

The "Baptist" Water For All manual/motorized drilling method
A update showing some parameters of the "Baptist" drilling method.
Concerning depth, hard ground, well clubs etc. June 1, 2008 (prepared for a recent inquiry)
By Terry Waller.

Depths.

Please see photos below. To be clear our normal wells in Bolivia are from 20 to 60 meters deep with some deeper. The shallow unconfined aquifers in our area of Bolivia (Rio Grande basin) are salty and thus we are forced to drill deeper for confined sand layers for better water. The deepest reported is 105 meters drilled in 2004 by Mr. Janzen a Mennonite driller trained by one of our water clubs. (see photos and narrative below.) This driller used a home made motorized adaptation to pull the rope (as we have always reported). He also reported he used a 30 ft 3 mm thick metal drill pipe. Usually we use a 20 ft 3mm and 6 mm thick metal drill pipe.

In the last 2 months Carlos Cruz a driller trained by us reported an 84 meter deep well drilled entirely manually in Cuatro Canadas for a flood refugee neighborhood by Dr. Danny Beams and Simple Water Solutions. Carlos was extensively trained by myself the originator of the technology. The third deepest well reported drilled entirely manually was 74 meters by my co worker Teofilo Belmonte. We know intimately the work of these men and have no doubt what so ever of their honesty in reporting. They have no motive to report falsely.

Hard ground. As for whether we can penetrate "hard" material. I have personally drilled wells where we have penetrated and made wells in lithified layers of brick hard laterite (Bolivia, Kenya, Ethiopia) weathered limestone (caliche) in Tom Green County, Texas, tuff rock (Ethiopia around lake Langano) and weathered gneiss rock and corral shelves in (Sri Lanka) . Drilling rate slows incredibly to be sure, sometimes to 2 inches per hour (from soft clay rates of 3-5 meters per hour). Where rock is encountered wells are usually shallow unconfined aquifer wells, not the deep sediment confined aquifer wells that we commonly drill in Bolivia. We can not drill through granite or basalt bed rock and never have claimed to. In one case in Kenya we drilled through a very hard laterite layer close to the surface for about a meter. We finally passed the layer and were advancing rapidly but we broke the bit off due to improper threading. We dug up the bit to see the rock we penetrated and passed through . See the photos below.

Third Party References.

The Baptist method has been presented professionally to the Geological Society of America (GSA) by Dr. Cathy Fitzgerald who is very familiar with our technique and drilled with it in several countries. Dr. Fitzgerald is an environmental science engineer and also as a well drilling instructor at the University of Reno in Nevada. She visited us several times in Bolivia and told me in person our drilling technique was much superior in many respects actually than other very expensive light mud rotary rigs she has used. We drilled a 54 meter deep well with her and a group of hydrology students in 2006 in Bolivia. Henk Holtslag watched a club drill a 23 meter deep well several years ago. There is ample third party verification. Some other third party verification that come to mind is Ben Ranz a peace Corp volunteer and Carlos Cruz now with simple water solutions mentioned above who have and are drilling with our technique in Bolivia. Also Mark McCracken who drilled with us some in Bolivia a few years ago. He formed several clubs and can verify to user friendliness for third world families. Also Paul Cloesen author of several articles about our technique at his own initiative has helped families drill about 100 family wells in Nicaragua.

For the complete context and story of the 105 meter well drilled with the Baptist technique (with motorized adaptor) and photos of the driller see below. I wasn't there when the well was drilled but I have no reason to doubt the honesty of the driller who drilled it. The families who contracted him to drill wouldn't have paid him if it wasn't the depth he said. . The local Mennonite culture in Bolivia prizes honesty and I have no doubt what so ever he drilled to the depths he personally reported to me.

Terry Waller

www.waterforallinternational.org

A few third party References. who have been trained and know our work and qualified enough to comment.

