



Site Attendance Guidelines for Automated/Unattended Monitoring and Process Controlled Facilities

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The guidelines will be revised and updated as new information warrants change.

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1.0 Introduction

Historically, water and wastewater facilities have required daily operator visitations and inspections. Recent advances in automated monitoring and process control have created the need for adjustments in the requirements for on-site visits of certified operators to water/wastewater works facilities equipped with these systems. This includes SCADA (Supervisory Control and Data Acquisition), PLC (Programmable Logic Controllers) and the DCS (Distributed Control Systems) among others, which enable remote monitoring and selective process control for many operational parameters of a facility.

This document sets the Saskatchewan Ministry of Environment (MOE) requirements and guidelines for the operation of facilities using automated monitoring/process control. Automation of water/wastewater works facilities to allow for unattended operation and off-site monitoring and/or control presents a number of management and technological challenges which must be overcome before an approval can be considered. Any facility applying for revisions to the Permit to Operate due to the addition or existence of an automated monitoring and/or process control will be required to comply with the following guidelines. These guidelines in no way supersede or lessen the requirements for a certified operator as required by The Water Regulations, 2002 or the options available for certified operators outlined under “EPB 286 Regional/Contract Operator Program”.

1.1 Definitions

Remote Monitoring

Remote monitoring is the ability to continuously receive real time data and operational conditions from a remote location via various methods of electronic data transfer. This includes alarm systems that only indicate adverse operational conditions, (i.e. dial-out alarms, low/high limit alarms).

Remote Process Control

Remote Process Control is the ability to continuously monitor operational parameters in real time and make operational or process adjustments from a remote location.

Major Alarm: Activates due to power failure, distribution line pressure loss, disinfection/process equipment failure, etc. which may require process shut down.

Minor Alarm (Includes High/Low Limit Alarms): Continually monitors set points above and below regulatory limits (Cl, turbidity, etc.) and reservoir levels, etc.

Security alarms: No direct effect on process.

Under the Direction of the Certified Operator

Means that the certified operator:

- Is responsible for and provides verbal instructions for any water/wastewater works system treatment process control changes;
- Physically attends the water/wastewater works system as often as required in this document or on the facilities' Permit to Operate;
- Stays informed of the operation of the water/wastewater works (via remote monitoring, updates from the control center, etc.), as required between site visits to ensure proper operation of the works;
- Physically attends the water/wastewater works within three hours of notice of any emergency, upset or significant treatment plant process control problem;
- Is responsible for verifying the accuracy, completeness and submission of all information required by the MOE; and
- Directs all system operations, repair and maintenance in accordance to Sec. 63 of The Water Regulations 2002.

2.0 Operation Guidelines for Automated/Unattended Process Control and Monitoring

2.1 Engineering Requirements

The first step in the process leading to design/operation of an automated system will be the development of an engineering report that defines how the control and/or monitoring system will function in the automation of plant operations, control monitoring and alarming. Use of up-to-date reports previously prepared (i.e. documents prepared for Application for a Permit to Construct) is acceptable where systems are already in place. New engineering reports are required when a new system is proposed. Information previously gained from system specific operational documents, waterworks system assessments and existing process control documents wherein engineering consultants or in-house professional engineers, have previously specified each and every possible adjustment and its effect are likely useful sources of information in completing a system design and application for approval to construct. The application and associated engineering system design must cover all aspects of the water and or wastewater works facility proposed automation systems including the following information and criteria:

- 1) All new systems or modifications to existing systems must follow the Application for a Permit to Construct guidelines.
- 2) Identification of critical features in the facility that will be electronically monitored, have alarms and can be operated automatically or off-site by the control system.
 - a. A description of automatic facility shut-down controls with alarms and conditions that would first warn of pending problems and then trigger shut-downs is to be included. (These dual or secondary alarms are needed for certain critical functions including, where applicable, elevated turbidity, low disinfectant residuals, low disinfectant supply,

disinfectant process loss, sludge level alarm in a surface water treatment plant clarifier, pressure loss below 20 psi within the distribution system (unless a low pressure pipeline system), power loss (including loss of standby power where in place), or any overflow condition that may jeopardize the treated reservoir supply.)

