

**Residual Life Assessment
and
Life Extension Programme
In Power Boilers
of Captive Power Plant of NALCO**

**By
R.S.DAS, Chief Manager (MECH),CPP,NALCO**

BRIEF ABOUT NALCO

(National Aluminium Company Ltd)

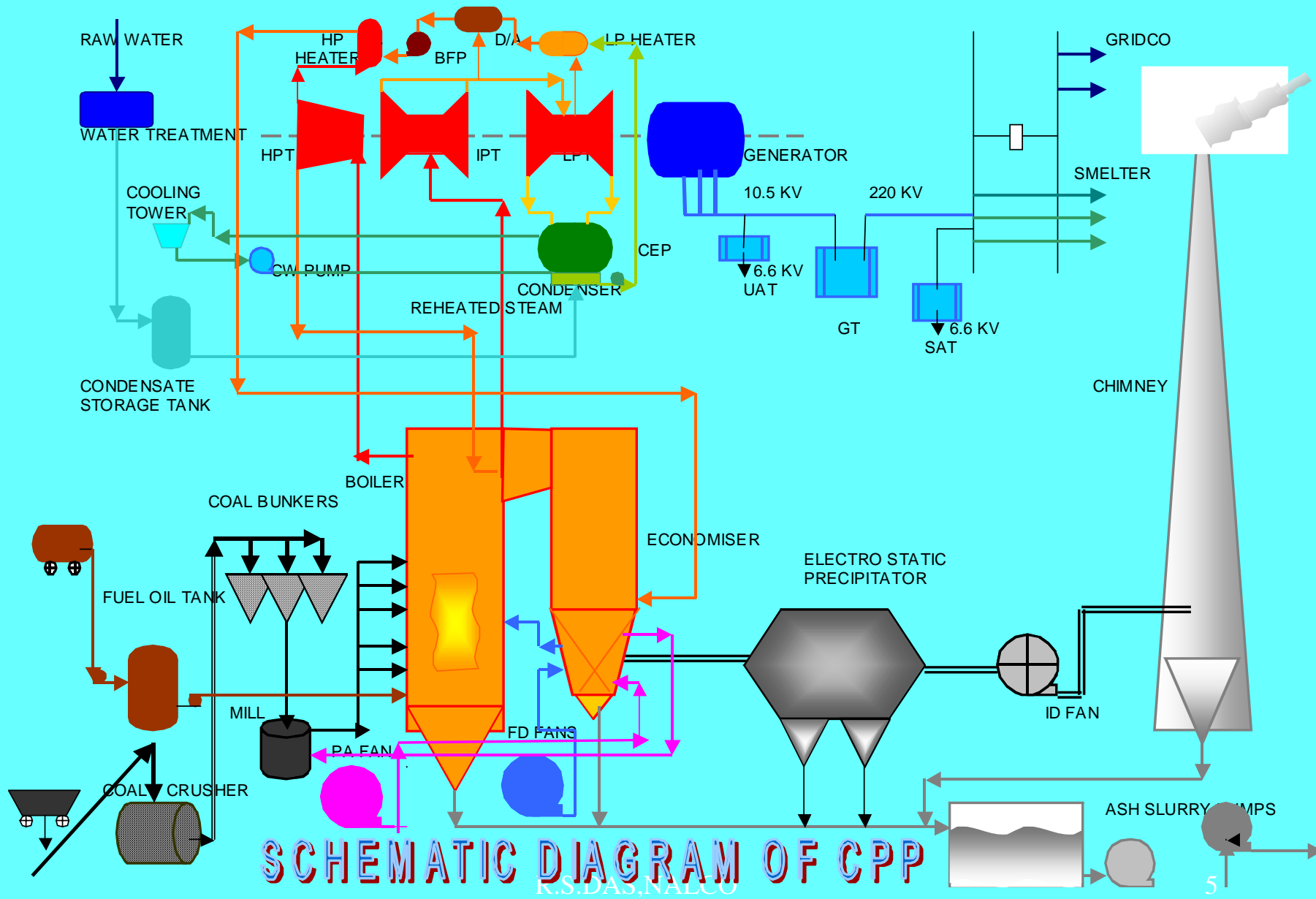
National Aluminium Company is an integrated aluminium producing Public Sector Company under Govt . Of India with Bauxite Mines, Alumina Refinery Plant, Smelter Plant, Captive Power Plant and Port Facility situated at different locations of Orissa and Andhra Pradesh .

PRESENT STATUS OF THE COMPANY

- METAL PRODUCTION CAPACITY: 3.45 lakh tones per annum
- NO OF METAL PRODUCING POTS: 720
- POWER CONSUMED BY THE POTS : 576 MW
- POWER GENERATING CAPACITY : $8 \times 120 = 960$ MW
- BOILER CAPACITY: 430 T/HR (unit-1 -6),
390T /HR(unit-7 & 8)
- BOILER TYPE:
BALANCED DRAFT,NATURAL CIRCULATION,PULVERISED COAL,
CORNER FIRED,WATER TUBE,REHEAT TYPE



120 MW X 8



SCHEMATIC DIAGRAM OF CPP

K.S.DAS, NALCO

Requirement of Residual Life Assessment Study (RLA)

- **To assess the present condition of the boiler pressure parts**
- **To assess the remaining life of the Boiler Pressure parts**
- **Statutory requirement as per IBR regulation “391A”**

RLA Study of Boiler is a statutory requirement as per regulation "391A" of "Indian Boiler Regulation-1950", which says:-

1. The Boilers which are operating at a temperature of 400°C & above including utility or industrial boilers & all boiler parts operating in the creep range of boiler shall be non-destructively tested as per Table-1, after they are in operation for 1,00,000 hours for assessment of the remnant life of parts.
2. The parts of a boiler when it completes a life of 25 years are to be tested as per Table-2 for assessment of remnant life of such parts. If results are acceptable as per the standards laid down by the Central Boiler Board, a certificate shall be issued by the Chief Inspector of Boilers for extending the life of boiler for a further period of 10 years or such less period as recommended by the Remnant Life Assessment Organisation. The remnant life shall be carried out thereafter every five years by approved parties by the Central boiler board.

PURPOSE OF RLA STUDY

- **Evaluation of present condition of pressure parts & piping**
- **Avoiding premature pressure parts failures and associated unforeseen outages**
- **Identification of problem areas**
- **Analysis of root cause of problems**
- **Estimation of balance life of pressure parts**
- **Providing technically sound and viable proposal for implementation**

RLA STUDY IN CAPTIVE POWER PLANT, NALCO

UNIT	YEAR
2(part RLA of RH)	1997
1	2000
2	2003
3	2004
4	2004
5	2005
6	2009(DUE)
7	2015(DUE)
8	2016(DUE)

Methodology adopted for Residual Life Assessment in NALCO, CPP By M/S BHEL

- **Review of the past data**
- **Field Visual and dimensional inspection**
- **UT**
- **DP**
- **Hardness Measurement**
- **Replication for Metallography**
- **Inside oxide scale thickness measurement**
- **Video Scopic Examination**
- **Tube Sampling**
- **Laboratory testing**
- **Recommendation and life prediction**

- ❑ TIME PERIOD FOR THE STUDY : 10 TO 12 DAYS
- ❑ PRELIMINARY REPORT SUBMITTED IMMEDIATELY AFTER THE STUDY
- ❑ THE FINAL REPORT WITH RECOMMENDATION SUBMITTED WITHIN 5 TO 6 MONTHS TIME.
- ❑ TEAM MEMBERS : 12 INCLUDING ONE TEAM LEADER

Tests Done during RLA Study of our Boilers

- **High temperature headers & piping**
 - **Ultrasonic, dye-penetrant tests**
 - **Video scope, Replication**
 - **Other inspections like**
 - **Dimensions,**
 - **Internal inspection**
 - **Insitu hardness**

Tests Done during RLA Study of our Boilers (Cont.)

- **Superheater & reheater tubes**
 - Tube samples, ultrasonic test
 - OD & Thickness
 - Deposit Analysis
 - Steam side oxide scale thickness
 - Life prediction
- **Attemperators**
 - Ultrasonic, dye penetrant tests
 - Replication, hardness
 - Fiber optics

Tests Done during RLA Study of our Boilers (Cont.)

- **Furnace & convection pass tubes**
 - Tube sampling, ultrasonic test
 - Deposit analysis (Internal & External)
- **Drums & downcomers**
 - Ultrasonic, dye-penetrant tests
 - MPI (Wet fluorescent & Dry)
 - Video scope

Tests Done during RLA Study of our Boilers (Cont.)

