

INTRODUCTION

Purpose of the Workshop

Since the U.S. Environmental Protection Agency (hereafter EPA or the Agency) last published recreational water quality criteria in 1986, there have been significant advances, particularly in the areas of molecular biology, microbiology, and analytical chemistry. EPA believes that these new scientific and technical advances need to be factored into the development of new or revised Clean Water Act (CWA) Section 304(a) criteria for recreation. To this end, EPA has been conducting research and assessing relevant scientific and technical information to provide the scientific foundation for the development of new or revised criteria. The enactment of the Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000 (which amended the CWA) required EPA to conduct new studies and issue new or revised criteria, specifically for Great Lakes and coastal marine waters.

From March 26 through 30, 2007, EPA convened a group of 43 national and international technical, scientific, and implementation experts from academia, numerous states, public interest groups, EPA, and other federal agencies, at a formal workshop to discuss the state of the science on recreational water quality research and implementation.

The purpose of the workshop was for EPA to obtain individual input from members of the broad scientific and technical community on the “critical path” research and science needs for developing scientifically defensible new or revised CWA §304(a) recreational ambient water quality criteria (AWQC) in the near-term. Near-term needs were defined as specific research and science activities that could be accomplished in 2 to 3 years so that results are available to EPA in time to support the development of new or revised criteria. The new or revised criteria, which would be available from EPA in roughly 5 years (2012), must be scientifically sound, protective of the designated use, implementable for broad CWA purposes, and when implemented, provide for improved public health protection. (See Appendix A for the full charge to the experts.) The Agency wants to develop this new or revised criteria in a highly participatory framework within the next 5 years based on the best available science.

Workshop Design

The Experts Scientific Workshop on Critical Research and Science Needs for the Development of New or Revised Recreational Water Quality Criteria was designed to be similar in organization and format to the Society of Environmental Toxicology and Chemistry (SETAC) Pellston Workshops, where technical experts in a particular subject area are invited to participate and evaluate current and prospective environmental issues. A Pellston-type workshop typically brings together between 40 to 50 technical experts from academia, business, government, and public interest groups. Experts are semi-sequestered for up to a week to facilitate focused discussions and individual and collaborative writing of a draft summary report by the end of the workshop. Subject leaders are then responsible for consolidating, editing, producing, and distributing the final (formal) workshop proceedings.

Participant Affiliation Balance

In addition to U.S. and international experts drawn from academia, public interest groups, and numerous state and other federal agencies, EPA selected several experts from within EPA to serve in the workgroups (see Appendix B for participant list). The 43 experts serving in 7 subject areas were supported by a total of 9 EPA resource personnel, 10 note takers, 3 logistics contractors, and a professional facilitator. The proper balance between EPA presence and outside experts was crucial for keeping the discussions on track with EPA's needs from the workshop while providing ample opportunity for the external experts to voice their opinions and intellectually explore topics of interest to EPA.

Agenda Overview

The workshop began on Sunday evening, March 25, 2007, with a logistics meeting for the workgroup chairs, EPA staff, and note takers. The plenary sessions on Monday served to orient participants regarding CWA §304(a) AWQC and EPA's needs from the workshop discussions and these proceedings. Monday afternoon the seven workgroups met for the first time to discuss interpretation of the charge questions (Appendix A). On Tuesday, all workshop participants met in a plenary session, which was followed by workgroup sessions throughout the day. The agenda facilitated and encouraged the workgroups to meet with each other to discuss common and overlapping issues. At the end of the day the workshop participants met again in plenary to hear report-outs from each workgroup chair that described their progress for the day.

Because the seven workgroup topics have many overlapping issues, it was important for the groups to communicate as needed so they could both stay informed of and build on each other's discussions. In addition to several joint breakout sessions, the workgroup chairs also shared all of their meals to discuss ongoing progress. On Wednesday, the workshop participants met once again in a plenary session to discuss overall progress followed by workgroup breakout sessions where each group continued discussions and began writing a draft workgroup report. The workgroups continued writing on Thursday. Friday morning, each workgroup turned in a 10 to 20 page draft report and their respective chairs provided an overview of each report regarding the major themes discussed and critical research needs in a final plenary session.

