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## Zimbabwe's upgraded well programme

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### Introduction

Very large numbers of family wells are in daily use in Zimbabwe, possibly as many as 100 000. Most of these wells are either unprotected or inadequately protected and can become heavily contaminated, especially during periods of heavy rain. Many are dangerous especially for children, because they are poorly lined and have little or no protection at the well head. Most family wells in Zimbabwe have the potential to be upgraded. When the upgrading process is complete, significant improvement in water quality can be expected.

Family wells are close at hand and very convenient for use. The technology is simple, logical, cheap and easy to build - it has grown out of traditional practice. The ownership is well defined and there is no debate about the responsibility for maintenance - it lies with the family itself. Because water is conveniently taken, more water is used in every aspect of home life, including preparing food, washing clothes and for personal hygiene. More water is available for growing food, especially vegetables which are important in a good diet. Vegetables can also earn money to buy soap and other things which improve the home. Improvements made in family wells are considered as family investments and often have prestige value. Where there is a choice they are always preferred to communal systems and have a stronger sense of ownership and willingness to sustain maintenance. They are known to be reliable and the protection endowed by the cover leads to improved confidence in the supply itself.

### Growth of Rural Water Supply

Following Independence in Zimbabwe in 1980, large numbers of primary communal water points have been introduced throughout the country, and as many as 20 000 - 25 000 handpumps have been installed. In addition to this a number of piped water schemes serving rural growth points and rural service centres have been installed.

Whilst these have greatly enhanced the availability of improved water supplies to rural populations, the

evidence available tends to show that these rural water points are often placed in very remote places and are becoming increasingly more difficult to service. This is partly because the cost of transport and spare parts are rising without equivalent budgetary increases and partly because the distribution of spare parts becomes more difficult. In addition the number of units in the field increases without a corresponding increase in skilled manpower to service them.

Efforts are thus being taken to place at least part of the responsibility for maintenance in the hands of the users. This includes the installation of handpumps which can be maintained more easily at village level like the Bucket Pump, and later models of the Zimbabwe Bush Pump. However the boldest step forward has been the establishment of a programme of upgrading family wells. Large areas of Zimbabwe are suitable for upgrading wells and in 1990 the concept of upgrading family wells became an official Government policy in Zimbabwe.

### The Upgraded Well

Work on the upgrading of traditionally designed wells has shown that significant improvements in water quality can be made by lining the well with bricks, adding a strong concrete apron and water run-off around the well head, fitting a hygienic bucket and windlass, and fitting a raised collar and tin lid on the well cover slab. The result is a unit called an "upgraded Well." Most shallow wells are owned by families and many are partly improved already. Clearly very large numbers of wells could be upgraded in this way, not only in Zimbabwe but throughout the continent as a whole.

The upgrading process is carried out in two stages. The first involves lining the well from the bottom up to the ground level and this contribution is made by the family itself. The second stage is the provision of the top slab, the windlass, the tin lid, chain and bucket and the poles and a hygienic apron and water run off. The cost of this second stage is shared by the Government and the individual families, with the Government contributing a small subsidy in the form of three

pockets of cement, a windlass and a tin lid, the family providing all the labour (including payment of the builders), the chain, the bucket, the bricks, the poles and the river sand.

In Zimbabwe the system of providing a subsidy to an individual family has already been tried with success in the rural sanitation programme where families are given a subsidy to help them build their own Blair VIP Latrine. The subsidy acts as a catalyst and encourages the families concerned to put physical effort and their own cash into developing their own facilities. When a family well is upgraded, it brings in some prestige to the owner. More important is the fact that with the upgrading of the family well, the burden of maintenance rests 100% in the hands of the user who, as evidence shows, are very happy to carry that responsibility solely because they own that well. This minimises the burden of maintenance on the part of Government.

