State of Ohio
Environmental Protection Agency

Division of Drinking and Ground Waters

Public Drinking Water Supply Beneficial Use Assessment Summary Report for the Sandusky River Watershed

Wyandot, Seneca, Crawford and Sandusky Counties

FINAL REPORT

July 2006

Bob Taft, Governor
Joseph P. Koncelik, Director

Public Drinking Water Supply Beneficial Use Assessment Summary Report for the Sandusky River Watershed

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Cover Photo by A.J. Klei:
Sandusky River in south of Fremont, Ohio along South River Road at Tindall Bridge looking upstream taken in February 2005.

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NOTICE TO USERS

Although Ohio has designated waters with the Public Water Supply beneficial use for many years, it is only recently that the agency initiated separate assessment of this use. Setting water quality standards for protection of public drinking water helps to achieve two goals: (1) Progress toward the Clean Water Act's goal of "drinkable" surface water can be measured; and (2) the Safe Drinking Water Act's source water protection initiatives are facilitated. Water quality criteria for protection of the public water supply beneficial use were primarily derived from SDWA water quality standards and will be updated periodically as supported by ongoing research on current and emerging contaminants.

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FOREWORD

What is the Public Drinking Water Supply Beneficial Use Designation?

The Ohio Water Quality Standards (WQS) defined in Ohio Administrative Code (OAC) Chapter 3745-1 consist of designated uses and chemical, physical, and biological criteria designed to represent measurable properties of the environment that are consistent with the goal specified by each use designation. Use designations consist of two broad groups, aquatic life and non-aquatic life uses (including public water supply). The public water supply beneficial use, hereafter referred to as public drinking water supply (PDWS) beneficial use, applies to all waters that, with conventional treatment, will be suitable for human intake and meet federal regulations for drinking water. The use designation applies to the following waters as defined in OAC Rule 3745-1-07:

(1) All publicly owned lakes and reservoirs;
(2) All privately owned lakes and reservoirs used as a source of drinking water;
(3) Surface waters within 500 yards of an existing public water supply surface water intake; and
(4) All surface waters used as emergency water supplies.

Ohio Water Quality Standards for Protection of the Public Drinking Water Supply Use

The water quality standards for protection of the public drinking water supply use were developed with the acknowledgment that source waters will undergo a certain amount of treatment and contaminant removal prior to human consumption. This baseline expectation of treatment was defined as "conventional treatment" and includes conventional filtration, coagulation, flocculation, sedimentation and disinfection. Source waters meeting these in-stream water quality standards could be treated with conventional processes only in order to comply with Safe Drinking Water Act (SDWA) standards for finished water. Therefore, in-stream standards for source water contaminants not effectively removed by conventional processes are based directly on the finished water SDWA standards. At the time of this report, the PDWS beneficial use methodology was in Draft format and was released for public comment as part of the Ohio 2006 Integrated Water Quality Report, in January 2006. It is anticipated that the methodology will be finalized later in 2006.

Selection of Key Water Quality Indicators

Assessments were focused on contaminants that pose the greatest risk to human health, impact treatment costs, and can be controlled within the watershed through source water protection efforts or existing permit programs. Ohio's assessment program will focus initially on nitrate, pesticides, microbial pathogens (*Cryptosporidium*) and other contaminants with established SDWA standards. Treatment options for these contaminants often exceed conventional measures and can be quite costly. Assessments in the future will be expanded as additional water quality standards are established. Algae will also be considered as a supplemental indicator and assessed if there are known water quality problems. Additional information on inclusion and exclusion rationale of water quality indicators is provided in the DRAFT PDWS assessment methodology document available as an attachment to Ohio's 2006 Integrated Water Quality Report (http://www.epa.state.oh.us/dsw/document_index/305b.html) .

Description of Sandusky River PDWS Assessment Pilot Project
As part of Ohio's efforts to develop a comprehensive assessment methodology, water quality data and treatment plant information were compiled from the surface water systems within the Sandusky River watershed in order to evaluate the current approach.

Each public water system was contacted to discuss the project and solicit input on the draft assessment methodology from the water supplier's perspective. The water systems completed a survey designed to identify source water contaminants causing the greatest impact on treatment efficiency and costs. The water systems also identified which contaminants they would like to see the agency target for source water protection efforts. All eight public water systems participated in the pilot project by completing the survey and providing available water quality data.

MECHANISMS FOR WATER QUALITY IMPAIRMENT

Impairment of source waters designated with the public drinking water supply beneficial use may be caused by either point or non-point sources. In Ohio, contaminants typically associated with non-point source pollution present the greatest challenge to surface water public water supplies. Run-off from agricultural areas may degrade stream quality with increased levels of nutrients, pesticides, sediment and microbial contaminants. Unsewered areas and malfunctioning or poorly-sited septic systems may constitute significant sources of nutrient and microbial contaminants. Urbanization and associated storm water quantity and quality impacts also threaten the quality of Ohio's drinking water sources.

In the Sandusky River Watershed, the primary source water concerns are nutrients and pesticides. Given the rural and agricultural nature of the watershed it is clear that source water protection efforts should be focused on non-point source pollution. Many of the public water systems using surface water within the Sandusky watershed have constructed off-stream (upground) reservoirs to better manage their source waters during periods of poor water quality.

Nitrate and phosphorus are key nutrients that can greatly impact the water systems if present in source water at elevated levels. Nitrate is not effectively removed with conventional treatment and if present in source waters at concentrations greater than the water quality standard of 10 mg/L may result in increased health risks and issuance of a SDWA violation to the public water system. Elevated phosphorus in the source waters, including off-stream reservoirs, can contribute to algal blooms and thereby indirectly affect treatment effectiveness and cost. Algal blooms often impart significant taste and odor problems and directly lead to exceedences of disinfection byproduct maximum contaminant levels in finished water.

Pesticides are prevalent in many Ohio streams with a clear seasonal occurrence coinciding with typical agricultural application periods. Public water systems rely on additional treatment processes and off-stream storage capacity to maintain compliance with SDWA finished water quality standards. While seasonal spikes or low levels may not trigger a violation of SDWA standards, they could result in more frequent sampling requirements and additional expenditures by the water system.

SOURCE WATER PROTECTION WITHIN THE SANDUSKY RIVER WATERSHED

Ohio EPA has completed Drinking Water Source Assessment Reports for all of the surface water public water systems within the watershed. These source water assessments identified source water protection areas for each active intake, inventoried potential contaminant sources within these areas, evaluated the susceptibility of the source waters to contamination, and provided recommendations for developing local source water protection programs.

The Sandusky River Watershed Coalition (www.sanduskyriver.org) is actively working to improve water quality through promotion of best management practices, partnerships with local organizations, and efforts to educate and engage watershed residents in protection activities. The watershed coalition along with local health departments and WSOS Community Action Commission are partners in an EPA-funded Section 319 program providing financial assistance to landowners for replacement of home sewage treatment systems. The watershed coalition is also partnering with the Seneca Soil and Water Conservation District (SWCD) to offer agricultural producers a self-assessment and training program to enhance economic viability while protecting valuable soil and water resources. This project was funded by a grant from the Ohio Environmental Education Fund.

In January 2005, a watershed action plan for Honey Creek was completed by the National Center for Water Quality Research at Heidelberg College in collaboration with the Sandusky River Watershed Coalition. Honey Creek is a Sandusky River tributary entering the Sandusky mainstem south of the city of Tiffin in Seneca County.

Public Drinking Water Supply Beneficial Use Assessment Summary Report for the Sandusky River Watershed July 2006

Crawford, Sandusky, Seneca, and Wyandot Counties

State of Ohio Environmental Protection Agency
Division of Drinking and Ground Waters
Lazarus Government Center
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INTRODUCTION

Each year Ohio's public water systems are faced with rising treatment costs driven by regulatory changes, emerging contaminants, point and non-point source pollution, urbanization and associated storm water quantity and quality impacts. The Clean Water Act calls for the states to maintain, restore and protect the water resources to the extent the waters meet their intended beneficial uses, including public water supply. Assessment and protection of drinking water sources is also the first step of the Safe Drinking Water Act's multiple barrier approach toward safeguarding public health. Development of a program to assess the Public Water Supply beneficial use, herein referred to as the Public Drinking Water Supply (PDWS) beneficial use, presents a unique opportunity to coordinate efforts of two key programs to achieve common goals of source water assessment and protection.

The primary objective for assessing the Public Drinking Water Supply Beneficial Use is to fulfill the Clean Water Act requirements and identify areas and specific causes of impairment. If a water body is identified as impaired for the PDWS beneficial use, then Ohio EPA is required to address the source of impairment through the TMDL (Total Maximum Daily Load) program. Assessments will provide the State, communities, and local watershed groups valuable information that will assist in watershed planning and protection efforts. Source water quality data compiled for these assessments may also be utilized for contaminant trend analysis and evaluation of ongoing watershed restoration activities, such as effectiveness of best management practices (BMPs).

Specific objectives of the Sandusky River Watershed PDWS assessment include:

(1) Apply the draft PDWS assessment methodology to actual water quality and public water system data and identify methodology deficiencies;
(2) Compile assessments for individual public water systems and identify watershed-wide source water issues as related to the public water supply use;
(3) Determine the attainment status of waters currently designated with the PDWS use; and
(4) Identify additional water quality data needs for future assessments.

ASSESSMENT SUMMARY

Sandusky River Watershed Description. The Sandusky River originates in north-central Ohio and is located in the Lake Erie drainage basin. The watershed lies within the Sandusky Hydrologic Unit (04100011) and encompasses a drainage area of 1,850 square miles. It is divided into 14 separate 11-digit hydrologic units. Ohio EPA identifies these 11-digit areas as assessment units and evaluates use attainment based on the entire area, rather than by stream segments. The exception is streams that exceed a drainage area of 500 mi^2. These are considered large rivers and are evaluated in a linear context. Portions of the Sandusky River mainstem exceed this drainage size and are assessed as a large-river assessment unit. Figure 1 shows the Sandusky River Watershed boundaries, hydrologic assessment units and public water systems with surface water sources.

Hydrologic Assessment Units. There are eight public water systems (PWSs) with at least one active surface water intake located within the Sandusky River Watershed. Seven of the fourteen HUC-11 hydrologic units within the watershed have the PDWS beneficial use designation. The Sandusky River large river assessment unit is also designated with the PDWS use for the city of Fremont and Ohio American Water -Tiffin District. Four of the assessment units (representing five PWSs) were assessed for aquatic life and other beneficial uses in 2001 in the Upper Sandusky River Watershed TMDL (Total Maximum Daily Load) Report finalized in October 2004. Two HUC-11 assessment units with the PDWS designation are scheduled for monitoring in 2009 and TMDL completion in 2011. The HUC-11 containing the city of Clyde's intake is not on the current 303(d) list of impaired waters. The city of Bellevue has a second intake located in the adjacent Huron watershed which will not be evaluated in this report. The TMDL schedule for hydrologic assessment units within the Sandusky River watershed is provided at the back of this report.

Water Quality Data. In order to complete assessment of the PDWS beneficial use, Ohio EPA identified water quality data representative of in-stream conditions at the drinking water intakes. The five year period of focus was 2000 through 2004. The following data were evaluated: Ohio EPA surface water sampling (ambient, periodic watershed surveys, and TMDL Program), Ohio Tributary Monitoring Program (National Water Quality Research Center at Heidelberg College), and public water system finished and raw water quality data.

Ohio EPA Surface Water Quality Data. Ohio EPA maintains an ambient sampling location just upstream of the Fremont intake at USGS gaging station 04198000. Nutrient and other data were collected on a near monthly basis for the past 10 years. In 2003, Ohio EPA published the Biological and Water Quality Study of the Sandusky River and Selected Tributaries, containing water quality data and aquatic life assessment for the upper Sandusky River basin. Figure 2 shows the locations sampled during the 2001 survey. A TMDL was completed in 2004 for the upper Sandusky River watershed. The next scheduled water quality study is in 2009 with a primary focus on the lower portion of the watershed and a TMDL projected for completion in 2011.

