of modification, two slots of 40 mm x 200 mm size were made in the liquid inlet box during this Shutdown.

[3] HP CONDENSER - H-1202:

(a) VISUAL INSPECTION :

Visual Inspection of top cover, top channel, top and bottom tubesheets, bottom channel, and bottom cover was carried out. In general, the condition of this equipment was found satisfactory. One pinhole was observed in the liner weld which was rectified by grinding-welding followed by DP test and ferrite measurement.

(b) EC SCANNING OF TUBES :

10% tubes (222 Nos.) were scanned on entire length for wall thickness. The followings were the results.

Wall thickness	Number of tubes
2.55 mm	57
2.50 mm	152
2.45 mm	13

Average wall thickness was found to be 2.51 mm against design thickness of 2.50 mm. Hence, no corrosion could be detected.

(c) OVERLAY WELD AND LINER THICKNESS MEASUREMENT:

The thickness of the overlay weld metal as well as liner in the top and bottom sections of HP Condenser were measured. The followings are the results.

TOP SECTION

Cover	-	19.5 mm to 19.6 mm
Manway	-	6.9 mm to 7.5 mm
Dome Area	-	6.7 mm to 7.0 mm
Cyl. Area	-	6.4 mm to 7.1 mm

BOTTOM SECTION

Cover	-	19.5 mm to 19.76 mm
Manway	-	6.0 mm to 7.7 mm
Dome Area	-	6.5 mm to 7.0 mm
Cyl. Area	-	6.5 mm to 6.9 mm

02 41 02 OTHER VESSELS:

(1) CO2 SPRAY COOLER H-1104:

Visual inspection and ultrasonic thickness measurement were carried out. The following observations were made.

a) Demister pad assembly was found to be in good condition.

b) Condition of epoxy paint was found satisfactory.

c) Several tray clamping bolts were found loose which required proper tightening before boxing up.

d) In general, the condition of this vessel was satisfactory.

Ultrasonic thickness measurement was carried out.

(2) 2ND STAGE EVAPORATOR - H-1424:

a) The shell had assumed shiny white colouration.

b) Condition of weld joints i.e.longitudinal as well as circumferential was found satisfactory.

c) Lots of long S.S.stripes of metallic gasket were seen hanging from the top nozzle pipe inside diameter and also some stripes found down.

d) Ultrasonic thickness measurement was also carried out.

	Max. thk.	Min. Thk.
Shell	11.9 mm	11.8 mm
Dish end	12.6 mm	11.1 mm

(3) AMMONIA WATER TANK - T-1301:

Visual inspection of internals and thickness measurement were done. The following observations were made during visual examination.

i) The overall condition was found satisfactory.

ii) No signs of corrosion on the shell plates and weld joints were observed.

iii) All the internals were intact.

iv) Ultrasonic thickness measurement was carried out.

(4) AMMONIA WATER TANK - T-1301/A:

Visual inspection of internals and thickness measurement were done. The following observations were made during visual examination.

i) The overall condition was found satisfactory.

ii) No signs of corrosion on the shell plates and weld joints were observed.

iii) All the internals were intact.

iv) Ultrasonic thickness measurement was carried out.

(5) UREA SOLUTION TANK T-1401 :

Visual inspection of internals and thickness measurement were carried out. The followings are the observations.

a) The shell was found brownish red in colour.

b) The bottom plate of the tank was found buckled upwards by approx. 3/4". This has been observed during earlier inspections also.

c) All the weld joints of the tank were found free from any corrosion.

d) Ultrasonic thickness measurement was carried out.Minimum thickness was found to be 5.5 mm against 6.0 mm Design.

(6) UREA SOLUTION TANK - T-1401/A:

Visual inspection and thickness measurement were carried out. The followings are the observations.

a) Overall condition of this tank was found satisfactory on visual inspection.

b) Internals were found intact.

c) All the weld joints were found free from corrosion.

d) Thickness measurement was carried out. Min. thickness was found to be 5.4 mm.

(7) CONDENSATE TANK - T-1501:

Visual examination of internals as well as Ultrasonic thickness measurement were carried out. No abnormalities were observed in the tank except one no. Support of the sparger line was found damaged. This was repaired followed by inspection. In general, the overall condition of this tank was found to be satisfactory.

Minimum thickness of shell was found to be 9.6 mm.

(8) CO2 KNOCKOUT DRUM - V-1101:

a) Demister pads of west side segment on north side was found in damaged condition/fallen down. Holding brackets for pads also found dislocated.

b) Peeling of epoxy paint on scattered locations was observed throughout the shell internal surface and particularly on west side of shell internal surface in approx. half circumference on upper half elevation/height. Bottom dished end epoxy paint had also got peeled off.

c) The overall condition of vessel was good except the epoxy paint on the internal surface.

(9) RECTIFYING COLUMN - V-1202:

Visual inspection was carried out before refilling the new raschig rings in this vessel. In general, the overall condition of the vessel was found to be satisfactory. The support grill was found to be cracked at one location which was lying outside. No other abnormalities were noticed. Ultrasonic thickness measurement was carried out.

(10) LP VENT SCRUBBER V-1206:

Visual inspection and ultrasonic thickness measurement were carried out. The following observations were made:-

a) The demister pads were found damaged and dislocated from their position.

b) The sieve covering the catalyst bed was found to be in good condition.

c) All fastening bolts of the catalyst bed covering sieves were intact.

d) No signs of corrosion were observed on parent shell and accessible weld joints.

e) Ultrasonic thickness measurement revealed Min.thickness of 5.5 mm.

(11) FLASH TANK SCRUBBER V-1421:

Visual inspection was carried out from outside as vessel entry was not possible due to Ammonia smell. The following observations were made:

a) The demister pads were slightly distorted.

b) Carbamate leakage sign was observed through the tell tale hole of the manway nozzle reinforcement pad. DP test was carried out. Cracks were observed in the shell which were rectified by grinding and welding followed by DP test.

c) In genral, the condition of the vessel was good.

d) Minimum thickness of 5.4 mm was recorded on the shell.

JOB CODE JOB DISCRIPTION

(12) 4 ATA STEAM DRUM - V-1501:

Visual inspection and ultrasonic thickness measurement were carried out. The following observations were made.

a) The shell had assumed blackish colouration.

b) The demister pads were intact in position and their condition was satisfactory.

c) Shallow pittings were observed on the dished end.

d) One No. riser baffle plate on west side of the drum shell i.e. counting 2nd from Northside Manhole found to be completely dislodged or removed from its position with all its fastening bolts sheared.Baffle plate found fallen down.

e) One no. bolt of flange joint of distributor pipe (at south side) found missing.

f) Other baffle plates are intact in position but some of its bolts found loosened and same missing.

g) Ultrasonic thickness measurement was carried out.

	Max. thickness	Min. thickness.
Shell	16.0 mm	15.3 mm
Dish ends	18.6 mm	17.1 mm

(13) 23 ATA STEAM DRUM V-1502:

Following inspections were carried out:

a) Visual inspection.

b) Ultrasonic thickness measurement.

c) Ultrasonic flaw detection of nozzle weld of manhole(west).

d) Dye-penetrant test of nozzle weld of manhole(west).

OBSERVATIONS :

a) Overall condition of the vessel was found satisfactory on visual inspection.

b) All the internals were in good condition.

c) No indications were observed during dye penetrant test.

d) No major abnormal indications were observed during ultrasonic flaw detection.

e) Ultrasonic thickness measurement showed Min. thickness of 29.9 mm on shell.

(14) 9 ATA STEAM DRUM - V-1503:

Visual inspection and thickness measurement was carried out. The observations found are as under

a) The shell and Dished end colouration was greyish black.

b) Bottom header clamp was found loose,and one nut of clamp found missing.

c) Ultrasonic thickness measurement was carried out.

