

# **Lake Huron to Lake Erie Real-time Drinking Water Protection Network - An Assessment of the Current Status and Recommendations for Reactivation**

**July 2017**





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## **Executive Summary**

The 80-mile Lake Huron to Lake Erie international corridor is a major global shipping route and its shores include both heavy manufacturing along downriver Detroit, Michigan and a concentrated network of petrochemical plants just south of Sarnia, Ontario. Accidental spills, emergency diversions (e.g., Fraser sinkhole) and nutrient-triggered algal blooms are a matter of historical record and are expected to continue, even at a reduced rate, into the future. There are 14 U.S. Water Treatment Plants (WTP) along this international corridor that treat water and subsequently distribute clean drinking water through an extensive network that serves a population of about 4 million in southeast Michigan. These WTPs are owned and operated by 12 different local communities and the Great Lakes Water Authority. The primary responsibility of a drinking water service provider is to protect public health.

In order to protect public health, WTPs need to be aware of potential source water risks/threats to the drinking water plants such as accidental spills and emergency diversions (e.g., Fraser drain collapse and sinkhole) into source water areas combined with nutrient-triggered algal blooms. These risks demonstrate historical occurrences and it is understood that they are impossible to completely eliminate. Despite this, the state and federal drinking water regulatory framework does not include specific requirements for source water monitoring.

The Huron-to-Erie Real-time Drinking Water Protection Network was created in the mid-2000s to counter those threats. The 14 communities and the Detroit Water and Sewer District (DWSD) agreed that in order to protect public health, they each needed to monitor (i.e. see in real-time) the quality of the source water entering the drinking water treatment plants in order to counteract any threats contained in the source water. The system network included many elements including a variety of monitors, data logging and website access. Unfortunately, a number of challenges, including the economic recession (dwindling budgets), complicated and high maintenance

equipment (costs) and limited staff resources (priorities) effectively reduced network participation and limited its effectiveness.

This report examines the benefits; challenges; and lessons learned and it recommends next steps to refine that program into a sustainable and coordinated system that will:

- 1) increase water treatment plant participation to 100% along the corridor;
- 2) improve the network to ensure consistent monitoring, maintenance and calibration;
- 3) enhance communication and public awareness, and;
- 4) protect public health.

Federal and state funds were initially made available to acquire and maintain the monitoring equipment and create the network and databases used by the WTP operators and public. All WTPs were provided with YSI multi-parameter sondes (bundled probes) while about half received total organic carbon (TOC) analyzers, fluorometer and gas chromatograph/mass spectrometers (GC/MS) units.

The sondes were the cheapest equipment to purchase and the simplest to maintain and use. They included sensors for general water quality parameters such as dissolved oxygen, conductivity, pH, temperature, turbidity, oxidation reduction potential, blue-green algae and chlorophyll. The TOC analyzers, used to detect total organic carbon, the fluorometers, used to identify hydrocarbons indicative of petroleum spills, and the GC/MS units for measuring volatile organic chemicals (VOCs), all required far greater expertise to use and were both more time-consuming and expensive to maintain. Regular equipment maintenance was either provided by a competent engineering firm or by internal WTP staff with expertise, depending on available resources. The global financial meltdown significantly stressed those resources and added to maintenance and training inconsistencies, and eventually a drop-off in network participation. Accordingly, only about six of the 14 WTPs participating in the network still maintain functional monitoring equipment, with the majority being the multi-parameter sondes.

Feedback from WTP operators and associated staff was obtained during one-on-one interviews during the summer-fall of 2016, a face-to-face meeting on February 9, 2017 at SEMCOG's Detroit offices and follow-up March online survey. The following information was learned:

1. All organizations interviewed that are responsible for source water treatment plans and drinking water distribution agree that source water monitoring is a priority.
2. The majority of WTP operators agree that they prefer a system they can sustainably operator within their own local budgets.
3. The system must be simple to operate, including future maintenance, calibration and replacement.
4. Coordination and communication between neighboring WTPs is important.

A network database application enhances communication and data efforts, but is not a critical component of WTP monitoring outcomes. Overall, the vast majority stress "Keeping it simple." This is evidenced by the fact that only six of the 14 WTPs are still actively monitoring the source water. It is critical that any WTP considering re-engaging in the monitoring network acquire

equipment based on their ability to sustainably operate it, including future maintenance, calibration and replacement costs. These investigators recommend that any future budget be earmarked for the current contractor, NexSensFondriest/NexSens, for datalogging to the network database application [wqdata.live.com](http://wqdata.live.com), and an YSI sonde for those WTPs expressing network participation interest – at a minimum.

Not all WTPs need to monitor for all the optional sonde parameters and could save costs by decreasing the number of probes. For example, the Port Huron WTP may be adequately served with monitoring pH at the intake since they are upstream of Chemical Valley and petro-chemical pipelines under the river. Blue-green algae and chlorophyll may not need to be monitored in the two rivers due to either the lower nutrient loads (relative to Lake St. Clair and western basin of Lake Erie) or fast currents inhibiting growth in that corridor. Conversely, blue green algae probably should be monitored where taste-and-odor problems have been periodically detected. The existing inventory of sondes can be upgraded with any needed sensors from the manufacturer (YSI) for a reasonable cost since the replacement components are compatible with the existing equipment. Next generation sondes with sensors are available that are not compatible with the once currently deployed in the network.

Similarly, not all WTPs need or want high-maintenance equipment. Each treatment plant operator was surveyed in late winter 2017 and asked to describe their respective needs as to the deployment of any TOC analyzer, fluorometer, or GC-ECD unit. For example, if a plant operator felt that their site is particularly susceptible to petroleum spills, a fluorometer could be considered. If the demand for treatment disinfectant is highly variable, a TOC analyzer is an option.

Lastly, GC-ECD units capable of detecting volatile organic compounds that are cheaper to purchase and less maintenance-intensive than the previously installed GC-MS units are now more viable options. Set up locations could be at WTPs that are strategically located along the corridor for detection of specific chemical compounds (e.g., one station each in the St. Clair and Detroit Rivers, respectively), or at WTPs with the staff sufficiently trained and interested in maintaining and using the equipment. The deployment of fluorometers and TOC analyzers and GC-ECD units should be dependent on location, staff support, and funding (State or internal).

All equipment, regardless of its complexity, requires regular maintenance to ensure proper and reliable functionality. Calibration and maintenance should be performed on all existing and future equipment based on manufacturer recommendations, in situ environmental conditions, and extent of use. Unless monitoring equipment is maintained by in-house WTP staff, most of those interviewed agree that contract maintenance should be performed by one entity. This will certify that all equipment is calibrated consistently and with the same frequency, threshold values for the notification system and alarms are uniformly established, and stakeholder messaging is identical.

Communication between WTP operators was also evaluated in the individual meetings through the online Nexus system. The interviews established that even when working properly, many operators did not use this function except to view their own monitoring results. They simply

want the ability to view their data from the sonde (ideally seeing it remotely for those plants that don't operate 24/7).

The one-on-one interviews also disclosed that the notification process to other treatment plants through the Nexus system was not being utilized due to the number of false positives. The operators were using simpler communication methods such as texting or calling up-and-downriver plants and working through the county emergency management system. These emergency management systems have been developed across the region between local and county agencies to coordinate on emergency issues. There seemed to be reluctance to pay to have this online notification process even when working properly.

The online database management system, called wqdatalive, was operated by Fondriest/NexSens to communicate directly with dataloggers at participating plants to provide real-time data to WTP operators. A public-facing Regional Water Quality Information Management System (RWQIMS) linked to wqdatalive was also created but difficult to use and hadn't been updated or maintained since 2013. The Healthy Urban Waters Program at Wayne State University diagnosed some of the RWQIMS database issues and moved the data to a more simplified prototype application that has been drastically simplified for potential future users. They also developed a prototype website which allows the public to access, query, graph, export and perform simple statistics on all of the data. Costs for continued hosting of the website and database maintenance would be needed if there is interest in keeping it operational. Regardless, it is important to maintain a real-time datalogging system that is independent of internet connections in the event of potential outages. WTP operators should see the data results without the need to connect to the internet.

While there never appeared to be a formal monitoring network governance structure, the Southeast Michigan Council of Governments (SEMCOG) has a Memorandum of Agreement with those corridor municipalities who are dues-paying members of the Council. Under this agreement, SEMCOG hosts periodic meetings with WTP and municipal representatives to determine the network status (i.e., what WTPs are continuing to effectively monitor) and related concerns and needs. SEMCOG should continue to play a leadership role especially since they have environmental staff highly interested in the network's future and source water protection for the region. Likewise, Wayne State University's (WSU) Healthy Urban Waters Program should also play a role, especially with the public-facing database and website.

Any future "outside" funding to support the monitoring network, especially from federal, state or private sources, needs to focus on a long-term funding solution and not a year-to-year appropriation. One option is to consider investing a one-time source of funds in an endowment, possibly overseen by a regional community foundation. Such a fund should be large enough to generate revenue sufficient for annual maintenance. This "endowment" should be augmented with annual contributions from each of the municipalities to ensure their "skin in the game" (minimum \$50,000+/year). Potential local contributions are discussed in the section "Future Equipment Maintenance - Current & Proposed Annual Maintenance Budget from Local Sources." A proposed governance structure consisting of at least a seven-member board to oversee the network, including finances for capital equipment costs and annual maintenance is

discussed in the section entitled “Governance and Related WTP Monitoring Network Coordination.”

It is important to recognize that SEMCOG is currently in the process of updating the *Water Resources Plan for Southeast Michigan*, with planned completion in March 2018. This plan will include regional policies and actions to guide SEMCOG’s work. The development of the plan is guided by an 80-member task force consisting of local, county, state and federal representatives in addition to environmental groups, not-for-profit agencies and academic institutions. Given the timeliness of interest in drinking water monitoring, the task force drafted the following regional policy on Source Water Protection:

- *To ensure that all have safe drinking water, monitor intakes to detect contaminants and implement coordinated and timely procedures for notification and emergency response.*

SEMCOG’s Executive Committee has also approved this policy for inclusion in the final Water Resources Plan. This policy is consistent with the following Michigan Water Strategy priority action:

- *Ensuring clean and safe drinking water for all Michiganders.*

Additionally, this report is directly relevant to the following recommendations from the 21<sup>st</sup> Century Infrastructure Commission Report:

- *Adopt policies that require self-sufficient and transparent budgets for water, sewer and stormwater facilities.*
- *Perform regular assessments and maintenance of Michigan’s drinking water, sewer, stormwater and dam infrastructure systems.*

These policies are consistent with the primary goal to protect public health. The recommended components of the proposed source water monitoring program will achieve this goal, but also include supporting activities that enhance communication, public education, awareness and outreach.

Scenarios on different project components and their respective roles are highly dependent on the availability of funds. The total estimated first year capital costs based on specific equipment identified by each WTP, are conservatively estimated at \$413,366 with annual maintenance of \$259,398 in the first and succeeding years. A sustainable source of funds has yet to be determined although a number of WTP operators have identified what think should be contributed from local sources.

# **Lake Huron to Lake Erie Real-time Drinking Water Protection Network - An Assessment of the Current Status and Recommendations for Reactivation**

## **Background**

The 80-mile Lake Huron to Lake Erie international corridor includes the St. Clair River, Lake St. Clair, and the Detroit River. It is a major global shipping route and its shores include both heavy manufacturing along downriver Detroit and a concentrated network of petrochemical plants just south of Sarnia. Nine pipelines cross under both rivers, some used for petroleum-based products. Corridor spills from multiple sources including vinyl chloride, methyl ethyl ketone and other volatile organics have occurred. Rainfall event-triggered nutrient loadings from combined sewer overflows and sanitary sewer overflows into Lake St. Clair are frequent and well documented. The corridor's fast flow rate limits the response time to address spill-related contamination events for downstream users, such as community water supply treatment facilities, and poses a real threat to the approximately 3.2 million people who depend on this source<sup>1</sup>.

To counter these threats, the Huron-to-Erie Real-time Drinking Water Protection Network was created in the mid-2000s with Department of Homeland Security, US Environmental Protection Agency and state funds<sup>2</sup>. The \$3M cost went toward the purchase of monitoring equipment installed in 13 (Monroe was the 14<sup>th</sup> member added in 2012) drinking water treatment plants (WTP). An online database of chemical monitoring results, equipment training and the first few years of annual equipment calibration and maintenance was also included. This water quality monitoring network provided near real-time (every 15 minutes) early detection of drinking water contamination from chemical spills and other threats to public health. In the event of a confirmed contamination in the corridor, WTP operators, county health officials and state agencies were to engage in a course of action including shutting down water intakes in the spill's path (See Figure 1). The volumes of data were also available for public users involved in research, spill investigation, river modeling, water treatment, or ambient water quality monitoring.

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<sup>1</sup> Huron to Erie Alliance for Real-time Monitoring and Information, Public Sector Consultants, 2009

<sup>2</sup> Michigan Department of Environmental Quality Administration Division Record



*Figure 1: Water Treatment Plant Monitoring Locations*

## **Water Treatment Plant Monitoring Network Assessments and High-Level Lessons Learned**

The Michigan Department of Environmental Quality (MDEQ) expected the community WTPs to identify funding to support equipment maintenance and calibration, database management and staffing once the initial grants expired. This was met with limited success due to many reasons highlighted below. Consequently, the monitoring network today consists of only six of the original 14 participating members.

Interviews with WTP operators and municipal officials were conducted during the summer-fall of 2016 with a follow-up meeting and online survey by a research team from the MDEQ's Office of the Great Lakes, Wayne State University's Healthy Urban Waters Program, and the Southeast

Michigan Council of Government (SEMCOG) to determine lessons learned and interest in reengagement. The summer-fall interviews and information gathered was used to generate an earlier version of this report with compiled estimated equipment, database and operating costs, assumptions and recommendations. This early draft report was provided to WTP operators and municipal officials for their review.

A meeting with these stakeholders was then hosted by SEMCOG at their Detroit office on February 9th, 2017 to review the cost estimates, including number/type of monitors and network systems and begin to get feedback for a more refined, accurate estimate for the entire network. The meeting summary is provided in APPENDIX 5.

Stakeholders provided post-meeting comments via email and phone call. These preliminary comments included specific edits to the draft report and budget. The initial budgetary comments resulted in a slight reduction in the annual maintenance costs (due to the clarification/removal of duplicative line items).

A more formal, follow-up 12-question survey (via survey monkey link) was also sent to the water treatment plant operators on March 3rd, 2017 (APPENDIX 6). The survey solicited comments on the DRAFT report (including the face-to-face assessments) and asked about the use of existing monitoring equipment, the need for new equipment, current and proposed annual equipment maintenance budget and related questions on hosting and data access. Thirteen of the 14 WTPs provided responses summarized in APPENDIX 7 with Algonac delaying their responses due to plant personnel changes.

The summer-fall interviews and the information gathered was used to generate an earlier version of this report with compiled estimated equipment, database and operating costs, assumptions and recommendations for WTP operator and municipal review.

Among the team's high-level findings:

### ***Challenges***

- The 2007-2009 global recession forced communities to prioritize line items in their annual budget (such as staffing costs). The network's automated, real-time monitoring was not a legal requirement and therefore staff training and network equipment maintenance were easy to drop during budget cuts
- Some of the equipment was maintenance intensive and suffered recurring malfunctions resulting in questionable data and concerns about sensor conditions.
- Some of the equipment sensors measure parameters that are already required (albeit less frequently) as part of WTP operations under the Safe Drinking Water Act.
- Lack of consistency among plants in maintenance/calibration schedules paired with aging equipment created false positives and subsequent erroneous email/text message alerts to WTP operators through. This made it difficult for operators to distinguish real events from false alarms.

- No two WTPs have the same operating equipment and staffing needs and each occupies unique locations along the “corridor.” Some are on fast-moving rivers while others are on lakes with relatively slow circulation.
- Governing bodies in some communities and even some participating WTPs lost interest and/or did not see the value of the network due to corridor location and other factors.
- As WTPs dropped out of the network, a domino effect was created and downstream community interest in continued network participation waned even further.
- The public component of the database (Real-time Water Quality Information Management System aka RWQIMS) has not been updated for years and was not used.
- No formal response plan exists as part of the river monitoring network. This portion of the monitoring is left to the individual utilities (i.e., via use of email, fax, and phone) to contact downstream WTPs.

