Discoloured Water Investigation Report

January 2014

Winnipeg

Summary

- An increase in discoloured water events has been occurring for several years in Winnipeg
- The recent CH2M Hill report has identified the cause
- The report also recommends a plan to remedy the situation

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Outline

- **What happened?**
  - history and reason for investigation
- **Why did it happen?**
  - investigation results
- **How is it being addressed?**
  - next steps
- **When will it improve?**

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What Happened?
History of Discoloured Water in Winnipeg

- Discoloured water common occurrence in many cities
- Increase in 2009 (likely due to increased ability to report incidents with introduction of 311)
- Further increase in 2010
- Hired AECOM to investigate in fall 2010 – report complete in spring 2011
- After improvements in 2011, experienced increased incidents in 2012
- Hired CH2M Hill to investigate in fall 2012 – report complete Dec 2013

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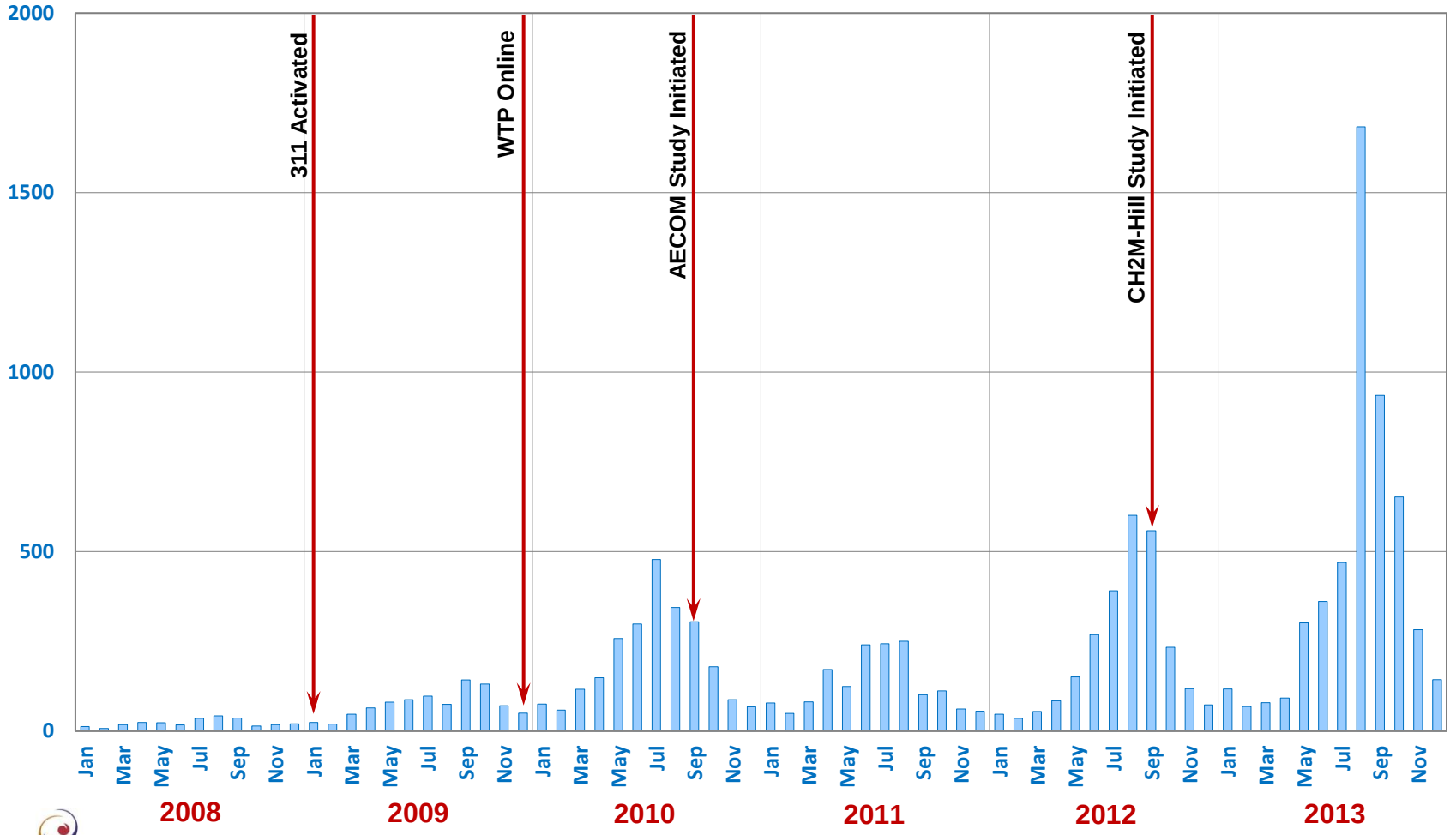
Timeline of Discoloured Water Calls



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What Happened?
AECOM Investigation

