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GHANA

COMMUNITY WATER SUPPLY AND SANITATION PROJECT

Support of Private Sector Participation

I. Policy to build capacity in the private Sector

1. To strengthen the private sector it is necessary to have a nationwide programme to establish the construction/drilling/maintenance capability. A clearly defined policy framework has to be followed under which a transition from the present "construction by GWSC projects" to a future "construction by private sector" is realized. Standardization and clearly defined regulations are the essential precondition to make this step. The private sector can only successfully operate if the economic environment is not hostile, and the markets are free of distortions.

2. The private sector that provides goods and services in CWS/S needs to be organized in such a manner that it can survive and carry on operating when the outside support ceases or changes. To achieve this, companies will need to have a business policy that does not tie them to one particular donor but allows them to work for any customer (e.g. A hand dug well and latrine construction company should rather work in a geographically restricted area for all donors and projects, than for only one donor supported project in a unrestricted area. This will reduce the dependency on a particular donor supported project). The small companies will not be able to create this kind of market by themselves. It will be necessary that GWSC, ESA's and NGO's will coordinate their activities and policies in such a way that all private enterprises have a chance to obtain work in a free competitive environment. Under this strategy all NGO's as well as Governmental CWS/S projects would include the objective of developing the private sector capacity. During an initial phase the projects would provide financial support as well as technical and managerial training to contractors.

District Water and Sanitation Teams (DWST)

3. A key factor in the development of a strong private sector is the coordination and cooperation of sector activities at District level. The CWSSP would assist District assemblies in the formation of such DWST's. The institutional framework for the DWST is discussed in Annex xx. A brief description of the professional skill requirements is given in this annex with special emphasis on the demands created from the relationship between DWST and the private sector. A DWST would be comprised of 4 skilled personnel:

a. Community Development Specialist, responsible for: animation work with the communities, motivating them to participate in the programme, relation with other agencies working on (non-sector) community based activities

b. Environment Health Specialist, responsible for: the sanitation component of the programme, health education, latrine construction

c. Water Supply Technology Specialist, responsible for: technical planning, assisting and advising communities in the choice of technology, relating to the private sector in a supervisory role (taking part in the pre-qualification process, supervising construction,

quality control), keeping records and data collection

d. Operation & Maintenance Technician, responsible for: advising communities on all aspects of O&M, monitoring water quality, training WATSAN COMMITTEE mechanics to repair pumps, liaison with area mechanics appointed by suppliers, communicate with the spare parts suppliers in the district, collect (preventive maintenance) inspection reports and maintain district database, initiate CWSSD intervention when appropriate (well maintenance, major breakdowns, etc.), process applications to the rehabilitation fund.

The educational requirements and the job profile for the Water Supply Technology specialist would be: a technician with practical experience in water supply, trained to read and understand technical drawings and to interpret specifications, trained to be able to assist in the design and calculation of small piped systems, trained in quality control issues (acceptance criteria, etc.), needs to have good skills in communication (participatory technique)

the Operation and Maintenance Technician: a mechanic with practical experience in handpump installation and maintenance as well as in pipe fitting and installation of mechanized systems, trained to be able to perform maintenance and small repairs on diesel engines, needs to have good skills in communication (participatory technique)

4. Presently personnel who has the basic skills to accomplish the required functions are employed within GWSC rural department (Drilling Unit, Maintenance Unit, PAMSCAD projects). Some of these workers will eventually become obsolete under the new sector strategy. The project would therefore assess the workforce in GWSC and retrain whoever is capable and willing to take on a new assignment at the district level. An internal qualifications system would be set up that would allow recognition of internal training and past practical experience. Thus it would be possible to select personnel not only on the basis of the scholar background. The requirements for the retraining are outlined in ANNEX xx.

Financial Assistance

5. The most important support to private contractors is that they are paid a fair price for their work. Operation in the "aid business" includes high risk factors which need to be reflected in the price of the facilities.

6. Price Bonus, Duty Exemption for local Products: Considering the additional benefits that arise from local Production it is justified that goods and services produced by local contractors can have an initial purchase price which is higher than the price of the imported products. Under standard IBRD procurement a price bonus is granted for local products. It is recommended that the Government of Ghana creates equal conditions for local industries as for importers. Presently CWS/S equipment imported for a GWSC or a donor assisted project does not attract any import duties. However raw material and spares purchased by local industry are taxed. To remedy this unequal situation local industries should be able to apply for tax relieve. It is however unlikely that efficient and un-bureaucratic procedures for the processing of these applications will be created in the near future.

7. Payment in Foreign Currency: In most donor financed water projects funds are available in foreign currency for the purchase of hardware. Locally produced equipment is a direct substitution of a imported goods. Under the investment code the Government of Ghana allows the local companies to sell the CWS/S equipment against foreign currency to projects. This income is considered equal to foreign currency earned through export. This alleviates to a certain extent the suppliers/contractors

problems of obtaining foreign currency for the purchase of raw material and spare parts.

8. Joint Ventures:,Partnering between local industries and industries abroad would be encouraged. The Ghanaian legislation with the investment code promotes such cooperation. This will enable a know-how transfer. Access to foreign currency and spare parts (especially in the drilling industry) is greatly enhanced. Joint ventures ensure that the technical support is utilized best as both partners have a vested interest in the successful operation.

9. Equipment grants/credits, hire purchase: In the case of the small companies that will engage themselves in the construction of hand dug wells and latrines the capital investment for equipment are considerable. The capital required to buy the basic equipment for constructing about 20-30 wells a year is approx. ¢ 5,000,000.- , not counting 1 truck and 2 motorcycles which may cost approx. ¢ 20,000,000.- Many small companies will require financial assistance to enable them to purchase the equipment. Several schemes of financial assistance are envisaged: hire purchase, leasing, equipment grant or credits (e.g. the entrepreneur purchases the equipment under a hire purchase agreement. He repays the projects by not receiving the full amount of the subsidy for each completed well. The project retains the hiring fee. After a given number of wells the contractor has paid for his equipment).