### ***Suggestions and Follow-up***

- Each WTP should review the value and cost of real-time parameters in the network against the required monitoring for the Safe Drinking Water Act.
- Since each WTP is unique in terms of staffing and location along the corridor, each WTP should verify the monitoring equipment needed and the associated implementation of QA/QC procedures. Note: This was done as a result of the February-March, 2017 follow-up meeting and survey.
- Attention to data, sensor performance, WTP data comparisons and data trending all should be routinely reviewed either by a contractor or staff trained in data interpretation.
- Maintenance and calibration information should be recorded so that maintenance logs at each plant can be reviewed.
- Past and future data anomalies for all parameters should be investigated to distinguish measurement error from environmental variability near time of collection. Erroneous data should be removed.
- The public-facing database and website redesigned with a more user-friendly interface and enhanced functionality should be considered for future deployment. The web application could serve as a major outreach component to the network and could be a hub for sharing regional water quality data.
- Any budget should include “depreciation of assets over useful life” to ensure equipment replacement costs. Equipment life expectancy and/or warranties should be verified and adjusted based on experience.

## **WTP Monitoring Network Equipment and Maintenance**

When the network was established, equipment was deployed based on feasibility and usefulness for source water protection (See Table 1). Although equipment locations worked well when external funding existed, our assessments showed that when funding expired, many WTPs did not have the internal expertise or local funding to maintain the equipment, especially during and after the 2007-2009 economic recession (See Table 3).

*Table 1: Original WTP monitoring equipment*

| <b>Equipment</b>                  | <b>Purpose</b>                                                                                                                                                                                                 |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>YSI Sonde</b>                  | Multi-parameter probe with sensors for general water quality parameters including dissolved oxygen, conductivity, pH, temperature, turbidity, oxidation reduction potential, blue-green algae and chlorophyll. |
| <b>Hach TOC Analyzer</b>          | Detects total organic carbon in source water. Organic compounds may react with water treatment disinfectants to produce potentially toxic and carcinogenic compounds.                                          |
| <b>Turner Designs Fluorometer</b> | Detects hydrocarbons indicative of petroleum spills. The units are calibrated to measure diesel fuel in parts per million.                                                                                     |
| <b>GC/MS</b>                      | Gas Chromatography/Mass Spectroscopy for measuring 25 Volatile Organic Chemicals (VOCs)                                                                                                                        |

Not all network utilities operated the same monitoring equipment (See Table 2). All stations had the YSI multi-parameter sonde with a varying number of sensors. Those WTPs that had GC/MS units later abandoned them due to calibration problems, maintenance costs and operational complexity. Much of the monitoring equipment has either approached or passed its projected end of life. Refurbishment and replacement costs for a “refurbished” network will depend on the parameters to be monitored and related equipment purchased to detect them. For example, the multi-parameter YSI sonde is relatively inexpensive to evaluate probe effectiveness and individual probe replacement costs are reasonable since replacement parts are compatible (from the original vendor) with existing equipment. In addition to the YSI sonde, some drinking water plants operated the TD 4100 Fluorometer for detecting hydrocarbons and the Hach Total Organic Carbon (TOC) Analyzer. The TD 4100 Fluorometer detects hydrocarbons indicative of petroleum spills. The presence of high TOC in source water can react with treatment disinfectants in high concentrations and form potentially toxic or carcinogenic compounds.

*Table 2: Initial Distribution of Monitoring Equipment*

| <b>Water Treatment Plant</b> | <b>Sonde</b> | <b>TOC Analyzer</b> | <b>Fluorometer</b> | <b>GC-MS</b> |
|------------------------------|--------------|---------------------|--------------------|--------------|
| <b>Port Huron</b>            | O            |                     |                    |              |
| <b>Marysville</b>            | O            |                     |                    |              |
| <b>St. Clair</b>             | O            | O                   | O                  | O            |
| <b>East China</b>            | O            |                     |                    |              |
| <b>Marine City</b>           | O            |                     |                    |              |

|                            |   |   |   |   |
|----------------------------|---|---|---|---|
| <b>Algonac</b>             | O | O | O | O |
| <b>Ira Township</b>        | O |   |   |   |
| <b>New Baltimore</b>       | O |   |   |   |
| <b>Mount Clemens</b>       | O | O | O | O |
| <b>Grosse Pointe Farms</b> | O | O | O |   |
| <b>Water Works Park</b>    | O | O | O | O |
| <b>Southwest Detroit</b>   | O | O | O | O |
| <b>Wyandotte</b>           | O | O | O |   |

The monitoring equipment at each of the network WTPs was initially maintained and calibrated by Environmental Consulting and Technology, Inc. (ECT). Depending on the plant, ECT visits ranged from biweekly to quarterly. It appears that WTPs furnished with only a sonde received quarterly or bimonthly visits whereas WTPs with more equipment, the GC-MS in particular, could have been visited every two weeks. Some of the more frequent visits were apparently due to unexpected maintenance as opposed to scheduled visits.

Two WTPs (Algonac and Marine City) continue to have an equipment maintenance contract with ECT. Monroe WTP calibrates their sonde with internal staff and they have a contract with Hach for quarterly maintenance on the TOC analyzer (Monroe WTP joined the network in 2012 and repurposed existing equipment from WTPs that left the network). Marysville, Water Works Park and SW Detroit maintain their equipment with internal WTP staff.

*Table 3: Current Distribution of Monitoring Equipment*

*Additional pieces of equipment are likely to be in storage at the Mt. Clemens WTP.*

| <b>Water Treatment Plant</b> | <b>Sonde</b> | <b>TOC Analyzer</b> | <b>Fluorometer</b> | <b>GC-MS</b> | <b>GC-ECD</b> |
|------------------------------|--------------|---------------------|--------------------|--------------|---------------|
| <b>Port Huron</b>            |              |                     |                    |              |               |
| <b>Marysville</b>            | O            |                     | O                  |              | O             |
| <b>St. Clair</b>             |              |                     |                    |              |               |
| <b>East China</b>            |              |                     |                    |              |               |
| <b>Marine City</b>           | O            |                     |                    |              |               |
| <b>Algonac</b>               | O            |                     |                    |              |               |
| <b>Ira Township</b>          |              |                     |                    |              |               |
| <b>New Baltimore</b>         |              |                     |                    |              |               |
| <b>Mount Clemens</b>         |              |                     |                    |              |               |
| <b>Grosse Pointe Farms</b>   |              |                     |                    |              |               |
| <b>Water Works Park</b>      | O            | O                   | O                  |              |               |
| <b>Southwest Detroit</b>     | O            | O                   | O                  |              |               |
| <b>Wyandotte</b>             |              |                     |                    |              |               |
| <b>Monroe*</b>               | O            | O                   | O                  |              |               |

*\* Monroe was added in 2014*



Figure 2: Drinking Water Monitoring Equipment – SW Detroit Water Treatment Plant (Complete site including Sonde, TOC Analyzer, Fluorometer, and GC-MS)

## Future Equipment Recommendations

The following findings are based on one-on-one assessments of WTP operators and municipal officials during the summer-fall 2016 and a follow-up meeting and survey conducted in February-March 2017. The findings, while compatible, are discussed separately below.

### ***Summer-Fall 2016 One-on-One Assessments – High-Level Monitoring Equipment Findings***

The research team interviewed the WTP operators and municipal representatives in the summer-fall 2016 to evaluate the current (and future) monitoring network and consider lessons-learned, including the:

- chemical parameters,
- monitoring equipment used to detect them,
- required maintenance,
- database management system

Sample questions asked one-on-one assessments and the interviewed contacts are included in APPENDIX 2 and APPENDIX 8, respectively. Assessment highlights based on WTP responses (See APPENDIX 3) included:

- refining the parameters monitored to reflect the likelihood of detecting *in situ* parameters (i.e., blue-green algae at Lake St. Clair and at the Monroe WTP),
- more user friendly, lower maintenance and cheaper alternatives to previously used monitoring equipment unless a WTP elects to maintain more complex components,

- possibly eliminating probes and chemical parameters that are already monitored frequently as part of required WTP operations, and
- other capital and annual cost savings.

One over-arching finding from the one-on-one assessments was that each participating WTP should deploy monitoring equipment based on their interest and ability to sustainably operate it, including future maintenance, calibration and replacement costs. Funds and a budget should be established to reimburse the current contractor, Fondriest/NexSens, for datalogging to the network database application, wqdatalive.com, and for a minimum of an YSI sonde. The sonde is the least expensive unit, is the easiest to calibrate, and will provide basic water quality indicators. Maintenance will include yearly manufacture tune-ups, quarterly calibrations, and occasional probe replacements. Most past and existing sondes in the network include the following probes:

- Temperature,
- Specific Conductivity,
- pH,
- Turbidity,
- Chlorophyll,
- Oxidation Reduction Potential,
- Dissolved Oxygen,
- Blue-Green Algae (some sites).

The assessments revealed that not all WTPs need to monitor for the above sonde parameters and could save costs by decreasing the number of sensors. For example, the Port Huron WTP appears to be adequately served with a low-cost pH meter at the intake since they are upstream of both Chemical Valley and the petro-chemical pipelines crossing under the St. Clair River. Likewise, blue-green algae and chlorophyll may not need to be monitored in the two rivers due to either the lower nutrient loads (relative to Lake St. Clair and western basin of Lake Erie) or fast currents inhibiting growth in that corridor. Conversely, blue green algae could be monitored especially where taste-and-odor problems have been periodically detected in the two lakes. To paraphrase more than one WTP operator interviewed during this assessment process, “You can tell something is up in the water with a rapid change in pH”

Similarly, not all WTPs need high-maintenance equipment of the type deployed in the network. The earlier version of this report provided as part of the February 9<sup>th</sup> SEMCOG meeting recommended that each treatment plant make its own decision to deploy the TOC analyzer, fluorometer, or a GC-ECD unit. If a plant operator believes that a site is particularly susceptible to petroleum spills, a fluorometer is recommended. If the demand for treatment disinfectant is highly variable, a TOC analyzer is recommended.

The deployment of fluorometers and TOC analyzers should be dependent on location, staff support, and funding (State or internal). Specific locations for deployment of these types of analyzers should be considered by the criteria mentioned above. Nonetheless, given the historical spills of volatile organic compounds in this corridor, at least limited monitoring equipment to detect them is highly recommended.

Lastly, GC-ECD units capable of detecting volatile organic compounds that are less maintenance-intensive devices than the previously installed and much-maligned GC-MS units could be deployed at either:

- those WTPs strategically located along the corridor for detection of specific chemical compounds (e.g., one station each in the St. Clair and Detroit Rivers, respectively), or
- at WTPs with the staff sufficiently trained and interested in maintaining and using the equipment.

During the summer of 2016, two GC-ECD units were evaluated for monitoring of volatile organic compounds (VOC) in replacement of the GC-MS units by a research team led by Dr. Judy Westrick (Wayne State University). The six month pilot was designed to address problems identified during the original monitoring network. The evaluation was established in two locations (the Great Lakes Water Authority (GLWA) Water Works Park Pilot Plant and the Marysville Drinking Water Treatment Plant) and included the training of operators and summarizing the service and economic logistics of the two piloted monitoring systems. The Inficon CMS 5000 VOC monitoring system was considered a more suitable option of the two due to its higher reliability and ability to detect 27 VOCs. The CMS 5000 has a minimum detection limit of 1-2 ppb, records concentrations every 30 minutes, and is capable of being connected to WTP SCADA systems.

#### ***February-March 2017 Survey – Specific WTP Monitoring Equipment Needs***

Based on the WTP responses to the March 2017 survey (to Questions #7), a more detailed estimate of costs could be determined for each of the responding WTPs that included replacement of sonde probes and/or new equipment. Some general observations include:

- Port Huron WTP only deploys a Hach pH meter to continuously monitor intake water and does not need new equipment. This makes sense since they are upriver from major industry including Sarnia's Chemical Valley.
- Detroit Water Works Park (Belle Isle) apparently does not require either replacement probes or any new equipment at this time except for a GC-ECD unit. WSU (Healthy Urban Waters) maintains a working relationship with Water Works Park and has paid for all sonde maintenance and purchased a new blue-green algae sensor for the sonde. Given the larger staff at Water Works Park, complex equipment like the GC-ECD unit should be in good hands.
- Only three WTPs requested new TOC analyzers and fluorimeters at some point, either because of advancing equipment "shelf life" (Monroe) or because they are not currently actively involved in the monitoring network and did not have any on line (Mt. Clemens, Grosse Pointe Farms).
- All WTPs, with the exception of Port Huron (and Ira Township who is delaying their response) requested either new sondes with specific probes or replacement probes for existing sondes.
- While this was not included in the survey, a next generation YSI sonde on the market since 2012 is not compatible with the currently used sondes in the network and will be phased out by 2020 and supported for a minimum of two to five years after that time

pending YSI's ability to source components that may have become obsolete. Costs are slightly higher than the current version sonde and sensors.

- Fondriest Environmental, the original network equipment provider and service, offers a comparison between the two sonde and sensor model prices in APPENDIX 4. Accordingly, if all WWTs participating in the monitoring network elect to purchase next generation equipment instead of replacement of the older technology sensors, then the equipment budget will increase approximately \$40,000 to \$50,000.
- We expect the yearly maintenance/replacement costs for the YSI Sonde to be about \$5,000 plus an additional \$5,000/year contingency for non-routine services and replacement (see APPENDIX 4). The necessary NexSensFondriest/NexSens subscription for each WTP is an additional \$1,950 per year
- Preliminary cost estimates for the Inficon CMS 5000 VOC unit, pump, and required supplies is approximately \$54,200 with estimated annual maintenance costs to be about \$3200. This does not include staff time (estimated at 5 hours/week) to operate it or a replacement cost estimate based on the instrument's expected lifetime and depreciation.

Based on the equipment requirements provided by the WTP operators resulting from our online survey (in response to Question #7), the revised one-time equipment budget is a minimum of \$365,787 and possibly up to an additional \$50,000 depending on the (existing versus next generation) version sondes purchased (See Table 4 below and APPENDIX 4). *Note: Algonac did not respond due to staff changes but a placeholder with minimum replacement of existing sensors was included as a placeholder until better information is provided.*

**Table 4: WTP Equipment Monitoring Needs and Associated Costs**

| New Equipment Needed by each WTP - Question #7                                           |                                                                            |                         |                               |          |                            |                   |            |                       |                            |              |             |        |                                                                                                                   |                                                                                                             |                |
|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------|-------------------------------|----------|----------------------------|-------------------|------------|-----------------------|----------------------------|--------------|-------------|--------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|----------------|
| Water Treatment Plant                                                                    | Multi-parameter sonde w/6 sensor ports, wiper, flow cell, cables, adapters | Sonde - Temp*           | Sonde - Specific Conductivity | Sonde-pH | Sonde - Ox-Redox Potential | Sonde - Turbidity | Sonde - DO | Sonde - Chlorophyll** | Sonde - Blue Green Algae** | TOC Analyzer | Fluorometer | GC-ECD | Replacement Options<br>NG = Next Generation YSI EXO Sonde w/Sensors<br>V2 = Current 6600 V2-4 Replacement Sensors | From Table 3: Current Distribution of Monitoring Equipment<br>O = Currently operating,<br>N = Not operating | Estimated Cost |
| 1                                                                                        | Port Huron                                                                 | No New Equipment Needed |                               |          |                            |                   |            |                       |                            |              |             |        |                                                                                                                   | O                                                                                                           | 0              |
| 2                                                                                        | Marysville                                                                 | 8,530                   | 1,650                         | 680      | 1,800                      | 1,960             | 3,480      |                       |                            |              |             |        | NG                                                                                                                | O                                                                                                           | 18,100         |
| 3                                                                                        | St. Clair                                                                  | 8,530                   | 1,650                         | 680      | 1,800                      | 1,960             | 3,480      |                       |                            |              |             |        | NG                                                                                                                | N                                                                                                           | 18,100         |
| 4                                                                                        | St. Clair - East China                                                     | 8,530                   | 1,650                         | 680      | 1,800                      | 1,960             | 3,480      |                       |                            |              |             |        | NG                                                                                                                | N                                                                                                           | 18,100         |
| 5                                                                                        | Marine City                                                                |                         | 650                           | 425      | 1,825                      |                   | 2,125      |                       |                            |              |             |        | V2                                                                                                                | O                                                                                                           | 5,025          |
| 6                                                                                        | Algonac                                                                    |                         | 650                           | 425      | 1,825                      |                   | 2,125      |                       |                            |              |             |        | V2                                                                                                                | O                                                                                                           | 5,025          |
| 7                                                                                        | Ira Township                                                               | 8,530                   | 1,650                         | 560      | 1,800                      |                   |            | 3,480                 |                            |              |             |        | NG                                                                                                                | N                                                                                                           | 16,020         |
| 8                                                                                        | New Baltimore                                                              | 8,530                   | 1,650                         | 560      | 1,800                      |                   |            | 3,480                 |                            |              |             |        | NG                                                                                                                | N                                                                                                           | 16,020         |
| 9                                                                                        | Mount Clemens                                                              | 8,530                   | 1,650                         | 680      | 1,800                      |                   | 3,480      |                       | 25,739                     | 24,000       |             |        | NG                                                                                                                | N                                                                                                           | 65,879         |
| 10                                                                                       | Grosse Pointe Farms - Highland Park                                        | 8,530                   | 1,650                         | 680      | 1,800                      | 1,960             | 3,480      | 25,739                | 24,000                     |              |             |        | NG                                                                                                                | N                                                                                                           | 67,839         |
| 11                                                                                       | Detroit Belle Isle                                                         |                         |                               |          |                            |                   |            |                       |                            |              | 54,200      |        |                                                                                                                   | O                                                                                                           | 54,200         |
| 12                                                                                       | Detroit Fighting Island                                                    |                         | 650                           | 425      | 1,825                      | 2,125             | 3,175      | 2,300                 |                            |              |             |        | V2                                                                                                                | O                                                                                                           | 10,500         |
| 13                                                                                       | Wyandotte                                                                  | 8,530                   | 1,650                         | 560      |                            |                   |            |                       |                            |              |             |        | NG                                                                                                                | N                                                                                                           | 10,740         |
| 14                                                                                       | Monroe                                                                     |                         | 650                           | 425      | 1,825                      | 2,125             | 3,175      | 2,300                 | 25,739                     | 24,000       |             |        | V2                                                                                                                | O                                                                                                           | 60,239         |
| * Temperature sensor only available bundled with conductivity sensor                     |                                                                            |                         |                               |          |                            |                   |            |                       |                            |              |             |        |                                                                                                                   | TOTAL                                                                                                       | 365,787        |
| ** Chlorophyll and blue green algae (phycocyanin) sensors only available as bundled pair |                                                                            |                         |                               |          |                            |                   |            |                       |                            |              |             |        |                                                                                                                   |                                                                                                             |                |

## Future Equipment Maintenance

Calibration and maintenance should be performed on all equipment based on manufacturer recommendations, *in situ* environmental conditions, and use. Except for a few WTPs remaining in the network, this is reportedly performed about quarterly (authors also recommend at least quarterly). An examination of archived data indicates that some parameters have disparities pointing towards the need for more frequent data validation and calibration. Since most WTPs in the corridor do not have the staff resources to maintain the monitoring equipment, the current contractual services model used by Marine City and Algonac should be considered (ECT or other).