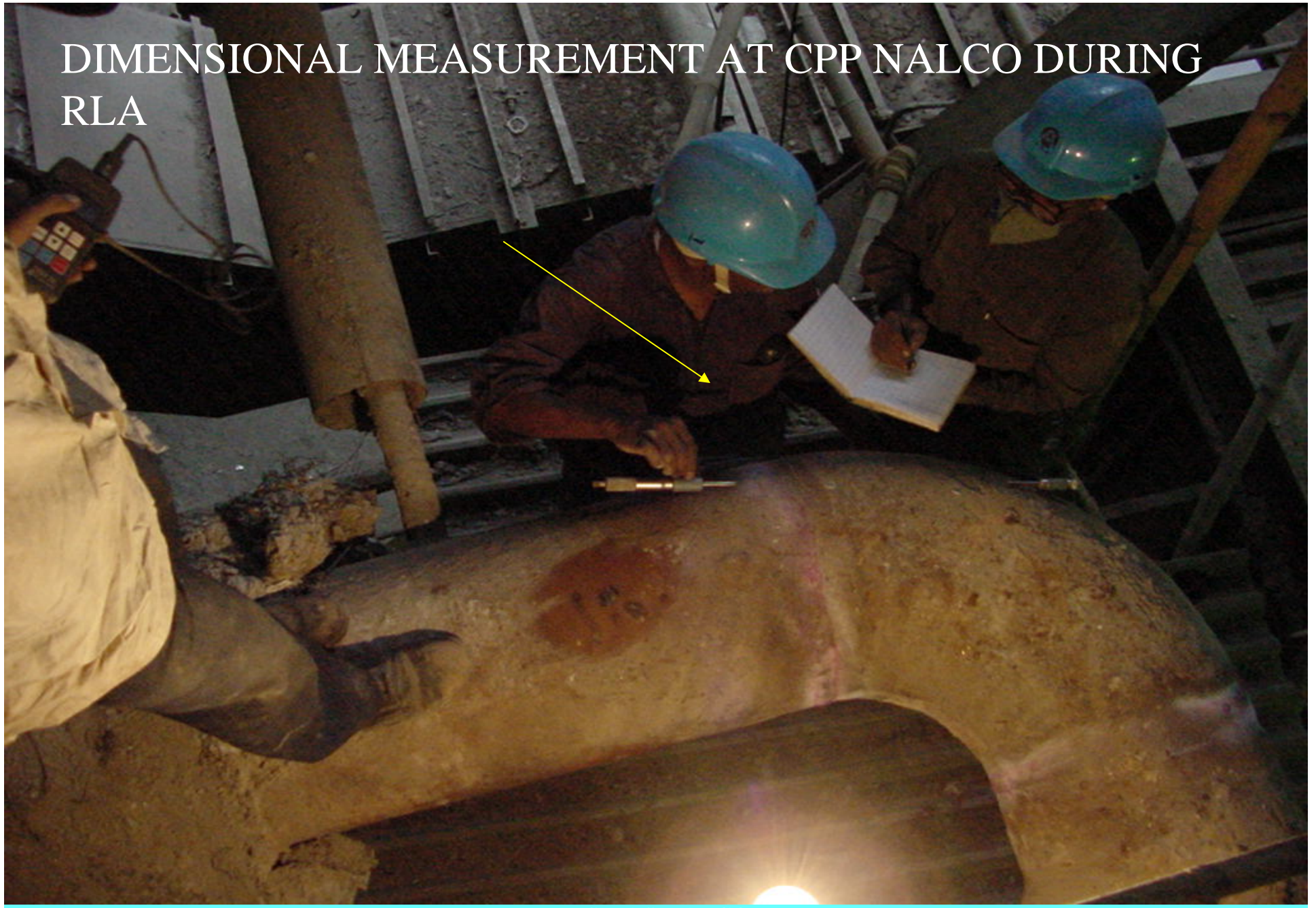
STEAM PIPING(MS,CRH,HRH & FW)

- Visual Inspection
- Replication, Insitu Hardness
- OD & thickness
- Hangers & Supports Inspection

General guidelines for selecting inspection points

- High turbulence or velocity
- Condensation points
- Dead ends & high stressed points
- Areas immediately downstream of chemical injection points
- All supports