10. Training: During the process of pre-qualification it will be become apparent what training needs exist in the private sector. CWSSD would have to open the Owabi Training School also for training of private sector personnel. The TNC in Kumasi could play a vital role in formulating the training materials and training methodologies. The Associations of private contractors could be assisted if specific training are conducted under the auspices of the association.

II. Hand Dug Well and Latrine Construction

Justification

11. Over 30,000 communities with a population of under 500 inhabitants are scattered over rural Ghana. A large part of these communities are unserved with safe water supplies. The current institutional arrangements are unsuitable and incapable of providing the desired service coverage for these small communities.

12. Hand Dug Wells are constructed all over the country by the GWSC, churches, community groups, individuals and NGO's in an unplanned, un-concerted manner. Poor design and poor workmanship lead to low quality Hand Dug Wells which deteriorate rapidly. They often dry out in the last few months before the rainy season. These wells thus represent little or no improvement over the present water supply situation. The approach of executing projects of limited duration does normally not include any measures to establish permanent maintenance structures, therefore many of the facilities become polluted or unserviceable after a short period of use.

Assistance and Training Requirement for the Private Sector

13. Presently Ghana does practically not have an established private sector dedicated to the construction of Hand Dug Wells and Latrines. A few very small private contractors (who have a shovel and some basic equipment) engage themselves in well digging. They normally lack the basic skills and adequate equipment for successful operations. Three main reasons are responsible for this situation:

a. The production of hand dug wells needs a considerable investment in equipment

(latrines to a lesser extent) and also involves a high proportion of transport cost. Small contractors do not have the capital to buy equipment needed for construction (¢ 5 - 10 millions) and/or vehicles for transport (some ¢ 10 to 20 millions).

b. The construction of hand dug wells and latrines is presently nearly always done by projects, mostly carried out by NGO's or PAMSCAD. It is impossible for a private entrepreneur to compete against a Church or Government subsidized organization.

c. Most small private entrepreneurs lack professional as well as managerial skills.

14. It would be logical that construction companies start producing wells and latrines. Their operation is very similar (after all a hand dug well is a vertical culvert). But because of the market distortion through government agencies and NGO's it has not been attractive to enter the market. In the Community Water Supply Programme it would be possible to tempt existing construction companies to take up the production of CWSS facilities. This approach would have two fundamental advantages. a)Professionals and managerial skills are available, b) if the construction of hand dug wells is a sideline of established operation, equipment can be shared and the overhead cost are dramatically reduced. NGO's already operating in the field would be encouraged to commercialise their operations. Thus the existing equipment would be utilized.

15. Every potential contractor would have to apply for pre-qualification. During the process of pre-qualification every contractor would be invited to participate in a training course. This on the job training will reveal the deficiencies in skills. WaterAid has been very active in the role of assisting and training NGO's in hand dug well construction. They would be contracted to take part (together with CWSSD(R) in the pre-qualification. They would than determine the actual training needs. All training materials and teaching aids are readily available. The contract with Wateraid would include that they would be contracted to provide technical training in the regions/districts to contractors. Two training courses per year would be conducted in the regions and districts. The technical training would be on the job. During each course one hand dug well and one latrine would be constructed. TNC would be contracted to supplement the training with specific inputs in participatory communication techniques, latrine construction, safety regulations and managerial/accountancy training. The expected output from this training would be:

5 contractors pre-qualified per year over 4 years period = total 20 contractors
5 contractors up-graded with training over 4 years = total 20 contractors

The cost for this training would be:

WaterAid contract for pre-qualification	US$	20,000.-
WaterAid Training course	US$	40,000.-
TNC input	US$	15,000.-
TOTAL	US$	**75,000.-**

Equipment Support

16. The following equipment is required to construct Hand Dug Wells or VIP Latrines:

Transport:

- Truck
- Pick-up truck (optional)

- Motorcycle

Equipment for Hand Dug Well/Latrine Construction and Handpump Installation:

- Set of moulds (locally made) ID 1.3 m for in situ lining of wells
- Set of moulds (locally made) ID 0.9 m, OD 1.1 m for casting of caisson rings
- Mould for production of well covers
- Tripod (locally made)
- Lifting winch
- Set of handtools (Miner's bar, pickaxes, buckets, spades wheel barrow, shovels, etc.)
- Set of Protection equipment (Helmets, wellingtons, overalls, etc)
- Mechanized De-watering Pump incl. Generator set (optional)
- Compressor, wheel mounted (optional)
- Pneumatic Breaker/Jack Hammer (optional)
- Water Quality Kit (optional)
- Set of geophysical survey equipment (optional)
- Safety equipment, gas detectors (optional)

The capital cost to buy the basic equipment (optional not included) for construction capacity about 30-50 wells per year are:

for a truck and two motorbikes	approx. US$ 40,000.-
for the basic equipment	approx. US$ 20,000.-

17. A computer programme was used to check out various production and quantity options. The results indicate that the optimum number of Hand Dug Wells constructed by a small contractor is between 50 to 80 Hand Dug Wells per year. Operations that produce less than 40 wells per year are burdened with very high overhead cost and therefore inefficient. Production of more than 100 wells per year does not offer any more benefits by economy of scale as the distances make transport and supervision more difficult. This indicates that in every region about 3 to 5 private contractors can make a living with each one of them concentrating on 2 to 3 districts.

