Chartri Klin-ubol 2011: Study of Fire Protection in Mae-moh Mine Substation by Fire Dynamic Simulation. Master of Engineering (Fire Protection Engineering), Major Field: Fire Protection Engineering, Interdisciplinary Graduate Program. Thesis Advisor: Assistant Professor Apichart Chaengbamrung, Ph.D. 119 pages.

This study was carried out using a fire dynamics simulation for a design of fire protection of a substation at Mae-Moh mine. By using a numerical method-based program called Fire Dynamics Simulation (FDS), a simulation model was created to see how the fire caught on cables of substation proceeds. The distribution of temperature and the rate of heat release were also investigated. The worst case caused by overheated cables was presented in the fire event of the substation with a size of 8.0 m x 5.0 m x 3.5 m (LxWxH). Heat release of cables was rated at 120 kW/m^2. Water was used as fire hydrant for the event. The occurrence was divided into 2 cases: Cable caught fire in power cable rail and cable caught fire in sub-floor of the electrical house.

It was revealed by the simulation model that the most critical area is the sub-floor of electrical house with the temperature of 720 °C and heat release of 5000 kW. The model was further extended over 3 cases – to provide sprinklers with a K value of 11.2 in a pattern of 1 row × 4 sprinklers, 2 rows × 2 sprinklers as well as 2 rows × 3 sprinklers for the electrical house lengthwise and overall area.

It were found that sprinklers could significantly help reducing temperature and heat release of the fire event. In the case of being equipped with a singer row of 4 sprinklers, the temperature and heat release were lowered to approximately 45 °C on average and 400 kW, respectively. The slightly better situation was achieved by using a configuration of 2 rows × 2 sprinklers, resulting in the maximum temperature and heat release being reduced to approximately 40 °C and 250 kW respectively. By using and arrangement of 2 rows × 3 sprinklers, the temperature was brought to roughly 22 °C and heat release was decreased to approximately 25 kW.

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