

# **Proposal for the Tri-County Drinking Water System – Coloured Water Challenges**

**SUBMITTED BY:**

Ontario Clean Water Agency  
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## Background

Over the years, the Tri-County Drinking Water System (DWS) has experienced water quality issues. The challenge of elevated colour has previously been attributed to:

- Oxidation downstream the membrane filter;
- Higher than normal algal growth in Lake Erie, due to unusually warmer weather and inhibited lake turnover.
- The presence of elevated dissolved iron and manganese (common metallic elements in the earth's crust and lake beds) due to anoxic conditions in warmer source water during the summer months.

Pleasing aesthetic qualities promotes public trust and confidence in drinking-water systems. While colour does not directly affect the safety of a water supply, it may cause *aesthetically objectionable* effects/render water unsuitable for use (e.g. low appeal, cause staining). Changes in tap water colour should be investigated as it is an indicator of change/degradation in raw water quality and potential public health concern(s).

The Ontario Clean Water Agency's (OCWA) Process Optimization and Technical Services (POTS) team has been asked to investigate the raw and treated water quality issues related to the water discolouration challenges at the Tri-County Drinking Water System (DWS). As part of the work, POTS will evaluate options available to improve the process at the Tri-County DWS and recommend the best solution(s) for dealing with these challenges. Our team has engaged in completing similar assessments for other systems across the province and some of these sites are highlighted in the table below.

Site Name	Region	Water Quality Challenge	Plant Rated Capacity (m <sup>3</sup> /d)
Casselman WTP	Eastern	Manganese	3,182
Old Snow Valley WTP	Georgian Bay	Iron and Manganese	200-300
Deep River	Eastern	Corrosion challenges	13,638
Emo WTP	Northwestern	Disinfection-By-Products related raw water organic challenges	950
Verner WTP	Northeastern	Manganese	1,054
Kirkland Lake WTP	Northeastern	Manganese	22,500

## Scope and Methodology

This proposal outlines the scope to investigate colour water issues at the Tri-County Drinking Water System (DWS) and to propose options for handling the issues.

The proposed scope includes:

1. **Review Plant Background Information:** A review of the DWS process (and configuration), previous studies and reports, current operations, MDWL/DWWP, historical operating data (including raw and treated water quality and quantity) and comparison to regulatory requirements.
2. **Identify Treatment Options/Modifications:** Research, evaluate and compare methods to respond to colour water issues at the Tri-County DWS. Evaluate the impacts of these options to other treatment challenges such as THMs/HAA5 removal.
3. **Costing:** Complete a cost assessment (including high level lifecycle cost analysis) for the various options.
4. **Recommendations:** Provide prioritized recommendations for consideration based on information above and input from Operations staff.

## Project Tasks

### Task 1: Kick-Off and Information Gathering

Upon project approval, a kick-off call will be organized between the Process Optimization and Technical Services (POTS) group and the Southwest Region staff to confirm project objectives and the deliverables. Following the call, background information, including plant operational data, design documents, engineering studies, etc. will be gathered. The information will be reviewed to determine the site capabilities and requirements.

### Task 2: System Evaluation

During this task, the following will be completed:

- An evaluation of the current operation, raw and treated water quality and quantity, inter-process challenges, regulatory review and compliance etc. This will help understand process challenges and establish the requirements for colour removal/reduction.
- Review of options to reduce colour challenges at the DWS. Evaluation of these options to other treatment challenges such as THMs/HAA5 removal. Consider health and safety and efficacy of each option. Connect with surrounding communities facing the same challenges to identify the treatment approaches that they are using and the effectiveness of these approaches.
- Request quotations for the shortlisted options. Identify of key operational and maintenance requirements of each system. Explore life expectancy of the systems based on technical specifications and experience of users and suppliers.
- Life cycle cost analysis which includes capital, installation, operation and maintenance costs for each option; and
- Prioritize the technical options based on the analysis.
- Prepare a proactive monitoring program for early detection of the colour water events, and develop a jar testing procedure to optimize chemical dosage based on raw water quality changes.