Min. thickness - 12.7 mm (shell)
13.6 mm (Dished ends)

(15) HYDROLISER - V-1301:

Visual inspection of this vessel was carried out. The following observations were made.

a) The first tray segment was found displaced from its position.

b) The remaining trays were also observed to have got displaced. Subsequently, the tray segments which were found dislocated and damaged, were rectified/replaced by maintenance group.

c) Lot of debris containing oil, mud etc. were found lying at the vessel bottom.

d) The condition of the shell and dished ends was found satisfactory.

e) No corrosion was observed on the accessible weld joints.

(16) FIRST DESORBER - V-1352:

a) In general, the condition of the vessel was found satisfactory.

b) The tray segment of the first tray was removed to inspect the further trays in view of damages to trays of Hydroliser. No abnormalities or damages to any tray were observed.

c) The lean carbamate inlet nozzle and gas inlet nozzle were found free from corrosion.

d) Out of four, two no. of fastners of one of the lean carbamate header flange inside the vessel were missing.

e) The shell and accessible weld joints were found free from corrosion.

02 41 03 MISCELLANEOUS JOBS:

1) CARBAMATE PUMP DISCHARGE LINE REPLACEMENT JOB:

During this shutdown, carbamate pump discharge line from Common-T junction on first floor upto HP Condenser was replaced with 4" NB Sch 160 SS-316 L piping through M/s DCPL. All the weld joints were inspected at four stages:-

1) Bevel Edge DPT.
2) Fit up.
3) Root DPT and Ferrite measurement
4) Final DPT and 100% X-ray.

2) DP TEST JOBS:

Various pielines were modified through M/s J&J Engrs, Departmental fabrication team viz; Ammonia Pump Recycle line, H-1102 interconnection of cold-Hot Ammonia, 4 ata steam line blind cap welds etc.

02 41 04 ULTRASONIC THICKNESS MEASUREMENT JOB:

In all, 55 pipeline loops consisting of airline, cooling water line, Co2 gas line, Ammonia line, urea carbamate solution lines, process waterlines, condensate lines and steam lines were measured for thickness. The detailed report on thickness measurement have been submitted separately to concerned plant areas for action on replacement of piping. The following pipelines have been recommended for partial/full replacement.

JOB CODE JOB DISCRIPTION 134

Sl.No.	Line No.	From	To
1.	PR-1208-4"	Autoclave top	HP Scrubber (one bendto be replaced)
2.	PR-1224-3"	FICV-1204	H-1203 (Two bends to be replaced)
3.	PR-1234-4"	PRC-1201	V-1203 (Two bends to be replaced)
4.	PR-1359-4"	P-1351 A/B	H-1351 C (Partial replacement recommended subject to MRT calculations)
5.	SC-1513-4"	LCV-1501	V-1503 (Two bends to be replaced)

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CIVIL JOBS

JOB CODE	JOB DISCRIPTION

02 51 01 CIVIL JOBS:

1) Dismentling of unwanted foundation at ground floor and making three nos. of new foundation.

2) Pipe replacement and new connection on West side of H.P.Ammonia pump.

3) Bitumastic lining on top of Prill Tower.

4) Bitumastic lining on top of Prill Room.

5) Bitumastic lining at ground floor.

6) Breaking concrete of conveyor gantry and finishing by plastering the same.

7) Making foundation near H.P.Ammonia.

8) Epoxy painting on R.C.C.surface of ...

   a) CO2 Spray cooler and knock-out drum.
   b) Prilling Room,Promotograph,Lift cabin
   c) South wall of lift cabin - H.P.Condensor.
   d) Prill tower scrapper floor - M.C.C.- 6.
   e) Prill cooling system.
   f) Door repairs for prill cooling room and Promatograph room.

9) R.C.C.Channel on south of urea plant.

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ELECTRICAL JOBS

JOB CODE	JOB DISCRIPTION

02 61 01 ELECTRICAL JOBS :

01) Preventive maintenance of TMG/SIEMENS make and L&T make LT ACBs carried out. Damaged parts and worn out contacts replaced.

02) Preventive maintenance was carried out on all feeder compartments mounted on following MCCs :

MCC-6, MCC-14, MCC-15

03) Overhauling of following motors was carried out.

P-1131 A, P-1132 B, P-1131 B, P-1231 B, P-1232 B, P-1351 A, P-1408, M-1402/1, M-1402/2, M-1419

04) Preventive maintenance of all motor operated valves, local control panels carried out.

05) Terminal boxes of all motors above 20 HP were checked for loose connection and burning of cables.

02 61 02 MOTOR TERMINAL BOX CHECKING :

EQUIPMENT NO.	FAULT OBSERVED AND RECTIFICATION
P-1113-B	OK
P-1202-A	OK
P-1202-B	OK
P-1204-A	OK
P-1204-B	OK
P-1302-A	OK
P-1302-B	OK
K-1401-1	OK
K-1401-2	OK
K-1401-3	OK
K-1401-4	OK
P-1102-B	OK
P-1502	OK
P-1351-A	OK
P-1351-B	OK
P-1701	OK
P-1702	OK
P-1302-C	OK
P-1302-D	OK
P-1102-A	OK
P-1102-C	OK
P-1201-A	OK
P-1201-C	OK

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INSTRUMENTATION JOBS

JOB CODE	JOB DISCRIPTION

02 71 01 CONTROL ROOM AREA:

1) REMOVAL OF OLD PNEUMATIC PANEL:

The old pneumatic panel was removed in the following step by step activities:

The annunciator wiring detail was prepared and kept ready.After the plant was shut down,all were checked,and cable/wires were given proper identification,and then all the cable were removed and taken to DCS room.

The cable were properly routed and dressed and terminated in DCS marshalling cabinet as per DCS drawing.

2) CABLE INTERCONNECTION:

An inter connecting junction box was installed on the wall behind the marshalling cabinet , to accomodate/extend short cables from control room or new cables,and their identification was carried out.Similarly,pump trip interlocks were taken in line.

3) SPECIAL INSTRUMENTS:

The following instruments which were on old panel were shifted to DCS Room as they are required to be connected to DCS for monitoring/control purpose of the process:

1) LR-1201.....Autoclave level indication.
2) LRC-1201.....Stripper level control
3) Cooling water flow,to urea,totaliser.
4) Old ammonia flow totaliser FS-1101.

LR-1201 Autoclave level indication counter was shifted to vibration panel for ready reference and easy readabilty to operating staff in the control room.

4) WOODWARD GOVERNOR RELOCATION:

The existing Position of the Woodward Governor was required to be shifted rightward from its position to accomodate the newly incoming third ICS. Its cable required, for removal of the cabinet and refixing, were removed and reconnected for shifting and dressing purpose.

5) NEW THIRD ICS (ICS 127):

The new ICS was installed in between the ICS-132 and Woodward Governor cabinet. Appropriate 110 v ac working power, Ethernet and dual redundant V-net connections were carried out.

After replacing the faulty ICS was comissioned, and software were loaded and ICS was taken in line. Subsequently all the three ICS were equalised.

6) PRINTER RELOCATION:

After removal of the old panel, both the printers were relocated Power supply to both the printers was made common instead of original individual power suply arrangement. This was done to accomodate new ICS Power supply requirement.

7) ENGINEERING STATION:

Engineering station was shifted from engineering station room to control room. Appropriate power supply of 110 v ac and 230 v ac was arranged at new location of the engineering station and Ethernet cable was also rerouteted from original place to the new place, and engineering station was restarted.

8) VIBRATION PANEL:

The Bently Nevada Vibration Panel for Hitachi Compressor :

The panel was shifted to a new location for aesthetic view. All the signal and power cables were rerouted and redressed so as to accomodate excess cable lengths in new place. Also the related cables of N/C Ratiometer, Water in carbamate meter and LR-1201 count indicator were rerouted and reconnected in the panel.

JOB CODE JOB DISCRIPTION 139

02 71 02 MARSHALLING CABINET ROOM:

230 volt ac power supply arrangement was carried out from UPSS by providing a suitable step up transformer from 110 V to 230 v. 230 volt ac is needed for LR-1201,Cooling Water Flow Totaliser,and Magnetic flow meters in Hydroliser plant.Suitable power distribution for 110 v and 230 v ac along with fuse and togle switches are provided to these instruments along with extra provision for future requirements.

