

National University of Science and Technology Zimbabwe

FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF TECHNICAL TEACHER EDUCATION

OPTIMIZATION OF THE OPERATING PARAMETERS OF THE EAST
COOLING TOWER AND THE SUBSEQUENT EFFECTS ON THE
PERFORMANCE OF THE ELECTROLYSIS PLANT

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ABSTRACT

This project write-up is about the optimization of the East Cooling Tower, which is at Sable Chemical Industries. The effect of this optimization program will be felt in the Electrolysis Plant 's performance particularly the cooling process and the production of hydrogen, which is used for the manufacturing of ammonium nitrate fertilizer at the company. The performance of the Electrolysis Plant depends on the performance of the East Cooling Tower, which is responsible for cooling the water used to cool the electrolytors. Before the optimization program of this project, the performance of the Electrolysis Plant was below expected levels and this was squarely attributed to the poor performance of the East Cooling Tower. Problems of inadequate cooling by the water from the East Cooling Tower had resulted in the tower having to be refurbished three times since its commissioning in 1972, but its performance deteriorated gradually and since then, it had been a problematic area, hence the request to optimize it was granted. The optimization of the East Cooling Tower sought to maximize the heat rejection from the electrolytor units by optimizing the operating parameters of the tower and hence that of the Electrolysis Plant. Changing the header pressure parameter to a higher value had resulted in the cooling water flow rates increasing thereby increasing the cooling rate of the electrolytor units. This had resulted in high hydrogen production rates, which favors a high ammonia production rate resulting in improved fertilizer production rates.