Announcement of an
Urban Stormwater Runoff Water Quality Management Short-Course:
An Introduction to the Technical Basis for
BMP Ratcheting Down to Meet Water Quality Standards

A two-day short-course devoted to review of the basic principles of urban area and highway stormwater runoff water quality impact evaluation and management will be presented by Dr. G. Fred Lee, PE, DEE and Scott Taylor, PE at the County of Orange Santiago Oaks Regional Park facilities in Orange, CA on November 18 and 19, 1998. The course instruction begins at 9:00 am and ends at 4:30 pm with breaks at mid-morning and mid-afternoon and one hour for lunch.

Course Sponsorship and Financial Arrangements

The course is co-sponsored by the Orange County Public Facilities and Resources Department (PFRD), G. Fred Lee & Associates of El Macero, CA and Robert Bein, William Frost and Associates of Irvine, CA. Orange County is making the Santiago Oaks Regional Park facilities where the course will be presented available at no cost. Orange County PFRD (Chris Crompton) is making the local arrangements for the course. As part of enhancing the quality of science and engineering in urban area and highway stormwater runoff water quality management, Dr. Lee and Mr. Taylor are donating their time in the development and preparation of the course as well as its presentation. Participants will need to cover the cost of refreshments during breaks, lunches which will be catered sandwiches and the expense of a hotel/motel and local transportation, such as auto rental. The cost of the refreshments and lunches will be $25.00 which is to be paid in advance.

In addition to several motels located within a few miles of the of the Orange County Santiago Oaks Park, the Park is located about six miles from the Disneyland hotel/motel area. A list of nearby motels will be proved to course registrants. Local transportation - automobile from the motel to the Park will need to be provided by the course participants.

Course Objectives

The objective of the course is to provide an introduction to the technical base of information that is being used to regulate urban area and highway stormwater runoff under the BMP ratcheting-down process. In January 1998, the US EPA Region 9 and Washington DC headquarters explicitly stated that NPDES-permitted urban area and highway stormwater runoff will ultimately have to be managed/treated so the residual constituents in the stormwater runoff do not cause or contribute to violations of water quality standards. Since there are no mixing zones allowed for NPDES permitted stormwater runoff in California, the stormwater runoff must meet water quality standards in the discharge to surface waters. Upon finding an exceedance of a water quality standard in the stormwater runoff, the stormwater runoff water quality management agencies must modify their stormwater management plan through the development of best management practices (BMPs) to address the exceedance. The BMP ratcheting-down process will likely play out over three to ten years where the time will likely be determined by environmental groups’ litigation. An outline of the major topic areas covered in the course is appended to this announcement.
Who Should Attend
Individuals interested in urban area and highway stormwater runoff water quality impact evaluation and management, including engineers, natural and social scientists, planners, attorneys and others.

Course Technical Level
This course will be taught at an introductory technical level where the major topic areas pertinent to understanding the technical basis of how the BMP ratcheting-down process should be conducted will be discussed. The emphasis will be on an introduction to establishing technically valid, cost-effective management of NPDES-permitted urban area and highway stormwater runoff where public funds are used to address real significant water quality use impairments that are caused by the urban/highway stormwater runoff. If there is sufficient interest, a follow-on course will be made available to discuss the topics areas in greater detail.

While the course is intended for participants with natural science and/or engineering backgrounds, those with social science and other backgrounds will gain considerable insight in the current problems and needed regulatory reform for appropriate management of urban area and highway stormwater runoff to protect the beneficial uses of the receiving waters for the runoff without significant unnecessary public expenditures for runoff constituent control.

The course is specifically designed for the technical staff of stormwater runoff management agencies, their co-permittees and the regulatory agencies. It will also be of value to industrial stormwater runoff water quality managers and consultants. Participants are encouraged to bring specific stormwater runoff water quality problems for discussion by the course participants.

Course Materials
A course notebook consisting of the text slides and selected papers/reports will be made available to course participants. References to US EPA and other literature pertinent to topics covered will be provided.