Unless monitoring equipment is maintained by in-house WTP staff, contract maintenance should be conducted by one entity to ensure consistency. This will certify that:

- all equipment is calibrated the same way and with the same frequency,
- threshold values for the notification system and alarms be uniformly established,
- stakeholder messaging is uniform, and
- training of WTP staff is similar

Calibration and maintenance (including implementation of QA/QC procedures for the more complex equipment) with contract staff possessing the appropriate skill sets are estimated to be \$178,496 per year (see APPENDIX 4). This includes up to four site visits per year and contingency costs for non-routine services and replacement (which may not be utilized).

### ***Current & Proposed Annual Maintenance Budget from Local Sources***

Two of the February 2017 meeting follow-up survey questions to the WTP operators (Questions #10 and #11) focused on the WTP's current versus their perception of a more "viable" source water monitoring budget. This would include needed annual equipment upkeep (probe and equipment replacement), calibration, training, etc. Only about four or so WTPs indicated the existence of an operating budget at some level (see Table/Appendix\_\_\_\_\_). The current Wyandotte WTP equipment budget is very high and may include monitoring equipment required as part of operations under the Safe Drinking Water Act. If so, then this would artificially "inflate" the current average existing budget.

Nine of the 13 reporting WTPs provided a desired annual budget with widely varying funding levels (\$1,000 - \$20,000 per year). Some of the cost estimate variability can be attributed to the amount and type of equipment identified in Question #5 (see Table/Appendix\_\_\_\_\_). For example, the Port Huron WTP currently deploys only a Hach pH meter with little interest in expanding their equipment inventory, primarily due to their location at the upper end of the corridor with few potential sources of pollution. For the majority, sondes with a limited number of probes are obviously cheaper to maintain than other more complex equipment, such as TOC analyzers, flourometers and GC-ECD units.

The wide variability among WTPs is recognized. Based on those responding and the statistic used (mean versus median), a reasonable average annual budget contributed by local sources would range from a low of \$3,600 to a high of \$6,900 per WTP. This translates to a total of \$50,400 to \$96,600 per year for all 14 WTPs (see Table 5). This represents between 23% – 43% of the total annual maintenance budget (\$178,496) based on the experience and records of Environmental Consulting and Technology, Inc., the company who continues to provide annual maintenance for some of the remaining WTPs in the network (see Appendix 4). Accordingly, this translates to a total of \$50,400 to \$96,600 per year for all 14 WTPs (see Table 5 of the report). This fits well with anecdotal comments made by treatment plant operators during the summer-fall 2016 one-on-one assessments as to the "sweet spot" of supportable maintenance budgets by their respective city councils (i.e., anything higher would be rejected). Alternatively, using the \$5,000/year "sweet spot" estimate for 13 water treatment plants (Port Huron would probably not contribute since they are upstream from potential spills) results in a potential \$65,000 annual contribution to the annual budget. Of course, any proposed maintenance budget from local sources would require approval by each respective community. Regardless of the percentage, having local government agree to contribute this portion of the total maintenance budget annually will be a challenge.

Table 5: Current & Proposed Annual Maintenance Budget from Local Sources – Question #10 and #11

| Current & Proposed Annual Maintenance Budget from Local Sources - Question #10 & #11 |                                                               |                                            |                                           |
|--------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------|-------------------------------------------|
|                                                                                      | Name of Plant                                                 | Current/Existing Annual Maintenance Budget | Proposed/Needed Annual Maintenance Budget |
| 1                                                                                    | Port Huron                                                    | 0                                          | 1,000 - 2,000                             |
| 2                                                                                    | Marysville                                                    | 0                                          | 3,000                                     |
| 3                                                                                    | St. Clair                                                     | 0                                          | 0                                         |
| 4                                                                                    | St. Clair - East China                                        | 0                                          | 3,600                                     |
| 5                                                                                    | Marine City                                                   | 8,500                                      | 8,500                                     |
| 6                                                                                    | Algonac                                                       |                                            |                                           |
| 7                                                                                    | Ira Township                                                  | 0                                          | 2,000 - 5,000                             |
| 8                                                                                    | New Baltimore                                                 | 0                                          | 2,000 - 5,000                             |
| 9                                                                                    | Mount Clemens                                                 | 0                                          | ?                                         |
| 10                                                                                   | Grosse Pointe Farms - Highland Park                           | 0                                          | 5,000                                     |
| 11                                                                                   | Detroit Belle Isle                                            | 0                                          | 0                                         |
| 12                                                                                   | Detroit Fighting Island                                       | 2,000                                      | 10,000                                    |
| 13                                                                                   | Wyandotte                                                     | 30,000 <sup>2</sup>                        | 0                                         |
| 14                                                                                   | Monroe                                                        | 16,200                                     | 20,000                                    |
|                                                                                      | mean <sup>1</sup>                                             | 14,175                                     | 6,122 - 6,900                             |
|                                                                                      | median <sup>1</sup>                                           | 12,350                                     | 3,600 - 5,000                             |
|                                                                                      | Total Annual for 14 WTP (based on mean)                       | 198,450                                    | 85,708 - 96,600                           |
|                                                                                      | Total Annual for 14 WTP (based on median)                     | 172,900                                    | 50,400 - 70,000                           |
|                                                                                      | <sup>1</sup> based on those WTPs responding                   |                                            |                                           |
|                                                                                      | <sup>2</sup> includes all plant source water monitoring costs |                                            |                                           |

Some proposed budgets do appear realistic based on the records maintained by some WTPs and follow-up phone discussions since this survey was conducted. As can be seen from the above report, both arithmetic mean and median averages were derived from the limited data provided for both current and proposed source water monitoring budgets. Unfortunately, while annual estimates have been generated for the 14 WTPs collectively in the above table due to the limited data set, we do not believe generalizations based on the generated means and medians would be appropriate. Accordingly, we recommend that the higher estimate for annual maintenance/replacement costs generated from consultation with Fondriest/NexSens and Environmental Consulting and Technology, Inc. be used as a placeholder. The actual amount needed per WTP will require further assessment based on the actual equipment deployed for network monitoring.

## **Quality Assurance, Control and Assessment**

To ensure the effectiveness and reliability of the Real Time Water Quality Monitoring Program, quality assurance, quality control and quality assessment procedures need to be implemented, especially for the higher maintenance equipment. The main difference between Quality Assurance and Quality Control is that while QA is process oriented, QC is product oriented. QC focuses on testing for quality (e.g., detecting defects) while QA focuses on building-in quality to prevent defects. QA helps certify you are doing the right things, the right way. QA procedures that we would suggest taking are that each plant diligently records maintenance and calibration in an online log book (potentially part of the public-facing database) so that it can be referenced when measurements wander. QA/QC procedures requires the use of acceptable blanks, duplicate, spikes and similar actions for the GC-ECD unit. Costs for the latter could be part of the annual maintenance (described further below). A more detailed description of Quality Assurance and Quality Control is included in APPENDIX 1.

## **Database Management**

Management of the near real-time data is critical to the notification process of the WTP operators. The archival data likewise has potential value for future non-WTP users. Both the near real-time and archival data involve hosting scenarios that need to be addressed.

### ***Archival Data Access and Hosting Issues***

The wqdatalive database is operated by Fondriest/NexSens and communicates directly with the dataloggers at participating plants to provide near real-time online data to WTP operators. In addition, the database archives data and allows users to create queries and retrieve data previously measured at WTPs that are still participating. Most WTPs have been pleased with this service from NexSens and we recommend keeping wqdatalive as the real-time, password-protected website for use exclusively by WTP operators.

At the network's inception in the mid-2000s, Bristol Technologies was contracted to make the public-facing Regional Water Quality Information Management System (RWQIMS) as a component of the real-time monitoring network. However, the network never had funding for its operations and maintenance. The database stored historical data from the network as well as regional data from organizations such as Macomb County Health Department, St. Clair County, and MDEQ. RWQIMS did not receive data in real-time and instead was packaged from NexSens/WQdatalive roughly every week as an excel file and then uploaded to the database. The website, when it was functional, allowed queries of all historical data and included graphing in the browser and export of spreadsheets to excel. RWQIMS reached approximately 19.5 million records which often timed out with large queries fostering user frustration and eventual disuse.

The application does not include data after 2013 because funding ran out and communication between Bristol Technologies and Fondriest/NexSens stopped. None-the-less, many stakeholders agree that a public website and database of the corridor data could potentially be used as an

opportunity to host additional water quality projects, thus increasing the value of the network to constituents in SE Michigan, and as an opportunity for community outreach.

Accordingly, one of the post February 2017 survey questions to the corridor WTP operators was their agreement for a letter to be sent from SEMCOG to Fondriest requesting them to provide Wayne State University the monitoring data that they collected from 2013 to the present. Responses were unanimously in agreement. Follow-up conference calls have occurred with Fondriest, SEMCOG, OGL and WSU and the letter has been sent.

Work by WSU's Healthy Urban Waters staff determined that either a major upgrade of the RWQIMS database management system or development of a new system should be considered. Application hosting could be either on a physical or a cloud server with maintenance support depending on the vendor selected to develop a more useable database management system. Healthy Urban Waters staff further diagnosed some of the RWQIMS database functionality issues and opted to move the data to a more simplified prototype database.

A prototype of a website has also been developed which allows the public to access, query, graph, export and perform simple statistics on the data. The current website, hosted through Microsoft Cloud technology is at <http://hurontoeriedrafttwo.azurewebsites.net/>. This website will likely change domain names as the design is finalized and if/when it is moved to a WSU sever as a more sustainable solution.

The unanimous response by the WTP operators to SEMCOG's data question is clear testimony from the network stakeholders about the value of the archival data for other potential users. Clearly, preservation of the database by WSU should be a component of the annual operating budget. Funds for hosting the website and database maintenance will also be needed and cost estimates are included in the overall budget breakdown in APPENDIX 4.

### ***WTP Real-time Data Hosting Issue***

Question #8 of the post SEMCOG February 2017 meeting survey asked the WTP operators their interest in an option that allows for real-time monitoring of data rather than the 15-minute delay that the operators are currently experiencing. This will require an additional investment in a computer, text messaging system and free downloadable applications from Fondriest (Lantronix and iChart). After the initial investment, annual cost savings would be about \$1,000 per year.

With the exception of Port Huron, the responses were unanimous for this option, or at least for a further look at the pros and cons. Given Port Huron's location at the top of corridor and upstream to major potential contamination spills, we understand their lack of interest (and associated expense). Some of the pros and cons for self-hosting include:

#### **Pros**

- The WTP would save \$1000 per year.
- The WTP staff would have immediate results for monitored parameters

- The WTP would have more control in troubleshooting and changing their system configurations if desired.

#### Cons

- The WTP would need to have a dedicated Windows PC or Server running iChart Software 24/7 in order to ensure there is no lag in the data transmission.
- The WTP would be responsible for a larger portion of the system troubleshooting, updating, etc.
- Our company would not be able to check/update iChart from our end, so it becomes more difficult for us to pinpoint issues as they arise.
- Employee neglect or turnover may cause the system to go offline for extended periods of time.

While some of the pros were discussed at the February 9<sup>th</sup> SEMCOG meeting with the WTP operators, the cons were not. Consequently, the cost savings were not included in the draft budget in APPENDIX 4 (cost of computers and increased staff time versus cost savings via hosting) but can be addressed at a later date once the operators decide which way they want to go on this issue.

## **Governance and Related WTP Monitoring Network Coordination**

The monitoring network never had a formal governance structure. Macomb County was given fiduciary responsibilities of the initial federal and state grant funds and the Southeast Michigan Council of Governments (SEMCOG) has an ongoing Memorandum of Agreement with many of the corridor municipalities that help coordinate network activities. Under this agreement, SEMCOG hosts periodic meetings with WTP and municipal representatives to determine the network status (i.e., what WTPs are continuing to effectively monitor) and related concerns. SEMCOG will continue to play a leadership role especially since their management and environmental staff have a vested interest in communities under their authority and in source water protection for the region.

Wayne State University's (WSU) Healthy Urban Waters Program should also play a future network role, especially given their improved public-facing online RWQIMS database prototype, interest in hosting the application and development of a monitoring network website. Such work will require business requirement gathering from potential users (public, university and private) and subsequent application refinements.

The international nature of the corridor points toward Canadian inclusion at some level of participation in the network. While Ontario's "Drinking Water Surveillance Program" is not real-time and consists of capturing "grab samples a few times a year<sup>3</sup>," their involvement may help to improve the notification process in the event of spills from Chemical Valley, a concern expressed by many of the WTPs along the St. Clair River. Accordingly, the MDEQ, Ontario

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<sup>3</sup> McInnis, Patrick – Drinking Water Quality Scientist, Environmental Monitoring and Reporting Branch, Ontario Ministry of the Environment and Climate Change – personal email, 5/31/2016

Ministry of the Environment and industry representatives, could either have some level of representation or play a governance role at some point. One industry example is the Sarnia-Lambton Environmental Association (SLEA), a non-profit co-operative comprised of 20 industrial manufacturers in the Sarnia-Lambton area of Southwestern Ontario (<http://www.sarniaenvironment.com/>). This group has attended some SEMCOG meetings and conducts some level of water quality sampling.

Any future “outside” funding to support the monitoring network, especially from federal, state or private sources, needs to focus on a long-term funding solution and not a year-to-year appropriation. One option is to consider investing a one-time source of funds in an endowment, possibly overseen by a regional community foundation. Such a fund should be large enough to generate annual revenue sufficient for annual maintenance. This “endowment” could be augmented with annual contributions from each of the municipalities to ensure their “skin in the game.” The WTP operator assessment process has indicated that local contributions could be in the \$3,500 - \$7,000 per year range from each participating municipality in the network (minimum of \$50,000+/year total).

If long-term “outside” funding does occur, it will require a formal governance structure to oversee its management. Public Sector Consultant’s 2009 governance recommendations (*Huron to Erie Alliance for Real-time Monitoring and Information: A Recommended Framework for Governance and Funding*) includes some usable components, such as a model resolution and by-laws, that could serve as a good starting point for further discussion.

Preliminary discussions between SEMCOG and MDEQ’s Office of the Great Lakes recommend that governance consist of at least a seven-member board representing the following:

- Governor: two members
- County Health Departments: two members
- GLWA: one member
- Water Treat Plant Operators: two members

Given SEMCOG’s current regional responsibilities and formal agreement with the majority of impacted riparian communities, they should play the role of executive/secretariat for this board. SEMCOG responsibilities would include fiscal decision making and as a liaison with the financial entity entrusted with any network support funds. Wayne State University should also serve as an ex-officio board member given its past and current involvement in the monitoring network, its data base applications and related activities. The revised network budget should also reflect potential secretariat fees and trust management fees (if, for example, funds are managed as an endowment w/in a foundation).

