Office of the Auditor General
Performance Audit Report

Community and Noncommunity Water Supplies
Office of Drinking Water and Municipal Assistance
Department of Environmental Quality

March 2016

State of Michigan Auditor General
Doug A. Ringler, CPA, CIA

761-0320-15

The auditor general shall conduct post audits of financial transactions and accounts of the state and of all branches, departments, offices, boards, commissions, agencies, authorities and institutions of the state established by this constitution or by law, and performance post audits thereof.

Article IV, Section 53 of the Michigan Constitution

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Report Summary

Performance Audit
Community and Noncommunity Water Supplies
Office of Drinking Water and Municipal Assistance (ODWMA)
Department of Environmental Quality (DEQ)

Report Number:
761-0320-15

Released:
March 2016

ODWMA is responsible for public drinking water and environmental health regulatory programs. There are approximately 11,000 public drinking water supplies in Michigan. Approximately 1,400 are community water supplies and the remaining 9,600 are noncommunity water supplies. Staff in eight district offices and the DEQ central office are responsible for monitoring the activities of the community water supplies. ODWMA contracts with local health departments (LHDs) to monitor the noncommunity water supplies. As of September 2015, ODWMA regulated 1,389 community water supplies and 9,574 noncommunity water supplies to ensure safe drinking water for Michigan residents.

Audit Objective	Conclusion
Objective #1: To assess the sufficiency of ODWMA's oversight of the State's Community Water Supply Program.	Not sufficient

Findings Related to This Audit Objective	Material Condition	Reportable Condition	Agency Preliminary Response
DEQ needs to improve its oversight and monitoring of community water supplies that implement a new water source or treatment process to ensure that DEQ meets its mission of promoting wise management of water resources to support healthy communities. DEQ did not require the City of Flint Water Treatment Plant to implement optimal corrosion control treatment when switching to the Flint River water source. A lack of optimized corrosion control treatment may have contributed to elevated lead levels in the drinking water system (Finding #1).	X		Agrees
ODWMA needs to improve its processes to ensure that sample sites selected for lead and copper testing meet Lead and Copper Rule (LCR) tier requirements and that consistent sources are used to determine populations served. ODWMA cannot ensure that it takes necessary actions to safeguard drinking water if it does not have assurances that samples are from homes with lead pipes and that sample sizes are appropriate and representative of the distribution system (Finding #2).		X	Agrees
ODWMA did not conduct 10% of sampled sanitary surveys (comprehensive reviews to assess compliance with State and federal requirements) and 15% of surveillance visits (more frequent follow-up visits based on the type of system and treatments utilized) within the time frames required by DEQ policy (Finding #3).		X	Agrees

Observations Related to This Audit Objective (*Continued*)	Material Condition	Reportable Condition	Agency Preliminary Response
Throughout our audit, we became aware of many instances in which sole reliance on the LCR may not serve the best interest of Michigan citizens. Office of the Auditor General staff do not purport to be environmental engineers, medical experts, lawyers, or the myriad of other professions necessary to ensure safe drinking water. However, our review of the Michigan Safe Drinking Water Act and the LCR, which are to be enforced by ODWMA, has identified concerns that should be considered during comprehensive deliberations on the mechanisms to provide safe drinking water to Michigan citizens. This observation is intended to provide some talking points for those discussions (Observation #1).	Not applicable	Not applicable	Not applicable

Audit Objective	Conclusion
Objective #2: To assess the sufficiency of ODWMA's efforts to monitor contracts with LHDs that complete inspections and observe activities related to the Noncommunity Water Supply Program.	Sufficient with exceptions

Findings Related to This Audit Objective	Material Condition	Reportable Condition	Agency Preliminary Response
ODWMA did not ensure that LHDs conducted all sanitary surveys, surveillance visits, and other monitoring within the time frames required by DEQ policy. ODWMA did not ensure that LHDs completed 294 (5%) of 5,744 surveys and 16 (36%) of 45 surveillance visits at 11 of 22 water supplies reviewed (Finding #4).		X	Agrees

Audit Objective	Conclusion
Objective #3: To assess whether annual fees cover the cost of monitoring the State's water supplies.	Costs not covered

Observations Related to This Audit Objective	Material Condition	Reportable Condition	Agency Preliminary Response
Annual fees alone did not sufficiently cover DEQ's cost of monitoring water supplies (Observation #2).	Not applicable	Not applicable	Not applicable

A copy of the full report can be obtained by calling 517.334.8050 or by visiting our Web site at: www.audgen.michigan.gov

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March 4, 2016

Mr. Keith Creagh, Director
Department of Environmental Quality
Constitution Hall
Lansing, Michigan

Dear Mr. Creagh:

I am pleased to provide this performance audit report on Community and Noncommunity Water Supplies, Office of Drinking Water and Municipal Assistance, Department of Environmental Quality.

We organize our findings and observations by audit objective. Your agency provided preliminary responses to the recommendations at the end of our fieldwork. The *Michigan Compiled Laws* and administrative procedures require an audited agency to develop a plan to comply with the recommendations and submit it within 60 days of the date above to the Office of Internal Audit Services, State Budget Office. Within 30 days of receipt, the Office of Internal Audit Services is required to review the plan and either accept the plan as final or contact the agency to take additional steps to finalize the plan.

We appreciate the courtesy and cooperation extended to us during this audit.

Sincerely,

Doug Ringler

Doug Ringler
Auditor General

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AUDIT OBJECTIVES, CONCLUSIONS, FINDINGS, AND OBSERVATIONS

OVERSIGHT OF COMMUNITY WATER SUPPLY PROGRAM

BACKGROUND

A community water supply*, also known as a water system*, furnishes drinking water year-round to residential populations of 25 or more.

A noncommunity water supply* is a public water system that regularly supplies water to at least 25 people or at least 15 service connections for not less than 60 days per year. Some examples of noncommunity nontransient water supplies* are factories, office buildings, schools, and hospitals. Noncommunity transient water supplies* provide water in places such as hotels or restaurants where people do not remain for long periods of time.

The following table provides descriptions and examples of community and noncommunity water supplies:

Classification	Description	Examples
Type I Community	Provides year-round service to not fewer than 15 living units or to not fewer than 25 residents.	Municipalities, subdivisions, apartments, condominiums, nursing homes, and manufactured housing communities
Type II Noncommunity: Nontransient	Serves at least 25 of the same individuals on an average daily basis for at least 6 months/year (and is not a Type I).	Places of employment, schools, hospitals, day care centers, and bottled water sources
Transient	Serves at least 25 individuals or at least 15 service connections on an average daily basis for not less than 60 days/year (and is not a Type I).	Hotels, restaurants, campgrounds, churches, and highway rest stops
Type III	Public water system that is not a Type I or Type II.	Subdivisions, apartments, condominiums, duplexes with 2 - 14 living units, and facilities serving less than 25 individuals or open less than 60 days per year
Private Water System	Serves a single living unit.	Single-family home

As of September 2015, the Office of Drinking Water and Municipal Assistance (ODWMA) regulated 1,389 community water supplies to ensure safe drinking water for Michigan residents (see Exhibit #1).

Staff in eight district offices and the Department of Environmental Quality (DEQ) central office are responsible for

** See glossary at end of report for definition.*

monitoring the activities of the community water supplies. ODWMA's primary monitoring procedures include:

- Conducting quarterly or annual site visits to ensure that regulatory requirements are met, water treatment plant operators are properly certified, and procedures are properly followed.

- Completing in-depth water surveys (called sanitary surveys*) every three years of the supplies, including the water source; treatment; distribution system; finished water storage; pumps, pump facilities, and controls; and monitoring, reporting, and data verification for existing or potential health hazards for the purpose of determining the ability of the public water supply to produce, treat, and distribute adequate quantities of water meeting State and federal drinking water requirements.

- Reviewing water sample reports for acute and chronic violations.

On April 25, 2014, the City of Flint changed its source of drinking water from Lake Huron water received from the Detroit Water and Sewerage Department (DWSD) to Flint River water processed by the City of Flint Water Treatment Plant (Flint WTP).

On December 23, 2015 and February 17, 2016, we responded to questions presented by a State legislator related to DEQ and the Flint WTP. See our responses at <www.audgen.michigan.gov>.

AUDIT OBJECTIVE

To assess the sufficiency of ODWMA's oversight of the State's Community Water Supply Program.

CONCLUSION

Not sufficient.

FACTORS IMPACTING CONCLUSION

- Material condition* related to improved oversight and monitoring of community water supplies that implement a new water source or treatment process (Finding #1).

- Two reportable conditions* related to improved processes for selecting lead and copper sample sites and determining populations (Finding #2) and sanitary surveys and surveillance visits* not always conducted within required time frames (Finding #3).

** See glossary at end of report for definition.*

- Observation* regarding concerns related to the Lead and Copper Rule (LCR) (Observation #1).

