

Continuous Water Quality Monitoring



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AECOM

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Delivered.

Agenda

1. Safety & Indigenous Moment
2. Regulation & Guideline Review
3. Why Continuous?
4. Objectives and KPI of a Good Program
5. Monitoring Options



Safety Moment

Every AECOM employee carries a Safety Red Card

- During an unsafe working condition, employees will physically present the card to STOP WORK
- When used, work can only continue when management clears the red card
- AECOM has a STOP WORK Authority procedure that includes documenting all STOP WORK incidents in LifeGuard or IndustrySafe



Red-Carding a Job

You have the right and responsibility to stop work if a job is unsafe or poses a danger to the environment.

All work on a red-carded job must immediately cease.

When red-carding a job, immediately report it to your supervisor.

Work on a red-carded job may only continue when a member of management clears the red card.

No one – fellow employees, customers or supervisors – has the authority to direct you to violate or disregard any safety or environmental standard.

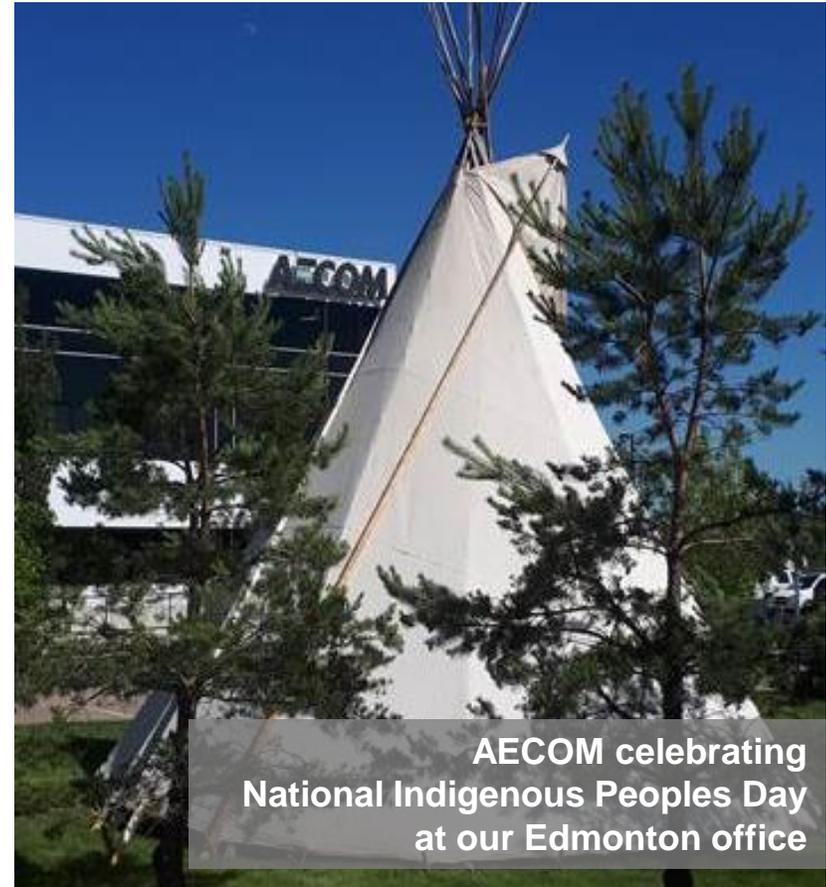
To report unresolved SH&E violations:

888-877-3181, Option 1

To report injuries: 877-878-9525

“We were part of the ecosystem....we were not masters of it....”

- Dit'oni Didlishi (Spotted Eagle) Bruce Starlight, Tsuut'ina Nation



**AECOM celebrating
National Indigenous Peoples Day
at our Edmonton office**

Regulation & Guideline Review

- In Canada, water discharge is provincially regulated
 - Alberta: Alberta Environment and Parks (AEP)

- Water quality monitoring and reporting requirements are dictated in accordance with site or infrastructure specific
 - Alberta: Environmental Protection and Enhancement Act (EPEA)

- All facilities (municipal, industrial, etc.) are required to follow the terms and conditions per the EPEA approval
 - Sampling and testing requirements
 - Reporting requirements

- Water quality requirements are science-based numeric concentrations of certain parameters that are set to protect aquatic life, agriculture, recreation and aesthetics. Depending on the project location, water quality may need to meet one or more sets of environmental quality guidelines such as:
 - Alberta: Environmental quality guidelines for Alberta surface waters (2018)
 - Canada: CCME Water Quality Guidelines for the Protection of Aquatic Life

- Parameters tested for compliance will be dependent on the industry and the regulatory approval. These could include, but not be limited to:
 - pH
 - Oil/grease
 - COD
 - TSS

- AECOM has reviewed and completed continuous water monitoring programs across Canada and in the US:
- Theory: so long as regulation requirements are adhered to, guideline protocols are incorporated into program planning, accurate reporting deliverables are achieved and upset conditions are mitigated and managed, the implementation of the program is at the discretion of the permit holder.
- This would suggest that modifications to a monitoring program can be accomplished so long as approval standards are achieved.

