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Technical bulletin: Making changes to supervisory control and data acquisition systems in municipal residential drinking water systems

Information for owners and operators of municipal residential drinking water systems about requirements when making changes to supervisory control and data acquisition systems.

Overview

This bulletin provides high-level information about what is and is not required by the ministry when making changes to a supervisory control and data acquisition (SCADA) system in a municipal residential drinking water system.

SCADA systems consist of hardware components (such as computers and process logic controllers) and associated software.

Municipal drinking water systems must follow the requirements in the [Safe Drinking Water Act, 2002 \(https://www.ontario.ca/laws/statute/02s32\)](https://www.ontario.ca/laws/statute/02s32), and its regulations. While repair or maintenance activities of SCADA systems are not subject to the approval requirements of the act, any alteration to the system must be done in accordance with an approval issued by the Ministry of the Environment, Conservation and Parks.

The examples included in this bulletin will help owners and operators identify the types of changes that may be considered, including:

- repair and maintenance that is not subject to approval requirements under the act, or
- an alteration to the system that is pre-authorized by conditions in Schedule B of a drinking water works permit.

Please note: this information is intended to be used as general guidance and may not be applicable to all systems.

Ministry contact

To determine the requirements for making a specific change to an individual system, you can either:

- refer directly to the system's drinking water works permit
- email the ministry's Municipal Water and Wastewater Permissions unit at [MDWLP@ontario.ca \(mailto:MDWLP@ontario.ca\)](mailto:MDWLP@ontario.ca).

SCADA hardware changes

SCADA hardware generally refers to items that support supervisory control and data acquisition in the drinking water system, including:

- the instrumentation
- process logic controllers
- computer terminals and servers

Additional hardware such as an uninterruptable power supply or networking devices are not considered SCADA hardware for the purposes of conditions in the drinking water works permit (permit).

Repair and maintenance

Routine actions that repair equipment or maintain the function of existing equipment are not subject to the approval requirements of the [Safe Drinking Water Act \(https://www.ontario.ca/laws/statute/02s32\)](https://www.ontario.ca/laws/statute/02s32).

In the case of SCADA hardware, repair and maintenance activities may include:

- any routine replacement or upgrade of existing instrumentation
- work to improve the reliability of a component such as an upgrade
- work to fix an existing issue while maintaining the same state that existed prior to alteration. For example, programmable logic controllers (PLCs) and human machine interfaces (HMIs) continue to evolve as new technologies are continuously added to their capabilities

Alterations

SCADA hardware changes that are not for the purposes of repair and/or maintenance are considered an alteration to the drinking water system. These alterations are pre-authorized through a condition in Schedule B of the permit and do not require additional approvals from the ministry.

An example of this condition is provided below. Exact numbering may vary slightly from permit to permit.

Example: drinking water works permit, Schedule B, Condition 4.1.2

- 4.1 The municipal residential drinking water system may be altered by adding, modifying or replacing the following components in the drinking water system:

- 4.1.2 Instrumentation and controls, including new SCADA systems and upgrades to SCADA system hardware.

Requirements for alterations

The SCADA hardware changes described in condition 4.1.2 of the permit are subject to the verification requirements outlined in the permit. This means that a form (a “Record of Minor Modifications or Replacements to the Drinking Water System”, also known as a “[Form 2](http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=012-2203E)” (<http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=012-2203E>.”)) needs to be completed before the hardware changes are placed into service.

The completed form does not need to be submitted to the ministry but should be retained by the owner of the drinking water system for a period of 10 years.

Examples of SCADA hardware changes that **need** a [Form 2](http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=012-2203E) (<http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=012-2203E>) completed:

- installation of a new SCADA system where one did not previously exist
- expansion of an existing SCADA system to previously unconnected infrastructure components. For example, connecting pre-existing process equipment with automation to the SCADA system or expanding the SCADA system to include a new outstation facility in the distribution system

Examples of SCADA hardware changes that **do not need** a [Form 2](http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=012-2203E) (<http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=012-2203E>) completed:

- upgrading “stand-alone” components to enable network or web-based functionality
- upgrading to a new controller model with no functional process changes
- installation of new SCADA server
- addition of supporting hardware or ancillary equipment such as a network jack, display or uninterruptable power supply

SCADA software changes

Except for those changes specifically described in Schedule B in the drinking water works permit, all other SCADA system software changes are considered a repair and maintenance activity.

