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A Prediction Method of Pollutants Distribution Pattern: Flare Motion Using Computational Fluid Dynamics (CFD) Fluent Model with Weather Research Forecast Input Model during Transition Season

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Abstract : A large amount of energy is being wasted by the release of natural gas associated with the oil industry. This release interrupts the environment particularly atmosphere layer condition globally which contributes to global warming impact. This research presents an overview of the methods employed by researchers in PT. Chevron Pacific Indonesia in the Minas area to determine a new prediction method of measuring and reducing gas flaring and its emission. The method emphasizes advanced research which involved analytical studies, numerical studies, modeling, and computer simulations, amongst other techniques. A flaring system is the controlled burning of natural gas in the course of routine oil and gas production operations. This burning occurs at the end of a flare stack or boom. The combustion process releases emissions of greenhouse gases such as NO2, CO2, SO2, etc. This condition will affect the chemical composition of air and environment around the boundary layer mainly during transition season. Transition season in Indonesia is absolutely very difficult condition to predict its pattern caused by the difference of two air mass conditions. This paper research focused on transition season in 2013. A simulation to create the new pattern of the pollutants distribution is needed. This paper has outlines trends in gas flaring modeling and current developments to predict the dominant variables in the pollutants distribution. A Fluent model is used to simulate the distribution of pollutants gas coming out of the stack, whereas WRF model output is used to overcome the limitations of the analysis of meteorological data and atmospheric conditions in the study area. Based on the running model, the most influence factor was wind speed. The goal of the simulation is to predict the new pattern based on the time of fastest wind and slowest wind occurs for pollutants distribution. According to the simulation results, it can be seen that the fastest wind (last of March) moves pollutants in a horizontal direction and the slowest wind (middle of May) moves pollutants vertically. Besides, the design of flare stack in compliance according to EPA Oil and Gas Facility Stack Parameters likely shows pollutants concentration remains on the under threshold NAAQS (National Ambient Air Quality Standards).

Keywords : flare motion, new prediction, pollutants distribution, transition season, WRF model
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