All the old exccess cables were removed and related surplus power distibution boxes also were removed to bring the aesthetic beauty of the room.All the cables in side the underground cable trench were properly dressed and the area was cleaned.

02 71 03 HITACHI COMPRESSOR AREA:

Alarm annunciaton siren was provided near control room for the local panel Annunciator.Necessory cable and power supply arrangement and initiating contact isolation by an interposing relay, from Hitachi comp.local panel,also was carried out.

All the pressure switches were checked for proper working at the set pressure,and general cleaning and maintenance was carried out on the switces.

All the pressure and flow transmitters calibration was carried out including antisurge transmitters

Control valve lifting arrangement for the antisurge control valve and final discharge vent was fabricated and welded on site so as to facilitate maintenance of the valve if trim is to be opened.

02 71 04 CONTROL VALVES:

1) HITACHI COMPRESSOR AREA:

The job on both the control valves, HV-1801 and PV-1810, was carried out under guidance / supervision of Mr.Haneda,from Nigata Masonielan,Japan;as he visited our site for this purpose to solve valve perfornance problem at the given design air pressure.

2) HV-1801:

The control valve was passing badly in running,control valve was opened and plug and seat were inspected and found some impression/damage due to foreign material and because of this;the valve was not getting tight shut off.The cage was also found with some appriciable scrathes on inside surface.Cage was cleared by filing and the damaged plug,seat,seal rings and handjack assembly were replaced by new ones.

3) PV-1810:

The control valve was opened for inspection.No foreign material was found inside the valve.Active surfaces of the plug and seat were properly cleaned and the valve was reassemblled,and the control valve was checked for proper travel/stroke length and found alright.

4) LRCV-1201:

The control valve was dropped from the line and brought to ourworkshop.Plug and seat were replaced by new set,gland packing and guide bush also were replaced by new spare ones.Actuator diaphragm was also replaced by a new one.Hydro test at 150 kg/cm sqr was sucessfully crried out for pressure holding by plug and seat,at full closed condition.

5) HIC-1201:

The control valve positioner,air set,and I/P Convertor were cleaned.Gland packing checked/tightened properly.The valve stroking was checked locally and from control room and found alright.

6) HIC-1202:

The control valve was taken to DCS.The control valve positioner,air set,and I/P Convertor were cleaned.Gland packing checked/tightened properly.The valve stroking was checked locally and from control room and found alright.

7) OTHER CONTROL VALVES:

The following control valve positioner,air set and I/P convertor were cleaned and checked for their performance.In some cases of the valves gland packing also changed.After these maintenance work all these valve stroking was carried out from control room as well as locally.

PICV-1502A, PICV-1502B, LRCV-1502B, PICV-1131,
LRCV-1351, LRCV-1352, PICV-1128, PICV-1129,
PICV-1130, PRCV-1202, LICV-1201, TICV-1808,
HICV-1803, HICV-1207, FICV-1287, LICV-1501,
LICV-1420, HICV-1207, PICV-1421, FICV-1281,
HICV-1281, PRCV-1504.

02 71 05 FIELD INSTRUMENTS:

1) FIELD TRANSMITTERS CALLIBRATION :

The following transmitters were calibrated :
FR-1201, FRC-1201,FR-1202,PIC-1422.

2) FR-1803 TRANSMITTER:

The transmitter was shifted to lower elevation to have shorter impulse line tube and the tubing was modified,to get proper flow,by giving a gradiant of 45 degrees,in the tubing.This avoids errors due to condensation.

3) PIC-1422 TRANSMITTER:

The transmitter was shifted to nearby location to have clearance for free movement in the area as it was coming in the way in the area.Also suitable air purging was given to the Sensing side impulse line to avoid condensation/chocking of the material in the impulse line.

4) OLD PNEUMATIC TRANSMITTERS:

All the old pneumatic transmitters along with their old impulse lines,air pressure regulator and air supply tues and out going pneumatic signal tubes were removed.

5) NEW CONTROL VALVES:

The following control valves were replaced by new control valves as part of the project job. Necessary air tubing,and I/P convertor installation,stroke checking was carried out.

FRCV-1201, PRCV-1201, FICV-1204, PICV-1201,
PRCV-1501, LICV-1203, TRCV-1422, HICV-1481,
HICV-1581, FRCV-1421.

6) OLD LOCAL CONTROL BOARDS:

The folowing pneumatic type of old speed regulating arrangement was removed and relevant speed controling output signals, for P-1102A,P-1201 A and B,from DCS to electrical variable speed drive system were given.

7) SPEED INDICATION OF HP PUMPS P-1102A & P-1201A:

The pump speed indication were given on DCS by providing speed sensing sytem which includes a proximity switch, f/i convertor and neceessary power cable,signal cable.

8) RADIOACTIVE SOURCES:

To facilitate job of mechanical maintenance and production side jobs;Radio active source of LR-1201 Autoclave level and LRC-1201 Stripper level were removed at the begining of the shutdown and were refixed at the end of the shut down.

9) HIC-1421:

Prill divert valve was overhauled and checked . performance,after maintenance.New isolation relay were provided for prill in line/divert indication on DCS.

10) 23 ATA STEAM DRUM WATER CONDUCTIVITY:

The conductivity indicating transmitter along with necessary sample cooling system and signal output to DCS were installed and comissioned.

11) PCS DUST DESOLVING TANK (NEW):

Tank level reciever switch and temprature controller were shifted to a safer place to save it from damage due to spillage of urea dust and water from the top.

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TECHNICAL & PROJECT DEPARTMENT JOBS

JOB CODE	JOB DISCRIPTION

02 81 01 TECHNICAL DEPTT.JOBS:

a) 2 Nos of 3 way valves with additional relief valves were provided on ammonia lines for proper isolation and safe maintenance of relief valve during plant operation.

b) Motor operated valve shifted in common 150 NB suction line of Ammonia pumps P-1102/A/B/C. Suction piping modified accordingly.

02 81 02 PROJECT JOBS:

a) Replacement of turbine & gear box with new L T Motor. and gear box of HP Carbamate pump (P-1201-B). Coupling between pump/gear box is also replaced. Lube oil cooler/pump and associated pipings of old gear box have been removed. Lube oil cooler/pump and associated pipings of crank case have been relocated.

b) HP Ammonia pump (P-1102-B)

Oil coolers/pumps at the pump are relocated to make space for movement of personnel on south side of the pump P-1102-C.

c) Carbamate pumps common discharge line has been replaced from 3" Sch 80 to 4" sch 160. Replacement is from individual pump discharge line joining point to HP Carbmate condenser. 3" size isolation valve on this line and check valve near HP Condenser is replaced with 4" size isolation valve and check valve.

d) Following control valves have been replaced :

- FICV-1204 (Carbmate to HP Scrubber)
- PICV-1201 (Ammonia to Autocalve)
- FRCV-1201 (Ammonia to HP Condenser)
- PRCV-1201 (HP Scrubber off-gas to LP Absorber)

e) Following new controls valve have been installed :

- HICV-1581 (Depressuring of 23 ata steam drum)
- PRCV-1501 (3.5 ata pressure control valve on steam export line)
- HICV-1481 (Pressure control valve on Pre-evaporater offgas line)
- FICV-1281 (Flow control valve to middle bed of V-1203)

f) Following safety relief valves have been replaced.

- RV-1102 (On top vapourline of NH3 suction vessel V-1103)
- RV-1209 (Off-gas entry to LP absorber V-1203)
- RV-1203 (Carbamate pump P-1201-A suction line)
- RV-1204 (Carbamate pump P-1201-B suction line)
- RV-1501 (On 3.5 Ata steam drum V-1501)
- RV-1502 (On 3.5 Ata steam drum V-1501)

g) Internals of following spray nozzles have been removed :

a) X-1201 - P-1200 A/B to H-1205-A
b) X-1202 - P-1352 A/B to H-1205-A

h) Control valve (HICV-1422-A) shifted from old poistion (from CCS-II line near urea solution heater H-1422-A, which has been isolated) to the by-pass line of CCSII to pre-evaporater H-1418-A.

i) Three platforms have been fabricated and erected.