Paul Cloesen, Costa Rica and Nicaragua self taught and has helped families drill 100 wells)
paulcloesen@yahoo.com

Dr. Cathy Fitzgerald, (Environmental Science Engineer and Well Drilling Instructor for University of Reno Nevada) fitzgeraldcathy@hotmail.com

Henk Holtslag who works everywhere! (not formerly trained by us but very familiar with our work).
holtslag.dapper@wxs.nl

Carlos Cruz, (Water for All trained driller currently working for Simple Water Solutions, Bolivia.)

Carlos is the 84 meter deep manual drilling record holder for the "Baptist" method.

kakruz303@yahoo.com , kakruz303@yahoo.com

Danny Beams, and director of Simple Water Solutions, (beamsclan@yahoo.com)

Ben Ranz (WFA trained Peace Corp Worker) ben.ranz@gmail.com

Mark McCracken (former Peace Corp volunteer) markmccracken@yahoo.com

Gert Jan Bon, who visited us in Bolivia and witnessed manual/motorized drilling method and subsequently wrote a proposal for Practica to adopt our drilling approach when Practicas' "roto sludge" method was having problems in 2005 because of slow drilling speed. (per Practica mission report copied to us by Jan). gertjan.bom@practicafoundation.nl

Below some photo for verification of depths of Baptist well drilling claims.



Case 1. Recent 69 meter deep well.

Interns in October 2007 Bolivia pull drill string from 69 meter deep training well. Pulling 6 meters at a time of plastic drill stem.

The drilling rig is our normal mal Water For a all Baptist 3 hp motorized drilling unit. All it does is pull the rope. Water clubs normally drill manually



Casing laid out and ready to case well open hole dug well. . Each casing length is 6 meters. Notice prepared filter on left. There are 12, 6 meter tubes class 9 pvc. Casing pipes that were placed in this well. . The well was 69 meters deep.



Interns with 6 meter 1/25 inch metal drill pipe, 3 meters 3mm thick and bottom 3 meters by 6 mm thick (welded jacket added to bottom three meters).

Note typical Baptist drill bit with movable ball dart tip and valve above. Formation was alternate layers of soft clay, then sand then hard clay then sand. This well was cased in the third sand aquifer.

Typical Plastic PVC drill stem. 20 lengths clearly shown. The 21st length is under the the pipe on the right. The lengths are 3 meters.

Add the 6 meter drill pipe on previous page and you get 69 meters.

This is representative of our ability to go deep.



Cased well, Water being poured in casing to counter weight buoyancy of casing against 69 meters of bentonite water drill mud.

We case with an end closed filter and screen due to surging sands. Thus the casing must be counter weighted with water and tied off to keep it from floating until well is fully developed.



Test pumping well with family Quechua widow owner.



Initial pump set up so user can water cattle. . column and pad added later but not shown. Bentonite plugged seal and grouting.

Water pumping depth 10 meters.

Pump 1.5 inch Baptist pump.

Case 2, Water For all water well club trained driller teaches local Mennonite family to drill. Sept 2004

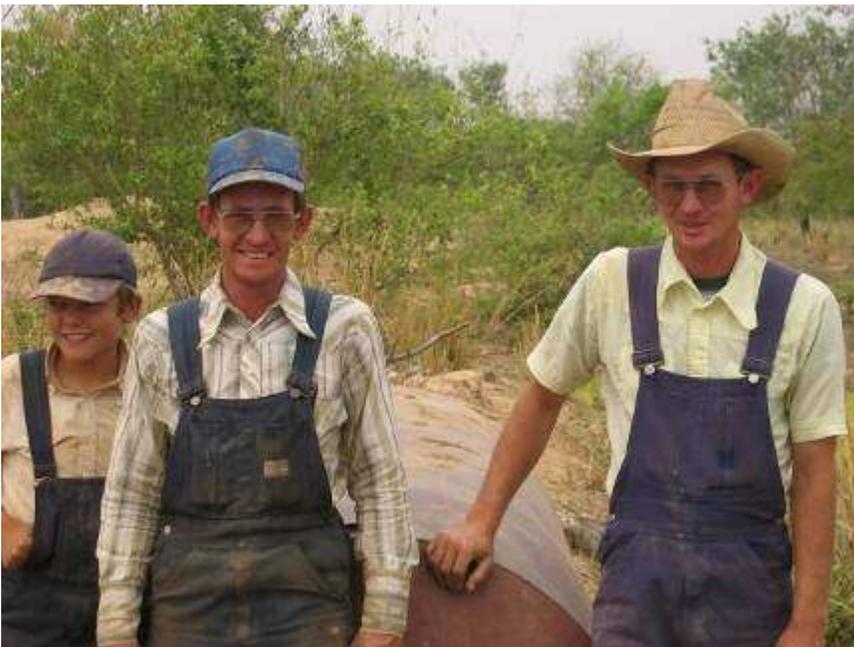
The 105 meter deep record.