18. A large stock of equipment is presently available in the country (NGO's, PAMSCAD, etc.). The policy to assist private companies would aim at making this equipment available to the private sector under leasing or hire purchase agreements or equipment grants, rather than introducing new equipment. Many NGO's are fully equipped to construct Hand Dug Well. If these organizations would start to operate on a commercial basis the relatively vast potential (equipment and manpower) could be utilized. The CWSSP would recover the cost for equipment assistance by leasing or hire purchase. Vehicles would be excluded from the assistance package as the use of existing transport capacity will be encouraged. The total cost for equipment would be:

20 contractors (50% of US$ 20,000.- each)	US$	**200,000.-**

Chapter needs to be reviewed

III. Assistance, in the Transition to privatization, of the GWSC Drilling Unit

19. The government owned Drilling Units (GWSC-DU, WRRI, Ministry of Education) have well accomplished their mandate by training skilled, valuable workforces with donor assistance and contributed to maintain price levels within acceptable range. The existing situation creates a monopoly and constitutes a burden where no more savings can be achieved. The existing drilling capabilities

within the country (more than 1,000 wells per year) is well above the market perspectives (400 to 600 wells per year). These valuable assets (drilling rig and personnel) have to be maintained and directed towards a sustainable private drilling sector.

20. Technical assistance would be required to evaluate and organize the legal frame work and financial requirements which will ensure optimum benefit and competitiveness to future projects. This would be achieved by assisting the existing drilling units to organize themselves for privatization. The coordination team would prepare a plan of action incorporating government requirements:

a. Partnering privatized drilling units with existing foreign drilling companies willing to participate in rural water projects. This partnering would ensure continuous training and technology transfer as well as alleviate the burden on equipment, spare parts and maintenance.

b. Assistance from the government and the public sector entity in this process would ensure speeding up of the legal transfer and consensus on cost recovery.

c. Assistance from the private drilling sector (local and abroad) would ensure long term commitment towards the objectives set forth in the national sector programme.

21. The financial assistance requirements are as follows:

Pre-implementation Phase (within 6 months)

External Consultant, (need assessment)	*20 weeks*	*US$*	*100,000.-*
Local Consultants,)privatized companies legal procedures, auditing, etc. governmental cooperations management plans, registrations, accounting, etc).	*45 weeks*	*US$*	*85,000.-*

Implementation Phase (6 to 24 months)

External Consultant, (supervision and monitoring)	*US$*	*60,000.-*
Local Consultant, (supervision and monitoring)	*US$*	*50,000.-*
Guarantees and Cash Flow Assistance newly established private companies	*US$*	*300,000.-*
Legal advise, Auditing, Reporting	*US$*	*90,000.-*
TOTAL	*US$*	*685,000.-*

IV. Manufacture and Distribution of Handpumps and Equipment

Estimate of the Market for Handpumps

22. The overall objectives of the sector strategy as adopted by the Government of Ghana is to reach a coverage with safe water supply of approx. 90% of the rural population by the end of the century. The main elements of the sector strategy are:

- Rehabilitation and stabilization of existing rural water supply systems (approx. 8,000 handpumps)

- The provision of 6,000 boreholes fitted with handpumps

- The provision of 10 to 20,000 dug-wells

23. Ongoing and Planned Water Supply Projects are: a) Caisse Francaise, 900 boreholes drilled in the Central Region over 5 years, b) DANIDA, in the Volta Region 500 to 1000 pumps over the next 8 years, c) UNDP, Eastern Region, 100 handpumps, d)JICA supporting GWSC, Western Region,about 600 handpumps, e) World Vision, Afram Plains 450, pumps, f) UNICEF is financing approx. 150 waterpoints with handpumps per year, g) NGO's,represent a demand of 200 - 400 pumps per annum, h) NORRIP, Northern Region, 350 handpumps, k) CIDA -WUP III, Upper Regions, 2700 pumps over 7 years. The eventual total handpump population for 90% coverage will be approx. 25,000 pumps. With an estimated service life of 12 years per hand pump the replacement market will be over 2,000 pumps per annum. Therefore it can be estimated that the market in Ghana will be 2,500 to 3,000 pumps per year. The local manufacturers could cover approx. 50 to 60% of this market, i.e. about 1,200 to 1,800 pumps per annum.

Assessment of the Financial Viability of Local Handpump Manufacture

24. The investments required for equipment and tooling as well as substantial demand for working capital constrain the choice of companies. Small scale and cottage industries would financially not be able to undertake such a venture and would not have the managerial ability for sustained successful production.

25. The economic conditions in Ghana have considerably improved over the last 4-5 years. Under the Ghana Investment Code it is possible to obtain quite favourable relaxations on import restrictions and tax and duty exemptions. However it is still an uphill battle for local industries trying to survive and to compete against imported products. Constraints that affect the local production are: a) Ghana does not have a traditional manufacturing industry, because of this there is a deficiency in managerial skills and trained personnel, b) The industry lacks confidence in the future of Ghana's economy and is therefore reluctant to make substantial long term investments. Most companies do not have venture capital and are not willing to invest in a project that will not have immediate returns, c) It is difficult to obtain foreign currency, d) Manufacturers have to pay for raw material through Letter of Credit. They pay import duties on raw material; exemptions are troublesome to obtain, e) Procurement is done by free international competitive bidding. Since the market would not support several local producers, it is not possible to restrict tenders to national competitive bidding. f) Handpumps can be imported duty free, and (for instance) manufacturers in India profit from export subsidies

26. It is essential that any attempt to produce handpumps in Africa is economically viable. Ventures that depend on assistance from donor projects will inevitably run into problems when the foreign help stops. Realistically, local manufacture is not always feasible, some countries just do not represent a market big enough. Ghana, even though theoretically large enough to sustain about two to three local manufacturers, will probably in the near future have to satisfy herself with one manufacturer for direct action pumps. The production of lever pumps might gradually materialize if conditions (pre-qualification, standardization) can be created that make it possible for local industries to produce the pumps. In the meantime it is essential to strive towards a more comprehensive understanding of supply of handpumps for CWSS Projects. If the pumps are supplied through the local, private sector as turn-key installations (including: supply, distribution, delivery to site, installation, training of village mechanic, provision of after- sales services) the locally added value is

quite considerable.