- Shiftable platform near FICV-1204
- Fixed platform for HICV-1581
- Fixed platform for PRCV-1501

j) Old PRCV-1501 (14" size) alongwith 6" by-pass valve have been removed and replaced with 18" spool piece.

k) 6" by-pass line is erected around new PRCV-1501 (8" size)

l) 2" isolation valve & check valve installed on NH3-Water line to top bed of V-1203 (L.P.Absorber)

m) 2" size isolation valve and check valve installed on NH3-water line to middle bed of V-1203 (L.P.absorber)

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OFFSITE & UTILITY PLANT

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MECHANICAL JOBS

JOB CODE JOB DISCRIPTION

03 02 01 COOLING WATER PUMP P-4401/B:

OVERHAULING THE PUMP:

a) Rotating assembly was replaced by protective coated impeller rotor (Protective coating done by M/s.Avee Enterprise with Belzona Compound)

b) Journal bearing inspection done and general condition of bearing found O.K. Following are the clearances.

Free end side : 0.008"
Coupling side : 0.008"

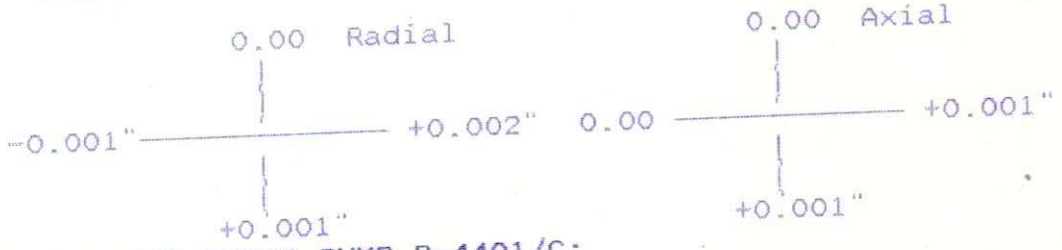
c) Cleaned the turbine side coupling and greasing done.

PARTS CHANGED:

1) Rotor assembly (duly protective coated with Belzona Compound).

2) Gland packing.

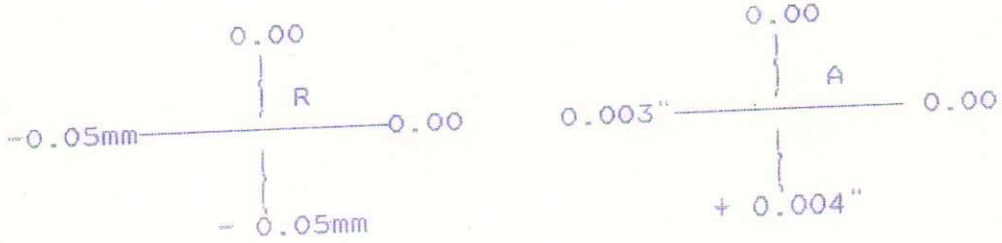
d) Aignment readings.



03 02 02 COOLING WATER PUMP P-4401/C:

a) Decoupled the coupling,cleaned and greasing done of pump coupling.

b) Alingment checked.



c) Journal bearing inspection done and general condition of bearing found O.K.Following are the clearances.

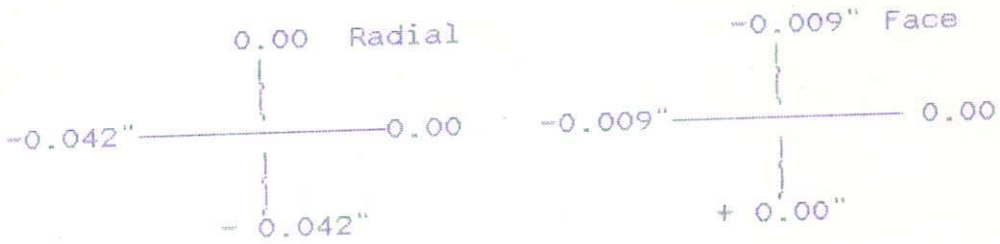
Free end side : 0.006"
Coupling side : 0.008"

d) Gland packing replaced.

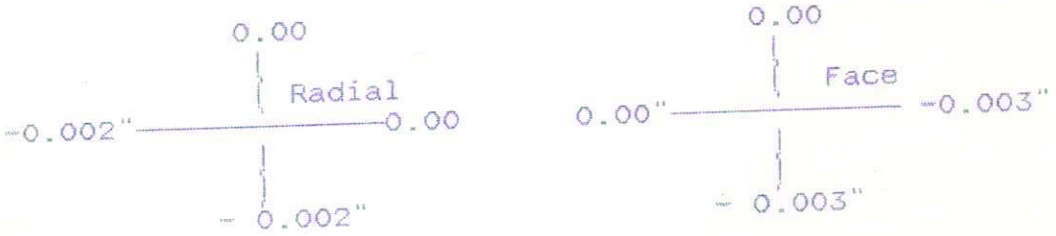
03 02 03 COOLING WATER PUMP P-4401/D:

a) Decoupled the coupling , cleaned and greasing done of pump coupling.

b) Alignment checked found misalignment as below.



Alignment reading.



c) Journal bearing inspection done and general condition of bearings found O.K. Following are the bearing clearance.

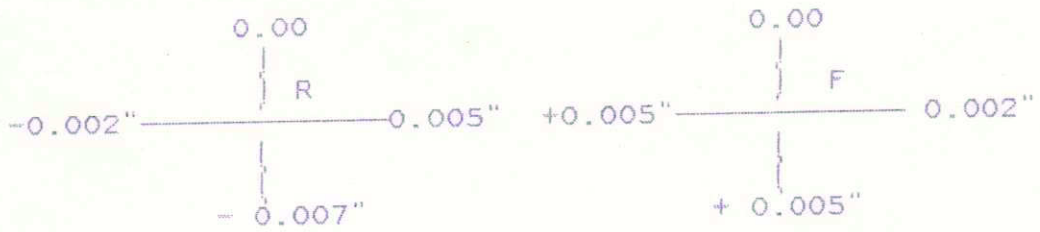
Coupling side : 0.17 MM
Free end side : 0.25 MM

03 02 04 COOLING WATER PUMP P-4401/E:

a) Decoupled the coupling, same of the sheems found broken of both sides of distance piece.

b) Bearing inspection done and general condition of bearings found O.K.

c) Alingment checked and found misalign, hence alingment done.



d) Parts changed :
1) Set of coupling sheems

03 02 05 COOLING WATER PUMP (STANDBY) TURBINE Q-4403:

1) All steam leak job attneded.

2) 4 Ata steam traps and its bypass line was modified for easy operation and maintenance.

03 02 06 AYR TURBINE Q-4411/A:

1) All steam leak jobs attended.

2) Old tapping of 4 ata steam line was removed from Q-4411 area.

03 02 07 BFW PUMP (TURBINE DRIVEN) P-5111:

Preventive Maintenance:

1) Bearing inspection done and general condition of bearing found O.K. Following are the clearance.

Coupling side	:	0.12 MM
Free end side	:	0.11 MM
Thrust	:	0.37 MM

2) Oil cooler opened, cleaned from tube side and boxed up.

3) Console oil drained, cleaned and fresh oil charged.

4) Coupling greasing done by B.R.B 100 grease after cleaning of coupling from inside.

JOB CODE JOB DISCRIPTION 148

03 02 08 **BFW PUMP TURBINE Q-5111:**

Preventive Maintenance

1) Bearing inspection done and general condition of bearing found O.K. Following are the clearance.

Coupling side	:	0.3 MM
Governor side	:	0.22 MM
Thrust	:	0.25 MM

2) Lube oil cooler opened,cleaned from both sides tube and shell side and boxed up. Oil console oil drained,cleaned and fresh oil charged.

