Closed Loop Ozonated Water Mains Cleaning

'Utilita and Grenof Collaboration'

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Industry Collaboration to Solve the Client's Problem with an Environmentally Sustainable Solution

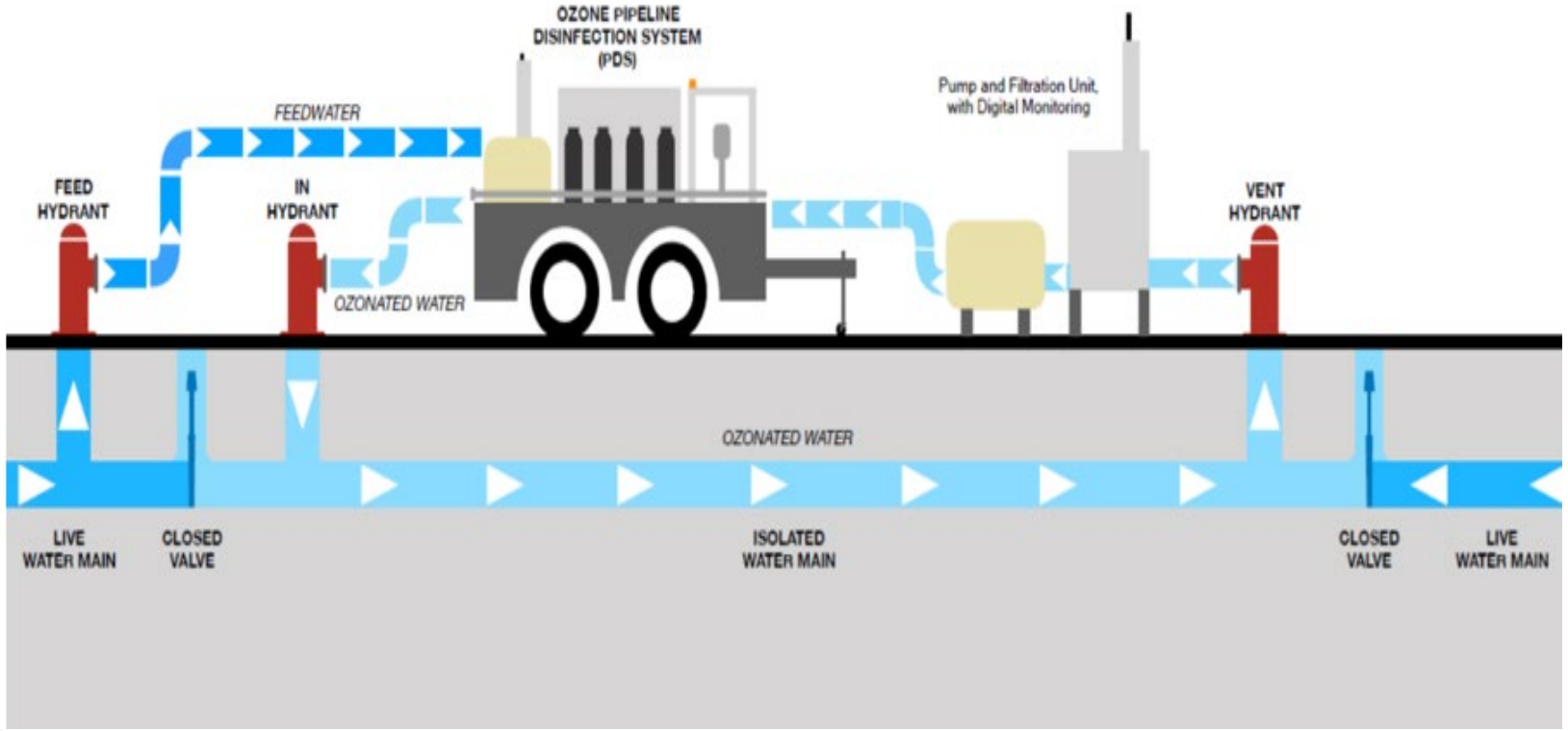
Case Study

- Successful trial of the new technology by cleaning 17 kilometres of water mains.
- The innovation combines ozonation, pumped scouring and media filtration in a closed loop that results in the water main being completely sanitised with almost no water loss.
- The challenge for both organisations was to modify the existing ozonation system to achieve the same or better results than current methods while also being cost competitive and result in minimal water loss.

