

CITY OF ROYAL OAK

2018 CONSUMERS ANNUAL REPORT ON WATER QUALITY

ATTENTION: THIS IS AN IMPORTANT REPORT ON WATER QUALITY AND SAFETY

The City of Royal Oak, The Southeastern Oakland County Water Authority and the Great Lakes Water Authority (GLWA) are proud of the fine drinking water they supply and are honored to provide this report to you. The 2018 Consumers Annual Report on Water Quality shows the sources of our water, lists the results of our tests, and contains important information about water and health. We will notify you immediately if there is ever any reason for concern about our water. We are pleased to show you how we have surpassed water quality standards as mandated by the Environmental Protection Agency (EPA) and the Michigan Department of Environmental Quality (MDEQ).

About the System

The City of Royal Oak purchases water from the Southeastern Oakland County Water Authority (SOCWA) at thirteen locations. SOCWA provides GLWA water through its member distribution systems to a population of 210,000 within a 56 square mile area. Current members are Berkley, Beverly Hills, Bingham Farms, Birmingham, Clawson, Huntington Woods, Lathrup Village, Pleasant Ridge, Royal Oak, Southfield and Southfield Township.

Your source water comes from the Detroit River, situated within the Lake St. Clair, Clinton River, Detroit River, Rouge River, Ecorse River, watersheds in the U.S. and parts of the Thames River, Little River, Turkey Creek and Sydenham watersheds in Canada. The Michigan Department of Environmental Quality in partnership with the U.S. Geological Survey, the Detroit Water and Sewerage Department, and the Michigan Public Health Institute performed a source water assessment in 2004 to determine the susceptibility of GLWA's Detroit River source water for potential contamination. The susceptibility rating is based on a seven-tiered scale and ranges from very low to very high determined primarily using geologic sensitivity, water chemistry, and potential contaminant sources. The report described GLWA's Detroit River intakes as highly susceptible to potential contamination. However, all four GLWA water treatment plants that service the city of Detroit and draw water from the Detroit River have historically provided satisfactory treatment and meet drinking water standards.

GLWA has initiated source-water protection activities that include chemical containment, spill response, and a mercury reduction program. GLWA participates in a National Pollutant Discharge Elimination System permit discharge program and has an emergency response management plan. In 2016, the Michigan Department of Environmental Quality approved the GLWA Surface Water Intake Protection Program plan. The programs include seven elements that include the following: roles and duties of government units and water supply agencies, delineation of a source water protection areas, identification of potential of sources of contamination, management approaches for protection, contingency plans, siting of new water sources, public participation and public education activities. If you would like to know more information about the Source Water Assessment report please, contact GLWA at (313 926-8102).

And/or

Your source water comes from the lower Lake Huron watershed. The watershed includes numerous short, seasonal streams that drain to Lake Huron. The Michigan Department of Environmental Quality in partnership with the U.S. Geological Survey, the Detroit Water and Sewerage Department, and the Michigan Public Health Institute performed a source water assessment in 2004 to determine the susceptibility of potential contamination. The susceptibility rating is a seven-tiered scale ranging from "very low" to "very high" based primarily on geologic sensitivity, water chemistry, and contaminant sources. The Lake Huron source water intake is categorized as having a moderately low susceptibility to potential contaminant sources. The Lake

Huron water treatment plant has historically provided satisfactory treatment of this source water to meet drinking water standards.

In 2015, GLWA received a grant from the Michigan Department of Environmental Quality to develop a source water protection program for the Lake Huron water treatment plant intake. The program includes seven elements that include the following: roles and duties of government units and water supply agencies, delineation of a source water protection areas, identification of potential of source water protection area, management approaches for protection, contingency plans, siting of new sources and public participation and education. If you would like to know more information about the Source Water Assessment report please, contact GLWA at (313 926-8102).

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline at (800-426-4791).

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses.

