Continuous Data Production

Pilot Project at WSC

Francois Rainville

September 2018

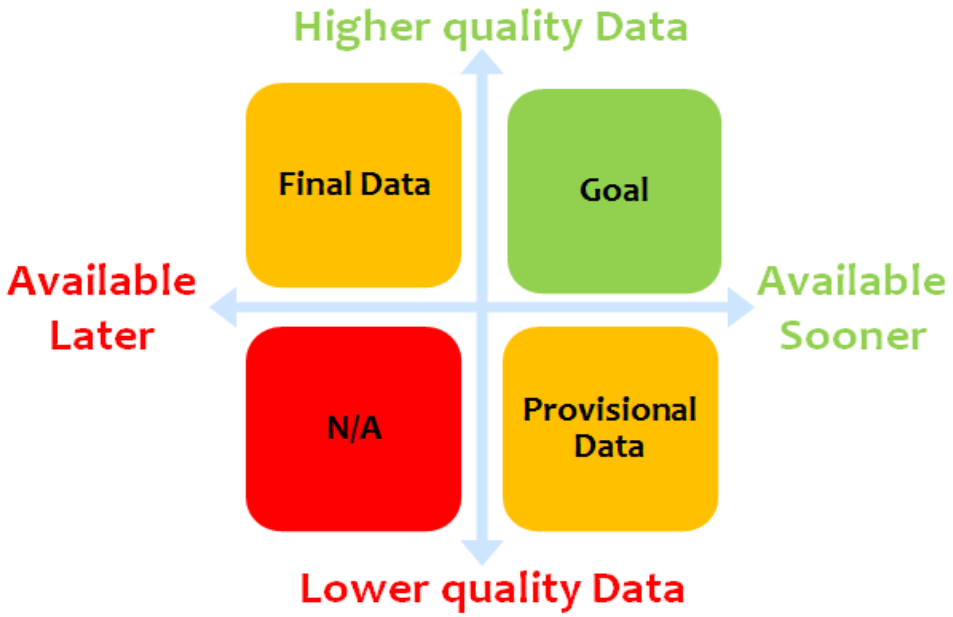
Hydrometric monitoring is in transition

Procedures must evolve

Worldwide, real-time is often equated with quick display of telemetry data:

- No process to accelerate quality control
- No standard for minimum acceptable quality

WSC wishes to redefine its production to provide better data faster



Current Conditions

- Conditions right now

Near Real-Time

- Data published right after their acquisition

Best Available

- Data as accurate as possible at any given time

Continuous Data Production

- Processes through which data are made as accurate as possible at any given time

Continuous Data Production Pilot

The Pilot started in June 2018.

Its objectives are to:

1) Define a process standard across all WSC
   - Solutions tested in 3 locations during all seasonal/operational changes
2) Assess costs and benefits
   - The goal is to be cost neutral to partners

Some of questions we hope to answer:

- Should data always be displayed regardless of quality?
- How should production adapt to events and stations?
- What field/office strategies could improve timeliness or efficiency?

The Pilot Teams

Located in 3 different offices:

1. Cranbrook, BC / 1 supervisor + 3 techs
2. Winnipeg, MB / 1 supervisor + 4 techs
3. Ottawa, ON / 1 supervisor + 5 techs

Coordination done by Headquarters:

- Modified procedures, Support tools, Performance metrics
- The 3 teams share progress through biweekly meetings

Contact A. Bouchard, C. Thomson, S. Moore, G. Walker or F. Rainville for details on pilot.

Pilot participants are asked to:

1) Apply results from site visits as soon as possible
   - Communicate electronic survey notes from the field
   - Share responsibilities to apply field results in a timely manner
2) Manage site conditions early and regularly
   - Use dashboard to track priorities and actions taken
   - Interpret and modify data as events occur
3) Optimize efforts to minimize validation/approval efforts
   - Modify review responsibilities to reduce redundancies

New Ways to Share Responsibilities

Data computation is a team responsibility for Pilot stations!

