

**Water Pollution:  
Desalination Processes to Clean the Water Supply**

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Have you ever spilled some of your motor oil on the breezeway when giving your car an oil change? Do you live near a factory with large amounts of smoke coming from the production of goods? Have you ever wondered where the chemicals go? These are some things many individuals have to deal with on a daily basis. Our children and adults are breathing and drinking contaminated water because of the constant dumping of hazardous chemicals, many times leading to disease, such as cancer, asbestos, and many others, that could have been easily avoided. There are a number of alternatives utilized for conserving our nation's water supply that might be shared with other countries so that they can fix these same issues in their country. What steps can we as individuals take to clean the earth's water supply by desalination so that our children will have cleaner drinking water? Processes such as reverse osmosis, high-grade water recycling, and multi-stage flash distillation are used to create cleaner drinking water for human consumption.

*Desalination* is the process in which salt and excess minerals are removed from water ("Desalination," 2008). One suggestion that can be taken is **reverse osmosis** technology. General Electric predicts that by 2025, water will exceed its supply by 56% due to consistent droughts, shifting of populations, and water need for industrial growth ("Desalination," n.d). *Reverse osmosis* is the process involving water being forced under pressure through semi-permeable water treatments ("Water Treatment Process," n.d.). Reverse osmosis is different from the regular osmosis process as it depends on the membrane in which pressurized water is forced. This treatment is primarily used in sea water to desalinize it and brackish water for its conversion into potable water. Places like South Africa and India are only a few countries that reverse osmosis can use this type of desalination treatment the most. Other countries use this method with successful

results. An example of this method would be in the United States. Across the nation and the world, the need for water is leading to a greater reuse of treated supplies. This summer, the village of Cloudcroft, New Mexico, with its 1,000 population at an elevation of 9,000 feet, will install a water recycling system that includes a membrane bioreactor and reverse osmosis with ultra-filtration technology (Goldstein, 2006). In addition to the filtration of sea water, this process is used on other mineral contaminates. Men, women, and children alike drink water from the ponds and lakes that animals drink from also. Reverse osmosis is only one of the many treatments used to filtrate our water supply; scientists use this method in combination with others, such as *high-grade water recycling*.

Another treatment that can be used for desalinating water is *high-grade water recycling*. *High-grade water recycling* mainly refers to the natural process itself. By recycling our water, we are preserving it for future use by future generations currently in the U.S.; public and domestic uses represent only about 12 percent of total water demand. In places like Florida, about 50 to 70 percent of potable water consumption is used outside, principally for irrigation (Bastian, 2008). This means that the need for renewing our water supply is vital to continue a life with healthy and clean drinking and occupational water. Most of the world considers the United States lucky because of the endless resources and coming-of-age technology we reveal every year. "The Water Reuse Association has estimated the amount of water reused in the U.S. in 2004 to be ~2.6 bgd and projected this amount would increase to about 12 bgd by 2015" (Bastian, 2006). An increase in population means an increase in water usage, and the coming of times when uneducated, ignorant individuals are still dumping toxic chemicals and waste into our world's drinking water supply, bigger measures to ensure a future of cleaner water supplies need to be implemented as

soon as possible. Laws have already been enacted to ensure that any law breakers will pay the price for committing the offense. One such law is the Clean Water Act (33 U.S.C. §1251), which is the statute that employs a variety of regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water" (Clean Water Act of 1972, 2012). Regulations and standards for the Clean Water Act of 1972 are set by U.S. EPA. Standards for marine sanitary devices are developed and enforced by the U.S. Coast Guard in compliance with the Clean Vessel Act of 1992. International agreement on sewage disposal from marine vessels has not been reached (Baasel-Tillis & Tucker-Carver, 1998). Although there are laws governing and protecting our water, we still have a long road ahead of us.

Another process that we may take to make the waters of the world cleaner is *multi-stage desalination* (MSF). "**Multi-stage flash distillation** is a method of distilling seawater by flashing a part of the water into steam in multiple stages of what are in essence regenerative heat extenders" ("Multi-Stage Flash Distillation," n.d.). This process is used mainly through the use of heat in combination with water. *Multistage stage flash distillation* for desalination is carried out in a pressure vessel that is divided into numerous sections that have decreasing pressures and temperatures (Scott, 2011). In a study conducted by H2O Solutions, they found that MSF distillation facilities produce over 80 percent of all desalinated water in the world ("Multi-Stage Flash Distillation," n.d.). More facilities like these would put a big dent in the contaminated water issue this world faces. The use of this method, with the help of mother nature, will take

some time off the cost and time of use with quality results.

In closing, all of these methods: reverse osmosis, high-grade water recycling, and multi-stage distillation will help out the world to desalinize our waters in one way or another. The most important part of all of this is that we must start the process now so that our children and our children's children will have clean drinking water to wash their clothes, farm with, swim in, and most importantly, cook with. Water is said to be our life's blood. Let's take more care of it so that it will last for the duration of all of our lifetimes.

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