Organic chemical contaminants, including synthetic and volatile organics, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff and septic systems.

Radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, EPA prescribes regulations, which limit the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water, which must provide the same protection for public health.

Key to the Detected Contaminants Table

| Symbol | Abbreviation | Definition/Explanation |
|---------|--|--|
| > | Greater than | |
| °C | Celsius | A scale of temperature in which water freezes at 0° and boils at 100° under standard conditions. |
| AL | Action Level | The concentration of a contaminant, which, if exceeded, triggers treatment or other requirements which a water system must follow. |
| HAA5 | Haloacetic Acids | HAA5 is the total of bromoacetic, chloroacetic, dibromoacetic, dichloroacetic, and trichloroacetic acids. Compliance is based on the total. |
| Level 1 | Level 1 Assessment | A Level 1 assessment is a study of the water system to identify potential problems and determine (if possible) why total coliform bacteria have been found in the water system. |
| Level 2 | Level 2 Assessment | A Level 2 assessment is a very detailed study of the water system to identify potential problems and determine (if possible) why an E. coli MCL violation occurred and/or why total coliform bacteria have been found in our water system on multiple occasions. |
| LRAA | Locational Running Annual Average | The average of analytical results for samples at a particular monitoring location during the previous four quarters. |
| MCL | Maximum Contaminant Level | The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology. |
| MCLG | Maximum Contaminant Level Goal | The level of contaminant in drinking water below which there is no known or expected risk to health. |
| MRDL | Maximum Residual Disinfectant Level | The highest level of disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants. |
| MRDLG | Maximum Residual Disinfectant Level Goal | The level of a drinking water disinfectant below which there is no known or expected risk to health. MRLDG's do not reflect the benefits of the use of disinfectants to control microbial contaminants. |
| n/a | not applicable | |
| ND | Not Detected | |
| NTU | Nephelometric Turbidity Units | Measures the cloudiness of water. |
| pCi/L | Picocuries Per Liter | A measure of radioactivity |
| ppb | Parts Per Billion (one in one billion) | The ppb is equivalent to micrograms per liter. A microgram = 1/1000 milligram. |
| ppm | Parts Per Million (one in one million) | The ppm is equivalent to milligrams per liter. A milligram = 1/1000 gram. |
| RAA | Running Annual Average | The average of analytical results for all samples during the previous four quarters. |
| TT | Treatment Technique | A required process intended to reduce the level of a contaminant in drinking water. |
| TTHM | Total Trihalomethanes | Total Trihalomethanes is the sum of chloroform, bromodichloromethane, dibromochloromethane and bromoform. Compliance is based on the total. |
| µmhos | Micromhos | Measure of electrical conductance of water |

**Springwells Water Treatment Plant
2018 Regulated Detected Contaminants Tables**

| 2018 Inorganic Chemicals – Monitoring at the Plant Finished Water Tap | | | | | | | | |
|--|-----------|------|----------------------------|-----------------------------|------------------------|--------------------|------------------|---|
| Regulated Contaminant | Test Date | Unit | Health Goal MCLG | Allowed Level MCL | Highest Level Detected | Range of Detection | Violation yes/no | Major Sources in Drinking Water |
| Fluoride | 6-12-2018 | ppm | 4 | 4 | 0.67 | n/a | no | Erosion of natural deposits; Water additive, which promotes strong teeth; Discharge from fertilizer and aluminum factories. |
| Nitrate | 6-12-2018 | ppm | 10 | 10 | 0.34 | n/a | no | Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits. |
| Barium | 5-16-2017 | ppm | 2 | 2 | 0.01 | n/a | no | Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits |

| 2018 Disinfectant Residuals – Monitoring in Distribution System by Treatment Plant | | | | | | | | |
|---|--------------|------|-----------------------------|------------------------------|-------------|------------------------------|------------------|---|
| Regulated Contaminant | Test Date | Unit | Health Goal MRDLG | Allowed Level MRDL | Highest RAA | Quarterly Range of Detection | Violation yes/no | Major Sources in Drinking Water |
| Total Chlorine Residual | Jan-Dec 2018 | ppm | 4 | 4 | 0.68 | 0.63-0.69 | no | Water additive used to control microbes |