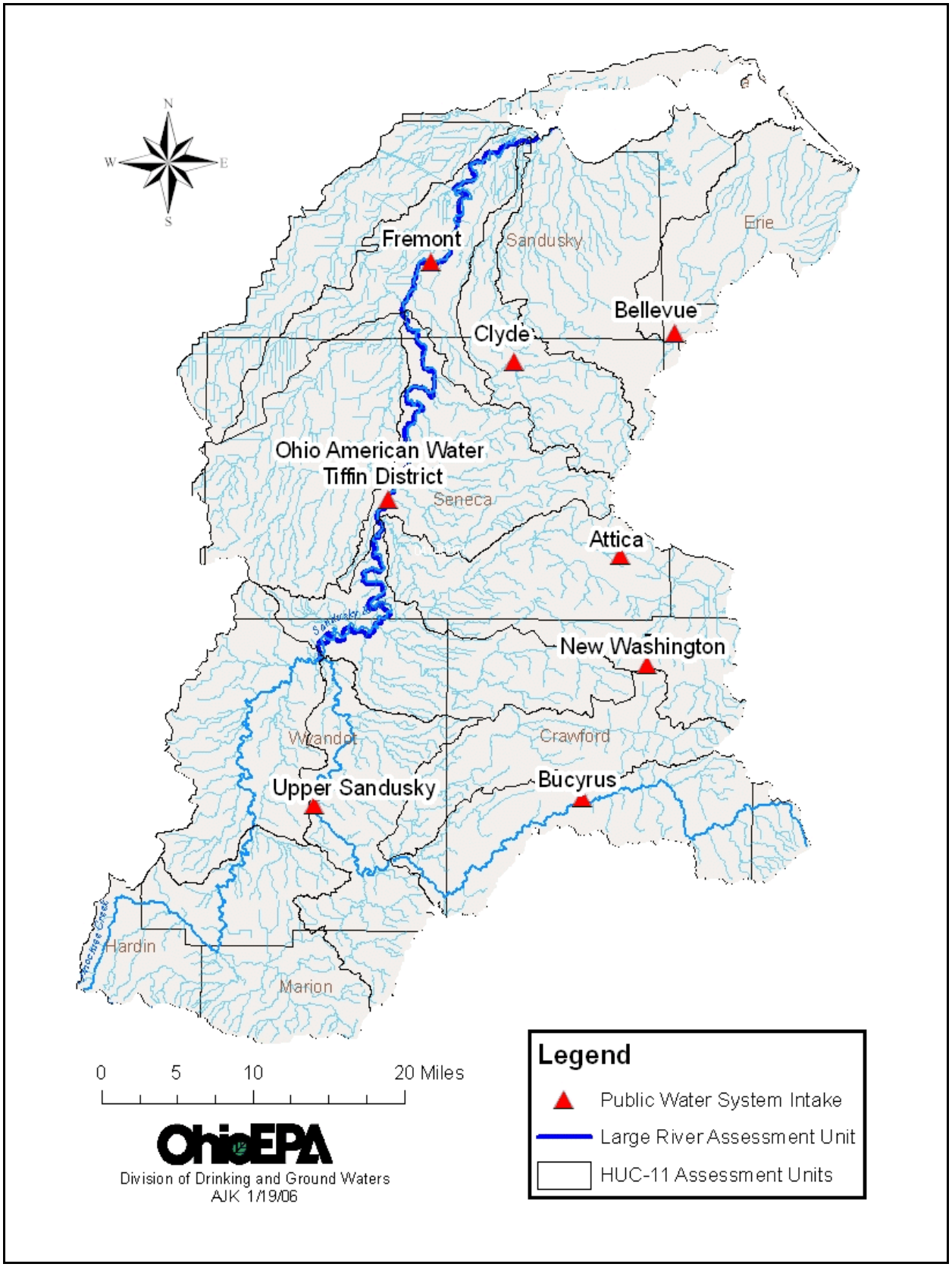

Figure 1 – Sandusky River Watershed and Active Public Water System Intakes

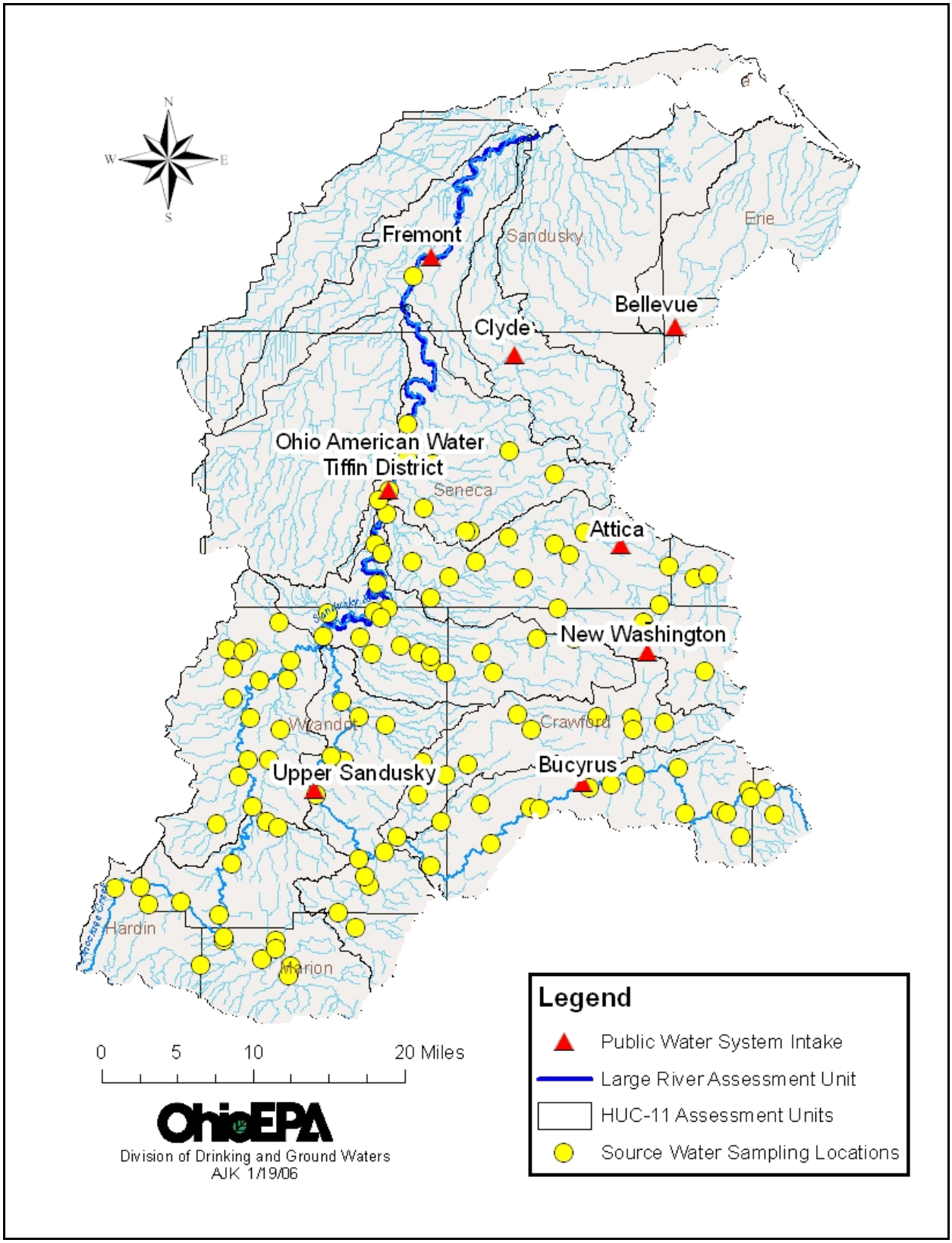

Figure 2 – Source Water Sampling Locations Within the Sandusky River Watershed (2001 OEPA Survey)

Ohio Tributary Monitoring Program - The National Center for Water Quality Research (NCWQR) at Heidelberg College. NCWQR collects data as part of Ohio Tributary Monitoring Program (OTMP) activities, including daily nitrate and seasonal pesticide monitoring. The NCWCR monitors water quality at seven stations throughout the state with one station located on the Sandusky River upstream of Fremont at USGS Gaging Station 04198000. Nutrient sampling (including nitrate) is conducted daily with increased sampling during high flow events. Pesticide sampling occurs monthly but between April 15th and August 15th is increased to bi-weekly during low flow conditions and tri-weekly during high flow conditions.

Public Water System Treatment Summary. Of the eight public water systems within the Sandusky River watershed only one, Ohio American Water-Tiffin District, utilizes ground water directly in combination with surface water. Six of the eight water systems maintain upground reservoirs for storage and source water management. Three systems utilize conventional treatment but one of those systems also blends with ground water. The village of New Washington recharges a surface reservoir with ground water but does not pump ground water directly to the treatment plant. Additional treatment beyond conventional at the other six water systems involves the addition of powdered or granular activated carbon, primarily used for taste and odor and pesticide control. Several water systems add copper sulfate or potassium permanganate to their reservoirs for algae control. A detailed description of each water system is provided in the Watershed Assessment Unit Reports.

Public Water System Compliance Data Summary. During the five year period 2000-2004, nitrate violations have been issued to three public water systems within the Sandusky River watershed with only one system receiving repeat violations. Since none of the water systems currently utilize additional treatment specific for nitrate removal, nitrate levels in treated water are considered representative of raw source water conditions. The only exceptions are the blended source scenarios. Within the watershed nitrate control is accomplished through water management and storage (upground reservoirs and selective pumping) and dilution with ground water. Figures 3 and 4 illustrate the occurrence of nitrate and atrazine in the finished water at public water systems.

Pesticides are also commonly detected in finished water. Atrazine was detected in five of the eight systems' finished water and for two systems at concentrations exceeding the MCL level. While seasonal spikes occur in the finished water, no MCL violations have been issued during 2000-2004. Violation of SDWA pesticide finished water standards are calculated from the annual running average so seasonal concentration spikes are minimized by low levels through the remainder of the year. Because most of the public water systems utilize treatment beyond conventional or blend source water with another source, raw water quality data will be required in order to fully evaluate pesticide levels in the source waters.

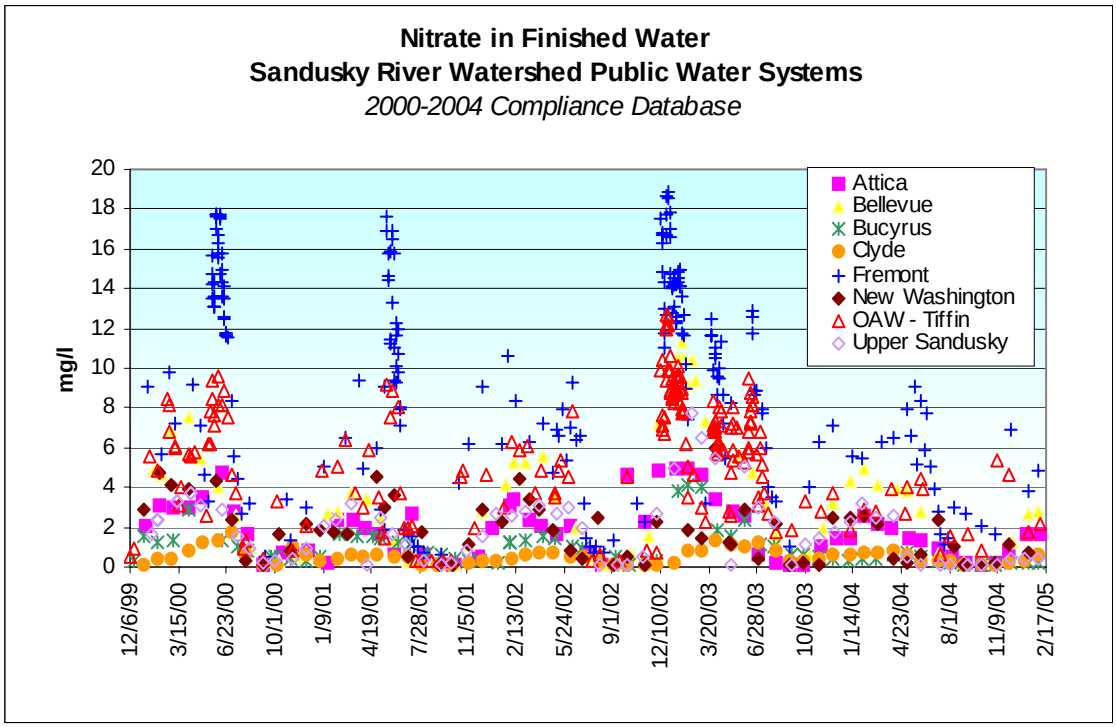

Figure 3

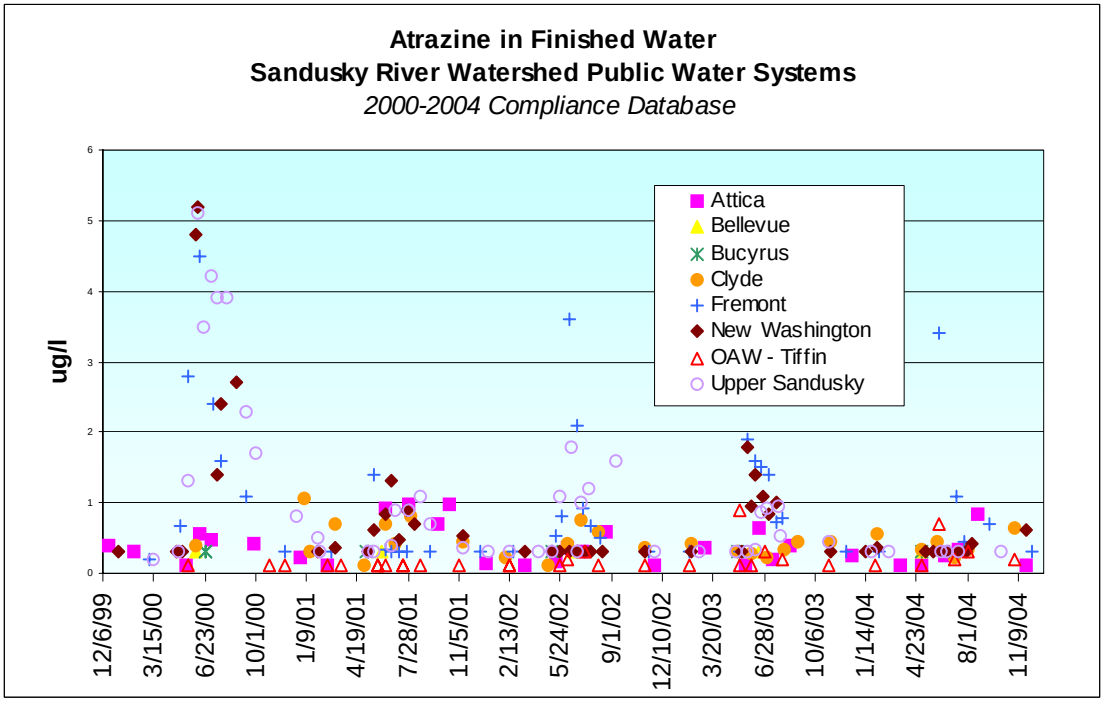

Figure 4

Summary of Ohio EPA 2001 Water Quality Survey - Nitrate

During the summer of 2001, Ohio EPA collected water quality data from 120 sites throughout the upper Sandusky River watershed and analyzed for various parameters including nitrate. Precipitation duration and intensity greatly impact movement of non-point source contaminants so it is important to note that precipitation for the north central region of the state was below normal during June-August 2001 (2001, ODNR Monthly Water Inventory Reports for Ohio). Figure 5 shows precipitation during the 2001 sampling period at a rain gauge in Crawford County, near Lykens while Figures 6 and 7 depict stream flow at two USGS gauges within the watershed, on the mainstem near Upper Sandusky and Fremont and on the tributary Honey Creek near Melmore. These figures were obtained directly from the USGS website at http://waterdata.usgs.gov/oh/nwis. Nitrate data obtained during the 2001 upper Sandusky watershed survey is depicted in Figures 8 and 9.