27. Once a network of pre-qualified suppliers with regional dealers is established and the capacity to import, sell and distribute pumps is built up the question whether the pumps can be (partly or completely) manufactured at lower cost in the country should be addressed. The private sector will eventually decide whether it is feasible to start this local production.

Pumptypes

28. A detailed cost analysis for local production of pumps was made by UNDP/World Bank in Dec 1991. The basis for this calculations were typical manufacturing costs in Ghana industry and typical imported raw material costs, including tax and duties. The most significant results from this investigation are listed below:

a. INDIA MKII, STANDARD, Galvanized Iron rising mains and rods

Ghana, sales price, ex works	US$	570.-
The CIF price when imported, approx.	US$	275.-

b. INDIA MKII, GHANA MODIFIED, Atlas Copco Rising Main and Rods, Stainless Steel V4A (316), SKF Flange Bearings

Ghana, sales price, ex works	US$	1,470.-
The CIF price when imported, approx.	US$	1,300.-

c. AFRIDEV, STAINLESS STEEL RODS, 10 mm stainless steel rod, V2A (AISI 304), hook and eye connectors

Ghana, sales price, ex works	US$	950.-
The CIF price when imported, approx.	US$	560.-

d. NIRA AF85

Ghana, sales price, ex works	US$	550.-
The CIF price when imported, approx.	US$	560.-

e. UST PUMP

Ghana, sales price, ex works	US$	560.-
the pump is not produced outside Ghana		

Conclusions:

29. Direct Action Pumps: Under the present conditions it appears that only the NIRA AF85 pump could feasibly be produced in Ghana. The pump is easy to manufacture, does not require extensive tooling. The Finnish company has started a joint venture with a Ghanaian partner. It is expected to start mid 1993. Technical and financial support will be provided under a Finnfund sponsored scheme.

30. The pump has a relatively big potential market, it is very well suited for community management, it is relatively moderate in cost and therefore would be the most suitable pump which could also be purchased by communities on fully private basis, especially for hand-dug wells. The NIRA AF85 pump is a shallow well pump restricted to well installations of up to 15 m. Available data on water tables indicates that direct action pumps would cover 40 - 50% of all boreholes in Ghana and nearly 100% of the Hand Dug Wells.

31. Deep Well Pumps: Afridev and especially India MKII handpumps can be imported at prices

with which Ghanaian producers can not compete. The Ghana Modified India MKII is an indigenous product therefore less under competition from abroad. The pumphead could be produced locally, the rest of the pump, rising mains, rods and cylinder need, have to be imported. It would be worthwhile considering local assembly of this pump. Similar the Vergnet pump would only have a potential for local production of the pumphead.

Recommended Actions to improve Manufacturing Capacity

Standardization

32. As outlined in Annex xx, Choice of Technology, standardization is a precondition for local manufacture. The number of handpumps produced by a local manufacturer has to be at least 500 or more pumps per annum. Local entrepreneurs would consider investing for tooling only if a firm prospect of a future market exists. To achieve a consistent market the number of different handpump types used in the country has to be restricted to the bare minimum without creating a monopoly.

33. During the preparation of the technology packages two or three handpump types would be selected. This selection would be the basis for future standardization. Handpumps that can be made locally at a competitive price and adequate quality when compared to imported products would be given preference. Mainly handpumps specified with an international specification would be considered for standardization. This would prevent any distortion of the market as the prices can be checked on an international level.

Pre-qualification of Suppliers

34. Manufacturers and importers would be requested to undergo a process of pre-qualification. Trial orders would be placed to assess their capabilities (technical personnel, managerial capacity, financial capacity, equipment, quality of products, delivery, quality of after sales services). If the manufacturer/supplier meets the set criteria he would be certified as a licensed supplier. The project would have the objective to establish at least 3 certified suppliers and one certified manufacturer over the first 3 years. External inspection agencies (the same as used for quality control) would be employed to assist in an unbiased assessment. Funding required for 4 trial orders of 50 handpumps would come from the budget for development of infrastructure.

The fees for external inspection agencies would be **US $ 25,000.-**

Collective Orders for Handpumps

35. The CWSSP as a demand driven project would not have the opportunity to order the handpumps in planned structured batches. Supplier (importers) and even more so local manufacturers however have to import/produce pumps in reasonable quantities. The production of a handpump involves about 50 -60 % of the sales price in raw material. The working capital requirements are considerable. The establishment of after sales services requires additional substantial capital inputs before the sales actually take place. To reduce the financial strain on local manufactures/suppliers the CWSSP would go for LCB for collective orders with pre-qualified suppliers. These orders would cover an anticipated two years supply of pumps. The project would pay an advance of 70%, (this would have an effect like an interest free credit to the suppliers over two years and thus would not have any budgetary consequences). The produced/imported pumps would be inspected in the premises of the manufacturer/supplier by an independent inspection company and sealed. During the process of project execution (when a packaged drilling contract is finished) the project would release the delivery of small quantities for installation. After the acceptance reports from these installations have

been received, the supplier would be paid 20 % of the price by the community. The project would retain 10% over the guarantee period of 12 months.

Quality Control

36. For locally produced handpumps it would be necessary to establish quality control procedures which ensure that the pumps produced in Ghana are of the same quality standard as the imported ones. The internal in-line quality control needs to be strengthened. This would be done by providing technical assistance to the manufacturer/suppliers. The above mentioned external inspection agencies would be employed for this purpose. Further it would be necessary to establish an independent third party quality assurance. The pumps purchased under CWSSP would be checked by an independent inspection organization for conformity to the standards.

