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Potable Water Treatment

Design, construction, installation and maintenance of waste treatment plants

General Information

The treatment to produce potable water, for human consumption, is a process, for the removal of contaminants from untreated natural water. During this treatment process, substances like suspended solids, bacteria, algae, viruses, fungi, fertilizers, minerals such as iron, manganese and heavy metals are been removed. Also, it is a common practice to add in the treated water disinfectants before its distribution to the water supply network, in order to ensure that the potable water will go to the consumption without any bacteriological contamination. World Health Organization (WHO) guidelines, are generally followed throughout the world for drinking water quality requirements. In addition to the WHO guidelines, each country or territory or water supply body can have their own guidelines for consumers to have access to safe drinking water.

Treatment stages

The stages of the water treatment plant using the Geochemical treatment method GACS are:

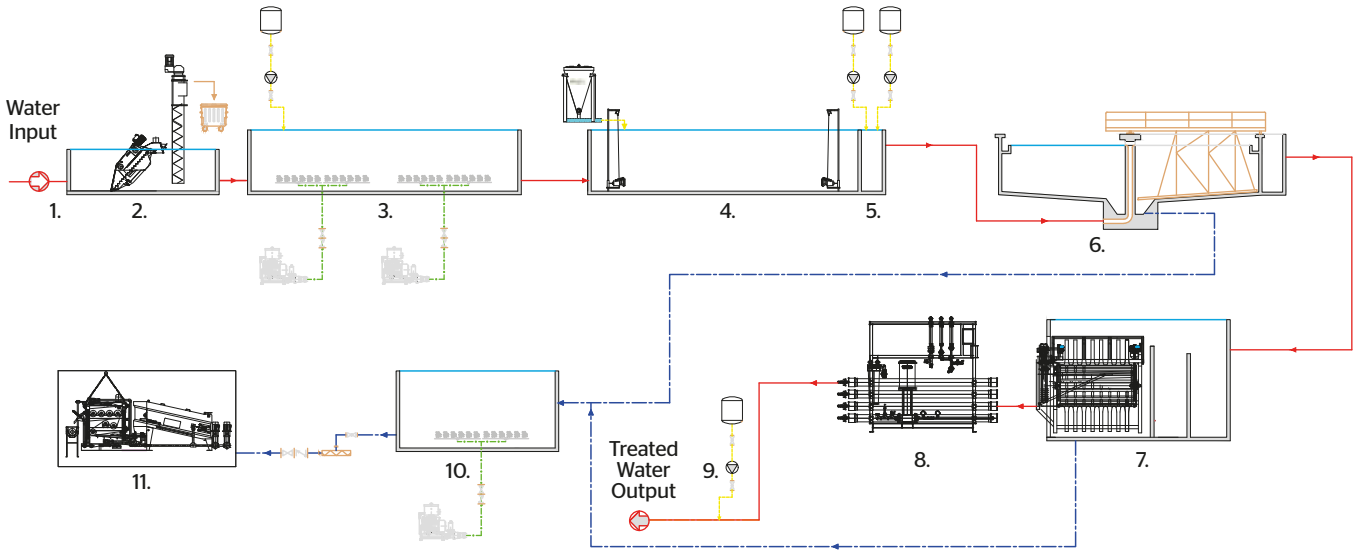
1. Flow measurement
2. Pre-Treatment (Screening – Sand Separation)
3. Chemical Oxidation
4. Geochemical Treatment
5. Coagulation - Flocculation
6. Sedimentation
7. Mechanical Filtration
8. Reverse Osmosis* (Required only under specific conditions)
9. Water Chlorination
10. Sludge thickener - dewatering

c/n	Parameter	Unit	Initial water	Water after treatment*	Upper limits for human consumption water
1	pH	-	6.59	7.10	6.50 – 9.50
2	NO3-	mg/lt	20.10	4.20	50.00
3	SO4-2	mg/lt	240.00	169.00	250.00
4	F-	mg/lt	0.337	0.14	1.50
5	CN-	μg/lt	8.00	1.00	50.00
6	NH4+	mg/lt	N.D.**	N.D.**	0.50
7	B	mg/lt	1.50	0.62	1.00
8	Al	μg/lt	45.00	4.00	200.00
9	Cd	μg/lt	< 20.00	< 5.00	5.00
10	Cr (total)	μg/lt	26.00	< 5.00	50.00
11	Cu	mg/lt	6.18	0.88	2.00
12	Fe	μg/lt	2,690	59.00	200.00
13	Mn	μg/lt	27.00	9.50	50.00
14	Ni	μg/lt	10.00	2.10	20.00
15	Pb	μg/lt	240.00	4.60	10.00