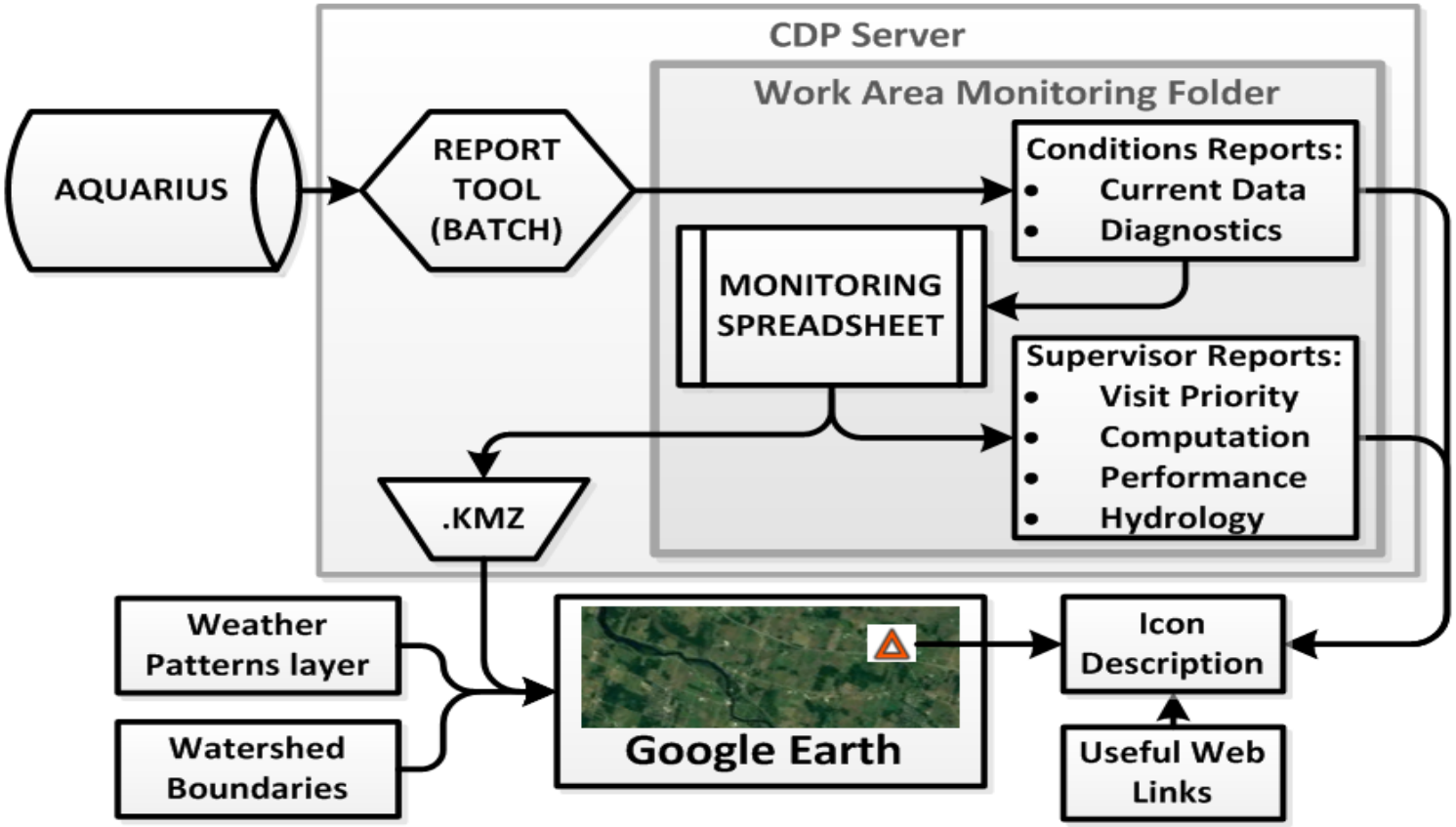
- Techs in the field must:
  - Capture results on electronic survey notes
  - Review results
  - Communicate results via Google Drive
- Techs in the office must:
  - Monitor their stations and stations assigned for techs in the field regularly (eyes-on-data)
  - Upload and apply field visit results when communicated
  - Peer review the application of field visit results on their stations

New Ways to Monitor Stations

A dashboard was built to track eyes-on-data and its conclusions.
It is a sandbox to experiment with new workflows and methods.