- ODWMA reported that 92% of required sanitary surveys for calendar years 2012 through 2014 were completed on time.

- Our field visits to 4 district offices and review of case files related to 6 *E. coli* maximum contaminant level* (MCL) violations and 4 lead action level* exceedances associated with community water supplies noted that ODWMA was generally in compliance with the regulations tested.

** See glossary at end of report for definition.*

FINDING #1

Improved oversight and monitoring of community water supplies needed.

DEQ needs to improve its oversight and monitoring of community water supplies that implement a new water source or treatment process to ensure that DEQ meets its mission of promoting wise management of water resources to support healthy communities. Not ensuring that the Flint WTP implemented optimal corrosion control treatment* when switching to the Flint River water source may have contributed to elevated lead levels in the drinking water system.

DEQ is responsible for enforcing the Michigan Safe Drinking Water Act and the LCR and providing regulatory oversight of all public water supplies.

DEQ did not:

DEQ did not ensure that the Flint WTP implemented optimal corrosion control treatment immediately after it switched water sources.

a. Ensure that the Flint WTP implemented optimal corrosion control treatment immediately after switching to the Flint River water source.

   During the time that DWSD provided water to the City of Flint, the water system purchased water that had optimal corrosion control treatment. However, when the City of Flint switched water sources to the Flint River, the Flint WTP did not initially have optimal corrosion control treatment in place. DEQ did not require corrosion control because it interpreted LCR requirements as allowing for two consecutive 6-month monitoring periods prior to determining whether treatment was necessary, after which DEQ determined that the Flint WTP needed to implement treatment to optimize corrosion control.

   According to the LCR, a water system that has optimized corrosion control with treatment, such as the addition of a phosphate corrosion inhibitor*, should continue to operate and maintain optimal corrosion control treatment when switching to a new water source. The United States Environmental Protection Agency (EPA) issued a memorandum on November 3, 2015 stating the importance of a large water system, such as the Flint WTP, taking the necessary steps to ensure that appropriate corrosion control treatment is maintained at all times. However, the memorandum also acknowledged that the language of the LCR had differing possible interpretations.

   By the time the EPA memorandum was issued, ODWMA had directed the Flint WTP to install optimal corrosion control treatment.

b. Notify the Flint WTP to begin pursuing optimized corrosion control treatment in a timely manner.

** See glossary at end of report for definition.*

The LCR states that the lead action level is exceeded if the lead level, as determined by the 90th percentile calculation*, is greater than 15 parts per billion (ppb). If exceeded, for a water system that has already installed corrosion control and/or source water treatment, additional actions are required, such as educating the public about lead in drinking water and replacing lead service lines. Water systems that serve more than 50,000 people that have not yet implemented corrosion control treatment and have sample results with a computed lead level above the practical quantitation level (PQL) for lead of 5 ppb are required to put an optimized corrosion control treatment plan in place.

In March 2015, DEQ received the Flint WTP's sample results for the 6-month period ended December 31, 2014. The sample results indicated that lead levels were 6 ppb. Because the results were over the PQL of 5 ppb, DEQ should have notified the Flint WTP to begin an optimized corrosion control treatment plan. However, DEQ waited until it received the sample results for the 6-month period ended June 30, 2015 so that it could assess whether water sample results improved. The June 30 sample results indicated that lead levels were at 11 ppb.

Unsafe lead levels in drinking water can result in serious health issues as well as impact businesses, schools, and other community gathering places.

RECOMMENDATION

We recommend that DEQ improve its oversight and monitoring of community water supplies that implement a new water source or treatment process to ensure that DEQ meets its mission of promoting wise management of water resources to support healthy communities.

AGENCY PRELIMINARY RESPONSE

DEQ provided us with the following response:

The DEQ agrees additional measures could have been pursued to ensure corrosion control treatment was implemented in Flint. As the audit acknowledges, the federal Lead and Copper Rule (LCR) enforced by the DEQ is ambiguous. Going forward, the DEQ will require water supplies with existing corrosion control treatment (CCT), or those purchasing water with CCT, to have CCT in place at the time of a change in water source or a change in treatment that may result in lead leaching from pipes. The DEQ supports changes to law that would provide increased clarity.

* *See glossary at end of report for definition.*

FINDING #2

Improved processes needed for selecting lead and copper sample sites and determining populations.

ODWMA needs to improve its processes to ensure that sample sites selected for lead and copper testing meet LCR tier requirements and that consistent sources are used to determine populations served. ODWMA cannot ensure that it takes necessary actions to safeguard drinking water if it does not have assurances that samples are from homes with lead pipes and that sample sizes are appropriate and representative of the distribution system.

The LCR requires that sample sites selected for a community water supply shall consist of tier 1 sample sites* that:

- Are served by a lead service line.
- Contain lead pipes or copper pipes soldered with lead installed after 1982.

If these two conditions do not provide an adequate number of sample sites, the water supply shall complete its sampling pool using other locations that meet proper criteria.

The LCR also requires the following number of sample sites for each prescribed monitoring period to determine lead and copper 90th percentiles at the community water supply:

	Required Number of	
Population Served	Sites to Sample (Standard Monitoring)	Sites to Sample (Reduced Monitoring)
Over 100,000	100	50
10,001 - 100,000	60	30
3,301 - 10,000	40	20
501 - 3,300	20	10
101 - 500	10	5
Fewer than 101	5	5

Our review disclosed:

ODWMA did not verify that locations sampled for lead met LCR sampling requirements.

a. ODWMA did not independently verify that community water supplies tested sites that met LCR requirements. ODWMA relies on the community water supplies to certify that sampled sites complied with LCR requirements.

In November 2015, ODWMA requested the Flint WTP to verify that 324 sites historically used for sampling met LCR requirements. DEQ records disclosed that the Flint WTP reported that all sample sites utilized since 1992 met LCR criteria. However, information provided by the Flint WTP to DEQ as a result of the WTP upgrading its electronic database of customer service connections contradicts DEQ records. At the time of our review, DEQ had reviewed 46 of the 324 sample sites and determined

** See glossary at end of report for definition.*

that the Flint WTP had documented that only 6 (13%) of 46 sites met LCR criteria. To help ensure that community water supplies sampled appropriate sites, DEQ should proactively and routinely validate sample sites selected by the water supplies.

ODWMA used inconsistent sources of information for determining the population served.

b. ODWMA used inconsistent sources of information to determine the population served, such as undocumented estimates of occupancy and verbal responses from the community water supplies. ODWMA used this approach because it did not have written procedures to ensure that it consistently identified and documented the population of customers served by a community water supply.

The Michigan Safe Drinking Water Act and the LCR are silent on allowable sources for determining population size. Although verifiable information is not always readily available, ODWMA's use of inconsistent sources of information to determine population totals impacts sample size and could lead to undersampling and inaccurate results.

RECOMMENDATION

We recommend that ODWMA improve its processes to ensure that sample sites selected for lead and copper testing meet LCR tier requirements and that consistent sources are used to determine populations served.

AGENCY PRELIMINARY RESPONSE

DEQ provided us with the following response:

Under the Safe Drinking Water Act (SDWA), drinking water system operators are responsible for selecting appropriate testing sites to meet LCR requirements. Like many environmental regulations, the SDWA requires water supplies to accurately report information to the State. The DEQ, similar to EPA and all other state environmental regulators, relies on the accuracy of submitted data in a variety of programs, and relied on the accuracy of the SDWA data that the City of Flint reported. As the audit found, the City of Flint submitted some sampling data that was not accurate and did not meet the LCR requirements. The DEQ will put in place appropriate audit procedures that will increase the confidence and accuracy of water supply submissions.

FINDING #3

Sanitary surveys and surveillance visits of community water supplies not always conducted within required time frames.

ODWMA did not always conduct community water supply sanitary surveys or surveillance visits within the time frames required by DEQ policy.

The EPA requires ODWMA to conduct sanitary surveys of community water supplies. The surveys are comprehensive reviews of community water supplies' compliance with State and federal drinking water requirements. ODWMA policy 399-021 states that all community water supplies shall have a survey conducted once every three years.

In addition, ODWMA policy 399-026 requires surveillance visits of community water supplies one to four times a year depending on the type of system and treatment utilized. These visits enable ODWMA to follow up deficiencies identified during the surveys and assist ODWMA in developing knowledge and familiarity with the community water supplies.

Our review of the timing of the most recently completed sanitary survey and surveillance visit of each community water supply disclosed that ODWMA did not:

10% of sanitary surveys not conducted within the required 3-year time frame.

a. Conduct surveys for 137 (10%) of the 1,389 community water supplies within the 3-year time frame. Surveys ranged from 2 months to more than 5 years past due:

Amount of Time Survey is Past Due	Number of Community Water Supplies
5 years or more	1
3 - 5 years	0
2 - 3 years	5
1 - 2 years	21
6 - 12 months	32
4 - 6 months	22
3 - 4 months	29
2 - 3 months	27
	137

Conducting timely surveys provides ODWMA with an assessment of the supplies' operating conditions; assurance that the supplies' equipment, technologies, and water treatment and distribution practices are functioning as expected; and verification that deficiencies identified in prior surveys have been corrected.