Water after treatment*: Typical sample
N.D.**: Non Detectable

Technical Characteristics

Technical Description of a typical Potable Water treatment unit using the Geochemical Active Clay Sediment method (GACS):



Legend:

Wastewater Line:
Air Line:
Consumable Line:
Sludge Line:

Potable Water Treatment plant using GACS including the following stages:

1. Flow Measurement
2. Screening / Desanding
3. Aeration - Chemical Oxidation
4. Geochemical Treatment
5. Coagulation - Flocculation
6. Settling Tank
7. Filtration
8. Reverse Osmosis (Optional)
9. Chlorination
10. Sludge Thickener - Storage
11. Sludge Dewatering

1. Flow Measurement : In this type of treatment plant is necessary to measure, in real time, the incoming water flow to the plant. Flow measurement is accomplished with the use of proper flowmeters connected to SCADA systems. Water flow is essential for the proper operation and the performance of the plant.

2. Pre-Treatment (Screening – Sand Separation) : In this stage sand and bigger size objects like rocks are been removed, with the use of proper E/M equipment. Usually compact screening and sand separation unit are used in this stage. Sand and other materials are been removed from the water, before the main treatment in order to protect the E/M equipment from any damage.

3. Chemical Oxidation : The next treatment stage is the Chemical Oxidation stage where the oxidation of the pollutants is taking place. Air is used to oxidize the pollutants using blowers and also chemical are added to speed up the process.

4. Geochemical Treatment : Geochemical treatment stage is the main treatment stage where the pollution load is captured by the geopolymer materials. Geopolymer materials are added in proper quantities with the use of dosing equipment. Stirring system are used to homogenized the fluid.

5. Coagulation – flocculation : Next stage is the coagulation – flocculation stage, where coagulant and flocculant are added to the water. These chemicals are necessary to reduce the settling time of the sludge in the settle tank.

6. Sedimentation : In this stage separation of solid and liquid phase of the water in taking place. Solids are settling to the bottom of the tank and the treated water overflows from the top of the tank. The produced sludge is stored to the sludge storage tank and the treated water goes to the filtration unit.

7. Mechanical Filtration : After sedimentation, treated water goes to a fully automated, mechanical filter, in order any remaining suspended solids in the treated water to be removed. Backwash of the filter goes to the sludge storage tank.

8. Reverse Osmosis* (Optional stage) **:** Reverse osmosis unit is optional and can be used only in cases that the conductivity of the treated water is high and must be lower, in order to reach the potable water standards, for human consumption.

9. Water Chlorination : Final treatment stage before treated water go to the water supply network is the chlorination. Chlorination is necessary for the hygiene of the treated water, which should have a zero microbiological load, at the end of the treatment process. So, after mechanical filtration is completed and the pollution load of the initial water is captured, NaOCl is added to the treated water, in appropriate proportions in order to comply with the legislation standards. After chlorination treated water can be used safely as human consumption water.

10. Sludge thickener - dewatering : Produced sludge in the settling tank and from the operation of the mechanical filter is stored to the sludge storage tank. For the reduction of sludge humidity, a filterpress or a decanter can be used. Inert sludge after dehydration can be disposed safely according to the legislation.

- All of the stages described above are fully automated and controlled through a Programmable logic controller (PLC).
- On-site control and interference with the operation of the unit is done via a touchscreen HMI (Human-machine interface).
- Supervisory control and data collection is done through the SCADA system (Supervisory Control And Data Acquisition).
- Remote control and operation of the unit is possible. Wireless communication for remote control can be done via mobile phone, tablet and PC.

Contact information

Industrial Area of Thessaloniki Sindos Greece Block 8/3A-10 Post Office Box 1086
Postal Code 570 22 T: +30 2310 251243 E: info@zeologic.gr
www.zeologic.gr