

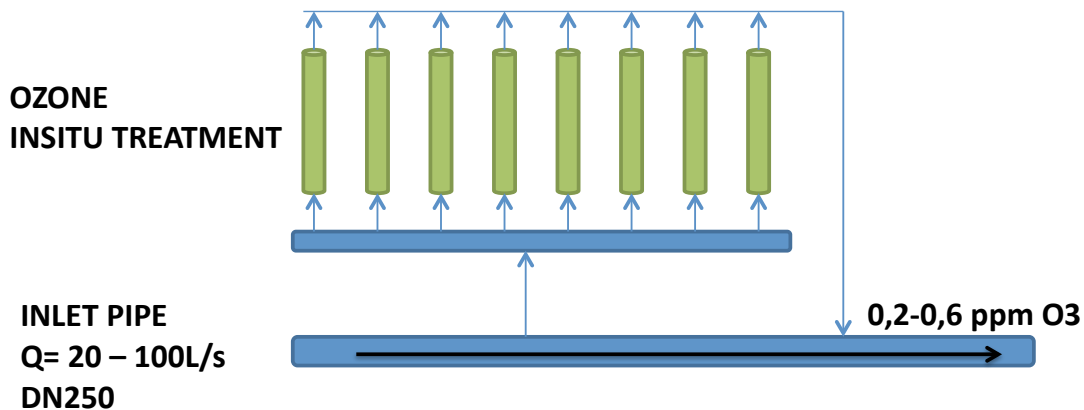
TEST TO REMOVE ZEBRAL MUSSELS WITH OZONE

The aim of the test is to remove veligers and post-veligers with ozone applying different dosing, from 0,2 to 0,6 ppm.

These test will be carry out at the ENDESA facilities in Spain. ENDESA, is the national electricity company that want to prove that with ozone we will removed zebra mussels.

With the successful of this proves they want to install ozone to treat the inlet water in the cooling system of the Thermal Plants.

They are interested in the in-situ technology because they would like to install in the inlet pipe in parallel.



Water Analysis:

PARAMETRO	RESULTADO	UNIDAD	CÓDIGO - MÉTODO
pH	8,01	upH	PNT.006 Electrometría
CONDUCTIVIDAD A 20°C	1023	µS/cm	PNT.007 Conductimetría
* TDS	654	mg/l	FM.019 Conductimetría
CARBONATOS	12	mg CO3/l	PNT.067 Titulación volumétrica
BICARBONATOS	199	mg HCO3/l	PNT.067 Titulación volumétrica
DUREZA TOTAL	406	mg CaCO3/l	PNT.069 Espectrometría A.A.
SULFATOS	239	mg/l	PNT.009 Turbidimetría
CLORUROS	127	mg/l	PNT.008 Titulación volumétrica
MAGNESIO	23,3	mg/l	PNT.069 Espectrometría A.A.
* SAR	2,0	---	FM.607 Método empírico
* CSR	Recomendable	---	FM.607 Método empírico
* CARACTERIZACIÓN DE RIEGO:	---	---	FM.607 Método empírico
* INDICE DE SCOTT	Tolerable	---	FM.607 Método empírico



TEST FACILITIES

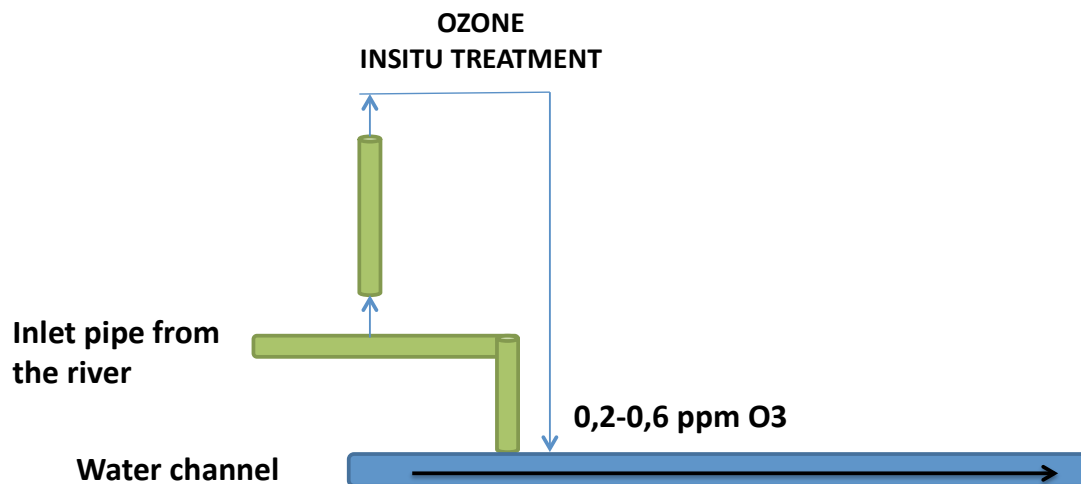
We have to type of test.

TEST N°1:

Water Channel:

INLET WATER: GREEN PIPE ABOUT 20 m³/h DN 65

The idea is to install an IN-SITU Ozone Generators in this inlet pipe. With a valve and a flowmeter we can control the flow rate of this pipe.



With the gates and the inlet flowrate we can control the contact time of ozone in the water.

TEST N°2:

Adult mussels. It's the same that the test 1 but in a small pools about 10L. Inlet water continuously flows.



In this case, I think that we have to use Ozone Gas Generators with a diffuser, because of we have to treat 8 at the same time.

Results

What we have found is that we have needed to apply doses of **0.10-0.20 ppm** to removed adult zebra mussels. With this dose of 0,20 ppm in a week the mortality rate is up to **65%** and in the second week up to **98%**. (dosing in continuous)

Doses lower than 0,10 ppm didn't affect the adult zebra mussels and with doses higher than 0.30 ppm the adult mussels close their valves and the mortality rate decreased. But if we sustain 0.3 PPM it will kill all the food and eventually they will die from hunger.