15% of surveillance visits not conducted within the required time frame.

b. Conduct visits for 214 (15%) of the 1,389 community water supplies within the required time frame. Visits ranged from 2 months to more than 2.5 years past due:

Amount of Time Visit is Past Due	Number of Community Water Supplies
2.5 years or more	2
1.5 - 2.5 years	12
1 - 1.5 years	27
6 - 12 months	67
4 - 6 months	41
3 - 4 months	28
2 - 3 months	37
	214

Visits are key to ensuring that identified deficiencies are addressed and to maintaining cooperative relationships with the supplies.

c. Require or maintain documentation of surveillance visits. ODWMA staff entered the date visits took place into a database; however, additional documentation was not entered or retained in all cases.

Documentation would assist management and policymakers in ensuring that concerns identified in prior visits were resolved and in identifying and analyzing trends and potential concerns on a timely basis.

RECOMMENDATION

We recommend that ODWMA conduct community water supply sanitary surveys and surveillance visits within the time frames required by DEQ policy.

AGENCY PRELIMINARY RESPONSE

DEQ provided us with the following response:

The State of Michigan has exceeded EPA targets for completion of sanitary surveys. Ninety percent of the sanitary surveys were conducted within the required three year timeframe. This exceeds the 79 percent target established by EPA in the 2016 National Water Program Guidance.

Eighty-five percent of the surveillance visits were conducted within the timeframes identified by DEQ policy. Surveillance visits are not required by EPA. The DEQ established aggressive timeframes for surveillance visits as a mechanism for increased communication and compliance assistance between DEQ staff and the owner and operator of the Community Water Supply. The DEQ will review policies and procedures and identify areas for process improvements to better meet program goals.

OBSERVATION #1

Concerns related to the LCR.

In 1991, the EPA published a regulation to control lead and copper in drinking water provided through public water systems known as the LCR. Lead and copper enter drinking water primarily through plumbing materials. The EPA reports that exposure to lead and copper may cause health problems ranging from stomach distress to brain damage.

Throughout this audit, we became aware of many instances in which sole reliance on the LCR may not serve the best interest of Michigan citizens. Office of the Auditor General staff do not purport to be environmental engineers, medical experts, lawyers, or the myriad of other professions necessary to ensure safe drinking water. However, our review of the Michigan Safe Drinking Water Act and the LCR, which are to be enforced by ODWMA, has identified concerns that should be considered during comprehensive deliberations on the mechanisms to provide safe drinking water to Michigan citizens. This observation is intended to provide some talking points for those discussions.

LCR compliance does not require monitoring for human exposure to lead.

The LCR does not contain provisions for other monitoring indicators of human exposure to lead, such as blood lead level testing results. The LCR aims to limit consumer exposure to lead in drinking water through requirements for corrosion control treatment, source water treatment, lead service line replacement, and public education. These requirements are triggered, in some cases, by lead and copper action levels measured in water samples collected at consumers' taps. However, the LCR does not require the monitoring of continued exposure to "acceptable" lead levels to evaluate the long-term effects and to corroborate that water-only testing is the best method to ensure lead and copper safety. Michigan could require DEQ to notify the Michigan Department of Health and Human Services (MDHHS) of elevated lead levels in a water supply and MDHHS, with the assistance of local health officials, could devise a methodology for monitoring human exposure over an extended period of time.

LCR monitoring is generally limited to single-family residences in larger communities.

Lead levels may be computed based on water samples from single-family residences and not from schools or hospitals.

The LCR requires that a water system collect samples from single-family residences (if a sufficient number are available) that are served by a lead service line, contain lead pipes, or contain copper pipes soldered with lead installed after 1982. Therefore, water supplies that serve large communities, such as the City of Flint, may compute lead levels based on water samples collected entirely from single-family residences and not from schools and hospitals. Although these sites would generally be excluded from testing for LCR compliance, the State could require and provide DEQ or another State agency with resources to monitor lead levels at schools, hospitals, and other facilities whose occupants are more susceptible to health effects from lead.

Resident-collected water samples could cause variations in results.

The LCR allows water samples to be collected by the public water system, a hired contractor, or a resident, which result in variations in sample results as the water system cannot ensure that samples were collected using proper procedures.

The water system must provide residents with proper instructions for collecting the water samples. DEQ published instructions on its Web site that included flushing the tap the night before sampling and not using the collection point tap in the home for at least the following six hours prior to drawing the sample. However, DEQ informed us that water systems are not required to use or distribute DEQ's published instructions to residents, leaving the method for collecting water samples up to the discretion of the water system.

Possible inconsistencies in instructions and sample collection could lead to variations in sample results.

When a water system allows residents to collect water samples, the system or contractor loses control of the sampling process and, therefore, cannot ensure that samples are consistently collected, which could lead to variations in the sample results even with proper instructions.

Michigan could establish separate guidelines whereby communities that have lead levels trending upward are then subjected to further testing to help ensure the integrity of test samples. Also, DEQ, to avoid the risk of inconsistencies in water sample collection, could require that the water systems provide DEQ's published instructions to residents who collect their own samples.

LCR 90th percentile calculation has been the sole means to determine lead action levels.

The LCR requires that the 90th percentile lead level be used to determine whether the lead action level of 15 ppb has been exceeded. A water system may be in compliance with the LCR even though some sample results have a lead level greater than the 15 ppb action level. A large water system with a computed lead level greater than 5 ppb (when source water lead concentration at the treatment plant is zero) must implement corrosion control treatment if it has not already done so. If the computed lead level exceeds 15 ppb, the water system must also implement the public education requirements and may also need to implement lead service line replacement requirements. If initial monitoring results for large water systems indicate lead levels are stable between zero and 5 ppb, or below the lead action level of 15 ppb for small and medium water systems, those systems are considered to be optimized without additional treatment.

To compute the 90th percentile lead level, the results of all lead samples collected during a monitoring period are placed in ascending order from the sample with the lowest concentration of lead to the sample with the highest concentration. Each sample is then numbered, starting at 1. The total number of samples collected during the monitoring period is then multiplied by 0.9.

The contaminant level of the sample with the assigned number equal to the result of this calculation is the 90th percentile lead level. This means that 90% of the samples collected have lead levels at or below the reported value. Exhibit #2 identifies the 90th percentile lead levels for the two most recent monitoring periods for the 25 largest Michigan cities.

DEQ should further assess sample results to identify warning signs of problems.

Regardless of the 90th percentile lead level reported for LCR compliance purposes, DEQ should further assess the sample results to identify warning signs of potential systemwide problems. For example, for the Flint WTP, the number of samples with lead levels of 5 ppb or higher increased from 17 (17% of 100 samples) in 2014 to 28 (41% of 69 samples) in 2015. This increase could indicate that the City of Flint's switch from water treated with a phosphate corrosion inhibitor to water with no added corrosion inhibitor caused excessive corrosion throughout Flint's distribution system that needed immediate attention.

LCR lacks guidance on necessary actions if DEQ becomes aware that a prior 90th percentile calculation was based on inaccurate information.

The accuracy of the 90th percentile calculation depends on the inclusion of all water sample results that met the appropriate site selection criteria and properly following LCR calculation procedures. If it is determined that one of these conditions was not met, the LCR is silent on proper follow-up actions to remediate an inaccurate 90th percentile calculation.

Inaccurate sample sites used in 90th percentile calculations could delay or prevent DEQ from taking necessary actions to protect the drinking water supply. Therefore, DEQ should recalculate 90th percentile calculations when it determines that sample site or other information was inaccurate.

Implementing corrosion control for the first time may take up to 5 years.

LCR guidance allows the implementation of corrosion control treatment to occur over several years.

Implementing corrosion control treatment for the first time, in accordance with LCR guidelines, could take years to complete. The following table details the steps and amount of time allowed to install corrosion control treatment after a system exceeds the lead action level (the time period would be shortened if DEQ does not require a corrosion control study):

Steps	Maximum Time Allowed by the LCR to Complete
DEQ notifies the water system that it must perform a corrosion control study	12 months
Water system performs corrosion control study	18 months
DEQ designates optimal corrosion control treatment	6 months
Water system installs optimal corrosion control treatment	24 months

If the maximum amount of time at each step is utilized, it could take up to five years to install corrosion control treatment and still be in compliance with the LCR. During this time, further corrosive damage could occur within the water system, exacerbating the problem and exposing residents to excess lead levels and potentially serious health issues. Michigan could mandate a more aggressive time line for implementing corrosion control when the action level has been exceeded.

