Estimating of Non-Point Pollution Load Reduction on Highway by Road Sweeping

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(a) Purpose of study or research hypothesis
It is necessary to investigate countrywide the characteristics of collected road deposited sediment (RDS) from road sweeping as fundamental data for estimating removal efficiency of highway nonpoint source (NPS) pollution.

(b) Key issue(s) or problem(s) addressed
Among the best management practices (BMPs), road sweeping is commonly regarded as effective way to prevent pollutant wash off to environment. However, there is little quantitative evidence that it directly reduces NPS in Korea.

(c) Methodology or approach used
Korea Expressway Corporation operates 4,113km of 30 highway routes and it is managed by 56 branches nationwide. Among them, 27 branches were selected considering traffic load and locality, and collected RDS were sampled three times at 21 branches nationwide and five times at 6 branches in metropolitan area.

(d) Results or conclusions derived from the project
The samples were analyzed for Moisture content, BOD, TN, TP, TOC and heavy metal concentration. Moisture content was analyzed to 11.6 ± 4.4%, BOD to 211.9 ± 93.3mg/kg, TN to 837.8 ± 461.1mg/kg, TP to 603.6 ± 182.4mg/kg and TOC to 14,996.6 ± 2,749.8mg/kg. In heavy metals, Cu was analyzed to 103.5 ± 45.6 mg/kg, Pb to 31.3 ± 15.4 mg/kg, Zn to 327.1 ± 104.5 mg/kg, Ni to 19.2 ± 6.7 mg/kg.

(e) Implications of the project relevant to congress themes
By road sweeping, nonpoint source pollutant annual reduced load were resulted that BOD was 3,894.9 kg/year, TOC was 275,652.5 kg/year, T-N was 15,399.1 kg/year, T-P was 11,095.6 kg/year, respectively. And heavy metal annual reduced load were resulted that Cu was 1,902.6 kg/year, Pb was 575.0 kg/year, Zn was 6,011.8 kg/year, Ni was 352.9 kg/year, respectively.

Keywords : Nonpoint Source (NPS) Pollution, Road deposited sediment (RDS), highway, road sweeping, nonpoint pollutant load