Course Registration
The course will be offered if 20 individuals register for the course. It is important to register using the attached form early by contacting Dr. G. Fred Lee at 27298 E. El Macero Dr., El Macero, CA 95618. Tel 530 753-9630; Fx 530 753-9956; Em: gfredlee@aol.com. The registration/attendance will be limited to 50 participants with first preference given to public agency staff until November 13, 1998. A registration form is appended to this announcement.
Instructors

**Dr. G. Fred Lee, PE, DEE**  
President, G. Fred Lee & Associates, El Macero, California

Dr. Lee has over 38 years of professional experience in water quality evaluation and management. He pioneered in the investigation of urban area and highway stormwater runoff water quality impacts in the 1960s and has been active as a researcher and consultant in this area since that time. Dr Lee is active with the CA State Storm Water Quality Task Force and chairs the Stormwater Science Work Group. Dr. Lee has a bachelor’s degree from San Jose State College, a Master of Science in Public Health degree from the University of North Carolina, Chapel Hill and a PhD in environmental engineering from Harvard University. For 30 years, until 1989, he held graduate-level university environmental engineering teaching and research positions where he conducted over $5 million in research devoted to water quality evaluation and management issues and published over 500 professional papers and reports on this work. He has developed over 50 professional papers and reports devoted to urban area and highway stormwater runoff water quality evaluation and management. He and his associates developed the Evaluation Monitoring approach to more reliably evaluate the water quality impacts of urban area and highway stormwater runoff-associated constituents on receiving water quality - beneficial uses. He and Mr. Taylor of RBF have been instrumental in adapting the Evaluation Monitoring approach to site-specific highway runoff situations and are now conducting a three-year demonstration project devoted to the implementation of the Evaluation Monitoring approach in the Upper Newport Bay watershed in Orange County, CA. Dr. Lee is a registered Professional Engineer and a Diplomate in the American Academy of Environmental Engineers.

Dr. Lee has established a web site, http://members.aol.com/gfredlee/gfl.htm, where he lists and makes available many of his papers and reports that are pertinent to the topics covered in this course. Also available is further information on Dr Lee’s qualifications and experience in urban area and highway stormwater runoff water quality management.

**Scott Taylor, PE**  
Associate, Robert Bein, William Frost and Associates, Irvine, CA

Mr. Taylor holds the position of Director of Flood Control Engineering with RBF and has over 15 years of experience in hydrologic, hydraulic and flood control design. He has a bachelor’s degree in civil and environmental engineering and a master’s degree in civil and water resources engineering. He is a registered Professional Engineer and has extensive experience in the design of regional and local flood control improvements associated with transportation and other public works projects. Mr Taylor chairs the State Storm Water Quality Task Force BMP Work Group. He is a part-time instructor in hydrology and hydraulic design at the University of California, Irvine and the California State University at Long Beach. Mr. Taylor has developed stormwater pollution prevention plans for many public and private sector clients, including specialized post-construction
stormwater quality management plans. RBF is one of the Silverado consortium of engineering and construction firms responsible for the design and construction of the Eastern Transportation Corridor (ETC), a new, 26-mile toll road that is being constructed in Orange County, CA. Mr. Taylor has the specific responsibility for the development of the stormwater runoff water quality management program for the ETC.

Mr. Taylor is the RBF staff person responsible for conducting a $3 million/yr, three-year Caltrans project that is evaluating the ability of conventional BMPs to treat highway stormwater runoff.
Outline of Short-Course

• Urban Stormwater-Related Water Quality Issues •
  With Emphasis on BMP Ratcheting Down Process

Duration: 2 days (9:00 am-4:30 pm; 1-hr lunch)  
November 18-19, 1998  
Course Organizer: 
Dr. G. Fred Lee, PE (TX), DEE

Location: Santiago Oaks Regional Park  
2145 North Windes Dr., Orange, CA  
(714) 538-4400  
G. Fred Lee & Associates  
El Macero, CA  
Ph: (530) 753-9630  
Course Instructors: 
G. Fred Lee, PhD, PE, DEE, G. Fred Lee & Associates, El Macero, CA  
Scott Taylor, PE, Robert Bein, William Frost and Associates, Irvine, CA

Cost: $25.00 to cover cost of refreshments-soft drinks and coffee and luncheon sandwiches, to be paid in advance,  
Fx: (530) 753-9956b  
Em gfredlee@aol.com

Local Arrangements: Chris Crompton, Manager Environmental Resources  
Orange County PFRD, Ph: 714-567-6360

Objective of the Course: To provide an introduction to the basic water quality issues that are pertinent to understanding and evaluating the water quality impact and cost-effective management of urban area and highway stormwater runoff water quality. The ultimate goal of the course is to provide an introduction to technically valid, cost-effective urban area and highway stormwater runoff water quality management.

