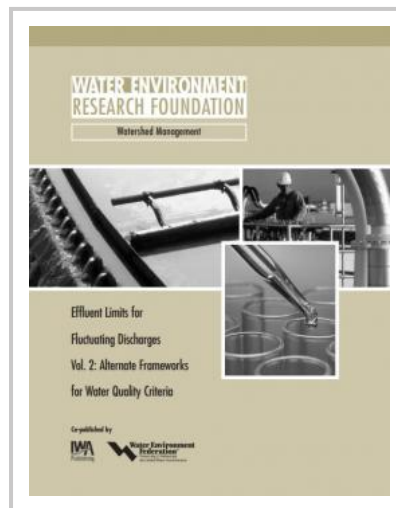


Effluent Limits for Fluctuating Discharges: Phase II - Alternate Frameworks for Water Quality Criteria

This research evaluated appropriate methodologies to calculate water quality criteria for exposure concentrations that vary in frequency, magnitude and duration. We reviewed over 30 toxicological studies that used either time-dose response or pulsed/intermittent exposure designs representing over 15 contaminants and 10 species. Most of these studies were conducted using freshwater species. Many workers demonstrated a relationship between organism response and internal contaminant concentration, independent of the exposure regime. Internal contaminant concentration has been used to predict organism responses in various models. Results of many laboratory studies indicate that for brief, episodic or high magnitude pollutant events, higher acute toxicity (or lower LC50s), is likely as compared to that predicted based on the averaged or long-term concentration. Our literature search, and evaluation of five case studies, revealed some cautions in using chemical benchmark (criteria) values and simple worst case dilution analysis to evaluate effluent compliance. Our results indicate that magnitude or peak concentration, not duration above a certain threshold, was most important in predicting chronic toxicity to *Ceriodaphnia*. The relatively infrequent pollutant monitoring in National Pollutant Discharge Elimination System (NPDES) permits, and the general lack of instream contaminant data, means that chemical exceedance duration, or a time-integration approach to permit compliance, is unlikely if not infeasible.



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