



CASE STUDY

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City of Montreal Upgrade of Atwater and Des Bailleurs Water Treatment Plants

Sidestream Venturi Injection—Basin Nozzle Manifold Contacting System

Montreal, Quebec, Canada

The Problem: In 2001, a water quality audit revealed that two of the largest drinking water plants in the City of Montreal were out of compliance with Quebec's latest water quality rules. In response to the audit, the city upgraded the 1,400 MLD Atwater and the 1,280 MLD Charles J. Des Bailleurs (Des Bailleurs) Water Treatment Plants (WTPs) to comply with the water quality rules and meet the water quality goals.

The Atwater modification would require the installation of pre-filter ozone, coagulant and post filter UV to improve disinfection and remediate taste and odor compounds. Des Bailleurs, already using air fed ozone, would convert to oxygen fed ozone and add a pre-filter coagulant, post ozone UV and sodium hypochlorite generators to further improve disinfection.

The Solution: Both drinking water facilities were located in heavily populated areas. Consequently plant modifications had to be accomplished within their existing infrastructure footprints. This was especially true for the Atwater WTP. Commissioned in 1918, the facility is surrounded by shops and residential homes and has insufficient space to allow for the construction of a building to house new ozone contact basins. It was proposed that an existing filter gallery would be converted into four ozone contact basins using sidestream Venturi injection (SVI) with basin nozzle manifolds (BNM) for ozone contacting. However, Atwater's 1918 construction left no room for the installation of SVI skirts near the converted filter gallery. Instead, the ozone injectors were wall mounted with the injectors' pumps remotely located in another part of the building.

The addition of horizontal baffles converted the filter gallery into four serpentine contact basins. At each inlet a vertical BNM was designed to provide full flow contacting of the raw water as it passed through each contactor's inlet gate (FIGURES 1 & 2).

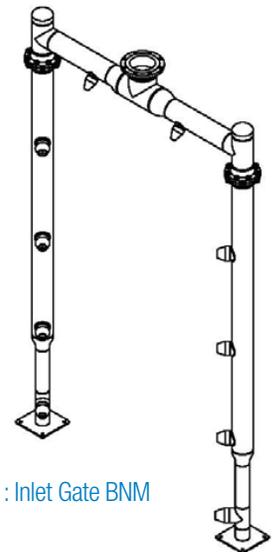


FIGURE 1: Inlet Gate BNM

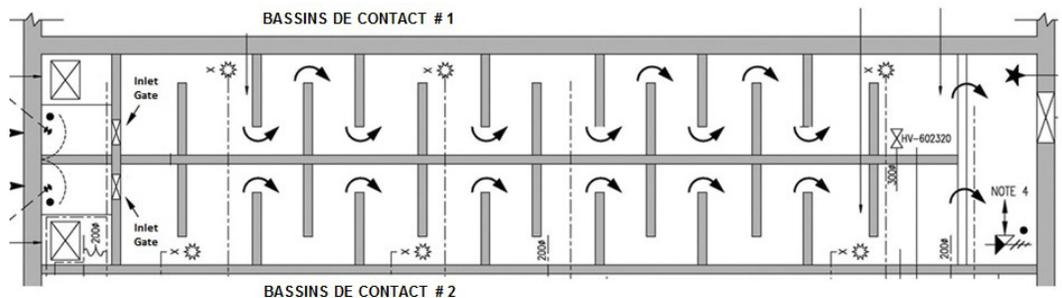


FIGURE 2: Atwater Contactors 1 & 2

Des Bailleurs' conversion from air to oxygen fed ozone required modification of the existing fine bubble diffusion (FBD) contactors. Each contactor's 500 l/s air fed ozone gas stream would become a variable 10 – 57 l/s gas stream once the conversion to oxygen fed ozone was completed. It was evident that a modification of the FBD grid would allow the plant to continue to operate with diffusers at full gas flow. However the almost 6:1 ozone turn down to a 10 l/s gas stream at the minimum plant flow and dosage, would make it difficult to completely contact the raw water flow using gas diffusion. The ozone turn down requirement, as well as the expected biannual FBD maintenance, motivated the design team to remove the gas diffusers and retrofit Des Baille's FBD basins with SVI-BNM ozone contacting systems.

