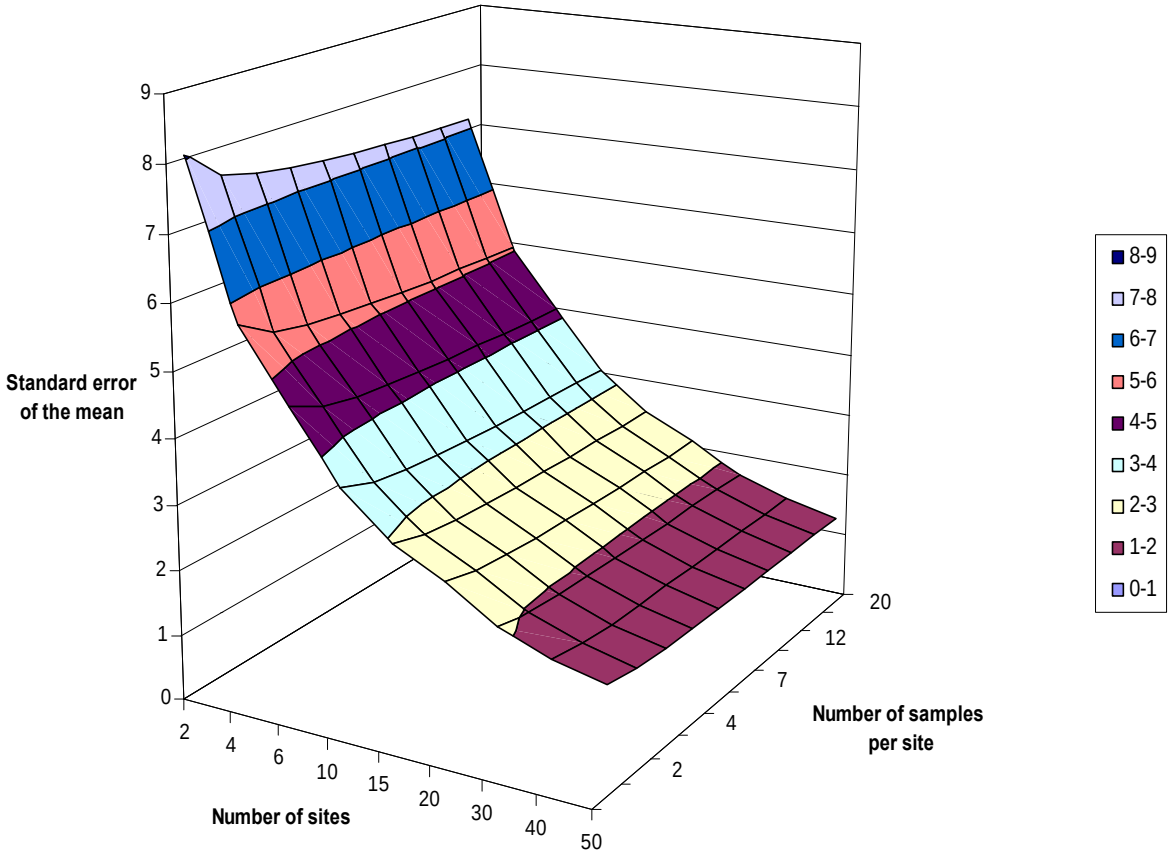
National Decentralized Water Resources Capacity Development Project

Executive Summary



Variability and Reliability of Test Center and Field Data: Definition of Proven Technology From a Regulatory Viewpoint

New England Interstate Water Pollution Control Commission
Lowell, Massachusetts

June 2005

Variability and Reliability of Test Center and Field Data: Definition of Proven Technology From a Regulatory Viewpoint

Submitted by New England Interstate Water Pollution Control Commission Lowell, Massachusetts

NDWRCDP Project Number: **WU-HT-03-35**

National Decentralized Water Resources Capacity Development Project (NDWRCDP) Research Project

Final Report, **September 2005**

NDWRCDP, Washington University, Campus Box 1150
One Brookings Drive, Cupples 2, Rm. 11, St. Louis, MO 63130-4899

DISCLAIMER

This work was supported by the National Decentralized Water Resources Capacity Development Project (NDWRCDP) with funding provided by the U.S. Environmental Protection Agency through a Cooperative Agreement (EPA No. CR827881-01-0) with Washington University in St. Louis. This report has not been reviewed by the U.S. Environmental Protection Agency. This report has been reviewed by a panel of experts selected by the NDWRCDP. The contents of this report do not necessarily reflect the views and policies of the NDWRCDP, Washington University, or the U.S. Environmental Protection Agency, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

CITATIONS

This report was prepared by:

Thomas W. Groves
New England Interstate Water Pollution Control Commission
Boott Mills South, 100 Foot of John Street
Lowell, Massachusetts 01852

New Jersey Department of Environmental Protection
Fred Bowers, Ph.D.

Pennsylvania Department of Environmental Protection
Edward J. Corriveau, P.E.

Independent Contractor
James F. Heltshe, Ph.D.

Northeast Environmental Corporation
John J. Higgins
(formerly Massachusetts Department of Environmental Protection)

Independent Contractor, The On-Site Corporation
Michael T. Hoover, Ph.D.

The final report was edited and produced by ProWrite Inc., Reynoldsburg, OH.