DIMENSIONAL MEASUREMENT AT CPP NALCO DURING RLA



DP TEST ON CRITICAL PIPING JOINTS AT CPP ,NALCO



DRUM INSPECTION AT CPP,NALCO



**HANGER
CHECKING AT
CPP ,NALCO**



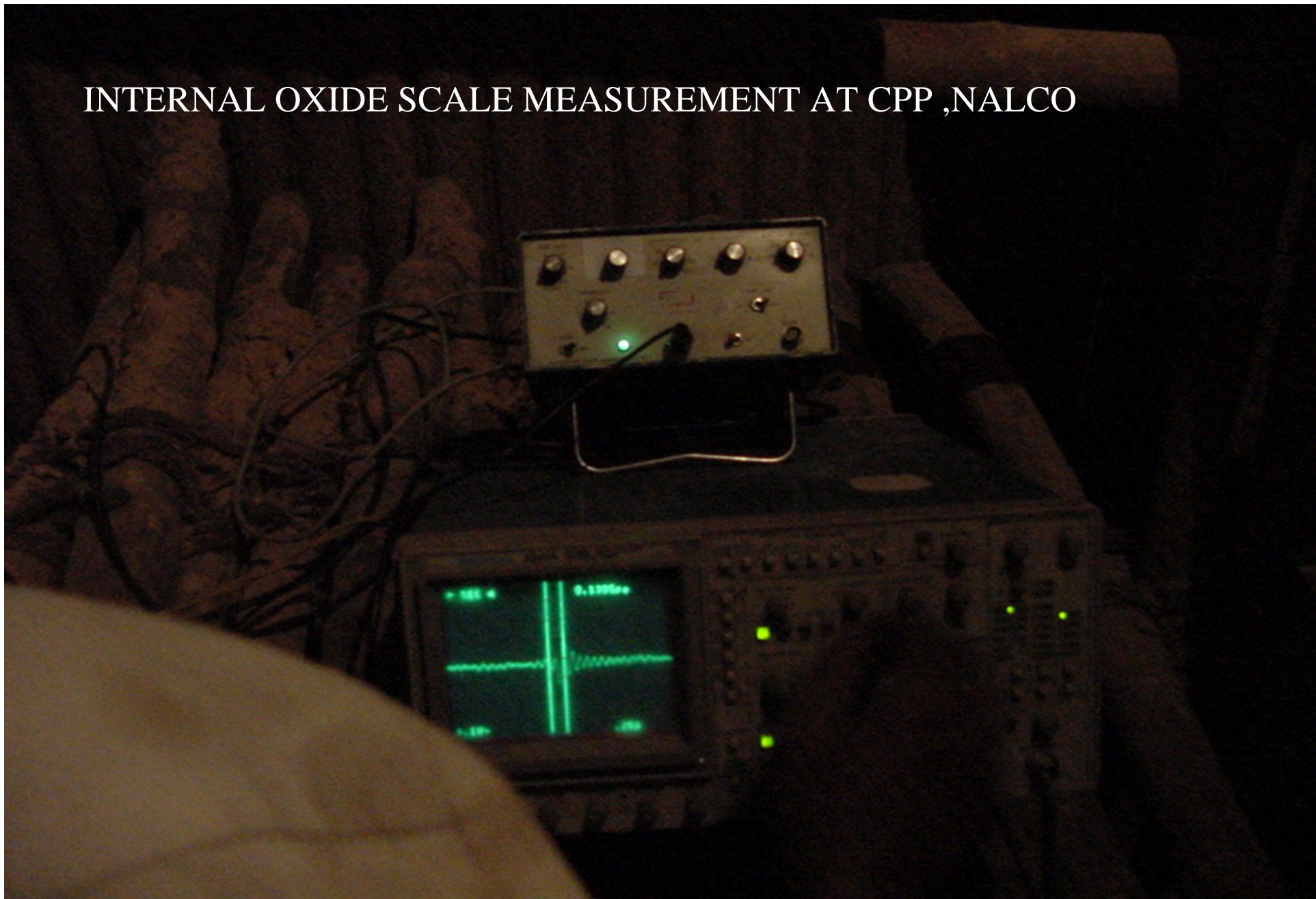
IN SITU REPLICATION ON MS PIPE



**MICROSCOPIC EXAMINATION DURING REPLICATION
AT CPP ,NALCO**



INTERNAL OXIDE SCALE MEASUREMENT AT CPP ,NALCO



IOT AT CPP ,NALCO

PROBE

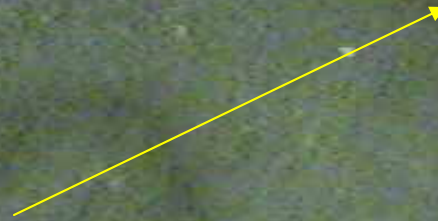
VIDEO SCOPE AT CPP BOILER ,NALCO

BOTTOM RING
HEADER



**VIDEO SCOPE OF
SH HEADER**

STUB



TUBE SAMPLING AND LABORATORY TESTING

● TUBE SAMPLES WERE COLLECTED FROM DIFFERENT ZONES OF OUR BOILERS FOR LABORATORY TESTING

1. WATER WALL- 04 NO
2. PLATEN SH- 02 NO
3. CRH- 02
4. RH INTER BANK-02
5. HRH-02
6. LTSH-02
7. ECO-01

Laboratory testing included the following

- ❑ Visual Examination
- ❑ Dimensional measurement
- ❑ Chemical composition analysis
- ❑ Flattening test for water wall tubes
- ❑ Hardness measurement
- ❑ Steam side oxide scale thickness measurement
- ❑ Micro examination of all the tube samples and insitu replicas (30 no) for spheroidisation level of PM,WELD &HAZ and creep level(PM only)
- ❑ Internal deposit analysis of water wall tubes and Boiler Drum
- ❑ Creep rupture testing for rupture life of Platen SH & RH coil tubes

General Recommendations Format of RLA FOR CPP, NALCO BY BHEL

- ▶ **Residual life of RH and SH coil tubes**
- ▶ **Creep and Spheroidisation level of pressure part components**
- ▶ **Parts needing replacements**
- ▶ **Parts needing repairs**
- ▶ **Chemical cleaning advice & procedure**
- ▶ **Advice on water regimes**
- ▶ **Future plans of tests**
- ▶ **Modifications required for life extension**
- ▶ **Any other specific observations**

INTERNAL DEPOSIT ANALYSIS

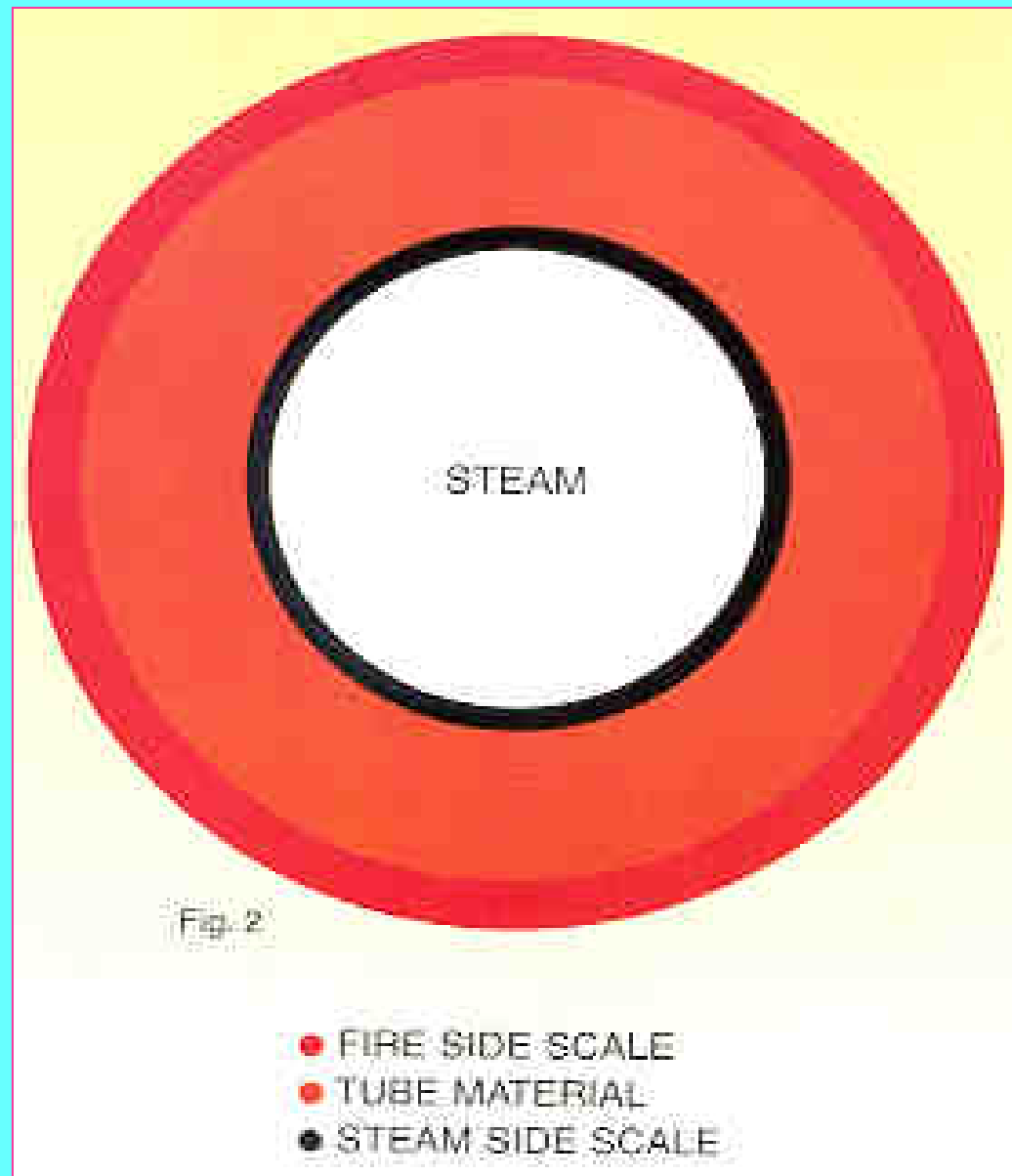
The internal deposit analysis of water wall and Drum (quantity and composition) were done for all the units .

Norms of our OEM (BHEL)

- < 15 mg/cm² – Clean
 - 15-40 mg/cm² – Moderately clean
 - >40mg/cm² – Very dirty
- ➡ All our boilers were found in the moderately clean zone after the deposit analysis.
- ➡ No immediate chemical cleaning was recommended.

Life Prediction Techniques Used

- **By using appropriate damage parameter**
- **Using strain measurements**
- **Post exposure testing**
- **Using Steam Side Oxide scale thickness**



Life prediction based on Oxide Scale Thickness Analysis

✚ The steam side oxide scale thickness are measured at critical locations in the high heat flux zone and near the bottom bends of the super heater and re heater coils.

✚ These values are used as inputs to computer-based software BHELMOLT which accurately calculates the tube metal temperatures for the entire cross-section of tubes and calculates the residual life .