- Station monitoring spreadsheet
  - Excel files track data and health info, to set priorities for problems detected.
- WSC data computation system
  - AQUARIUS remains the place to compute data.
- Google Earth
  - Station info in context to help dispatch resources during crisis.
- Summary reports
  - Produced automatically, helps review data in minutes.
- Server space
  - All CDP information is managed in dedicated server space.

Dashboard General Concept



File Home Insert Developer Page Layout Formulas Data Review View Acrobat

S14

Office: Ottawa **Area:** Ottawa and Brockville **User:** F Rainville **Date:** (d/m/y) 19 Sep 2018 Click To Update Det

Metadata

Monitoring

Map ?	Station ID	Station Name	Station Output	Funding	Service Level	View Report	Computation Update	View Report	Station Health	View Weather	Hydrological Conditions	Visit Priority	Additional Station Monitoring Comments
Yes	02KF005	OTTAWA RIVER AT BRITANNIA			Enhanced		No Update		Health OK		Uneventful	Routine	spike in VB trace may be worth looking into
Yes	02KF020	SHARBOT LAKE AT OUTLET OF SHARBOT LAKE			Normal		No Update		Health OK		Uneventful	High	lots of panting in the HG trace (not normal) and running hot but may need a check of the sunsa
Yes	02LA004	RIDEAU RIVER AT OTTAWA			Enhanced		No Update		Health OK		Uneventful	Routine	
Yes	02LA006	KEMPTVILLE CREEK NEAR KEMPTVILLE			Enhanced		No Update		Health OK		Uneventful	High	battery is running hot suggest a check of the su normal) very low water level a mmts may be in
Yes	02LA007	JOCK RIVER NEAR RICHMOND			Normal		No Update		Health OK		Uneventful	Routine	
Yes	02LA015	OUTAOUAIS (RIVIERE DES) A HULL			Normal		No Update		Health OK		Uneventful	Routine	
Yes	02LA024	TAY RIVER IN PERTH			Enhanced		No Update		Health OK		Uneventful	Routine	
Yes	02LA027	RIDEAU RIVER ABOVE RIDEAU FALLS			Normal		No Update		Health OK		Uneventful	Routine	some spikes in the VB trace (maybe normal)
