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# USAID ENERGY POLICY PROGRAM

## SITE VISIT REPORT MUZAFFARGARH THERMAL POWER STATION

August 2009

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## SITE VISIT REPORT

### MUZAFFARGARH THERMAL POWER STATION

Contract No: AID-EPP-I-00-03-00004

Order No: AID-391-TO-12-00002

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## BRIEF REPORT ON THE VISIT TO TPS MUZAFFARGARH

### Background:

On the advice of Chief of Party, USAID ep-ep Project, a visit to TPS Muzaffargarh was made on August 20, 2009. The TOR is given as under:

1. To assess equipment requirement and technical training of operation and maintenance staff related to TPS Muzaffargarh as mentioned in MD PEPCO letter of July 28.
2. To opine after taking into account a cost/benefit perspective, that what should be done in terms of equipment repair/replacement and upgrading technical and managerial capabilities of O&M staff.
3. To submit a brief written report within 24 hours of completing visit through e-mail.

### Findings:

Inspection of major equipment of all units was carried out, checked the present status of units, and examined the operating parameters / statistical data of one year. A brief status of all units is given below:

Unit	Make	COD	Running Hours	Generation (GWh)	Installed Capacity (MW)	Present Capacity (MW)
Unit No.1	Ex-USSR	09-09-1993	101727	16884.845	210	140
Unit No.2	-do-	23-03-1994	99572	16308.334	210	180
Unit No.3	-do-	20-02-1995	94167	14836	210	130
Unit No.4	China	23-12-1997	80367	19457	320	215
Unit No.5	-do-	14-02-1995	66296	9203	200	70
Unit No.6	-do-	14-08-1995	60381	8164	200	100

The present strategy of plant operation is to keep units in operation at any cost due to power crises in the country. Periodic / scheduled maintenance shutdowns are not allowed to clean airpreheater surfaces and condenser tubes. Unit No. 5 is being operated at 35% of rated capacity with one IDF, flue gases exit temperature is below than permissible minimum reaching the dew point thus the damages due to corrosion are at an excessive degree. Heat rates have increased at part load operation on all units resulting in excessive fuel bill.

### **Unit 1-3:**

On these units (particularly 1&3), repeated leakages of final superheater occurred during the year 2008-09 and earlier as is evident from the Outage status of units attached as Annexure 'A'. Roughly 41% of total forced shutdown hours of unit no. 1 are due to super heater tube leakages. Due to this defect, drum pressure and consequently steam pressure ahead of steam turbine has been kept low as 110 Kg/cm<sup>2</sup> against the rated 130 Kg/cm<sup>2</sup> which has resulted into load reduction. One tube bend was seen which had a pinhole after thinning out the bend wall which was already 4mm against 6mm thickness of other heating surfaces.

As a result of ICB, G.M. (Thermal) has issued a letter of intent (1510-13/GMT/P&S/MZG/T-1641) to place Purchase Order on 13.08.2009 to a Ukrainian Firm for Supply, Dismantling, Installation, Testing and Commissioning of 1340 numbers of Tube Bends/8M length (approximately) of 2nd loop for HP Convection superheaters of all three units at a total FOB cost of 3.09 million Euro. It is expected that due to stringent conditions of payment stipulated in LOI, the supplier will waste lot of time in correspondence and even may back out.

The drawing of these tube beds along with material is given in Annexure-'B'

Another significant and chronic problem has been condenser fouling resulting in scaling of condenser tubes, increase of TTD, drop of vacuum and consequently the load of machine. The present condition of all condensers is given as below:

Unit No	Terminal Temperature Difference	Remarks
1	15	Condenser requires cleaning
2	4.5	Recently cleaned
3	24	Condenser requires cleaning badly
4	15	Condenser requires cleaning
5	10	Condenser requires cleaning
6	11	Condenser requires cleaning

Presently pH control with sulphuric acid dosing in circulating water is being done which is not effective due to blowdown and adding cold water to keep CW temperatures low. There is dire need to add some more inhibitors which may stop scaling process. One such chemical being used by IPPs to treat circulating water is NALCO 20212 / NALCO D4605. The station management proposed these inhibitors two years ago but nothing could be materialized so far.

#### **Unit No.4:**

On this unit, LP Turbine re-blading of two stages is required for which procurement process has come to stalemate. It looks impossible to arrange these blades within two-three months for replacement in overhauling. Drain valves will be replaced during next major overhauling scheduled from 1<sup>st</sup> November 2009 to the end of January 2010 and the material is available. As far as other items like repair of ID Fan duct and condenser fouling are concerned same will also be attended in the forthcoming overhauling by replacing ducting sheets of one side (one side was replaced last year) and condenser cleaning mechanically with water jetting or chemical cleaning with HCl, most likely the second option will be adopted.