3) Overspeed trip mechanisum checked and turbine overspeed tripped at 4750 RPM on 07/05/98.

03 02 09 **BFW PUMP (MOTOR DRIVEN) P-5112:**

Preventive Maintenance

(A) **BFW PUMP:**

1) Bearing inspection done & governor condition of bearing found O.K. Following are clearance.

a) Motor side	:	0.09 MM
b) Free end side	:	0.10 MM
c) Thrust	:	0.5 MM

2) Lube oil console oil drained, cover opened, cleaned and fresh oil charged.

(B) **GEAR BOX:**

1) Oil cooler opened,cleaned from tube side and shell side boxed up.

03 03 01 **F.D.FAN TURBINE Q-5113:**

1) Lube oil console oil drained,console cleaned and fresh oil charged.

2) Suction filter of Q-5113 cleaned and boxed up.

3) Clutch oil "Servo Transfluid-A" drained and replaced.

4) 60 ata inlet pressure gauge I/V gland repacked.

5) 4 ata P I isolation valve and 4 ata NRV's by pass valve gland repacked.

6) 60 ata steam to FD fan flow totaliser both root valves gland repacked.

JOB CODE JOB DISCRIPTION 149

03 14 01 **STEAM LEAK JOBS:**

All steam leak jobs attended as per Job Activities list.

03 15 01 **BOILER INSPECTION:**

BHEL BOILER F-5111 INSPECTION:

1) Boiler was inspected by Boiler Inspector in Open test condition, on 29/04/98. Hydrotest at 90 Kg/cm2 pressure on 02/05/98. All three relief valves were overhauled. Relief valve tested on 04/05/98 and their pressure setting readings were as follows.

	Poping pressure in Kg/cm2g	Reset pressure in Kg/cm2g
Drum front R.V.	72.0	67.0
Drum Rear R.V.	69.5	64.5
Superheater R.V.	65.5	62.0

2) Damper of burner made free and greasing done.

3) Dearetor inspection was done and found O.K. its trays and support found intack.

4) All dampners were made free by greasing.

03 15 02 **REGENERATIVE AIR HEATER H-5111:**

When Regenerative air preheater was in operation, suddenly it was jammed in night shift on 19/04/98. On opening of man holes and general inspection , followings were observed.

1) 1 No cold end basket air heater elements were found burned.

2) 3 Nos radial seal were found damaged.

3) Hot end side rotor main bearing found damaged. (Steel cage and outer race were broken in to nos.of pieces)

Following jobs were done

a) 1 No cold end basket (spare old basket) was replaced.
b) 3 Nos radial seal were replaced.
c) Both side rotor bearing changed.
Brg.No.22330 CCK/C3/W 33 (With withdrawal sleeve)
Lock nut & Lock washer No. AHX 2330

Procedure of bearing replacement

a) 4 Nos Jack hole covers opened (All four Jackhole covers are at bottom of the RAH casing)

b) Diaphragm area lined up with the centre of the jackhole opening by rotating the rotor (There is no draphragm provided at cold end side. Only one side hot end side diaphragm is provided)

c) 4 Nos 50 tonnes cap. Hydrolic Jack placed under the jacking ring and blocked up jacks until the jacking ring met the rotor.

d) Disconnected the union of water cooling system.

e) Bearing housing cover opened and bearing housing hold down bolts loosened.

f) All 4 Nos jacks were raised and relieved the one side bearing from rotor.

g) Removed the bearing by Jack bolt welding with outer and inner race.

h) Inserted the new bearing and boxed up the cover.

i) Repeated the activities "d" to "h" for replacement of other side bearing.

03 17 01 **COOLING WATER DISTRIBUTION VALVES:**

1) Cooling tower (Ammonia) top distribution valves overhauled.

2) Cooling tower (Urea) U-3 distribution valve replaced and other valves were overhauled.

03 20 01 **FABRICATION JOBS:**

1) Rerouting of C.w.inlet line of surface H-4411 was done.

2) Drinking water pump suction line from Row water tank was replaced.

3) Inter connection of D.M.water line 4" dia x Sch.10 from P-4209/A discharge line (D.M. Booster pump) to P-4202/P-4203 discharge line (D.M.Pump) was done.

OFFSITE & UTILITY PLANT

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INSPECTION JOBS

JOB CODE JOB DISCRIPTION

03 41 01 BHEL BOILER (GT-2068):

Visual inspection and ultrasonic thickness measurement of Steam drum, Mud drum, Furnace tubes and Deaerator were carried out.The following observations were made on each equipment.:

(1) STEAM DRUM:

i) All the internals & fittings were found intact in position.

ii) All the weld joints of shell and dished end were found free from any corrosion from inside.

iii) The shell had assumed blackish brown colouration from inside.

iv) In general, condition of steam drum was found satisfactory.

Ultrasonic thickness measurement was carried out.

(2) MUD DRUM:

i) The colouration of shell internal surface was found to be blackish brown.

ii) No sign of corrosion/pitting was observed on shell internal surface and weld joints from inside.

iii) The overall condition of mud drum was found satisfactory.

Ultrasonic thickness measurement was carried out.

(3) FURNACE:

i) Refractory was found damaged partially on the area surrounding both the burners.

ii) Refractory blocks found fallen from bank tubes near superheater coil.

iii) Furnace tubes,bank tubes and superheater tubes surface was found covered with dust,ash,flue gas deposits.

All the above findings were reported to Shift incharge, Utility for necessary corrective action.

Ultrasonic thickness measurement of side wall tubes,bank tubes,baffle wall tubes,primary and secondary superheater tubes,D-panel tubes,cut corner tubes was carried out.

(4) DEAERATOR:

i) Shell inside surface assumed to be brownish black.

ii) Internals of deaerator head and drum were found intact in position.

iii) Overall condition of vessel found satisfactory.

Ultrasonic thickness measurement was carried out.

03 41 02 Ultrasonic thickness measurement of the following pipelines was carried out.

(1) 60 ata steam line from New Boiler to Urea Plant

(2) Cooling water between new and old cooling tower

03 41 03 36" NB COOLING WATER JUMP OVER LINE:

The fabrication work of the above mentioned line was done by M/s DCPL, Delhi.The following inspection jobs were performed during fabrication.

a) Fit up check for all the joints.

b) DP test of root run welding.

c) Visual inspection of final welding.

d) 10 % radiography.

03 41 04 **CATION - I NEW VESSEL:**

The new Cation vessel was internally inspected before installation at site to examine the condition of the rubber lining. The condition of rubber lining was found satisfactory on visual inspection.Hardness of the rubber lining was observed to be 70-75 Shore-A, which was normal.

03 41 05 **NAPHTHA TANK T-3301/B:**

Visual inspection, internal painting inspection and ultrasonic thickness measurement of Naphtha Tank T-3301/B were carried out. In general the overall condition of the tank was found satisfactory. The shell was found free from any corrosion whereas the bottom plate of the tank was observed to have shallow pittings and corrosion scaling at scattered locations. The maximum depth of the pitting was observed to be approx. 1.5 MM.

THICKNESS MEASUREMENT:

Ultrasonic thickness measurement of the bottom plate, roof plate and the shell course No.1,2 and 3 counting from bottom was carried out. The following minimum thickness were observed :

On Bottom plate : 9.2 MM (Design thickness 10.0 MM)

On Top Roof : 5.8 MM (Design thickness 6.0 MM)

On Shell : First course : 14.9 MM

On Shell : Second course : 13.6 MM

On Shell : Third course : 11.6 MM

PAINTING INSPECTION:

Internal painting of the complete tank was carried out during shutdown by M/s.Nippon Paints Ltd,Mumbai. Thickness measurement of the Dry paint Film was carried out at different stages. Since the required dry film thickness was not available after the different coat applications on the shell and roof, the Engineers from M/s.Asian Paints Ltd were called for their inspection and supervision on the application of the additional coats after necessary surface preparation to avoid peeling of the paint film and better painting life. Finally, the painting was completed within acceptable DFT.