Funding required for:

Technical assistance to 4 suppliers	US$	**25,000.-**
External third Party inspection 1000 pumps	US$	**30,000.-**

Distribution and Installation of Handpumps

37. Suppliers/Manufacturers with Dealer Network and Area Mechanics. Initial efforts would be directed to build the capacity in the private sector to fulfil the role as a supplier of hardware and services. Contract for the supply of handpumps would include the provision of hardware as well as related services. The suppliers would be required to establish a comprehensive network of regional dealers and spare part outlets. These regional dealers and their area mechanics would be the backbone of the repair services. The model would have the following pattern:

a. A pre-qualified Supplier imports/manufactures the pumps and spares. He appoints Regional Dealers who are supplied by him, trained in marketing and technical aspects.

b. The Regional Dealers are the licensed representatives of the supplier. They sell (on regional level) and install handpumps. They appoint Area Mechanics who are licensed to perform repairs and to sell spare parts.

c. The Area Mechanic is the link to the community. He is the representative of the Regional Dealer.

d. The Village Mechanic is a member of the WATSAN committee. He is responsible for the day to day maintenance of the pump and the pump site.

The below table indicates the division of functions under this model for Distribution and Installation of handpumps:

ORGANIZATION	ACTION
CWSSD(HQ)	■ Selects 2 - 3 Pump Types for Standardization ■ Defines Specification ■ Pre-qualifies Suppliers
CWSS PROJECTS (Bilateral Donors and NGO's)	■ Plans the project ■ Purchases Pumps according to CWSSD(HQ) Guidelines ■ Organizes Quality Control ■ Service Contract with Supplier ■ Supervises the works
SUPPLIER/ MANUFACTURER	■ Imports/manufactures the pumps ■ Custom clearance ■ Stocks Pumps and Spares ■ Appoints Regional Dealers ■ Distributes Pumps to Regional Dealer ■ Training of Mechanics, Area Mechanics, Installation Crews ■ Marketing of the Pumps ■ Liaison with Manufacturer ■ After Sales Services
REGIONAL DEALER	■ Distributes Pumps to Site ■ Pump Installation ■ Training of Village Mechanic ■ Stocks and Sells Spare Parts ■ Provides Repair Services ■ Liaison with Area Mechanics
AREA MECHANIC	■ Makes the annual (preventive maintenance) Inspection ■ Repairs Pumps and sells Spare Parts on commission ■ Assist Regional Dealer in Installations ■ Liaison with Community
WATSAN COMMITTEE PUMP MECHANIC	■ Management of O&M ■ Minor Repairs ■ Collection of Inspection fee

The criteria for pre-qualification compel the suppliers to gear up to these requirements. The CWSSP would initiate that this model is introduced. The cost of the services provided by the private sector would reflect in the cost of the handpumps. The installed price is approx. 1.6 -2 times the FOB price. The handpump cost have therefore been included calculated accordingly.)

V. Maintenance and Repair Services

Community based Water Supply Schemes

38. The VLOM concept has the objectives to attain sustainability by motivating the communities to take over the full financial and managerial responsibility for O&M. Community management of O&M will relieve the government from the day to day interventions in remote rural areas. It is assumed that it would be possible to recover the recurrent cost for O&M. Certain aspects in the O&M of handpump based water systems and small piped systems can not easily left to the communities:

a. major repairs might be beyond the technical capability of the village or area mechanic and well outside the financial capacity of the community

b. replacement cost for pumps and expensive equipment/components at the end of their service life might be too high for communities

c. borehole maintenance requires specialized skills and equipment

39. Sharing of responsibilities and costs between the government and the villages might under the circumstances be a pragmatic, practical solution. In order to arrive at an operative cost sharing system constant interaction between the communities, the DWST and the private sector (as provider of goods and services) will be necessary.

Critical Aspects of Community Management

40. Several pilot projects in Ghana and in other African countries revealed the following conclusions:

a. CWS projects in francophone African countries suffered from inadequate extension work and no follow-up. Most projects had an extension and education programme that lasted only for the time of borehole drilling and installation of pumps. This meant that the communities had their education and the project support during the time when their pumps were still new and had little problems. But they had no support any more when the pumps grew older and started to breakdown more often.

b. The choice of technology is an important factor to the success of VLOM. Some handpumps did not reach the expected service life and were very expensive to repair after relatively short time of use. Reliable handpumps allow the communities to develop enough confidence in this technology.

c. It is possible to motivate and to train the communities to perform the necessary maintenance by themselves. The technical skills and the knowledge about safe water utilization are substantial in the communities. The communities are in general willing to assume their responsibility and contribute to O&M cost. They are also capable to perform the common repairs without help. Experience shows however that there seems to be a threshold to what extent the community participation can be expanded. If the cost for O&M rises too high the villages refuse to participate. The level of this threshold depends on what importance the community places on the provision of potable water. This in itself depends on various factors, e.g. availability of alternative sources, reliability of the existing supply, awareness of hygiene and health aspects, economic capacity to pay, etc. It is interesting to see that very often the willingness to pay is much lower than the ability to pay.

d. Breakdown maintenance (repairs only when the pump is not operational any more) is prevailing under community management. Preventive maintenance is virtually not done in all CWS projects in Africa. Its introduction requires long time of education, as a complete behavioural change is required. The concept can not be introduced within a period of 5 years. This means in CWS project interventions are less frequent, but of much higher cost than in preventive maintenance schemes. The amount per repair might exceed what the community is willing to pay. It is essential to maintain a follow-up programme (with the authority to intervene) in order to prevent that the communities will perform only breakdown maintenance.

e. Communities have no real concept of the actual cost implications. The pump breakdowns are too infrequent to allow them to understand that they have to cater for major repairs in the future. The cost for O&M is not perceived as the average cost over years but most of the time judged at the actual cost of the present repair (e.g. a

repair that cost $ 50.00 after 5 years is considered more costly than a annual repair of $ 15.00 in spite of the fact that the total cost of the latter is higher).

f. None of the VLOM projects has achieved complete sustainability with full recovery of recurrent and replacement cost. In all projects the continued inputs provided by government or ESA assistance are essential to keep the pumps operational.

