LIST OF USERS

Of Technology Tools and Methodologies Developed Under the Science and Technology for Sustainability Multi-Year Plan and its Predecessor MYP

Environmental Technology and Verification (ETV) Program

1. ***OPPT Using ETV Testing for Lead Test Kits:*** EPA Renovation Repair and Painting Rule (see http://www.epa.gov/fedrgstr/EPA-TOX/2008/April/Day-22/t8141.pdf) requires ETV testing or approved equivalent ETV is referenced in the Renovation, Repair and Painting Rule promulgated on March 31, 2008 that includes a lead test kit recognition program. The recognition program references ETV as the testing organization that will be used to evaluate the test kits. ETV is in the process of verifying the performance of lead in paint test kits under an Environmental and Sustainable Technology Evaluation (ESTE) project.

2. ***Generic Verification Protocol for Baghouse Filtration Products:*** A Sept 26, 2007 memo from Steve Page, Director, OAQPS, to the EPA Regional Air Division Directors, states OAQPS will consider use of the ETV baghouse filtration protocol in future regulations, recommends regions consider opportunities to employ protocols in state and local regulatory programs, and suggests use of filter media tested under the ETV protocol. On a related note, California's Proposed Amended Rule 1156, Further Reductions of Particulate Emissions from Cement Manufacturing Facilities, June 13, 2008 states "In lieu of annual testing, the operator who elects to use all (ETV) verified filtration products in its baghouses shall conduct a compliance test every five years."

3. ***Generic Verification Protocol for Diesel Exhaust Catalysts, Particulate Filters, and Engine Modification Control Technologies for Highway and Non-Road Use Diesel Engines*** The ETV Program includes three well-accepted diesel retrofit technology protocols, which have advanced efforts to standardize protocols across programs. The ETV protocols are currently posted on the EPA's Voluntary Diesel Retrofit Program (VDRP) and ETV Web sites and can be used by retrofit technology manufacturers and others to generate data on the performance of diesel engine retrofit technologies. Technology vendors have submitted the data generated by ETV using these protocols to the VDRP. VDRP has used this information to determine, at least in part, whether to post ETV-verified technologies on the VDRP-verified technology list. Posting on the VDRP list is expected to reduce the amount of state- or program-specific testing needed to evaluate retrofit technologies and determine the pollutant reductions associated with their use.

4. ***States use ETV protocols in wastewater rules and guidance:*** In 2008, ETV added seven states, in addition to two documented in 2005 or prior, as referencing ETV in their regulations or guidance.

Florida - Florida Administrative Code 64E6.012, Applications for Innovative System Permits and System Construction Permits, indicates that an application for innovative system permits shall include: (b) Compelling evidence that the system will function properly and reliably to meet the requirements of this chapter and Section 381.0065, F.S. Such compelling evidence shall include one or more of the following from a third-party testing organization approved through the NSF Environmental Technology Verification Program.

Idaho - The State Technical Guidance Manual (October 4, 2007) includes references to "has successfully completed an EPA sanctioned Environmental Technology Verification (ETV) test" for Extended (Wastewater) Treatment Package Systems, as well as for nitrogen reduction systems.

Maryland - The BAT workgroup has adopted a protocol used by the Environmental Protection Agency/Environmental Technology Verification (EPA/ETV) to establish a procedure to verify the performance of nitrogen reducing OSDS (onsite distribution systems). Further, a review team comprised of three engineers from MDE and one County Environmental Health Director are reviewing the applications to ensure that each technology has been third party evaluated to a standard at least as stringent as the EPA/ETV's.

Pennsylvania - The Experimental Onlot Wastewater Technology Verification Program requires technologies accepted for performance verification complete appropriate testing. . . following a protocol developed by or in cooperation with ANSI and/or the U.S. Environmental Protection Agency (ETV).

Virginia - State DEQ encourages innovative technology developers and vendors to use technology templates, such as the EPA Environmental Technology Verification Program, to serve as means for potential customers and regulators to see consistent descriptions, application information, and performance data on new technologies.