Partial replacement of lead service lines is ineffective. When a water system fails to meet the lead action level after applying corrosion control treatment to the source water, the system may need to implement the LCR lead service line replacement requirements. Water systems generally do not own all of the service lines within the distribution system. In many cases, the property owner is responsible for the service line that connects the residence to the water main. See Exhibit #3 for a community water distribution system and service line illustration.

Under the LCR's lead service line replacement requirements, a water system is only responsible for replacing the portion of the water service lines that the system owns; however, the system must notify the owners that they have lead service lines and offer to replace them at the owners' expense. This can often lead to partial lead service line replacements if the homeowners opt not to pay for replacing their portion of the lead service lines. According to a 2011 EPA Science Advisory Board study, partial lead service line replacement has not been shown to reliably reduce drinking water lead levels in the short term, ranging from days to months, and potentially even longer. The study further noted that partial lead service line replacement has been frequently associated with short-term elevated lead levels after replacement, suggesting the potential for harm rather than benefit during that time period. The Science Advisory Board's data suggests that lead levels would gradually stabilize.

Partial lead service line replacements may not reduce lead levels in the short term.

Michigan, in conjunction with the State's numerous community water supplies, should consider formalizing a plan to identify the best instances for the replacement of service lines, the priority for replacing service lines, and potential assistance programs for homeowners in need of new service lines.

NONCOMMUNITY WATER SUPPLY PROGRAM MONITORING

BACKGROUND

A noncommunity water supply is a public water system that regularly supplies water to at least 25 people or at least 15 connections for not less than 60 days per year. Some examples of noncommunity nontransient water supplies are factories, office buildings, schools, and hospitals. Noncommunity transient water supplies provide water in places such as hotels and restaurants where people do not remain for long periods of time.

As of September 2015, ODWMA regulated 9,574 noncommunity water supplies (see Exhibit #1). ODWMA contracts with local health departments (LHDs) to monitor the noncommunity water supplies. Monitoring responsibilities include:

- Conducting sanitary surveys at least once every five years.
- Conducting inspections for compliance with the Michigan Safe Drinking Water Act by qualified sanitarians or the equivalent.
- Providing program oversight for required water quality monitoring and reporting.
- Ensuring that repeat samples are collected promptly where initial sample results indicate a potential violation of State drinking water standards or where the sample analyses are unreliable because of overgrowth, excessive transit time, or the presence of organic chemical contamination.
- Conducting reinspections within 10 days of the expiration date of the compliance schedule to ensure that violations have been corrected and providing documentation of the results of the reinspection to the owner. If compliance has not been achieved, LHDs initiate enforcement in accordance with procedures established by the State.

ODWMA is responsible for ensuring that LHDs complete the required monitoring of the noncommunity water supplies.

AUDIT OBJECTIVE

To assess the sufficiency of ODWMA's efforts to monitor contracts with LHDs that complete inspections and observe activities related to the Noncommunity Water Supply Program.

CONCLUSION

Sufficient with exceptions.

FACTORS IMPACTING CONCLUSION

- ODWMA ensured that LHDs completed 95% of the required sanitary surveys of noncommunity water supplies in fiscal years 2013 through 2015.
- ODWMA developed a comprehensive Staff Reference Manual to assist in managing noncommunity water supplies.
- Our field visits to 10 LHDs and our review of case files related to 7 *E. coli* MCL violations and 5 lead or copper action level exceedances associated with noncommunity water supplies disclosed that LHDs were generally in compliance with the regulations tested.
- Reportable condition related to sanitary surveys, surveillance visits, and other monitoring not conducted within required time frames by LHDs for noncommunity water supplies (Finding #4).

FINDING #4

Sanitary surveys, surveillance visits, and other monitoring not conducted within required time frames by LHDs for noncommunity water supplies.

ODWMA did not ensure that LHDs conducted all sanitary surveys, surveillance visits, and other monitoring within the time frames required by DEQ policy for noncommunity water supplies.

ODWMA contracts with LHDs to provide program oversight and water quality monitoring of noncommunity water supplies, such as businesses and restaurants that provide water to its customers and employees from an independent water source. Contracts between DEQ and the LHDs require that ODWMA provide administrative oversight of the LHDs to determine that work performed is satisfactory according to contract terms and conditions.

ODWMA's monitoring of LHDs did not ensure that LHDs:

a. Conducted required sanitary surveys every 5 years as required by *Michigan Administrative Code* R 325.10702.

5% of sanitary surveys not conducted within the 5-year time frame required by DEQ policy.

Contracts require that LHDs perform a survey on a minimum of 20% of the noncommunity water supplies so that each supply is surveyed every 5 years. LHDs did not complete the most recent surveys within the 5-year time frame for 294 (5%) of the 5,744 noncommunity water supplies reviewed. Surveys ranged from 2 months to more than 6 years past due:

Time Past Due	Number of Surveys Past Due
6 years or more	3
5 - 6 years	2
4 - 5 years	1
3 - 4 years	3
2 - 3 years	9
1 - 2 years	46
6 - 12 months	105
4 - 6 months	48
3 - 4 months	53
2 - 3 months	24
	294

Conducting timely surveys is essential to ensuring that deficiencies do not exist in the water supply that would endanger customers and employees.

b. Conducted all required surveillance visits of noncommunity water supplies in accordance with Staff Reference Manual Section 11.4.

Visits are required for noncommunity water supplies that treat their water with certain chemicals. The required frequency of these visits range from once a year to once every three years, depending on how the water is treated by the water supply. The majority (98%) of the supplies do not treat their water source.

36% of surveillance visits not conducted within the time frames required by DEQ policy.

We selected a sample of 22 of the 238 supplies that required visits during 2015. LHDs had not performed 16 (36%) of the 45 required visits at 11 of the 22 supplies. Conducting timely visits is essential to ensuring that hazards are identified and that the supplies properly treated the source water.

c. Retained adequate documentation of surveillance visits.

Staff Reference Manual Section 11.4 requires that LHD staff enter the date of the visits into the database. However, LHDs did not maintain documentation of the purpose of visits or the information gathered during the visits. According to the Staff Reference Manual, LHDs should ensure that treatment chemicals are properly used, stored, and labeled; test kits are available; the operator is aware of test site locations; and the operator can perform a routine test sample.

Documentation is important to help DEQ and water supply management ensure that concerns identified in prior visits were resolved and to aid management in identifying trends and potential concerns.

d. Completed required activities for *E. coli* violations or lead action level exceedances on a timely basis.

We visited 10 LHDs to review the circumstances surrounding 7 *E. coli* MCL violations and 4 lead action level exceedances. Our review disclosed:

(1) For 4 (57%) of the 7 *E. coli* MCL violations reviewed, LHDs did not ensure that noncommunity water supplies collected repeat samples on a timely basis. *Michigan Administrative Code* R 325.10707 requires a water supply to collect a repeat sample within 24 hours of being notified that the original sample was coliform positive. Repeat samples were taken 4 to 14 days after notification of the positive result.

(2) LHDs could not document that 3 (43%) of the 7 *E. coli* MCL violation locations were visited by their staff within 5 days of public notification. The Staff Reference Manual requires that a site visit be made to verify that the public notification is in place and actions are underway to resolve the violation. The LHDs did not document when the required visits were made.

(3) LHDs did not ensure that water supplies provided public education to all customers for 2 (50%) of 4 water sources that had lead action level exceedances. *Michigan Administrative Code* R 325.10410 requires that the water supply provide public education within 60 days from the end of the monitoring period.

RECOMMENDATION

We recommend that ODWMA ensure that LHDs conduct sanitary surveys, surveillance visits, and other monitoring within the time frames required by DEQ policy for noncommunity water supplies.

AGENCY PRELIMINARY RESPONSE

DEQ provided us with the following response:

The DEQ agrees that 95 percent of the sanitary surveys and 64 percent of the surveillance visits were conducted by Local Health Departments within the timeframes required. This exceeds the goals set by EPA.

ADEQUACY OF ANNUAL FEES TO COVER MONITORING COSTS

BACKGROUND

Sections 325.1011a and 325.1011b of the *Michigan Compiled Laws* established the annual fees imposed on community and noncommunity water supplies. These sections require that fees be adjusted on October 1 of each year by applying a percentage adjustment using the Detroit consumer price index. The community water supply fees may also be adjusted as the result of increased federal funding or a reduction in actual costs, as determined by DEQ. Section 325.1011b provides that if 5 or more noncommunity water supplies are under the same ownership on contiguous properties, the annual fee per supply is reduced by 25%.

AUDIT OBJECTIVE

To assess whether annual fees cover the cost of monitoring the State's water supplies.

CONCLUSION

Costs not covered.