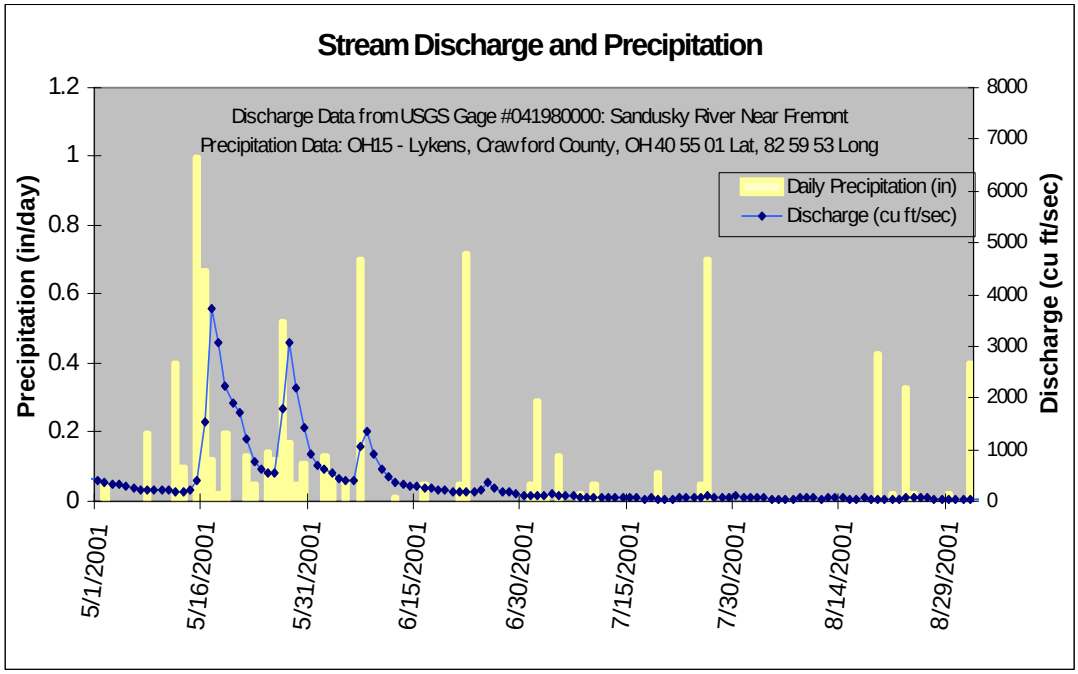

Figure 5 – Precipitation and Stream Discharge Data for June-August 2001

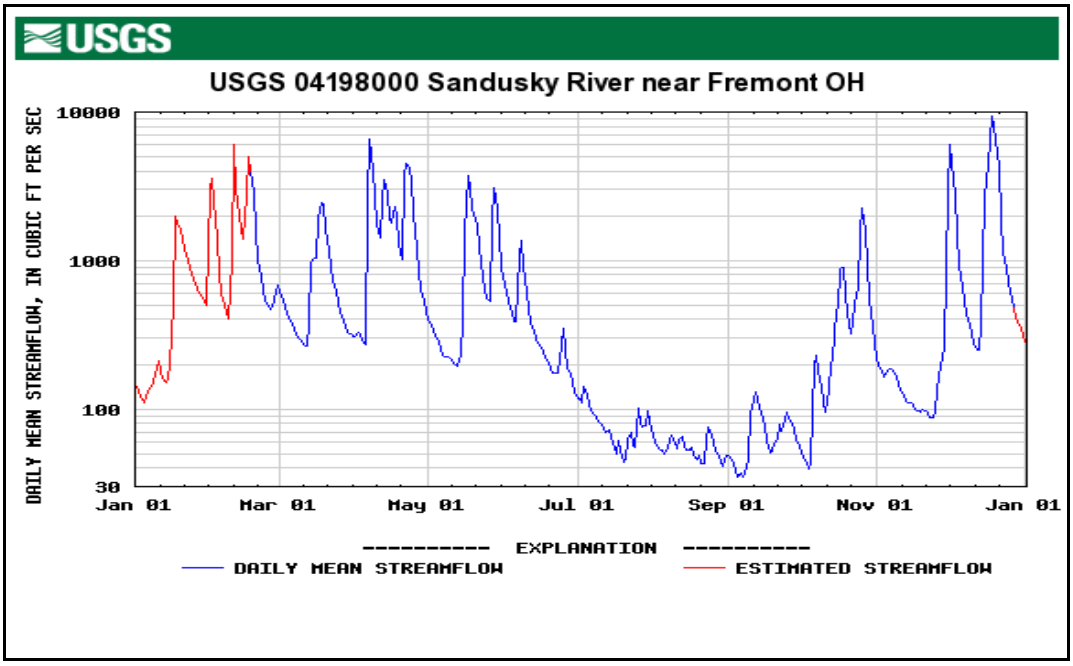

Figure 6 - USGS 04198000 (Sandusky Co.)
Hydrologic Unit Code 04100011, Lat. 41°18'28", Long. 83°09'32"
Drainage area = 1,251.00 square miles

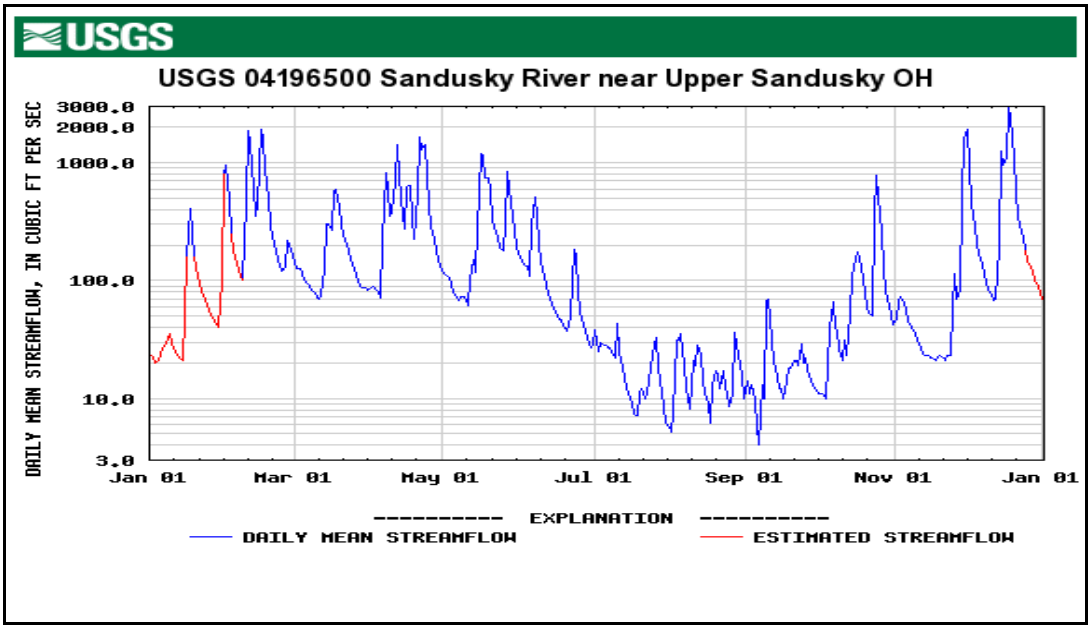

Figure 7 – USGS 04196500 (Wyandot Co.)
Hydrologic Unit Code 04100011, Lat. 40°51'02", Long. 83°15'23",
Drainage area = 8.00 square miles

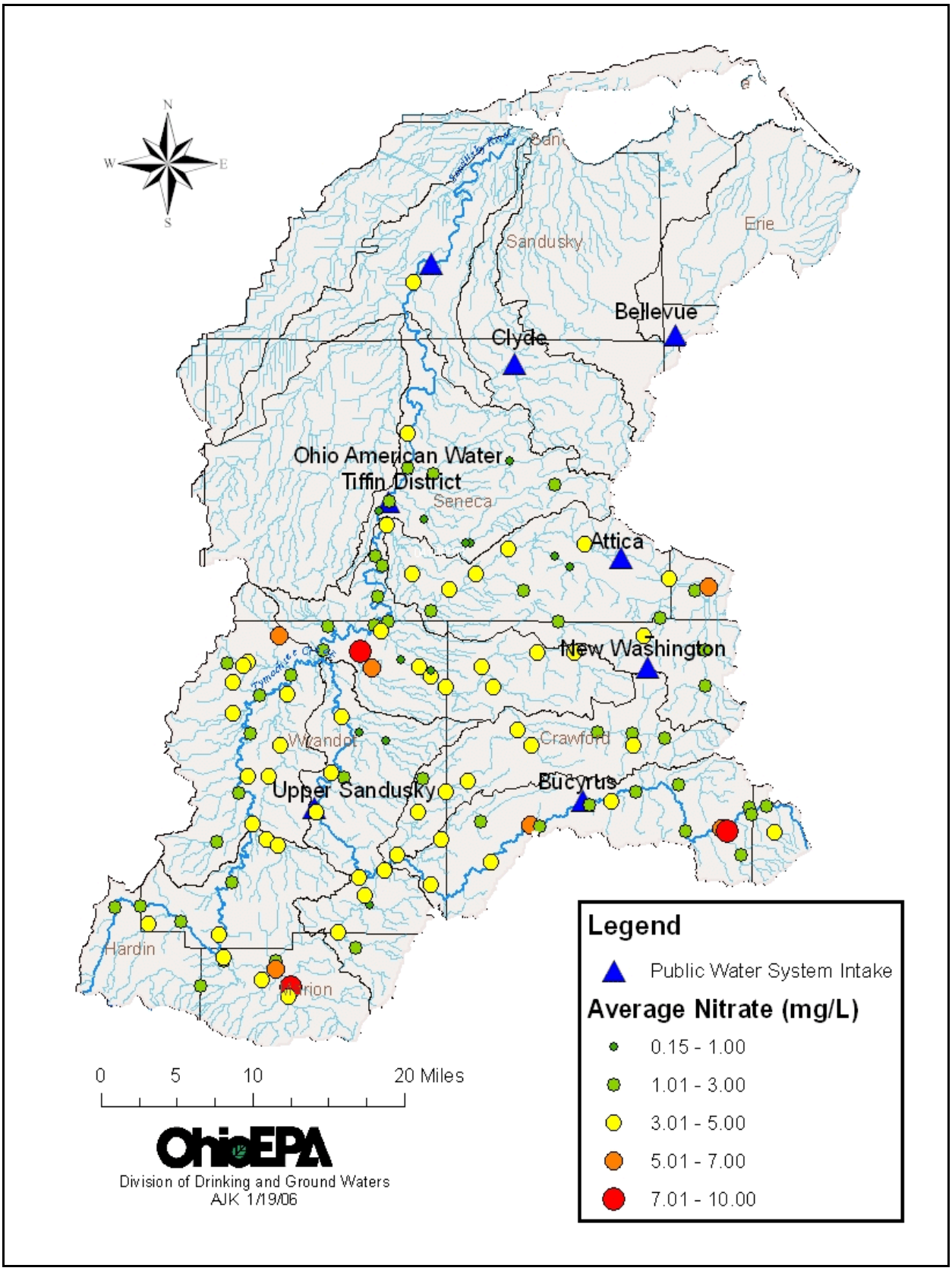

Figure 8 – Average Nitrate at Ohio EPA Sampling Sites During the 2001 Survey

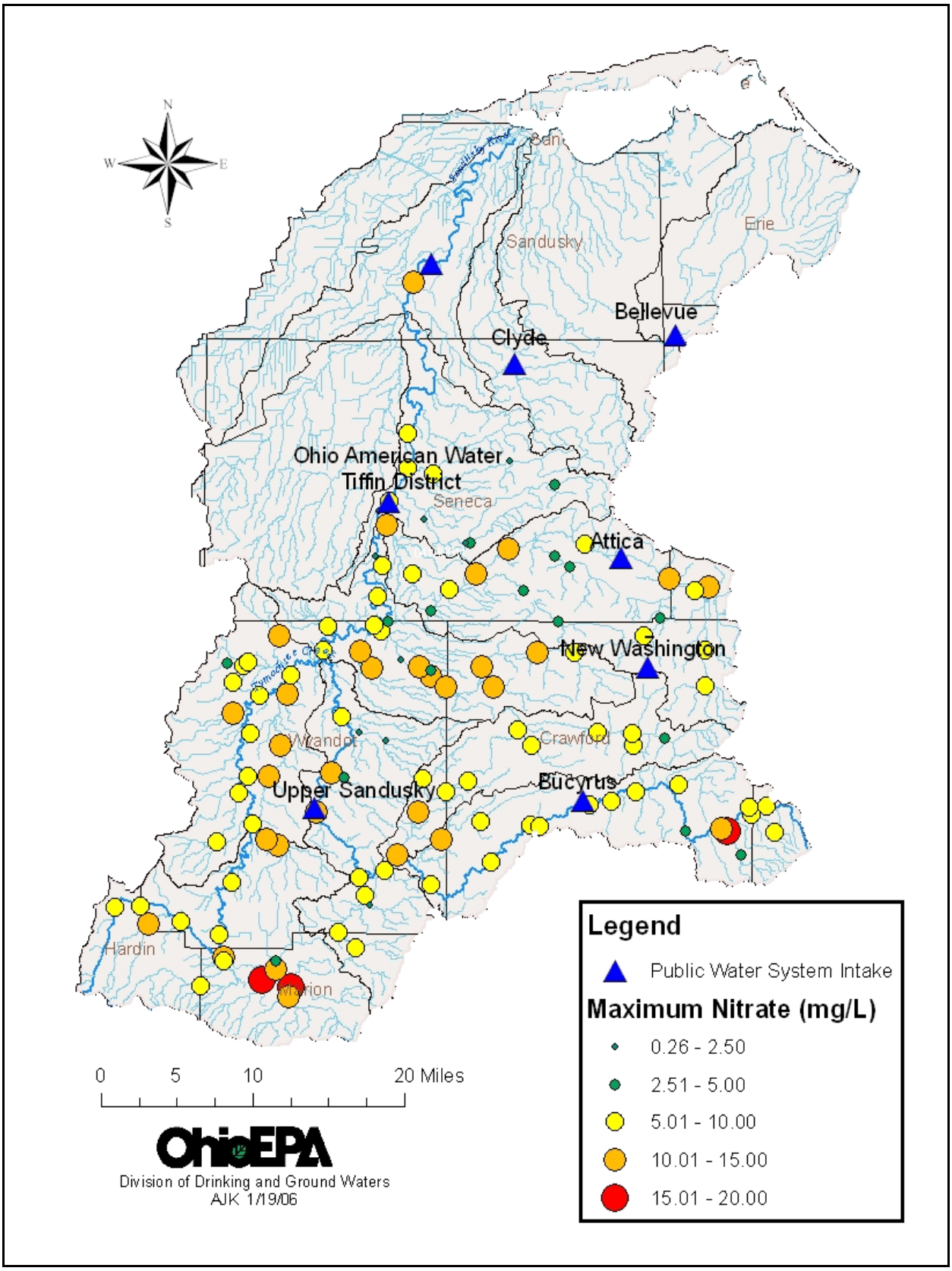

Figure 9 – Maximum Nitrate at Ohio EPA Sampling Sites During the 2001 Survey

Public Drinking Water Supply Beneficial Use – Attainment Status Summary

Only one of the eight PDWS source waters could be fully evaluated based on available water quality data. For another assessment, sufficient data was available to complete a full assessment of the nitrate indicator but not the pesticide indicator, resulting in a partial assessment. The six remaining source waters were not assessed due to insufficient water quality data. While finished water quality data was available from each public water system, only select data was applicable for assessment purposes. Treated water quality data was used to assess nitrate in some of the reservoirs. Where water systems treatment processes are beyond conventional or off-stream storage (upground) reservoirs exist, source water data directly from the stream source was required. Nitrate data from the 2001 Ohio EPA water quality survey provided some source water data but in most cases the sample counts were below the assessment data requirements specified in the PDWS Assessment Methodology.