- April 2011 AECOM report key conclusions:
  - due to “historic accumulation of corrosion products, debris and biofilm”
  - will “dissipate over time” with operational changes including higher chlorination, water main cleaning
- AECOM recommendations implemented
- Fewer incidents in 2011, appeared to be stabilizing
- However, increased incidents in 2012

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What Happened?
CH2M Hill Investigation

- Hired CH2M Hill in fall 2012
- Significant increase in discoloured water in August 2013
- Final investigation report is complete

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Why Did It Happen?
CH2M Hill Investigation Conclusions

- 2010 to 2011 increase in discoloured water incidents related to biofilm / sediment issues (mainly iron)
- Data indicates biofilm/iron issue has decreased
- Steady increase in level of manganese in treated water since commissioning of water treatment plant
- CH2M Hill concluded that **Winnipeg water continues to be safe** and meets all regulatory requirements for health

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Manganese Health Facts

- Manganese is an essential nutrient for physiological function:
  - most of the manganese in our body comes from food
  - typical diet includes 0.7 to 11 mg of manganese per day, and even higher for vegetarian diets
- Currently, Health Canada has set an aesthetic objective (i.e., colour) for manganese of 0.05 mg/l in the Canadian drinking water quality guidelines
- Health Canada has not set a health guideline for manganese in drinking water

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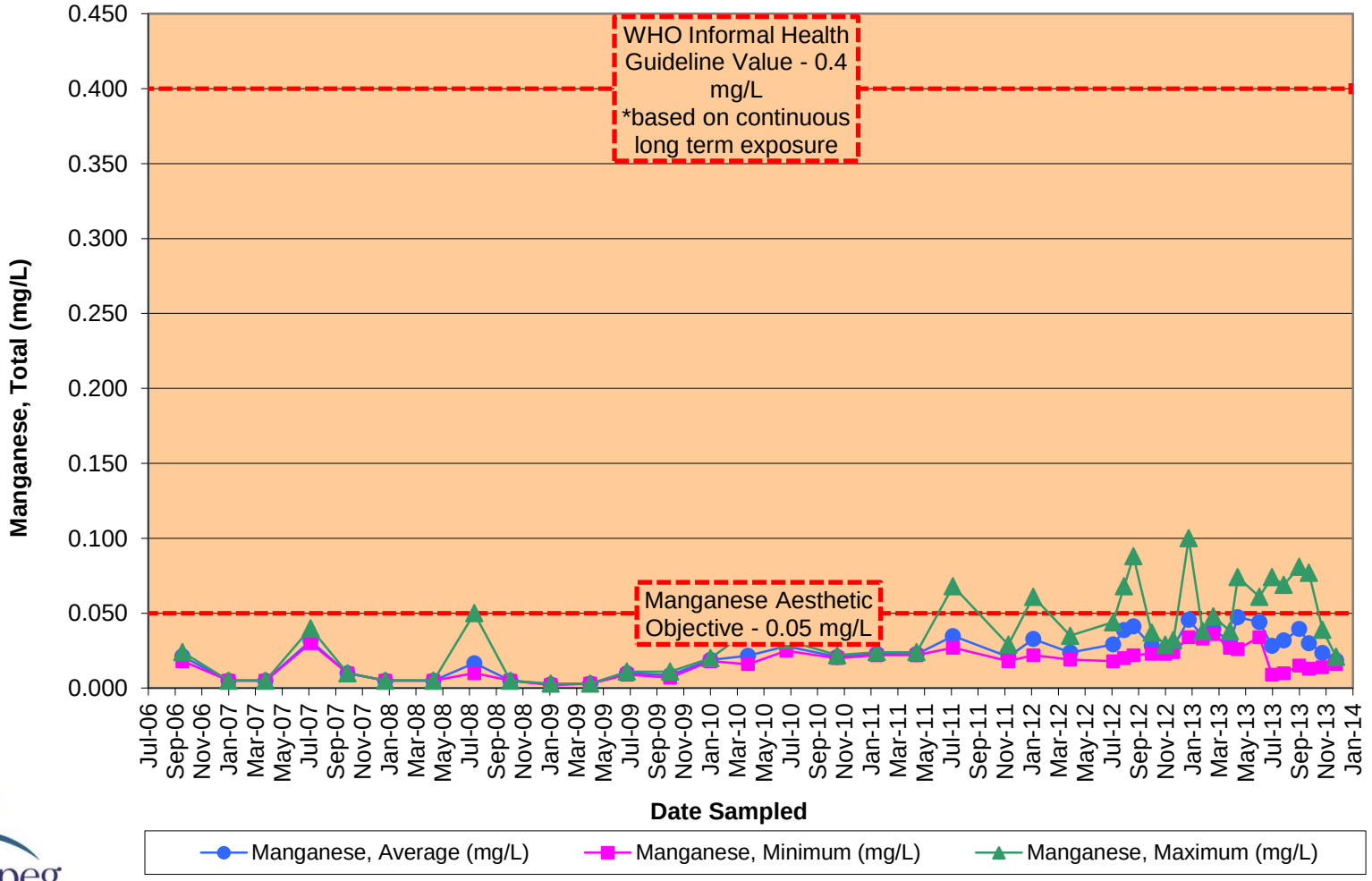
Distribution System Total Manganese (Average of six distribution system locations)



