Model Systems Plan

Regulatory Impact Analysis

Background:

Requirements under the Safe Drinking Water Act, as amended in 1996, and technical issues identified by the Environmental Protection Agency (EPA) and its stakeholders have combined to create the need for new regulatory costing and economic impact analysis methodologies. With the development of the radon in drinking water proposal in 1991, it became clear that for EPA to develop suitable costs of compliance, a clear and well-documented model must be used to determine costs at a range of water systems. To make better estimates of regulatory costs (and benefits) EPA must take into consideration the diversity of the regulated drinking water community: from the very smallest of non-community water systems (NCWS), to large multi-well groundwater systems; from the largest urban surface water systems requiring upgrades, to the smallest community water systems (CWS) serving trailer parks, rest areas, and restaurants which may require treatment for the first time. Clearly the multiple types of water systems will have highly divergent needs and methods of installing treatment, in addition to varying distributions of regulatory costs and benefits.

EPA's development of unit treatment and household costs (and other aspects of the cost and benefit analyses) will depend upon the accurate portrayal of "model systems," i.e., models which describe the characteristics of the major public water system types. Development of model systems for the Office of Ground Water and Drinking Water (OGWDW) has begun with the review of background documents, some of which were produced by drinking water stakeholders (1,2). In addition, OGWDW in 1997 studied available water system data, including the results of the recent Community Water System Survey (CWSS)(3). The CWSS has contains valuable information on community supplies such as CWS water production and design flow data, information on numbers and types of sources, customer information, water distribution and storage data, and other system profile information which may be utilized to pull together a model systems plan. The office also reviewed the analysis of 1980's CWS flow and population data as performed by Cummins (4), and system data collected under the recent ESWTR/DBP ICR analysis. These may be useful tools in checking the reasonableness of the new model systems flow regime.

OGWDW has set the goal of developing a logical model water systems plan which will serve as a periodically updated reference work for the cost/benefit analyses. The office is just now completing a strawman model systems plan. Expert review of the strawman analysis is anticipated in the Fall of 1997. EPA is planning to implement the new model systems plan in its assessments of impact for the proposed groundwater disinfection rule (GWDR) and the radon and arsenic proposals as they develop in 1998-99.

The new model systems plan will be used by rule managers, engineers and economists, among others, in the estimating of unit treatment costs, household costs, national costs and benefits of proposed rules. It appears likely that EPA will continue to base its cost analyses on population categories with assigned flow values because population risks and benefits must be determined. In addition, NCWS are expected to be modeled separately from the CWS due to the nature of NCWS and a lack of national NCWS survey data. It is expected that the resulting NCWS and CWS models will be significantly different.

EPA's regulatory impact analyses is expected to profit from this effort: for example, refinements to system operational information (e.g., flow) will be applied to characterize differences in water use and therefore human exposure at various types of model facilities. Perhaps more immediately, system characteristics may be used to determine appropriateness of treatment technologies for very small water systems and distribution of treatment within larger multi-source supplies.

Summary of Activities:

Review of Sources. In 1996-97 EPA reviewed the AWWARF report on cost of compliance (1) and results of the 1996 Blue Ribbon Panel (2). These references covered such issues as model size categories, the flow vs population relationship, excess capacity (design: average flows), source water type (groundwater and surface waters), distribution of sources (e.g., wells), and potential effects of ownership type on cost, all of which require investigation prior to drafting a model systems plan. EPA reviewed other resources including the original flow analysis of Cummins of EPA (4) and results of recent surveys as a prelude to developing new model systems for the cost/benefit analyses.

Data Development. EPA spent mid-1997 investigating applicability of CWSS data to refining model systems concepts and developing methods to utilize that data to formulate statistically valid "typical (median)" and "average (arithmetic)" system flows for costing purposes. It now appears that the number of "cells" used to represent of the whole PWS domain will be much larger than the previous EPA 12 system size scheme (which included minimal differentiation by type, source, number of treatment sites, etc.). The new analysis has given way to the possibility of including model CWS and NCWS, groundwater and surface water source types, mixed GW/SW systems, private and public ownership, and a range of population/flow categories.

An additional effort was required in determining water use rates at non-community type water supplies (NCWS), focusing on categorizing the myriad types of NCWS into groups of systems with roughly similar consumption/use rates. Based on review of engineering design manuals and on professional judgement, it has been determined that most types of NCWS have much lower average and design flow needs compared to CWS due to typical consumer use that may range from 4 to 40 gallons per capita per day (e.g., use at a church vs. a motel).

Expert Review. A model systems (CWS-NCWS) strawman document is to be reviewed by a panel of technical experts in October-November 1997. If there is sufficient stakeholder interest, a short turnaround review of the peer reviewed draft product will be offered prior to its implementation in early 1998.

Model systems development is on the critical path in relation to the proposal of the arsenic, radon and groundwater disinfection rules. EPA's Office of Ground Water and Drinking Water (OGWDW) plans at the very least to implement updated flow regimes which will distinguish community and non-community water systems by population category, type of source (ground vs. surface), and entry points to distribution.

Other important model system characteristics may be deferred beyond the current model systems development effort. Among the characteristics unlikely to be addressed in the early model systems development effort are: system differences attributable to regional setting, variations in exposure routes related to system type, system residence times, storage profiles, and existing treatment profiles. Some of these parameters may be addressed by the Baseline Development effort.

Schedule:

Review of Background Reports	Nov. 1996 - Jan. 1997
Developing Model System Plan	April 1997 - Sep. 1997
Peer Review of Strawman Model System Plan	November 1997
Revised Model Systems Plan	March 1998
Pilot Model System Plan	Approx. June 1998

Questions for Discussion

1. Has EPA considered appropriate sources of information in developing model systems characteristics (i.e., survey data)?

2. Are there other model system parameters and corresponding data that EPA might consider which would help better define impacts and benefits?

3. Are there important characteristics which should be added to the model systems before their first application?

4. Past commenters have expressed the concern that the use of many categories of water systems in our analyses limit the reader's ability to follow our rationales. What are stakeholder preferences in terms of detail versus simplicity of presentation?

References Cited:

1) Raucher, Robert S. Estimating the Cost of Compliance With Drinking Water Standards: A User's Guide. American Water Works Assoc. Research Foundation (1985).

2) U.S. Environmental Protection Agency. Proceedings of the Blue Ribbon Panel Report on SDWA Costing (1996).

3) U.S. Environmental Protection Agency. Community Water System Survey, Volumes 1 & 2. EPA-815-R-97-001a/b (1997).

4) U.S. Environmental Protection Agency. Transmittal by Michael D. Cummins: Analysis of Flow Data (1987).

5) U.S. Environmental Protection Agency. Meeting Summaries: Regulatory Impact Analysis Discussions (1997).