| 2018 Turbidity – Monitored every 4 hours at Plant Finished Water | | | |
|--|--|------------------|---------------------------------|
| Highest Single Measurement Cannot exceed 1 NTU | Lowest Monthly % of Samples Meeting Turbidity Limit of 0.3 NTU (minimum 95%) | Violation yes/no | Major Sources in Drinking Water |
| 0.25 NTU | 100% | no | Soil Runoff |
| Turbidity is a measure of the cloudiness of water. We monitor it because it is a good indicator of the effectiveness of our filtration system. | | | |

| Regulated Contaminant | Treatment Technique 2018 | Typical Source of Contaminant |
|----------------------------|---|-------------------------------|
| Total Organic Carbon (ppm) | The Total Organic Carbon (TOC) removal ratio is calculated as the ratio between the actual TOC removal and the TOC removal requirements. The TOC was measured each quarter and because the level was low, there is no TOC removal requirement | Erosion of natural deposits |

| Contaminant | MCLG | MCL | Level Detected 2018 | Source of Contamination |
|--------------|-------------|------------|---------------------|-----------------------------|
| Sodium (ppm) | n/a | n/a | 6.00 | Erosion of natural deposits |

GLWA voluntarily monitors for Cryptosporidium and Giardia in our untreated source water monthly. The March 2018 untreated water samples collected from the Belle Isle intake indicated the presence of one Giardia cyst. All other samples collected from the Belle Isle intake in the year 2018 were absent for the presence of Cryptosporidium and Giardia. Systems using surface water like GLWA must provide treatment so that 99.9 percent of Giardia lamblia is removed or inactivated.

Northeast Water Treatment Plant
2018 Regulated Detected Contaminants Tables

| 2018 Inorganic Chemicals – Monitoring at the Plant Finished Water Tap | | | | | | | | |
|--|-----------|------|----------------------------|-----------------------------|------------------------|--------------------|------------------|---|
| Regulated Contaminant | Test Date | Unit | Health Goal MCLG | Allowed Level MCL | Highest Level Detected | Range of Detection | Violation yes/no | Major Sources in Drinking Water |
| Fluoride | 6-12-2018 | ppm | 4 | 4 | 0.65 | n/a | no | Erosion of natural deposits; Water additive, which promotes strong teeth; Discharge from fertilizer and aluminum factories. |
| Nitrate | 6-12-2018 | ppm | 10 | 10 | 0.36 | n/a | no | Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits. |
| Barium | 5-16-2017 | ppm | 2 | 2 | 0.01 | n/a | no | Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits |

| 2018 Disinfectant Residuals – Monitoring in Distribution System by Treatment Plant | | | | | | | | |
|---|--------------|------|-----------------------------|------------------------------|-------------|------------------------------|------------------|---|
| Regulated Contaminant | Test Date | Unit | Health Goal MRDLG | Allowed Level MRDL | Highest RAA | Quarterly Range of Detection | Violation yes/no | Major Sources in Drinking Water |
| Total Chlorine Residual | Jan-Dec 2018 | ppm | 4 | 4 | 0.73 | 0.68-0.77 | no | Water additive used to control microbes |

| 2018 Turbidity – Monitored every 4 hours at Plant Finished Water | | | | |
|--|--|--|------------------|---------------------------------|
| Highest Single Measurement Cannot exceed 1 NTU | Lowest Monthly % of Samples Meeting Turbidity Limit of 0.3 NTU (minimum 95%) | | Violation yes/no | Major Sources in Drinking Water |
| 0.20 NTU | 100 % | | no | Soil Runoff |
| Turbidity is a measure of the cloudiness of water. We monitor it because it is a good indicator of the effectiveness of our filtration system. | | | | |

