

Theodore G. Cleveland, Ph.D., P.E.

Area of Practice: Dr. Cleveland blends strong skills in water resources investigation using laboratory and field methods with equally strong skills in information management, experimental design, and computational modeling. He is a competent code developer, experimental researcher, modeler, and teacher. His technical background includes environmental and civil engineering, and his research work is focused on water resources problems encompassed by both of these areas.

Synopsis of Water Resources Experience: Dr. Cleveland has developed computational and experimental tools to support hydrologic research and development as well as having conducted research in solid-liquid separation. He has supervised numerous studies of natural water, storm water, and wastewater systems. He has personally conducted sewer infiltration studies, field dye-tracer studies, and rapid biological assessments of a coastal stream. In addition to experimental capabilities, including the invention and fabrication of instruments when commercial devices are cost prohibitive, he is an accomplished computer programmer. He has personally constructed three cluster computers to support large-scale data processing and has built image collection systems to measure flows by image interpretation.

Project Activity: Current projects include: culvert designs to facilitate solids transport through the culvert to preserve the natural stream-bed gradient; empirical velocity diagrams to provide rapid QA/QC check for hydraulics models. Dr. Cleveland also conducts professional contract training in hydrology, urban storm drains, and watershed modeling with HEC-HMS, and engineering ethics.

Past projects include: hydrologic modeling approaches for low-slope watersheds; applicability of the rational and modified rational method for transportation infrastructure design; research to estimate the effect of urbanization on storm water runoff quantity and timing; research to quantify performance of temporary sediment controls in highway construction, including use of rapid-biological assessment to quantify impact to receiving streams; research to identify pollutant sources in an urban underground storm drainage system and mitigation strategies; use of agricultural-derived filter-aids to produce burnable filter-cake. Dr. Cleveland also developed techniques to identify rainfall induced inflow and infiltration by ammonia dilution in the collection system.

In addition to these kinds of projects, Dr. Cleveland has developed internet-based computational tools to facilitate fate and transport estimation of suspended and dissolved constituents and interpret water related data. He has also built instrumentation to make requisite measurements.

Project Experience: Listed below are selected examples of Dr. Cleveland's project experience.

Floodwise, Block B, Harris County Flood Control District: Dr. Cleveland supported the Block B team with hypothetical watershed modeling using generic models and semi-realistic models. The generic models allow the modeling team refined control over hydraulic elements, basin development factor, etc. The semi-realistic models ensure the modeling effort produces results (hydrographs) that were similar to observed hydrographs without an involved calibration exercise.

Harris County BMP Effectiveness. Dr. Cleveland co-operated with Harris County on a BMP effectiveness study that involved the selection and monitoring of two water quality enhancement ponds. In addition to developing a scoring scheme (to evaluate adherence to design guidelines and policy), an ideal flow model of a dozen or so ponds was used to identify short circuit potential.

Education

- Ph.D. - Civil Engineering, University of California, Los Angeles, CA(1989)
- M.S. - Civil Engineering, University of California, Los Angeles, CA (1987).
- B.S. – Environmental Resources Engineering, Humboldt State University, Arcata, CA (1986).

Professional Registration

- Professional Engineer: Texas 86653

Experience Highlights

- Computational and physical modeling of solid-liquid systems.
- Field studies.
- Laboratory studies.
- Purpose built instrumentation and computing capabilities.

Assignments

- Associate Professor, 2008-present; Department of Civil and Environmental Engineering, Texas Tech University.
- Associate Professor, 1990-2008; Department of Civil and Environmental Engineering, University of Houston.
- Hydrogeologist 1989-1990; CH2M-HILL, Emeryville, California.

Use of Agricultural Fibers to Produce Burnable Filter Cake. Dr. Cleveland supervised several studies in the use of Kenaf fibers to enhance industrial filtration processes and recover net energy when the processes were complete. Using fibers as admixtures to enhance sludge dewatering, oil-water separation, and as a poly-electrolyte substitute in centrifuges we concluded that fibers were beneficial to the processes but at the time (circa 1995) the energy recovery was not sufficient to overcome the added economic cost of handling fibers.