This photo shows a WFA water club in San Miguelito Bolivia that has just drilled it's first 55 meter deep family water well using the Baptist method. The Club formed in 2004.

The man in the white cap is named Norberto. He later prepared his own rig and drilled private wells and taught the family below to drill.

Norberto has drilled dozens more wells as a private driller.



These are the Janzen Brothers, Norberto's neighbors in a Mennonite colony. . They hired Norberto and club members to drill some wells for them using the "Baptist method" they learned from WFA.. In the process they learned to drill themselves. They built their own motorized adaption.

I went out to check out reports of their drilling in Villa Victoria area close to San Julian. .

They were contracted by families and made 9 or 10 wells in the area. They reported all the wells in this area all in the 80-90 meter depth range with the deepest 105 meters. I have

no reason to doubt them. The families who contracted them would not have paid the by meter charge had it not been true. See their drilling rig below.



Mennonite mobile home where the family lived while drilling in this location. Notice horse buggy used for transportation.

The red vehicle is my vehicle.



Some typical Baptist plastic PVC Drill stem and standard class 9 well casing. This drill stem is 1.25 inch schedule 40 with threaded ends with plastic couplings.

We recommend at least schedule 40 one inch pipe though some countries are using SDR 26 type pipe with glued fittings. Some of the wells drilled by this driller were two inch casing with 18 meters of three inch casing at at top. A common practice of WFA drillers. Some were all three inch cased wells, depending on the customer.

For the 2 inch wells with three inch tops the driller charged \$10 per meter . The price included a standard brass cylinder down hole

single action pump with pump rods and homemade lever pump jack. See Below.



The home made drill bit coupled to typical 1.25 inch metal drill pipe. (we use many types of bits) The driller reported he used 12 meters of drill pipe for the deep wells in this area. We usually use only 6 meters for wells to the 50 meter range. The driller report he had to pass through two thin layers of soft rock. The driller reported his 105 meter deep well took a 5 days to drill using his home made motorized adaptation to pull

the rope. Several other wells were made in the 80-90 meter range.



Home made adaptation for motorizing Baptist drill method. Note the 3 meter length of plastic drill stem in back ground.



Typical Baptist Drilling technique “arco” cross bar shown with rope rigged to be pulled by home made motor adaptor. adaptation. Instead of people.



The final product with a typical home made pump lever and post. This is an 80 meter deep well. Static water level 10-15 meters from surface. The pump is a standard brass cylinder pump. The 105 meter deep well is in this same well rural area and with the same set up. Several undesirable water bearing zones had to be passed. Passing through several undesirable water zones is typical for the area of Eastern Bolivia where most Baptist wells have been drilled. These aquifers are all confined aquifers between thick layers of clay with water rising under pressure from one to 15 meters from the surface. We have drilled several wells closer to the Andes Mountains that flow artesian. .

Case 3. WFA “Water Clubs” drilling with WFA “Baptist Method” Bolivia, Nicaragua and Ethiopia



Typical Well club with Bolivian villagers training WFA interns in 2007. This club is in the village of San Juan de la Cruz and drilled 10 wells. These wells were all in the 20 to 25 meter range. Drilling time one day typical. Families typically buy their own well and pump material.