How it Works

- High velocity ozonated water pumped in a closed loop

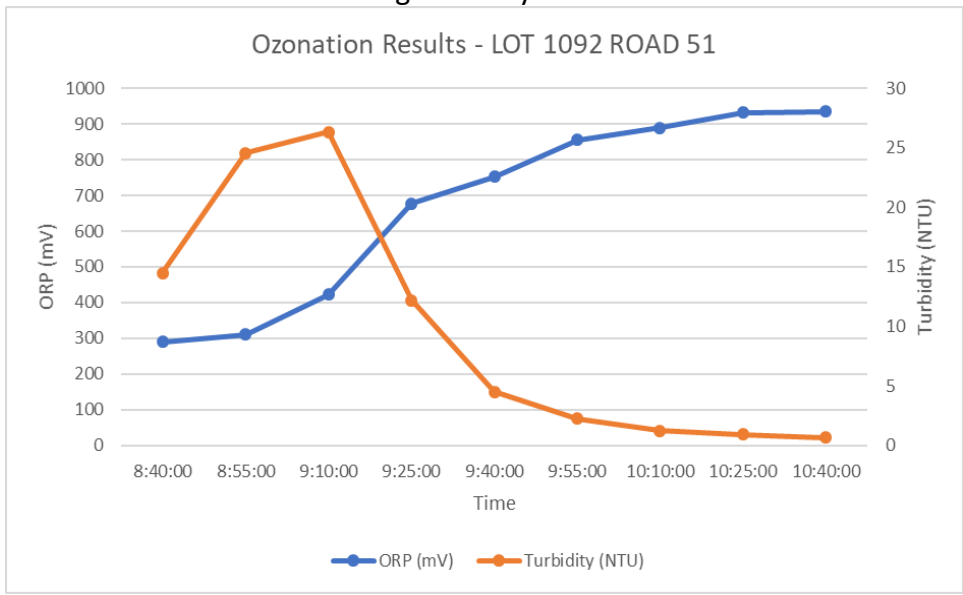
- Ability to be mobilised extremely quickly
- Completely sanitise sections of water mains from all pathogens
- Creates an enclosed loop providing insignificant water loss during the cleaning process
- Removes biofilm
- As the ozonated water with suspended particles recirculates through the filtration system, all particles of a size greater than 1 micron are captured



How it Works

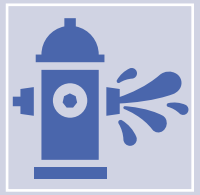
- The filtered clean water is recirculated until the water quality is proven using a digital monitoring station (DMS)
- DMS tests for turbidity and Oxidation Reduction Potential (ORP)
- Measurements are taken continuously throughout the process
- This method allows the Technicians to assess in real time the performance of the ozonation
- The data is recorded and provided in time lapse format to provide proof of improvement in water quality

Team Member Recording Turbidity and ORP Measurements

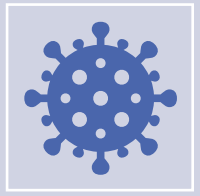


Example of Digital Monitoring Station Results

Results of Case Study



The increase of 10 to 30 percent in flow rate and static pressure within the water mains has numerous benefits for the client. Low velocity water mains inhibit the possibility of self-cleaning.



The improved flowrates and pressure within the network enables greater self-cleaning of the water mains and improved water quality for a longer period before the next sanitisation and scouring.

	Before		After	
Hydrant	Flow Rate (l/s)	Pressure (kPa)	Flow Rate (l/s)	Pressure (kPa)
1	10	500	25	500
2	11	500	20	500
3	20	400	23	420
4	26	280	28	300
5	20	380	26	380

Lessons Learned

- Shorter re-circulation loops due to undulating land
- Reducing the pressure in the main to allow pumped velocity to be increased
- Correct and verified isolations are key
- Pre-existing cleanliness of the main impacts time to clean
- Improvements in Digital Monitoring Station identified

Benefits in Comparison to Traditional Methods

	OZRIC	Closed-Loop Flushing	Chlorine	Scour Pigging	Ice Pigging	Air Scouring
Disinfects	99%	70%	70%	0%	0%	0%
Cleans Existing and New Mains	Yes	Yes	Yes	No	No	No
Tubercule Removal	Yes	No	No	No	No	No
Mechanical Pin-holing	No	No	No	No	Yes	Yes
Stress Fractures	No	No	No	Yes	Yes	Yes
Time to Complete	Low	Med	High	Med	Med	Med
1st Pass Completion Rate	99%	Clean Only	70%	Clean Only	Clean Only	Clean Only
Workplace Safety Exposure Risk	Low	High - Burns	High - Burns	Low	Low	Low
Customer Exposure	Highly Unlikely	Highly Unlikely	Possible	Highly Unlikely	Highly Unlikely	Highly Unlikely
Need to Flush After Process	No	Yes	Yes	Yes	Yes	Yes
Potential for Environmental Damage	No	Yes	Yes	No	No	No
Reconnection Time	Same Day	3 Days or more	3 Days or more	Same Day	Same Day	Same Day
Operational Cost Per Metre	Med	Low	Low	Med	High	Low

Additional Applications for Use

The technology could be also be used for a bacterial outbreak within a network. With the ability to be mobilised extremely quickly whilst isolating and completely sanitising sections of water main from all pathogens all whilst having minimal water loss.

	Survival in seconds (s) or hours (h) at ORP		
Pathogen	< 485 mV	550 – 620 mV	> 665 mV
E. coli O157:H7	> 300 s	< 60 s	< 10 s
Salmonella spp.	> 300 s	> 300 s	< 20 s
Listeria monocytogenes	> 300 s	> 300 s	< 30 s
Thermotolerant coliform	> 48 h	> 48 h	< 30 s

- Collaboration Grenof, Utilita and the client
- Grenof - Proven ozone technology adapted for a new application
- Utilita – Extensive network knowledge and excellent client management

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