- b. Turbidity, chlorine residual and chlorine supply alarms require low and high set points indicating a problem as a means to provide an early warning of pending problems and time for advance response.
 - c. Also included would be any other functions as determined by the design engineers or as requested by the MOE, Engineering and Approvals Unit, Municipal Branch.
- 3) Major and minor alarm features must be provided for all automated, critical functions. Major alarms must have shut-down (process stopping) capabilities from the remote location or automatically. Following a shut-down by a major alarm, automated restart is not allowed and requires a site visit for re-initialization. Response and adjustment capabilities by the control system are required for all minor alarms as determined through discussion with the Engineering and Approvals Unit, Municipal Branch. Verification of operational status (are they armed and functional) of major and minor alarms by the control system, is to be provided.
 - 4) All data and controls must operate in real-time.
 - 5) Polling of each monitored parameter must be at a minimum of once every five minutes (whether on-site or via remote station). The five minute polling should be an average of a set of data taken at smaller intervals (each five or 10 or 30 seconds for example).
 - 6) Must have the capability for manual operation of all facility equipment and process functions in event of automation failure.
 - 7) A facility flow diagram which shows the location of all critical features, alarms and automated controls to be provided.
 - 8) Include a description of off-site control station(s) (if applicable), that allow observation of facility operations, receiving alarms and having the ability to adjust and control operation of equipment and the treatment process.
 - 9) The facility must be equipped with an alarm system (i.e. security) that will alert the operator(s) and any others, as required. The intent here is to indicate unauthorized entry to the works that may result in compromised water quality due to terrorist activities, vandalism or similar circumstances.
 - 10) Any control or monitoring system component materials in contact with drinking water must conform to the NSF/ANSI certification code.

2.2 Procedural and Operational Requirements

Automated/unattended water/wastewater works facility operation will require close adherence to operational procedure and protocol. The following need to be included in an operational protocol:

- 1) On-site evaluations, operational functions and required maintenance and calibration of all critical treatment components and monitoring equipment must be provided to ensure reliability of operations. Maintenance and calibration must be performed in accordance and on a frequency as recommended by the manufacturer. Routine grab sample and comparison frequency for verification of online instrumentation accuracy (+/- 0.10 mg/l or 15%) is required as a means to assure quality control for compliance purposes. (See EPA Method 334 for further information.)
- 2) A schedule for maintenance of equipment and critical parts replacement.
- 3) Plant staff must perform, as a minimum, weekly checks on the communication and control system to ensure reliability of operations.
- 4) Operations manual which gives operators step by step procedures for understanding and using the automated control system under all water quality conditions. Emergency operations during power or communications failures or other emergencies must be included. Backup power at the remote monitoring or control end is required.
- 5) During startup of a new automated/unattended monitoring or process control system an operator certified to the plant/system level shall be in attendance, on-site, during system testing and commissioning. Full automated monitoring or operation of the system shall not be initiated until such time as operation of control and alarm systems has been successfully performed.

2.3 Facility Security

Facility security measures are needed to help ensure that public water suppliers attain an effective level of safety from vandalism, tampering and other destructive activities. The following security measures are necessary for operation of an automated/unattended facility:

- 1) A security system which incorporates motion sensors, alarms and/or cameras (or a combination of such equipment) separate, or incorporated with the SCADA, PLC or other control system must be installed at entry points to the remotely controlled or monitored part of the system such as water treatment plants, pump houses, reservoirs, etc. Third party operation of a security alarm system may be considered.
- 2) All alarms and installed monitoring equipment for security purposes should include monitors at remote, manned locations (includes auto-dialing systems, pagers, third party alarms, etc.).
- 3) For further information on security at water treatment plants, readers should follow "EPB 363 Security at Water Treatment Plants".

2.4 Regulatory Requirements for Automated/Unattended Process Control and Monitoring

The following requirements must be met for automated/unattended waterworks system permitted by the Saskatchewan Ministry of Environment:

- 1) All MOE reporting requirements of upset conditions, maintenance, and other parameters set in the Permit to Operate a Water/Wastewater Works must be complied with at all times.
- 2) Continuous monitoring of water quality parameters, as set out in accordance with the Permit to Operate a Water/Wastewater Works, is required. All MOE legislated water quality requirements in the Permit to Operate a Water/Wastewater Works must be otherwise monitored and met via General Chemistry, Health and Toxicity and/or other sampling.
- 3) Continuous monitoring of the waste water quality parameters such as pH, ammonia, dissolved oxygen and CBOD, as set out in accordance with the Permit to Operate a Water/Wastewater Works, may be required for facilities continuously releasing effluent into sensitive water bodies. All MOE legislated wastewater effluent quality requirements must be otherwise monitored and met by final effluent sampling as required in the Permit to Operate. Record keeping in accordance to section 42(1) & (2) of The Water Regulations, 2002 is required. Records collected and generated by remote monitoring systems may form components of facility records.
- 4) The operator(s) in Direct Responsible Charge (DRC) must be certified to the level of the water/wastewater works system (distribution/collection systems included). The certified operator or designate must be available onsite within a three (3) hour response time.
- 5) An operator(s) certified to the level of the works must be available or on call twenty-four hours a day seven days a week.
- 6) An Emergency Response Plan is required and is to be added to the required QA/QC Emergency Response Plan in accordance to section 43(1) of The Water Regulations, 2002. The QA/QC shall include a basic description of manual plant operation.