Elevated nitrate above the water quality criteria (10 mg/L) resulted in impairment determinations for drinking water intakes at the city of Fremont and Ohio American Water -Tiffin District. Both intakes are located on the Sandusky River mainstem. Four additional areas were placed on Ohio EPA's watch list for nitrate levels above 8 mg/L and will be targeted for additional monitoring. A single detection of nitrate above 8 mg/L within the five year period in either finished or source water is sufficient to place the PDWS zone on the watch list. These areas include Upper Sandusky on the Sandusky River mainstem, Attica and New Washington in the Honey Creek watershed, and Bellevue in the Berry Creek watershed. Waters may be placed on the watch list even though there was insufficient data to complete the full assessment.

Due to nearly all of the water systems within the watershed using additional treatment beyond conventional or upground reservoirs, these assessments are highly dependent on in-stream pesticide water quality data. Pesticides could be fully evaluated at only one intake (Fremont) and indicated full attainment. However, quarterly averages exceeded the water quality standard for atrazine at the Fremont and Upper Sandusky intake zones.

These assessments focused primarily on nitrate and pesticide occurrence in the surface water. All available finished and source water quality data were reviewed for other contaminants with established water quality standards and no exceedences were identified. For the data period reviewed, 2000-2004, there was no water quality data available for *Cryptosporidium*.

List of Prioritized Impaired Waters 303(d) Listing - TMDL Schedule

Field Monitoring 2009, TMDL 2004
Upper Sandusky River Watershed - Completed, U.S. EPA approved October 2004.
04100011 001 Sandusky R. (dnstrm Tymochtee Ck to mouth) [Fremont PWS]
04100011 020 Sandusky R. (headwaters to upstrm Broken Sword Ck) [Bucyrus PWS)
04100011 030 Broken Sword Creek
04100011 040 Sandusky R. (dnstrm Broken Sword Ck to upstrm Tymochtee Ck) [Upper San. PWS]
04100011 050 Tymochtee Ck (headwaters to dnstrm Warpole Ck)
04100011 060 Tymochtee Creek (dnstrm Warpole Ck to mouth)
04100011 070 Sandusky R. (dnstrm Tymochtee Ck to upstrm Honey Ck; ex.Sandusky R)
04100011 080 Honey Creek [Attica and New Washington PWS]

Field Monitoring 2009, TMDL 2011
04100011 090 Sandusky R. (dnstrm Honey Ck to upstrm Wolf Ck) [Ohio American-Tiffin PWS]
04100011 140 Lake Erie Tributaries (west of Mills Ck to east of Sawmill Ck) [Bellevue PWS]

Sandusky River HUCs not currently on 303(d) list
Field Monitoring in potentially in 2009
04100011 110 Green Creek [Clyde PWS]
04100011 130 Lake Erie Tributaries (east of Green Ck to west of Mills Ck)

(Note: An updated schedule is available on OEPA Division of Surface Water's Website at http://www.epa.state.oh.us/dsw/tmdl/monitoring.html.)

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2001. Biological and Water Quality Study of the Sandusky River and Selected Tributaries. Seneca, Wyandot, and Crawford Counties. Ohio EPA Technical Report EAS/2003-4-6.

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WATERSHED ASSESSMENT UNIT SUMMARIES

In January 2005, Ohio EPA initiated assessments of surface waters within the Sandusky River watershed that were designated with the Public Drinking Water Supply Beneficial Use. Eight active public water systems were identified that maintain at least one intake within the Sandusky River watershed boundary. The watershed boundary was delineated to include waters that feed directly into the Sandusky Bay. The public water systems included in this assessment were Attica, Bellevue, Bucyrus, Clyde, Fremont, New Washington, Ohio American Water-Tiffin, and Upper Sandusky. All of the water systems draw surface water through a single intake with the exception of Bellevue, which maintains a second intake in the adjacent Huron River watershed. Intakes for Fremont and Ohio American-Tiffin District are located within the Sandusky River large river assessment unit.

Hydrologic assessment units (HUC-11) and corresponding public water systems are as follows:

04100011 001 Sandusky R. (downstream Tymochtee Creek to mouth)
– **Fremont PWS**

04100011 020 Sandusky R. (headwaters to upstream Broken Sword Creek)
– **Bucyrus PWS**

04100011 040 Sandusky R. (downstream Broken Sword Creek to upstream Tymochtee Creek)
– **Upper Sandusky PWS**

04100011 080 Honey Creek
– **Attica PWS and New Washington PWS**

04100011 090 Sandusky R. (downstream Honey Creek to upstream Wolf Creek)
– **Ohio American Water-Tiffin District PWS**

04100011 140 Lake Erie Tributaries (west of Mills Creek to east of Sawmill Creek)
– **Bellevue PWS**

04100011 110 Green Creek
– **Clyde PWS**

Detailed assessments of the PDWS use were completed for each public water system and provide a summary of available water quality data, determination of impairment status, and identification of future water quality data needs. For most water systems, insufficient water quality data was available to complete a full assessment.

Public Water System: City of Fremont
Assessment Unit: 04100011-001 Sandusky River
(downstream Tymochtee Creek to mouth)

The city of Fremont water supply intake is currently located on the Sandusky River at the Ballville Dam, about a mile upstream of the treatment plant at River Mile (RM) 18.02. In 2002, the City purchased land and plans are underway for construction of a new reservoir upstream of the Ballville Dam with projected completion by 2013. The water treatment plant utilizes conventional treatment with additional enhanced coagulation and granular activated carbon (GAC) filtration. The plant recently completed a major expansion in November 2005 designed to allow the treatment plant to meet increased demand and improve the filtration processes. Major source water concerns for Fremont include nitrate, taste and odor, organic matter, (THM precursors) and high turbidity.

There is a significant amount of in-stream water quality data available for nitrate and pesticides. A U.S. Geological Survey (USGS) stream gaging station (#04198000) is located upstream from the water supply intake at RM 20.25. The National Center for Water Quality Research (NCWQR) and Ohio EPA utilizes this location as a long term sampling site (See Figure 10). NCWQR collects water quality data from this location as part of the Ohio Tributary Monitoring Program (OTMP), including daily nitrate and seasonal pesticide monitoring. Ohio EPA maintains an ambient surface water sampling site at the same location collecting several years of monthly nitrate and other nutrient data.

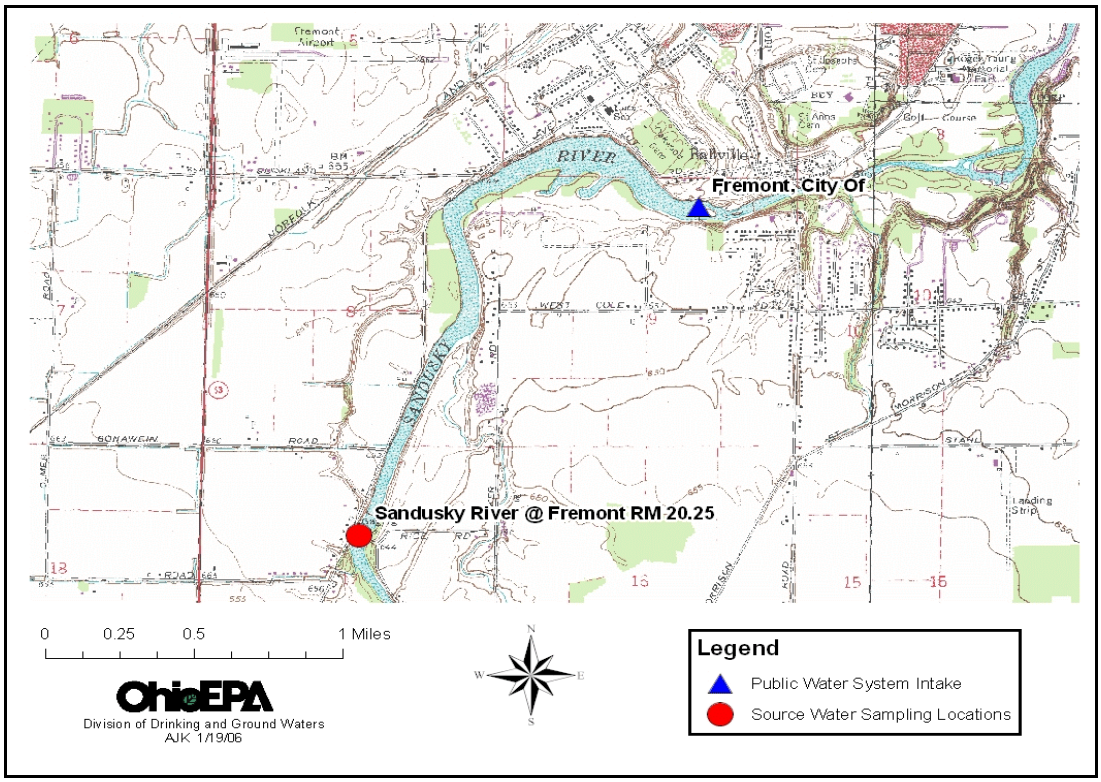

Figure 10 – Source Water Sampling Location Near the Fremont Intake

Nitrate. During the five year period (2000-2004) the Fremont public water system received eight SDWA MCL violations for nitrate in the finished water. Figures 11 and 12 show finished water quality reported by the Fremont PWS. The maximum level of nitrate detected was 20.8 mg/L in January 2003. Nitrate levels in the source water are consistently high and current treatment is not designed for nitrate removal. Extensive nitrate monitoring through the OTMP indicated that nitrate levels exceeded the water quality standard during 14 of the 60 months during the five year period (Figure 13).

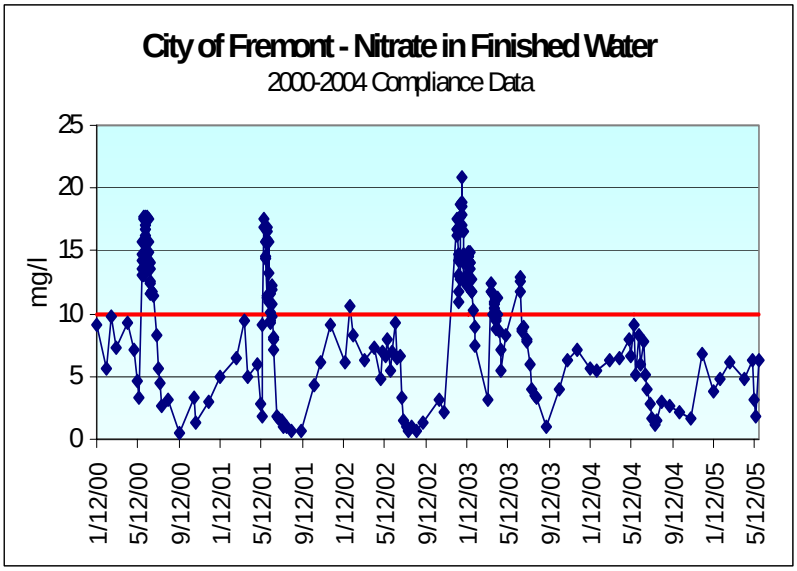

Figure 11

Pesticides. Fremont is required to analyze nine samples annually for atrazine, alachlor and simazine during specified time periods. Atrazine was detected in the finished water at levels exceeding the water quality standard of 3.0 ug/l, however the annual running average remained below this level. The OMTP sampling program has a stratified design to increase sampling frequency during high flow events in the months these contaminants are typically present in source water. Monthly average atrazine concentrations were tabulated and used to calculate the annual average.

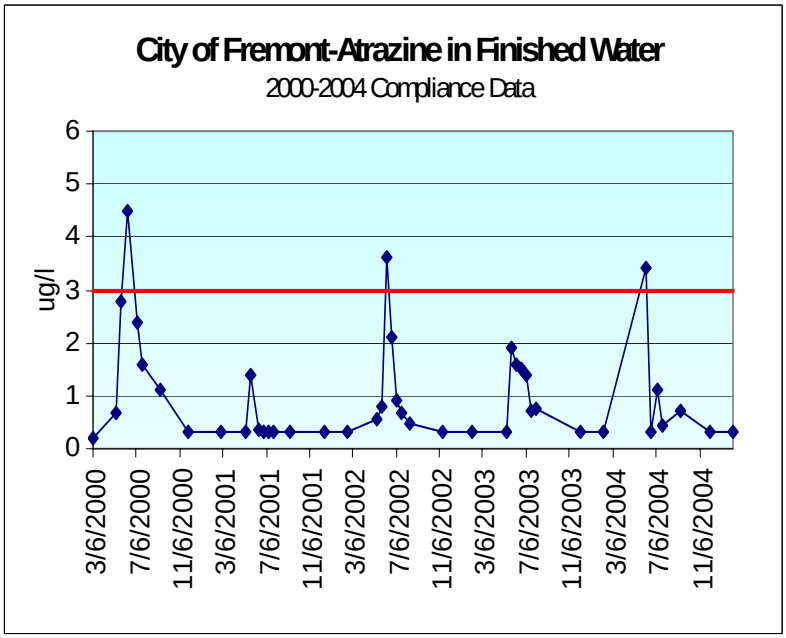

Figure 12

The highest annual average occurred in 2002 at 2.056 ug/L, still below the water quality standard of 3.0 ug/L. However, quarterly averages (May-July) for the five year period ranged from 3.09 ug/L to 6.79 ug/L. Figure 14 shows OTMP atrazine levels.