PLANT TURNAROUND - APRIL - MAY 1998

OFFSITE & UTILITY PLANT

CIVIL JOBS

154

JOB CODE	JOB DISCRIPTION

03 51 01 CIVIL JOBS:

(A) COOLING TOWER AREA:

1) R.C.C.Slab casting work for covering sump and channel of C.T.cell No.7 & 8 and also on channel between new and old C.T.cell.

2) 6 Nos. Wooden cover making for slab of channel and sump toilet

3) Fixing of Louvers in C.T.Cell and one side sheet near C.T.No.7

4) Fixing electric poles work done.

5) Covering connecting channel in-between NH3 cooling towers.

(B) WATER TREATMENT PLANT:

1) For levelling of floor on west side of Anion tank No.3 (Concrete dismentling and new R.C.c.worked out.)

2) Bitumastic lining on floor of water treatment plant covered area of Anion and Cations.

3) Making pipe supports.

(C) EFFLUENT TANK:

1) Dismentling of R.c.c.in strong effluent tank No.A & B for pit of new sunction pipe.

2) Making R.C.c.foundation for installing of new effluent pump.

3) Acid proof lining of new Pit and east side wall of strong effluent tank "A".

4) Acid proof lining of floor and on side on new instaled pump.

5) Gap filling of old effluent pump area and P.C.C.flooring area.

PLANT TURNAROUND - APRIL - MAY 1998

OFFSITE UTILITY PLANT

155

ELECTRICAL JOBS

JOB CODE JOB DISCRIPTION

03 61 01 ELECTRICAL JOBS :

01) Preventive maintenance of TMG/SIEMENS make LT ACBs installed in MCCs carried out. Damaged parts and worn out contacts replaced.

02) Preventive maintenance carried out on all feeder compartments mounted in following MCCs.

MCC-1, MCC-2B/2E, MCC-8, MCC-11, MCC-13
New AMF PCC, New AMF Aux. MCC.

03) Preventive maintenance of 11 KV Switch gear JYOTI/TMG/ KIRLOSKAR installed at 66 KV Switch yard, Old MPSS and New MPSS. Switch gears were inspected, cleaned. Nut, bolts were tightened and defective parts replaced.

04) Meggaring of C.T.s on 66 KV side was carried out.

05) Overhauling of following motors carried out :
P-5119, P-5117, H-5111

06) Terminal boxes of motors above 20 HP were checked for loose connection and burning of cable.

03 61 02 MOTOR TERMINAL BOX CHECKING :

EQUIPMENT NO.	FAULT OBSERVED AND RECTIFICATION
P-3701	OK
P-4101/1	OK
P-4101/2	OK
P-4101/3	OK
P-4204-A	INSULATION TAPING PROVIDED
P-4204-B	OK
P-5303	INSULATION TAPING PROVIDED

03 61 03 OFFSITES JOBS :

01) Preventive maintenance carried out on TMG/SIEMENS make LT ACBs installed in MCC and replaced damaged parts and worn out contacts.

02) Preventive maintenance carried out on all feeder compartments in MCC-3.

03) Terminal boxes of all motors above 20 HP were checked for loose connection and burning of cable.

JOB CODE JOB DISCRIPTION 156

03 61 04 MOTOR TERMINAL BOX CHECKING :

EQUIPMENT NO.	FAULT OBSERVED AND RECTIFICATION
P-3201-A	OK
P-3201-B	OK
P-3201-C	OK
P-3302-A	OK
P-3302-B	OK
P-3303-A	OK
P-3303-B	OK
P-3304-A	OK
P-3304-B	OK
P-3301-A	OK
P-3301-B	OK
P-3101	OK
P-3102-A	OK
P-3102-B	OK
K-4705-A	OK
K-4705-B	INSULATION TAPING PROVIDED
K-4701	OK
K-4702	INSULATION TAPING PROVIDED

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OFFSITE & UTILITY PLANT

157

INSTRUMENTATION JOBS

JOB CODE JOB DISCRIPTION

03 71 01 **NEW BOILER:**

1) **CONTROL ROOM INSTRUMENT:**

Overhauling and Calibration of following Receivers , Recorders was done. (cleaning of Flapper Nozzle, restriction,Orifice and Supply ports etc.).

(A) FR-3 / FR-4 (STEAM TO TURBINE SPRAY WATER FLOW)
(B) TRC-4 (DESUPER HEATER OUTLET TEMPERATURE)
(C) TRC-5 (OUTLET STEAM TEMPERATURE)
(D) FRC-11/PR-15 (AIR FLOW / FURNACE FLOW)
(E) LRC-2/FR-1 (DRUM LEVEL / FEED FLOW)
(F) PR-1/PR-2 (BFW PRESSURE BEFORE AND AFTER 100% CONTROL VALVE)

(G) LRC-3 (BLOW DOWN TANK LEVEL)
(H) FRC-1/FR-2 (FEED CONTROLLER / STEAM FLOW)
(I) FRC-21/FR-22 (FUEL OIL / GAS FLOW)
(J) 40 ata STEAM PRESSURE / RAW WATER TANK LEVEL RECORDER
(K) Servicing and calibration of all receiver guages of control room panel was done.

(L) Control room regulator overhauling and cleaning was done,also replaced bowl with new one.

(M) Checked calibration of following temprature indicators.

TRC-5,TI-14,TR-15,TR-13 TIA-6 YOKOGAWA RECORDER (TR - 30), TI-21,TI-11 & 12.

Following Receiver switches were checked for operation.

(1) PSL-7 , (2) PSL-2 , (3) LAL-3 ,(4) PSL-6,(5) PSL-8, (6) FSL-5111(7) FSL-11, (8) PAL-4, (9) FSL-2,(10) PSL-11 & PSH-12,(11) PSL-28(12) PSL-29(13) PAL-22
(14) PAL-23 (15) Provided new switch assy. for steam drum high level alarm.

2) **CONTROLLERS:**

Cleaned Orifice, Flapper-nozzle and Pilot and checked Synchronization and cascade and auto-manual switch of following controllers

(1) TRC-4 , (2) TRC-5 , (3) LRC-3/LRC-4 , (4) FRC-1
(5) FRC-11 (6) FRC-21 (7) LRC-2

(8) 40ata Steam presure controller (Replaced reset unit.)

(9) PRC-5 (STEAM HEADER PRESSSURE CONTROLLER)
(10) Dearetor Pressure Controller

Seal leakage in A/M switches in following controllers was checked.

(1) FRC-21, (2) FRC-11 (3) TRC-5, (4) FRC-1, (5) LRC-2, (6) PRC-5.

3) U.P.S.S SYSTEM:

Following checks were carried out in U P S S system and found O.K.

(a) Checked battery realiability by "Switching ON and OFF",charger for 15 minutes.

(b) Checked static switch operation.

(c) Checked/measured battery voltage.

03 71 02 FIELD INSTRUMENTS:

1) CONTROL VALVES:

a) Checking and Overhauling of following BTVs and all BTV Limit Switches was done.

(i) BTV No. 1-1 , 1-2 , 1-3 & BTV No. 2-1 , 2-2 , 2-3.

(ii) Following manual valve's Limit Switchs were checked.

(1) CCV-2 (2) GHTV (3) IGTV

b) Cleaning and stroke checking of the following control valves was carried out.

i) BTV-2 (2) PCV-2 (3) LRC-4 (4) PRC-50 (5) 30 % BFW CONTROL VALVE. (6) PCV-1 (7) TCV-1 (8) TCV-2 (9) PCV-2 (10) PICA-1 14 ATA STEAM PRESSURE. (11) HOHTV, (12) CCV - 21 (13) Boiler feed water by-pass control valve stroke checked. (14) Dearetor over flow control valve overhauling and checked its stroke.

c) Oil Temperature Control Valve (TCV) Removed from bonet, seat plug inspected it & fixed back

JOB CODE JOB DISCRIPTION 159

2) TRANSMITTERS:

Checked calibtration of following field transmitters.