### Task 3 Technical Memorandum

Once the analysis is complete, a Draft Technical Memorandum will be prepared for the review by Regional staff. The memo will outline the results and findings of Task 2. The draft will first be presented

to the Southwest Region for internal OCWA review. After the Hub's comments are integrated, the findings will be presented to the Tri-County Board for their review. Once all parties have reviewed the document and comments are addressed, the memo will be finalized.

## Project Team

The following personnel are proposed for this project:

- Senior Water/Wastewater Process Engineer – John Zhang, Ph.D., P.Eng
- Process and Energy Specialist – Scott Stewart, C.Tech
- Engineering Support – Jason Pereira
- QA/QC – Sangeeta Chopra, M.Eng, P.Eng

### John Zhang, PhD, P.Eng – Senior Process Engineer

John has over 20 years of experience in water and wastewater engineering, process and hydraulics, and project management. He has worked with numerous municipal and industrial clients in Canada and internationally. In his work, John has evaluated processes, completed energy efficiency reviews and conducted facility optimization studies. John has special expertise in drinking water process optimization and troubleshooting, and had led diverse engineering projects related to treatment plant performance improvement, disinfection by-products reduction, color water treatment optimization, corrosion control, and Arsenic removal. John has more than 30 publications in water & wastewater fields and has held a number of research and consulting positions throughout his career. **John will be the Project Engineer for this assignment.**

### Scott Stewart – Process and Energy Operations Specialist

Scott is a seasoned water/wastewater technician with over eight years of experience in the water/wastewater field. Through his career with OCWA, Scott has worked in various roles within the organization as support to compliance, operation, health and safety and maintenance services to water and wastewater facilities in Ontario. Scott brings with him hands-on operational experience that complements the services that POTS currently offers. **Scott will be the Operations Specialist for this assignment.**

### Jason Pereira – Process Optimization Assistant

Jason is an engineering intern currently studying Chemical Engineering at the University of Toronto. Jason will be assisting the team for delivering this assignment. **Jason will assist in all aspects of the project, supporting the project team.**

### Sangeeta Chopra, M.Eng, P.Eng – Director – Process Optimization and Technical Services

Sangeeta Chopra is a Professional Engineer with 20 years of experience in municipal and industrial water and wastewater planning, engineering, project management and delivery, operations and management. She has collaborated with municipalities, regulators, consultants, contractors, technology providers and stakeholders at all levels. Through her roles in both public and private sectors, she has employed technical knowledge to meet the needs of communities and assist clients with implementing solutions. **Sangeeta will provide QA/QC as required for this work.**

## Schedule & Budget

Our estimated fee to complete the proposed evaluation and memorandum is \$22,650 exclusive of HST for our professional fees and disbursements. This cost will be considered as an upset limit and will not be exceeded without the written consent of the Tri-County Board. The table below breaks down the hours by task.

<b>1</b>	<b>Kick-Off &amp; Information Gathering</b>	<b>20 hours</b>
1.1	Project setup and initiation	2
1.2	Team Kick-Off Meetings and Client Kick-off	4
1.3	Background Information Investigation	10
1.4	Project Management & Communications	4
<b>2</b>	<b>System Evaluation</b>	<b>90 hours</b>
2.1	Review of data and current operation practices and inter-process Challenges	20
2.2	Review Options to Handle Water Quality Issues	15
2.3	Request for Quotations for Shortlisted Options	20
2.4	High-Level Cost Analysis	20
2.5	Prioritization of options and Sequencing for Tri-County DWS	15
<b>3</b>	<b>Technical Memorandum</b>	<b>40 hours</b>
3.1	Draft Tech Memo preparation	20
3.2	Draft Report Review	14
3.3	Tech Memo Revision and Finalization	6

We are ready to start the project immediately upon approval. The full project is expected to take 8-10 weeks complete from the date of approval, if all background information is available.

We appreciate the opportunity to submit this proposal and look forward to working with the Board on this important assignment. Please do not hesitate to contact the undersigned should you have any questions regarding our proposal.

Sincerely,



John Zhang, Ph.D, P.Eng.  
 Senior Water/Wastewater Process Engineer,  
 POTS



Sangeeta Chopra, P.Eng.  
 Director, POTS