## **Budget**

There are many cost-related factors related to re-establishing the source water monitoring program. Most importantly, the WTP operators and their respective elected officials must determine the following:

- level of monitoring needed to protect public health;

- type of equipment to achieve the desired level of monitoring;
- methods for coordinated emergency response and communication between WTP operators;
- role of internet data reporting and public outreach websites; and
- amount of annual budget to support the local source water monitoring program.

As mentioned above, the WTP operators have provided much of this information via the SEMCOG February 9<sup>th</sup> meeting and follow-up survey. Accordingly, the estimated budget contained in this report reflects the components needed to re-engage the WTPs in the Huron to Erie Corridor. Factors incorporated into the estimated budget include:

- operational status of existing monitoring equipment and new equipment needs,
- annual equipment maintenance and calibration,
- hosting and annual database management,
- depreciation of assets over useful life,
- public outreach

Not surprisingly, the WTP operator's strong suggestion of a "simpler the better" approach toward monitoring (with at least two-three notable exceptions) was reflected in the recent online post February 2017 survey (see Table 4). Only four of the WTPs selected some of the high-maintenance equipment (TOC analyzer, fluorometer, GC-ECD unit) requiring more extensive training and the time needed to use it. The envisioned future monitoring network appears to be a more streamlined version of what was originally deployed over a decade ago.

Equipment depreciation costs (10% plus 3% inflation) are also provided. The budget includes a placeholder for annual equipment maintenance for 12 of the 14 WTPs at the current rate charged by Environmental Consulting & Technology (ECT), Inc. Two of the 14 WTPs (Marysville and Monroe) currently maintain their own equipment at their cost.

Maintenance of the wqatalive site which provides real-time data to WTP operators and the public-facing RWQIMS both require capital and annual costs as well due to hosting and data management expenses. Finally, at least a minimum of education and outreach to keep the public informed of the corridor's environmental status should be considered, especially if public funds are to be used for support.

Annual support costs for Fondriest/NexSens datalogging and wqdatalive.com was maintained at the current level in the suggested budget but will probably increase through time, possibly at an annual inflation rate. Budget adjustments will be needed if this occurs. WTP operators also have emergency response and coordination procedures that are not reliant on internet connections. Redundancy is an important consideration for this program.

A limited budget should be considered toward support for the RWQIMS database. Long-term sustainability and funding is an important consideration. While the WTP operators use wqdatalive and not this particular application, it has value as both a data source for researchers and use by the general public as part of network outreach. It is also a data-rich resource for

eventual connectivity at a regional and national level to the State/EPA/Tribal Exchange Network <http://www.exchangenetwork.net/>. Accordingly, annual support costs for a database manager are earmarked. While the authors do not prescribe a particular entity for database management, we recommend that Wayne State University's Healthy Urban Waters program be seriously considered due to their geographic proximity within the corridor, initial efforts to redesign and simplify the user interface and their offer of related in-kind services, including hosting costs and education and outreach activities.

A proposed budget which hopefully reflects the interests and concerns of the WTP representatives attempts to incorporate these needs and is provided in APPENDIX 4. The total estimated first year capital costs are \$413,366 with annual maintenance of \$259,398 in succeeding years.

### ***Network Funding Sources***

Question #9 of the post February 9<sup>th</sup> SEMCOG meeting with WTP operators wanted to know the level of local commitment as compared to the need for outside funding. Accordingly, the stakeholders were asked which elements of the monitoring program they could support through local budgeting versus which elements would require outside funding? Network monitoring elements included:

1. Replacement Equipment/parts
2. New Equipment Purchase
3. Annual Maintenance
4. Quarterly Calibration by Equipment Supplier
5. Purchase of Server Hardware for Real-Time monitoring
6. Annual Calibration by Consultant
7. Database Management and Public – Facing Website

The Budget Source responses are tallied in Table 6 below. Based on the survey respondents, there was not a unanimous consensus among the seven monitoring elements. Four (1, 2, 3, and 6 - see above) of the seven would require primarily outside funding. The remaining three (4, 5, and 7) were a combination of local, outside and shared funding sources.

**Table 6: Potential Budget Sources as Identified by WTPs**

| Budget Source - Question #9 |                                     |                               |                        |                    |                                     |                                                      |                                  |                                               |       |         |  |
|-----------------------------|-------------------------------------|-------------------------------|------------------------|--------------------|-------------------------------------|------------------------------------------------------|----------------------------------|-----------------------------------------------|-------|---------|--|
|                             | Name of Plant                       | Replacement Equipment / Parts | New Equipment Purchase | Annual Maintenance | Quarterly Calibration by Consultant | Purchase of Server Hardware for Real-Time Monitoring | Annual Calibration by Consultant | Database Management and Public-Facing Website | Total | Trend   |  |
| 1                           | Port Huron                          | O                             | O                      | O                  | O                                   | O                                                    | O                                | O                                             | 70    | Outside |  |
| 2                           | Marysville                          | L                             | O                      | L                  | L                                   | L                                                    | O                                | L                                             | 5L-2O | Local   |  |
| 3                           | St. Clair                           | O                             | O                      | O                  | O                                   | O                                                    | O                                | O                                             | 70    | Outside |  |
| 4                           | St. Clair - East China              | O                             | O                      | O                  | S                                   | S                                                    | S                                | O                                             | 4O-3S | Mixed   |  |
| 5                           | Marine City                         | L                             | O                      | L                  | L                                   | L                                                    |                                  | O                                             | 4L-2O | Local   |  |
| 6                           | Algonac                             |                               |                        |                    |                                     |                                                      |                                  |                                               |       |         |  |
| 7                           | Ira Township                        | L                             | L                      | S                  | S                                   | S                                                    | S                                | S                                             | 2L-5S | Share   |  |
| 8                           | New Baltimore                       | L                             | L                      | S                  | S                                   | S                                                    | S                                | S                                             | 2L-5S | Share   |  |
| 9                           | Mount Clemens                       | O                             | O                      | O                  | O                                   | O                                                    | O                                | O                                             | 70    | Outside |  |
| 10                          | Grosse Pointe Farms - Highland Park | O                             | O                      | O                  | O                                   | O                                                    | O                                | S                                             | 6O-1S | Outside |  |
| 11                          | Detroit Belle Isle                  | O                             | O                      | O                  | O                                   | O                                                    | O                                | S                                             | 6O-1S | Outside |  |
| 12                          | Detroit Fighting Island             | O                             | O                      | O                  | O                                   | O                                                    | O                                | O                                             | 70    | Outside |  |
| 13                          | Wyandotte                           | O                             | O                      | S                  | S                                   | S                                                    | S                                | S                                             | 2O-5S | Share   |  |
| 14                          | Monroe                              | S                             | S                      | S                  | S                                   | S                                                    | S                                | S                                             | 7S    | Share   |  |
|                             | Total                               | 4L-1S-8O                      | 2L-1S-10O              | 2L-4S-7O           | 2L-5S-6O                            | 2L-5S-6O                                             | 5S-7O                            | 1L-6S-6O                                      |       |         |  |
|                             | Trend                               | Outside                       | Outside                | Outside            | Mixed                               | Mixed                                                | Outside                          | Mixed                                         |       |         |  |
| L                           | Local Budget                        |                               |                        |                    |                                     |                                                      |                                  |                                               |       |         |  |
| S                           | Share Costs from Local Budget       |                               |                        |                    |                                     |                                                      |                                  |                                               |       |         |  |
| O                           | Outside Funding                     |                               |                        |                    |                                     |                                                      |                                  |                                               |       |         |  |

Conversely, there was a distinct difference of opinion among the 13 responding WTPs as to the funding source. Port Huron, St. Clair, Mt. Clemens, Grosse Pointe Farms, and Detroit Belle Isle indicated that either 100% or a strong majority of funds come from outside sources. Only Marysville and Marine City indicated that the majority of funds should come from local sources. The remaining WTPs indicated funding come from Shared or a mixture of sources. Clearly, given declining municipal revenues, the need for outside funding (state/federal/etc.) at some level funding is a clear precursor to the success of the network.

## Summary

The Huron to Erie Real-time Drinking Water Protection Network has inherent value to protecting regional water quality in both the short and long terms. It is also in alignment with SEMCOG's *Water Resources Plan (WRP) for Southeast Michigan* with the following draft policy focusing on Source Water Protection:

- *To ensure that all have safe drinking water, monitor intakes to detect contaminants and implement coordinated and timely procedures for notification and emergency response.*

This policy is consistent with the following Michigan Water Strategy priority action:

- *Ensuring clean and safe drinking water for all Michiganders.*

Additionally, this report is directly relevant to the following recommendations from the 21<sup>st</sup> Century Infrastructure Commission Report:

- *Adopt policies that require self-sufficient and transparent budgets for water, sewer and stormwater facilities.*
- *Perform regular assessments and maintenance of Michigan's drinking water, sewer, stormwater and dam infrastructure systems.*

These policies are consistent with the primary goal to protect public health. The recommended components of the proposed source water monitoring program will achieve this goal, but also include supporting activities that enhance communication, public education, awareness and outreach.

The Huron-to-Erie-Real-Time Drinking Water Protection Network provides short-term value to all participating water treatment plants with the ability to detect threats to source water in real-time which is far beyond the legal monitoring requirements of the Safe Drinking Water Act. Additionally, the collaborative effort of all plants allows for advanced warning to plants downstream during spill events and subsequently more time to react to threats. One long-term value of the network is the ability to observe year-to-year changes in source water quality which could help predict or detect early warning signals for large state changes in source water ecosystems. However, both the short and long term value of the network is dependent on a high proportion of participating plants and that adequate equipment maintenance is conducted so that all stakeholders can have high confidence in the data.

Both participation and adequate maintenance/replacement of equipment has been a major challenge to the network. It is also understood from interviews with WTP operators that the return on investment for each WTP is greatly increased by active and committed participation of more WTPs. The inherent value provided by the network and its potential to prevent expensive drinking water challenges should be considered as each municipality evaluates its future participation in the network.

## **APPENDIX 1 – Quality Assurance, Control and Assessment**

To ensure the effectiveness and reliability of the Real Time Water Quality Monitoring Program, Quality Assurance, Quality Control and Quality Assessment procedures need to be implemented. The main difference between Quality Assurance and Quality Control is that while QA is process oriented, QC is product oriented. QC focuses on testing for quality (e.g., detecting defects) while QA focuses on building-in quality to prevent defects. QA helps certify you are doing the right things, the right way. QC helps to ensure the results of what you've done are what you expected.

### Quality Assurance

Quality Assurance (QA) includes all high-level activities, structures and mechanisms used to ensure and document the accuracy, precision, completeness, effectiveness and representativeness of the monitoring program. Quality Assurance ensures the overall integrity of the program design and consists of two separate but interrelated activities: Quality Control (QC) and Quality Assessment. Quality Assurance program elements include:

- Monitoring program plan.
- Ensuring probe maintenance and warranty checks are carried out in compliance with manufacturer recommendations.
- Personnel qualification and training.
- Technical procedures for sampling and conducting field and analytical work.
- Troubleshooting of instruments, recording equipment, installations, transmission of data and corrective action plans.
- Record keeping including chain of custody for grab samples, logbooks and instrument calibration records.
- Implementation of QA/QC procedures including data verification and validation.
- Preparation of analytical reports, data packages and water quality web page.
- Assessments to determine whether personnel are adhering to program requirements and following internal procedures.
- Expert peer review of water quality monitoring program design, QA/QC procedures and data analysis.
- Keep up to date on emerging real-time monitoring technology, QA/QC procedures, and analysis techniques.
- Develop first-hand knowledge of participating WTP functionality, service areas and associated issues through observation and field visits.

### Quality Control

Quality Control refers to the technical activities employed to ensure that the data collected are adequate for quality assessment purposes. This includes feedback systems to ensure activities are

working as planned and intended, and to verify that procedures are being carried out satisfactorily. Quality Control program elements include:

- Maintenance and calibration of the equipment (including sonde and its sensors) on a monthly basis.
- Inspection and maintenance of WTP station monitoring equipment installation.
- Field readings taken at the time of removal and reinstallation of the equipment for maintenance and calibration purposes using a calibrated field instrument.
- Potential collection of a water quality grab sample at the time of reinstallation of the probe to be sent to a laboratory for analysis.
- Updating maintenance forms with collected field instrument readings after reinstallation.
- Updating spreadsheet with grab sample results once laboratory analysis is complete.

## **APPENDIX 2 – Example Water Treatment Operator – Monitoring Network Questions**

### **A. Monitoring Equipment**

1. What monitoring equipment (purchased through the former collaborative) in your WTP remains operational?
2. What are the equipment tag numbers?
3. What are the approximate ages of the monitoring equipment in your WTP?
4. What is the minimum set of parameters that need to be measured for the benefits of the overall regional system?
5. What monitoring equipment do you think you need to effectively monitor for spills?
6. What is the minimum equipment you think you need to be effective?
7. How should equipment be depreciated over time and by who?

### **B. Equipment Maintenance**

1. What is the approximate annual maintenance cost per device (i.e., replacement, etc.? Do not consider calibration or QA/QC costs here).
2. How much time per week or month is spent on equipment calibration?
3. Who performs maintenance and/or calibration on your equipment and how often is it done?

### **C. Quality Control/Quality Assurance**

1. What are your perspectives on needed quality control and quality assurance procedures that need to be implemented based on current operations (i.e., personnel training, data verification and validation, equipment maintenance and calibration records, third party analysis and round robin testing)?
2. Who should adjudicate QA/QC on behalf of the network?

### **D. Event Detection and Response**

1. What improvements in the spill notification process should be implemented?
2. What should be done to improve the event detection, such as the use of thresholds for all monitored parameters, event detection software, etc.?
3. What improvements should be implemented in the event detection and response communication process?
4. How should event detection happen (type of notification or technology)?
5. What role, if any, should either the Canadian federal or Ontario provincial government have in the monitoring network (i.e., monitoring? communication & response?)?

### **E. Public Participation, Education and Outreach**

1. What role, if any, would your WTP staff play in public education and outreach, including better use of the public-facing database and website?
2. Should the public have access to all or part of the raw data, the summaries of the data or should this only be available to the WTP operators?

### **F. Governance**

1. Do you approve of the Public Sector Consultants' governance model?
2. What improvements to the PSC governance model would you recommend?
3. How should the Tribes or First Nations (especially Walpole Island) be involved?

G. Environmental Impact

1. What do you think the impact to your WTP could be in the event of a spill involving VOCs?
2. Can you give me a minimum-maximum cost of a spill's impact to your WTP?

H. Resource Availability

1. Do you have staff available to commit to active participation in the monitoring network?

## APPENDIX 3 – Water Treatment Plant Assessment Notes

### *Port Huron*

Huron – Erie Real-Time Drinking Water Monitoring Network Assessments  
Port Huron Water Treatment Plant, 1200 Pine Grove Avenue  
July 7, 2016 – 10:00am-11:30am

#### **Attendees:**

Amy Mangus, SEMCOG  
Bill Parkus, SEMCOG  
James Olson, Wayne State University – Healthy Urban Waters  
Michael Beaulac, MDEQ-Office of the Great Lakes  
Norman Hurren, City of Port Huron Water Plant Superintendent  
Eric Witter, City of Port Huron Utilities Manager

#### **Meeting Notes:**

##### Monitoring Equipment and Equipment Maintenance

- High annual operating costs, including equipment replacement, were the main reason for Port Huron abandoning the H-E monitoring network. They had a contract with ECT to maintain/replace (?) probes on the sonde and the wqdataLive contract with NexSensFondriest/NexSens.
- Equipment reliability was problematic
  - Original YSI sonde had chronic reliability issues
  - Time and costs associated with trouble-shooting competed with other priorities and maintenance costs
- Port Huron returned the sonde to Macomb County. ECT took apart the equipment.
- WTP purchased a cheaper and less problematic Hach SC200 pH monitor to continuously (real time) assess their water intake. This was installed as the sonde was removed. Their process to remove the sonde and add the pH meter and not be part officially of the network was approved by City Council.
- A number of parameters are monitored by every WTP every 2-4 hours based on Safe Drinking Water Act requirements
  - Many of these parameters are redundant of those monitored by the YSI sonde, etc.
  - pH, turbidity, alkalinity, bacteria, etc.
  - Sonde measurements do not relieve the WTPs from sampling for the Safe Drinking Water Act
- Indicated that they could re-engage/participate in the network (i.e., contribute real-time data to the online wqdataLive.com application) with their real-time pH monitor and possibly a few additional parameters
- Norman was interested in participating in meetings of the Huron to Erie Monitoring Group.