Yes	02LB006	CASTOR RIVER AT RUSSELL			Enhanced		No Update		Health OK		Uneventful	Routine	some spikes in the VB trace (maybe normal)
Yes	02LB008	BEAR BROOK NEAR BOURGET			Normal		No Update		Health OK		Uneventful	High	need a new N2 tank and keep an eye on the bat to be holding a new trend in the past month
Yes	02LB020	SOUTH CASTOR RIVER AT KENMORE			Normal		No Update		Health OK		Uneventful	Routine	some spikes in the VB trace (maybe normal)
Yes	02LB033	BECKETTS CREEK NEAR BECKETTS CREEK			Normal		No Update		Health OK		Uneventful	Routine	some spikes in the VB trace (maybe normal)
Yes	02MA001	LYNDHURST CREEK AT LYNDHURST			Normal		No Update		Health OK		Uneventful	Routine	some spikes in the VB trace (maybe normal)
Yes	02MB006	LYN CREEK NEAR LYN			Normal		No Update		Health OK		Uneventful	Routine	battery has been running hot with drops offs to
Yes	02MB007	ST. LAWRENCE RIVER AT BROCKVILLE			Normal		No Update		No Status		Uneventful	Routine	
Yes	02MB010	BUELLS CREEK AT BROCKVILLE			Normal		No Update		Health OK		Uneventful	Routine	
Yes	02KF015	GRAHAM CREEK AT NEPEAN			Normal		No Update		No Status		Uneventful	Routine	
Yes	02LB036	Becketts Creek near Cumberland Estates			Normal		No Update		No Status		Uneventful	Routine	some spikes in the VB trace (maybe normal)
Yes	02LA028	OTTAWA RIVER MAIN CHANNEL BELOW CHAUDIERE			Normal		No Update		No Status		Uneventful	Routine	some spikes in the VB trace (maybe normal)
							No Update		No Status		No Status	Routine	
							No Update		No Status		No Status	Routine	
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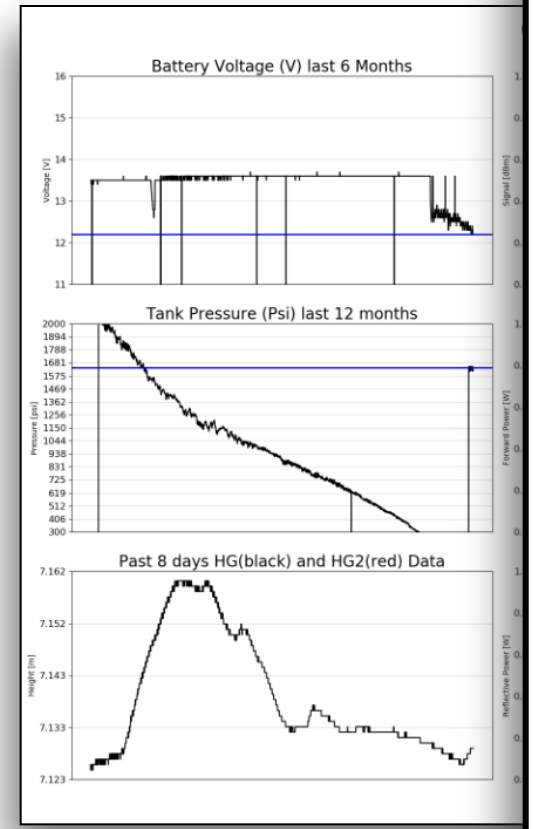
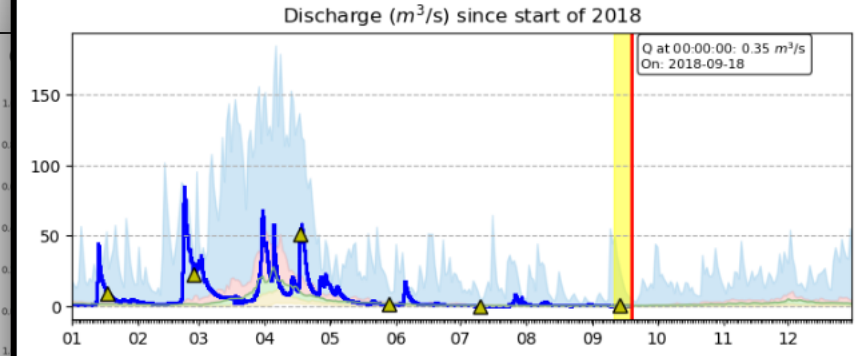
							No Update		No Status		No Status	Routine	
							No Update		No Status		No Status	Routine	

Station Monitoring | Computation History | Performance History | Hydrological History | Recommended Visit History | Comments History | Station Data