Seven Workgroup Topics

The seven workgroup topics are presented in seven chapters in this report. The relationships between these and other topics are graphically represented in Figure 1. In Figure 1 shaded boxes correspond to the seven workgroups. The alternatives boxes in Figure 1 refer to various possible indicators that a toolbox approach could provide for each of the CWA applications. The charge questions helped the workgroups to define the scope of their discussions. The experts were asked to provide their individual insights on the state of the science as well as critical path research that could be completed by EPA in the next 2 to 3 years. A short description of each workgroup and the tasks EPA asked them to discuss follows.

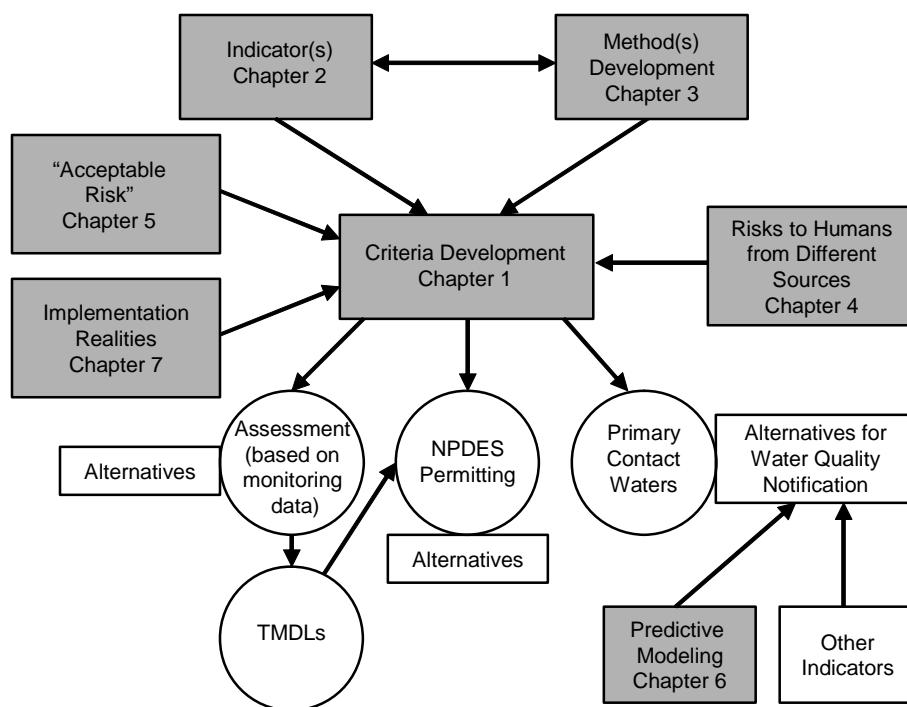


Figure 1. Flow Diagram of How the Workgroup Components Contribute to the Development of New or Revised Recreational Water Quality Criteria.

1. **Approaches to Criteria Development** – focus on a toolbox approach as well suggest other potential approaches for new or revised criteria development.
2. **Pathogens, Pathogen Indicators, and Indicators of Fecal Contamination** – discuss the strengths and limitations of indicators of fecal contamination, pathogen index microorganisms, and specific pathogens for development of new or revised recreational AWQC.
3. **Methods Development** – discuss methods for quantifying indicators and pathogens, such as culture-based methods, molecular-based methods (e.g., quantitative polymerase chain reaction [qPCR]), and faster culture-based methods and their applicability for AWQC.
4. **Comparing Risks to Humans from Different Sources** – discuss the relative risks of illness to humans in waters contaminated with human fecal material versus animal fecal material.
5. **Acceptable Risk** – discuss the level of risk to various populations that would be associated with numeric AWQC. EPA was interested in the science necessary to inform the policy decision regarding the target risk range and the process through which the policy decision could be reached.
6. **Modeling Applications to Criteria Development and Implementation** – discuss predictive modeling approaches and their potential applications in implementation of AWQC.

7. **Implementation Realities** – identify and consider factors that influence implementation of criteria for each of the CWA uses (beach monitoring and notification, development of National Pollutant Discharge Elimination System [NPDES] permits, assessments to determine use attainment, and development of total maximum daily loads [TMDLs]).

Background

Clean Water Act §304(a) Recommended Criteria

What are EPA's Recommended §304(a) Criteria?

CWA §304(a) AWQC are (typically) expressed as numeric concentrations of pollutants. These are essentially the numbers that EPA recommends that States and Tribes adopt in setting their own Water Quality Standards (WQS) to protect waters for specified designated uses. State and Tribal WQS, once approved by EPA, are the effective standards used in CWA regulatory and non-regulatory programs. Figure 2 provides an overview of CWA WQS.