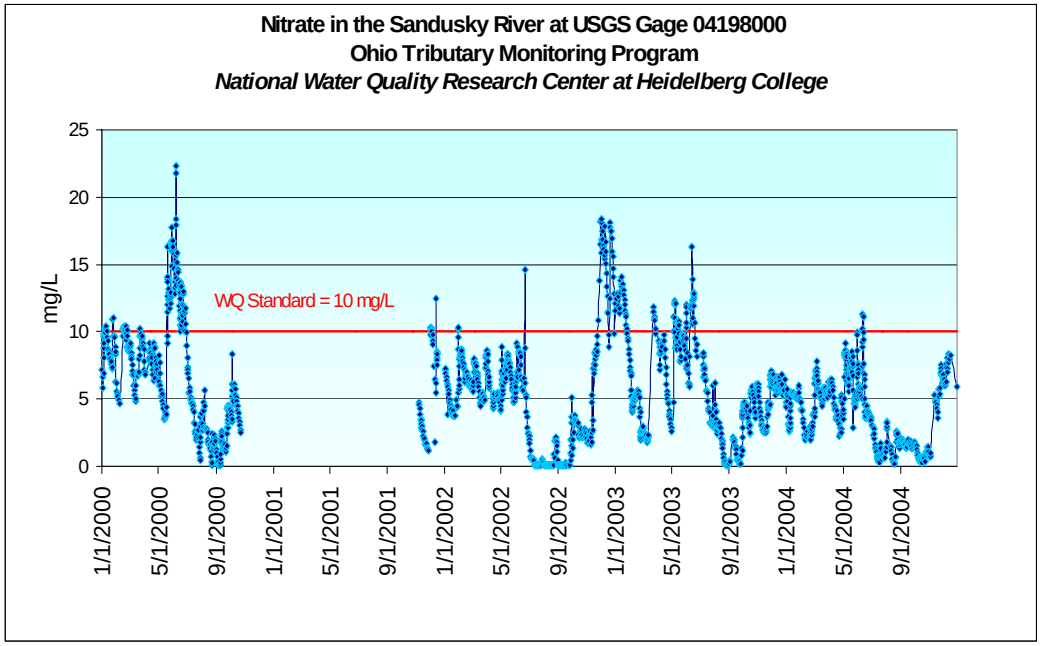

Figure 13

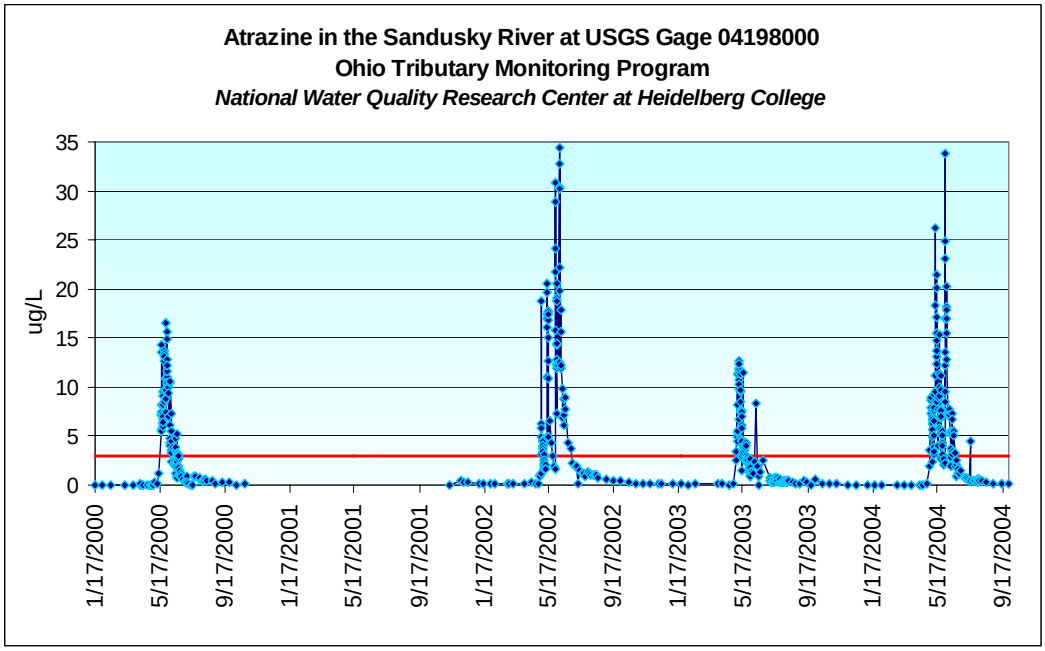

Figure 14

PDWS Use Attainment Assessment
Public Water System: City of Fremont
Assessment Unit: 04100011-001 Sandusky River

Assessment of the public drinking water beneficial use was based on compliance data and raw water quality data collected by Ohio EPA and the National Center for Water Research (NCWQR) at Heidelberg College. Extensive source water data was available for both nitrate and pesticides resulting in a full assessment of the PDWS beneficial use. The water quality standard for nitrate was exceeded repeatedly in both treated and finished water, indicating an impairment for this indicator. Due to Fremont's use of additional treatment beyond conventional targeted toward pesticide and TOC removal, assessment of the pesticide indicator was based solely on in-stream source water quality data. During the five year time period, all annual averages for atrazine remained below the water quality standard, but quarterly averages exceeded the standard each year. Outside of the 2000-2004 five year window, the annual average in 1999 also exceeded the water quality standard. Therefore, the source waters will be placed on a watch list and reassessed for this indicator as additional water quality data become available.

Table 1. Attainment Status for PDWS Source Waters at Fremont PWS

Water Body	Nitrate		Pesticides		Cryptosporidium		Other MCL Contaminants	
	Status	Data	Status	Data	Status	Data	Status	Data
Sandusky River @ RM 18.02	I	Y	WL[1]	Y	NA	N	FS	Y

Comments:
Status Codes: FS-Full Support, I-Impaired, WL-Watch List, NA-Not Assessed
Data Codes: Y-Sufficient Data for Assessment, ID-Insufficient Data, N-No Data
Data Years: 2000-2004
Data Sources: Ohio EPA PWS Compliance Monitoring; Ohio Tributary Monitoring Program (NCWQR)
[1] Atrazine

Public Water System: Ohio American Water -Tiffin District
Assessment Unit: 04100011-090 Sandusky River
(Downstream Honey Creek to Upstream Wolf Creek)

Ohio American Water-Tiffin District (OAW-Tiffin) obtains source water from the mainstem of the Sandusky River at RM 41.08 and from a wellfield located adjacent to the river. Primary source water concerns for OAW-Tiffin are nitrate, pesticides, algae and ammonia. The water plant utilizes several treatment processes beyond conventional and blends with ground water in order to meet SDWA finished water quality standards. Within the past five years the water system has incurred only one MCL violation for nitrate during December 2002. In order to meet the SDWA standard for nitrate the system relies specifically on dilution with groundwater. Ground water currently accounts for approximately 14% of the total water production. The water system is investigating the possibility of developing additional wells.

Algae, previously only a seasonal problem, has emerged as a year-round concern and contributes to increased total organic carbon (TOC) and taste and odor problems. In order to control TOC and turbidity, OAW-Tiffin supplements powered activated carbon treatment with liquid cationic polymer addition. TOC is also controlled with an advanced sludge removal system. Granular activated carbon (GAC) treatment is run yearly as needed for control of source water contaminants, including pesticides. Ammonia is typically elevated in the spring and fall with several ammonia spills documented within the past two years, prompting the treatment plant to respond with process adjustments. OAW-Tiffin monitors finished water for nitrate and is required to sample six times a year for pesticides. In 2002, the water system received a violation for elevated nitrate in the finished water but has met SDWA requirements since that time.

In 2001, Ohio EPA collected raw water samples as part of a biological and chemical monitoring survey in the upper Sandusky River and its tributaries. Although sampling did not specifically target the PDWS use, two sampling sites were located near the OAW-Tiffin intake (Figure 15).

Nitrate. A review of 187 nitrate compliance samples from 2000-2004 indicated that the water quality standards of 10 mg/L was exceeded during two months (Figure 16). Average nitrate in the finished water was 5.75 mg/L during the five year period. Nitrate concentrations from the 2001 Ohio EPA survey ranged from 0.6 mg/L to 7.38 mg/L at the two sites near the intake. OAW-Tiffin conducts nitrate monitoring of the raw source water with their certified on-site laboratory during periods of elevated nitrate. Monthly maximum nitrate levels in the source water were reviewed from January 2003 to December 2004. The water quality standards were exceeded during four months with a maximum of 14.80 mg/L recorded in January 2003.

Pesticides. Treatment processes currently used by OAW-Tiffin effectively control pesticides maintaining contaminant levels in finished water well below SDWA standards. Pesticides were not evaluated during the 2001 Ohio EPA water quality survey. Therefore, additional source water quality data is needed for pesticides in order to complete a full assessment of this indicator.

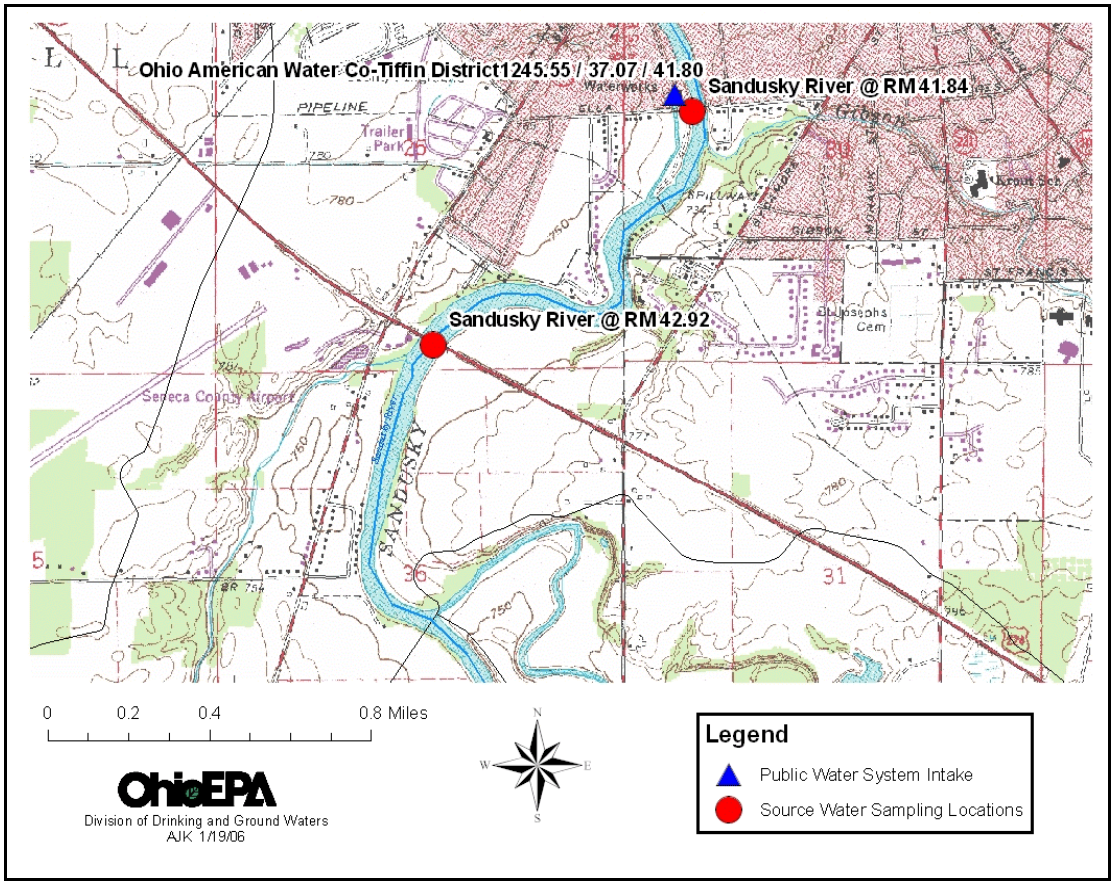

Figure 15 - Ohio EPA 2001 Survey Source Water Sampling Locations Near the OAW-Tiffin Intake

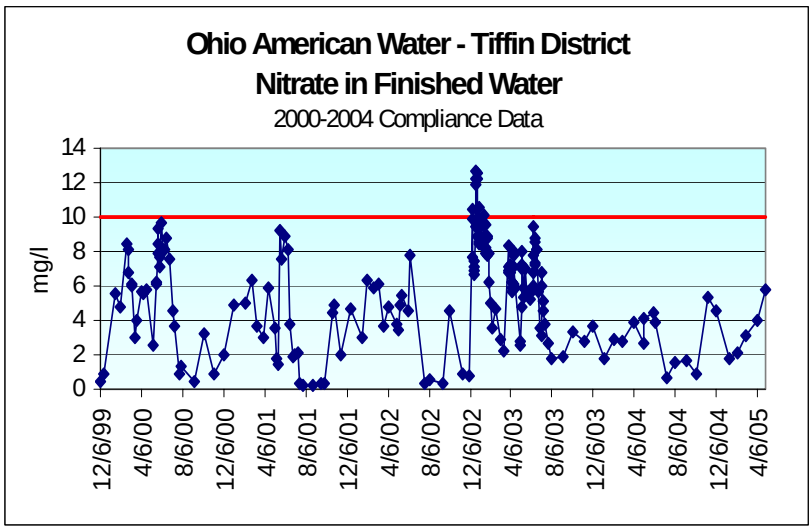

Figure 16

PDWS Use Attainment Assessment
Public Water System: Ohio American Water-Tiffin District
Assessment Unit: Sandusky Large River A.U. and HUC-11 (04100011-090)

Assessment of the public drinking water supply beneficial use was based on review of both compliance and raw water quality data provided by OAW-Tiffin. Treatment beyond conventional precludes use of the finished pesticide data for assessment of the source water. Exceedence of the nitrate water quality standard is documented in both untreated source water and in finished water samples. Sufficient data is available to complete a full assessment of the nitrate indicator but additional source water data is needed to assess the pesticide indicator.

Table 2. Attainment Status for PDWS Source Waters at OAW-Tiffin PWS

Water Body	Nitrate		Pesticides		Cryptosporidium		Other MCL Contaminants	
	Status	Data	Status	Data	Status	Data	Status	Data
Sandusky River @ RM 41.08	I	Y	NA	ID	NA	N	FS	Y

Comments:
Status Codes: FS-Full Support, I-Impaired, WL-Watch List, NA-Not Assessed
Data Codes: Y-Sufficient Data for Assessment, ID-Insufficient Data, N-No Data
Data Years: 2000-2004
Data Sources: Ohio EPA PWS Compliance Monitoring; Ohio EPA 2001 Watershed Survey; Ohio Tributary Monitoring Program (NCWQR)

Public Water System: City of Bucyrus
Assessment Unit: 04100011-020 Sandusky River
(Headwaters to upstream Brokensword Creek)

The primary source of water for the city of Bucyrus public water system is obtained through an intake on the Sandusky River at river mile (RM) 115.45. Raw water from the river is pumped to one of two primary upground reservoirs. While the City has four reservoirs available, only two are regularly used, Reservoir #3 (Riley) and Reservoir #4 (Outhwaite). Reservoir #4 was constructed in 1979 in order to address the problem of elevated nitrate in Sandusky River source water. These two reservoirs have significant storage capacity affording the City great flexibility pumping raw water from the Sandusky River. The reservoirs are typically filled in the winter during several weeks of pumping, avoiding much of the non-point source contamination present during the spring and summer. Recreational use is permitted at the Riley and Outhwaite Reservoirs and ODNR manages the reservoirs for fishing.