This report is available online at www.ndwrcdp.org. This report is also available through the

National Small Flows Clearinghouse
P.O. Box 6064
Morgantown, WV 26506-6065
Tel: (800) 624-8301
WWCDRE51

This report should be cited in the following manner:

Groves, T. W., F. Bowers, E. Corriveau, J. Higgins, J. Heltshe, and M. Hoover. 2005. *Variability and Reliability of Test Center and Field Data: Definition of Proven Technology From a Regulatory Viewpoint.* Project No. WU-HT-03-35. Prepared for the National Decentralized Water Resources Capacity Development Project, Washington University, St. Louis, MO, by the New England Interstate Water Pollution Control Commission, Lowell, MA.

ACKNOWLEDGEMENTS

Appreciation is extended to the following individuals for assistance in the preparation of this report:

Project Team
Fred Bowers, Ph.D., New Jersey Department of Environmental Protection
Edward J. Corriveau, P.E., Pennsylvania Department of Environmental Protection
James F. Heltshe, Ph.D., Independent Contractor
John J. Higgins, (formerly Massachusetts Department of Environmental Protection)
Northeast Environmental Corporation
Michael T. Hoover, Ph.D., The On-site Corporation, Independent Contractor

New England Interstate Water Pollution Control Commission
Stephen Hochbrunn, Editor
Peter Cavanaugh, Intern

Appreciation is also expressed to the NDWRCDP for their support of this work:

Principal Investigator
Jay R. Turner, D.Sc., Washington University

Project Coordinator
Andrea L. Shephard, Ph.D.

NDWRCDP Project Steering Committee:

Coalition for Alternative Wastewater Treatment
Valerie I. Nelson, Ph.D.

Consortium of Institutes for Decentralized Wastewater Treatment
Ted L. Loudon, Ph.D., P.E.

Electric Power Research Institute
Raymond A. Ehrhard, P.E.
Tom E. Yeager, P.E.

National Onsite Wastewater Recycling Association
Jean Caudill, R.S.

National Rural Electric Cooperative Association
Scott Drake, P.E.

Water Environment Research Foundation
Jeff C. Moeller, P.E.

Members-At-Large:
James F. Kreissl
Richard J. Otis, Ph.D., P.E.
Jerry Stonebridge

Outside Reviewer:
Mark A. Tumeo, Ph.D., P.E.

ABSTRACT

A consortium of environmental agencies concerned with the quality and relationship of test center data to real world data for alternative onsite technologies banded together to formulate this project. The New England Interstate Water Pollution Control Commission (NEIWPCC) is the lead agency for this consortium, which includes the Massachusetts Department of Environmental Protection, the Pennsylvania Department of Environmental Protection, and the New Jersey Department of Environmental Protection. The goals of this research were:

- To develop a statistical and sound scientific relationship between test center data and actual field data of installed alternative technology onsite wastewater treatment systems
- To develop a decision support system to help regulators evaluate the quality and quantity of data submitted for regulatory decisions

While these two major research goals are similar, they require different approaches. The study on these two critical, but different, topics was essential at this stage of technology implementation in the decentralized wastewater field.

State regulatory agencies have been concerned with discrepancies between test center data and real world installations of these technologies. To effectively manage an alternative technology program, state regulatory agencies must be confident in the results that will occur in the real world when constant monitoring, management, and oversight might not be present.

The study included the evaluation of three different alternative onsite technologies that had ample test center and field data sources. Datasets for each system were analyzed statistically using appropriate models. The range of variability was developed, including its variance/covariance structure and the relationships of test center data to predict field system performance. Insights into this variability are beneficial to regulatory staff to optimally design a field-sampling regime, better define a field verification protocol, and better predict expected field performance

The degree of quality assurance/quality control (QA/QC) and management level for the systems was noted, and a baseline was created for comparison of system performance. Relationships between existing data sources—including type, frequency, method of sampling, and quality—were analyzed, developed, and presented.

This research fits into the efforts of the National Onsite Wastewater Recycling Association's (NOWRA) Model Code and the National Decentralized Water Resources Capacity Development Project's (NDWRCDP) goals and objectives to further the beneficial use of proven onsite wastewater technology to solve the nation's small community wastewater needs.

Additionally, a Decision Support System (DSS) tool was developed to help regulators evaluate all sources of data (including test center and field data) to determine the field performance of a technology and guide the regulatory and manufacturing communities on the amount and quality of data needed to accept a technology as "proven."

The DSS consists of a series of spreadsheets, examples, and documents that guide the user through the ranking of study types, weighting factors, and performance for a stated end-goal. The ideal use of the DSS is as a support tool for regulators making decisions on the evaluation of technology. This is best done by using a multi-reviewer expert panel approach that includes both scientists and regulators, as suggested.

Both goals of this project provide greater insight into where the future of decision-making lies. As the onsite program and industry move toward performance-based codes, this project will improve the baseline understanding of how to assemble, assess, and interpret new and existing datasets to maximize their benefit to the onsite program.

Printed on recycled paper in the United States of America.

WU-HT-03-35

NDWRCDP
Washington University, Campus Box 1150, One Brookings Drive, Cupples 2, Rm. 11, St. Louis, Missouri 63130-4899 • USA

This report is available online at www.ndwrcdp.org. This report is also available through the National Small Flows Clearinghouse • West Virginia University/NRCCE, P.O. Box 6064, Morgantown, WV 26506-6064 • USA Tel: (800) 624-8301 • WWCDRE51