FACTORS IMPACTING CONCLUSION

- ODWMA complied with the *Michigan Compiled Laws* and adjusted fees annually. However, these fees did not generate sufficient revenue to cover costs.
- Michigan's fees were generally lower than fees charged by surrounding states (see Exhibits #4 and #5).
- ODWMA has spent significant time on interagency work groups evaluating alternative funding mechanisms to cover monitoring costs; however, DEQ has not attempted to increase fees through the legislative process.
- Observation related to fees not covering the cost of monitoring water supplies.

OBSERVATION #2

Annual fees alone did not sufficiently cover DEQ's cost of monitoring water supplies.

Fees insufficient to cover the cost of monitoring water supplies.

Sections 325.1011a and 325.1011b of the *Michigan Compiled Laws* established community and noncommunity water supply fees based on the number of residents served. In fiscal year 2015, annual fees ranged from $384 to $128,631 for community drinking water supplies, from $414 to $553 for noncommunity nontransient systems, and from $98 to $130 for noncommunity transient systems.

DEQ's cost to monitor water supplies exceeds total funding by an average of $1.8 million annually.

ODWMA monitors community water supplies to help ensure that they provide safe drinking water. ODWMA contracts with LHDs to monitor the noncommunity water supplies. Combined expenditures for the Community and Noncommunity Water Supply Programs exceeded fee revenue plus General Fund appropriations and federal funds by almost $2.0 million for fiscal year 2014 and by $1.6 million for fiscal year 2015:

	Fiscal Year 2014	Fiscal Year 2015
Fee revenue	$ 4,578,569	$ 4,412,221
General Fund appropriations	1,275,000	1,288,700
Federal funds	4,213,000	4,145,000
Total funding	$ 10,066,569	$ 9,845,921
Expenditures	12,037,535	11,461,074
Variance	$ (1,970,966)	$ (1,615,153)

DEQ uses federal funds to help offset the fee revenue shortfall. The federal funds are used primarily for staffing expenditures, which leaves less for DEQ to fund loans and grants for infrastructure improvements. DEQ is aware that expenditures incurred to operate the Programs exceed revenue from fees and has adjusted the fees annually by the amount of the Detroit consumer price index as allowed by the *Michigan Compiled Laws.*

UNAUDITED
Exhibit #1

COMMUNITY AND NONCOMMUNITY WATER SUPPLIES
Office of Drinking Water and Municipal Assistance
Department of Environmental Quality

Noncommunity and Community Water Supplies
As of September 2, 2015

	Noncommunity	Community		
County	Number of Supplies	Number of Supplies	Population Served	Percentage of Total Population
Alcona	70	4	601	0.01%
Alger	23	5	4,040	0.05%
Allegan	237	50	33,423	0.45%
Alpena	44	3	15,795	0.21%
Antrim	82	15	9,241	0.12%
Arenac	51	8	8,545	0.12%
Baraga	25	2	4,540	0.06%
Barry	217	16	16,231	0.22%
Bay	13	21	100,784	1.36%
Benzie	99	10	4,076	0.06%
Berrien	142	39	107,629	1.46%
Branch	65	14	19,132	0.26%
Calhoun	149	20	78,913	1.07%
Cass	111	19	13,212	0.18%
Charlevoix	90	17	15,145	0.20%
Cheboygan	148	10	6,643	0.09%
Chippewa	157	6	23,518	0.32%
Clare	133	4	5,097	0.07%
Clinton	86	12	14,393	0.19%
Crawford	82	4	2,104	0.03%
Delta	49	8	19,125	0.26%
Dickinson	34	7	20,959	0.28%
Eaton	100	17	54,305	0.73%
Emmet	182	35	19,589	0.26%
Genesee	385	47	288,346	3.90%
Gladwin	79	8	4,793	0.06%
Gogebic	35	10	15,266	0.21%
Grand Traverse	141	23	39,326	0.53%
Gratiot	77	9	21,855	0.30%
Hillsdale	78	11	14,646	0.20%
Houghton	30	17	28,872	0.39%
Huron	91	20	16,854	0.23%
Ingham	99	24	256,496	3.47%
Ionia	102	18	28,695	0.39%
Iosco	77	12	14,764	0.20%
Iron	19	15	11,373	0.15%
Isabella	67	13	41,719	0.56%
Jackson	216	27	86,434	1.17%
Kalamazoo	253	21	210,362	2.85%
Kalkaska	69	2	2,254	0.03%
Kent	337	47	496,387	6.71%
Keweenaw	14	5	398	0.01%
Lake	81	5	1,195	0.02%
Lapeer	257	14	20,280	0.27%
Leelanau	125	14	4,987	0.07%
Lenawee	160	28	51,076	0.69%
Livingston	382	49	54,558	0.74%
Luce	28	3	3,451	0.05%
Mackinac	46	4	3,469	0.05%
Macomb	90	26	823,739	11.14%
Manistee	73	11	10,195	0.14%
Marquette	46	25	47,205	0.64%
Mason	69	9	11,107	0.15%
Mecosta	152	14	12,438	0.17%
Menominee	38	5	10,845	0.15%
Midland	30	11	62,651	0.85%
Missaukee	55	3	1,598	0.02%
Monroe	133	9	121,791	1.65%
Montcalm	148	12	18,963	0.26%
Montmorency	55	3	1,077	0.01%
Muskegon	184	23	109,178	1.48%
Newaygo	119	9	10,046	0.14%
Oakland	721	115	1,023,110	13.84%
Oceana	119	5	5,139	0.07%
Ogemaw	113	8	2,870	0.04%
Ontonagon	22	5	4,070	0.06%
Osceola	75	6	5,245	0.07%
Oscoda	63	4	882	0.01%
Otsego	106	10	4,366	0.06%
Ottawa	211	27	200,450	2.71%
Presque Isle	58	5	4,895	0.07%
Roscommon	205	16	1,928	0.03%
Saginaw	39	26	173,979	2.35%
Sanilac	72	20	19,410	0.26%
Schoolcraft	32	3	4,174	0.06%
Shiawassee	145	23	29,953	0.41%
St. Clair	93	21	123,332	1.67%
St. Joseph	85	17	31,301	0.42%
Tuscola	93	17	14,953	0.20%
Van Buren	142	27	26,520	0.36%
Washtenaw	230	30	320,839	4.34%
Wayne	13	44	1,826,503	24.70%
Wexford	108	8	13,622	0.18%
Total	9,574	1,389	7,393,270	100.00%

Source: The Office of the Auditor General (OAG) prepared this exhibit using data from DEQ.

COMMUNITY AND NONCOMMUNITY WATER SUPPLIES
Office of Drinking Water and Municipal Assistance
Department of Environmental Quality

Lead Levels for the 25 Largest Michigan Cities
For the Two Most Recent Sample Periods

City	2014 Estimated U.S. Census Population	System Considered Optimized	Sample Period 1			Sample Period 2		
			Monitoring Period (1)	Number of Samples (3)	90th Percentile ppb	Monitoring Period	Number of Samples (3)	90th Percentile ppb
Detroit	680,250	Yes (2)	06/2011 - 09/2011	54	3.4	06/2014 - 09/2014	57	2.3
Grand Rapids	193,792	Yes	10/2007 - 09/2010	53	4	06/2013 - 09/2013	50	2.2
Warren	135,099	Yes (2)	06/2011 - 09/2011	31	3	06/2014 - 09/2014	28	0.48
Sterling Heights	131,741	Yes (2)	06/2011 - 09/2011	24	NR	06/2014 - 08/2014	25	0
Ann Arbor	117,770	Yes	06/2011 - 09/2011	51	4	06/2014 - 09/2014	52	2
Lansing	114,620	Yes	06/2011 - 09/2011	43	6	06/2014 - 09/2014	43	7.8
Flint	99,002	No	07/2014 - 12/2014	100	6	01/2015 - 06/2015	69	11.2
Dearborn	95,535	Yes (2)	06/2011 - 09/2011	18	2.5	06/2014 - 09/2014	18	0.4
Livonia	94,958	Yes (2)	06/2011 - 09/2011	20	0	06/2014 - 09/2014	20	0
Troy	83,107	Yes (2)	06/2011 - 09/2011	15	1.1	06/2014 - 09/2014	15	0
Westland	82,314	Yes (2)	06/2011 - 09/2011	16	1.2	06/2014 - 09/2014	15	2.8
Farmington Hills	81,435	Yes (2)	06/2011 - 09/2011	13	0	06/2014 - 09/2014	13	0
Kalamazoo	75,922	Yes	06/2011 - 09/2011	53	5.5	06/2014 - 09/2014	59	13
Wyoming	74,826	Yes	10/2007 - 09/2010	30	0	06/2013 - 09/2013	32	0
Rochester Hills	73,125	Yes (2)	06/2011 - 09/2011	12	0	06/2014 - 09/2014	13	0
Southfield	73,002	Yes (2)	06/2011 - 09/2011	14	2.1	06/2014 - 09/2014	12	0
Taylor	61,594	Yes (2)	06/2011 - 09/2011	12	8.3	06/2014 - 09/2014	11	3.4
St. Clair Shores	60,036	Yes (2)	06/2011 - 09/2011	11	0	06/2014 - 09/2014	11	0
Pontiac	59,808	Yes (2)	06/2011 - 09/2011	12*	0	2011 - 2014	10	0
Royal Oak	59,069	Yes (2)	06/2011 - 09/2011	11	4	06/2014 - 09/2014	11	3.5
Novi	58,416	Yes (2)	06/2011 - 09/2011	7	0	06/2014 - 09/2014	7	0
Dearborn Heights	56,415	Yes (2)	06/2011 - 09/2011	10	0	06/2014 - 09/2014	10	0
Battle Creek	51,833	Yes	06/2012 - 09/2012	31	0	06/2015 - 09/2015	33	1.7
Kentwood	50,764	Yes (4)	10/2007 - 09/2010	14	0	10/2010 - 10/2013	14	4.2
Saginaw	49,844	Yes	06/2010 - 09/2010	30	11	01/2011 - 12/2013	30	8

(1) All systems tested every 3 years except Flint, which is tested every 6 months.