Course Outline

(All sessions will be taught by Dr. G. Fred Lee unless noted otherwise)

Urban Area Stormwater Runoff as a Source of Potential Pollutants
  Introduction - Overview of Issues
  Overview of Urban Stormwater Runoff Related Water Quality Problems - Real and Perceived
  Physical Impacts
    Flow-Related Erosion  
    Altered Biological Habitat  
    Suspended Solids - Physical & Chemical  
    Abrasion, Deposition, Turbidity
  Chemical Impacts
    Heavy Metals (Cu, Cd, Pb, Zn, Hg)  
    Organics (PAHs, Petroleum Hydrocarbons, Pesticides, etc.)  
    Nutrients - N and P Compounds
  Microorganisms - Sanitary Quality (Coliforms)
  Litter
Urban Stormwater Regulatory Requirements
Municipal and Highway NPDES-Permitted Runoff
Control “Pollution” Using BMP to MEP
Application of Water Quality Standards (Objectives) to Stormwater Runoff
Overview of BMP Ratcheting Down Process To Achieve Water Quality Standards
Litigation likely to Determine Period of Ratcheting Down

Principles of Water Quality Evaluation

Basic Concepts

• Designated Beneficial Uses - Water Quality
• Water Quality Criteria and Standards/Objectives
  Drinking Water MCLs
    Primary and Secondary Standards
  Chemical-Specific • Toxicity-Based (Acute and Chronic) • Aquatic Life Criteria
  Bioaccumulation of Hazardous Chemicals
  Fish Advisories
  Sanitary Quality
  Domestic Water Supplies, Contact Recreation and Shellfish Harvesting
  Narrative Standards
    Toxicity - WET
      Toxicity Units
    Nutrients N and P - Eutrophication
      Nutrient Water Quality Criteria/Standards
    Sediments - Turbidity - Habitat - Shoaling
    Aesthetics
  Biological Criteria
    Numbers, Types and Characteristics of Aquatic Organisms
    Relative to Habitat Characteristics
  Wildlife Standards
  Endangered Species Act Issues
  Compliance with Water Quality Standards/Objectives
    Averaging Period and Occurrence Frequency

What Makes a Chemical Hazardous to Aquatic Life

• Overview of Principles of Aquatic Chemistry
  Chemical Species - Toxic/Available
    Soluble vs. Total Contaminants
  Relationship Between Analytical Results for Specific Chemicals and Water Quality
  Toxicity Testing Methods used to Establish Criteria/Standards
• Overview of Basic Principles of Aquatic Toxicology
  Duration of Exposure
  Sensitivity of Organisms
• Chemical Constituents vs. Pollutants
  The Characteristics of the Source and the Receiving Water Determines if a Chemical
  Constituent is a Pollutant

Characteristics of Urban Stormwater Runoff
• Elevated Concentrations of Unavailable/Non-Toxic Forms of Constituents
• Duration of Organism Exposure
  Typically Short Durations of Exposure; Episodic Events

Testing Discharge/Runoff vs. Ambient Waters To Assess Impacts
Objectives of Water Pollution Control - Protect Designated Beneficial Uses
• Numbers, Types, Character of Desirable Aquatic Organisms in Receiving Water
• Use of Water for Domestic Water Supplies
• Contact and other Recreation
• Runoff Testing as Measure of Potential Impact on Receiving Water Quality-Often
  Unreliable
  Translation of Runoff Concentrations to Receiving Water Impacts

Water Quality Impairment
Exceedances of Water Quality Standards -
  Adverse Impact on Designated Beneficial Uses
  “Administrative Exceedance-Use Impairment”
  “Administrative Exceedance”  “Beneficial Use Impairment”
Problems with Use of Exceedances of Water Quality Objectives (Standards) as Determiner
of Water Quality Impairment
  Chemical-Specific Objectives
  Worst-Case Assumptions
  Chemical Constituent Toxicity/Availability
  Chronic Exposure Conditions
  Organism Sensitivity
Criteria/Objectives: 1-hr Avg.; 4-day Avg.; 1 Exceedance/3 yrs
  Overly-protective
  303 (d) list of Impaired Waterbodies - Often Unreliable as Currently Developed

Biological Impact Evaluation
Effluent/Discharge Aquatic Life Toxicity Test Limitations
• Toxicity Test Conditions More Severe Than Typically Occurs in Ambient Waters
• Runoff Toxicity Cannot Be Directly Translated to Receiving Water Toxicity
Biological Assessment
• Factors Affecting Numbers & Types of Organisms
  Habitat • Natural Variability • Storms • Flows • Other Influences