Oxide Scale Thickness Analysis

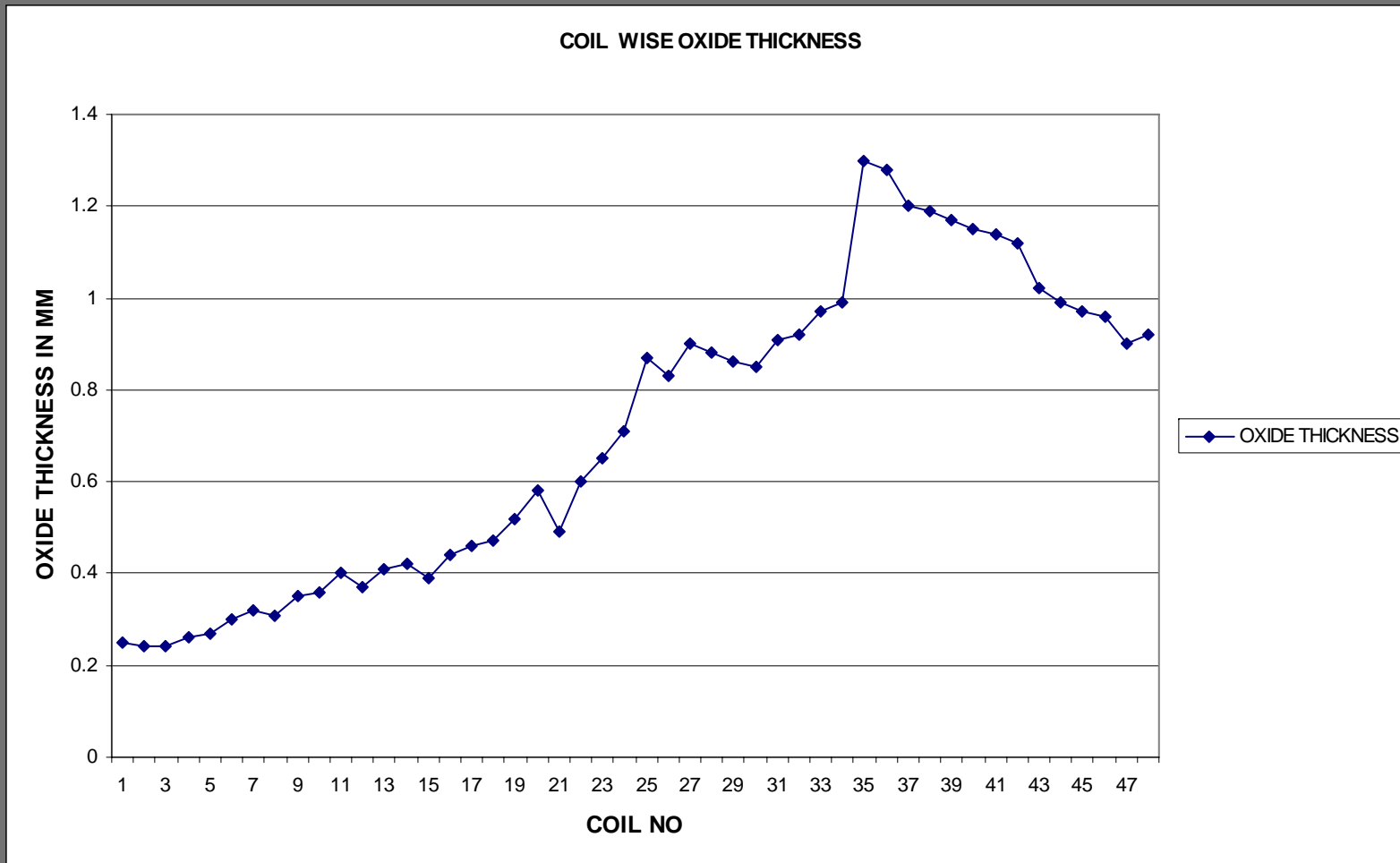
DATA INPUT TO THE SOFTWARE

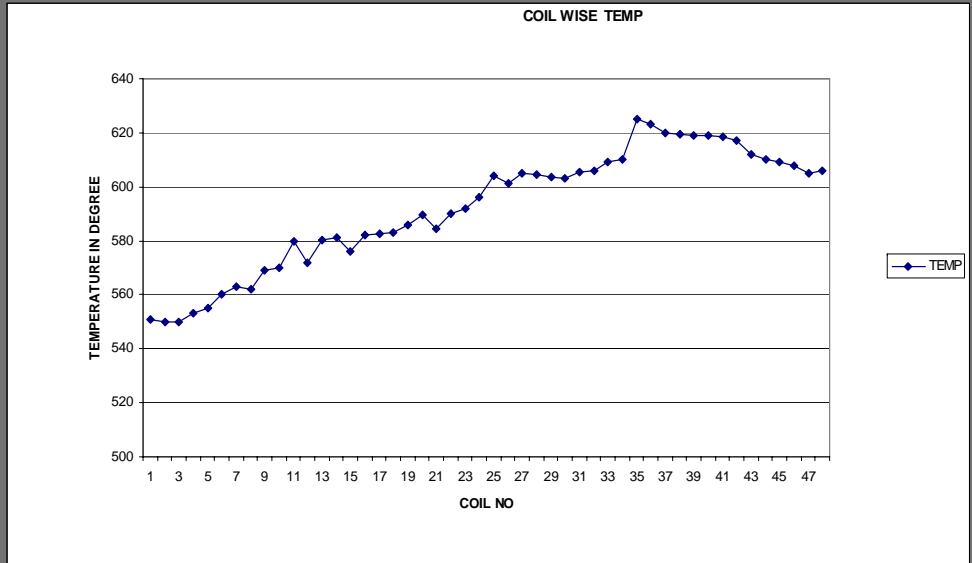
- ✚ ORIGINAL TUBE OD
- ✚ ORIGINAL TUBE THICKNESS
- ✚ MATERIAL
- ✚ SERVICE HOURS
- ✚ PRESSURE
- ✚ OXIDE SCALE THICKNESS
- ✚ MINIMUM TUBE THICKNESS
- ✚ MINIMUM TUBE OD

OUT PUT

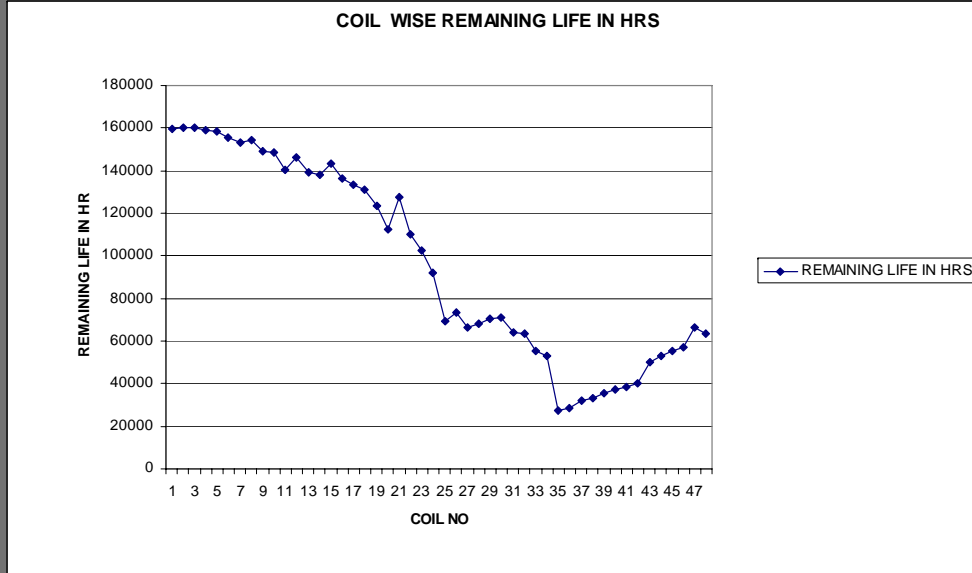
- **TOTAL RUPTURE LIFE**
- **REMAINING LIFE**

COILWISE OXIDE SCALE THICKNESS OF REHEATER





COIL WISE SERVICE TEMP.