Cost for 2 inch casing and a 10 meter 1.5 inch all plastic “Baptist pump” the cost has historically been around \$2-3 dollars per meter.

Example

2 inch casing cost in Bolivia at factory \$10 per 6 meter length. Transport to rural area is very inexpensive as clubs hire empty cattle trucks to haul their light material to the area. Pump material cost approx. \$20. Families provide labor and are taught to assemble their own pumps on site. A 30 meter deep well would cost \$70 in material. Families sell cows or borrow from relatives or friends to purchase casing and pump material. WFA lends a drilling rig and provides initial guidance for two or three wells.



Finished family well
San Julian Bolivia
2008 42meters



All Women's
drilling club
Nicaragua.
(courtesy of
Paul
Cloesen).

The club
drilled I
believe made
9 water wells.



"Baptist" bit from Nicaragua dulled on Cantera Rock



Hewn cantera rock used for construction.



Another water club in Nicaragua drilling in Cantera.

The clubs Paul Cloesen has started and trained install one inch "EMAS Flexi pumps"

Well depths in Nicaragua around the Leon area I believe are from 10- 20 meters. Verify with Paul Cloesen

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Water For All Water Club working in Ethiopia
May of 2008 drilling with the
"Baptist Method"



. Test
Pumping
new wells.
Cement
Pads will be
added.

To date one
of seven
wells
completed
by families
(and a few
drop in
visitors) to



15 meter deep Family well in Ethiopia replaces dangerous hand dug wells that must be re dug every two years and many times go dry in dry season.

Cement pad added later after test pumping.



WFA "Baptist"
FAMOM Pump.

(Family
Made, Operated,
and Maintained
Pump.

As with all of our
clubs we teach
families to make
and maintain their
pumps on site.

Each pump will
vary a bit
depending on
locally available
affordable
material.

Materials Costs
for casing and on
site fabricated
pump around \$60.

Wells 10 to 15
meters deep.
Families are
paying for the
casing and
provide all labor.
Well completion is
one day full work
day. (Cement
pad and column
will be added)
Pump shown is
the WFA "Baptist"
Ethiopian model
shallow family
well all plastic
pump. 2008

Case 4. Penetrating Hard Lithified layers in Kenya and Togo.



Test Wells Northern Togo. May 2008 Kara vicinity. Drilling through hard shallow lithified layers.



Finished 3 inch well. 10 meter deep test well. Total cost of well casing and pump and pad and \$70. Drilling time about a day.



Village fabricated pump jack cement column. Heavy duty Water For All "Baptist" pump head installed for community well use.

Pump is standard WFA "Baptist" FMOM (Family made and operated pump with poly pump rod. Pump rod, piston, cylinder/rising bottom check valve main can be removed without hand tools for local quick local maintenance without removing the metal pump head.



Penetrating hard laterite layer in Rabondo Kenya. Two wells drilled in one week trial drilling trip 2006.

Rig and bit made in local welding shop in Awendo.



Rain filled hand made seep water hole into surface laterite about 10 meters from above well site. Shows the laterite that was penetrated.



The laterite is the red material under the surface boulders.

Casing the well with 3 inch casing. This well was only 7 meters deep. We passed through several meters of very hard lithified laterite and drilling slowed at times to 2 inches per hour at the slowest point.



Cuttings reoved from settling pit showing what material was drilled.



Recovering a drill bit during trial drill Rabondo Kenya May 2006 after passing through hard shallow lithified layer.

This gave us a chance to see exactly what we had drilled through.

The bit broke as it wasn't completely threaded onto the drill pipe.



Worker digging with iron rock bar to penetrate hard rock layer.



Rock hole dug to recover bit that was lost after passing through shallow hard lithified layer, Rabondo Kenya. May 30, 2006

Bottom of shallow lithified layer. Bit was recovered in soft clay under bolder at about. 4 meters depth. Note the channel made in bolder by bit. The bit was recovered jus tunder the end and to the right of the submerged iron digging bar in the softer sediment BELOW the rock layer.



