

CWWA Water Sector Pandemic Action Plan

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Background

A pandemic occurs when a novel Infectious Disease virus strain emerges with an ability to efficiently spread in human populations and cause significant morbidity (illness) and mortality (death). Since the 1500's, pandemic Infectious Diseases have occurred 3 to 4 times per century. In the last century, there were 3 pandemics: The 'Spanish Flu' of 1918 (H1N1), The 'Asian Flu' of 1957 (H2N2), and the 'Hong Kong Flu' of 1968 (H3N2). This (near) century has had H1N1, H5N1 and now COVID19.

Currently in Canada there are over 1500 identified people with the COVID-19 virus. The documented cases seem to increase in exponential fashion. On the 23rd of January, the city of Wuhan, had 444 confirmed COVID-19 cases. A week later, by the 30th of January, it had 4,903 cases. Another week later, by the 6th of February, it had 22,112.

It is suggested that the fatality rate for this coronavirus might wind up being about 1 percent. If that guess proves true, the coronavirus is 10 times as deadly as the flu. So far the only measure that has been effective against the coronavirus is extreme physical distancing.

With this in mind, all infrastructure sectors should take precautions as directed by their local health agencies and prepare for a potential employee absence between 25 - 40% of normal staffing levels for periods up to four weeks or more.

Absenteeism of up to 40% or more will be the major issue that the Water Sector will be forced to deal with. People will be absent from work for many reasons, including illness, caring for others, fear of going to work, pandemic related public health measures (e.g. school closures) and normal baseline absenteeism.

Research developed after SARS indicates heavy impacts to Water with a novel virus pandemic impacting the Health Sector. The following is a derivative of the CI Dependency matrix developed in Macaulay's book; *Critical Infrastructure: understanding its component parts, vulnerabilities, operating risks, and interdependencies* and contains only the Health-related dependency metrics and the assessed risk from this case-study.

		Inbound dependencies								
Outbound dependencies	CI sector	Energy	Comms & IT	Fin	Health Care	Food	Water	Trans	Gov / Safety	Manf
	Energy				4.19					
	Comms & IT				5.14					
	Fin				4.19					
	Health Care	4.86	2.37	3.00	8.24	1.80	4.20	3.25	7.00	2.61
	Food				4.05					
	Water				4.90					
	Trans				4.86					
	Gov Safety /				6.17					
	Manf				4.00					

The columns in the above Table represent the Inbound Dependency metric for a given sector, where “Inbound” refers to the level of assurance required by a sector in the goods and/or services supplied by another sector. The rows represent the Outbound Dependency metric for a given sector, where “Outbound” refers to the level of assurance other sectors places upon the goods and/or services supplied by a given sector.

The metrics clearly indicate the interdependencies and latent impacts to the Water Sector.

During the current COVID19 pandemic Water and Wastewater Treatment Plants should initiate the following courses of action:

Access to facilities

- suspend projects involving contractors on site.
- suspend access for all plant tours and scheduled visits of groups.
- limit access to all but essential services which should be further defined as Critical, Vital, Necessary and Desired.

Physical distancing strategies

- avoid meeting people face to face.
- use the telephone, e-mail and the Internet to conduct business as much as possible even when participants are in the same building.
- avoid any unnecessary travel and cancel or postpone non-essential meetings and training sessions.
- Prepare the alternate SCADA site to use remotely if required
- arrange for telecommuting so employees can work from home or work flex hours to avoid crowding at the workplace.

Medical and hygiene practices

- wash hands frequently with soap and water.
- cover coughs and sneezes with tissues.
- all employees should have up to date vaccinations.
- sick employees should be encouraged to stay home.
- employees should have medical clearances prior to returning to work from travel or an illness.
- wipe down and disinfect all hard surfaces including control panels, keyboards, etc.

Longer Term Actions

- suspend all capital projects
- preventative maintenance reduced to critical equipment only
- sampling limited to collection from auto samplers and essential samples
- focus on Critical and Vital services only
- implement all policies on physical distancing
- monitor and document illness and expenses related to the pandemic
- maintain contact with suppliers and consider modifications of treatment to conserve chemicals and energy

Essential Skills

Identify and record the essential skill sets required to maintain the full operation of the Water and Wastewater Treatment Plants without disruption of service so that Essential Services are identified and further broken down to Critical, Vital, Necessary and Desired;

Critical are services that must be provided immediately without which, loss of life, infrastructure destruction, loss of confidence in leadership and significant loss of revenue will result. These services normally require resumption within 24 hours.

Vital are services that must be provided within 72 hours without which would likely result in loss of life, infrastructure destruction, loss of confidence in leadership and significant loss of revenue will result. These are vital and necessary services that would normally need to be performed or completed within one week to avoid significant damage or loss. These are services that may be performed on a rotating schedule.

Necessary are services that must be resumed within two weeks, or could result in considerable loss, further destruction, or disproportionate recovery costs. These are services that staff will be allocated to either last or on a need to do priority.

Desired are services that could be delayed for two weeks or longer but are required in order to return to normal operating conditions or alleviate further disruption. These are services that will be deemed as non-essential until such time as either staff levels are back to normal and/or priority necessitates. Desired services could be temporarily curtailed to divert resources to the Critical, Vital, Necessary or Emerging Services.