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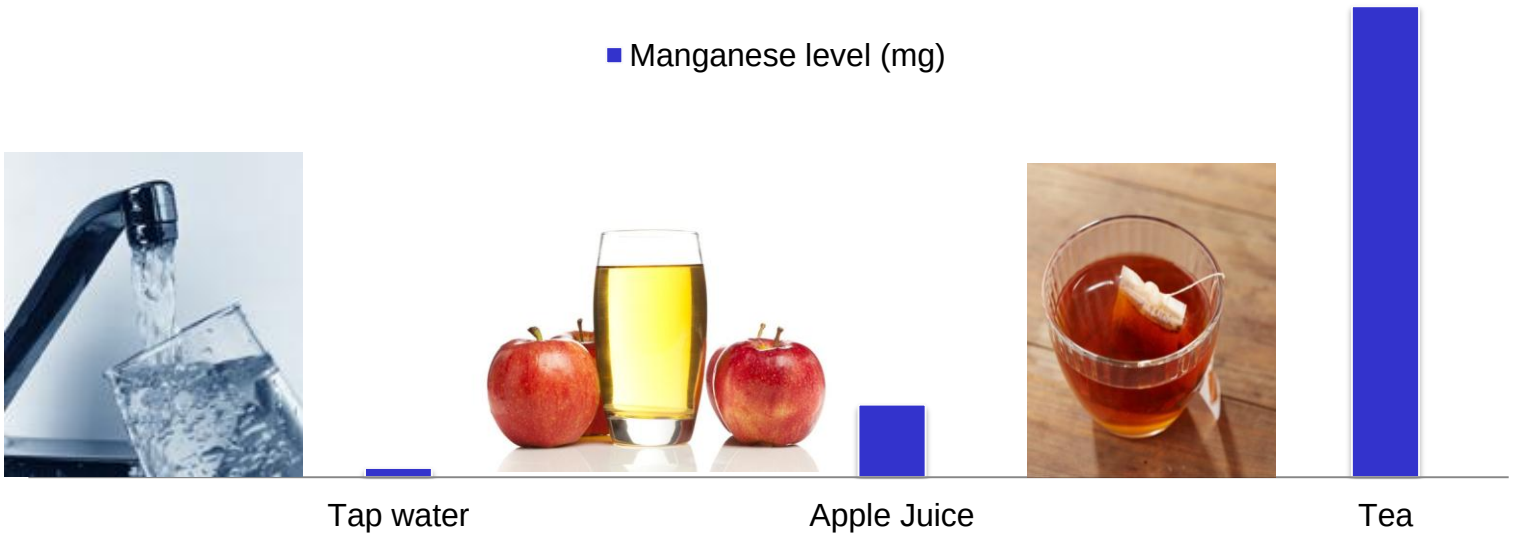
Comparison of Manganese in Beverages (250 ml / 8 ounces)

Tap water
0.025 mg*

Apple Juice
0.2 mg

Tea
0.4 – 1.3 mg



**Based on highest value during routine distribution system monitoring in 2013*

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Why Did It Happen?
CH2M Hill Investigation Conclusions

- Some manganese in source water (Shoal Lake)

- Primary source of manganese is the coagulant used in a key treatment process at the plant
- Discoloured water will continue until manganese:
  - is reduced in the treated water leaving the plant
  - buildup in the water distribution system is removed

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Why Did It Happen?
Ferric Chloride

- All chemicals used for water treatment meet industry standards for drinking water
- Ferric chloride:
  - is used as coagulant
  - contains small and varying amounts of manganese as an incidental by-product

- The plant was not designed to remove manganese based on historical data and extensive pilot testing at the time

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How is it Being Addressed? (CH2M Hill Report Recommendations)

- Monitor water source to assess need for dedicated manganese treatment
- Replace current ferric chloride product with lower manganese content (Feb 2014)
- Select alternate coagulant chemical (2016)
- Modify existing treatment process to reduce manganese (summer 2014)
- Maintain consistent water quality
- Review distribution operations
- Accelerate Water Main Cleaning Program (2014/15)
- Clean all three reservoirs (underway)

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How is it Being Addressed? (additional recommendations from WWD)

- Minimize disruptions in flow direction/velocity:
  - increase scrutiny of construction schedules
  - minimize/optimize fire hydrant use (e.g., street cleaning, irrigation, pavement projects)
  - employ unidirectional flushing techniques for spot flushing
- Engage third party independent engineering consultant to review:
  - water treatment plant design
  - discoloured water investigation reports (AECOM, CH2M Hill)
  - determine whether there are any other actions which could help resolve discoloured water

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When Will It Improve?

- Will take about two years to implement all recommendations
- Incremental improvements expected with each measure
- Expect gradual reduction in reports of discoloured water as each recommendation is implemented until manganese is reduced to an adequate level in the water distribution system

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Questions

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