(2) System is optimized because it receives treated water from the Great Lakes Water Authority (previously the Detroit Water and Sewerage Department).

(3) The number of samples for the cities receiving water from the Great Lakes Water Authority are appropriate even though they are less than the number required by the LCR. DEQ received EPA approval to collect samples using a consecutive system approach in which all water supplies conduct their own monitoring on a prorated basis.

(4) System is optimized because it receives treated water from the City of Wyoming.

NR - Not reported.

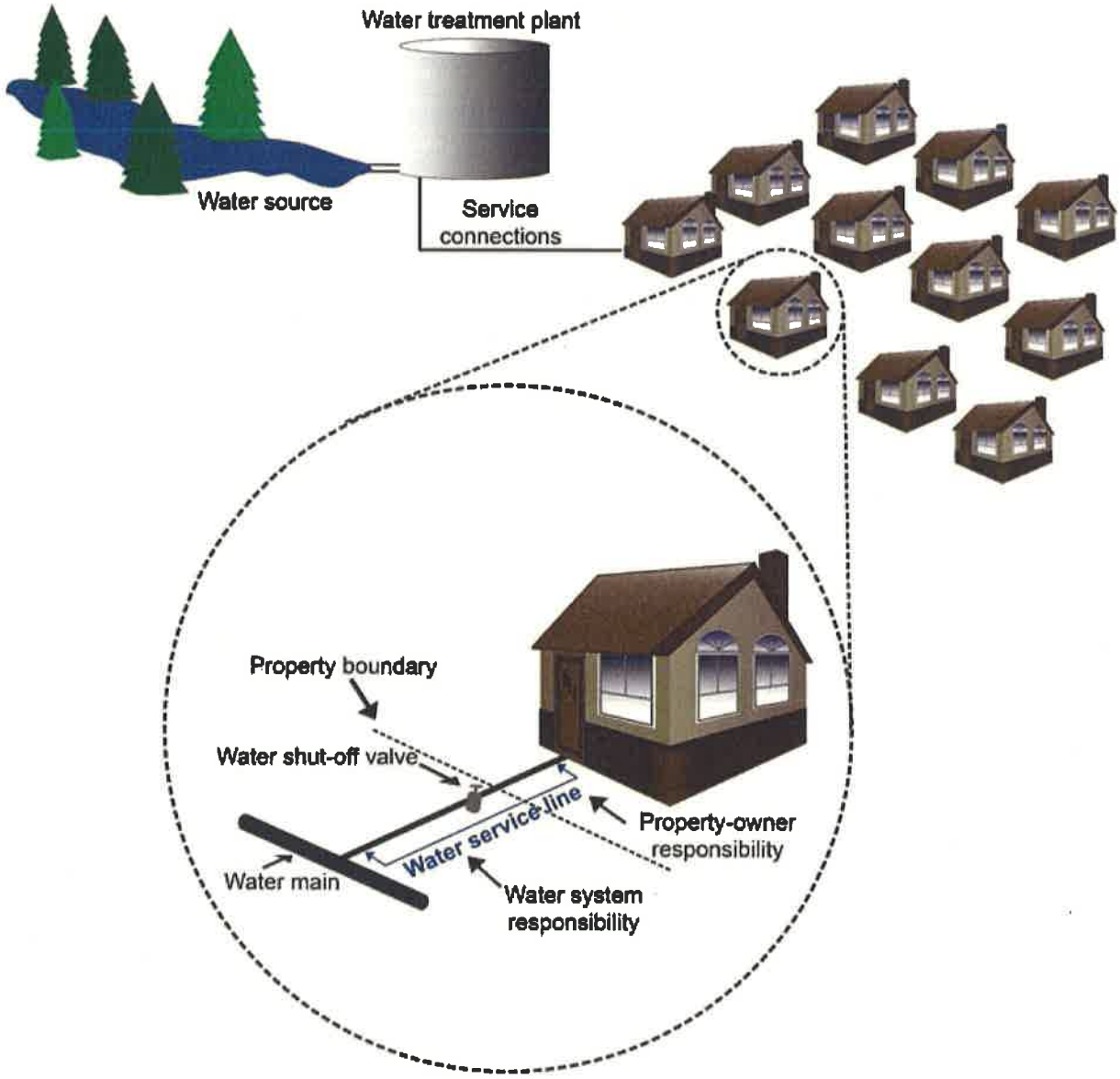
* Minimum number of samples required; actual number of samples taken not reported.

Source: The OAG prepared this exhibit using information from the cities' Lead and Copper Report and Certificate.

Exhibit #3

COMMUNITY AND NONCOMMUNITY WATER SUPPLIES
Office of Drinking Water and Municipal Assistance
Department of Environmental Quality

Community Water Distribution System and Service Line Illustration



Source. The OAG prepared this exhibit.

COMMUNITY AND NONCOMMUNITY WATER SUPPLIES
Office of Drinking Water and Municipal Assistance
Department of Environmental Quality

Comparison of Community Water Supply Annual Fees
Fiscal Year 2015

Fee amounts allowed by law:

Michigan		Ohio		Indiana	
Population Served	Adjusted Fee	Service Connections	Fee	Service Connections	Fee
More than 500,000	$ 128,631.17	200,000 or more	$ 0.76/connection	More than 400	$ 0.95/connection
100,001 - 500,000	$ 26,708.63	150,000 - 199,999	$ 0.80/connection	400 or fewer	$350.00
50,001 - 100,000	$ 16,884.77	100,000 - 149,999	$ 0.86/connection		
25,001 - 50,000	$ 9,977.38	50,000 - 99,999	$ 0.92/connection		
10,001 - 25,000	$ 5,372.01	25,000 - 49,999	$ 1.04/connection		
5,001 - 10,000	$ 2,916.46	15,000 - 24,999	$ 1.10/connection		
1,001 - 5,000	$ 1,227.99	10,000 - 14,999	$ 1.16/connection		
401 - 1,000	$ 767.50	7,500 - 9,999	$ 1.34/connection		
101 - 400	$ 613.99	5,000 - 7,499	$ 1.42/connection		
25 - 100	$ 383.75	2,500 - 4,999	$ 1.48/connection		
		100 - 2,499	$ 1.92/connection		
		50 - 99	$176.00		
		Not more than 49	$112.00		

Examples of fee revenue generated at various fee levels:

Example Population	Michigan	Ohio	Indiana
300,000	$26,708.63	$228,000.00	$285,000.00
75,000	16,884.77	69,000.00	71,250.00
37,500	9,977.38	39,000.00	35,625.00
17,500	5,372.01	19,250.00	16,625.00
7,500	2,916.46	10,050.00	7,125.00
3,000	1,227.99	4,440.00	2,850.00
750	767.50	1,440.00	712.50
250	613.99	480.00	350.00
62	383.75	176.00	350.00
441,562	$64,852.48	$371,836.00	$419,887.50

Source: The OAG prepared this exhibit based on data obtained from Section 325.1011a of the *Michigan Compiled Laws*, Ohio Revised Code 3745.11, and Indiana Code 13-18-20.5-2

COMMUNITY AND NONCOMMUNITY WATER SUPPLIES
Office of Drinking Water and Municipal Assistance
Department of Environmental Quality

Comparison of Noncommunity Water Supply Annual Fees
Fiscal Year 2015

Fee amounts allowed by law:

Nontransient

Michigan		Ohio		Indiana	
Classification	Fee	Number Served	Fee	Number Served	Fee
Nontransient	$ 552.59	30,000 or more	$ 16,820.00	More than 10,000	$ 3,000.00
Contiguous Nontransient	$ 414.43	22,500 - 29,999	$ 12,430.00	5,001 - 10,000	$ 1,500.00
		15,000 - 22,499	$ 9,048.00	3,301 - 5,000	$ 600.00
		7,500 - 14,999	$ 5,510.00	1,001 - 3,300	$ 450.00
		3,000 - 7,499	$ 2,816.00	501 - 1,000	$ 300.00
		1,500 - 2,999	$ 1,268.00	251 - 500	$ 240.00
		750 - 1,499	$ 628.00	101 - 250	$ 180.00
		300 - 749	$ 384.00	25 - 100	$ 150.00
		150 - 299	$ 176.00		
		Less than 150	$ 112.00		

Transient

Michigan		Ohio		Indiana	
Classification	Fee	Number of Sources	Fee	Type of Water System	Fee
Transient	$ 130.47	1	$ 112.00	Groundwater	$ 100.00
Contiguous Transient	$ 97.84	2	$ 112.00	Purchase	$ 50.00
		3	$ 176.00	Surface	$ 200.00
		4	$ 278.00		
		5	$ 568.00		
		Surface water	$ 792.00		

Examples of fee revenue generated at various fee levels:

Example Nontransient Population	Michigan	Ohio	Indiana
5,300	$ 552.59	$2,816.00	$1,500.00
2,250	552.59	1,268.00	450.00
1,000	552.59	628.00	300.00
525	552.59	384.00	300.00
225	552.59	176.00	180.00
149	552.59	112.00	180.00
9,449	$3,315.54	$5,384.00	$2,910.00

Source: The OAG prepared this exhibit based on data obtained from Section 325.1011b of the *Michigan Compiled Laws*, Ohio Revised Code 3745.11, and Indiana Code 13-18-20.5-2

COMMUNITY AND NONCOMMUNITY WATER SUPPLIES
Office of Drinking Water and Municipal Assistance
Department of Environmental Quality

Contaminant Levels Reported In Community Water Supplies for the 25 Largest Michigan Cities
Calendar Year 2014 (a)

	Lead	Copper	Barium	Fluoride	Nitrate	Total Chlorine Residual	TTHM	HAA5	Bromate
Recommended Health Level	0	1.3/ppm	2/ppm	4/ppm	10/ppm	4/ppm	None	None	0
Maximum Contaminant Level	15/ppb	1.3/ppm	2/ppm	4/ppm	10/ppm	4/ppm	80/ppb	60/ppb	10/ppb
Ann Arbor	2	0.07	0.015	0.99	0.5	NR	6.5	6.4	6.6
Battle Creek	<3	0.56	0.160	1.05	NR	0.53	52	15	NR
Dearborn	0.4	0.08	NR	N/A	N/A	N/A	N/A	N/A	N/A
Plant A				0.61	0.39	0.74	50	13	NR
Plant B				0.56	0.29	0.73	50	13	NR
Dearborn Heights	0	0.08	NR	0.61	0.39	0.74	69.4	21	NR
Detroit	2.3	0.08	NR	0.69	0.39	1.01	48.8	15.1	1.9
Farmington Hills	NR	0.04	NR	0.61	0.39	1.14	44	14	NR
Flint	6	0.11	0.030	NR	0.5	3.5	**196.2 (b)**	**64 (c)**	**23 (c)**
Grand Rapids	2.2	0.06	0.021	0.71	0.5	1.87	58	56	NR
Kalamazoo	13	1.20	NR	1.2	1.5	1.96	30.2	15	NR
Kentwood	4	0.11	NR	0.7	NR	1.41	44	25	NR
Lansing	7.8	0.02	0.028	0.68	NR	NR	4.4	6.8	NR
Livonia	0	0.03	NR	0.61	0.39	0.74	47	15	NR
Novi	<1	0.04	NR	N/A	N/A	N/A	90	16	NR
Plant A				0.59	0.31	0.94			
Plant B				0.61	0.39	0.74			
Pontiac	NR	0.03	NR	0.59	0.31	1.16	59	13	NR
Rochester Hills	0	0.05	NR	0.59	0.31	0.94	53	19	NR
Royal Oak	3.5	0.04	NR	N/A	N/A	N/A	45	14	NR
Plant A				0.61	0.39	.74			
Plant B				0.59	0.31	.94			
Plant C				0.59	0.26	0.85			
Saginaw	8	0.19	0.280	0.93	NR	0.97	66	28	NR
Southfield	0	0.09	NR	N/A	N/A	N/A	35	15	NR
Plant A				0.61	0.39	0.74			
Plant B				0.59	0.31	0.94			
Plant C				0.59	0.26	0.85			
St. Clair Shores	0	0.046		N/A	N/A	N/A	41.7	21	NR
Plant A			0.010	0.55	0.32	0.93			
Plant B			0.010	0.63	0.42	0.85			
Sterling Heights	<2	0.09	0.010	0.59	0.31	0.94	45	19	NR
Taylor	3.4	0.10	0.010	0.56	0.29	0.73	37	12	NR
Troy	0	0.05	NR	N/A	N/A	N/A	54	13	NR
Plant A				0.59	0.31	0.94			
Plant B				0.59	0.26	0.85			
Warren	0.048	0.05	NR	0.59	0.26	0.85	42	13	NR
Westland	2.8	0.08	NR	0.61	0.39	0.74	53	20	NR
Wyoming	0	0.10	NR	0.6	NR	1.5	44	51	NR

	Potential Health Effects From Long-Term Exposure
Lead	Delayed development in children and kidney problems and high blood pressure in adults
Copper	Liver or kidney damage
Barium	Increased blood pressure
Fluoride	Increased chance of bone disease
Nitrate	Negative effects on infants less than 6 months old
Total Chlorine Residual	Eye or nose irritation or stomach discomfort
Total Trihalomethanes (TTHM)	Liver, kidney, or nervous system problems
Haloacetic Acids (HAA5)	Increased risk of cancer
Bromate	Increased risk of cancer

(a) This is the most recent information available. Calendar year 2015 information should be known in July 2016.
(b) Violation reported; running annual average exceeds the maximum contaminant level.
(c) Reported the highest detected level in the annual report; running annual average was less than the maximum contaminant level.
ppm - parts per million
ppb - parts per billion
NR - Not reported.
N/A - Not applicable.

Source: The OAG prepared this exhibit using information from the EPA's National Primary Drinking Water Regulations. The OAG also used the highest amount in the results range or otherwise reported the highest level/amount detected, whichever was reported, in the Annual Water Quality Reports for 2014.

DESCRIPTION

ODWMA is responsible for public drinking water and environmental health regulatory programs. There are approximately 11,000 public drinking water supplies in Michigan. Approximately 1,400 are community water supplies that furnish drinking water year-round to residential populations of 25 or more. The remaining 9,600 are defined as noncommunity water supplies.

ODWMA and contracted LHDs are responsible for enforcing compliance with community water supply and noncommunity water supply requirements, respectively, of the Michigan Safe Drinking Water Act (Act 399 of 1976, as amended). Michigan also is a primacy state, meaning it has received authority from the EPA to enforce compliance with the National Primary Drinking Water Regulations at all of its public water supplies.

All public water supplies must collect samples of their water on a set schedule and analyze the samples for contaminants. The sample results are reviewed by ODWMA and the LHDs. If contaminants that exceed drinking water standards are present and confirmed by repeat samples, the supply must post notice to the public and, if required, issue a "boil water" or "do not drink" notice until the underlying problem is corrected and the drinking water tests free of contaminants.

ODWMA is required to conduct sanitary surveys of all community water supplies at least every three years to ensure that the supply is properly operated and maintained. A sanitary survey is a comprehensive evaluation of the entire supply to determine the ability of the supply to produce, treat, and distribute adequate quantities of water to the public. During the survey, staff review maintenance and operating practices and records to ensure that drinking water produced meets all State and federal drinking water requirements. Survey findings often lead to the identification of potential problem areas that can be corrected before they become significant issues. LHDs are required to conduct sanitary surveys at all noncommunity water supplies at least once every five years.

DEQ administers a water treatment plant operator training and certification program. About 4,600 certified operators in Michigan provide oversight of public water systems. DEQ offers examinations twice a year, with about 1,400 applicants annually. To stay current with technology and regulations as well as maintain their certification, operators must also meet continuing education requirements every three years. DEQ partners with technical assistance providers to offer targeted training to enhance the capability of operators and assist in meeting continuing education requirements.

AUDIT SCOPE, METHODOLOGY, AND OTHER INFORMATION

AUDIT SCOPE

To examine the program and other records related to community and noncommunity water supplies. We conducted this performance audit* in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

PERIOD

Our audit procedures, which included a preliminary survey, audit fieldwork, report preparation, analysis of agency responses, and quality assurance, generally covered the period October 1, 2012 through December 31, 2015.