(1) PIC-22, (2) FT - 1 ,(3) FT - 2 ,(4) FT - 2 (STEAM FLOW) , (5) FT - 4 (6) SPRAY WATER FLOW (7) STEAM FLOW TO BFW (8) FT - 11 COMBINED AIR FLOW (9) FT -21 FUEL OIL FLOW (10) DPT - 1 (11) DPT - 14 D.P.WIND BOX (12) PT - 4 & 5 STEAM PRESSUR (13) PT - 15 (14) LT-1 (Replaced Transmitter). (15) LT - 2

3) LEVEL SWITCHES:

Following Drum Level switches calibration checked.

LSLL - 1 Checked Operation, LAL - 2, LAH - 3, Leakage from welding joint Attended it Provided new gasket.

4) IGNITORS:

Checking and cleaning of Ignitor Gun and Spark Plug and also cleaning of Gas Solenoid valve of Ignitor of both burner No. 1 & 2.was done.

5) DAMPERS:

All dampers cleaning and overhauling was done and checked operation of following dampers.Damper's cylinders were painted.

(a) FD fan inlet damper and its valve positioner
(b) FD fan outlet
(c) Air heater inlet damper.
(d) Air heater outlet damper
(e) both fuel air damper and its valve positioner.

6) EYE-HYE (FOR DRUM LEVEL):

Checked terminals of eye-hye electrodes and replaced five nos corroded lugs.

7) TEMPRATURE INDICATOR:

BFW motor bearing temperature indicator was calibrated.

8) F.D.FAN:

Removed all instruments from FD fan to facilitate Mech. Maint.and after completion of all the jobs all the instruments were fixed back. Calibration of all PI was done. Provided new receiver gauge on FD fan Governor)

JOB CODE JOB DISCRIPTION 160

9) LSHS DAY TANK:

Installed and commissioned LSHS day tank self actuating temperature controlling system (Capital Job)

10) JUNCTION BOXES:

Painting of all Electrical Junction boxes in Field was done.All Electrical Junction boxes terminals tightening and cleaning of wires was done.Cleaning of all pneumatic junction boxes were done.

11) PRESSURE GAUGES:

Calibration of following Pressure Gauges were checked.

(a) PI- 2, (b) PI - 3, (c) PI - 4, (d) PI - 5,
(e) PI - 1, (f) 14 ATA Steam presssure, (g) checked calibration of BFW discharge Pressure gauge.

12) Oxygen Analyser:

Removed sample tube for cleaning of filter.Replaced filter.

Sensor filter cleaned with 7kg air. fixed sample tube back.

12) CALIBRATION OF FIELD CONTROLLER:

Cleaning and checking of synchronisation of following Field controllers.(440 R) was done.

(a) Oil Heater temperature controller.
(b) DPC-1 furnace pressure (fuel oil damper).
(c) Blow down tank LEVEL controller.
(d) PIC-1 & PIC-2 (e) TIC-1 (f) Oil pressure controller.

03 71 03 NH3 STORAGE:

a) Calibration of field transmitters and controllers was checked.

(1) PT-3002
(2) PT-3009
(3) PT-3008 Pneumatic
(4) PT-3008 Electronic
(5) PIC-3008 (440 R CONTROLLER)
(6) PT-3103
(7) PIC-3103 (RECEIVER CONTROLLER)
(8) LT-3002
(9) LT-3003
(10) FL-3050 A/B
(11) PT-3008

b) Checked following Pressure Switches and Level Switches.

(1) PS-3001 (2) PS-3002 (3) PS-3008
(4) PS-3009 (5) LAH-3001 (6) LAL-3001

c) Cleaning of Main Panel and PLC Panel was done.

d) All control valves of compressor A were cleaned and overhaued also checked all control valve stroke.

03 71 04 OLD BOILER:

1) PICV- 5151 Cleaned & overhaued control valve Positioner and checked stroke of control valve.

2) Shifted PICV-5151 controller from urea control room to New Boiler Control Room as per the requirement of urea production deptt.

3) Shifted DM Water to dearetor, Flow transmitter indication to new location as per the requirememt of Manager(Utilities).

03 71 05 COOLING TOWER:

1) Following transitters overhauling and calibration was checked.

(a) Basin Level Transmitter (b) Raw water tank level transmitter.

2) Checked stroke of control valves and Filled glands.

(a) PICV - 5153. (b) PICV -5154.

3) Raw water tank Level indicator(float type) was repaired as tank was emptied and taken in service.Painting of scale was done.

4) Checked Tachometers of P-4401B & P-4403 also cheched their connections in junction boxes.

5) Checked calibration of all pressure gauages and temprature indicators(THIs) of new cooling water turbine pump.

03 71 06 CHROMATE PLANT:

1) Cleaned Flapper nozzle and calibrated receiver recorders.

2) Cobined pH receiver recorder was calibrated.

JOB CODE JOB DISCRIPTION 162

3) Overhauled and calibrated following field Transmitters

(a) Weak Effeleunts Tx.(b) Strong Effeleunts Tx.

4) Relocation & tubing of weak effluent Transmitter was done.

5) Sample line for Ammonia analyser was laid and fabricated from sump to Effluent treatment control room.

6) Installed Ammonia analyser in Effluent control room and commissioned.

03 71 07 D.M. PLANT:

1) Cleaned Orifice and Flaper nozzle and calibrated following receiver recorders and controllers.

(a) M-1 Tank level recorder
(b) SMB-4 / Cation-5 flow recorder
(c) DM-1 flow recorder / C.T. make up flow recorder
(d) Raw water to D.M. water flow / D.M. flow recorder
(e) D.M.-3 flow recorder
(f) D.M.Water/NH4OH tank level/NAOH Flow recorder
(g) D.M. tank level /D.M.-4 flow recorder
(h) Overhauling Six Nos. of Control Room air regulators was done.

2) Cleaned flapper nozzle, relay of following transmitters and checked their Calibration.

(a) Cation-1,2,3,4,5
(b) DM - 1,2,3,4,5
(c) PMB - 4 DM flow
(d) SMB-4 DM water flow
(e) FT - 53 Cation regeneration flow
(f) FT - 1 Raw water to DM Plant.
(g) FT - 2
(h) FT - 3
(i) Boiler feed water make up,
(j) DM water flow for NAOH flow
(k) ANION - 5 , NH4OH flow ,
(l) FT - 51
(m) DM Water flow for NH4OH preparation ,
(n) Drinking water flow
(o) FT - 52 NH3 flow for NH4OH preparation
(p) Steam flow to Turbine
(q) Dilution water flow
(r) Raw water to cooling Tower
(t) HCL measuring tank,(M1) level transmitter.

3) Calibrated HCL loading/unloading transmitter.Relocated the transmitter and carried out necessory changes in impulse lines .

JOB CODE JOB DISCRIPTION 163

4) Overhauled and checked calibration of following Receiver Controllers

(a) LT - 4102 CT make up
(b) De-Cation water
(c) LIC 4104 Degaser receiver Controller
(d) Raw water pressure controler.

5) Installed 4 nos.of flow measuring devices on Anion outlet lines, consisting of orfice assy., smart Transmitters,and counters.also commissioned the system.

6) Cleaning of all conductvity cells and also provided lug on cell terminals.

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OFFSITE & UTILITY PLANT

164

TECHNICAL DEPARTMENT JOBS

JOB CODE	JOB DISCRIPTION

03 81 01 **TECHNICAL DEPTT. JOBS:**

UTILITY

a) LSHS day tank temperature control valve provided to control oil temperature in the range of 80 - 95 deg.C.

b) 14 Ata to 4 Ata let-down hooked-up in 4 ata steam header going to LSHS storage area for heating and tracing during plant shutdown.

c) 80 NB interconnection line provided inbetweeb P-5114 and P-5115/A. Pump's strainer to facilitate online strainer cleaning.

d) Tapping of 25 NB size x 4 Nos taken for Ammonia injection to BHEL Boiler.

