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A PREDICTIVE STUDY: CARBON MONOXIDE EMISSION MODELING AT A SIGNALIZED INTERSECTION

FREDDY WEE LIANG KHO*, PUONG LING LAW

Faculty of Engineering, Universiti Malaysia Sarawak (UNIMAS),
94300 Kota Samarahan, Sarawak, Malaysia
*Corresponding Author: frexwl@gmail.com

Abstract

CAL3QHC dispersion model was used to predict the present and future carbon monoxide (CO) levels at a busy signalized intersection. This study attempted to identify CO "hot-spots" at nearby areas of the intersection during typical A.M. and P.M. peak hours. The CO concentration "hot-spots" had been identified at 101 Commercial Park and the simulated maximum 1-hour Time-Weighted Average (1-h TWA) ground level CO concentrations of 18.3 ppm and 18.6 ppm had been observed during A.M. and P.M. peaks, respectively in year 2006. This study shows that there would be no significant increment in CO level for year 2014 although a substantial increase in the number of vehicles is assumed to affect CO levels. It was also found that CO levels would be well below the Malaysian Ambient Air Quality Guideline of 30 ppm (1-h TWA). Comparisons between the measured and simulated CO levels using quantitative data analysis technique and statistical methods indicated that CAL3QHC dispersion model correlated well with measured data.

Keywords: CAL3QHC dispersion model, Carbon monoxide, Maximum average, Peak hours, Signalized intersection.

1. Introduction

Transportation activities have been identified as one of major source of air pollution in urban areas [1-3] with subsequent adverse human health effects [4, 5]. Signalized intersections generate relatively large volumes of traffic, particularly during rush hours when traffic typically circulates at low speeds with frequent stops and starts. This traffic pattern produces relatively high CO emissions. According to Claggett et al. [6], the ambient concentration of CO resulting from vehicular traffic might be high near locations where vehicles trend to accumulate, slow down, and idle for a