Aquatic Sediment Water Quality Impacts
Particulates in Urban Stormwater Runoff
Assessing Water Quality Impacts
Chemical Approaches
  Co-Occurrence-Based Approaches
  Long and Morgan Sediment Quality Guidelines-Unreliable
Biological Assessment
Toxicity
Bioaccumulation Potential
WRCB BPTCP Toxic Hot Spot Designation and Ranking
  Unreliable Designation of Toxic Hot Spots
  Sediment Superfund-Aquafund
  Designation of Responsible Parties and Modified NPDES Permits
  Inappropriate Use of Chemical Information in Sediment Quality Triad

Overview of Principles of Aquatic Life Hazard/Risk Assessment
Tiered, Integrated Evaluation of
• Aquatic Chemistry ( Constituent Fate & Transport ), and
• Aquatic Toxicology ( Constituent Availability, Duration of Exposure, Sensitivity/Types of Organisms ), to Assess Potential Impairment of Designated Beneficial Uses by Particular Source/Discharge/Runoff

Evaluation Monitoring
  Focus on Assessing Receiving Water Impacts on Beneficial Uses
  Watershed-Based, Technical Stakeholder Managed Consensus on Problems and Management Approaches
  Examples: Orange County Upper Newport Bay, CA
  Sacramento River Watershed

Physical Aspects of Stormwater Runoff - Scott Taylor
Urban and Highway Stormwater Runoff Flows
  Hydrology - Precipitation Runoff Relationships for Paved and Unpaved Areas
  Traditional Flow Conveyance Structure Components and Design
  Regulation of Stormwater Flow Impacts
Erosion
  Sediment Transport, Siltation
Management of Urban Stormwater-Runoff Associated Constituents

**Conventional BMP Approaches** - Scott Taylor and G. Fred Lee
- Detention Basins
- Filters
- Infiltration Systems
- Wetlands
- Vegetative Areas
- Others

Efficacy in Controlling Pollutants - Real Significant Water Quality Problems;
- Toxic Pit Issues
- Managing Soil Lead Issues

**Appropriate Implementation of BMP Ratcheting-Down Process**
- Use US EPA Worst-Case-Based Water Quality Criteria Adjustment Approaches to Develop
- Technically Valid, Cost-Effective Discharge Limits/Discharge Standards
- Standards Adjustment for Site-Specific Conditions
- Characteristics/Components of Site-Specific Studies
- Variances
- Use Attainability Analysis
- Economic Feasibility

**Changes in Urban Stormwater Runoff Water Quality Management Regulations**
- Clean Water Action Plan
- Additional Regulation of Stormwater Runoff
- ANPRM
- Changes in Water Quality Standards Regulations
- Revision of the Clean Water Act

**Specific Stormwater Runoff Water Quality Issues Raised by Course Participants**

**Course Evaluation and Closure**
Directions:

Take the 55 Freeway (Costa Mesa Freeway) to Katella Ave. Head east for approximately 3 miles (9 traffic lights) during which Katella Ave changes name to Villa Park Road and to Santiago Canyon Road. Turn left at the Windes/Meads traffic light. Follow Windes Drive, which is narrow and residential to the entrance of the park.
Registration for Stormwater Science/Engineering Short-Course
November 18-19, 1998; Orange County, CA

Those interested in attending the Stormwater Science/Engineering Short-Course that is being offered by Dr. G. Fred Lee and Scott Taylor should submit this form to Dr. Lee.

Name: _______________________________Position: _________________________________
Affiliation: __________________________________________________________________
Mailing Address: __________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
Telephone: ______________________________Fax : ______________________________
E-mail: ______________________________
Years of Professional Experience in Water Quality Related Activities: _________________
Undergraduate degree major: ______________________________Yr of Degree: ____________
Graduate degree major: ______________________________Yr of Degree: ____________

Are you involved in urban area and/or urban area stormwater runoff water quality management? If so, explain your involvement.
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

Have you examined the course outline? Yes__ No___ It is available at Dr. Lee’s web site: http://members.aol.com/gfredlee/gfl.htm? _________________________

Please summarize your interest in taking the course.
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

Please submit this form as soon as possible. Course registration is limited to 50 participants with preference given to governmental agency personnel. A minimum enrollment of 20 individuals is required by November 13, 1998 to avoid cancellation. Please send a check made out to G. Fred Lee and Associates in the amount of $25.00 to cover break refreshments and lunch sandwiches. If there are questions about the course, please contact Dr. G. Fred Lee: em: gfredlee@aol.com; Ph: 530-753-9630; Fax: 530-753-9956; or 27298 E. El Macero Drive, El Macero, CA 95618-1005.