Washington - Rules (On-site Sewage Systems, Chapter 246-272A WAC, Effective July 1, 2007) written for Testing Requirements for Proprietary Treatment Products requires (1) EPA/NSF Protocol for the Verification of Wastewater Treatment Technologies / EPA Environmental Technology Verification (April 2001) for systems designed to treat high-strength sewage when septic tank effluent is anticipated to be greater than treatment level E. (Such as at restaurants, grocery stores, mini-marts, group homes, medical clinics, residences, etc.); and (2) Protocol for the Verification of Residential Wastewater Treatment Technologies for Nutrient Reduction/EPA Environmental Technology Verification Program (November, 2000) for residential and high strength wastewater applications.

Oregon - The State Administrative Rules for Approval of New or Innovative Technologies, Materials, or Designs for Onsite Systems specifies that the department may approve new or innovative technologies, materials, or designs for onsite systems pursuant to this rule if it determines they will protect public health, safety, and waters of the state as effectively as systems authorized in this division. The department must base approval on one or more of the following: (D) Certification of the new material, technology, or design for proposed uses by NSF International, EPA's Environmental Technology Verification (ETV) program, or another program providing certification equivalent to the performance demonstration required by this rule and approved by the department.

5. ***States using ETV in drinking water regulations and guidance:*** Thirty-one states responding to the 2008 Association of State Drinking Water Administrators (ASDWA) survey indicated that they can allow for reduced pilot testing of drinking water treatment systems for those products with acceptable ETV reports.

Massachusetts regulation (Massachusetts Department of Environmental Protection, Bureau of Resource Protection – Water Supply, BRP WS 27 Permits for New Technology with Third-party Approval) states that verification reports can be used to qualify a technology for approval, potentially with reduced pilot testing.

The State of Utah's drinking water regulations specifically identify the ETV Program as a source of performance verification data. (See Utah Safe Drinking Water Act; R309535-13; June 2005.). The Utah Department of Environmental Quality Web site also states: "A number of treatment processes have undergone rigorous testing under the EPA's Environmental Technology Verification Program (ETV). If a particular treatment process is a "verified technology", it may be accepted in Utah without further pilot plant testing." (See http://www.drinkingwater.utah.gov/plan_review_intro.htm for quote.)

The State of Washington's water system design manual references ETV protocols for surface water treatment. (See http://www.doh.wa.gov/ehp/dw/DesignManual/chapter12.DOC)

6. ***Generic Verification Protocol for Determination of Emissions from Outdoor Wood-Fired Hydronic Heaters:*** EPA OAQPS is participating in the development of a Model Rule that will help states and local agencies that choose to regulate emissions from outdoor wood-fired hydronic heaters (OWHH) and a voluntary program for testing and disclosing emission performance. The OWHH has identified ETV as "an independent, objective and high quality source of performance information" for assessing OWHH performance; ETV published a protocol in June 2008 for verifying OWHH performance. (See http://www.epa.gov/woodheaters).

- Massachusetts has proposed regulation for outdoor hydronic heaters (310 CMR 7.26(50) Outdoor Hydronic Heaters) identifies ETV as a source for emission test data (see 310 CMR 7.26(50) Outdoor Hydronic Heaters)

- NESCAUM's proposed rule (http://www.nescaum.org/topics/outdoor-hydronic-heaters) requires testing via ETV.

7. ***OPP using ETV and its pesticide spray drift research to develop pesticide risk assessment and labeling requirements.*** OPP intends to use verified drift-reduction technologies in its pesticide risk assessments and registration decisions (Interview, J. Ellenberger, OPP, Daily Environment Report, May 21, 2007). The ESTE spray drift project is covered in page 7 of the draft pesticide registration notice for pesticide spray drift entitled " Pesticide Registration (PR) Notice 2008-X Draft: Pesticide Drift Labeling"

8. ***ETV reports and data were used during EPA's decision to retain Syngenta Method AG-625 as an approved method for atrazine, subject to certain conditions.*** (See 40 CFR Part 122, 136, et al.; Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act; National Primary Drinking Water Regulations; and National Secondary Drinking Water Regulations; Analysis and Sampling Procedures; Final Rule; March 12, 2007).