Within the reservoirs, algae is an occasional problem while zebra mussels regularly impact the intake. At the time of the interview, the City was considering adding a chemical feed line at the intake for zebra mussel control. Algae control is accomplished through application of copper sulfate directly to the reservoirs and during treatment by addition of powdered activated carbon (PAC) for taste and odor control. Potassium permanganate has also been used within the last five years for organic control.

The City collects monthly nitrate and annual pesticide samples for SDWA compliance purposes and also collects raw water quality data on nitrate and total organic carbon in the reservoirs. Since the City only draws from the river a few weeks per year, a valid assessment of the PDWS use will require in-stream water quality data. In 2001, Ohio EPA collected data as part of a biological and chemical monitoring survey of the Sandusky River and its tributaries. One site was sampled five times at river mile RM 116.18, less than a mile upstream of the drinking water intake at RM 115.43 and was evaluated for this assessment (Figure 17). Aquatic life impairments were attributed to nutrient enrichment, low dissolved oxygen and elevated temperature. According to the report, enrichment sources were likely point sources in Crestline and agricultural practices in the watershed. The survey also included water quality sampling from the reservoirs indicating low levels of pesticides and elevated manganese and iron at lower depths.

Nitrate. Nitrate compliance data from the past five years indicate that nitrate remained below 5 mg/L with a maximum detection of 4.17 mg/L (Figure 18). Nitrate levels in 2001 at the sampling site upstream of the intake ranged from 0.1 mg/L to 6.09 mg/L, all below the water quality standard of 10 mg/L.

Pesticides. The pesticide levels in finished water samples were all well below detection limits. Pesticides were not evaluated during the 2001 water quality survey. Consequently, additional source water quality data will be required in order to complete a full assessment of this indicator.

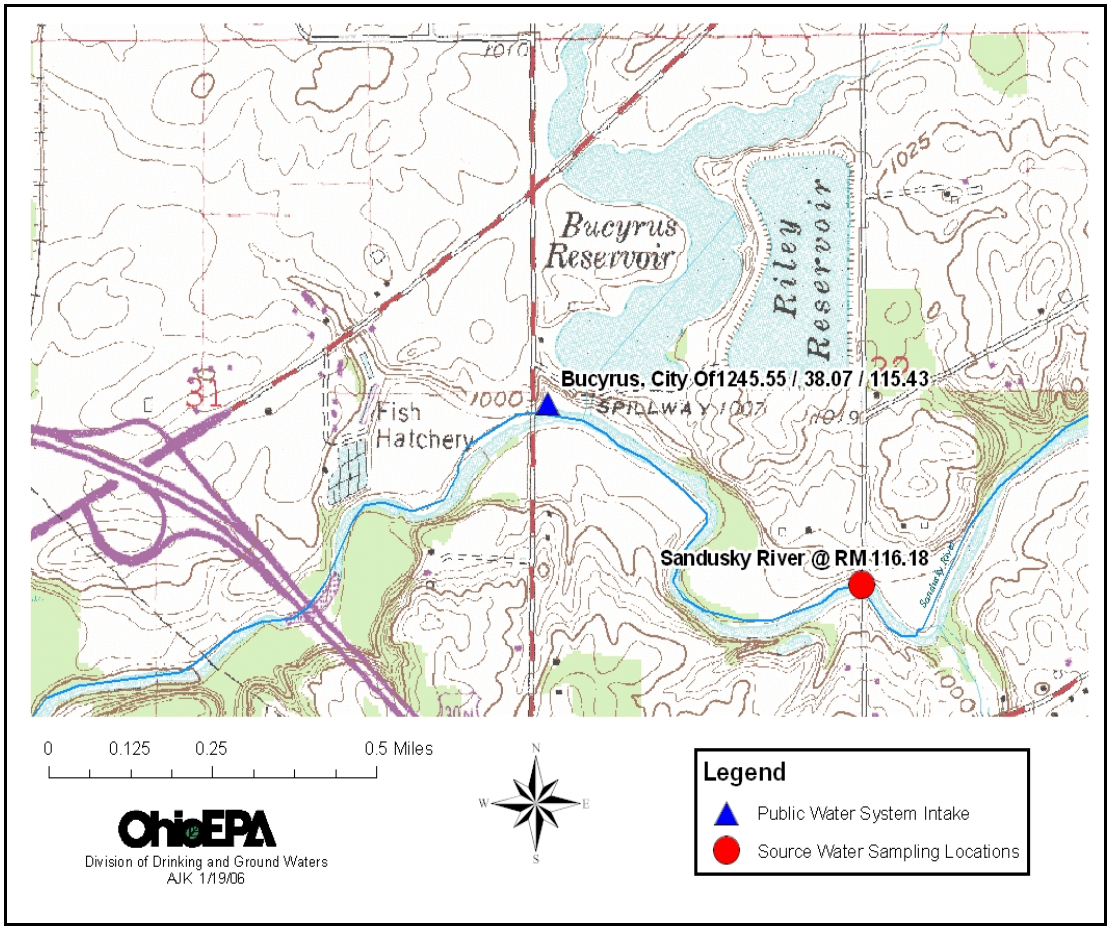

Figure 17 – Source Water Sampling Location Near the City of Bucyrus Intake (2001 OEPA Water Quality Survey)

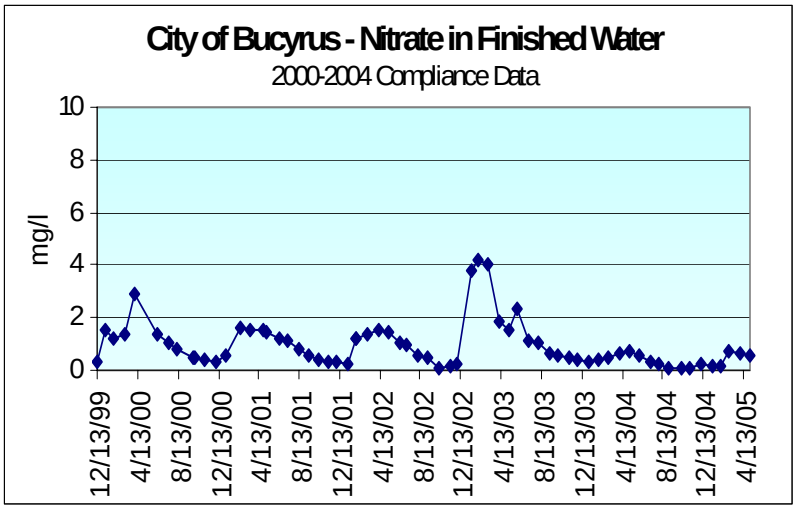

Figure 18

PDWS Use Attainment Assessment
Public Water System: City of Bucyrus
Assessment Unit: HUC-11 (04100011-020)

Assessment of the public drinking water beneficial use was based on compliance data and raw water quality data collected by Ohio EPA. Treatment beyond conventional and use of upground reservoirs precludes use of the treated water quality data for assessment of the stream source water. Since the treatment process does not include nitrate removal, finished water quality was used for assessment of the nitrate indicator in Reservoirs #3 and #4. Water quality data from the 2001 survey was valid for assessment purposes and indicates stream quality is meeting nitrate standards, However, in order to fulfill data requirements specified in the PDWS methodology, a minimum of 10 samples is required to complete an assessment of the PDWS use. Additional source water quality data is needed for nitrate and pesticides from both the Sandusky River and the primary reservoirs.

Table 3. Attainment Status for PDWS Source Waters at Bucyrus PWS

Water Body	Nitrate		Pesticides		Cryptosporidium		Other MCL Contaminants	
	Status	Data	Status	Data	Status	Data	Status	Data
Sandusky River @ RM 115.45	NA	ID	NA	ID	NA	N	NA	ID
Reservoir #1	NA	N	NA	N	NA	N	NA	N
Reservoir #2	NA	N	NA	N	NA	N	NA	N
Reservoir #3 (Riley)	Y	FS	NA	N	NA	N	FS	Y
Reservoir #4 (Outhwaite)	Y	FS	NA	N	NA	N	FS	Y

Comments:
Status Codes: FS-Full Support, I-Impaired, WL-Watch List, NA-Not Assessed
Data Codes: Y-Sufficient Data for Assessment, ID-Insufficient Data, N-No Data
Data Years: 2000-2004
Data Sources: Ohio EPA PWS Compliance Monitoring; Ohio EPA 2001 Watershed Survey; Ohio Tributary Monitoring Program (NCWQR)

Public Water System: City of Upper Sandusky
Assessment Unit: 04100011-040 Sandusky River
(Downstream Broken Sword Creek to upstream Tymochtee Creek)

The city of Upper Sandusky uses source water from the Sandusky River at river mile (RM) 82.9 to fill its two storage reservoirs. The second larger reservoir was completed in 2004 and is hydraulically separate from the Sandusky River. The reservoir contains a Class 2 dam but is primarily filled with pumped river water. Construction of the new reservoir was driven in part by poor source water quality in the Sandusky River. Both reservoirs have public access and are managed by Ohio Dept. of Natural Resources for fishing. Source water concerns include nitrate, pesticides, algae and total organic carbon (TOC). Elevated TOC has contributed to formation of disinfection by-products in finished water, resulting in violations of the SDWA finished water quality standards. The water system added enhanced coagulation and feeds oxide chemicals for control of organic material.

The Upper Sandusky water treatment plant samples finished water monthly for nitrate and nine times a year for selected pesticides. During the treatment process, powered activated carbon (PAC) is added primarily for taste and odor control, but also effectively removes pesticides. Since the City increased off-stream reservoir storage capacity, pesticide and nitrate levels in treated water have decreased significantly. This capacity allows treatment plant personnel to selectively pump water from the river when contaminant levels are low.

In 2001, Ohio EPA conducted sampling within the upper Sandusky River watershed as part of a biological and chemical monitoring survey. As shown in Figure 19, the Sandusky River

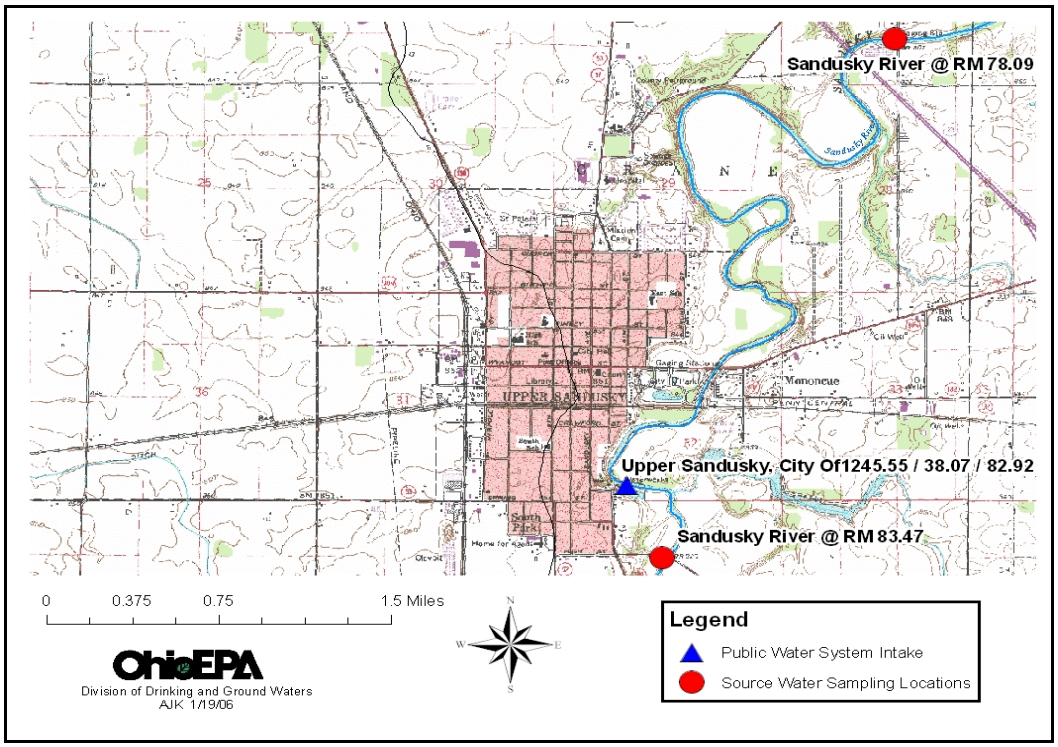

Figure 19 – Surface Water Sampling Locations near the City of Upper Sandusky Intake (2001 OEPA Water Quality Survey)

was sampled at RM 83.47, just upstream of the drinking water intake at RM 82.9. This site was sampled five times during the 2001 survey for nitrate and other contaminants.

Nitrate. Of the 65 nitrate compliance samples, all detections were below the water quality standard (10 mg/L) with a maximum detection of 7.71 mg/L. Figures 20 and 21 show finished water quality. Nitrate values of the five samples collected upstream from the intake ranged from 0.1 mg/L to 10.9 mg/L.

Pesticides. Of the 47 atrazine compliance samples, the average was 1.03 ug/L and five samples exceeded the water quality standard value of 3 ug/L The maximum concentration detected in the treated water was 5.1 ug/L. The quarterly averages for May-June 2000 and June-August 2000 were 3.6 ug/L and 4.12 ug/L, respectively. The water quality standard applies as an annual average and was not exceeded in finished water. Pesticides were not evaluated during the 2001 survey.