3.0 Minimum Attendance Guidelines for Automated/Unattended Waterworks Facilities

The following section provides the guide for minimum attendance for automated/unattended waterworks facilities. An exception to this guideline is any system that uses chlorine gas for disinfection. There will not be reduced attendance for any of these systems.

3.1 Automated/Unattended Water Distribution Only System

A 'water distribution only' system is described as a system where there is no water treatment and the treated water source is intended to be potable from another regulated waterworks. A water distribution only system may have line pressure booster stations and the ability to adjust processes such as disinfection chemicals. The scope of this section is for rural water pipelines

covering large distances, excluding municipal or private systems serving concentrated populations (subdivisions, etc.).

- 1) The certified operator(s) or designate (minimum Small Water System (SWS), Class I,) must visit the waterworks a minimum of one time per week with no more than six days between visits. The remote operator(s) shall remain informed continually of the waterworks system operation via remote monitoring to ensure proper operation of the system.
- 2) The facility and certified operator must comply with the Sections 2.0 to 2.4 previously stated in this document.
- 3) Class III and IV distribution/pipelines system will be reviewed by MOE on a case-by-case basis for visitation reduction eligibility.

3.2 Automated/Unattended Water Treatment Facility

This applies to groundwater, surface water and GUDI (Groundwater Under Direct Influence of surface water) waterworks systems that are SWS, Class I, or Class II with continuous remote monitoring and the ability to adjust and control the treatment process.

3.2.1 Groundwater Under Five Hundred Population

- 1) The certified operator(s) or designate (minimum SWS, Class I), must visit the waterworks a minimum of two times per week, with no more than three days between such visits. The remote operator(s) shall remain informed continually of the waterworks system operation via remote monitoring to ensure proper operation of the system.
- 2) The facility and certified operator must comply with the Sections 2.0 to 2.4 previously stated in this document.
- 3) Class III and IV water treatment systems will not be eligible for reduced on-site visitation.

3.2.2 Surface Water, GUDI and Large Groundwater Systems

- 1) The certified operator(s) or designate (minimum SWS, Class I), must visit the waterworks a minimum of three times per week, with no more than two days between such visits. The remote operator(s) shall remain informed continually of the waterworks system operation via remote monitoring to ensure proper operation of the system.
- 2) The facility and certified operator must comply with the Sections 2.0 to 2.4 previously stated in this document.
- 3) Class III and IV water treatment systems will not be eligible for reduced on-site visitation.

3.3 Automated/Unattended Wastewater Collection Systems

A wastewater collection system is described as a system where there is no wastewater treatment. They consist of collection lines and lift stations.

- 1) The certified operator(s) or designate (minimum Small Wastewater System (SWWS), Class I) must visit the wastewater collection facility a minimum of one time per week with no more than six days between visits. The remote operator(s) shall remain informed continually of the wastewater works system operation via remote monitoring to ensure proper operation of the system.
- 2) The facility and certified operator must comply with the Sections 2.0 to 2.4 previously stated in this document.
- 3) Class III and IV collection system will be reviewed by MOE on a case-by-case basis for visitation reduction eligibility.

3.4 Automated/Unattended Wastewater Treatment Facility

With more communities opting for small mechanical wastewater treatment plants that are fully automated and operable by remote monitoring/process control, inclusion in automated/unattended guidelines is necessary. This applies to wastewater works systems that are SWWS, Class I, and Class II, and (subject to review by MOE) Class III, with continuous remote monitoring and the ability to adjust and control the treatment process.

- 1) The certified operator(s) or designate (minimum Class I), must visit the wastewater works a minimum of three times per week, with no more than two day between such visits. The remote operator(s) shall remain informed continually of the wastewater works system operation via remote monitoring to ensure proper operation of the system.
- 2) The facility and certified operator must comply with the Sections 2.0 to 2.4 previously stated in this document.
- 3) Class IV wastewater treatment systems will not be eligible for reduced on-site visitation.
- 4) Additional site specific requirements may apply to situations where a continuous effluent discharge is employed or where effluent discharges are released to sensitive receiving environments. Please contact the Ministry of Environment for further information.