The consequences of these conclusions are:

Community management of O&M will not relieve the government from its continued involvement in rural water supply. It might however be possible for the government to assign some of the duties to the communities and the private sector.

41. The following preconditions need to be met if community management is to be introduced with success at a sustained basis:

a. the communities need to be made aware of the importance of a safe drinking water supply system

b. the communities need to be informed about the cost implications to obtain and run a water supply system. They have to be prepared to take on their responsibility for planning, construction and O&M of the facilities

c. the communities have to be trained in all aspects of the operation and maintenance

d. the water supply systems need to be reliable for a long period of time

e. the water quality needs to be acceptable to the people

f. the necessary back-up services (spare parts, repair services, technical support, etc.) need to be readily accessible in the vicinity

g. a long term follow-up system in which the DWST/GWSC safeguards the pumps/water supply systems by supervising the O&M done under community management and in which the DWST provides an advisory service to the villages to make the necessary repairs in time

h. it will be necessary to make provisions for the repairs beyond the capacity of communities, like well maintenance, pump/equipment replacement, etc.

Effectiveness of the Maintenance Systems

42. The cost effectiveness of preventive maintenance is beyond doubt. Centrally managed maintenance systems allow the introduction of preventive maintenance. Community managed, preventive maintenance is generally not known. It would appear that a centralized maintenance system could be more effective in pure terms of how many pumps are in serviceable condition at any time. However the need to organize tariff collection makes it difficult to operate the system efficiently. Presently only GWSC is allowed to charge tariffs for water, district assemblies could not do this. So it is quite obvious that GWSC would have to take the role of the executing agency for centralized O&M. This is against the sector policy. The GWSC bureaucratic apparatus is complicated which

reduces flexibility. In the past this has been one of the major set backs in the provision of repair services to handpumps and water supply systems through GWSC.

43. A community managed system will most probably see a higher percentage of pumps out of service. In order to prevent that the momentum of the initial education campaign is lost it will be necessary to maintain a constant supervision and advisory service to the communities. This makes the CWS dependent on continued government support. This support can be provided through the district assembly. The direct interaction between community and district administration enhances accountability for both parties.

Social Aspects

44. A centralized system features the insurance to the communities that in case of a major breakdown they will not be faced with a higher tariff. In CWS, where every individual community is directly responsible for their pump/system, a disastrous breakdown will put a very heavy financial strain onto the community.

45. A further aspect is that availability of water is often directly linked with the economic potential of the village. In areas where water is found relatively close to the surface the soil is often quite fertile. Therefore in these areas the villages are relatively well off. In areas with very low water tables, rainfall figures are often low and the agricultural yield is little. This means that the communities which are most likely to have little problems with their handpump (because of the low pumping lift and the shallow cylinder setting) are also the communities that could afford best to pay for their repairs. On the other hand, the communities which have to pump water from great depth (so that their pump is likely to have serious breakdowns quite often) are also most of the time economically deprived. The CWS system that relies on direct payment of the community for O&M does not have any regulatory function. This might in practice be compensated by the fact that the communities which have little water are very often much more willing to pay large parts of their income for water. However, it could well be that a poor community genuinely can not afford the cost for a major repair.

46. A very positive aspect of the education campaign, which is necessary to introduce community management, is that it might trigger off some other community development activities, thereby contributing to the overall community development in rural areas.

Maintenance Strategy

47. At first the CWSSP(HQ) would formulate a general maintenance strategy, for newly developed facilities and for existing facilities as well. The strategy would be drafted in such a way that it would cater in a practical manner for the transition of the present O&M system to the new CWS system, preserving the already existing infrastructures, keeping the present O&M structures operational thereby making best use of the personnel resources in GWSC.

This strategy would be based on the following:

a. Acceptance that O&M needs to be subsidized also under community management. It is unlikely that the communities can generate the full funding for all aspects of O&M. It is also clear that CWSSD can not generate revenues for CWS. Therefore the strategy would include a programme how initially the CWSSP can provide the funds for certain aspects of O&M (well maintenance, pump replacements, etc.). These rehabilitation funds would be allocated to the district assemblies and the regions to be utilized to assist communities in a cost sharing arrangement if a major breakdown

occurs that the pump/equipment needs to be replaced.

b. Assessment of the existing resources. GWSC Maintenance Unit in the South and GWSC maintenance units in the Upper Regions represent a strong base to build on. The CWSSP would place high importance that these units are not dissolved but gradually changed and incorporated into the new system. Eventually privatization of the services provided by these units would be encouraged.

c. Standardization of Handpumps. Involvement of the private sector for O&M and the provision of spare parts make it mandatory that the number of different pump types is kept to a minimum (see above).

d. Establishment of a continued annual preventive maintenance and inspection service. The communities would at the time when they acquire a water facility (handpump or piped system) take on the obligation that they will have it inspected and preventive maintenance carried out on an annual basis. This will safeguard that the investments made by GOG are used and maintained properly. The DWST would provide a continued follow-up on the communities to assist them to solve the problems arising from managing the water facilities.

e. Identification of what services can be privatized. Within the framework of CWSSD it would be necessary to define what services can be privatized and how this can best be achieved. Franchising of some of the services to NGO's or private companies which are acting on behalf of GWSC would be considered.

f. Plan to assist the private sector to develop a network that can provide the spare parts and services. Pre-qualification of suppliers that demands the inclusion of after-sales services into the regions and districts with the supply of the initial pumps/equipment would guarantee that communities have spare parts and trained mechanics in the vicinity.

g. Training requirements for community pump mechanics, area mechanics and O&M Technicians would be defined after taking the decision of what technologies have been standardized on. In general, suppliers would be requested to train area mechanics and the community pump mechanics according to their specific requirements. District and CWSSD(R) personnel would be trained on all technologies employed in the project on a broader basis.