02LB006 CASTOR RIVER AT RUSSELL 2018-09-18



Last 8 Corrections and Notes

Applied	Type	Data	Comment
2 days ago	Drift	HG	SENSOR RESET -0.015m - Drift Correction
69 days ago	Infill	HG	DATA GAP FILL - Copy and Paste for Gap F
105 days ago	Drift	HG	SRC -0.016m - Drift Correction with Cali
139 days ago	Infill	HG	DATA GAP FILL - Copy and Paste for Gap F
154 days ago	Multi-Point	Q	ICE -- Multi-Point Drift Correction of (
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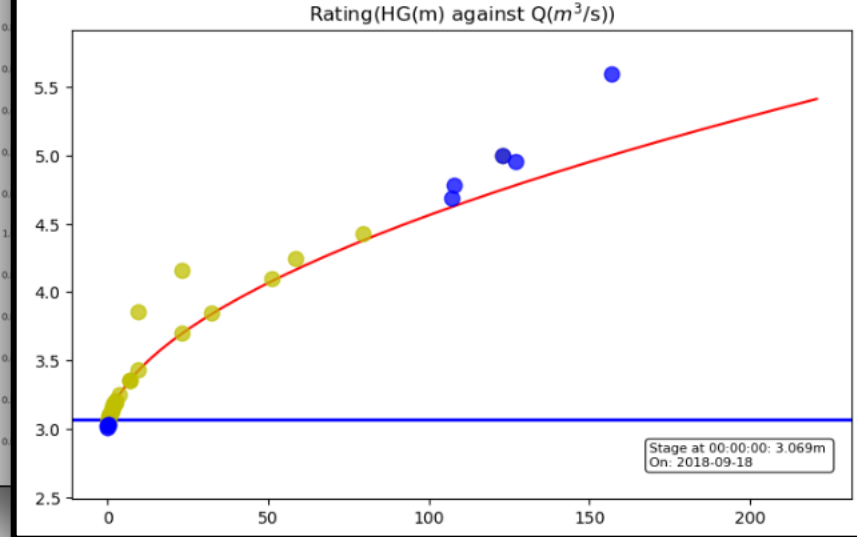
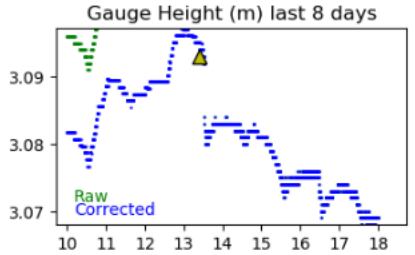
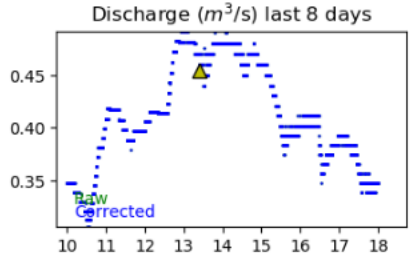
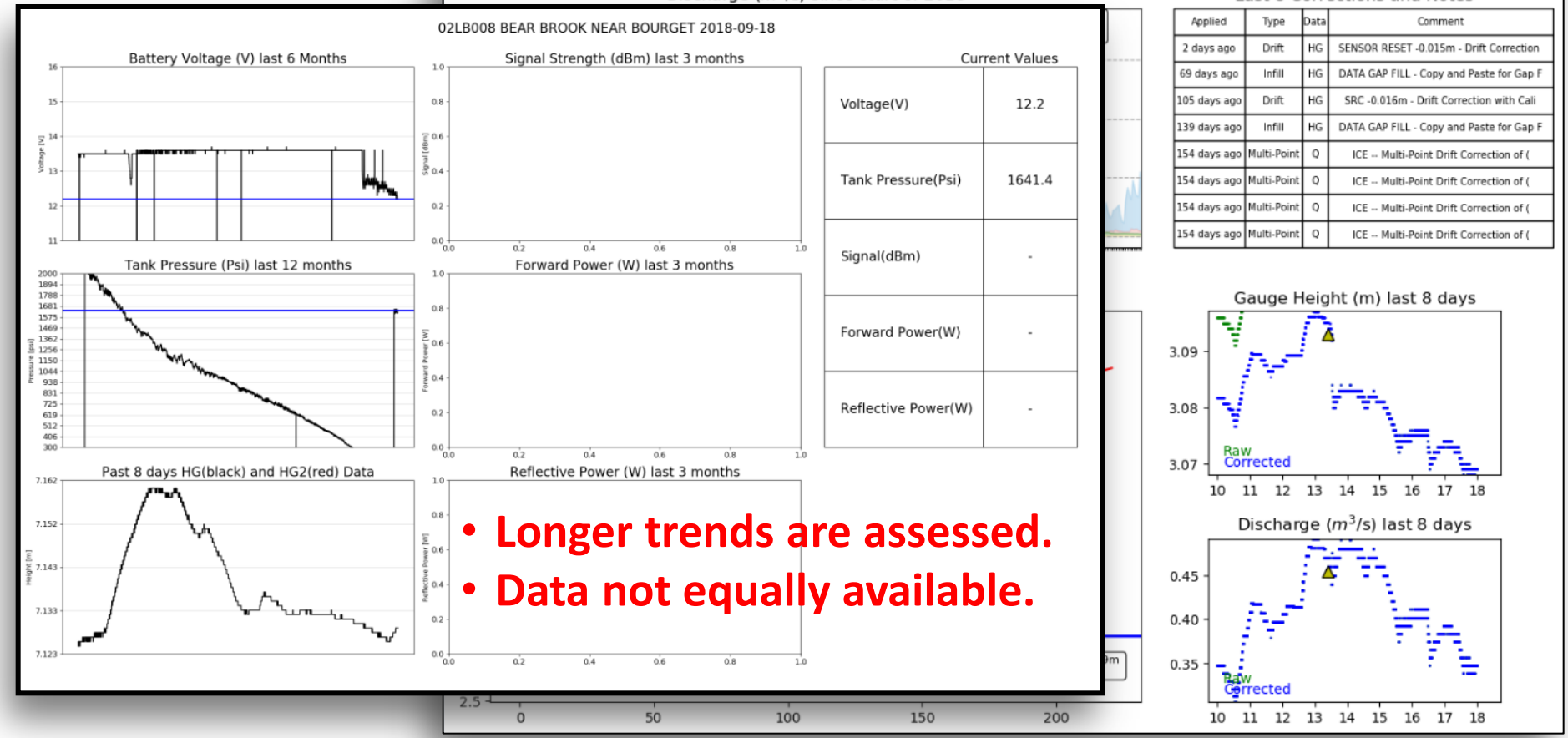







