

Toxicity of urban highway runoff with respect to storm duration

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ABSTRACT

The toxicity of stormwater runoff during various time-based stages was measured in both grab and composite samples collected from three highly urbanized highway sites in Los Angeles, California between 2002 and 2005. Stormwater runoff samples were tested for toxicity using three freshwater species (the water flea *Ceriodaphnia dubia*, the fathead minnow *Pimephales promelas*, and the green algae *Pseudokirchneriella subcapitata*) and two marine species (the purple sea urchin *Strongylocentrotus purpuratus*, and the luminescent bacteria *Photobacterium phosphoreum* using Microtox™). Toxicity results varied substantially throughout the storm events for both freshwater and marine species toxicity tests. In general, however, the first few samples were found to be more toxic compared with those collected during later stages of each storm event. In most cases, more than 40% of the toxicity was associated with the first 20% of discharged runoff volume. Furthermore, on average, 90% of the toxicity was observed during the first 30% of storm duration. Toxicity identification evaluation results found copper and zinc to be the primary cause of toxicity in about 90% of the samples evaluated with these procedures. Surfactants were also found to be the cause of toxicity in less than 10% of the samples.

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