315/C

Assessment of atmospheric deposition due to highway construction

P.M.A.D.I. Thilakarathna,[1] M.K.S.P. Fernando,[2] M. Vithanage,[3] and B.C.L. Athapattu[2*]

[1]*CINEC Maritime Campus,*
[2]*The Open University of Sri Lanka,*
[3]*University of Sri Jayawardenepura*

With the development of technology, the infrastructure, highways and buildings, is also increasing. With these, environment problems were increasing in developing countries. Sri Lanka is facing some environmental and health problems with air pollution in developing industrialization and urbanization. Atmosphere deposition that included heavy metals was a main issue for human health and the environment. In this research, the level of heavy metals in atmosphere deposition was analyzed in the Kadawatha – Kerawalapitiya highway (The Outer Circular Highway Package II) construction site in Sri Lanka. Construction activities of the outer circular highway were done in a rapid phase. Therefore, air pollutants were generated in the construction site and negatively affected the surrounding environment. This research was focused on Zn, Pb, Cd, Cu, Ni, Fe, Cr, Al, and Mn, which were widespread in the atmospheric depositions at the construction site. Many identified heavy metals are from construction materials, emission from work vehicles, and due to the dust of the highway construction process. To estimate the atmospheric depositions, four air quality monitoring locations were selected 2m - 5m distance from the road edge with no disturbance at the outer circular highway construction route. The deposition collectors were made by using funnels and beakers, which were connected to a stand with a height of 1.5m. Atmospheric deposition samples were collected for six months with a control sampler which was set before the construction commenced. Samples were collected only in dry deposition, *i.e.*, after 3 - 5 dry, sunny days before rain and once a month. Prior to the sampling, the plastic beakers and funnels were washed with deionized water by an acid wash with HNO_3.The collected samples were carried to the laboratory and it was arranged for digestion in control procedures and samples were stored at 4^0C temperature until laboratory analysis.The samples were analyzed for the heavy metals by an Inductively Coupled Plasma Mass Spectrometer (ICP-MS). The results revealed that Pb and Zn both showed high positive variation in atmospheric deposition in the outer circular highway construction phase. Zn increase by 75 - 90%, and Pb by 65-95%, which are considerably higher when compared to the control and the stipulated standards in Sri Lanka. Therefore, the impact to environment from the heavy vehicles, machinery, and construction activities are not monitored, and no regulations to control or minimize pollution are in place. This study recommends that new policies and new standards be developed for monitoring and controlling the atmospheric pollution during the construction phase of development activities.

Keywords: Atmospheric deposition, highway construction, heavy metals, air pollution, deposition collector

E-mail: bcliy@ou.ac.lk