### Training programmes

On the national level, we have identified areas where shallow wells are in existence and are now looking at developing a training programme in the relevant districts so that we train the local health staff in the well upgrading technique and also train the local builders in the actual construction process so as to end with a core of trained builders in each district. This training component is important to ensure durability of the wells and sustainability of the well upgrading programme.

### Evaluations

#### a) water quality

Staff of the Blair Research Institute have undertaken extensive surveys in which the quality of ground water extracted for domestic use from various sources has been tested. Table 1 below shows the bacteriological quality of water taken from wells and handpumps used in a peri-urban settlement area (Epworth from January to November 1988) which included a heavy rainy season.

**Table 1.**

Source of water of samples	Mean E. coli/100ml	No.
Poorly protected well	266,42	233
Upgraded well	65,94	234
Bucket Pump	33,72	338
Blair Pump	26,09	248
Bush Pump	6,27	281

As indicated in table 1 the ratio between unprotected and upgraded wells is 4.071, reflecting a considerable improvement in bacterial quality, although not to the same standard as the handpump. However a handpump supply is only safe whilst the pump is operational. If the pump breaks down without immediate repair, then the community is often forced to take water from totally unprotected sources often with disastrous consequences.

What is therefore more important with the upgraded well is that water quality is improved using a technique which is totally maintainable on site by ensuring adequate measures of sanitary protection. Water quality monitoring is always performed together with a sanitary survey or on site inspection of the well. Particular attention is paid to the following points:

1. The location of the well - whether this is sited on raised ground and therefore avoiding the possibility of flooding.
2. The depth of the well - the deeper the well the less likelihood of contamination from surrounding areas and the more effective is the filtration of water through the soil.
3. The depth of the water in the well. The deeper the water in the well the greater the degree of settlement of the water. There is also less chance of the turbulence caused by the bucket raising soils from the bottom.
4. The lining of the well should be complete and undamaged. A good lining prevents collapse and soil erosion.
5. The state of the slab and apron covering the well. This should be complete and not cracked so that waste water released at the surface does not drain back into the well.
6. The water raising system should be hygienic. A windlass helps to keep the chain clean and aids in raising the bucket. The improved headworks provides a hygienic place for resting the bucket when not in use.
7. The well should be covered with a good lid to prevent access of foreign objects and dust.

In a study performed in some family wells in the Goromonzi district of Zimbabwe we were able to illustrate the importance of these points quite explicitly - as shown in the table below.

Table 2. Quality of water and sanitary protection.

Well No.	Mean E. coli/100ml	Turbidity	Sanitary Survey
2	74,0	7,3	satisfactory
3	37,2	7,4	good
17	133,0	12,0	poor
18	> 1000,0	72,5	very poor
19	5,0	2,3	very good
21	> 1000,0	> 100,0	very poor
21	19,2	2,9	very good

These figures show the close relationship between sanitary conditions, turbidity and water quality in general.

### Personal and domestic hygiene

Water availability is a major factor in facilitating improvements in hygienic practices and in this regard the Blair Research Institute is undertaking some baseline studies in parts of the country where the upgraded family well programme has begun as a prelude to hygiene education intervention. Information has been collected through a Knowledge, Attitudes and Practices Survey in relation to diarrhoeal diseases in children, but the results are yet to be analysed.

### Summary

While the technique described here applies only to families or small communities living in areas which have high groundwater levels, this covers a substantial part of the country and includes those areas with the highest population densities. Obviously upgraded wells can be upgraded further with a hand-operated

or motorized pump, which may find greater favour in the future, especially where the maintenance problem can be resolved in practice.

Because maintenance is such a key issue, any system where this has been successfully resolved must be considered seriously. The fact that so many wells fitted with a bucket and windlass system have operated successfully in the past suggests that they are likely to continue working in the future. This makes the system desirable, and makes the effort of digging wells deeper or digging more of them certainly worthwhile. The ultimate aim would be to provide one upgraded well for every family where it has technically feasible, a possibility which the present system may allow.

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