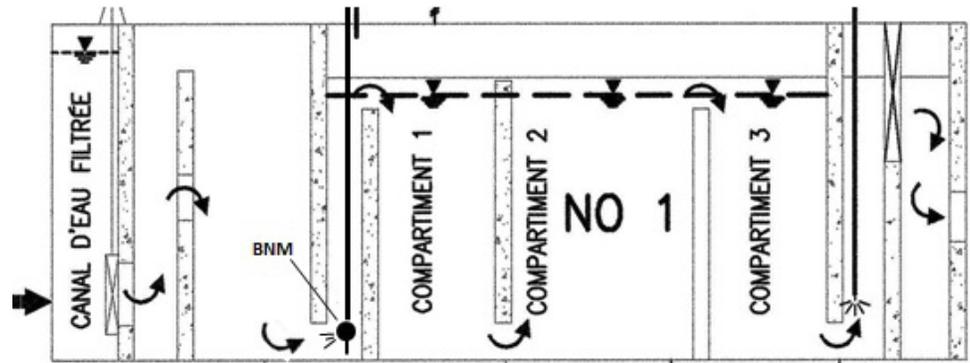


FIGURE 3: Des Bailleurs Contactor No. 1

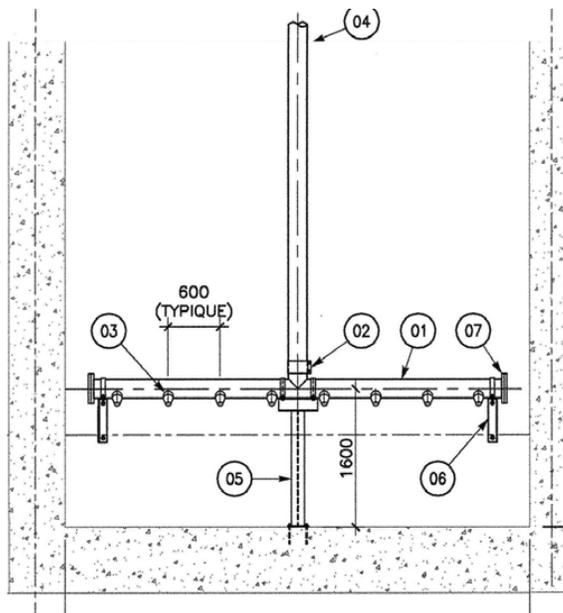


FIGURE 4: Basin Nozzle Manifold Installation Drawing

The retrofit of the Des Bailleurs' existing ozone contactors with the SVI-BNM gas injection contacting systems was easily accomplished. The room housing the basins' ozone destructs sat directly on top of the contactors and had plenty of open space to floor mount the SVI systems directly above each contactor's BNM. To ensure full flow ozone contacting, a tee type BNM was oriented to jet a high velocity plume, countercurrent to the entering raw water flow (FIGURES 3 & 4).

The Results: The final Atwater design called for an applied dosage of 1.9 –

2.53 mg/l at an ozone transfer efficiency of 95% using 10% wt. ozone to remediate taste and odor compounds and meet the disinfection goals. The Des Bailleurs design called for an applied ozone dosage of 1.05 – 3.2 mg/l and also set the requirement for an ozone transfer efficiency of 95% using 10% wt. ozone to remediate taste and odor compounds and optimize downstream UV transmittance. At the writing of this case study, all equipment has been installed at both facilities. Atwater still is in the process of commissioning its ozone system, and the Mazzei equipment at Des Bailleurs is up and running well. The SVI-BNM systems were provided with an ozone transfer warranty of 98% and 97% respectively for the Atwater and Des Bailleurs WTPs, however, the final performances of the ozone systems have yet to be recorded.



For additional information on how Mazzei can assist with your water treatment goals, contact us at:

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