# Water Quality Criteria/Standards Development and Implementation

Beginning in the late 1960s, Dr. G. F. Lee pioneered in the development of approaches for evaluating the water quality/environmental impact of chemicals. The focus of his work has been on the integration of aquatic chemistry and toxicology in evaluating the impact of chemicals on water quality. Dr. G. Fred. Lee has been involved in the development, evaluation, and implementation of water quality criteria and state standards since the early 1960s. A summary of his experience is provided at http://www.gfredlee.com/exp/wqexp.htm. During the 1960s while he held the position of Professor of Water Chemistry and Director of the Water Chemistry Program at the University of Wisconsin, Madison he served as an advisor to the Wisconsin Department of Natural Resources on the development and implementation of water quality criteria and standards. During that time and subsequently he has served as an advisor to numerous governmental agencies including municipalities, industry, and environmental/citizen groups on water quality criteria issues. In the early 1970s Dr. Lee served as an invited peer reviewer for the National Academies of Science and Engineering's "Blue Book of Water Quality Criteria - 1972." In the late 1970s, he served as an invited member of the American Fisheries Society Water Quality Panel that conducted a review of the US EPA's 1976 Red Book of Water Quality Criteria. In the early to mid-1980s he served as a US EPA invited peer reviewer for the 1986 Gold Book of Water Quality Criteria development approach and for several of the specific chemical criteria. During the 1960's through the mid-1970's he served as an advisor to the International Joint Commission for the US-Canadian Great Lakes in developing water quality objectives for the Great Lakes and their implementation. His pioneering work on PCB's in the 1960's led to his being selected to head the US Public Health Service committee on developing drinking water standards for PCB's.

Drs. Lee and Jones-Lee have published extensively on the development of water quality criteria and their implementation into state standards to appropriately regulate water quality impacts without significant over-regulation of wastewater and other discharges. Many of those publications are available on their website, www.gfredlee.com in the Surface Water section, http://www.gfredlee.com/pwwqual2.htm#criteria.

Dr. G. F. Lee has served as technical consultant to several chemical companies such as Procter & Gamble, FMC and Monsanto providing guidance in evaluating the potential impact of new or expanded use chemicals. Work with Monsanto included reviewing the environmental fate and impacts of PCBs in aquatic systems and evaluating the environmental impacts of phosphorus used into detergent formulations. With FMC, he helped evaluate the fate and effects of a carbon tetrachloride spill on the Ohio River water quality. For about 10 years Dr. Lee served as a reviewer for evaluating the impact of new products developed by Procter & Gamble. In the early 1970s, Dr. Lee became an advisor to the President's Council on Environmental Quality (CEQ) in Washington DC helping to develop programs for screening new or expanded use chemicals for potential environmental impact. This work evolved out of the widespread occurrence of environmental pollution by PCBs, DDT and other organochlorine pesticides and mercury.
During the 1970s Dr. Lee was a member of a group representing chemical companies, regulatory agencies and universities that develop "Pellston" workshops devoted to developing approaches for screening chemicals for environmental impact. In the late 1970s, the efforts of this group led

to the development of the environmental hazard assessment approach for evaluating the expected toxicological impacts and water quality assessment for new or expanded use chemicals that could cause large scale environmental pollution. These efforts ultimately led to the development of the Toxic Substances Control Act (TSCA). Drs. Lee and Jones together with their graduate students expanded this work to include conducting a water quality hazard assessment for domestic wastewaters. This work included development of environmental chemistry fate models for assessing the water quality impacts of domestic wastewater constituents such as chlorine used for disinfection domestic wastewaters and ammonia present in these waters using integrated laboratory and field toxicity testing. This work became what they work on this approach became the foundations for the water quality and public health risk assessment approaches that are widely used today.

During the 1970s, on behalf of the Corps of Engineers Dredged Material Research Program, Dr. Lee conducted about $1 million in contracts devoted to development of dredged sediment disposal criteria associated with open water disposal of sediments dredged from US waterways as part of maintaining navigation depth. This work led to the development of dredged sediment toxicity tests that are used to determine whether chemicals in dredged sediments are in toxic/available forms and therefore could be adverse to aquatic life at the dredged sediment disposal site. These studies demonstrated that the high concentrations of most chemicals such as heavy metals in dredged sediments are in non-toxic forms.

Drs. Lee and Jones-Lee have been active in reviewing the reliability of aquatic sediment criteria developed by regulatory agencies. As they have discussed, the approach of the California Water Resources Control Board for incorporating chemical concentration information in evaluating the sediment quality is not technically valid that can readily led to incorrect evaluation of sediment quality and the impact of chemicals in sediments on a waterbodies water quality.