Another aspect not mentioned in the letter but of important nature is the use of Fuel Additives. It was recommended two years earlier that as an experiment, these additives be used on unit 4 and if found useful it will be arranged / extended to all units. 'PROTEA MGS-1' an oil based

additive from M/S System Separation, Sweden was being used up till now and it gave very good results. (Frequent vibration of IDF and washing of APH eliminated and boiler heating surfaces has no deposits as shown in file photo no.1) This has now been discontinued which will create multidimensional problems.

#### **Units 5&6:**

On Unit No.5&6 the condition of boiler flues has worsened since its last replacement with MS sheets. Photographs attached with the report reveal the miserable condition of ID fan and flues. These units require rehabilitation work immediately otherwise the present operating conditions will deteriorate units further.

#### **Training:**

Managerial training is required for both maintenance & operation Engineers for implementation of recent trends in the field (two Engineers from each of three phases).

Specialized training in the field of predictive maintenance techniques is required for at least two Engineers.

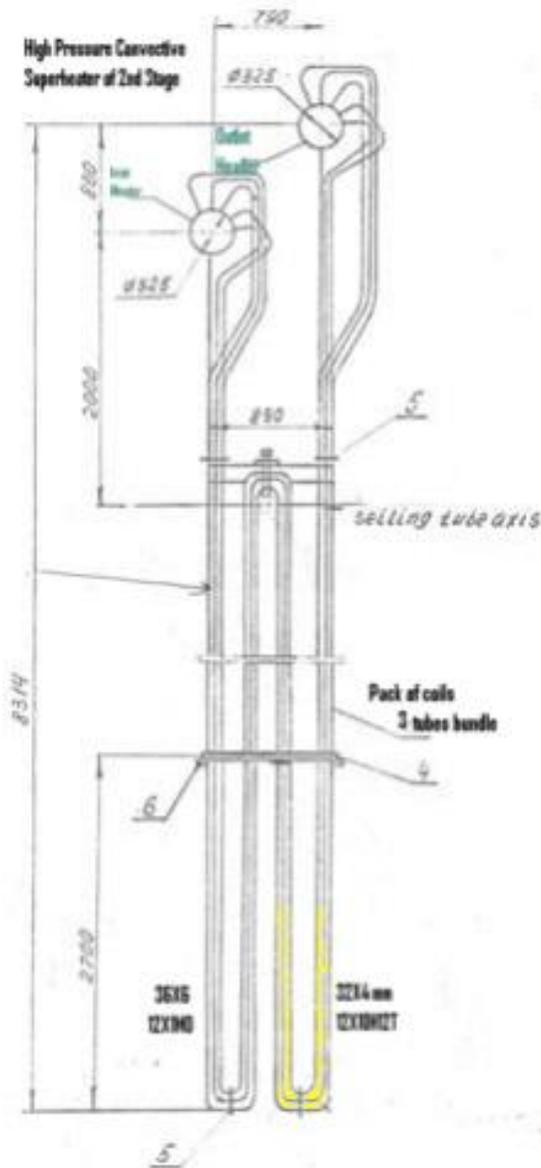
Computerized maintenance management system is required to be established with latest and efficient software. The store inventory and assets have already been listed and partially computerized but their integration with the new / proposed SMMS will be required by engaging computer literates for a short period. In-house training to run this program will be required for approximately one year. Additionally off-line efficiency monitoring software and its training to one engineer is recommended.

#### **Conclusion:**

Immediate steps to replace parts and carry out proper maintenance are required to be taken are most beneficial even if spread over the areas which are not motioned in the letter but given in Annexure 'C' The cost benefit analyses of all works is given in Annexure 'D'

USAID may take over the process of procurement of superheater tube bends for units 1-3, LP turbine blades of last two rows of Unit no.4 and ID Fans of unit 5&6. Training programs need to be implemented for improving availability, reliability and efficiency of units.

## Annexure 'B'



Partial replacement of superheater tube bends of 32X4mm tubing is recommended. The metal composition is as below:

C; 0.12, Si;0.80, Mo;2.0, P;0.035,  
S;0.02, Cr;17-19.0, N1;11-13

**LIST OF ADDITIONAL JOBS**

1. Repair of flues, procurement of IDF for unit 4
2. Special cooling water treatment for all units
3. Up-grading of DCS system for unit No.5 & 6
4. Up-grading of DEH system for unit No.4,5 & 6
5. Rehabilitation of cooling towers of Units 1-3 & procurement of APH Elements
6. Rehabilitation of soot blowing system of unit No.5 & 6.
7. Use of Fuel Oil additives on all units

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