

## Chlorination Project Uganda April 2016

Safe drinking water is a problem for communities worldwide. In Uganda alone, 22 children die every day from diseases caused by using unsafe water. Recent advances in technology and Ugandan ingenuity have led to an opportunity to change things for the better. From a single car battery and a salt solution, enough chlorine can be produced to serve up to 100 people a day. A successful prototype has already been built. With funding, there is the opportunity to pilot test the concept in four villages this coming April.



About two years ago, I had the opportunity to meet with Bob Hayes of Uganda Mission and discuss ways to improve the drinking water in rural Uganda. This meeting resulted in my first visit to Uganda with Bob last year. While there, I was struck by the ingenuity of the Ugandan people.

The region we visited is very remote and, consequently, no utilities in a traditional sense are available. Most villages have a hand-operated well, although the use of surface water and rainwater is not uncommon. Because of the red clay in the area, the water is often discolored and unappetizing to drink. Of greater concern is the presence of bacteria. Often, the wells are sited downstream from the villages and have, consequently high bacteria counts, often in the 1000s.

During our first evening, round about dark, I was thinking we'd be done for the night without lighting. I was surprised to find our host hooking up a car battery to a light bulb to provide light for the night. It seems that that was a way they had developed to light their homes after dark. Then, in the morning, they'd hook the battery up to a solar panel and recharge it.

Sitting around the campfire that night, I remarked how that reminded me of experiments we used to do in school – hooking up a 9 volt battery to a glass of water and splitting the water molecule into hydrogen and oxygen. And as I pondered further, I was reminded how chlorine is produced for many swimming pools – passing a current through a salt solution splitting the sodium ion from the chlorine ion and producing chlorine. I reasoned that it might be possible to do that very thing in a remote place like rural Uganda.

When I returned home, I did some research on the potential for building a chlorinator with a car battery, recharged by solar. It turns out the idea is not singular, but uncommon and the devices previously developed were not ideal for this community.

Building off of that work, with funding from other Christians and the Society of American Military Engineers (SAME), I developed a very simple prototype made simply of a car battery, titanium electrodes, wiring, and a bucket of salt water. I found that I could consistently produce a 2.2% chlorine solution overnight. That 2.2% should be sufficient to disinfect the drinking water for about 100 people.



One of the very important aspects of any new system is that it must be adapted to fit the culture in which it would be used. In this case, the chlorine produced is almost ideal for the purpose. The designated villager would hook the battery up to the salt solution at night before he/she goes to bed at a cost of about 10 minutes. In the morning, the chlorine would be made available to the villagers on the way to the well. About 6 teaspoons is sufficient to provide the 2 mg/l of chlorine recommended by the World Health Organization for disinfection. By the time the Jerry Can (20 liter water container) is full and the villager has returned home, the required contact time of 30 minutes should be fulfilled and the water disinfected.

In those communities where a car battery and solar panel are already present, the cost of this chlorination system is less than \$60. A full set including battery and solar panel would cost \$200 – 250. We propose to send a team of 4 – 6 people to four villages in Uganda to build a chlorinator in each village and pilot test it for 1 – 2 weeks. Upon the success of this venture, it should be easy to adapt it to the surrounding communities.

It is our goal to also use this opportunity to create a micro business for a local villager where he could produce these chlorinators, sell them to local villages (providing income for his own family) and, very importantly, be in the local area to check and maintain the chlorinators over time to ensure their smooth continuous operation.

We appreciate your prayers – certainly for safe travel and enough funding – but also, in particular, for the project itself. Even with good preparation, things always work out a little different in Uganda than you imagined them at home. There will probably be dozens of little problems to be solved in the pilot testing, but with God's blessing, things are sure to go right. Also, if you feel led, we'd appreciate your donation that you can make here through Uganda Mission and the Africa Christian Training Institute. Just be sure to include "**chlorination project**" on your donation to ensure the funds are properly directed.

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