

The Canadian Ground Water **Journal** *Canadien des eaux Souterraines*

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Welcome to CanWell!



INSIDE:

**Safety Through Communication
Is Bigger Better?**



Is Bigger Better?

Reflections on Sustainable Water Projects

By Jim Gehrels P.Geo and Rob Purdon, P.Geo

As our work is largely overseas in Liberia, Nigeria and Haiti, we often have to question what is “sustainable” and what is “appropriate” when we look at water projects. At the moment we are contemplating buying a commercial well drilling rig to ship to Africa. Is this an expensive mistake or a more productive way forward? What should Lifewater do?

Lifewater Canada is a non-profit well drilling company started in 1995 to provide safe water in developing countries. We hire local workers who are given the skills and equipment they need to drill wells. Professional colleagues, environmental and water companies,

friends, families, churches and schools here in Canada donate money to make these projects affordable. Together, we have drilled over 500 wells, providing safe water for 200,000 people.

One of the things we find remarkable is that every \$1 given to Lifewater provides a child with safe drinking water for a year! We can do this because we are powered by volunteers working from home, keeping our overhead under five per cent. Our overseas costs have also been kept low by focusing on sustainable, appropriate technologies – our drill rigs are basic and our handpumps are easily maintained with locally available materials.

Many people living in Liberia West Africa drink from contaminated shallow dug wells or from stagnant swamps and rivers. As a result, 15 per cent of children die before age five from water-borne diseases. We have been able to save hundreds of lives by drilling wells at schools, orphanages, churches, clinics and villages without safe water. Most of these wells have been drilled using a LS-100 drill rig built by Little Beaver Inc. from Livingston, Texas.

The LS-100 is a small mud-rotary rig which is built around a modified post-hole digger rotary powered by a 5.5 hp diesel engine. The rotary is attached by a shuttle plate to a mast, and is moved up and down by a chain attached to a hand-cranked winch. The rotary is connected through a quill and swivel to drill stems that are five feet long, 1 1/4" diameter.

One of the strengths of the LS-100 is that it is portable. It can and has been checked onto an airline as 22 pieces of luggage! It has also been disassembled and carried into remote villages which are not connected to roads. We will never forget one Liberian village where children were dying because their only source of water was a diseased, shallow swamp. The people pledged to do whatever was necessary to get a well. The Lifewater Liberia workers drove to the end of the road where a vine-bridge crossed a ravine to the path that led to the village. There waiting were the village men, dressed in their Sunday best to show how important this occasion was. The LS-100 was stripped down, and one by one the pieces were lifted between sticks or hoisted onto heads, carefully carried across the sagging bridge and walked without complaint to the village. The highly portable LS-100 was clearly the appropriate technology for this village.

Later, the same drilling crew went to a community called Black Rock Village.








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One of the things we find remarkable is that every \$1 given to Lifewater provides a child with safe drinking water for a year!



The community was just as eager for safe water. The team set-up their LS-100 and drilled, and drilled, and drilled. They were soon into hard basalt, drilling with a light portable rig with no pull-down capacity. After one week everyone was discouraged – the women had hauled water for the mud pits, the drillers had eaten many village meals, the fuel drums were empty and the post hole was 18 feet into solid, dry rock with a penetration rate down to 1 cm per hour. Clearly, the LS-100 was not the appropriate technology for this village.

Our friend Bill Ashe, who encouraged us to start Lifewater Canada, often reminded us to “do the easy ones first.” We believe that each life is sacred, and that where you are born should not determine whether you live or die. Everyone has a right to safe drinking water and a chance at life. But we are also faced with the reality of limited budgets, and so we focus on trying to drill where there is the greatest chance of success, where each dollar we invest will save as many lives as possible. Sounds simple and appropriate, right?

But now consider this – a request for a well comes from a community of 600 people with a handpump well that is drilled into a productive sandstone aquifer. There should not be more than

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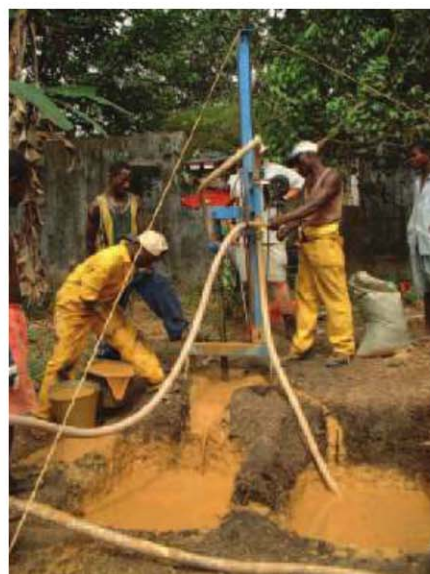
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300 people on a well to keep waiting times reasonable for the girls responsible for hauling the water and to keep the pump from prematurely failing. So this request is legitimate and reasonable. But at the same time, a request comes from a community of 75 people living in grass huts up-country in a black rock area. There is cholera, no safe water, and half the children under age five are dying. Do we do the easy one first and give 300 people a better water supply, or focus on the harder community and give life-saving water to 75 people who were dying?

We think all of our hearts would say, drill in the black rock community. But for this, we need a hydraulic powered air rotary rig with a 125 psi, 350 cfm compressor and a 5" air hammer. The cost is \$80,000 plus shipping, a good chunk of our annual budget. It is appropriate for the black rock community.

But is an air rotary rig sustainable with hydraulic power units costing \$8,000 each time one is blown-up because it is run hot with low oil? Or the hammer seizes because it is run dry without adequate water or oil injection? All these parts need to be flown in from Canada or the UK at great cost and it is difficult and expensive to maintain a sufficient stock of these parts in a developing nation such as Liberia.

Then there is the issue of safety. In 17 years of drilling with the LS-100, the only serious injury was a worker losing a finger when it was jammed between the drill table and the truck bed. With bigger and more powerful rigs come greater risks. We have had a drill mast separate and part come crashing down, though fortunately no one was hurt. Another time an experienced driller took off his hard hat and moments later a pipe wrench forgotten on the hydraulic power motor fell off, splitting his skull and exposing his brain. He recovered, but the risks of bigger machines are clearly greater, and include the high

pressure separator in the compressor, high pressure, hot hydraulic fluid etc.

Is it appropriate to take on greater cost and risk to drill in areas that are not the "easy ones"? Ask the mother of a dying child in a black rock village and the answer is clearly yes. Ask a donor sitting in their warm Canadian house looking at cost/child statistics to provide water, and you may get a different answer.

Fortunately, nothing fell on our heads today. But trying to compare small vs. large rigs and considering "appropriate" and "sustainable" are leaving us with a major headache.

If you would like to support a well or if you have a small air rotary rig that you would like to donate, Lifewater can use it. Please contact us at www.lifewater.ca or phone 807-622-4848. Until then, I think we will go take some Tylenol.



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