METHODOLOGY

We conducted a preliminary survey of the State's Community and Noncommunity Water Supply Programs to formulate a basis for establishing our audit objectives and defining our audit scope and methodology. We:

- Interviewed ODWMA personnel to obtain an understanding of the Programs.
- Reviewed applicable laws, rules, regulations, policies, procedures, manuals, and other pertinent information.
- Completed limited testing of community and noncommunity water supply sanitary surveys to identify surveys not completed within required time frames.

OBJECTIVE #1

To assess the sufficiency of ODWMA's oversight of the State's Community Water Supply Program.

To accomplish our first objective, we:

- Interviewed staff responsible for the Community Water Supply Program.
- Identified the population of community water supplies.
- Reviewed various articles and reports concerning water quality in the City of Flint.
- Reviewed the sampling techniques utilized to evaluate the City of Flint's water for lead and copper.

** See glossary at end of report for definition.*

- Reviewed the EPA's interpretation of the use of corrosion control measures for a change in water source.

- Reviewed ODWMA's lead level calculations from sampled locations in the City of Flint.

- Analyzed data to determine whether sanitary surveys were completed on a timely basis.

- Analyzed data to determine if ODWMA completed the required number of annual site visits at each community water supply.

- Completed file reviews of 6 judgmentally selected *E. coli* MCL violations and 4 judgmentally selected lead action level exceedances at 4 DEQ district offices for compliance with the Michigan Safe Drinking Water Act. The files were selected based on geographic location, size of the population served by the water system, the dates of the occurrences, and whether the water supply was a repeat offender.

- Compared contaminant levels reported in community water supplies for the 25 largest Michigan cities (see Exhibit #6).

OBJECTIVE #2

To assess the sufficiency of ODWMA's efforts to monitor contracts with LHDs that complete inspections and observe activities related to the Noncommunity Water Supply Program.

To accomplish our second objective, we:

- Interviewed staff responsible for the Noncommunity Water Supply Program.

- Reviewed ODWMA's contracts with LHDs to determine each party's role in monitoring noncommunity water supplies.

- Identified the population of noncommunity water supplies.

- Analyzed ODWMA data to determine if sanitary surveys were completed on a timely basis.

- Analyzed the population of noncommunity water supplies that treat their water to determine if LHDs completed surveillance visits.

- Reviewed a random sample of water samples tested by State-owned laboratories in 2015 from various noncommunity water supplies to determine whether samples were analyzed within 30 hours of being drawn.

We also reviewed 68 water samples tested by State or private laboratories during our review of 7 judgmentally selected *E. coli* MCL violations.

- Completed file reviews of 7 judgmentally selected *E. coli* MCL violations and 5 judgmentally selected lead or copper action level exceedances at 10 LHDs for compliance with the Michigan Safe Drinking Water Act.

OBJECTIVE #3

To assess whether annual fees cover the cost of monitoring the State's water supplies.

To accomplish our third objective, we:

- Compared annual fees charged to community and noncommunity water supplies in Michigan to fees charged by other states (see Exhibits #4 and #5).
- Determined the revenue generated from annual fees for fiscal years 2014 and 2015.
- Determined the amount of expenditures reported by ODWMA for the community and noncommunity water supply programs for fiscal years 2014 and 2015.
- Compared fee revenue with expenditures incurred for fiscal years 2014 and 2015.

CONCLUSIONS

We base our conclusions on our audit efforts and the resulting material conditions and reportable conditions.

When selecting activities or programs for audit, we direct our efforts based on risk and opportunities to improve State government operations. Consequently, we prepare our performance audit reports on an exception basis.

AGENCY RESPONSES

Our audit report contains 4 findings and 4 corresponding recommendations. DEQ's preliminary response indicates that it agrees with all 4 recommendations.

The agency preliminary response that follows each recommendation in our report was taken from the agency's written comments and oral discussion at the end of our audit fieldwork. Section 18.1462 of the *Michigan Compiled Laws* and the State of Michigan Financial Management Guide (Part VII, Chapter 4, Section 100) require an audited agency to develop a plan to comply with the recommendations and submit it within 60 days after release of the audit report to the Office of Internal Audit Services, State Budget Office. Within 30 days of receipt, the Office of Internal Audit Services is required to review the plan and either accept the plan as final or contact the agency to take additional steps to finalize the plan.

PRIOR AUDIT FOLLOW-UP

We released our prior performance audit of the Public Drinking Water Supply Program, Department of Environmental Quality (76-120-99), in June 2001. We released a follow-up report (761-0120-99F) of that audit in October 2011. Within the scope of this audit, we followed up 9 of the 11 prior audit recommendations. DEQ complied with 7 of the 9 recommendations, and we rewrote the 2 other recommendations for inclusion in Findings #3 and #4 of this audit report.

SUPPLEMENTAL INFORMATION

Our audit report includes supplemental information presented as Exhibits #1 through #6. Our audit was not directed toward expressing a conclusion on this information.

GLOSSARY OF ABBREVIATIONS AND TERMS

90th percentile calculation	A calculation in which the results of all lead and copper samples collected during a monitoring period are placed in ascending order from the sample with the lowest concentration to the sample with the highest concentration. Each sample is assigned a number, ascending by single integers beginning with the number 1 for the sample with the lowest contaminant level. The number assigned to the sample with the highest contaminant level is equal to the total number of samples collected.
community water supply	A public water supply that provides year-round service to not fewer than 15 living units or that regularly provides year-round service to not fewer than 25 residents. Also known as a water system. Examples include municipalities, subdivisions, apartments, and condominiums.
corrosion inhibitor	A substance that is capable of reducing the corrosivity of water toward metal plumbing materials, especially lead and copper, by forming a protective film on the interior surface of those materials.
DEQ	Department of Environmental Quality.
DWSD	Detroit Water and Sewerage Department.
EPA	United States Environmental Protection Agency.
Flint WTP	City of Flint Water Treatment Plant.
LCR	Lead and Copper Rule.
lead action level	The level at which various requirements of the LCR are triggered when the concentration of lead in 10% or more of tap water samples collected (the 90th percentile) exceeds 15 ppb.
LHD	local health department.
material condition	A matter that, in the auditor's judgment, is more severe than a reportable condition and could impair the ability of management to operate a program in an effective and efficient manner and/or could adversely affect the judgment of an interested person concerning the effectiveness and efficiency of the program.

maximum contaminant level (MCL)	The maximum permissible level of a contaminant in water that is delivered to any user of a public water supply.
noncommunity nontransient water supply	A public water system that regularly supplies water to at least 25 of the same people for at least six months per year. Some examples are factories, office buildings, schools, and hospitals.
noncommunity transient water supply	A public water system that provides water in places such as hotels or restaurants where people do not remain for long periods of time.
noncommunity water supply	A public water system that provides service on an average daily basis to 25 or more individuals or 15 or more service connections for not less than 60 days per year but does not meet the criteria to be considered a community water supplier. Also known as a water system. Examples include places of employment, schools, hotels, restaurants, and campgrounds.
OAG	Office of the Auditor General.
observation	A commentary that highlights certain details or events that may be of interest to users of the report. An observation differs from an audit finding in that it may not include the attributes (condition, effect, criteria, cause, and recommendation) that are presented in an audit finding.
ODWMA	Office of Drinking Water and Municipal Assistance.
optimal corrosion control treatment	The corrosion control treatment that minimizes the lead and copper concentrations at users' taps while ensuring that the treatment does not cause the public water supply to be in violation of any drinking water regulations.
performance audit	An audit that provides findings or conclusions based on an evaluation of sufficient, appropriate evidence against criteria. Performance audits provide objective analysis to assist management and those charged with governance and oversight in using the information to improve program performance and operations, reduce costs, facilitate decision making by parties with responsibility to oversee or initiate corrective action, and contribute to public accountability.
ppb	parts per billion.

PQL	practical quantitation level.
reportable condition	A matter that, in the auditor's judgment, is less severe than a material condition and falls within any of the following categories: an opportunity for improvement within the context of the audit objectives; a deficiency in internal control that is significant within the context of the audit objectives; all instances of fraud; illegal acts unless they are inconsequential within the context of the audit objectives; significant violations of provisions of contracts or grant agreements; and significant abuse that has occurred or is likely to have occurred.
sanitary survey	An on-site review of a water system, including the water source; treatment; distribution system; finished water storage; pumps, pump facilities, and controls; and monitoring, reporting, and data verification for existing or potential health hazards for the purpose of determining the ability of the public water supply to produce, treat, and distribute adequate quantities of water meeting State and federal drinking water requirements.
surveillance visit	An on-site inspection or meeting with personnel from the public water system to observe operational procedures; inspect well houses, treatment facilities, and storage tanks; review regulatory compliance; discuss construction activities; consult on system planning; conduct operation training; or provide compliance assistance.
tier 1 sample site	Single-family or multiple-family residence with a lead service line, lead plumbing, or lead soldered copper piping constructed after 1982.
water system	A system that provides water for drinking or household purposes to persons other than the supplier of the water. Also known as a water supply.

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