### Quality Control/Quality Assurance and Event Detection and Response

- Protocols/guidelines were never developed at either the WTP or network level which itemized “next steps” in the event that something was detected (i.e., what does a WTP operator do if/when they see a spike in one of the parameters?)
- It appeared that the WTP operators weren’t trained on either routine maintenance or what to do when a parameters gets a hit.
- The “old process” (pre-H-E Monitoring Network) continues to work just fine for Port Huron WTP
  - St. Clair Emergency Management notifies WTP operators if/when a spill occurs
  - Email and phone calls are made by Port Huron WTP operators to downstream WTPs if anything unusual is detected.
  - Due to the proximity to Lake Huron, and upstream location from Sarnia’s Chemical Valley, the potential of a spill event detected at the Port Huron intake is very small
    - Their pH meter did detect a spike attributed to aluminum sulphate  $\text{Al}^2(\text{SO}^4)^3$  in 2012(?) that was from a suspected paper plant near the mouth of the river.
  - They are unsure if they have a Source Water Intake Protection Plan, but remember doing something in 2004. They did understand their main threats included the bridge, a paper mill, and the potential of a barge from Lake Huron.
  - They have a police scanner so they can hear instantly if there is an emergency such as on the bridge.

### Environmental Impact

- Impact of a spill on the WTP infrastructure and downtime is difficult to predict
  - If detected early enough, the system could be back-flushed
  - Impact to the WTP and/or human health is parameter-specific
    - impact could be nullified by the WTP’s filters or even absorbed into the system w/o serious impact
    - the impact of the  $\text{Al}^2(\text{SO}^4)^3$  spill on either the WTP or human health would be negligible and would probably be removed in the treatment process because aluminum sulfate is added to help coagulation.
    - impact of VOC could be significant but no way to determine w/o knowing more details (i.e., intake is 30 feet below the surface and petroleum products float)
- Port Huron WTP operates 24/7 but can be off-line for up to 12 hours in the event of an emergency
- They had one hit that the pH probe caught that was Aluminum Sulfate. They feel that the pH probe does detect spills. They haven’t had a time when their other monitoring caught something that was not detected by the pH probe.
- When they had the spill, they did a grab sample. There seemed to be little follow-up from DEQ according to the City.
- The City was very concerned about the lack of timeliness to report spills by Canada.

### Budgetary Issues

- Re-engagement/participation in the H-E Monitoring Network is budget dependent. Any amount of reengagement would likely include City Council approval. (Since the approved removing themselves from the network).

- WTP can absorb a \$1,000-\$2,000 commitment for annual equipment maintenance
- Annual costs of \$5,000 require city council approval (Note: city council approved of the WTP's decision to "opt out" of the network and would need to reverse that decision if funds at this level are needed for re-participation)
- Annual costs of \$10,000-\$12,000 is a deal-breaker for network participation

## ***Marine City***

### **Huron – Erie Real-Time Drinking Water Monitoring Network Assessments Marine City Water Treatment Plant, 303 South Water Street July 7, 2016 – 2:00pm-3:30pm**

#### **Attendees:**

Amy Mangus, SEMCOG

Bill Parkus, SEMCOG

James Olson, Wayne State University – Healthy Urban Waters

Michael Beaulac, MDEQ-Office of the Great Lakes

Michael Itrich, Marine City DPW Superintendent

Elaine Leven, Marine City Manager

#### **Meeting Notes:**

##### Monitoring Equipment and Equipment Maintenance

- YSI sonde remains operational and tied to network via datalogger
  - Sonde parameters are the usual bundle except blue green algae is not monitored
- Contracted services for all WTP equipment
  - ECT maintains the sonde for a monthly fee
  - NexSensFondriest/NexSens maintains the network technology (datalogger, wqdatalive.com application)
  - TetraTech maintains the WTP operation. When TetraTech got the contract most of the WTP employees who were previously city employees were shifted to TetraTech.
- Marine City is very interested in maintaining the drinking water monitoring equipment (sonde) and seeing greater participation by other WTPs in the network
- Mike is interested in getting more active in the meetings of the Huron to Erie Drinking Water Group.

##### Quality Control/Quality Assurance and Event Detection and Response

- WTP experiences 2-3 "hits" or upstream calls/year about detected chemical anomalies
- St. Clair County's Warning Information Notification System (WIN)
  - [https://www.stclaircounty.org/offices/emerg\\_mngmt/wins.aspx](https://www.stclaircounty.org/offices/emerg_mngmt/wins.aspx) helps with notifying the public about problems with drinking water problems
    - Water shut-off notifications, water use restrictions, boil water warnings, etc.
- They inform the public through WIN, Facebook, and CCR.

- Currently they make calls to downstream plants if they get a “hit”. They are unsure if TetraTech uses the online service to monitor upstream or if they rely on phone calls/texts.
- Although they have wqdataalive displayed on one of the computers at the WTP, the mouse doesn’t work and the start menu was covering the parameters.
- Some concern with the current WTP notification system
  - Who all gets the email notification if there is an upstream contaminant detected?
  - What downstream WTP gets the message and are Marine City’s calls to downstream WTPs redundant?
  - Marine City shuts down at night so they may miss phone calls when they are not in operation.

#### Environmental Impact

- Marine City Plant is operated only 12 hours/day, seven days/week
- WTP can be offline approximately 12hours/day before the need to connect to East China’s water supply. It can also connect to the City of St. Clair.
  - Eight hours offline in summer
  - 14 hours in winter

#### Budgetary Issues

- Marine City self-funds the sonde maintenance via a quarterly service fee to customers
  - ~3,000 customers
  - \$3.35/quarterly service fee/customer
- Annual network costs
  - Approx. \$6,000-\$9,000/year for the sonde and wqdataalive.com application
    - \$1,950 Fondriest
    - \$4,000 ECT
- Acquisition of additional equipment (or parameters) will only increase maintenance costs and would probably not be considered favorably by city council, etc.

### ***New Baltimore & Ira Township***

#### **Huron – Erie Real-Time Drinking Water Monitoring Network Assessments New Baltimore and Ira Township Water Treatment Plants, 36535 Green Street, New Baltimore July 12, 2016 – 10:45am-12:00pm**

#### **Attendees:**

Amy Mangus, SEMCOG

Bill Parkus, SEMCOG

James Olson, Wayne State University – Healthy Urban Waters

Michael Beaulac, MDEQ-Office of the Great Lakes

John Dupray, Mayor, City of New Baltimore

Chris Hiltunen, Water and DPS Superintendent, City of New Baltimore

Andy Messina, Water Department Superintendent, City of New Baltimore

Bonnie McInerney-Slater, Administrative Assistant to the Mayor, City of New Baltimore  
Robert McCoy, Supervisor, Ira Township

## **Meeting Notes:**

### Monitoring Equipment and Equipment Maintenance

- Annual operating costs continued to be a question and concern since it was in part, dependent on the number of WTPs participating in the network
  - Funds available for equipment maintenance theoretically decreased as WTPs dropped out of the network and cost per plant for wqdatalive increased as plants withdrew.
  - The economic recession exacerbated the network drop off of WTPs due to budget cuts to Water Department budget
- Costs associated with connectivity to the wqdatalive.com and public facing application were also considered excessive
  - New Baltimore and Ira Township did not think the applications provided much if any value since the existing method of phone calls seemed to work fine
- What do we really need?
  - Do not need all the previously provided equipment, especially if it doesn't tell us what the contaminant is
  - WTPs are not equipped to do water quality monitoring for a large number of unknown contaminants
    - Taking a grab sample and shipping it off to a Lansing-based lab is counter-productive since whatever caused the contaminant spike has since moved out of the area due to wind and currents
  - Ira Township and New Baltimore are not necessarily in the same path as those water treatment plants on the St. Clair River
    - Even if a contaminant reaches Ira Twp. and/or New Baltimore, winds, currents and dilution may make it difficult to detect
  - The two biggest parameters of interest for New Baltimore and Ira Twp. are pH and blue-green algae. They are very open to getting sondes with just these two parameters.
    - Taste and odor problems (from blue green algae) are some of the biggest issues the WTP must treat. It would be great if the WTPs could analyze the raw water during an event (i.e., blue green algae) and then have the ability to analyze the effectiveness of their treatment (i.e., activated carbon to treat taste and odor problems)
      - Currently depend on citizen reports to determine treatment effectiveness
  - Other parameters like turbidity and alkalinity are already monitored daily due to federal Safe Drinking Water regulations and would be redundant if included with real-time monitoring
- One option is to have a minimum number of parameters to be monitored at each WTP with more advanced equipment capable of a broader range of parameter sampling at strategic WTP locations (St. Clair)
  - Need "indicator" equipment to tell us what the contaminant is
- Monitoring should be 24/7 regardless of plant operation hours
  - New Baltimore WTP operates 16 hours per day with 12,000 people served

- Ira Township WTP operates 12 hours per day with 6,500 people served

#### Quality Control/Quality Assurance and Event Detection and Response

- Online wqdatalive system is excessive and not needed
  - Too many false hits or alerts via email and text messages
  - Questionable detection alerts (both email and texts) became frustrating and were ignored, deleted without review, and eventually blocked from appearing.
    - Up to 40 alerts per day reported without knowing their validity or next steps
- There seemed to be a “disconnect” between detecting “something” in the intake (via a spike of some magnitude) and the type of response (i.e., what do we do next?)
  - Shut down the WTP?
  - Take a grab sample for later analysis by some remote lab?
    - And what do you do in the interim?
- One major frustration is getting timely spill reports from Ontario (Chemical Valley, etc.)
  - Most reports from Ontario are hours after the spill event and possibly after whatever was reported has already passed by the upstream WTPs.
- New Baltimore will soon have an online event notification system similar to St. Clair County’s WIN application to alert its population on contamination events, boil water notices, etc.

### ***Mt. Clemens***

#### **Huron – Erie Real-Time Drinking Water Monitoring Network Assessments**

**Mt. Clemens City Hall, One Crocker Boulevard**

**Sept. 19, 2016 – 9:00am-10:00am**

#### **Attendees:**

Amy Mangus, SEMCOG

Bill Parkus, SEMCOG

James Olson, Wayne State University – Healthy Urban Waters

Lisa Borgacz, City of Mt. Clemens, Interim City Manager/City Clerk

Laura Kropp, City Council

Jeff Wood, Public Services Director

#### **Meeting Notes:**

- The WTP is being run by FV operations, a third-party firm. When they took over, they dropped the network in the fall of 2015. There was little communication with the city employees in attendance at this meeting as to why they dropped out. Their understanding was the equipment wasn’t working properly so the annual payment to NexSensFondriest/NexSens wasn’t worth it.
- FV operations’ contract was renewed in June 2016 for one year.
- Mt. Clemens has been dealing with a lot of turnover and budget cuts. Lisa is serving as the Interim City Manager but will be replaced in the coming months.

- Mt. Clemens originally had all 4 pieces of equipment. Chuck Bellmore was the WTP operator at the time and was very engaged and collected a lot of the extra equipment when other plants dropped out.
- The city officials in this meeting were not very knowledgeable on the history of the network or the issues that their plant faced more recently.
- They are very interested in monitoring source water and protecting public safety. They are open to rejoining the network but the price will be the challenge
- Unfunded mandates for drinking water are a major challenge. Jeff explained that the mandates are costly and that the city has to anticipate that more mandates will be coming in the aftermath of the Flint Water Crisis.

## *East China*

### **Huron – Erie Real-Time Drinking Water Monitoring Network Assessments East China Water Treatment Plant, 5111 Pointe Dr. July 26, 2016 – 10:00am-11:30am**

#### **Attendees:**

James Olson, Wayne State University – Healthy Urban Waters  
Dwayne Loper, East China Charter Township WTP Superintendent

#### **Meeting Notes:**

##### Monitoring Equipment and Equipment Maintenance

- The WTP had only a sonde from the beginning of the network until early 2012. They had the same contract with ECT which was paid with the original funding. He believes that when funding ran out they chose to drop out of the network (or maybe stayed one additional year). Estimated the yearly contract with ECT and NexSens to be ~\$5000.
  - They currently have no automated detection equipment for raw water. I believe they are just abiding by the Safe Drinking Water Act sampling that other plants have mentioned.
  - Although costs might have been an issue, the largest problem was that the sonde provided no value to the plant.
    - Immediately when water enters the plant it is passed through a couple screens to catch coarse material and then it is filtered through a very fine, new technology filter. The filter is capable of filtering out contaminants and pathogens. This means that there is no pretreatment/flocculation stage and thus no lead time if they have a sonde where raw water enters the plant
    - A sonde deployed in the river, before the intake would be much more valuable.
  - Once the funding for ECT ran out, none of the operators were trained adequately to do the sonde maintenance themselves. The superintendent at the time had a different operator attend each training session, which meant none felt capable of all maintenance.

### Quality Control/Quality Assurance and Event Detection and Response

- Dwayne doesn't think that phone calls among the plants always happen. However, the plant is only open 4AM – 4PM, so they might miss some of these calls when they are shut down.
  - Doesn't think that they were contacted for the 2011 Alum spill which was detected in Port Huron.
- He says State of Michigan notifications (by fax) of spills happen frequently. They are sporadic so sometimes they can have them at almost a weekly rate.
- East China WTP operators only used the sonde and wqdatalive to double-check their bench-top readings for confirmation. It was never connected to any alarms in the plant and he was not aware of the email notifications that others received in the network (Chris Hiltunen of New Baltimore described this).
- Dwayne is very confident that the data the sonde was collecting was always accurate while ECT was calibrating/maintaining it.

### Environmental Impact and threats

- The main threat to the WTP is the Edison coal power plant a few hundred yards upstream. Freighters offload coal directly onto the dock here and they have had coal sprayed off of the freighter deck into the river before. This was an issue for their filtration system to handle.
- Spills from Sarnia are the other large concern.
- Wished that there was a better way to estimate when a spill would be at his intake. Although, he has heard of the spill model for the St. Clair River, it has never been shared with him. Simply estimates with a velocity reading from USGS.

### General Notes

- The WTP operates from 4 AM to 4 PM.
- Serves 5,000 people in East China and part of China Township.
- Water distribution is connected to St. Clair and Marine City. In emergencies, could draw water from either.
- The intake pipe is 300 feet from shore and in 20 feet of water.
- The plant is still run by East China employees under the St. Clair River and Water Authority and not by a contractor.

### Summary

Although a sonde does not provide much value to their plant due to their filtration system, Dwayne hopes that something can be worked out and is not opposed to trying to join the network again. He recognizes that there is a collective value in having everyone involved. However, it might be a hard sell to get the city board to commit.