OFFSITE PLANT:

a) Taken 40 NB tapping in dry ice plant for CO2 gas from Urea plant.

PLANT TURNAROUND - APRIL - MAY 1998

B & MH PLANT

MECHANICAL JOBS

JOB CODE	JOB DISCRIPTION

04 03 01 RECLAIM MACHINE M-2116:

a) Reclaimer link conveyor gear box attended for gear box oil seal replacement of worm shaft and worm wheel outer end.

b) Replaced the coupling bushes & bolts of link conveyor gear box.

c) Replaced all gear boxes oil.

d) Replaced the gear box coupling bushes.

e) Attended swing pinion and hub replacement job with new set of shear pins.

f) Checked and attended the gear boxes coupling alignment.

g) Complete greasing done.

h) 4 Nos of reclaimer chain scraper blade replaced.

i) Main drive assembly chain side outer bearings checked and attended for proper fixing of bearing caps with new studs and nuts.

j) The skirit rubber replacement of link conveyor belt attended.

k) Boom point skirit rubber replaced 25 FT long,duplex type.

l) Replaced the main drive chain.

m) Main drive shaft needle roller bearings at chain side replaced.

n) Bucket elevator shaft needle roller bearing at chain side replaced.

04 21 01 PLANT TRANSFER CONVEYOR M-2110 :

a) Fabrication of structure on head pulley for lifting facility.

b) Reconditioning of head pulley shaft at coupling portion.

c) Replacement of MPG 75 bearings on pulley shaft.

d) Replacement of FC-10 flexible coupling assyembly with key on pulley and gear box.

e) Replacement of complete gear box assembly 7 FSM 40 : 1

f) Repairing of motor to gear box drive coupling with new coupling bolts and rubber bushes, & did alignment.

g) Proper alignment done.

h) Replacement of guide roller at either side.

i) 10 Meter 800 MM wide conveyor belt added in place of damage portion of conveyor and 2 Nos new joints vulcanised.

j) Complete greasing done in all points.

k) Replacement of skirit rubber at tail end.

l) Reinforcement of foundation frame of gear box.

m) Pulley hood devided in 2 parts for easy removal.

04 21 02 FRESH UREA SHUTTLE CONVEYOR M-2112:

a) Replacement of FC-9 coupling on gear box and pulley side with rubber bushes.

b) Replacement of FC-7 coupliing on motor to gear box with coupling bolts and rubber bushing.

c) Reinforcement of gear box foundation frame.

d) Gear box attended for replacement of oil seals and noisy operation.

e) Skirit rubber at tail end replaced.

f) New clip joint made on conveyor belt by removing damaged portion of belt.

g) Tripper gear box coupling bush replaced and greasing done.

h) Replaced the defective guide roller at both sides.

i) Belt alignment done for its proper centre operation.

j) 4 Ply 600 MM wide Cotton belt added about 125 ft long in place of damage 3 ply belt & 3 Nos of joints Vulcanised.

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04 21 03 RECLAIM CONVEYOR M-2117:

a) Attended all rollers to make them free.

b) Attended belt for 1 No new joint vulcanising.

c) attended gear box and motor side coupling for bushes replacement.

04 21 04 BAGGING FEED CONVEYOR M-2121:

a) Attended gear box for oil seal and oil replacement.

b) New FC-16 coupling replaced on pulley and gear box shaft.

c) Replaced the rubber bushes of motor and gear box coupling.

d) Proper alignment done at both side of couplings.

e) New coupling bolts fitted in FC-16 coupling alongwith rubber bushings.

f) Complete greasing done in pillow block bearings at drive end.

g) Both side skirit rubber replaced.

h) Replaced 18 Nos of return rollers after reconditioning.

04 21 05 BAGGING HOPPER FEED CONVEYOR M-2122:

a) Gear box attended for replacement of motor side coupling and coupling bolts.

b) Gear box foundation attended for proper reinforcement by putting extra thick M.s.plate on frame.

c) Shirit rubber replacement done at tail end.

d) Tripper attended for coupling bolt and bush replacement.

e) Guide rollers and return rollers made free.

04 21 06 TRANSFER TOWER DUST CONVEYOR M-2137:

a) The new gear box assembly NU-4 replaced in place of FSM-4 old model gear box after fabrication of new foundation strucutre.

b) Attended all rollers to make them free.

c) Attended all grease points for lubrication.

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B & MH PLANT

CIVIL JOBS

JOB CODE	JOB DISCRIPTION

04 51 01 CIVIL JOBS:

1) Epoxy painting on R.C.C.surface of slab,colums, and beams at hopper floor, Bag stitching floor of Bagging plant.

2) Epoxy painting completed in conveyor belt.

3) Epoxy painting of R.C.C. slabs , beams , walls of transfer tower of bagging plant.

4) Bitumastic lining of hopper floor.

5) epoxy monolythetic plaster on packer floor.

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ELECTRICAL JOBS

JOB CODE	JOB DISCRIPTION

04 61 01 ELECTRICAL JOBS :

01) Preventive maintenance on TMG/SIEMENS/L&T make ACBs carried out. Damaged parts and worn out contacts replaced.

02) Preventive maintenance on all feeder compartments mounted in the following MCCs carried out :

MCC-4, MCC-4A, MCC-9 and L&T make new MCC.

03) Overhauling of following motors carried out.

M-2116, M-2112

04 61 02 MOTOR TERMINAL BOX CHECKING :

EQUIPMENT NO.	FAULT OBSERVED AND RECTIFICATION
M-2121	INSULATION TAPING PROVIDED

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INSTRUMENT JOBS

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JOB CODE	JOB DISCRIPTION

INSTRUMENT JOBS:

04 71 01 Provided New 1/2" S.S.Air header (7 Kg/cm2) and checked leakage for shift room.

04 71 02 Calibration of all the packer scales 1,2,3,4,7,and 8 was done.

a) Checked load-cell cables,junction boxes and measured m/volt O/P.

b) Checked Dataponds and cleaned its socket of packer scale Nos.1,2,3,4,7 and 8.

c) Cleaned all the keyboard and display and checked their operation for all dataponds.

d) Checked the load cells of all the six packer scales.

e) Checked all the RIC card of all the control panels of M/cs.

f) Checked all the solenoid valve operations of all the packer scale Nos.1,2,3,4,7 and 8.

g) Checked all the lamp indicators of all the packer scales.

h) Checked all the relays of all the packer scales operation wise.

i) Tightened all the terminal strip of packer scale Nos.1,2,3,4,7 and 8.

j) Cleaning and painting of Tolerence reset panel and Loadcell JBS.

k) Painting of all local junction boxes, all the packer scale panels and solenoid boxes was done.

l) Cleaned all the handswitches and checked it.

m) Checked all proxy switches.

n) Over hauling and calibration of libra weigh scale indicator was done by M/s.Weldeal Technicians (10 Nos)

o) Painting of all Libra weigh scale Platform.

p) J.R.S.L. M/C 1 & 2 cleaning and checking was done.

q) Provided new hand s/w assemblies in 3 nos. of machines.

r) Provided lamp indication on hopper floor with panel to sack hold lamps.

04 71 03 40 MT ELECTRONIC WEIGH BRIDGE:

a) Cleaned electronic head, pit, linkage assy. platform.

b) Calibration of weigh bridge was carried out.

c) The job was done by the Engr./Tech. of M/s.Gujarat Scales Rep.of M/s.Ashbee, New Delhi.

04 71 04 30 MT " LIBRA " ELECTRONIC WEIGH BRIDGE:

a) Cleaned electronic head, pit, linkage assy., platform.

b) Painting of load cell junction boxes was done.

c) Calibration of weigh bridge was carried out.

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B & MH PLANT

TECHNICAL DEPARTMENT JOBS

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JOB CODE	JOB DISCRIPTION
04 81 01	TECHNICAL DEPTT.JOBS:

a) The discharge chute of Silo shuttle conveyor M-2114 was replaced by a new modified discharge chute with enhanced cross sectional area. Also the chute has been now made one way instead of earlier two way.