

Solar Solution To Safe Drinking Water

Solar Powered UV Disinfection Plant

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The solar powered UV disinfection plant was developed and installed at Haiderpur Waterworks, Delhi Jal Board. It was evaluated for treatment of microbial contamination of western Yamuna canal water for different microbial count and turbidity and flow rates.

Water is an essential human need. But in today's milieu it is difficult to get a pollution free and clean source of water supply. It has, therefore necessitated to treat water to make it potable. The problem of drinking water supply in the cities has been addressed successfully by disinfection by chlorination and by a centralized water supply system. However, there is no centralized system of drinking water supply in rural India. The objective of this work has been to design and develop a drinking water plant which can supply safe and reliable water to villages.

The rural areas of India are generally devoid of industrial

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The system of UV disinfection method run at 12 volt DC power is capable of supplying safe and reliable drinking water in the villages with the use of solar power on a sustainable basis.

pollution except in some very specific pockets. However, microbial contamination of drinking water remains the chief source of water borne diseases. Remote areas suffer the most as the erratic power supply denies access to safer ground water. With this background the present work of design and development of solar power drinking water UV disinfection was undertaken.

As chlorine has been linked to a number of health problems due to formation of trihalomethanes which are possible human carcinogens and also require long contact time for disinfection, UV disinfection method has been preferred. Since villages have no pressurized water supply available, the disinfection unit chosen is a gravity flow type which delivers 900 litres/minute. This enables the unit to disinfect water available from wells as well as bore-wells. The unit requires only 50 watts of power which can be met by solar photovoltaic power.

A 70 watt peak power solar module to suit all weather conditions has been used to charge the battery-bank. The power to the disinfection unit is provided by the battery-bank (12 V, 120 AH—low maintenance lead acid type) and is controlled by the electronic control unit. The entire system has been designed to run at 12 volt DC power. In the event of a number of consecutive no sun days when domestic power also fails the system can be operated by the 12V battery-bank of the system. This ensures uninterrupted drinking water supply to the villages.

The system was designed and developed and then installed at Haiderpur Waterworks, Delhi Jal Board, New Delhi. It was evaluated for treatment of microbial contamination of western Yamuna Canal Water for different microbial count and turbidity and flow rates. At a flow rate of 15 litres/minute further study on microbial life was undertaken for another 10 to 15 days. The results were appreciable. Microbial count MPN 290/100 ml treated to 0 at a turbidity of 7 NTU and at a maximum turbidity of 16 NTU the coliform (MPN) 240/100 ml also dropped to 0. An added study on the treatment unit with respect to the turbidity of water and the microbial treatment/disinfection was also undertaken. A preferred turbidity was created for eight days in increasing and decreasing order to map the limits of turbidity for microbiological treatment with the ultraviolet system. The experimental results reflected the limitation of the ultraviolet treatment unit to high turbidity. Therefore wherever turbidity in water is found to be high using the sand filter is desirable.

The system is capable of supplying safe and reliable drinking water in the villages with the use of solar power on a sustainable basis. The system is modular in design and therefore it can be scaled up for larger inhabitations. ☀

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