02LB006 CASTOR RIVER AT RUSSELL 2018-09-18
Discharge (m^3/s) since start of 2018
Last 8 Corrections and Notes
Applied | Type | Data | Comment
2 days ago | Drift | HG | SENSOR RESET -0.015m - Drift Correction
69 days ago | Infill | HG | DATA GAP FILL - Copy and Paste for Gap F
105 days ago | Drift | HG | SRC -0.016m - Drift Correction with Cali
139 days ago | Infill | HG | DATA GAP FILL - Copy and Paste for Gap F
154 days ago | Multi-Point | Q | ICE -- Multi-Point Drift Correction of (
154 days ago | Multi-Point | Q | ICE -- Multi-Point Drift Correction of (
154 days ago | Multi-Point | Q | ICE -- Multi-Point Drift Correction of (
154 days ago | Multi-Point | Q | ICE -- Multi-Point Drift Correction of (
Gauge Height (m) last 8 days
Raw
Corrected
Discharge (m^3/s) last 8 days
Raw
Corrected
02LB008 BEAR BROOK NEAR BOURGET 2018-09-18
Battery Voltage (V) last 6 Months
Signal Strength (dBm) last 3 months
Current Values
Voltage(V) 12.2
Tank Pressure(Psi) 1641.4
Signal(dBm) -
Forward Power(W) -
Reflective Power(W) -
Tank Pressure (Psi) last 12 months
Forward Power (W) last 3 months
Past 8 days HG(black) and HG2(red) Data
Reflective Power (W) last 3 months
• Longer trends are assessed.
• Data not equally available.

