Public Drinking Water Supply - Beneficial Use
Development of Ohio's Assessment Methodology

June 2006

Background

Each year Ohio's public water systems are faced with rising treatment costs driven by urbanization and associated storm water quantity and quality impacts, non-point source pollution, regulatory changes, and emerging contaminants. To protect these valuable source waters Ohio EPA recently developed an assessment methodology for the Public Drinking Water Supply beneficial use as required under Section 305(b) of the Clean Water Act (CWA).

Previously, it was believed that water quality standards designed to protect the aquatic life uses were comprehensive enough to protect the public drinking water supply use. However, several water bodies in Ohio were identified where the aquatic life use assessment failed to identify source water conditions which required additional treatment and expenditures by a public water system. This program provides an opportunity to strengthen the connection between Clean Water Act and Safe Drinking Water Act (SDWA) activities by employing the authority of the CWA to meet SDWA objectives of source water protection and reduced risk to human health.

The draft methodology for assessment of PDWS beneficial use was included as Appendix C of Ohio's 2006 Integrated Water Quality Report, posted on 1/20/2006. The document is available for review on the agency's website at http://www.epa.state.oh.us/dsw/tmdl/2006IntReport/App_C_PDWS methodology.pdf. Prior to developing this document, the agency prepared an internal summary report of current PDWS methodologies used by the other 49 states. Since this report was completed in 2002, a number of states have reevaluated their approach and are designing more comprehensive assessments.

Assessment Strategy and Objectives

The primary objective for assessing the PDWS beneficial use is to fulfill the CWA requirements and identify areas and specific causes of impairment. If a water body is identified as impaired for the PDWS use, then Ohio EPA must address the cause of impairment through the TMDL process. Source water quality data compiled for these assessments would also be utilized for contaminant trend analysis and evaluation of ongoing watershed restoration activities, such as effectiveness of best management practices (BMPs). The water quality goal is that waters with conventional treatment will be suitable for human consumption and able to meet federal drinking water standards. The first round of assessments will focus on indicators with established water quality criteria, while later assessments will incorporate additional indicators as related criteria are finalized.

Water Quality Indicators

Assessments will focus on several core water quality indicators; nitrate, pesticides, other chemicals with established primary SDWA MCLs, and *Cryptosporidium*. Selection was based on the following:

- documented or suspected human health impacts, availability of established water quality standards,
- availability of credible and reliable data,
- impact of the indicator on water treatment processes and costs; and
- ability of the agency to conduct future sampling.

Algae and taste/odor will also be considered supplemental indicators and assessed if there are known water quality problems. Additional criteria will be developed in the future to address harmful and nuisance algal blooms

Source Water Quality Data

As part of ongoing watershed surveys, Ohio EPA is collecting water quality samples near drinking water intakes to assess the PDWS beneficial use. Additional data from Drinking Water Source Assessment Reports, Total Maximum Daily Load (TMDL) Reports, Unregulated Contaminants Monitoring Rule (UCMR), and other special studies will be reviewed to identify future sampling sites and focus monitoring on areas with impacted source water.

Many public water systems collect raw water data for operational and source water protection purposes but most of this data is not routinely submitted to Ohio EPA. Water systems will be

contacted to identify which ones have relevant data and are willing to share it with the agency for assessment purposes. Data used to support impairment determinations must meet specific Ohio credible data requirements. However, Ohio EPA may utilize source water data that is not level 3 to guide future agency sampling efforts, corroborate credible data, and identify regional source water quality problem areas.

PWS Finished Water Quality Data

This is a large database of primarily treated water quality data. Data will be evaluated from the most recent five years. However, if treatment beyond conventional is used then use of this data as an indicator of source water quality may be limited.

For the purposes of these assessments, conventional treatment refers to baseline treatment required by Ohio law for public water systems using surface water as a source. Conventional filtration and standard disinfection processes, such as chlorination, are considered conventional treatment for these assessments. The following processes are examples of treatment considered beyond conventional; activated carbon (powered and granular), ion exchange, electrodialysis, ozonation, reverse osmosis, enhanced coagulation and membrane filtration.

Treatment Plant Process Inventory

As part of the assessment process the public water system operator will be contacted in order to obtain recent treatment history and to verify information regarding current treatment processes, purpose, estimated costs, and to identify source water concerns. Source water management information will also be captured during the assessments and used to assess the applicability of treated compliance water quality data (as representative of source water conditions). This data will be compiled and used to identify regional and statewide source water concerns as related to public water system treatment costs and limitations.

Water Quality Standards

As specified in Ohio regulation, OAC Chapter 3745-1, surface water quality standards were designed to protect source water to the extent that public water systems can meet the finished water SDWA standards utilizing only conventional treatment. Source water quality will be assessed though comparison of in-stream and applicable treated water quality data to numeric water quality criteria for the core indicators; nitrate, pesticides, other contaminants and *Cryptosporidium* (following criteria development). The numeric water quality criteria are based on treatment standards established by the SDWA or were adopted from U.S. EPA's 304(a) recommended water quality criteria. Criteria will apply as

average concentrations except for nitrate. At elevated levels, nitrate can cause acute health effects and the SDWA finished water standard applies as a maximum concentration not to be exceeded. Consequently, the water quality criteria for nitrate will be applied as a maximum value. Algae and taste and odor will also be considered as supplemental indicators and assessed if there are known source water quality problems. If areas of nuisance algae are present and impacting the water treatment system, then the waters may be designated impaired due to the aesthetic narrative criteria described in OAC rule 3745-1-07.

Attainment Determination

Each assessment will result in identification of one of three attainment categories: Impaired, Full Attainment, and Not Assessed-Insufficient Data. Full attainment waters will further be evaluated for water quality conditions placing it on a "watch list". Waters in this category will be targeted for increased monitoring and assessment. The following table specifies impaired and "watch list" water quality conditions.

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Table 2 from the Ohio EPA November 2005 Draft Report, Assessment Methodology and Standards for Protection of the Public Drinking Water Supply Beneficial Use

Public Drinking Water Supply Impairment Determination *Applies to in-stream ambient and treated water quality data for the most recent five year period.*	
Indicator	**Impaired Conditions**
Nitrate	❑ Two or more excursions[1] above the WQ criteria within the 5 year period
Pesticides	❑ Annual average exceeds WQ criteria
Other Contaminants	❑ Annual average exceeds WQ criteria
Cryptosporidium	❑ Annual average exceeds WQ criteria (1.0 oocysts/L*)*
Indicator	**Full Attainment Conditions**
Nitrate	❑ No more than one excursion[1] above the WQ criteria within the 5 year period.
Pesticides	❑ Annual average does not exceed the WQ criteria
Other Contaminants	❑ Annual average does not exceed the WQ criteria
Cryptosporidium	❑ Annual average does not exceed the WQ criterion
Indicator	**"Watch List" Conditions** *Source waters targeted for additional monitoring and assessment*
Nitrate	❑ Maximum instantaneous value > 8 mg/L (80% of WQ criterion)
Pesticides	❑ Running quarterly average > WQ criteria ❑ Maximum instantaneous value > 4x WQ criteria
Other Contaminants	❑ Maximum instantaneous value > WQ criteria
Cryptosporidium	❑ Annual average > 0.075 oocysts/L

[1] Excursions must be at least 30 days apart in order to capture separate or extended source water quality events.

WQ Criteria - Water Quality Criteria defined in OAC Chapter 3745-1 established to protect in-stream water quality for the PDWS beneficial use (Human health- Drinking Water)