Implementation

48. The implementation of the national strategy would be started in the Brong Ahafo Region and would be expanded later to the Volta Region Project (Danida), the Eastern Region Project (UNDP), the CWSSP remaining project area (Ashanti, Northern, Western) and the Upper Regions Project (WUP III; CIDA). In the South of Ghana new donors are entering the rural water supply sub-sector and their projects aim at supplementing the existing water points. In these project areas approx. 3600 pumps, installed under the 3000 Wells Project, are maintained by the GWSC Maintenance Unit. The communities have to pay water tariff. An introduction of a community managed system means a shift for this communities from the tariff payable to GWSC to direct payment of all repairs and spares. It is highly unlikely that a clean cut transition can be arranged. This will severely affect the existing pumps, creating problems with the willingness to pay and the danger that the pumps will not be maintained. To avoid these problems the strategy would be implemented in the following way.

49. Communities, when they enter the development contract to obtain a water facility, sign an agreement that they will have the facilities inspected by a CWSSD approved mechanic on an regular basis (handpumps once a year, piped systems according to the technical requirements). This inspection would include a preventive maintenance component in which the fast wearing parts are exchanged. The communities will have to pay for this service to the mechanic. The tentative recommended cost for handpumps would be:

Shallow Well Pump	approx	US$	26.-
Deep Well Pump	approx	US$	38.-
2 Vergnet per borehole	approx	US$	63.-

The inspection report has to be prepared in triplicate (copies for: the community, DWST, CWSSD(R)). This will allow to keep a data base on the status of the water facilities on district and regional level. Any other repairs and additional spare parts which become necessary between the inspections would have to be paid by the communities.

50. Technical back-up for repairs that are well outside the technical and financial capability of the communities would need to be ensured by CWSSD. Borehole cleaning and redevelopment would have to be organized. Presently GWSC has the capacity to maintain all the boreholes in the country (5 maintenance rigs, 3 with the Maintenance Unit and 2 in the Northern/Upper regions). Based on the fact that the equipment and the skilled personnel are established in GWSC it makes sense that GWSC would continue to operate. Setting up a private sector operation would create a overcapacity with insufficient market. However it will be necessary to streamline and eventually privatize the GWSC Maintenance Unit operations (see below).

51. For major repairs and rehabilitation of the systems a rehabilitation fund would be established to alleviate the financial constraint on the communities (see below). This fund would initially be established through the CWSSP during the project period.

52. In case of a major repair or borehole redevelopment the community would have the possibility to apply for financial assistance to the district assembly. The application would be scrutinized by the DWST and CWSSD(R) office. Precondition to be eligible for any assistance would be that the community had all the (preventive maintenance) inspections carried out. The cost sharing arrangement would need to be worked out in detail for all the technologies. Communities would need to pay a reasonable percentage of the cost.

53. The CWSSP would introduce the new maintenance strategy for handpumps in the Brong Ahafo region. Initially only a few districts would be selected to start with the introduction. For the other technologies (piped systems) the strategy would be introduced in the complete project area. Outside Brong Ahafo the CWSSP would concentrate mainly on hand dug wells and piped systems for about two years. Based on the experience in the districts that started immediately with community management the transition in the other districts would be effected.

54. GWSC would carry on for the time being with the present, centralized handpump maintenance system under the Maintenance Unit in the other project area regions. A management and business plan would be worked out to restructure the Maintenance Unit in such a way that it would change from its present operation to the regular (preventive maintenance) inspections as foreseen in the maintenance strategy. Tariff payment would stop and the Unit would charge the recommended costs for the inspections to the communities. Spare parts would not any more be imported by the Unit, but sold on commission for one or more national suppliers. Thus a strong distribution network for private suppliers would be established. In addition to the handpump maintenance the Unit would continue with its well

maintenance operations, and pump repair services. These services would be provided under competitive conditions.

The institutional structure of the Maintenance Unit would be changed such that the Unit could operate as an independent profit centre. It would be taken out of GWSC operations, It would be autonomous, have its own management, staffing arrangements and its own accounts. This would be the first step towards future privatisation of the Unit. It is recommended that GWSC would seriously examine the sale of this Unit thereby giving a management buy-out the first preference in order to ensure the functioning of the unit.

55. The communities in these regions would be told that a change in the maintenance system is imminent and they would be educated towards this goal. Since they have been used to pay regular tariffs it should be quite easy to motivate them to cooperate with the new maintenance structure. Initially the annual cost would appear slightly lower to them then the present tariff. They would however have to pay the full costs in case of a major repairs.

56. The structures of the GWSC Maintenance Unit (or the privatized enterprise that would emerge from it) would be adjusted to the new maintenance system. The Unit would have to compete with the private sector and provide the services at competitive prices. It would to operate commercially, i.e., the Unit would have to invoice for all work.

An economic survey showed that the Unit, if only maintaining and repairing handpumps, would not be commercially viable. Additional activities with a higher economic return would need to be performed. It is essential to maintain the well maintenance operations within the Unit. New activities, such as handpump and piped system installation and repair services for piped systems could be included.

57. This approach would allow GWSC to implement a nationwide maintenance strategy in steps without compromising on the present pumps. It would also give the donors a chance to be actively involved in the building up of CWSSD, the DWST and the private sector.