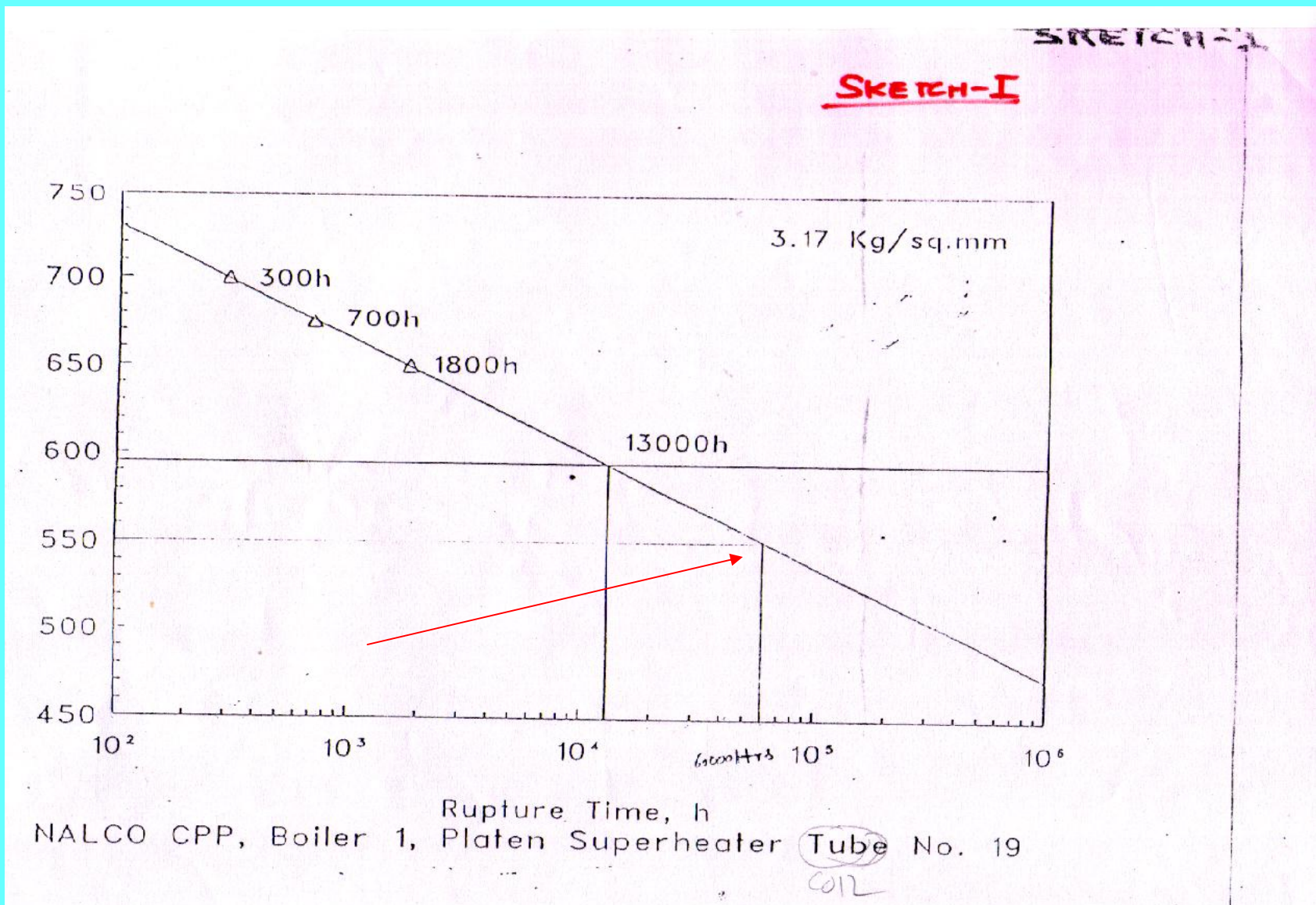
COIL WISE REMAINING LIFE.

POST EXPOSURE TESTING

The sample tubes, removed from Boiler SH and RH are subjected to burst tests at accelerated temperature and service pressure in the hot burst rig facility available at BHEL's laboratory. The pressure and temperature are controlled very accurately.

To predict the remaining life from the results of stress rupture tests, the following methods are adopted.

1. Parametric extrapolation
2. Application of Life fraction rule



EXTRAPOLATED LIFE OF SH COIL

LIFE PREDICTION

LIFE PREDICTION OF OUR RH AND PLATEN SH TUBES WAS DONE BASED ON INSIDE OXIDE SCALE THICKNESS MEASUREMENT.

- IN UNIT-2 , 37 NO RH COILS WERE REPLACED IN 2001 BASED ON LIFE PREDICTION DONE IN 1997.
- IN UNIT-1 , 34 NO RH COILS WERE REPLACED IN 2005 BASED ON LIFE PREDICTION DONE IN 2000.
- IN OTHER UNITS THE PREDICTED LIFE OF RH AND SH COILS ARE AS BELOW.

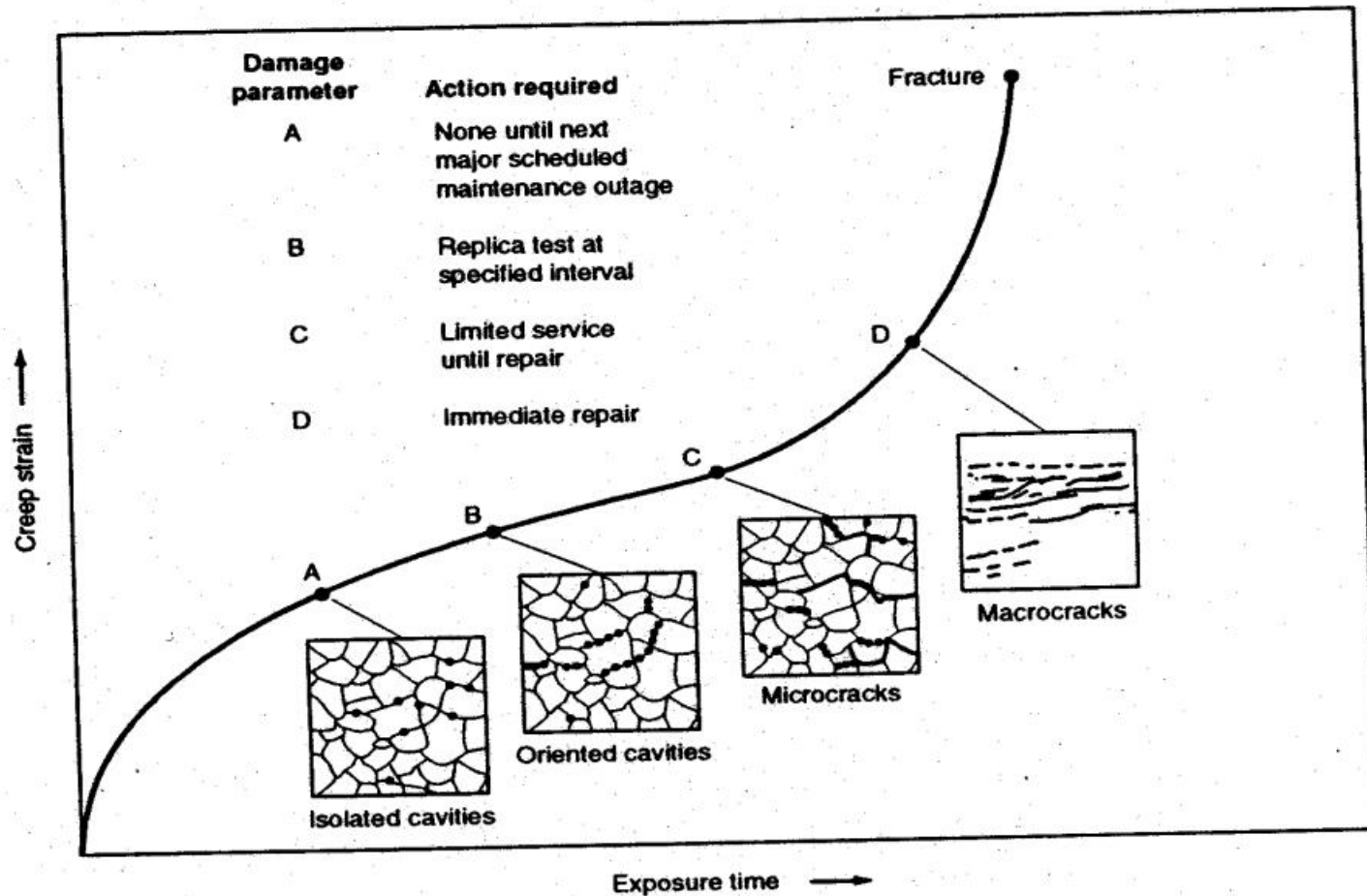
PREDICTED LIFE OF RE HEATER TUBES

DESCRIPTION	PREDICTED LIFE
UNIT-3 RH AND PLATEN SH COIL TUBES	MORE THAN 1 LAKH HOUR
UNIT-4 PLATEN SH	MORE THAN 1 LAKH HOUR
UNIT -4 HRH coil Coil 30 fifth ckt rear	54,500 Hrs
Unit-4 HRH Coil 32 fifth ckt rear	47,500 Hrs
Unit-4 HRH Coil 33 fifth ckt rear	56,500 Hrs
Unit-4 all other RH coils	MORE THAN 1 LAKH HOUR
Unit-5 HRH Coil 22 fifth ckt rear	59,100 Hrs
Unit-5 HRH Coil 31 fifth ckt rear	56,100 Hrs
Unit-5 HRH Coil 33 fifth ckt rear	66,100 Hrs

PREDICTED LIFE OF SUPER HEATER TUBES

DESCRIPTION	PREDICTED LIFE
UNIT-1 PLATEN SH COIL TUBES	MORE THAN 2 LAKH HOUR
UNIT-2 PLATEN SH COIL TUBES	MORE THAN 1 LAKH HOUR
UNIT-3 PLATEN SH COIL TUBES	MORE THAN 1 LAKH HOUR
UNIT-4 PLATEN SH COIL TUBES	MORE THAN 1 LAKH HOUR
UNIT-5 PLATEN SH COIL TUBES	MORE THAN 1 LAKH HOUR