Evaluation of the Impacts, Performance, and Costs of Storm Water Pollution Prevention Plans as Applied to Highway Construction Activities. Dr. Cleveland supervised three field investigations were conducted along with a laboratory study of erosion to justify the costs involved in installing and maintaining storm water pollution prevention devices in road construction activities.

Investigation of Intervention Strategies to Improve Water Quality on Country Club Bayou. Dr. Cleveland supervised a multi-year study of a Houston receiving stream in cooperation with Montgomery Watson Americas Inc. The work included sampling 3X per week, development of water quality models, and ultimately detected major sources of unintentional discharges into the bayou. Removal of these sources in cooperation with the dischargers dramatically improved the Bayou's appearance and utility.

Computer Model to Investigate Operation Rules for a Wastewater Flow Splitter Dr. Cleveland developed a hydraulic model for the City of Houston that was used to program pumps to maintain permitted flows to two wastewater treatment plants, and test the consequences of a decision to remove a weir upstream of the pump forebay.

Physical Modeling to Determine Head Loss at Selected Surcharged Sewer Manholes. Dr. Cleveland created a physical model in support of the Greater Houston Wastewater Program to examine the consequences of operating a wastewater collection system under intentional surcharge conditions to use storage in the large diameter sewers and a flow-equalization technique.

Systematic Inspection and Severity Ranking of a Municipal Sanitary Sewage Collection System Harris County Municipal Utility District(s) #19,#20 and #73 Dr. Cleveland developed a sampling program to detect inflow and infiltration using dilution of the ammonia component in the wastewater collection system and created a thematic mapping tool to visually locate frequent point repairs to guide in planning substantial maintenance (rehabilitation) activities.

Selected Publications: (<http://cleveland2.ce.ttu.edu> has a complete list)

- Cleveland, T.G., Thompson, D.B., Fang, X., and He, X. 2008 "Synthesis of Unit Hydrographs from a Digital Elevation Model" American Society of Civil Engineers, Journal of Irrigation and Drainage Engineering, Vol. 134, No. 2, pp 212-221.
- Cleveland, T.G., and A. Fashokun, 2006. "Construction-Associated Solids Loads with a Temporary Sediment Control BMP." American Society of Civil Engineers, Journal of Construction Engineering and Management, Vol. 132, No. 10, pp 1122-1125.
- Orozco, S, and Cleveland, T.G., 2007. "Evaluation of Travel Path Ratio as a Measure of Short-Circuiting Potential in Stormwater Quality Basins using Ideal Flow Modeling." in Proceedings of ASCE World Environmental and Water Resources Congress, May 15-19, 2007. ISBN 0-7844-0927-7.
- Tiller, F.M., T.G. Cleveland, and R. Lu, 1999. "Pumping slurries forming highly compactable cakes." Industrial and Engineering Chemistry Research., 38, (3), pp 590-595.
- Wang, KH., Cleveland, T.G., Towsley, C., and D. Umrigar, 1998. "Head loss at manholes in surcharged sewer systems." Journal of American Water Resources Association, 34(6), pp 1391-1400.
- Varghese, B.K, and T.G. Cleveland, 1998. "Kenaf as a Deep Bed Filter Medium to Remove Oil from Oil-in-Water Emulsions." Journal of Separation Science and Technology, 33 (14), pp. 2197-2220.
- Cleveland, T.G., and T. Glanton, "Hydraulic Modeling of a Sewer Flow Split Structure to Evaluate Proposed Changes" Texas Section, American Society of Civil Engineers, Annual Spring Meeting, April 1997.
- Tiller, F.M., Cleveland, T.G., and J.B. Lee, "Theory of Filtration of Highly Compactable Biosolids," International Association on Water Quality, 18th Biennial International Conference, Singapore, June 1996. (Water Science and Technology, IAWQ, Vol 34:3-4,pp 299-306.)