States and Tribes classify waters by their designated use,¹ which includes “primary contact recreation.” States and Tribes typically define primary contact recreation to encompass recreational activities that could be expected to result in the ingestion of, or immersion in, a waterbody (such as swimming, water skiing, surfing, or any other recreational activity where ingestion of, or immersion in, the water is likely).

CWA §304(a):

- AWQC often are described as concentrations in the water column and generally have a time and duration component.
- AWQC could be expressed as an annual average concentration that should not be exceeded; a daily value or seasonal concentration that should not be exceeded; or a value that should not be exceeded, on average, more than one time every 3 years (for acute aquatic life criteria).
- AWQC are often associated with EPA-approved analytical methods. This is partly because without EPA-approved methods to measure concentrations in effluent, States are reluctant to adopt criteria in WQS that are then used in NPDES permits (see more below).

States typically adopt the recommended criteria into their WQS (i.e., regulations promulgated using state rulemaking processes [similar to Federal regulation development]).

What do States do with these EPA-recommended Numbers and how are they used by States?

Increasingly, because of the dynamics of State rulemaking processes and public and regulated community involvement, States are reluctant to adopt EPA's recommended criteria unless the

¹ CWA designated use (DU) classifications are narrative statements describing appropriate intended human and/or aquatic life and other quality objectives for waterbodies.