9. ***EPA referenced nine ETV verification reports and two verification protocols in the final drinking water LT2 rule***. (See 40 CFR Parts 9, 141, and 142; National Primary Drinking Water

Regulations: Long Term 2 Enhanced Surface Water Treatment Rule; Final Rule; January 5, 2006) Additionally, EPA defined a set of test conditions that must be met for an acceptable challenge test to be used for compliance with the LT2ESWTR. These conditions provide only a framework for the challenge test and States may develop additional testing requirements. The draft Toolbox Guidance Manual identifies the ETV Protocol for Equipment Verification Testing for Physical Removal of Microbiological and Particulate Contaminants as containing sections that provide guidance for developing and conducting a bag and cartridge filter challenge test for LT2ESWTR.

10. ***TV reports and data were used to inform the development of Continuous Instrumental Test Methods Rule.*** (See, 40 CFR Part 60; Update of Continuous Instrumental Test Methods; Final Rule; May 15, 2006 at http://www.epa.gov/EPA-AIR/2006/May/Day-15/a4196.htm).

11. ***The California State Lands Commission (Commission) Marine Invasive Species Program's (MISP) Ballast Water Treatment Technology Testing Guidelines is based on the ETV "Draft generic protocol for verification of ballast water treatment technologies"*** which was developed as a joint effort by ETV's WQPC and the USCG. (See http://www.slc.ca.gov/Spec_Pub/MFD/Ballast_Water/Documents/TestingGuidelinesFinal_101008.pdf for more information)

Others can be found in the ***two case study documents we produced in 2006.*** They can be found at http://www.epa.gov/etv/pubs/600r06001pv.pdf and http://www.epa.gov/etv/pubs/600r06082pv.pdf, respectively.

Sustainable Materials And Residuals managemenT (SMART) Decision Support Tool
(Previously referred to as the Municipal Solid Waste DST)

1) Sandra Cointreau
   Solid Waste Management Advisor
   World Bank
2) Brian Bahor
   Covanta Projects, Inc.
   Fairfield, NJ 07004
3) Frank Ferraro
   Wheelabrator Technologies, Inc.
   Hampton, NH 03842
4) Daniel Dietch
   CH2MHILL
   Coral Gables, FL 33134
5) William Brandes and Jesse Miller
   EPA, Office of Solid Waste
   1200 Pennsylvania Avenue, N. W.
   Washington, DC 20460
6) H. Scott Matthews
   Associate Professor of Civil and Environmental Engineering and Public Policy
   Research Director, Green Design Institute Carnegie Mellon University
   Pittsburgh, PA 15213

7) Debra R. Reinhart, PhD, PE, BCEE
   Interim Director NanoScience Technology Center
   Interim Assistant VP for Research
   University of Central Florida
   Orlando, FL 32826
8) Jenna R. Jambeck, Ph.D.
   Research Assistant Professor
   Environmental Research Group
   Department of Civil/Environmental Engineering
   University of New Hampshire
   Durham, NH 03824

Application of SMART Tool

The tool has been used to support decisions at the global, national, regional and community levels. Places where it has been applied in one or multiple municipal solid waste (MSW) studies are as follows:

Communities include: Anderson County, S.C.; Atlanta, Georgia; Edmonton, Alberta; Lucas County, Ohio; Madison, Wisconsin; Minneapolis, Minnesota; Portland, Oregon; Seattle, Washington; Spokane, Washington; Tacoma, Washington; and Wake County, N.C.; U.S. EPA's RTP Facility

State or Regional studies include: Great River Regional Waste Authority, Iowa; California; Delaware; Georgia; Hawaii; New York; Virgin Islands; Washington; Wisconsin;; U.S. Navy Region Northwest; Greater Regional Vancouver

The tool has also been used in a U.S. GHG Study for U.S. Conference of Mayors and globally in World Bank funded study of 10 different communities of which 8 are in economically developing countries.

Example applications of the SMART-DST include:

- Estimate the environmental and cost implications of existing and new management programs such as expansion of curb-side recycling programs
- Develop waste management plans in a more regional/integrated fashion
- Quantify carbon emissions or emission reductions for GHG reduction programs or in meeting renewable portfolio standards
- Evaluate new waste management technologies such as waste conversion technologies
- Measure progress over time in meeting environmental goals
- Identify which materials in MSW will obtain greater environmental benefit from source reduction and materials recovery programs.

Waste Reduction Algorithm (WAR Algorithm)

[These are researchers who used WAR in their own research projects not just citations.]