A hydrology student and myself examine metamorphic sedimentary rock from the hole and rock formation that was drilled through. It broke off in smooth sheets. We avoid this hard rock when we can. But we did pass through about a several feet of it in a couple of hours..



A closer look. This rock is now a paper weight on my desk!



Avoid rocks when possible!

3 inch well drilled about 15 meters from where the rock was encountered. No rock encountered and easy drilling. When all else fails ask the local where to drill!

A brief history of "Baptist" well drilling technology

First Well numbers. According to our latest conservative count 1,941 wells as of June 11 2008 have been drilled in 12 countries. These come from our records from early notes during development and reports from trained drillers and later records from well club applications and follow up and reports from credible drillers internationally.

During initial technology and development in 1993-1994 Terry Waller and Crew drilled 50 wells for families and charged \$6 per meter for well and pump. In Bolivia we are slowly going back and placing GPS coordinates as we can. The wells are very spread out and most very far off road where homestead families live or have there farms. We have thousands of photos and videos.

First Well Classes Bolivia 1995 - 2000. (micro enterprises, part time family well drillers)

Julio, Suarez, and crew drilled 50 wells.

Koki Soliiz drilled 200 plus wells.

Santiago Surubi. 50 wells

Epifanio 30 plus.

Pedro y Feli 30 plus.

Leonardo 30 plus

Arcelio 50 plus (isosog area in the chaco)

Oscar 10

Don Sandalio and son. 20 plus

Pedro Chamo 10 plus

Maximo 10 plus.

Teofilo 200 plus

Ruben 200 plus

Total from initial drilling classe graduates and initial development. 940 wells.

We changed to Water Well Clubs after communities requested to borrow drilling rigs and offered to pay for their material. I don't have my files with me, they are in Bolivia, but we have formal written request form most well clubs with member names and do follow up. We help each club get started and lend a drilling rig.

Clubes from homestead communities drilling family wells. (each well we estimate serves 10- 20 people plus livestock.

	Wells
Villa Primavera	10
Canaan	24
San Miguelito	15
La Frontera	20
OACE	20
Barro Bolivar from Nucleo 23	6
Barrio Nuevo from Nucleo 23	4
Independencia	10
El Paraiso	7
El Paraiso 2 and 3	20..
Cercain	17
Nucleo 2	10.
Nucleo 2 y 5	10.
Taperas. 8 wells.	
Villa Arrancibias (1, 2, and 3)	18 .
Nucleo 20	5 .

Nucleo 69	5
San Jorge	8
Nucleo 73	10
Nucleo 72	10
Nucleo 42	10
Nucleo 31	5
Nucleo 36	4
Nucleo 35	13
Tajibos	6
Yapacani	13
Nucleo 8	12
Nucleo 66	14
Villa Nueva	11
Nucleo 23	5
Nucleo 38	8
Vallecito	7
Vallecito (damnificados)	9
Nuevo Jerusaln	8
San Jose	6
2 de Agosot	3
Clubs sponsored by Peace Corp	
Volunteers	60
San Juan de La Cruz	10 (2007)
Antofagasta	8 (2007)
Intern Training wells	
Gregorio field	1 well
Carmelo	1 well (2007)
Tomasa	1 well (2007)
WFA/Prefect of Oruro/ Peace Corp	
Trial	2 wells
New tribes course San Julian	
	1 well
Waller house San Julian	
	1 well
Gather property	2 wells
WGM radio station	1 well
University Reno/ Hydrology class/ At Baptist church	1
Bolivia Club spawned private Drillers	
Modesto	10 plus
Norberto	10 plus
Janzen	10 plus
Arrancibias	20 plus
Nucleo 35	10 plus
Roberto Gomez	3 plus
Total club and club spawned driller wells.	495
Koki and other drillers	

Since 2001	200 (conservative estimate)
Initial well classes and development	940

Total wells in Bolivia	1635
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International "Baptist" method wells.