Visit Priority High
Data Updated
Station Health Issue
Hydrological Issue
Normal/No Status-Issue

02LB005
02LB036
02LB033
02LA027
02LA015
02LA028
02LA004
02KF015
02KF005
02KF011
02LB006
02LB020
02LA007
02KF012
02KF006
02LB017
02LA006
02KF001
02KF010
02LB007
02KF018
02LA024

02LB008 BEAR BROOK NEAR BOURGET

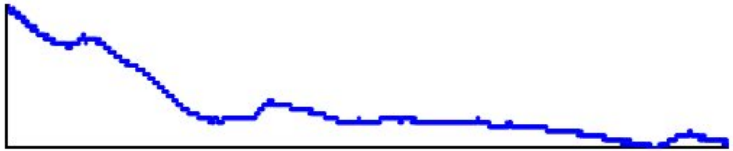
Station Output:
Station Costs:
Service Level: Normal

Station Health: Station OK or No Status
Hydrological Conditions: No Event or No Status
Recommended Visit Priority: High
(Reported by: CMP)
(Last Update: 17/09/2018)

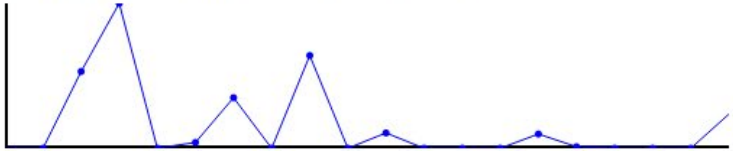
Additional Station Monitoring Comments:
need a new N2 tank and keep an eye on the battery as it seems to be holding a new trend in the past month

Current Data Report
Current Diagnostics Reports
Station Description Report
Weather Forecast at Station
Real Time Water Office

Last 5 Days of Stage Data (Max: 7.159m, Min: 7.126m)



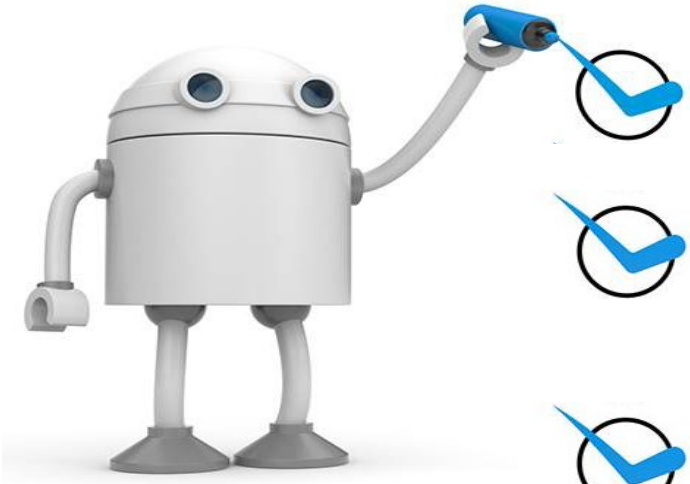
Last 5 Days of CaPA Data (Max: 0.00472mm, Min: 0.00000mm)



Directions: From here - To here

Image Landsat / Copernicus

More automations are desired



- Quickly process field results
- Guide validation
  (Alerts to focus interventions)
- Apply corrections
  (Range, spikes, offsets)

New WSC procedures emphasize need to adopt automated processes, either for validation, correction or estimation.

Methods such as “Machine Learning” are also assessed to automate rating development and associated shifts.

Next steps

- Measure changes in computation performance
  (e.g. Time from visit/problem to data correction)
- Identify factors influencing efforts at any station
  (When does a station require more attention?)
- Prepare for more complex periods
  (How to provide better data faster during estimations?)