STUDY ON RELIABILITY IMPROVEMENTS OF LAKVIJAYA POWER STATION RELATED TO THE BOILER SIDE: A CASE STUDY

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Degree of Master of Science

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DECLARATION

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ABSTRACT

Lakvijaya power station (LVPS) is the first coal power experience in Sri Lanka. Even though the main objective of the power plant is to meet the increasing power demand at low cost, still it is behind the expectations due to low reliability of the power plant. Failures in the boiler side equipment have been considerably responsible for this with a huge financial loss to the country. This project studies the suitable designs for design faults and shortcomings of LVPS to improve the reliability of the power plant related to the boiler side. By analyzing the past data until the first overhaul of the power plant, it is revealed that the main failures are arisen in the primary air system, coal pulverizing system, secondary air and flue gas systems related to the boiler side. In addition to the low reliability of primary air system, it is not supplying the required total amount of primary air to the system to run the pulverizers within the safe margins. Installing a new primary air fan in the system not only meets the deficiency, but also improves the reliability. Failures related to the pitch controllers of forced draft fans and induced draft fans resulting to high vibrations and high bearing temperatures directly affect to the low reliability in the secondary air and flue gas system. Variable speed drivers to control the air flow instead of fan pitch controlling or inlet vane controlling methods are discussed in this paper. According to the past data of the plant, 53% of failures arose in the pulverizing system have been recovered within ten hours. Rearranging the system with pulverized coal storages for ten hours with a suitable fire protection system is also discussed here. Considering financial losses of these deficiencies, simple pay back periods of each of proposed implementations lies well within the acceptable limits.

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LIST OF ABBREVIATIONS

Abbreviation	Description
APH	Air Pre-Heater
BMCR	Boiler Maximum Continuous Rating
BOP	Balance of Plant
CEB	Ceylon Electricity Board
CO_2	Carbon Dioxide
DCS	Distributed Control System
ESP	Electro Static Precipitators
FD	Forced Draft
GIS	Gas Insulated Substation
HP	Horse Power
ID	Induced Draft
LVPS	Lak Vijaya Power Station
PA	Primary Air
PID	Proportional-Integral-Derivative
RPM	Revolutions per minute
SCC	System Control Center
TMCR	Turbine Maximum Continuous Rating
USD	United States Dollar
VSD	Variable Speed Drive
VWO	Valve Wide Open

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