## ***SW Detroit***

### **Huron – Erie Real-Time Drinking Water Monitoring Network Assessments SW Detroit Water Treatment Plant, 14700 Moran Rd., Allen Park August 30, 2016 – 11:00am-12:30pm**

#### **Attendees:**

Pawan Kapila, Team Leader – Operations, GLWA

Bill Parkus, SEMCOG

James Olson, Wayne State University – Healthy Urban Waters

Dr. Carol Miller, Wayne State University – Healthy Urban Waters

Michael Beaulac, MDEQ-Office of the Great Lakes

#### **Meeting Notes:**

##### Monitoring Equipment and Equipment Maintenance

- Water intake is unique among the 14 WTPs
  - Gravity fed water intake is located in the Detroit River in Canada just west of Fighting Island and east of the international shipping channel
  - 12-foot wide Intake tunnel is one mile along the bottom of the river and three miles from the western shore of the river
  - All installed monitoring equipment therefore detects water already four miles into the intake tunnel at the WTP and not at the intake
    - One big question is what does the WTP do if/when contamination is detected since the volume of four miles of water cannot be flushed out of the intake tunnel? (Four mile intake = 2.4 M ft<sup>3</sup>)
  - Current treated water supply to communities is 80 – 90 MGD, although they have the capacity for up to (240 MGD)
- Originally issued the following monitoring equipment. Some of the equipment was problematic and is either offline or no longer properly functioning because it was either wrong choice of equipment or required too frequent attention of expert technician.
  - YSI sonde:
    - Easiest to maintain but did need periodic probe replacement (which was done)
    - pH probe never worked properly until the latest (2<sup>nd</sup>?) replacement
    - problem with one of the probe wipers not operating (Was repaired and is working now)
    - existing probes should be recalibrated to ensure their accuracy (Being done)
    - The probes have value: pH, Chlorophyll, conductance, Turbidity, DO, etc. (information is being captured on server)
  - Hach TOC Analyzer:
    - Analyzer is still recording data, however it has not been maintained and is likely inaccurate. (Maintenance requires Hach trained expert technician)
    - Would consider the use of an online continuous UV254 organics monitor as a continuous surrogate measurement for total organic carbon and to replace for the current high maintenance Hach model (Southwest Plant already has it installed on the Raw Water sample and uses the data internally)

- Turner Designs Fluorometer:
  - Too much maintenance was needed to keep it functional. It is still recording data, however it has not been maintained and is likely inaccurate.
  - Fluorometer would be helpful in a monitoring network for oil spill detection
- GC/MS:
  - Apparently never operated very effectively since it was retrofitted from reading air samples to detecting VOCs in water
  - The need for constant calibration impeded its use and/or made sample results highly suspect
  - Equipment is no longer in use
  - Need something for VOCs: the GC-ECD units currently being tested by Judy Westrick (WSU) may show promise due to lower cost and less needed maintenance
  - Any equipment for VOC detection must be easy to maintain!
- Some of the above issued equipment was redundant to that used in the WTP as part of their daily monitoring operations.
  - Phytoplankton counts are conducted at least twice/week by plant staff
    - Chlorophyll probe has value
  - pH probe could be eliminated as well since raw and finished water is continuously monitored by WTP monitors (Hach)
  - They also have an inline UV 254 sensor, which is not an exact replacement for TOC but is used as an indicator.
- ECT provided regular equipment maintenance under contract while funding existed.
  - Weekly, monthly and sometimes more often if there were problems
  - WTP does not have the staff or resources needed to maintain the monitoring equipment due to other duties required by law (Safe Drinking Water Act, etc.)
  - Since some of the monitoring equipment is no longer maintained, it is no longer functional and no longer used. A maintenance contract, similar to what previously existed with ECT, is a requirement for a successful monitoring network
- SW Detroit WTP has only one technician to maintain all plant equipment (instruments only)
  - There must be some level of coordination between any equipment maintenance contractors and selected internal WTP staff, including chemists and instrument technicians

#### Quality Control/Quality Assurance and Event Detection and Response

- Both the wqdatalive (WTP-only) and the public (web based) database system have value
- WTP operators must know the minimum-maximum value of each of the monitored parameters in order to trigger the appropriate alarms
  - Must be consistent for all WTPs in the network
  - Must be published
- Each WTP “monitoring center” needs some sort of electronic dashboard to keep tabs on the specific parameters being monitored that should appear as part of our data monitoring system.
  - Some parameters are only available via the wqdatalive database accessible via computer (which functions as a type of dashboard)

- TOC Analyzer and Fluorometer show outputs via the display on the individual monitoring equipment. The Sonde does not show data without accessing wqdatalive or connecting sonde to a handheld.
- WTP staff do not use the data generated by the monitoring network (due to monitoring equipment redundancy with that used within the plant) – “But we want to be a team player” and support a revised network if maintenance and costs can be reduced.

## *Algonac*

### **Huron – Erie Real-Time Drinking Water Monitoring Network Assessments Algonac Water Treatment Plant, 1530 St. Clair River Drive, Algonac September 1, 2016 – 9:00am-10:50pm**

#### **Attendees:**

Mark Scott, City of Algonac Department of Public Works Supervisor  
Richard Poole, City of Algonac Chief Water Operator  
James Olson, Wayne State University – Healthy Urban Waters  
Michael Beaulac, MDEQ-Office of the Great Lakes

#### **Meeting Notes:**

##### Monitoring Equipment and Equipment Maintenance

- Algonac WTP intake is approximately 200 feet offshore in St. Clair River with a two foot diameter pipe. The intake crib depth is 38 feet.
- The plant is operational from 7 AM to Midnight.
- Algonac WTP was considered a “major” site on the monitoring network
  - Had all four pieces of equipment, including: YSI sonde, Turner Designs Fluorometer, Hach TOC Analyzer and GC/MS
  - All equipment installed in by 2007, there is no data in RWQIMS before 10/24/2007
  - All equipment came offline at some point after the funding ran out. Database has break in data starting in 2010. Then it resumes again in 2012 when they got a sonde back.
  - Sonde re-installed (2012) in part due to public pressure for Algonac WTP to continue monitoring at some level.
    - Sonde bundle includes: temp, turbidity, DO, conductivity, pH, chlorophyll
    - Data outputs are seldom consulted due in part to redundancy with required monitoring for plant operations to ensure compliance with Federal Safe Drinking Water Act.
      - Other upstream WTP’s monitoring data (as reported to wqdatalive) are consulted if/when a spill is reported from any source. They still get Sarnia spill notifications from MDEQ or sometimes Environment Canada.
      - They also get automated notifications by email when a plant upstream is detecting an anomaly. Most often a false alarm.

- Data redundancy using “in-plant” monitoring equipment includes:
    - Emergency management
- WTP staff took “a lot of classes and training” needed to operate and maintain the equipment
- Environmental Consulting & Technology, Inc. (ECT) was under contract to provide WTP staff training, equipment calibration and maintenance.
  - Required staff time of about eight hours per month for equipment maintenance of all four pieces
  - WTP staff could not perform equipment calibration since that procedure required a laptop which was not provided to staff
  - ECT continues to provide maintenance service for the sonde at about two hours contact time every other month
- Algonac WTP staff believe that there is a need for a “major” network monitoring site in the St. Clair River and south of Chemical Valley at a WTP that is best suited to monitor for VOCs and TOCs
  - St. Clair WTP would be an ideal major monitoring site due to their location

#### Quality Control/Quality Assurance and Event Detection and Response

- Algonac WTP usually gets email alarms from Marine City (upstream WTP this will usually happen when their pump is turned on)
  - Pump stirs up sediments in the water
  - Most alarms have been false positives
- Turbidity seems to be an issue with rainfall events and ice flow conditions
- Most actual “spills” are sewage-based from Sarnia due to combined sewer overflows (CSO) and sanitary sewer overflows (SSO) problems during and after rainfall events
- Richard also said that they used to have chemical spills reported from Sarnia about twice a week before the network was put in. Now they only very rarely get a spill report. The most common spill from Sarnia was polystyrene (plastic).
- Once a spill is reported (via fax, email, phone call, etc.), Algonac WTP staff will check with wqdatalive to determine if the data shows any sign of an upstream problem.
- They also try to stay in contact (phone, fax, email) with the WTPs upstream and downstream during a spill.

### *St. Clair*

#### **Huron – Erie Real-Time Drinking Water Monitoring Network Assessments** **St. Clair Water Treatment Plant, 1200 Adams Street** **October 14, 2016 – 11:00am – 12:15am**

#### **Attendees:**

Bill Parkus, SEMCOG

James Olson, Wayne State University – Healthy Urban Waters

Michael Booth, City of St. Clair Superintendent, Finance Director

Bob Plonka, City of St. Clair Water Treatment Operator

**Meeting Notes:**

Monitoring Equipment and Equipment Maintenance

- There is no equipment left operating or in storage at the St. Clair plant. RWQIMS shows that the sonde, TOC analyzer, and fluorometer were removed in 2012 and the GC-MS in 2011.
- ECT was contracted to perform calibration and maintenance. Bob Plonka believes ECT was coming every two weeks because there were so many maintenance issues.
- Bob was not in his current position while the network was in operation. He is aware of false positives being the biggest reason St. Clair dropped the network. Also, maintenance expense could have been an issue.
- Another challenge with St. Clair is that the monitoring equipment was located in a pump house near the river rather than the plant. Plant operators rarely have a reason to go to the pump house because all of their pumps can be manipulated remotely.
- The water was brought to the h-e monitoring equipment through a line that was put out through the intake pipe. It had a separate pump so that it could run even when the plant was down. This pump also failed sometimes.

Quality Control/Quality Assurance and Event Detection and Response

- They are still receiving automated emails for other plants involved in the network. This week they got emails from Algonac and Marine City (downstream) for abnormal pH.
- There is a call list for who the plant should call if they detect any spills or other issues. Since Bob has been the operator, they haven't received any calls from upstream about spills.
- They have not received the NOAA spill model yet, but would love to see it to better estimate spill arrivals.
- If a spill was detected, they would shut down the intake pump until the spill has passed. If contaminants had already entered the plant the tanks could be drained to the sewage plant.

General Notes

- The WTP runs 16 hours/day from 8am to Midnight. Occasionally they will be open for 17 or 18 hours if demand is high in the summer.
- Serves 7,500 people.
- Water distribution is connected to East China and Marysville. In emergencies, could draw water from either. When they had a water main break, they borrowed water from each and they supplied East China during the DTE fire this summer.
- The 16 inch intake pipe is ~300 feet from shore
- All of the operators are employees of the City of St. Clair.
- They operate at 1.9 to 2.5 MGD and the plant has a 3.0 MGD capacity.
- They have pretreatment with alum, chlorine and fluoride in settling pools. Then the water is passed through what is called "slow sand," which has a combination of substrates including anthracite.

### Future Participation

- There is a lot of interest in rejoining the network in some capacity and they believe there is room in the budget.
- They believe that if trained by Marysville (calibration videos recorded by Bari Wrubel) they would do the maintenance/calibration themselves.

## ***Grosse Pointe Farms***

**Huron – Erie Real-Time Drinking Water Monitoring Network Assessments  
Grosse Pointe Farms Water Treatment Plant, 29 Moross Rd.  
November 1, 2016 – 9:30am-11:00am**

### **Attendees:**

Bill Parkus, SEMCOG

James Olson, Wayne State University – Healthy Urban Waters

Michael Beaulac, MDEQ-Office of the Great Lakes

Scott Homminga, Water Superintendent

### **Meeting Notes:**

#### Monitoring Equipment and Equipment Maintenance

- Scott thought the monitoring network had its merits but the Grosse Pointe Farms (GPF) equipment has not been operational since sometime after Scott took the classes on equipment maintenance
- ETC did a great job keeping the equipment operational but Scott admits that he had neither the time nor proficiency to do it himself
  - Equipment was a maintenance headache
  - Money/finances was the main issue
- All in all, the equipment ran fairly well but Scott hopes that newer equipment is less maintenance intensive
- Liability is also a big issue: one entity should be charged with equipment maintenance for the entire network due to the need for consistency
- GPF had the basic package: multi-parameter sonde, TOC and fluorometer
  - Loved the TOC: required at least monthly maintenance from Hach. Monroe has had greater success with only quarterly maintenance from Hach.
  - Fluorometer never registered any “hits”
- Parameters to consider (for GPF WTP)
  - pH
  - chlorophyll (Granular Activated Carbon unit added to plant operations due to taste and odor problems)
  - conductivity is another big one
  - alkalinity
  - fluorometer is a key piece of equipment

- TOC not that big a deal at this particular plant due to its location it includes more WTP participants on Lake St. Clair
  - Scott agrees that the GC-ecd unit should be considered somewhere along the Huron to Erie corridor depending on practicality (strategic location) and usability (including maintenance)
- As an increasing number of WTPs went off line, the incentive to remain in the network diminished
  - The monitoring network will only be as good as the number of participants
  - Number of participants will be key to GPF WTP participation in any future network
- GPF would love to be in the monitoring network but only if there are more WTP participants and commitment to remain active.
- GPF still has the sonde, TOC, and Fluorometer. All were prepared for long-term storage and are expected to be functional still.

#### Environmental Impact

- Grosse Pointe Farms WTP operates 24/7
- 10 MGD capacity but average is two MGD with summer days up to six MGD
- Reserves (in case of shut down) include one day storage in winter and about four hours storage in summer
- GPF does have interconnections with GLWA in case of emergency
- Water intake is 12' deep on the bottom of Lake St. Clair
- 30" diameter intake pipe is 1800' from shore (Lakeshore Drive) and empties into a "shore well" prior to pumping to the WTP for treatment
- Pipe to "shore well" is gravity fed, meaning any contaminant will flow into the shore well before it is detected in the plant. The network equipment measured the water after it was in the plant and had been in the shore well for a period.
- The WTP's clear well has 2.5 MG treated water storage capacity

#### Budgetary Issues

- Equipment maintenance prior to shut down was
- Approximately \$5000 - \$6000/year for monitoring equipment
- about \$1900/year for wqdata live

## APPENDIX 4 – Suggested Budget

| Network Equipment, Maintenance and Database Management Estimate of Probable Costs        |                        |                    |                                                                                                                                                                      |           |          |                                                                                                                                                  |
|------------------------------------------------------------------------------------------|------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Description                                                                              | Equipment Cost         | Annual Cost        | Itemized Cost Description                                                                                                                                            | Unit Cost | Quantity | Notes                                                                                                                                            |
| <b>New Equipment Purchase</b>                                                            |                        |                    |                                                                                                                                                                      |           |          |                                                                                                                                                  |
|                                                                                          | \$365,787              |                    | See Requested Equipment Tab for WTP-specific equipment                                                                                                               |           |          |                                                                                                                                                  |
| <b>Total New Equipment Costs</b>                                                         |                        |                    |                                                                                                                                                                      |           |          |                                                                                                                                                  |
| <b>Annual Maintenance/Calibration/Replacement - Equipment Costs with WTP Site Visits</b> |                        |                    |                                                                                                                                                                      |           |          |                                                                                                                                                  |
| Total estimate per Sonde                                                                 |                        | 130,000            | \$5,000 for annual maintenance w/six site visits plus \$5,000 contingency for non-routine services and replacement. Note: Contingency may not be utilized w/in year. | 10,000    | per/yr   | Quantity = proposed number of sondes in the network                                                                                              |
| Hach TOC 1950plus                                                                        |                        | 9,000              | 4 visits per year from Hach Technician for calibration and maintenance. Includes calibration solutions                                                               | 3,000     | per/yr   | Quantity = proposed number of TOC Analyzers in the network                                                                                       |
| TD 4100                                                                                  |                        | 7,947              | Estimate from Treatment Plant Operator Magazine (to be verified for more accurate estimate)                                                                          | 2,649     | per/yr   | Quantity = proposed number of Fluorometers in the network                                                                                        |
| GC-ECD                                                                                   |                        | 5,400              | Based on quote from manufacturer (Inficon) for CMS 5000 and demo from Judy Westrick                                                                                  | 5,400     | per/yr   | Assume 10% of purchase price                                                                                                                     |
| Estimated Depreciation - Sonde/TOC/Fluorometer 10 year life                              |                        |                    |                                                                                                                                                                      |           |          | Annual Sonde estimate above includes replacement of all probes at least twice during 10-year depreciation cycle (Recalc of Deprec may be needed) |
| Estimated Depreciation - GC-ECD 10 year life                                             |                        | 19,103             | 10% depreciation + 3% inflation                                                                                                                                      |           |          |                                                                                                                                                  |
|                                                                                          |                        | 7,046              | 10% depreciation + 3% inflation                                                                                                                                      |           |          |                                                                                                                                                  |
| <b>Total Annual Maintenance/Replacement Costs</b>                                        |                        | 178,496            |                                                                                                                                                                      |           |          |                                                                                                                                                  |
| <b>Database and Website</b>                                                              |                        |                    |                                                                                                                                                                      |           |          |                                                                                                                                                  |
| Nexsens datalogging and wqdataalive.com                                                  |                        | 27,300             | Private, real-time interface for WTP operators. Has automated event detection and notifications system.                                                              | \$1,950   | per/yr   | Quantity = the number of plants that will have any monitoring equipment                                                                          |
| New Server for DB storage and Website                                                    | 10,000                 |                    | web application and database for an estimated length of 10+ yrs                                                                                                      | \$10,000  | each     | Quantity = 1                                                                                                                                     |
| Domain Name                                                                              |                        | 20                 | Estimate for Domain Name Services                                                                                                                                    | \$20      | per/yr   | Quantity = 1                                                                                                                                     |
| IT costs at WSU                                                                          |                        | 0                  | Annual server/IT fee for the LEEM server at WSU                                                                                                                      | \$0       | per/yr   | Quantity = 1                                                                                                                                     |
| Database Manager                                                                         |                        | 30,000             | Data system manager (30% FTE)                                                                                                                                        | \$30,000  | LS       | Quantity = 1                                                                                                                                     |
| <b>Total Database/Website Costs</b>                                                      | \$10,000               | 57,320             |                                                                                                                                                                      |           |          |                                                                                                                                                  |
| <b>Project Management</b>                                                                |                        |                    |                                                                                                                                                                      |           |          |                                                                                                                                                  |
| Education/Outreach Coordinator                                                           |                        | 0                  | WSU Healthy Urban Water (in-kind)                                                                                                                                    | \$0       | LS       | 1                                                                                                                                                |
| <b>Total Project Management Costs</b>                                                    |                        | 0                  |                                                                                                                                                                      |           |          |                                                                                                                                                  |
| <b>Network Governance and Financial Management</b>                                       |                        |                    |                                                                                                                                                                      |           |          |                                                                                                                                                  |
| Governance Costs                                                                         |                        |                    | tdb Secretariat costs to be determined by SEMCOG                                                                                                                     |           |          |                                                                                                                                                  |
| Financial Management Costs                                                               |                        |                    | tdb based on Financial Management institution                                                                                                                        |           |          |                                                                                                                                                  |
| <b>Total Annual Governance and Financial Management Costs</b>                            |                        |                    |                                                                                                                                                                      |           |          |                                                                                                                                                  |
| <b>Subtotal All Costs</b>                                                                | 375,787                | 235,816            |                                                                                                                                                                      |           |          |                                                                                                                                                  |
| <b>Contingency 10%</b>                                                                   | 37,579                 | 23,582             |                                                                                                                                                                      |           |          |                                                                                                                                                  |
| <b>Total</b>                                                                             | 413,366                | 259,398            |                                                                                                                                                                      |           |          |                                                                                                                                                  |
|                                                                                          | <b>First Year Cost</b> | <b>Annual Cost</b> |                                                                                                                                                                      |           |          |                                                                                                                                                  |
| <b>Grand Total</b>                                                                       | <b>\$672,763</b>       | <b>\$259,398</b>   |                                                                                                                                                                      |           |          |                                                                                                                                                  |

This high-end cost estimate assumes replacement of equipment based on survey responses from each of the Water Treatment Plant operators. Costs are subject to further fluctuation based on the WTP's specific sonde models and associated sensors selected. The depreciation estimate assumes a 10-year equipment life.