| Regulated Contaminant | Treatment Technique 2018 | Typical Source of Contaminant |
|----------------------------|---|-------------------------------|
| Total Organic Carbon (ppm) | The Total Organic Carbon (TOC) removal ratio is calculated as the ratio between the actual TOC removal and the TOC removal requirements. The TOC was measured each quarter and because the level was low, there is no TOC removal requirement | Erosion of natural deposits |

| Special Monitoring 2018 | | | | |
|--------------------------------|-------------|------------|---------------------|-----------------------------|
| Contaminant | MCLG | MCL | Level Detected 2018 | Source of Contamination |
| Sodium (ppm) | n/a | n/a | 5.94 | Erosion of natural deposits |

GLWA voluntarily monitors for Cryptosporidium and Giardia in our untreated source water monthly. The March 2018 untreated water samples collected from the Belle Isle intake indicated the presence of one Giardia cyst. All other samples collected from the Belle Isle intake in the year 2018 were absent for the presence of Cryptosporidium and Giardia from the Belle Isle intake. Systems using surface water like GLWA must provide treatment so that 99.9 percent of Giardia lamblia is removed or inactivated.

**Lake Huron Water Treatment Plant
2018 Regulated Detected Contaminants Tables**

| 2018 Inorganic Chemicals – Monitoring at the Plant Finished Water Tap | | | | | | | | |
|--|-----------|------|----------------------------|-----------------------------|---------------------------|-----------------------|---------------------|--|
| Regulated Contaminant | Test Date | Unit | Health Goal MCLG | Allowed Level MCL | Highest Level Detected | Range of Detection | Violation yes/no | Major Sources in Drinking Water |
| Fluoride | 6-12-2018 | ppm | 4 | 4 | 0.76 | n/a | no | Erosion of natural deposits; Water additive, which promotes strong teeth; Discharge from fertilizer and aluminum factories. |
| Nitrate | 6-12-2018 | ppm | 10 | 10 | 0.33 | n/a | no | Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits. |
| Barium | 5-16-2017 | ppm | 2 | 2 | 0.01 | n/a | no | Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits |

| Regulated Contaminant | Test Date | Unit | Health Goal MRDLG | Allowed Level MRDL | Highest RAA | Quarterly Range of Detection | Violation yes/no | Major Sources in Drinking Water |
|-------------------------|--------------|------|-----------------------------|------------------------------|----------------|------------------------------------|---------------------|---|
| Total Chlorine Residual | Jan-Dec 2018 | ppm | 4 | 4 | 0.83 | 0.79-0.87 | no | Water additive used to control microbes |

| 2018 Turbidity – Monitored every 4 hours at Plant Finished Water | | | | |
|--|---|--|---------------------|------------------------------------|
| Highest Single Measurement Cannot exceed 1 NTU | Lowest Monthly % of Samples Meeting Turbidity Limit of 0.3 NTU (minimum 95%) | | Violation yes/no | Major Sources in Drinking Water |
| 0.17 NTU | 100 % | | no | Soil Runoff |
| Turbidity is a measure of the cloudiness of water. We monitor it because it is a good indicator of the effectiveness of our filtration system. | | | | |

| Regulated Contaminant | Treatment Technique 2018 | Typical Source of Contaminant |
|----------------------------|---|-------------------------------|
| Total Organic Carbon (ppm) | The Total Organic Carbon (TOC) removal ratio is calculated as the ratio between the actual TOC removal and the TOC removal requirements. The TOC was measured each quarter and because the level was low, there is no TOC removal requirement | Erosion of natural deposits |

| Radionuclides 2014 | | | | | | | |
|-----------------------------|-----------|-------|----------------------------|---------------|------------------|---------------------|---------------------------------|
| Regulated contaminant | Test date | Unit | Health Goal MCLG | Allowed Level | Level detected | Violation Yes/no | Major Sources in Drinking water |
| Combined Radium 226 and 228 | 5-13-14 | pCi/L | 0 | 5 | 0.86 + or - 0.55 | no | Erosion of natural deposits |

| Contaminant | MCLG | MCL | Level Detected 2018 | Source of Contamination |
|--------------|-------------|------------|---------------------|-----------------------------|
| Sodium (ppm) | n/a | n/a | 5.21 | Erosion of natural deposits |