Why Continuous?

Why Continuous?

- Clients have commented on challenges associated with: safety, human error, access, weather, reliability and cost
- Desire to identify and integrate innovative solutions into existing compliance systems
- Reduce time and cost for daily reporting
- Up to date compliance monitoring, digital solutions for information sharing across assets and client offices

Objectives & KPI of a Good Program

- Automated sampling and testing to assess compliance
- Reduce time, costs, human errors and safety concerns for sampling
- “Real time” monitoring of parameters and compliance so more immediate actions can be taken if parameters are out of compliance (e.g. close valves)
- KPIs to consider:
 - Level of accuracy desired
 - Maintenance requirements (calibration frequency, cleaning frequency, replenishing of reagents, etc.)
 - Testing frequency (sampling monitoring every 1 minute, every 1 hour, every 4 hours, etc.)
 - Capital and operational/maintenance costs

- Various technologies are available for continuous water quality monitoring
 - Different technologies use different testing methods to determine concentration of parameters
 - It is important to understand how testing is currently being completed, to ensure that proposed technology uses similar methods for consistency and compliance
 - It is important to understand site conditions at monitoring locations to ensure that proposed technology will work in the field (e.g. water temperature, water levels/submergence, moving/stagnant water, etc.)

Technology Options

- Real COD is a laboratory test
 - Uses a chemical oxidant, heat and additional reagents, and takes approximately 2 hours to perform

Titrimetric



Colorimetry



Monitoring Options - COD

- COD monitoring options
 - Real COD (lab test) or COD estimate
 - UV absorption used as an estimate for COD
 - Batch monitoring: Various sampling intervals/time between measurement options available
- What technology is currently used by the lab?
- Does client wish to proceed with similar testing as done currently?

- Oil and grease monitoring options:
 - Oil in water (OIW) content is typically measured by fluorescence, UV, spectrometer, etc.
 - Continuous monitoring
 - Cleaning and maintenance can vary, depending on technology. Some are self cleaning.
 - Some devices are submersion, others are sampling units
- What technology is currently being used by the lab? What parameter(s) is being measured?



- TSS and pH monitoring options:
 - Numerous options available; standard/simple test, readily-available technology
 - Continuous monitoring
 - Available in submersion or inline with pipe
 - No consumables required.

- Both sensors can be connected to one common transmitter. Transmitters can be ordered with multiple communication protocols.

Monitoring Options – TSS and pH

- TSS and pH probe maintenance requirements:
 - Maintenance typically includes monthly cleaning of sensor

pH

Maintenance task	90 days	Annually
Clean the sensor	X	
Inspect sensor for damage	X	
Replace salt bridge and fill solution		X
Calibrate sensor	Set by regulatory agencies or experience	



TSS

Maintenance task	Maintenance interval
Visual inspection	Monthly
Check calibration	Monthly (depending on environmental conditions)
Inspection	Every six months (counter)
Replace wiper shaft gaskets	Every year (counter)
Replace wiper profile	As indicated by counter (20,000 cycles)

- All sites will require:
 - Power supply to power sampling pump and instrumentation
 - Heated enclosure (shed) to house equipment
 - Communication method to send test results to plant control system for remote monitoring

- Options available for pre-fabricated enclosures with pre-installed monitoring/controls equipment



- Is there water movement at the sampling location?
- What is the typical water temperature range?
- Does the water freeze?
- How much will the water level at the sample point fluctuate?
- Are there area classifications of the sampling location on the pond?
(i.e. hazardous location classification code per Canadian Electrical Code)
- Integration with existing plant control system
 - What is the existing control system?

- Automated pond level monitoring
- Valve actuator for outlet control structure valves so operators can remotely open/close the valve
 - Could be integrated with sample data so valves are opened/closed automatically depending on test results

Thank You!

Interested in learning more about designing a continuous water quality monitoring program?

Please contact robin.reese@aecom.com