Sri Lanka WFA CBF/WC drilling trials.

Klanochi area	3
Trincomalee	2
Bataloa	2

Subsequent per WC email	70
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iNicaragua (per Paul Cloesen and Henk Holstag)	100
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Cameroon Per Ivo Ngufor Trained in Bolivia	60
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Kenya, WFA/Cathy F. Rabondo Test	2
Subsequent by Melchizadeck	3plus
Harry Bennet	1
Cathy Fitzgeralds (Turkana area)	1

Ethiopia WFA CBF/Selam Langano test	
Terry Waller	3
Joe Stocker	3
Tufa	3
Awasa	1

Subsequent Selam Water is Life per report From Yared/Selam	30
WFA/Blair trial Assoa	2

Addis Kidan WFA Awashbuni Trial	3 (2007)
New club	7 (2008)

Nicaragua WFA Interns Allan and Kris	1 (2008)
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Malawi Seed Sower/WFA tirals	1 (2007)
Joe Stockeer	1(2008)

Netherlands (per Paul Cloesen)	1	
Togo , Kara area WFA/church of Christ Trials	3 (2008)	
Mexico Gabe Hillard Chiapas	2	
Argentina (father and son team that trained in Bolivia	1	
Costa Rica per Paul Cloesn	1	
Texas, San Angelo Duncan Ranch WFA drilling course	2	
Total international wells to date	312	
Total wells Bolivia		1635

Total conservative estimate Baptist wells world wide. 1,947 iwells in 10 countries

Also have reports of wells done in Tanzania and Mali by Henk Holstag and Cathy Fitzgerald.

History

In 1987 Equatorial Guinea we lacked water and began experimenting with light weight cable manual cable tool rigs.

We made one prototype rig (less the plastic drill stem) modifying the ball and dart valve we were using on our home made cable tool bailer.

We deemed heavy metal drill stem too cumbersome to work with and dropped it and went back to our cable tool efforts. Plastic drill stem was unavailable in Equatorial Guinea at the time..

In Bolivia in 1991 we began drilling wells with the Mennonites Central Committee auger system using cement tubes and rope pumps. Drilled wells with mud rotoray was the only other option and these cost \$50/meter.

The Mennonite auger system was fine where the first aquifer was fresh. Drilling deeper than the first aquifer was limiting.

We began working with homesteaders in areas where first aquifer was salty and we needed to go deeper. I began experiments with our Africa cable tool rig and remembered our experimental rig.

Initially we used a 10 meter drill pipe and modified our bit and valve design. It occurred to me out of the blue one day while cable tool drilling we might be able to replace the cable with plastic pipe.

We tried it advanced quickly into the first sands and lost tools. We added bentonite and the problem was solved. We began drilling 1.5 inch cased wells to about 20 meters in the Cotoca area with a simple one inch poly cylinder/rising main and ½ inch poly pump rod and our "Baptist" sliding plastic water seal piston. Later to go deeper we increased the length and thickness of the drill pipe. Later we increased well diameters by reaming and increased our pump sizes to 1.25 inch and 1.5 inch. The most unique aspect of our drilling method is the use of plastic drill stem. I should add we had to experiment a great deal with different PVC makers as some brands were more brittle than others and would break. We finally found several that worked and learned not to over thread and to inspect threads often for cracks. We also became very proficient at fishing. Breaks sometime occur but almost always from improperly threaded our coupled pipe and hasn't been a major limiting factor. It is interesting to note also that plastic

pipe prices have decreased in Bolivia from when we first started as local plastics industries developed. This allowed us to increase our hole casing diameter without increasing cost.

"God cannot give us a happiness and peace apart from Himself, because it is not there. There is no such thing. " C.S. Lewis

Water For All/Agua Para Todos

For info on ministry in Bolivia visit,
www.geocities.com/h2oclubs/

For info on Water For All's international work visit,

www.waterforallinternational.org

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