Creep Cavity Level Classification System Proposed by Wedel & Neubauer



CREEP AND SPHEROIDISATION LEVEL

- #THE CREEP AND SPHEROIDISATION LEVEL OF ALL THE PRESSURE PARTS WERE ANALYSED BY BHEL EXPERTS.**
- #NO MAJOR ABNORMALITIES WERE FOUND IN MOST OF THE CASES.**
- #ONLY IN UNIT-3 ISOLATED CREEP CAVITIES WERE OBSERVED ON THE GRAIN BOUNDARIES OF MS PIPE LINE . BHEL SUGGESTED FOR RE-EXAMINATION AFTER THREE YEARS WHICH IS TO BE DONE IN 2008.**

SUMMARY OF THE OBSERVATIONS OF RLA STUDIES OF DIFFERENT UNITS

SL N O.	AREA OF THE BOILER PR PARTS	UNIT # 1 (OR-369)	UNIT #2 (OR-370)	UNIT # 3 (OR-372)	UNIT # 4 (OR-382)	UNIT # 5 (OR-397)	UNIT # 6 (OR- 513)	UNIT # 7 (OR- 696)	UNIT # 8 (OR- 713)
01.	RLA Study of Boiler after 1,00,000 Hrs. of Operation	Done in August' 2000	Done in December' 2003	Done April' 2004	Done in July' 2004	Done in June- 2005	Not due (runnin g hrs < 100000)	Not due (runnin g hrs < 100000)	Not due (runnin g hrs < 100000)
02.	Boiler Drum - Visual -Insitu Replica -Hardness -UT -DP - Deposit analysis	No specific recommendatio n and found o.k	No specific recommendatio n and found o.k	No specific recommendatio n and found o.k	No specific recommendatio n and found o.k	No specific recommendatio n and found o.k	NA	NA	NA
03.	Water Wall -Visual -Sampling(internal deposit and hydrogen embrittlement) - Dimensions (OD & thickness)	No specific recommendatio n and found o.k	No specific recommendatio n and found o.k	No specific recommendatio n and found o.k	No specific recommendatio n and found o.k	No specific recommendatio n and found o.k	NA	NA	NA

SL. NO	AREA OF THE BOILER PR PARTS	UNIT # 1 (OR-369)	UNIT #2 (OR-370)	UNIT # 3 (OR-372)	UNIT # 4 (OR-382)	UNIT # 5 (OR-397)	UNIT # 6 (OR-513)	UNIT # 7 (OR-696)	UNIT # 8 (OR-713)
04.	Eco Coils; - Visual -Dimensional checks, -Sample check for metallography	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	NA	NA	NA
05.	Low tem Header (Eco in and out, Bottom ring header); - Visual -Fibrovision Inspection -Hardness -DP -Dimensions	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	NA	NA	NA
06.	LTSH Coils; - Visual - Hardness -Dimensional checks, -Sample check for metallography	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	NA	NA	NA

SL. NO	AREA OF THE BOILER PR PARTS	UNIT # 1 (OR-369)	UNIT #2 (OR-370)	UNIT # 3 (OR-372)	UNIT # 4 (OR-382)	UNIT # 5 (OR-397)	UNIT # 6 (OR-513)	UNIT # 7 (OR-696)	UNIT # 8 (OR-713)
07.	LTSH Outlet Header (SHH – 9); - Visual -Fibrovision Inspection -Insitu Replica -Hardness -UT -DP -Dimensions	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	NA	NA	NA
08.	SH Inlet Header (SHH – 10); -Fibrovision Inspection -Insitu Replica -Hardness -UT -DP -Dimensions	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	NA	NA	NA

SL. NO	AREA OF THE BOILER PR PARTS	UNIT # 1 (OR-369)	UNIT #2 (OR-370)	UNIT # 3 (OR-372)	UNIT # 4 (OR-382)	UNIT # 5 (OR-397)	UNIT # 6 (OR-513)	UNIT # 7 (OR-696)	UNIT # 8 (OR-713)
09.	SH Outlet Header (SHH – 11); -Fibrovision Inspection -Insitu Replica -Hardness -UT -DP -Dimensions	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	NA	NA	NA
10.	Platen SH Coil -IOT Measurement -DP -Dimension check, -Samples for Creep rupture & Metallography Test. - Hardness	Predicted life : > 2,00,000 hrs	Predicted life : > 1,00,000 hrs	Predicted life : > 1,00,000 hrs	Predicted life : > 1,00,000 hrs.	Predicted life : > 1,00,000 hrs.	NA	NA	NA
11.	Desuperheater :- -Fibrovision Inspection. -Insitu Replica -Hardness -UT -DP -Dimension check	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	NA	NA	NA

SL. NO	AREA OF THE BOILER PR PARTS	UNIT # 1 (OR-369)	UNIT #2 (OR-370)	UNIT # 3 (OR-372)	UNIT # 4 (OR-382)	UNIT # 5 (OR-397)	UNIT # 6 (OR-513)	UNIT # 7 (OR-696)	UNIT # 8 (OR-713)
12.	Reheater Inlet Header (RHH – 1) -Fibrovision Inspection -Insitu Replica -Hardness -UT -DP - Dimensions	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	NA	NA	NA
13.	Reheater Outlet Header (RHH – 2) -Fibrovision Inspection -Insitu Replica -Hardness -UT -DP - Dimensions	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	NA	NA	NA
14.	Reheater Coil :- -IOT Measurement -Samples for Creep rupture & Metallography Test -Dimension check. -Hardness	Replacement of Reheater Coils (25 - 48) from Interbank outlet to HRH outlet header; (RLA :- 2000, Aug) . Action taken : Reheater Coils (15 - 48) from Interbank outlet to HRH outlet header were replaced in May –2005.	Predicted life: i) Front coils > 95,000 hrs ii) Rear coils > 1,00,000 hrs	Predicted life : > 1,00,000 hrs	Predicted life : 1. > 1,00,00 for all coils except HRH coil 30,,32,33 in the fifth ckt rear. 2. Coil 30 fifth ckt rear- 54,500 hrs, 3. Coil 32 fifth ckt rear- 47,500 hrs 4. Coil 33 fifth ckt rear- 56,500 hrs,	Predicted life : 1. > 1,00,00 for all coils except HRH coil 22,31,33 in the fifth ckt rear. 2. Coil 22 fifth ckt rear- 59,100 hrs, 3. Coil 31 fifth ckt rear- 56,100 hrs 4. Coil 33 fifth ckt rear- 66,100 hrs,	NA	NA	NA

R.S.DAS,NALCO

SL. NO	AREA OF THE BOILER PR PARTS	UNIT # 1 (OR-369)	UNIT #2 (OR-370)	UNIT # 3 (OR-372)	UNIT # 4 (OR-382)	UNIT # 5 (OR-397)	UNIT # 6 (OR-513)	UNIT # 7 (OR-696)	UNIT # 8 (OR-713)
15.	a) MS Pipe line :- -Insitu Replica -UT -DP -Dimension checks.	No specific recommendation and found o.k	No specific recommendation and found o.k	Reexamination in 2008	No specific recommendation and found o.k	No specific recommendation and found o.k	NA	NA	NA
	b) HRH Pipe line :- -Insitu Replica -UT -DP -Dimension checks.	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	NA	NA	NA
	c) CRH Pipe line :- -Insitu Replica -UT -DP -Dimension checks.	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	NA	NA	NA
	d) MS Pipe line from MS-1 & MS-2 up to Turbine stop valve. -Insitu Replica -UT -DP - Dimension checks.	No specific recommendation and found o.k	No specific recommendation and found o.k	Reexamination in 2008	No specific recommendation and found o.k	No specific recommendation and found o.k	NA	NA	NA
	e) HP Bypass Pipe line -Insitu Replica -UT -DP -Dimension checks.	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	No specific recommendation and found o.k	NA	NA	NA

S L. N O	AREA OF THE BOILER PR PARTS	UNIT # 1 (OR-369)	UNIT #2 (OR-370)	UNIT # 3 (OR-372)	UNIT # 4 (OR-382)	UNIT # 5 (OR-397)	UNIT # 6 (OR-513)	UNIT # 7 (OR- 696)	UNI T # 8 (OR - 713)
	f) Feed water Pipe line -Insitu Replica -UT -DP -Dimension checks.	No specific recommenda tion and found o.k	No specific recommenda tion and found o.k	No specific recommenda tion and found o.k	No specific recommen dation and found o.k	No specific recommen dation and found o.k	NA	NA	NA
16	RLA Study of Boiler after 1 lakh hrs of Operation	DONE	DONE	DONE	DONE	DONE	2009	2015	2016
17	Compete RLA Study of Boiler after 25 Years of Operation	2008	2009	2009	2009	2010			