Repair and maintenance

Municipalities often perform upgrades to their SCADA system hardware and software to eliminate programming bugs, enhance security and improve reliability and performance of the system. These routine actions are also generally considered to be repair and maintenance of the system.

Repair and maintenance activities do not require approval from the ministry and are exempted from “verification requirements” through conditions in Schedule B in the drinking water works permit. A “[Form 2](http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=012-2203E)” (<http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=012-2203E>.”) is a verification requirement and does not need to be completed for repair and maintenance activities.

An example of this exemption is identified below. Exact numbering may vary slightly from permit to permit.

Example: drinking water works permit, Schedule B, Condition 4.7

- 4.7 For greater certainty, the verification requirements set out in conditions 4.5 and 4.6 (in the drinking water works permit) do not apply to any addition, modification, replacement or removal in respect of the drinking water system which:
 - 4.7.1 Is exempt from subsection 31(1) of the *Safe Drinking Water Act* by subsection 9.(2) of O. Reg. 170/03; or
 - 4.7.2 Constitutes maintenance or repair of the drinking water system, including software changes to a SCADA system that are not listed in condition 4.1.3.

Alterations

An example of a Schedule B condition describing software is provided below. Exact numbering may vary slightly from permit to permit.

Please note: “CT” refers to the CT Disinfection Concept, as described in the ministry’s [Procedure for Disinfection of Drinking Water in Ontario](https://www.ontario.ca/page/procedure-disinfection-drinking-water-ontario) (<https://www.ontario.ca/page/procedure-disinfection-drinking-water-ontario>).

Example: drinking water works permit, Schedule B, Condition 4.1.3

- 4.1.3 SCADA system software or programming that:
 - a. measures, monitors or reports on a regulated parameter;
 - b. measures, monitors or reports on a parameter that is used to calculate CT; or,
 - c. calculates CT for the system or is part of the process algorithm that calculates log removal, where the impacts of addition, modification or replacement have been reviewed by a licensed engineering practitioner.

The SCADA software changes described in condition 4.1.3 of the permit are subject to the verification requirements outlined in the permit. This means that a “[Form 2](http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=012-2203E)” (<http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=012-2203E>.”) needs to be completed before the hardware changes are placed into service. The completed form does not need to be submitted to the ministry but should be retained by the owner of the drinking water system for a period of ten years.

Examples of SCADA software changes that **need** a [Form 2](http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=012-2203E) (<http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=012-2203E>) completed:

- updates to SCADA system software to include updated CT calculations after installation of new baffles in a clearwell

- adjustments to SCADA system software that result from moving or modifying instrumentation that measures or, monitors a regulated parameter and provides information that demonstrates regulatory compliance (such as free chlorine)

Examples of SCADA software changes that **do not need a Form 2** (<http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=012-2203E>), completed:

- installation of an iterative SCADA software revision or update
- changes to SCADA system software that results from the addition of instrumentation that is not used to measure or monitor a regulated parameter
- changes to SCADA system software to reflect alterations to the drinking water system that have been undertaken for the purpose of repair and maintenance

Inspections and documentation requirements

As part of inspections of municipal drinking water SCADA systems, we will require access to different types of records based on the changes made. Examples of the types of changes and documentation that may be required include:

- **Repair and maintenance activities** – documentation may include information recorded in a log book, work order or purchase order.
- **Alterations to the drinking water system** – documentation regarding the change should be available for ministry inspection upon request (such as a completed Form 2 and any other verification requirements outlined in the permit).
- **Alterations that change an equipment or instrumentation described in Schedule A of the drinking water works permit** – records should demonstrate that a [Director Notification Form](http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=012-9166E) (<http://www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryDetail?OpenForm&ACT=RDR&TAB=PROFILE&ENV=WWE&NO=012-9166E>) has been submitted to the ministry. This form should be submitted to the ministry within 30 days of completing or placing the alteration into service.

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Related

- [Municipal drinking water systems: licensing, registration and permits](https://www.ontario.ca/page/municipal-drinking-water-systems-licensing-registration-and-permits) (<https://www.ontario.ca/page/municipal-drinking-water-systems-licensing-registration-and-permits>)