

# TOC REDUCTION USING NUCHAR® POWDERED ACTIVATED CARBON

## Lower Disinfection By-Product Formation and Improve Water Quality

### MWV NUCHAR POWDERED CARBONS AND THE ORANGE WATER & SEWER AUTHORITY

For over 5 years, MWV Nuchar powdered activated carbon has enabled Orange Water & Sewer Authority (OWASA) to meet water quality targets in the Carrboro-Chapel Hill community. Greater than 70% reduction in TOC (total organic carbon) is achieved in the OWASA water treatment process by using wood-based carbon in combination with coagulant and other chemicals. A temporary switch to a competitive powdered carbon resulted in less than 58% TOC reduction in the finished water.

The target set by the EPA for OWASA is 50% TOC removal. Reducing TOC beyond the EPA target also decreases trihalomethane and haloacetic acid levels, by-products of chlorine disinfection. Chlorine reacts with organic material in the raw water, forming disinfection by-products, which are regulated by the EPA.

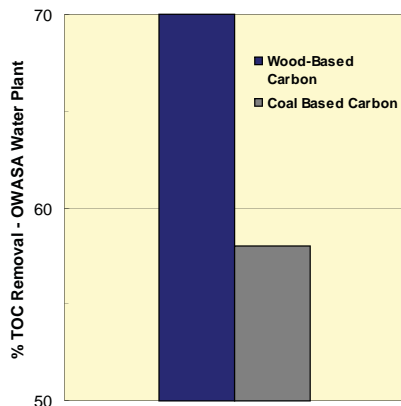
OWASA has a strong history of providing high quality water to its customers by producing water that exceeds state and federal drinking water requirements and through voluntary participation in the AWWA Partnership for Safe Water. OWASA has received the AWWA Director's Award consecutively for 4 yrs, as a reward for their voluntary effort to provide safe, clean drinking water with low turbidity.

Nuchar activated carbon contributes to the consistent production of high quality drinking water for OWASA customers.

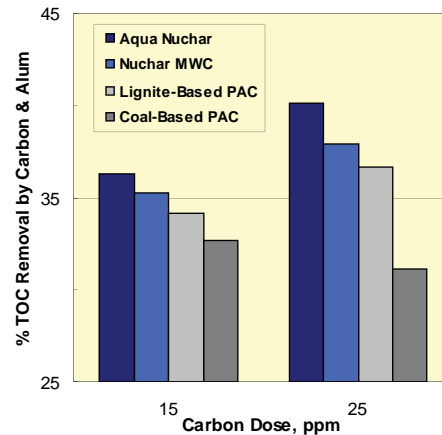
“Wood-based activated carbon provides the adsorption we need to remove TOC in our drinking water treatment process to meet disinfection by-product requirements and treat taste and odor episodes. Actual carbon performance in our process exceeds TOC removal as predicted by lab-scale jar testing.”

- KENNETH LOFLIN, OWASA WATER SUPPLY AND TREATMENT MANAGER, CARRBORO, NC

NUCHAR TOC REMOVAL IN WATER TREATMENT PROCESS



NUCHAR TOC REMOVAL MWV LAB-SCALE JAR TEST RESULTS



## MWV Nuchar powdered activated carbons have been used for many years in the U.S. drinking water industry to control unpleasant taste and odors, particularly MIB and Geosmin.



WICKLIFFE, KENTUCKY CARBON MANUFACTURING PLANT

MWV Nuchar powdered activated carbons have been used for many years in the U.S. drinking water industry to control unpleasant taste and odors, particularly MIB and Geosmin. Adsorption of TOC is another performance advantage of Nuchar powdered activated carbons. Other benefits of Nuchar carbons include high surface area, high pore volume, increased suspendability, and low ash content. Pipe or process scaling does not occur in water treatment plants using MWV carbons.

MWV Specialty Chemicals has over 90 years of activated carbon experience and technical expertise. MWV domestically manufactures wood-based activated carbon from renewable tree resources in Covington, VA, and Wickliffe, KY. The carbon products supplied to the water treatment industry meet the following requirements:

- ANSI/AWWA B600-05
- NSF/ANSI Standard 61
- Food Chemicals Codex

### ROLE OF MWV NUCHAR POWDERED CARBONS

Nuchar wood-based carbons have a large surface area and extensive pore structures. These properties enable the adsorption of a variety of dissolved organics, including atrazine.

Powdered carbon, like Nuchar, is typically added near the raw water intake to provide contact time for adsorption, prior to coagulation and disinfection. Powdered activated carbon is later removed from the process as part of sedimentation or filtration. In some circumstances, the use of powdered activated carbon offsets the need for intensive capital installation of deep granular carbon beds.

### WHY ARE WATER TREATMENT PLANTS REDUCING TOC?

According to the EPA website the Stage 1 Disinfection By-Product Rule is already in effect and requires some water treatment plants to remove up to 50% TOC from raw water. EPA also regulates certain disinfection by-products, such as trihalomethanes (THM) and haloacetic acids (THA).

Staged implementation is underway for the Long Term 2 Enhanced Surface Water Treatment Rule and the Stage 2 Disinfection Byproduct Rule. These rules strengthen protection against microbial contaminants and reduce potential health risks associated with disinfection by-products. The Stage 2 Rule is a tighter means of control and further reduces risk to water consumers. Many water treatment plants are required to remove specified percentages of organic materials, measured as total organic carbon (TOC) to reduce the opportunity for forming disinfection by-products later in the treatment process or in the distribution system. TOC removal targets are specific to each water treatment plant and raw water source.

### COMPARISON OF TYPICAL CARBON PROPERTIES

Carbon Type	Surface Area m <sup>2</sup> /g	Pore Volume mL/g	Ash Content wt%	Iodine Number mg/g
Nuchar Wood-Based Carbon	1200 - 1800	1.2	4 - 6	900 - 1200
Coal-Based Carbon	800 - 1000	0.5	4 - 10	800 - 1100
Lignite-Based Carbon	400 - 600	0.5	30 - 35	400 - 600