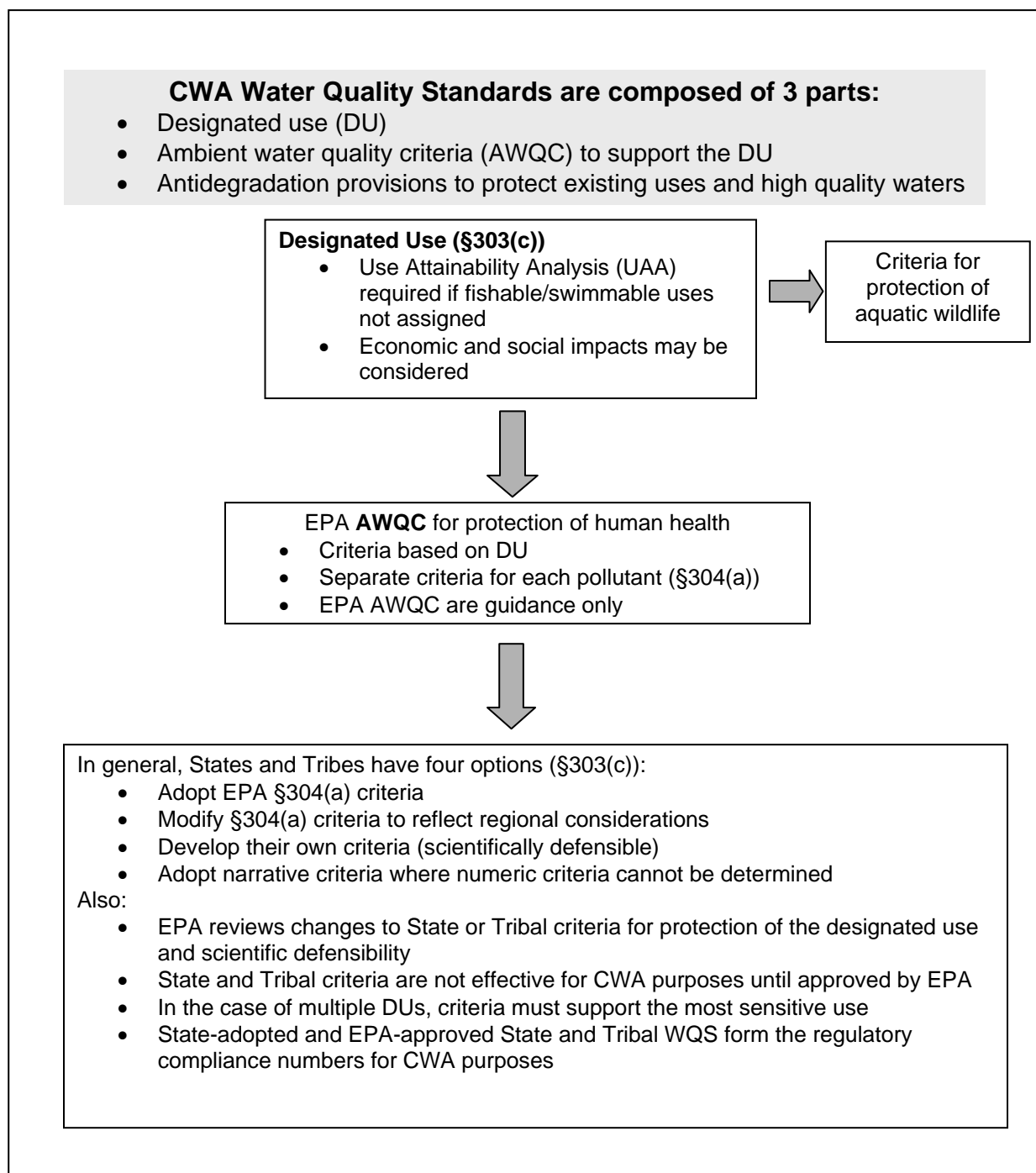


Figure 2. Clean Water Act: Water Quality Standards Overview.

underlying science supports the desired environmental result *and* the criteria can be implemented for all aspects of their CWA Programs.

Under CWA §304(a)(9), EPA is required to publish new or revised water quality criteria for pathogens and pathogen indicators (including a revised list of testing methods, as appropriate) for the purpose of protecting public health in coastal recreation waters. Coastal recreation waters

are marine and Great Lake waters designated by States for use for swimming, bathing, surfing, or similar water contact activities. Under CWA §303(i)(1)(B), States are then required to adopt new or revised WQS for those pathogens and pathogen indicators for which EPA's new or revised criteria have been developed. States must submit these standards to EPA for approval or disapproval. EPA approves the standards if they are scientifically defensible and protective of the designated use.

Once approved, State WQS become effective for CWA purposes. This means that the State-adopted §304(a) criteria become regulatory standards and are used for several different CWA purposes, including the following:

- **§303(d) listings.** Under §303(d) of the CWA, States prepare lists of waters that are impaired and need TMDLs; States develop the lists every 2 years and submit them to EPA for approval. If States determine that waters are not meeting applicable water quality standards (whether from point or non-point sources of pollution), States are to identify those waters as "impaired" under §303(d).
- **TMDL calculations** for impaired waters must be prepared to implement the applicable State WQS.
- **NPDES permits**, which are issued after State WQS are in place for a pollutant, must have discharge limits as stringent as necessary to meet such WQS. EPA's analytical methods are often used to measure compliance with permit limits.
- **Public Notification at Beaches.** Under the BEACH Act of 2000, eligible coastal and Great Lakes States may apply for and receive BEACH Act grants for their beach monitoring and public notification programs. Those States use their recreational contact WQS to determine whether to close an area for swimming or issue a swimming advisory.

Toolbox Approach

EPA's recommended AWQC have to be applicable at a national level. A toolbox approach is under consideration because of the potential for greater flexibility in selecting situationally-appropriate indicators/methods and increased options for implementation, which is desirable for nationally applicable criteria. A toolbox allows for the use of varied techniques and approaches to achieve public health protection.

A preliminary working definition of the Toolbox approach for recreational water quality criteria might be the following:

The toolbox approach is a set of potential microbiological (i.e., a microbe plus a specified enumeration method) and/or physico-chemical assays that could be employed alone, or in certain combinations, to protect and restore the recreational use of waters. The contents of the toolbox (the "tools") would be used by State public health and water quality agencies for beach advisory/closing program purposes and for all other Water Quality Standard related regulatory purposes under the CWA. The level of risk (or public health protection) would be the same regardless of which tool is used.

Although the toolbox concept allows a context for considering feasibility and applicability of different indicator and method combinations in developing new or revised recreational criteria under CWA §304(a), it is critical that there is an understanding of the relationship among the different methodologies for proper implementation of the criteria. For example, if EPA recommended one type of indicator for one set of uses (e.g., culturable enterococci) and also recommended the use of a DNA-based method (e.g., enterococci qPCR) for other uses, then there would have to be an understanding of the meaning of those multiple measures (i.e., linkage) in the context of the overall CWA §304(a) program. Without a clear understanding of the linkage and context of different methods the entire “toolbox” concept becomes unmanageable from a regulatory perspective.