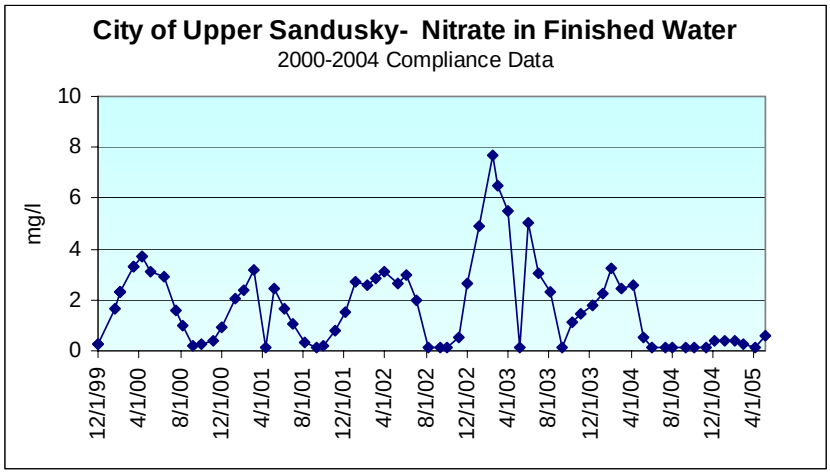

Figure 20

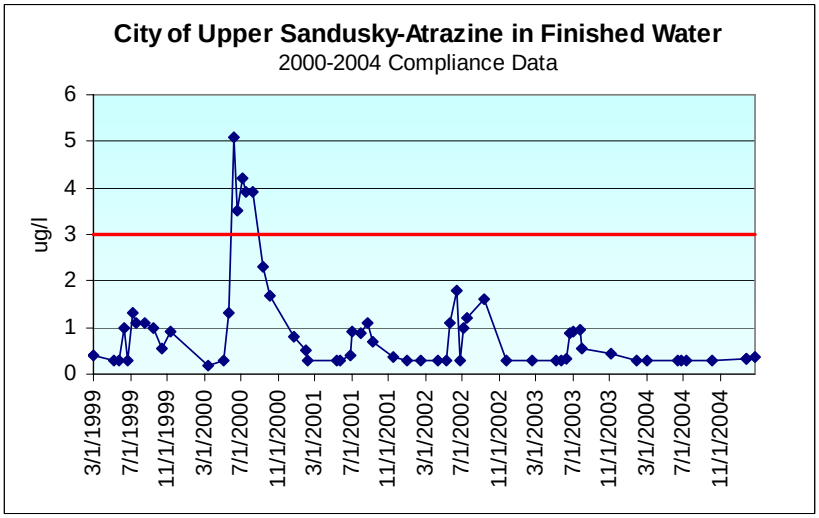

Figure 21

PDWS Use Attainment Assessment
Public Water System: City of Upper Sandusky
Assessment Unit: HUC-11 (004100011-040)

Full assessment of the public drinking water beneficial use could not be completed at this time due to insufficient source water data. Since the treatment process does not include nitrate removal the finished water quality data was used to assess nitrate in the two reservoirs. Additional source water quality data is needed for nitrate and pesticides. The water quality standard of nitrate was exceeded in one source water sample, but the small sample size fails to meet statistical requirements specified in the PDWS methodology. However, a single nitrate value above 8.0 mg/L and available atrazine data indicating quarterly average exceedences of the water quality standard are sufficient to place the Sandusky River source water on the watch list for nitrate and pesticides.

Table 4. Attainment Status for PDWS Source Waters at Upper Sandusky PWS

Water Body	Nitrate		Pesticides		Cryptosporidium		Other MCL Contaminants	
	Status	Data	Status	Data	Status	Data	Status	Data
Sandusky River @ RM 82.9	NA	ID/WL	NA	ID/ WL[1]	NA	N	NA	ID
Reservoir #1	FS	Y	NA	N	NA	N	NA	N
Reservoir #2	FS	Y	NA	N	NA	N	NA	ID

Comments:
Status Codes: FS-Full Support, I-Impaired, WL-Watch List, NA-Not Assessed
Data Codes: Y-Sufficient Data for Assessment, ID-Insufficient Data, N-No Data
Data Years: 2000-2004
Data Sources: Ohio EPA PWS Compliance Monitoring; Ohio EPA 2001 Watershed Survey; Ohio Tributary Monitoring Program (NCWQR)
[1] Atrazine

Public Water System: Village of Attica
Assessment Unit: 04100011-080 Honey Creek

The village of Attica utilizes source water drawn from Honey Creek pumped to an upground reservoir. At the time of the survey, the Village was in the process of initiating construction of a new water treatment plant and upground reservoir. The additional reservoir will allow the village to meet future increased demand. The current treatment plant employs additional treatment beyond conventional with seasonal addition of powered activated carbon for taste and odor control. Algae is a seasonal problem in the Attica reservoir and is treated via direct application of potassium permanganate to the water surface. Total organic carbon (TOC) in the source water combined with current treatment limitations at the aging plant contribute to elevated disinfection by-products. Nitrate and pesticides in the source water are a concern but are managed through selective pumping from Honey Creek. The village of Attica analyzes finished water monthly for nitrate and six times a year for select pesticides.

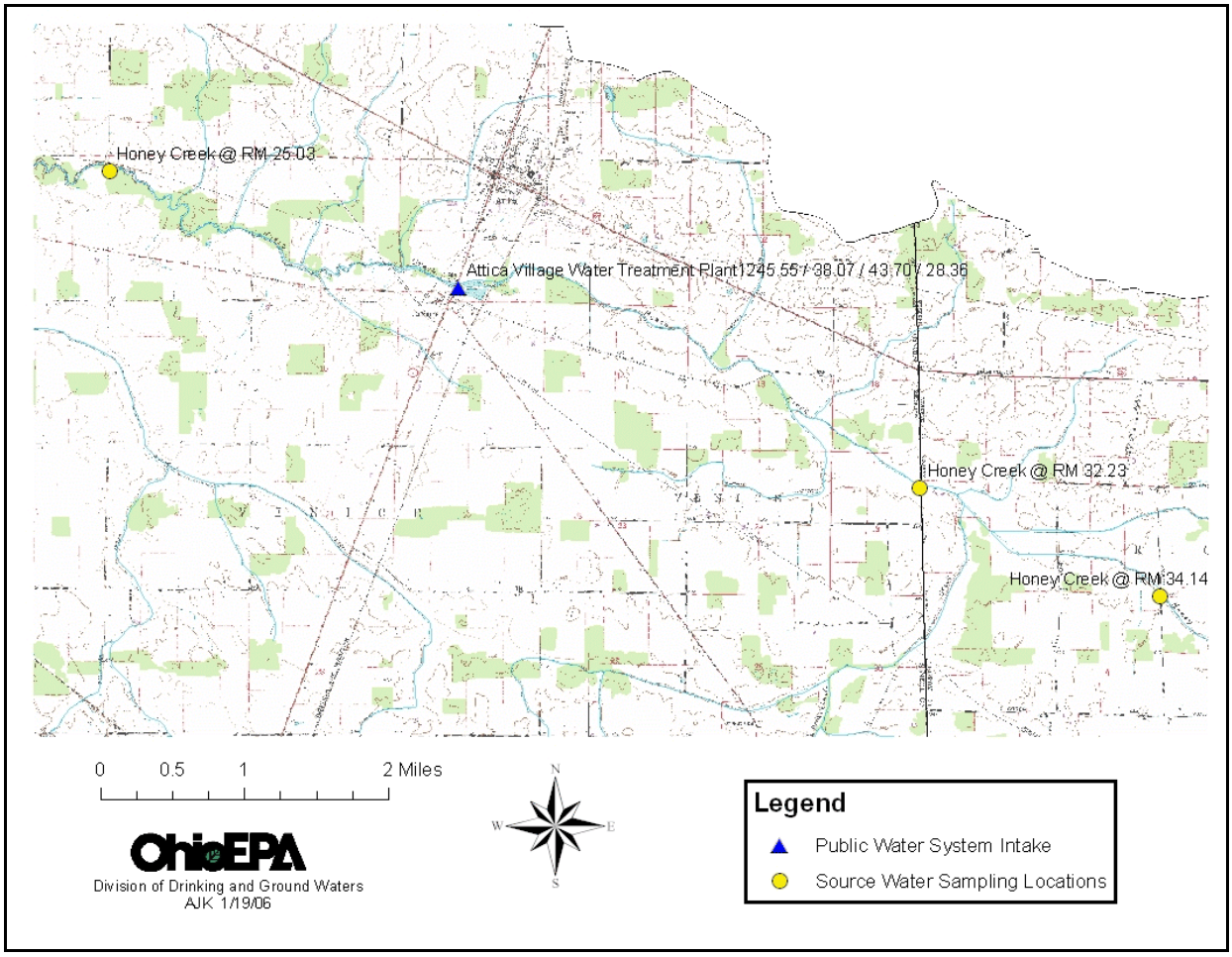

Figure 22 – Ohio EPA 2001 Survey Surface Water Sampling Locations Near the Village of Attica Intake

In 2001, Ohio EPA conducted sampling within the upper Sandusky watershed as part of a biological and chemical monitoring survey. As shown in Figure 22, Honey Creek was sampled at river miles (RM) 25.02, 32.23 and 34.14. The water treatment plant intake is located at RM 28.36. Results of the study indicate water quality impairments for aquatic life use due to nutrient enrichment and low dissolved oxygen. According to the 2003 water quality survey report based on the 2001 data, "the failure of streams within the assessment unit to attain applicable aquatic life uses and water quality criteria can be largely attributed to either agricultural practices within the watershed or point source pollution loadings."

Nitrate. Compliance sampling for nitrate is conducted at least monthly and more frequently during periods of elevated levels. Of the 59 treated water samples, all nitrate detections were below the water quality standard (10 mg/L) and the maximum level detected was 5 mg/l. Figures 23 and 24 show treated water quality data. Nitrate values at the three Honey Creek sampling sites ranged from 0.1 mg/L to 8.14 mg/L, all below the standard.

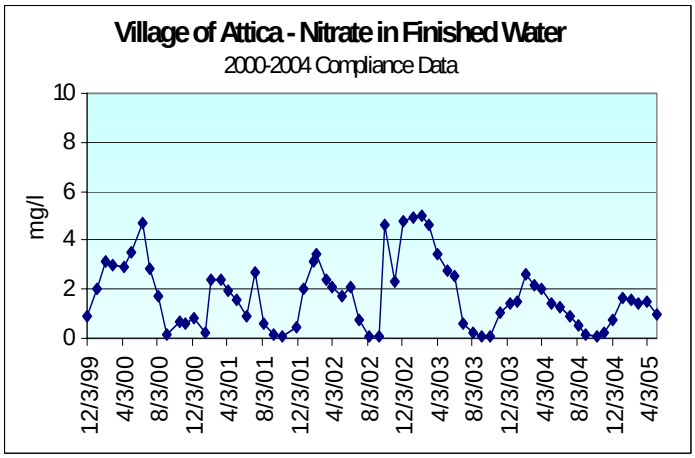

Figure 23

Pesticides. Atrazine was detected in the finished water at levels well below the water quality standard (3.0 ug/l) with a maximum detection of 0.97 ug/l. Attica minimizes pesticide levels in the finished water through the use of selective pumping from Honey Creek and use of powdered activated carbon during treatment. Pesticides were not evaluated during the 2001 survey. Consequently, additional water quality data from raw source water will be required in order to complete a full assessment.

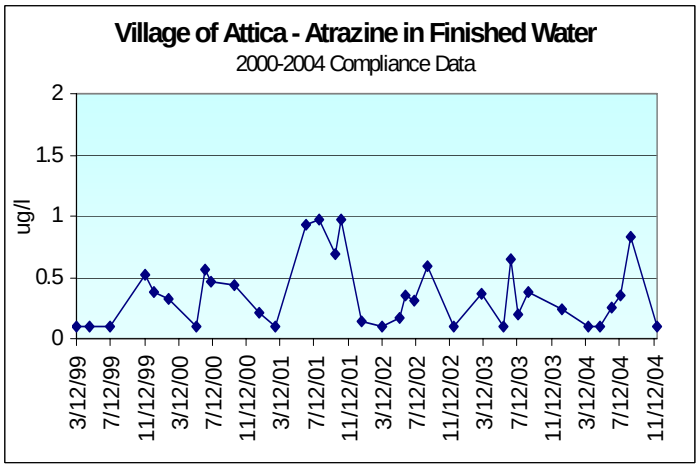

Figure 24

PDWS Use Attainment Assessment
Public Water System: Village of Attica
Assessment Unit: HUC-11 (04100011-080) Honey Creek

A full assessment of the public drinking water supply beneficial use was not possible at this time due to a lack of water quality data. Source water data for nitrate was available from three sampling locations but only five days were represented by the water quality data. However, nitrate has been detected in source water at levels above 8 mg/L, thus placing the waters on the watch list for nitrate. Treated water quality data was used to assess the nitrate indicator in the Attica reservoir. Additional source water quality data is needed for nitrate from the Honey Creek source water and pesticides data from both Honey Creek and the reservoir.

Table 5. Attainment Status for PDWS Source Waters at Attica PWS

Water Body	Nitrate		Pesticides		Cryptosporidium		Other MCL Contaminants	
	Status	Data	Status	Data	Status	Data	Status	Data
Honey Creek @ RM 28.36	NA	ID/WL	NA	ID	NA	N	NA	ID
Attica Reservoir	FS	Y	NA	N	NA	N	FS	Y

Comments:
Status Codes: FS-Full Support, I-Impaired, WL-Watch List, NA-Not Assessed
Data Codes: Y-Sufficient Data for Assessment, ID-Insufficient Data, N-No Data
Data Years: 2000-2004
Data Sources: Ohio EPA PWS Compliance Monitoring; Ohio EPA 2001 Watershed Survey; Ohio Tributary Monitoring Program (NCWQR)

Public Water System: Village of New Washington
Assessment Unit: 04100011-080 Honey Creek

The village of New Washington obtains water from two sources, an unnamed tributary to Brokenknife Creek at RM 5.50 and four groundwater wells. Water is pumped from the creek and wells into three upground reservoirs. According to the former water plant operator, timing of pumping from the stream source is critical in order to avoid elevated nitrate and pesticides. To control algae and organic content, potassium permanganate is added to the reservoirs. Water treatment processes consist of conventional treatment measures.

Compliance data for treated water is routinely submitted to Ohio EPA to determine compliance with SDWA requirements. The Village of New Washington analyzes treated water monthly for nitrate and nine times a year for select pesticides. Compliance sampling is conducted at least monthly and more frequently during periods of elevated levels. Since the village utilizes an upground reservoir supplemented with ground water, the compliance data is not considered representative of water quality conditions in the creek source. There were no source water sampling sites applicable for this assessment.

Nitrate. Of the 59 treated compliance water samples, all nitrate detections were below the water quality standard (10 mg/L) with a maximum detection of 8.81 mg/L. Figures 25 and 26 show finished water quality data.