Emerging services are new or unforeseen jobs that will be determined during the response to the pandemic. These are services that people from other areas may be reassigned to.

Operations

- Chief Operator – monitors and oversees the operations of the plant in accordance with regulations and license requirements.
- Operator 3 – oversees the primary or secondary treatment area of the plant through hands on inspection, alarm response, system troubleshooting, as well as monitoring and adjusting process parameters through computer system and sample analysis to ensure process set points are maintained
- Operator 2 – hands on inspection, alarm response, system troubleshooting, as well as monitoring and adjusting process parameters through computer system and sample analysis to ensure process set points are maintained in either the primary or secondary treatment area of the plant.
- Operator 1 – hands on inspection, alarm response, system troubleshooting, as well as monitoring and adjusting process parameters through computer system and sample analysis to ensure process set points are maintained in either the primary or secondary treatment area of the plant.

Maintenance

- Electrician – install, maintain, test, troubleshoot and repair plant electrical equipment and associated electrical and electronic controls.
- Instrument Mechanic – repair, maintain, calibrate, adjust and install plant measuring and controlling instrumentation
- CDACS Mechanic – maintains, repairs, implements, programs and configures process computer control and monitoring strategies.
- Groundman – assist electrician in the maintenance and repair of electrical equipment, maintain UV disinfection and plant lighting.
- Millwright – repair, troubleshoot, adjust, overhaul and maintain stationary industrial equipment and piping.
- Plumber – install, maintain, test, troubleshoot and repair plant domestic and effluent water systems, gas systems and plant heating systems.
- Maintenance Man – assist millwright in the maintenance and repair of stationary industrial equipment and piping as well as preventative maintenance.
- Truck Driver – drives large truck for the removal of solids and waste from the plant to sanitary landfill.

Staffing Levels

Staff levels should be the minimum that can be maintained to effectively continue daily operations of the Water/Wastewater Treatment Plants. That would include a 12-hour shift rotation for operational staff and for maintenance staff.

Staffing Level Chart (E.G);

Position	Water	Wastewater	Skills & Certifications
Chief Operator	J. Smith		Water Operator III Water Analyst I Pump Repair License
Operator 3			
Operator 2			
Operator 1			
Maintenance			
Lab Analyst			
Electrician			
Instrument Mechanic			
Groundman			
Millwright			
Plumber			
Maintenance Man			
Truck Driver			
Utility Man			

Essential Parts & Supplies

- Stock current on UV lamps and ballasts
- Stock current and up to date on bearings, seals, filters, etc...

Supplies

- Water
- Food
- Disinfectants
- Antibacterial Cleaners
- Disposable coveralls and booties
- Respirators and replacement cartridges, disposable masks
- Rubber Boots
- Rubber Gloves
- Wash down facilities and equipment

Contractors

- Electrical/Instrumentation
- Mechanical/Plumbing
- Equipment suppliers and repair depots

Memorandums of Understanding

- Alum
- Bulk Oil
- Chlorine
- Diesel Fuel
- Ferric Chloride
- Liquid Oxygen
- Polymer
- Propane
- Scrubber Media
- Water Treatment

Summary

We are no longer in the “Preparedness Phase” of this pandemic, rather in the latter stages of the “Response Phase” so Water and Wastewater facilities should be prepared for potential impacts to operations, including staff absenteeism, and to respond to customer inquiries. Treatment plants are dependant on outside sources for all forms of communication. Communication within the organisation through telephones, cell phones and e-mail must be strengthened to ensure it will be reliable or alternative methods available. Additionally, communicate frequently with suppliers of essential treatment chemicals and supplies and customers about the safety of the water supply per provincial and federal health authorities.

Cross training of essential skills should be one element considered before a staffing shortage could develop. Education in personal hygiene and diligence in workplace cleanliness will be very critical to prevent the spread of germs to co-workers and considerations on restrictions or protection for face-to-face interactions should be given, including customer service and payments.

Review of current minimum stock quantities on part inventories should have occurred to ensure no shortages would hinder plant operation; this also includes all personal protective equipment (PPE).

And finally, work with your Director of Emergency Management (DEM) to ensure you are recognized as “Essential-Critical” to the continued operation of your municipality.

About the Authors

Greg Solecki is a Certified Emergency Manager and Business Continuity Professional providing government and corporate strategic planning for complex water systems specific to critical infrastructure and their interdependencies with specialization in emergency, business continuity, crisis and risk management. He has been the EOC Manager during the largest flood disasters in Canadian history, as well as providing his expertise in developing International Standards in Emergency, Crisis and Business Continuity Management.



Ian McIlwham is the current Water Sector Chair for Canada's National Critical Infrastructure Working Group and national team lead for the International Standard on Water Utility Crisis (ISO 24518). He has been instrumental in developing Public Works emergency and continuity programs in his position as Manager, Compliance at the Regional Municipality of Durham while chairing the Security and Emergency Management Committee for CWWA. The Security and Emergency Management Committee cooperates with Public Safety Canada and other federal departments concerned with emergency preparedness and national security to actively contribute to the knowledge base and federal programs related to critical infrastructure.