BENEFITS OF RLA STUDIES IN CPP NALCO

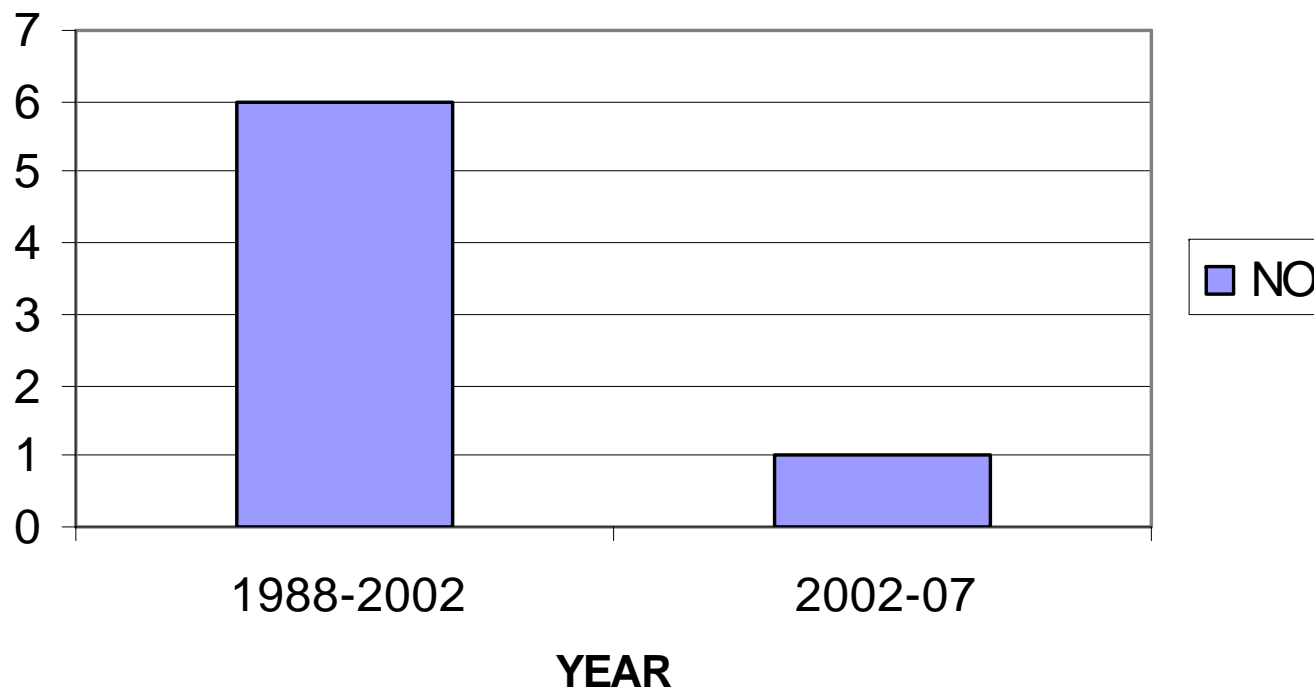
- A THOROUGH CHECK OF ALL THE PRESSURE PARTS, CRITICAL PIPE LINE AND HANGER SUPPORTS COULD BE MADE.
- THE SPHEROIDISATION LEVEL AND CREEP LEVEL OF THE PRESSURE PARTS INCLUDING THICK WALLED COMPONENTS LIKE DRUM, ALL HEADERS, PIPE LINES COULD BE ASSESSED.
- THE LIFE OF THE PLATEN SUPER HEATER AND REHEATER TUBES COULD BE PREDICTED.
- THE DEPOSIT INSIDE AND OUT SIDE OF THE TUBES COULD BE ANALYSED.
- THE CONDITION OF THE HANGERS COULD BE ASSESSED AND REMEDIAL ACTION COULD BE TAKEN.
- CORRECTIVE AND PREVENTIVE MEASURES LIKE TIMELY REPLACEMENT OF RH COILS IN UNIT-1 (34 NO) AND 2 (37 NO) COULD BE INITIATED.
- PLANT AVAILABILITY HAS BEEN INCREASED BY TIMELY REPLACEMENT OF PRESSURE PARTS.
- OPERATING PARAMETERS ARE NOW BETTER CONTROLLED AND TEMPERATURE EXCURSIONS ARE ELEMENATED.

EXPENDITURE FOR RLA STUDIES IN CPP NALCO

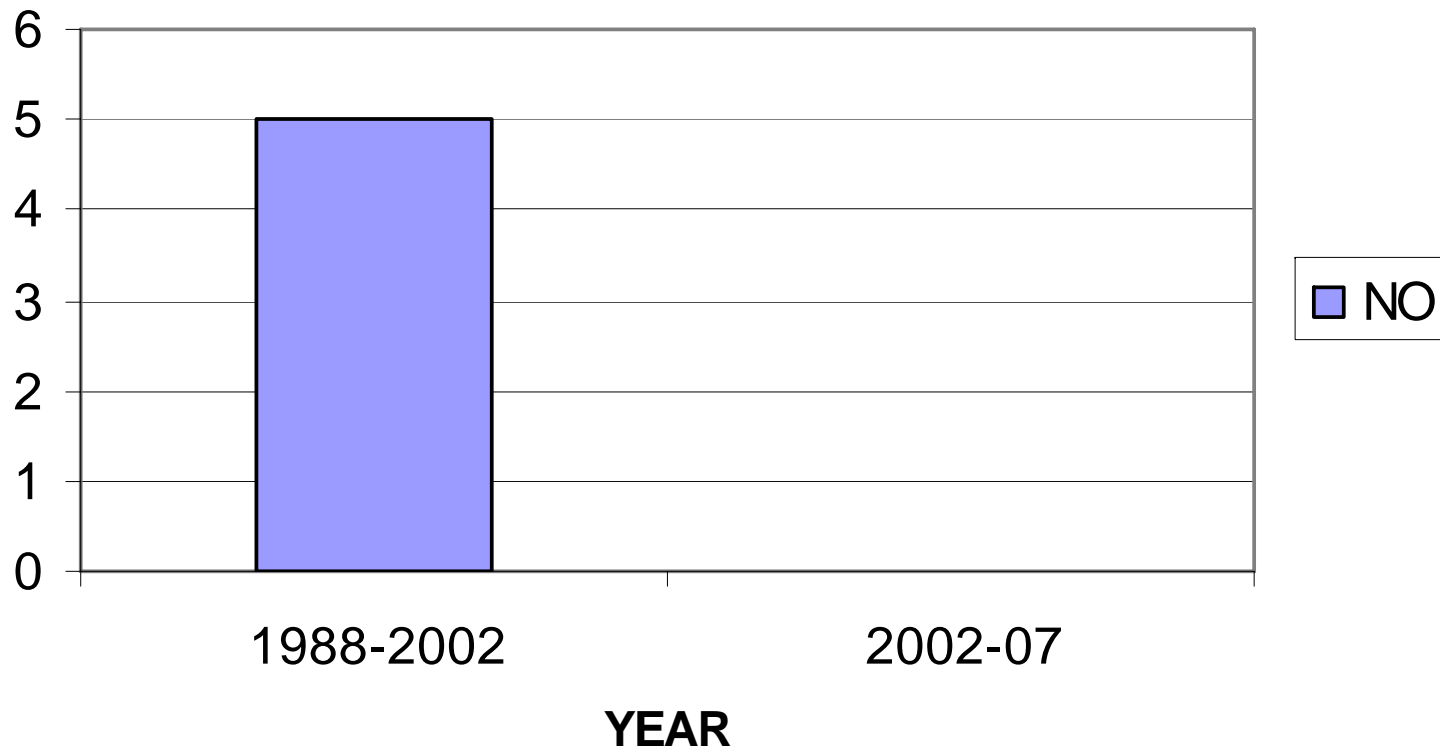
(VALUE OF THE CONTRACTS ON BHEL)