1) Auburn University (Auburn, AL)
2) Brandenburg Technical University Cottbus (Cottbus, Germany)
3) Chinese Academy of Sciences (Beijing, China)
4) Danish Technical University (Lyngsby, Denmark)
5) ETH Institute for Chemical and Bioengineering (Zurich, Switzerland)
6) Kuwait University (Safat, Kuwait)
7) Memorial University of Newfoundland (St. John, Newfoundland, Canada)
8) National University of Colombia (Caldas, Colombia)
9) National University of Singapore (Singapore, Singapore)
10) Polytechnic University of Catalunya (Barcelona, Spain)
11) South China University of Technology (Guangzhou, China)
12) Swiss Federal Institute of Technology (Zurich, Switzerland)
13) The National University of the South (Buenos Aires, Argentina)
14) Tsinghua University (Beijing, China)
15) University of California Los Angeles (Los Angeles, CA)
16) University of Illinois – Chicago (Chicago, IL)
17) University of Melbourne (Melbourne, Australia)
18) University of Nevada (Reno, NV)
19) University of Oldenburg (Oldenburg, Germany)
20) University of Paderborn (Paderborn, Germany)
21) University of Porto (Porto, Portugal)
22) University of Tennessee (Knoxville, TN)
23) University of Toledo (Toledo, OH)
24) University of Trieste (Trieste, Italy)
25) Xian Jiaotong University (Xian, China)
26) Zhongyuan Institute of Technology (Zhengzhou, China)

WAR Downloads

- 416 downloads TOTAL (since 2004)
- 92 downloads in FY09
- Historical Distribution (59 % academia; 12 % industry; 9 % government; 8 % other; 12 % unspecified)

Toxicity Estimation Software Tool (T.E.S.T.)

1) Mario Negri Institute for Pharmacological Research (Milan, Italy)
2) University of North Carolina (Chapel Hill, NC)

TEST Downloads (software put on www.epa.gov during summer of 2008)

- 38 downloads in FY09

Methodology for an Incentive-based Approach to Decentralization of Stormwater Management

1) Metropolitan Sewer district of Greater Cincinnati, Karen Ball
2) Cleveland Metroparks, John Mack
3) Northeast Ohio Regional Sewer District, Linda Mayer-Mack, Kyle Dreyfuss-Wells
4) USEPA Region 5, Bob Newport

Methodology for a Multidisciplinary Approach to Examining Regional Sustainability

1) Adam State College, Rafe Weston
2) US EPA Region 2, Puerto Rico, Carl-Axel Soderberg

Life Cycle Assessment

1) National Energy Technology Laboratory (NETL)
2) United States Postal Service
3) EPA Office of Solid Waste (OSW)
4) EPA Office of Air Quality Planning and Standards (OAQPS)
5) EPA Office of Prevention, Pesticides, and Toxics (OPPT)
6) Kimberly-Clarke
7) Treated Wood Council
8) Aluminum Association
9) International Copper Association
10) American Coal Ash Association

Life Cycle Inventory Database

1) National Renewable Energy Laboratory
2) GreenBlue (a non-profit)
3) United Nations Environment Programme

Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI)

1) US Green Building Council Leadership in Energy and Environmental Design (LEED),
2) National Institute of Standards and Technology (NIST) Building for Environmental and Economic Sustainability (BEES),
3) Region 9 Remediation Technology Evaluation,
4) US Marine Corps' Environmental Knowledge and Assessment Tool (EKAT),
5) International Design Center for the Environment's eLCie software,
6) Pre Consultants' SimaPro (software for LCA),
7) The Institute for Market Transformation to Sustainability Emergency SMART Building Product Standard,
8) The Institute for Market Transformation to Sustainability, SMART 2.0 Flooring Standard,

9) The Institute for Market Transformation to Sustainability, SMART Sustainable Textile Standard 2.0,
10) Draft American Society for Testing and Materials (ASTM) Standard D7075 - 04 – Standard Practice for Evaluating and Reporting Environmental Performance of Biobased Products,
11) National Science Foundation (NSF) International/American National Standard NSF 140 – 2005 – Sustainable Carpet Assessment Draft Standard,
12) Listed within the draft ASTM Standard D7075 - 04 – Standard Practice for Evaluating and Reporting Environmental Performance of Biobased Products.