## Budget Summary – Equipment Costs

| <b>Current YSI 6600 V2-4 Replacement Sensors*</b>                                            | <b>Price</b>                                                 |             |  |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------|-------------|--|
| 6560 temperature/conductivity sensor                                                         | 650                                                          |             |  |
| 6589 Fast-Response pH sensor                                                                 | 375                                                          |             |  |
| pH plus oxidation reduction potential (ORP)                                                  | 425                                                          |             |  |
| 6150 ROX optical dissolved oxygen sensor with self-cleaning wiper                            | 2,125                                                        |             |  |
| 6136 turbidity sensor with self-cleaning wiper                                               | 1,825                                                        |             |  |
| 6131 BGA (phycocyanin) sensor with self-cleaning wiper                                       | 2,300                                                        |             |  |
| 6025 chlorophyll sensor with self-cleaning wiper                                             | 3,175                                                        |             |  |
|                                                                                              |                                                              |             |  |
| <b>Next Generation YSI EXO Sonde and Sensors*</b>                                            | <b>Price</b>                                                 |             |  |
| EXO2 multi-parameter water quality sonde with 6 sensor ports & 1 wiper port, no depth sensor | 5,950                                                        |             |  |
| EXO central wiper                                                                            | 1,110                                                        |             |  |
| EXO2/EXO3 flow cell, 925mL                                                                   | 310                                                          |             |  |
| EXO flying lead field cable, 10m                                                             | 470                                                          |             |  |
| EXO DCP signal output adapter                                                                | 295                                                          |             |  |
| EXO USB signal output adapter                                                                | 395                                                          |             |  |
| EXO wiped conductivity & temperature sensor                                                  | 1,650                                                        |             |  |
| EXO unguarded pH sensor                                                                      | 560                                                          |             |  |
| EXO pH plus oxidation reduction potential (ORP)                                              | 680                                                          |             |  |
| EXO optical dissolved oxygen sensor                                                          | 1,960                                                        |             |  |
| EXO turbidity sensor                                                                         | 1,800                                                        |             |  |
| EXO freshwater total algae sensor (chlorophyll & phycocyanin)                                | 3,480                                                        |             |  |
|                                                                                              |                                                              |             |  |
| * All quotes from Fondriest Environmental provided 04/06/2017 (expires 07/06/2017)           |                                                              |             |  |
|                                                                                              |                                                              |             |  |
| <b>Organic Detection Instrumentation</b>                                                     | <b>Description</b>                                           | <b>Cost</b> |  |
| Hach TOC Analyzer                                                                            | Quote from Hach                                              | 25,739      |  |
| Turner Designs Fluorometer                                                                   | Treatment Plant Operator Magazine estimate                   | 24,000      |  |
| Gas Chromatography/Mass Spectroscopy                                                         | CMS 5000 Manufacturer (Inficon) quote and Judy Westrick demo | 54,200      |  |

## WTP-Specific Estimated Equipment Budget

| New Equipment Needed by each WTP - Question #7                                           |                                                                            |                         |                               |          |                            |                   |            |                       |                            |              |             |         |                                                                                                                         |                                                                                                                      |                |  |
|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------|-------------------------------|----------|----------------------------|-------------------|------------|-----------------------|----------------------------|--------------|-------------|---------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------|--|
| Water Treatment Plant                                                                    | Multi-parameter sonde w/6 sensor ports, wiper, flow cell, cables, adapters | Sonde - Temp*           | Sonde - Specific Conductivity | Sonde-pH | Sonde - Ox-Redox Potential | Sonde - Turbidity | Sonde - DO | Sonde - Chlorophyll** | Sonde - Blue Green Algae** | TOC Analyzer | Fluorometer | GC-ECD# | Replacement Options<br>NG = Next Generation YSI EXO Sonde<br>w/Sensors<br>V2 = Current 6600 V2-4 Replacement<br>Sensors | From Table 3: Current Distribution of<br>Monitoring Equipment<br>O = Currently operating,<br>N = Currently operating | Estimated Cost |  |
|                                                                                          |                                                                            | No New Equipment Needed |                               |          |                            |                   |            |                       |                            |              |             |         |                                                                                                                         |                                                                                                                      |                |  |
| Port Huron                                                                               | 8,530                                                                      | 1,650                   | 680                           | 1,800    | 1,960                      | 3,480             |            |                       |                            |              |             |         | NG                                                                                                                      | O                                                                                                                    | 0              |  |
| Marysville                                                                               | 8,530                                                                      | 1,650                   | 680                           | 1,800    | 1,960                      | 3,480             |            |                       |                            |              |             |         | NG                                                                                                                      | O                                                                                                                    | 18,100         |  |
| St. Clair                                                                                | 8,530                                                                      | 1,650                   | 680                           | 1,800    | 1,960                      | 3,480             |            |                       |                            |              |             |         | NG                                                                                                                      | N                                                                                                                    | 18,100         |  |
| St. Clair - East China                                                                   | 8,530                                                                      | 1,650                   | 680                           | 1,800    | 1,960                      | 3,480             |            |                       |                            |              |             |         | NG                                                                                                                      | N                                                                                                                    | 18,100         |  |
| Marine City                                                                              |                                                                            | 650                     | 425                           | 1,825    |                            | 2,125             |            |                       |                            |              |             |         | V2                                                                                                                      | O                                                                                                                    | 5,025          |  |
| Algonac                                                                                  |                                                                            | 650                     | 425                           | 1,825    |                            | 2,125             |            |                       |                            |              |             |         | V2                                                                                                                      | O                                                                                                                    | 5,025          |  |
| Ira Township                                                                             | 8,530                                                                      | 1,650                   | 560                           | 1,800    |                            | 3,480             |            |                       |                            |              |             |         | NG                                                                                                                      | N                                                                                                                    | 16,020         |  |
| New Baltimore                                                                            | 8,530                                                                      | 1,650                   | 560                           | 1,800    |                            | 3,480             |            |                       |                            |              |             |         | NG                                                                                                                      | N                                                                                                                    | 16,020         |  |
| Mount Clemens                                                                            | 8,530                                                                      | 1,650                   | 680                           | 1,800    |                            | 3,480             |            |                       |                            | 25,739       | 24,000      |         | NG                                                                                                                      | N                                                                                                                    | 65,879         |  |
| Grosse Pointe Farms - Highland Park                                                      | 8,530                                                                      | 1,650                   | 680                           | 1,800    | 1,960                      | 3,480             |            |                       |                            | 25,739       | 24,000      |         | NG                                                                                                                      | N                                                                                                                    | 67,839         |  |
| Detroit Belle Isle                                                                       |                                                                            |                         |                               |          |                            |                   |            |                       |                            |              | 54,200      |         |                                                                                                                         | O                                                                                                                    | 54,200         |  |
| Detroit Fighting Island                                                                  |                                                                            | 650                     | 425                           | 1,825    | 2,125                      | 3,175             | 2,300      |                       |                            |              |             |         | V2                                                                                                                      | O                                                                                                                    | 10,500         |  |
| Wyandotte                                                                                | 8,530                                                                      | 1,650                   | 560                           |          |                            |                   |            |                       |                            |              |             |         | NG                                                                                                                      | N                                                                                                                    | 10,740         |  |
| Monroe                                                                                   |                                                                            | 650                     | 425                           | 1,825    | 2,125                      | 3,175             | 2,300      |                       |                            | 25,739       | 24,000      |         | V2                                                                                                                      | O                                                                                                                    | 60,239         |  |
| TOTAL                                                                                    |                                                                            |                         |                               |          |                            |                   |            |                       |                            |              |             |         |                                                                                                                         |                                                                                                                      | 365,787        |  |
| * Temperature sensor only available bundled with conductivity sensor                     |                                                                            |                         |                               |          |                            |                   |            |                       |                            |              |             |         |                                                                                                                         |                                                                                                                      |                |  |
| ** Chlorophyll and blue green algae (phycocyanin) sensors only available as bundled pair |                                                                            |                         |                               |          |                            |                   |            |                       |                            |              |             |         |                                                                                                                         |                                                                                                                      |                |  |
| # Based on quote from manufacturer (Infincon) for CMS 5000 and demo from Judy Westrick   |                                                                            |                         |                               |          |                            |                   |            |                       |                            |              |             |         |                                                                                                                         |                                                                                                                      |                |  |

\* Temperature sensor only available bundled with conductivity sensor

\*\* Chlorophyll and blue green algae (phycocyanin) sensors only available as bundled pair

# Based on quote from manufacturer (Inicon) for CMS 5000 and demo from Judy Westrick

## APPENDIX 5 – February 9, 2017 Meeting Notes



Sustainable Michigan and Great Lakes Water Communities

Developing Financial Solutions

### Huron to Erie Corridor Drinking Water Monitoring Network February 9, 2017 Meeting Summary

#### Next Steps:

1. Representatives from each WTP should review the report and the summary of their WTP contained in Appendix 3. Provide comments to Kelly Karll ([karll@semcog.org](mailto:karll@semcog.org))
2. WTP Representatives please complete the survey on program equipment and costs via survey monkey or in the word document and send back to Kelly Karll ([karll@semcog.org](mailto:karll@semcog.org)). Review the estimated budget cost estimates.
3. SEMCOG to send out presentations to the entire group.
4. OGL will investigate the Asset Management Requirement option for equipment and maintenance as proposed at the meeting.

#### Meeting Summary:

SEMCOG is working with the Michigan Department of Environmental Quality Office of the Great Lakes and Wayne State University, Healthy Urban Waters Program as part of the update of its Water Resources Plan update, to reassemble the drinking water monitoring network for the protection of public health along the Huron to Erie Corridor. This includes working with each of the 14 municipal water Treatment Plants (WTPs) along the Huron to Erie Corridor.

After a six months of meeting with Water Treatment Plant Operators and other municipal leaders, to evaluate their water treatment system and understand their reasons for leaving the Drinking Water Monitoring Network, a meeting was held with the WTP operators to review recommendations, equipment list and costs as well as the technology used to connect the plants and store the monitoring data.

Some recommendations from the meeting include:

- *Keep it simple:* Municipalities are willing to return to the system with simplified less expensive monitoring equipment to maintain, such as the sonde with just a couple probes, or even one – Ph.
- *Sustainability:* Each participating WTP should deploy monitoring equipment based on interest, need and ability to sustain its operation.
- *Workload interference:* Work-loads interfere with maintenance intense equipment
- *Parameter refinement:* Refine Sonde parameters to ensure likelihood of detecting them.
- *Contractor use:* Contract maintenance through one entity to ensure consistency – unless equipment maintained by WTP staff.
- *wgdatalive:* Database (operated by NexSens) communicates w/dataloggers and realtime data to WTP operators – should be maintained.
- *RWQIMS:* Public domain database RWQIMS will be ended and replaced with a new more flexible, and user friendly version by WSU.

## Huron-to-Erie-Corridor Source Water Monitoring Survey of Program Components

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**1. Please provide some contact information.**

Name of Plant

Name of Person Completing Survey

Contact Information (phone or email)

**2. Please reference the Lake Huron to Lake Erie Real-time Drinking Water Protection Network -An Assessment of the Current Status and Recommendations for Reactivation that is attached to the email.**

**Does the information contained in Appendix 3 of the report accurately describe your facility and source water monitoring operations?**

**3. Please reference the Lake Huron to Lake Erie Real-time Drinking Water Protection Network -An Assessment of the Current Status and Recommendations for Reactivation that is attached to the email.**

**Please provide any comments on the overall report that should be incorporated into the final draft.**

**4. Please indicate, if applicable, which equipment you currently use to monitor source water at the WTP.**

- ☐ Multi-Parameter Sonde: Temperature
- ☐ Multi-Parameter Sonde: Specific Conductivity
- ☐ Multi-Parameter Sonde:pH
- ☐ Multi-Parameter Sonde: Turbidity
- ☐ Multi-Parameter Sonde: Chlorophyll

- ☐ Multi-Parameter Sonde: Oxidation Reduction Potential
- ☐ Multi-Parameter Sonde: Dissolved Oxygen
- ☐ Multi-Parameter Sonde: Blue-Green Algae
- ☐ Fluorometer
- ☐ GC-MS
- ☐ GC-ECD

Comments:

**5. Does your current equipment need replacement for continued source water monitoring activities? Please check any equipment and any related probes.**

- ☐ Multi-Parameter Sonde: Temperature
- ☐ Multi-Parameter Sonde: Specific Conductivity
- ☐ Multi-Parameter Sonde:pH
- ☐ Multi-Parameter Sonde: Turbidity
- ☐ Multi-Parameter Sonde: Chlorophyll
- ☐ Multi-Parameter Sonde: Oxidation Reduction Potential
- ☐ Multi-Parameter Sonde: Dissolved Oxygen
- ☐ Multi-Parameter Sonde: Blue-Green Algae
- ☐ TOC Analyzer
- ☐ Fluorometer
- ☐ GC-MS
- ☐ GC-ECD

Comments:

**6. Does your current equipment need calibration and maintenance?**

**Please check any equipment and/or probes.**

- ☐ Multi-Parameter Sonde: Temperature
- ☐ Multi-Parameter Sonde: Specific Conductivity
- ☐ Multi-Parameter Sonde:pH
- ☐ Multi-Parameter Sonde: Turbidity
- ☐ Multi-Parameter Sonde: Chlorophyll
- ☐ Multi-Parameter Sonde: Oxidation Reduction Potential
- ☐ Multi-Parameter Sonde: Dissolved Oxygen
- ☐ Multi-Parameter Sonde: Blue-Green Algae

- ☐ TOC Analyzer
- ☐ Flourometer
- ☐ GC-MS
- ☐ GC-ECD

**7. Does your facility need new equipment for WTP source water monitoring operations?  
Please check all that apply.**

- ☐ Multi-Parameter Sonde: Temperature
- ☐ Multi-Parameter Sonde: Specific Conductivity
- ☐ Multi-Parameter Sonde:pH
- ☐ Multi-Parameter Sonde: Turbidity
- ☐ Multi-Parameter Sonde: Chlorophyll
- ☐ Multi-Parameter Sonde: Oxidation Reduction Potential
- ☐ Multi-Parameter Sonde: Dissolved Oxygen
- ☐ Multi-Parameter Sonde: Blue-Green Algae
- ☐ TOC Analyzer
- ☐ Flourometer
- ☐ GC-MS
- ☐ GC-ECD
- ☐ No New Equipment Needed
- ☐ I am Interested in New Equipment but Need Outside Funding to Purchase

Comments:

**8. Would your facility be interested in an option that allows for real-time monitoring of data rather than the 15-minute delay that WTP operators are currently experiencing? This will include the need for a computer, text messaging system and free downloads from Fondriest (Lantronix and iChart).**