- UNIT-1 : 20.5 LAKH
- UNIT-2 &3 : 20.5 LAKH X 2
- UNIT-4 &5 : 20.00 LAKH X 2

RH TUBE FAILURE IN UNIT-2



RH TUBE FAILURE IN UNIT-1



LIFE EXTENSION MEASURES IN THE BOILERS OF NALCO CAPTIVE POWER PLANT

1. FITMENT OF PROTECTIVE SHIELDS IN EROSION PRONE AREAS LIKE ECONOMISER TUBES , BENDS AND LOW TEMPERATURE SUPER HEATER HEADERS, SCREEN TUBES, WATER WALL "S" PANEL (TOP OF QUENCHING NOZZLE)

2. FITMENT OF 6 MM SS RODS IN THE BURNER PANEL TUBES TO DIVERT THE SECONDARY AIR THUS PREVENTING EROSION

3. GANGING OF ECONOMISER COILS TO MAKE ECO COIL SPACING UNIFORM.

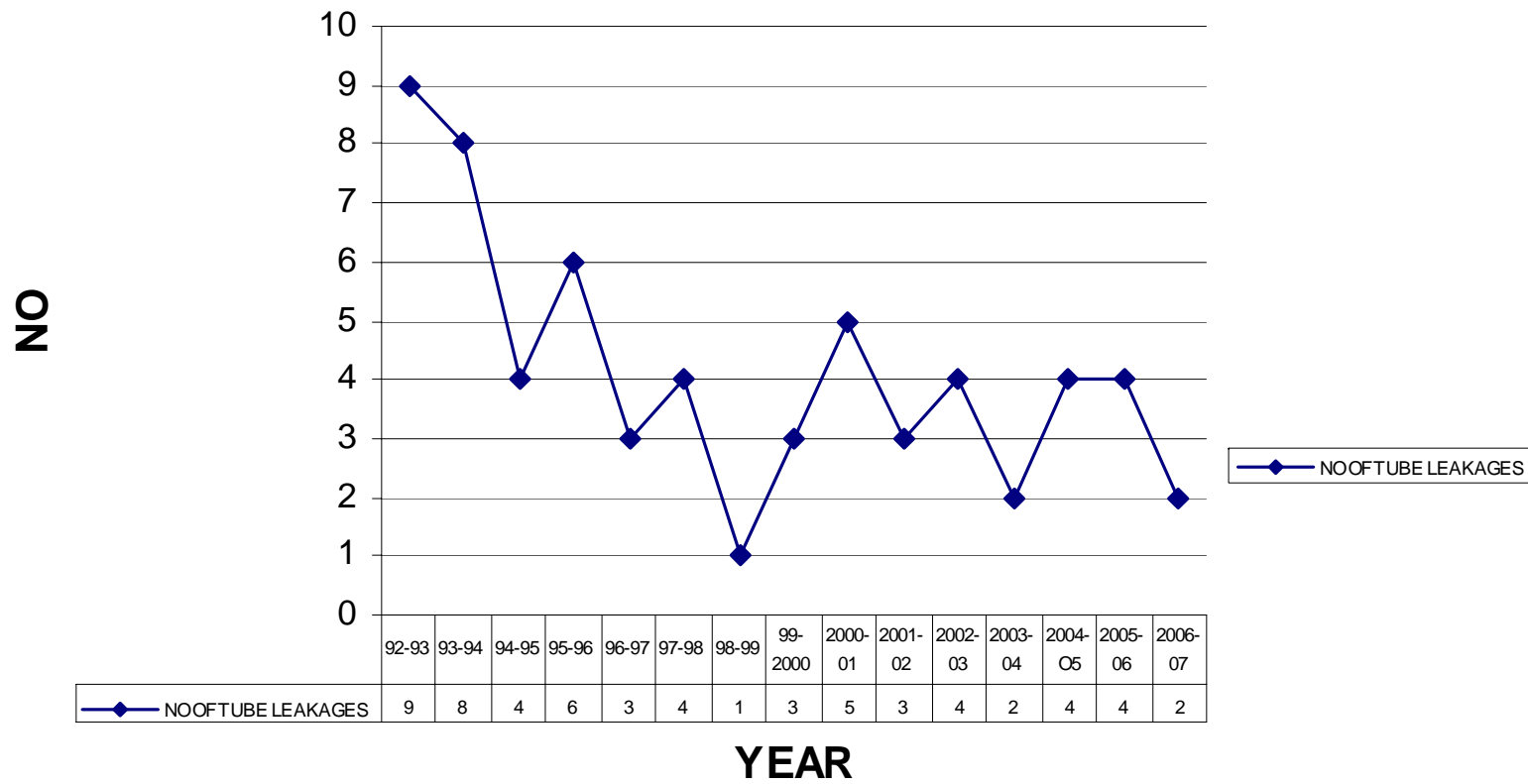
4. REPLACEMENT OF TUBES ON THE BASIS OF THICKNESS MEASUREMENT

5. SETTING SOOTBLOWER STEAM BLOWING POSITION 7MM MORE THAN THE DESIGNED VALUE TO MINIMISE STEAM EROSION

6. REPLACEMENT OF REHEATER TUBES ON THE BASIS OF VISUAL INSPECTION OF "FIRE SIDE" OXIDE SCALES AND THICKNESS CHECKING OVER A LONGER SPAN OF THE TUBES(NEAR TO THE ROOF)

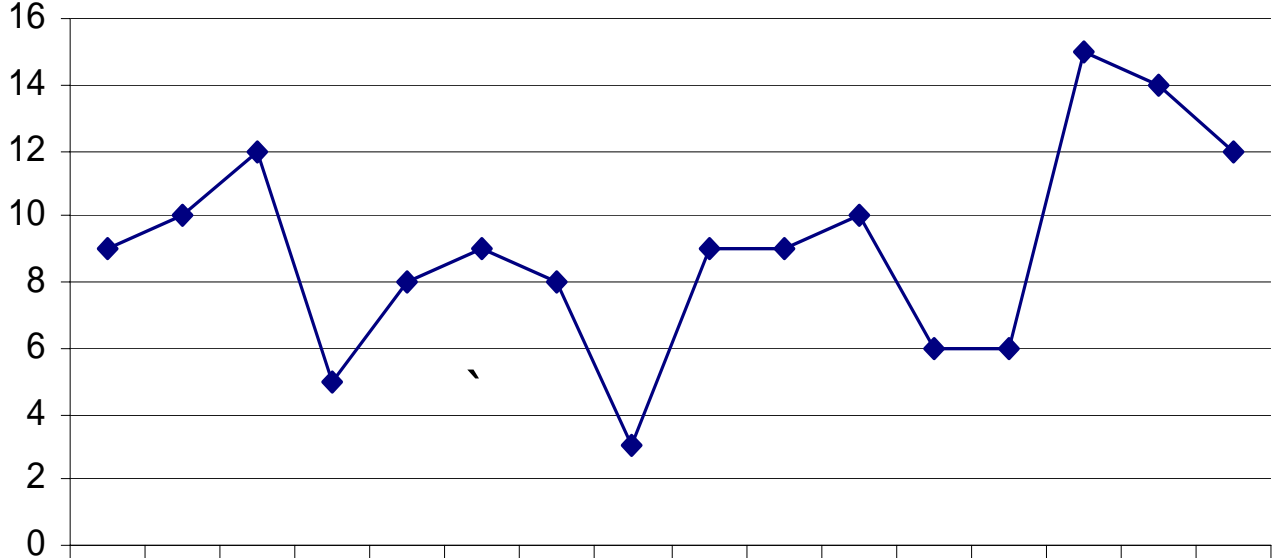
7. METAL SPRAYING(TAFA) WAS TRIED OVER SOME EROSION PRONE PRESSURE PARTS EXPERMENTALLY.

TREND OF TUBE FAILURES DUE TO ASH, SEC AIR, STEAM EROSION UPTO 31.3.2007



TREND OF TUBE FAILURES IN BOILER

NO



	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
NO OF FAILURES	9	10	12	5	8	9	8	3	9	9	10	6	6	15	14	12

YEAR



NO OF FAILURES

OUR FUTURE PLANNING

- ➡ INSIDE OXIDE SCALE THICKNESS MEASUREMENT OF RE HEATERS & SUPER HEATERS DURING ANNUAL OVERHAULING SO THAT REPLACEMENT CAN BE DONE ON REGULAR BASIS TO REDUCE BREAK DOWN.
- ➡ INTERNAL CORROSION MAPPING OF BOILER TUBES
- ➡ METAL SPRAYING OVER EROSION PRONE AREAS
- ➡ RLA OF BOILERS WHICH HAVE RUN FOR MORE THAN 25 YEARS
- ➡ MAJOR REPLACEMENT OF COILS /TUBES BASED ON RLA STUDIES

Thank You

