



Affordable Arsenic Control

ARSENIC REMOVAL

Orca Water Technologies designs and manufactures custom water treatment systems for the small to medium sized potable water supply companies. Having over 100 years combined experience in the water treatment field, Orca Water Technologies has the ability to solve most water treatment issues. Our expertise in this area is recognized globally.

Currently, we are proactively developing cost effective and efficient technology to meet the new EPA arsenic guideline. We take our designs from concept to reality faster than most companies in the field.

Orca Water Technologies will evaluate your system starting with on-site jar testing and pilot studies. A detailed preliminary report will outline the various treatment options including the efficiency and the applied cost of each option. We evaluate and consider the entire project right up to and including sludge disposal costs. We don't leave you with any "surprises".

DESCRIPTION OF EQUIPMENT

The KEMLOOP system is a standard, full-scale, skid mounted system supplied by ORCA for the treatment of groundwater. The KEMLOOP system is a self-contained, complete system that connects to either a pressurized water supply (20-75 psi) or to a non-pressurized supply source. If the source is not pressurized, a pump, supplied with the unit, is used to pump the water through the treatment system. The unit delivers filtered water to either a site supplied collection tank or other drainage location. The systems are designed to

treat flows from 10 gpm with a maximum capacity of 900 gpm.

The KEMLOOP system is fully automated and programmed to control all aspects of plant operations. The control system will automatically initiate backwash cycles based on three criteria; 1) differential pressure across the media filter 2) treated water turbidity compared to raw water turbidity 3) time or volume set by the operator. The backwash cycle time will be dependent on the water quality conditions and the amount of solids generated in the coagulation process.

The control system is a programmable logic control and personal computer (PLC/PC) based controller with data logging, trend display graphs, and a remote monitoring modem connection for off-site technical support. The computer monitors and records data from the system operation. All this information is available to the on-site operator and to remote users.

ENGINEERING AND SCIENTIFIC CONCEPTS

Coagulation and precipitation of arsenic using iron as a coagulant is a well-known basic technology for arsenic removal. Various forms of iron or aluminum are added to water to an optimal level to form metal hydroxide floc. As part of the coagulation process, arsenic is co-precipitated with the iron or aluminum. The mixing process helps to build the floc into larger particles that can then be removed by various forms of particle removal (settling, filtration etc.) The KEMLOOP process is based on chemical coagulation, a proprietary mixing loop to optimize the coagulation process, and granular media filtration with no intermediate solids separation process.

ARIZONA CASE STUDY

We have recently concluded a pilot plant study for arsenic removal in Southwestern Arizona. At this particular location, water arsenic levels reach 24 ppb. Waters that have high levels of arsenic often have other constituents that make the water difficult to treat and interfere with normal treatment programs. Drawing on our extensive experience in the water treatment field, our engineers and chemists designed a custom **Kemloop 1000** to meet the existing conditions (see picture below).



As with many situations, space was a premium at the site so we had to build a compact system to meet those requirements without sacrificing efficiency. Utilizing our many years of engineering expertise, the **Kemloop 1000** was custom fitted to the existing layout.

The location was remote so consideration had to be given for the operation of the plant. Plant operators could not afford to spend many hours on operation and maintenance. The **Kemloop 1000** is built with very few moving parts so maintenance is at a minimum. The plant was fitted with a remote control component so the plant could be monitored and operated through the internet.

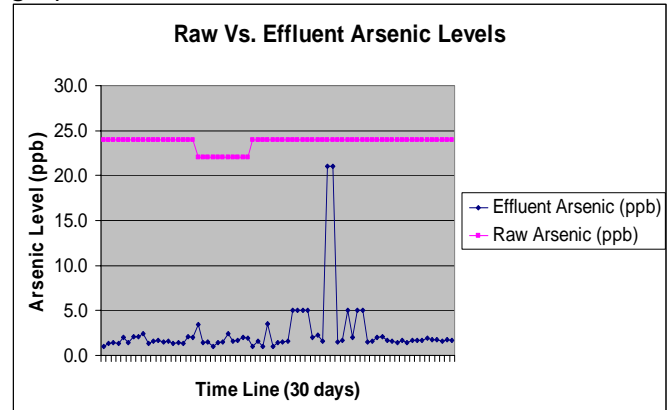
PILOT TEST

We tested the plant at varying flow rates from 12 gpm to 20 gpm. A raw water analysis is shown in Table 1.

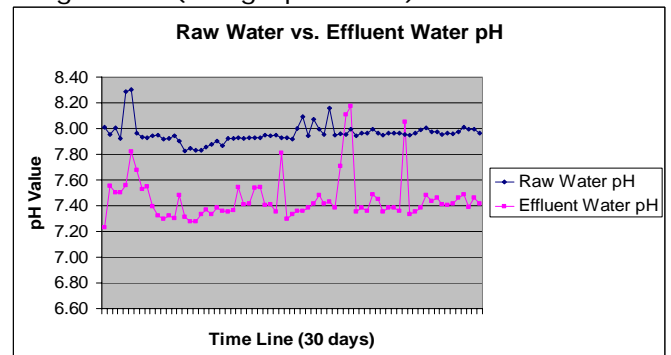
TABLE 1

CONTAMINANT	AMOUNT (mg/l)
Fluoride	3.5
Nitrate	1.1
Sulfate	130
Alkalinity (as CaCo3)	74
pH	8.1
TDS	1700
Iron	<.05

The **Kemloop** has been able to reduce the arsenic levels in the water from 24 ppb to less than 2 ppb on average. Please see graph below.



The pH does not require adjustment prior to treatment. The only pH reduction comes from the addition of the iron salt used for coagulation (see graph below).



CONCLUSION

The **Kemloop 1000** is very efficient and is not affected by other water contaminants and pH adjustment is not necessary. Operation costs are very competitive and the system can be operated remotely to minimize operator attention. The **Kemloop 1000** is an excellent solution for small utilities looking for a low cost, simple, and effective system for removal of arsenic in source water.

To discuss treatment options for your water, please contact Orca Water Technologies, LLC at 1-805-639-3071. For more information, please visit our website at www.orcawt.com.