CITY OF ROYAL OAK

| 2018 Disinfection By-Products – Monitoring in Distribution System, Stage 2 Disinfection By-Products | | | | | | | | |
|--|------------------|-------------|-----------------------------|------------------------------|---------------------|---------------------------|-------------------------|---|
| Regulated Contaminant | Test Date | Unit | Health Goal MCLG | Allowed Level MCL | Highest LRAA | Range of Detection | Violation yes/no | Major Sources in Drinking Water |
| Total Trihalomethanes (TTHM) | 2018 | ppb | n/a | 80 | 33 | 16.9–42.9 | no | By-product of drinking water chlorination |
| Haloacetic Acids (HAA5) | 2018 | ppb | n/a | 60 | 15 | 10–15 | no | By-product of drinking water disinfection |

| 2017 Lead and Copper Monitoring at Customers' Tap | | | | | | | | |
|--|------------------|-------------|-----------------------------|----------------------------|--|----------------------------------|-------------------------|--|
| Regulated Contaminant | Test Date | Unit | Health Goal MCLG | Action Level AL | 90th Percentile Value* | Number of Samples over AL | Violation yes/no | Major Sources in Drinking Water |
| Lead | 2017 | ppb | 0 | 15 | 2.4 ppb | 0 | no | Corrosion of household plumbing system; Erosion of natural deposits. |
| Copper | 2017 | ppm | 1.3 | 1.3 | 0.1 ppm | 0 | no | Corrosion of household plumbing system; Erosion of natural deposits; Leaching from wood preservatives. |

*The 90th percentile value means 90 percent of the homes tested have lead and copper levels below the given 90th percentile value. If the 90th percentile value is above the AL additional requirements must be met.

| 2018 Microbiological Contaminants – Monthly Monitoring in Distribution System | | | | | |
|--|-------------|--|--------------------------------|-------------------------|--|
| Regulated Contaminant | MCLG | MCL | Highest Number Detected | Violation yes/no | Major Sources in Drinking Water |
| Total Coliform Bacteria | 0 | Presence of Coliform bacteria > 5% of monthly samples | 0 | no | Naturally present in the environment |
| E. coli Bacteria | 0 | A routine sample and a repeat sample are total coliform positive, and one is also E.coli positive. | 0 | no | Sanitary defects |

Important Health Information

Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Royal Oak is responsible for providing high quality drinking water but, cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at <http://www.epa.gov/safewater/lead>.

People with Special Health Concerns

Some people may be more vulnerable to contaminants in drinking water than is the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at (800) 426-4791.

Infants and young children are typically more vulnerable to lead in drinking water than the general population. It is possible that lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing. If you are concerned about elevated lead levels in your home's water, you may wish to have your water tested and flush your tap for 30 seconds to 2 minutes before using tap water. Additional information is available from the Safe Drinking Water Hotline (800-426-4791).

Questions:

Local Distribution: City of Royal Oak, Public Works Administration (248) 246-3300

Southeastern Oakland County Water Supply System – Water Authority offices: (248) 288-5150. Visit our web site at www.socwa.org

Great Lakes Water Authority – www.glwater.org

Michigan Department of Environmental Quality - (586) 753-3755 – www.michigan.gov/deg

U.S. Environmental Protection Agency – Safe Drinking Water Hotline: (800) 426-4791.

Water quality data for community water systems throughout the United States is available at <https://www.epa.gov/wqs-tech>