- ☐ Yes
- ☐ No

**9. Please review the following table and indicate which elements of the monitoring program you can support through local budgeting vs. which elements will require outside funding. This does not commit you to anything at this time. We are trying to get an understanding of the level of local commitment as compared to the need for outside funding.**

|                                                                         | <b>Interested in Funding<br/>with Local Budget</b>                                                                             | <b>Interested in Sharing<br/>Costs with Other WTPs<br/>From Local Budget</b>                                                                            | <b>Outside Funding<br/>Needed b/c Not Able to<br/>Include in Local<br/>Budget</b>                                                                        |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Replacement<br/>Equipment / parts</b>                                | <input type="radio"/> Replacement<br>Equipment / parts<br>Interested in Funding<br>with Local Budget                           | <input type="radio"/> Replacement<br>Equipment / parts<br>Interested in Sharing<br>Costs with Other WTPs<br>From Local Budget                           | <input type="radio"/> Replacement<br>Equipment / parts<br>Outside Funding Needed<br>b/c Not Able to Include<br>in Local Budget                           |
| <b>New Equipment<br/>Purchase</b>                                       | <input type="radio"/> New Equipment<br>Purchase Interested in<br>Funding with Local<br>Budget                                  | <input type="radio"/> New Equipment<br>Purchase Interested in<br>Sharing Costs with Other<br>WTPs From Local<br>Budget                                  | <input type="radio"/> New Equipment<br>Purchase Outside<br>Funding Needed b/c Not<br>Able to Include in Local<br>Budget                                  |
| <b>Annual<br/>Maintenance</b>                                           | <input type="radio"/> Annual Maintenance<br>Interested in Funding<br>with Local Budget                                         | <input type="radio"/> Annual Maintenance<br>Interested in Sharing<br>Costs with Other WTPs<br>From Local Budget                                         | <input type="radio"/> Annual Maintenance<br>Outside Funding Needed<br>b/c Not Able to Include<br>in Local Budget                                         |
| <b>Quarterly<br/>Calibration by<br/>Equipment<br/>Supplier</b>          | <input type="radio"/> Quarterly<br>Calibration by<br>Equipment Supplier<br>Interested in Funding<br>with Local Budget          | <input type="radio"/> Quarterly<br>Calibration by<br>Equipment Supplier<br>Interested in Sharing<br>Costs with Other WTPs<br>From Local Budget          | <input type="radio"/> Quarterly<br>Calibration by<br>Equipment Supplier<br>Outside Funding Needed<br>b/c Not Able to Include<br>in Local Budget          |
| <b>Purchase of<br/>Server Hardware<br/>for Real-Time<br/>monitoring</b> | <input type="radio"/> Purchase of Server<br>Hardware for Real-Time<br>monitoring Interested in<br>Funding with Local<br>Budget | <input type="radio"/> Purchase of Server<br>Hardware for Real-Time<br>monitoring Interested in<br>Sharing Costs with Other<br>WTPs From Local<br>Budget | <input type="radio"/> Purchase of Server<br>Hardware for Real-Time<br>monitoring Outside<br>Funding Needed b/c Not<br>Able to Include in Local<br>Budget |
| <b>Annual<br/>Calibration by<br/>Consultant</b>                         | <input type="radio"/> Annual Calibration<br>by Consultant Interested<br>in Funding with Local<br>Budget                        | <input type="radio"/> Annual Calibration<br>by Consultant Interested<br>in Sharing Costs with<br>Other WTPs From Local<br>Budget                        | <input type="radio"/> Annual Calibration<br>by Consultant Outside<br>Funding Needed b/c Not<br>Able to Include in Local<br>Budget                        |
| <b>Database<br/>Management and<br/>Public – Facing<br/>Website</b>      | <input type="radio"/> Database<br>Management and Public<br>– Facing Website<br>Interested in Funding<br>with Local Budget      | <input type="radio"/> Database<br>Management and Public<br>– Facing Website<br>Interested in Sharing<br>Costs with Other WTPs<br>From Local Budget      | <input type="radio"/> Database<br>Management and Public<br>– Facing Website<br>Outside Funding Needed<br>b/c Not Able to Include<br>in Local Budget      |

Other (please specify)

**10. Do you currently have an annual budget set aside for the source water monitoring program?**

- ☐ Yes  
☐ No

Please provide an approximate annual budget that you currently allocate for source water monitoring.

**11. Is there an annual budget that you would consider reasonable from your local perspective to contribute to source water monitoring?**

- ☐ Yes  
☐ No

If Yes, How Much?

**12. SEMCOG is proposing to send Fondriest a letter requesting them to provide WSU the monitoring data that they have collected from 2013 to present day. If they are currently collecting data from your WTP, are you agreeable to SEMCOG sending the letter on your behalf?**

**Note that as we move forward we can update any data collection process if necessary with Fondriest; the purpose of this letter is to update the current database of data.**

- ☐ Yes  
☐ No  
☐ Comments:

Done

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## APPENDIX 7 – SEMCOG Online Survey Results

A follow-up 12-question survey (via survey monkey link) was sent to 14 water treatment plant operators on March 3rd, 2017 (APPENDIX 6). The survey solicited comments on a DRAFT version of this report (including the face-to-face assessments) and asked about their use of existing monitoring equipment, the need for new equipment, current and proposed annual equipment maintenance budget and related questions on hosting, data access and budget. Thirteen of the 14 WTPs provided responses with Algonac delaying their responses due to plant personnel changes. Some of the key questions and cumulative responses are summarized below.

| <b>Q4: Please indicate, if applicable, which equipment you currently use to monitor source water at the WTP</b> |                  |
|-----------------------------------------------------------------------------------------------------------------|------------------|
| Answered: 8   Skipped: 5                                                                                        |                  |
| <b>Answer Choices</b>                                                                                           | <b>Responses</b> |
| Multi-Parameter Sonde: Temperature                                                                              | 6                |
| Multi-Parameter Sonde: Specific Conductivity                                                                    | 6                |
| Multi-Parameter Sonde: pH                                                                                       | 6                |
| Multi-Parameter Sonde: Turbidity                                                                                | 6                |
| Multi-Parameter Sonde: Chlorophyll                                                                              | 5                |
| Multi-Parameter Sonde: Oxidation Reduction Potential                                                            | 5                |
| Multi-Parameter Sonde: Dissolved Oxygen                                                                         | 4                |
| Multi-Parameter Sonde: Blue-Green Algae                                                                         | 3                |
| TOC Analyzer                                                                                                    | 1                |
| Flourometer                                                                                                     | 5                |
| GC-MS                                                                                                           | 0                |
| GC-ECD                                                                                                          | 0                |

**Q5: Does your current equipment need replacement for continued source water**

| Answered: 2   Skipped: 11                            |           |
|------------------------------------------------------|-----------|
| Answer Choices                                       | Responses |
| Multi-Parameter Sonde: Temperature                   | 2         |
| Multi-Parameter Sonde: Specific Conductivity         | 1         |
| Multi-Parameter Sonde: pH                            | 2         |
| Multi-Parameter Sonde: Turbidity                     | 1         |
| Multi-Parameter Sonde: Chlorophyll                   | 1         |
| Multi-Parameter Sonde: Oxidation Reduction Potential | 1         |
| Multi-Parameter Sonde: Dissolved Oxygen              | 1         |
| Multi-Parameter Sonde: Blue-Green Algae              | 1         |
| TOC Analyzer                                         | 2         |
| Fluorometer                                          | 2         |
| GC-MS                                                | 0         |
| GC-ECD                                               | 0         |

**Q6: Does your current equipment need calibration and maintenance?**

| Answered: 5   Skipped: 8                             |           |
|------------------------------------------------------|-----------|
| Answer Choices                                       | Responses |
| Multi-Parameter Sonde: Temperature                   | 3         |
| Multi-Parameter Sonde: Specific Conductivity         | 2         |
| Multi-Parameter Sonde: pH                            | 3         |
| Multi-Parameter Sonde: Turbidity                     | 2         |
| Multi-Parameter Sonde: Chlorophyll                   | 2         |
| Multi-Parameter Sonde: Oxidation Reduction Potential | 2         |
| Multi-Parameter Sonde: Dissolved Oxygen              | 1         |
| Multi-Parameter Sonde: Blue-Green Algae              | 1         |
| TOC Analyzer                                         | 4         |
| Fluorometer                                          | 4         |
| GC-MS                                                | 0         |
| GC-ECD                                               | 0         |

**Q7: Does your facility need new equipment for WTP source water monitoring operations?**

| Answered: 11    Skipped: 2                                            |           |
|-----------------------------------------------------------------------|-----------|
| Answer Choices                                                        | Responses |
| Multi-Parameter Sonde: Temperature                                    | 2         |
| Multi-Parameter Sonde: Specific Conductivity                          | 0         |
| Multi-Parameter Sonde: pH                                             | 2         |
| Multi-Parameter Sonde: Turbidity                                      | 2         |
| Multi-Parameter Sonde: Chlorophyll                                    | 0         |
| Multi-Parameter Sonde: Oxidation Reduction Potential                  | 0         |
| Multi-Parameter Sonde: Dissolved Oxygen                               | 0         |
| Multi-Parameter Sonde: Blue-Green Algae                               | 2         |
| TOC Analyzer                                                          | 0         |
| Fluorometer                                                           | 0         |
| GC-MS                                                                 | 0         |
| GC-ECD                                                                | 1         |
| No New Equipment Needed                                               | 1         |
| I am Interested in New Equipment but Need Outside Funding to Purchase | 7         |

**Q8: Would your facility be interested in an option that allows for real-time monitoring of data rather than the 15-minute delay that WTP operators are currently experiencing?**

| Answered: 13    Skipped: 0 |           |         |
|----------------------------|-----------|---------|
| Answer Choices             | Responses | Percent |
| Yes                        | 12        | 92.3    |
| No                         | 1         | 7.7     |

**Q9: Please review the following table and indicate which elements of the monitoring program you can support through local budgeting vs. which elements will require outside funding**

| Answered: 13 Skipped: 0                              |                                      |                                                            |                                                                |       |
|------------------------------------------------------|--------------------------------------|------------------------------------------------------------|----------------------------------------------------------------|-------|
| Element                                              | Interested in Funding w/Local Budget | Interested in Sharing Costs w/Other WTPs From Local Budget | Outside Funding Needed b/c Not Able to Include in Local Budget | Total |
| Replacement Equipment / Parts                        | 5                                    | 1                                                          | 7                                                              | 13    |
| New Equipment Purchase                               | 2                                    | 1                                                          | 10                                                             | 13    |
| Annual Maintenance                                   | 2                                    | 4                                                          | 7                                                              | 13    |
| Quarterly Calibration by Equipment Supplier          | 2                                    | 6                                                          | 5                                                              | 13    |
| Purchase of Server Hardware for Real-Time Monitoring | 4                                    | 3                                                          | 6                                                              | 13    |
| Annual Calibration by Consultant                     | 0                                    | 5                                                          | 7                                                              | 12    |
| Database Management and Public – Facing Website      | 1                                    | 6                                                          | 6                                                              | 13    |

**Q10: Do you currently have an annual budget set aside for the source water monitoring program?**

| Answered: 13 Skipped: 0 |           |         |
|-------------------------|-----------|---------|
| Answer Choices          | Responses | Percent |
| Yes                     | 4         | 30.8    |
| No                      | 9         | 69.2    |

**Q11: Is there an annual budget that you would consider reasonable from your local perspective to contribute to source water monitoring?**

Answered: 13 Skipped: 1

| Answer Choices | Responses | Percent |
|----------------|-----------|---------|
| Yes            | 9         | 75      |
| No             | 3         | 25      |

**Q12: SEMCOG is proposing to send Fondriest a letter requesting them to provide WSU the monitoring data that they have collected from 2013 to present day. If they are currently collecting data from your WTP, are you agreeable to SEMCOG sending the letter on your behalf? Note that as we move forward we can update any data collection process if necessary with Fondriest; the purpose of this letter is to update the current database of data.**

Answered: 11 Skipped: 2

| Answer Choices | Responses | Percent |
|----------------|-----------|---------|
| Yes            | 10        | 90.1    |
| No             | 0         | 0       |
| Comments       | 1         | 9.1     |

## **APPENDIX 8 – Report Contacts/References**

Allan, Jon – Director, Office of the Great Lakes, Michigan Department of Environmental Quality  
Beaulac, Michael – Senior Project Administrator, Office of the Great Lakes, Michigan  
Department of Environmental Quality  
Benzie, Richard – Assistant Chief, Office of Drinking Water and Municipal Assistance,  
Michigan Department of Environmental Quality  
Booth, Michael – City of St. Clair Superintendent, Finance Director  
Borgacz, Lisa – City of Mt. Clemens, Interim City Manager/City Clerk  
Coscarelli, Mark – Vice President, Public Sector Consultants  
Creisher, Cynthia – Public Utilities Engineer, Gas Operations Section, Operations and Wholesale  
Markets Division, Michigan Public Service Commission  
DeMaria, Annette – Engineer, Environmental Consulting and Technology, Inc.  
Dolehanty, Mary Ann – Office of Drinking Water and Municipal Assistance, Michigan  
Department of Environmental Quality  
Donaldson, Kristina – Office of Drinking Water and Municipal Assistance, Michigan  
Department of Environmental Quality  
Dupray, John – Mayor, City of New Baltimore  
Eschenburg, Lori J. – Planner, St. Clair County Metropolitan Planning Commission  
Foosse, Melanie – AOC Coordinator, Detroit River, St. Clair River, Raisin River - Office of the  
Great Lakes, Michigan Department of Environmental Quality  
Forlini, Anthony – State Representative, 24<sup>th</sup> District  
Fountain, Tom – City of St. Clair Water Treatment Operator  
Goddard, Matthew – Spill Prevention Specialist, Water Resources Division, Michigan  
Department of Environmental Quality  
Goike, Kenneth – State Representative, 33<sup>rd</sup> District  
Gold, Steven – Director, Macomb County Department of Health & Community Services  
Heise, Kurt – State Representative, 20<sup>th</sup> District  
Hill, Charles – Water Resources Division, Michigan Department of Environmental Quality  
Hiltunen, Chris – Water and DPS Superintendent, City of New Baltimore and Ira Township  
Hobrla, Richard – Engineer Manager, Great Lakes Unit, Office of the Great Lakes, Michigan  
Department of Environmental Quality  
Homminga, Scott – Grosse Pointe Farms Water Treatment Plant - Water Superintendent  
Hurren, Norman – City of Port Huron Water Plant Superintendent  
Itrich, Michael – Marine City DPW Superintendent  
Johnson, Carl R. – Project Manager, CDM Smith Inc.  
Jones, Jeffrey – Environmental Quality Specialist, Water Resources Division, Michigan  
Department of Environmental Quality  
Kapila, Pawan – SW Detroit Water Treatment Plant Team Leader - Operations, GLWA  
Karll, Kelly – Engineer, Southeast Michigan Council of Governments  
Kozanas, Dena – Deputy Chief of Staff to Rep. Candice Miller, US House of Representatives  
Kropp, Laura - City of Mt. Clemens City Council  
LaRoy, Barry – Director, City of Monroe Water & Wastewater Utilities  
Leven, Elaine – Marine City Manager

Lomako, Kathleen – Executive Director, Southeast Michigan Council of Governments

Lopez, Amber – Office of Drinking Water and Municipal Assistance, Michigan Department of Environmental Quality

Loper, Dwayne – East China Charter Township WTP Superintendent

Maher, Sharon – Administration Division, Michigan Department of Environmental Quality

Mangus, Amy – Deputy Executive Director, Southeast Michigan Council of Governments

Martz, Douglas – St. Clair Channel Keeper

McCoy, Robert – Supervisor, Ira Township

McInerney-Slater, Bonnie – Administrative Assistant to the Mayor, City of New Baltimore

McInnis, Patrick – Drinking Water Quality Scientist, Environmental Monitoring and Reporting Branch, Ontario Ministry of the Environment and Climate Change

Messina, Andy – Water Department Superintendent, City of New Baltimore

Miller, Dr. Carol Jean – Director, Healthy Urban Waters, Civil and Environmental Engineering, Wayne State University

Nieberding, Paul – Fondriest Environmental, Inc.

Olson, James C. – Research Assistant, Healthy Urban Waters, Civil and Environmental Engineering, Wayne State University

Ostlund, Peter – Interim Chief, Water Resources Division, Michigan Department of Environmental Quality

Pallone, Maggie – Deputy Director, Policy and Legislative Affairs, Executive Division, Michigan Department of Environmental Quality

Parkus, Bill – Environmental Planner, Southeast Michigan Council of Governments

Plonka, Bob – City of St. Clair Water Treatment Operator

Poole, Richard – City of Algonac Chief Water Operator

Porter, Cheryl – Chief Operating Officer, Great Lakes Water Authority

Price, Meghan – Senior Associate Scientist, Environmental Consulting & Technology, Inc.

Rostorfer, Devan – Environmental Planner, Southeast Michigan Council of Governments

Scott, Mark – City of Algonac Department of Public Works Supervisor

Selzer, Michelle – Lake Erie Coordinator, Office of the Great Lakes, Michigan Department of Environmental Quality

Treemore Spears, Lara – Program Coordinator, Healthy Urban Waters, Civil and Environmental Engineering, Wayne State University

Warner, Matthew – Environmental Quality Analyst, Office of the Great Lakes, Michigan Department of Environmental Quality

Westrick, Dr. Judy – Director, Lumigen Instrument Center, Civil and Environmental Engineering, Wayne State University

Wintermute, Jason – Water Management Supervisor, Lower Thames Valley Conservation Authority (Ontario)

Witter, Eric – City of Port Huron Utilities Manager

Wood, Jeff – City of Mt. Clemens Public Services Director

Zdrogowski, Michelle – Public Affairs Officer, Great Lakes Water Authority