Pesticides. The maximum level of atrazine in the finished water was 5.2 ug/l. Although atrazine was detected above the water quality standard level (3 ug/L) in two out of the 45 samples, the annual average was well below the standard. New Washington minimizes pesticide levels in the finished water through the use of selective pumping from Brokenknife Creek and dilution with well water in the reservoirs. Consequently, additional water quality data on the raw source water will be required in order to complete a full assessment.

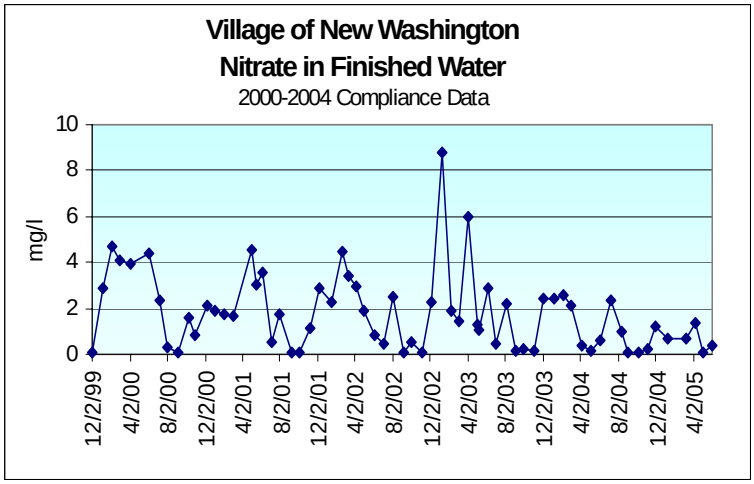

Figure 25

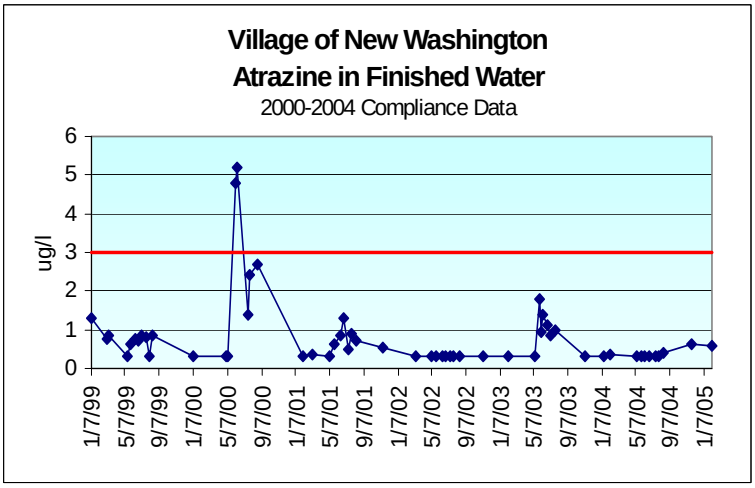

Figure 26

PDWS Use Attainment Assessment
Public Water System: Village of New Washington
Assessment Unit: HUC-11 (04100011-080) Honey Creek

A full assessment of the public drinking water supply beneficial use was not possible at this time due to a lack of source water quality data. Treatment beyond conventional and use of upground reservoirs preclude use of treated water quality data to assess the stream source water. However, the treatment process does not include nitrate removal so the finished water quality data was used to assess nitrate in the reservoirs. Nitrate has been detected in finished water at levels above 8 mg/L, thus placing the waters on the watch list for nitrate. Additional source water quality data from Brokenknife Creek and the reservoirs is needed to complete assessment of the PDWS use.

Table 6. Attainment Status for PDWS Source Waters at New Washington PWS

Water Body	Nitrate		Pesticides		Cryptosporidium		Other MCL Contaminants	
	Status	Data	Status	Data	Status	Data	Status	Data
Unnamed Tributary to Brokenknife Creek	NA	ID/WL	NA	ID	NA	N	NA	ID
New Washington Reservoir (primary)	Y	FS/WL	NA	N	NA	N	FS	Y

Comments:
Status Codes: FS-Full Support, I-Impaired, WL-Watch List, NA-Not Assessed
Data Codes: Y-Sufficient Data for Assessment, ID-Insufficient Data, N-No Data
Data Years: 2000-2004
Data Sources: Ohio EPA PWS Compliance Monitoring; Ohio EPA 2001 Watershed Survey; Ohio Tributary Monitoring Program (NCWQR)

Public Water System: City of Bellevue
Assessment Unit: 04100011-140 Lake Erie Tributaries
(West of Mills Creek to east of Sawmill Creek)

The city of Bellevue obtains water from two surface water sources in separate watersheds, Berry Creek/Snyders Ditch (Sandusky River basin) and Frink Run (West Branch Huron River basin). This assessment covers only the Berry Creek source water.

The Bellevue water system consists two surface water intakes and five upground reservoirs. Four smaller reservoirs are located adjacent to the Berry Run intake while the newest and largest reservoir is located about nine miles east of town adjacent to the Frink Run intake in the West Branch Huron River watershed. This reservoir system allows for some selective pumping and managed control of nitrate and pesticide input. Potassium permanganate is added to the reservoirs and directly at the treatment plant for algae and total organic carbon control. Excess organic material from the source water or created from algae in the reservoirs can lead to formation of total trihalomethanes (THMs). Algae blooms that commonly occur during the warm summer months also contribute to taste and odor problems. Treatment at the Bellevue plant includes conventional treatment and addition of powdered activated carbon for taste and odor control. When surveyed for which source water contaminants the water system would like to see reduced in the raw water, operators at the Bellevue treatment plant identified the following source water contaminants; total organic carbon (TOC), nitrate and other nutrients contributing to algal growth, turbidity, and pesticides.

Nitrate. Compliance data for treated water is routinely submitted to Ohio EPA to determine compliance with SDWA requirements. Compliance sampling is conducted at least monthly and more frequently during periods of elevated levels. Of the 64 treated water samples, four samples exceeded the nitrate MCL of 10 mg/L with a maximum detection of 11.3 mg/L (Figure 27). In January 2003, the water system was issued a nitrate MCL violation but has not received any since that time. This period of nitrate elevated above 10 mg/L lasted approximately 29 days.

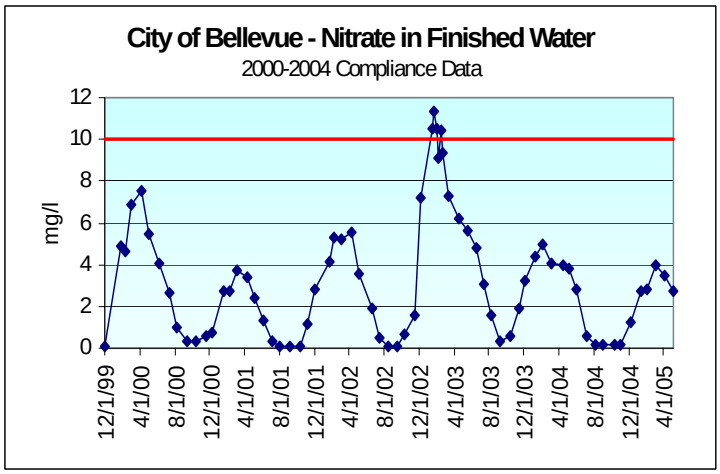

Figure 27

Pesticides. The City of Bellevue analyzes treated water twice a year for select pesticides. Bellevue effectively controls pesticide levels in the finished water through the use of selective pumping from stream sources and source water management through the reservoir storage system. The addition of activated carbon during treatment processes also reduces pesticide levels in the finished water.

PDWS Use Attainment Assessment
Public Water System: City of Bellevue
Assessment Unit: HUC-11 (0410 0011-140)

Assessment of the public drinking water supply beneficial use could not be completed at this time due to a lack of source water quality data. Treatment beyond conventional and the use of upground reservoirs precludes the use of treated water quality data for assessment of the source water. Nitrate has been detected in finished water at levels above 8 mg/L, thus placing the waters on the watch list for nitrate. Source water quality data is needed specifically from the two stream sources and the reservoirs to complete this assessment.

Table 7. Attainment Status for PDWS Source Waters at Bellevue PWS

Water Body	Nitrate		Pesticides		Cryptosporidium		Other MCL Contaminants	
	Status	Data	Status	Data	Status	Data	Status	Data
Berry Run/Snyders Ditch	NA	ID/WL	NA	N	NA	N	NA	N
Bellevue Reservoir #1	NA	ID/WL	NA	N	NA	N	NA	N
Bellevue Reservoir #2	NA	ID/WL	NA	N	NA	N	NA	N
Bellevue Reservoir #3	NA	ID/WL	NA	N	NA	N	NA	N
Bellevue Reservoir #4	NA	ID/WL	NA	N	NA	N	NA	N
Frick Run (Huron Basin)	NA	ID/WL	NA	N	NA	N	NA	N
Bellevue Reservoir #5 (Huron Basin)	NA	ID/WL	NA	N	NA	N	NA	N

Comments:
Status Codes: FS-Full Support, I-Impaired, WL-Watch List, NA-Not Assessed
Data Codes: Y-Sufficient Data for Assessment, ID-Insufficient Data, N-No Data
Data Years: 2000-2004
Data Sources: Ohio EPA PWS Compliance Monitoring; Ohio Tributary Monitoring Program (NCWQR)

Public Water System: City of Clyde
Assessment Units: 04100011-110 Green Creek

The city of Clyde obtains water from Beaver Creek via Royer Ditch. Previously, the City used source water from Raccoon Creek but this intake is now inactive. Water is pumped to the Beaver Creek Reservoir (upground) and then gravity fed to either the Raccoon Creek Reservoir (upground) or directly to the treatment plant. Treatment consists of conventional processes and the addition of activated carbon.

Potassium permanganate is added to the raw water entering the pretreatment basins inlet channel for taste and odor control and as an oxidizer for organic contaminants. Excess organic material, whether from the source water or created from algae, can lead to formation of total trihalomethanes (THMs). Algae blooms that commonly occur during the warm summer months may also contribute to taste and odor problems. Copper sulfate is directly applied to the reservoirs for algae control while activated carbon is added during the treatment process for taste and odor control. Due to the large storage capacity of the two reservoirs, the City is able to selectively pump source water from Beaver Creek, minimizing periods of poor water quality.

Nitrate. Compliance data for treated water is routinely submitted to Ohio EPA to determine compliance with SDWA requirements. Figures 28 and 29 show finished water quality. Compliance sampling is conducted at least monthly and more frequently during periods of elevated levels. All of the 60 treated water samples were well below the nitrate MCL of 10 mg/L with a maximum detection of 1.8 mg/L. While these results are considered representative of nitrate levels within the reservoirs, additional source water quality data from Beaver Creek is needed in order to complete the assessment.

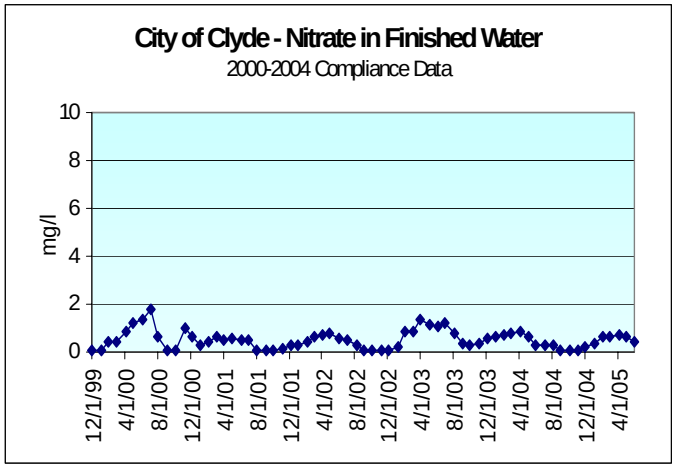

Figure 28

Pesticides. The city of Clyde analyzes treated water six times a year for select pesticides. Atrazine has been detected in treated water at low levels well below the water quality standard (3.0 ug/L) with a maximum detection of 1.06 ug/L. Clyde controls pesticide levels in the finished water through the use of selective pumping from the stream and source water management through the reservoir storage system. The addition of activated carbon during treatment may also reduce pesticide levels in the finished water. Additional source water quality data from Beaver Creek is needed in order to fully assess this indicator.

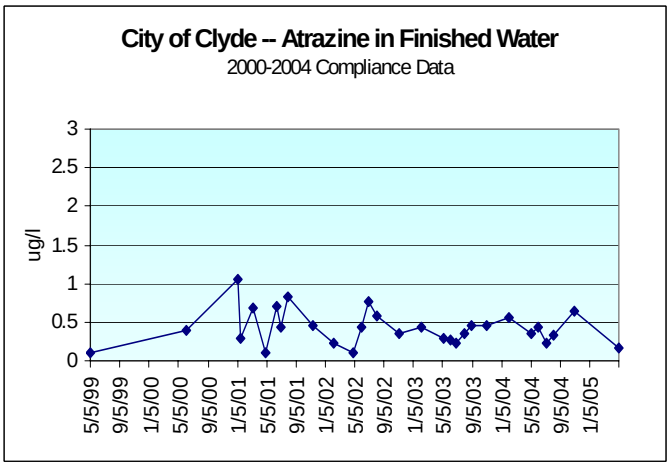

Figure 29

PDWS Use Attainment Assessment
Public Water System: City of Clyde
Assessment Unit: HUC-11 (04100011-110)

Assessment of the public drinking water beneficial use could not be completed at this time due to a lack of source water quality data. Treatment beyond conventional and the use of upground reservoirs preclude the use of treated water quality data for assessment of the Beaver Creek source water. However, since the treatment process does not include nitrate removal, the finished water quality data was used to assess nitrate in the two reservoirs. Additional source water data is needed from Beaver Creek and the reservoirs to full assess all indicators.

Table 8. Attainment Status for PDWS Source Waters at Clyde PWS

Water Body	Nitrate		Pesticides		Cryptosporidium		Other MCL Contaminants	
	Status	Data	Status	Data	Status	Data	Status	Data
Beaver Creek @ RM 2.88	NA	ID/WL	NA	N	NA	N	NA	N
Clyde Reservoir #1 (Raccoon Creek Res.)	FS	Y	NA	N	NA	N	FS	Y
Clyde Reservoir #2 (Beaver Creek Res.)	FS	Y	NA	N	NA	N	FS	Y

Comments:
Status Codes: FS-Full Support, I-Impaired, WL-Watch List, NA-Not Assessed
Data Codes: Y-Sufficient Data for Assessment, ID-Insufficient Data, N-No Data
Data Years: 2000-2004
Data Sources: Ohio EPA PWS Compliance Monitoring; Ohio Tributary Monitoring Program (NCWQR)