58. For O&M of more complicated piped systems GWSC would be invited to participate in tenders for service contracts. The community would make their choice of how O&M will be executed. In local competitive bidding GWSC's urban section might have many comparative advantages over the private sector, so that the Corporation could provide these services cheaper then its competition and still be able to generate revenues.

Operation and Maintenance Support by the District Water and Sanitation Team

59. The permanent follow up with the communities is a key factor to the introduction of community management. The DWST would be the institution which is permanently in place, regardless of donor inputs. The Operation & Maintenance Technician of the DWST are responsible for advising and motivating the communities in all aspects of O&M (see above). If possible, the O&M Technician would be seconded by CWSSD to the DWST with all his operational costs being paid by the district. Reorientation and additional training would be provided by the project.

60. The O&M Technician would stay in close contact with the GWSC approved private repair contractors. He would be responsible to maintain the data base of all water facilities in the district. Applications to the rehabilitation fund would be routed through the DWST to be checked whether the (preventive maintenance) inspections had been made. The O&M Technician would be part of the team that scrutinizes the applications.

Rehabilitation Fund

61. A Rehabilitation Fund would be established by the CWSSP. The objective of this fund would be to mitigate the financial constraint on the communities in the case when the borehole needs to be cleaned or the pump/equipment needs to be replaced or completely overhauled. Initially the CWSSP would inject some seed money to get the fund started. It is recommended that the GOG would take over the financial responsibility to replenish the Rehabilitation Fund. The GOG could use for this purpose either its own funds or counterpart funds generated with sector funding by ESA's. A percentage of the cost of all development projects for rural water supply could be put aside to replenish this fund.

A further financial input could be generated if GWSC would sell all its spare parts stock to private suppliers. (The communities would under the CWS maintenance strategy have to buy the parts directly from the supplier or, if the Maintenance Unit is selling the part, the spare parts would be sold on commission). The proceeds from this bulk sale of spare parts would be injected into the Rehabilitation Fund.

62. The fund would be administrated by CWSSD. CWSSD (HQ) would establish the rules and regulations for the use of the fund. It would allocate the funds to the CWSSD(R) according to the national planning. CWSSD(R) would plan the distribution of the funds to the district assemblies according to the regional planning. The district assemblies would be given an advance of their allocation. The bulk of the money would remain at regional level. Payments for repairs and replacements of handpumps would be made at the district level under the guidance of the DWST and with supervision from CWSSD(R). Rehabilitation of boreholes and piped water systems would be administered at regional level. At a semi annual basis, after receipt of accounts, the CWSSD(R) would disburse replenishment to the districts.

63. The funds would be used for the following purposes:

a.	Borehole rehabilitation		
	Minimum community payment	US$	100.-
	Up to a maximum of	US$	700.-
b.	subsidize replacement of shallow well hand pumps.		
	Minimum community payment	US$	180.-
	Up to a maximum of	US$	300.-
c.	subsidize replacement of deep well hand pumps		
	Minimum community payment	US$	250.-
	Up to a maximum of	US$	700.-
d.	subsidize rehabilitation for piped systems		
	Minimum community payment	US$	2,000.-
	up to a maximum of	US$	8,000.-
e.	subsidize rehabilitation for Hand Dug Well		
	Minimum community payment	US$	70.-
	up to a maximum of	US$	330.-

Initially the Fund would not be heavily used as nearly all the facilities in the project area (Upper West, Upper East, Northern, Ashanti, Brong Ahafo, Western) will be new or newly rehabilitated. At the end

of the project period the projected annual subsidy would be US$ 1,3 million. The below table shows the financial requirement per annum:

	No. of Facilities	Frequency Years	Cost per Repair $	Subsidy $	Comm. Paym't %	Total Cost of Rehab. $	Subsidy required $
Borehole Rehab.	8,800	10	750.-	650.-	13%	660,000.-	572,000.-
Deep Well Pumps	5,600	9	900.-	650.-	28%	560,000.-	404,444.-
Shallow Well Pumps	3,000	6	400.-	220.-	45%	200,000.-	110,000.-
Hand dug Wells	4,000	15	400.-	330.-	18%	106,667.-	88,000.-
Piped Systems	200	12	10,000.-	8000.-	20%	166,667.-	133,333.-
					TOTAL	1,693,333.-	1,307,778.-

Private Sector Involvement in O&M

64. Suppliers of equipment would be compelled to set up their own after sales service network under the guidelines for pre-qualification. Thus the private sector would be responsible for the supply and distribution of spare parts. Spare part distribution on its own is not an economically viable operation. It has therefore to be tied in with the supply of new equipment. If the renewal of pre-qualification license is dependent on the continued availability of spare parts in the districts at reasonable cost, suppliers will ensure that the spare parts will be available. Regional sales centres equipped with the necessary tools and spares will be set up.

65. Cost of Handpump Maintenance, The maintenance strategy foresees that privatized enterprises would perform the (preventive maintenance) inspections and the major repairs. The inspections would be on an annual basis. The repairs had been calculated at one repair every 4 years. The private unit would sell the spare parts with a commission of 20%. Bigger units could have a borehole cleaning and redevelopment operations attached to the pump repairs.

The cost for an annual inspection have been worked out as follows:

	Labour and Transport	Spare Parts	Total	Total ¢
Ghana mod India MKII	US$ 23.-	US$ 10.-	US$ 33.-	19,800.-
Afridev	US$ 23.-	US$ 15.-	US$ 38.-	22,800.-
NIRA AF85	US$ 23.-	US$ 3.-	US$ 26.-	15,600.-
Vergnet	US$ 23.-	US$ 20.-	US$ 43.-	25,800.-
2 Vergnet	US$ 23.-	US$ 40.-	US$ 63.-	37,800.-

It was assumed that the mechanics will earn the full amount for labour and transport as well as 20% of the spare parts cost.

The cost for well maintenance had been calculated at US$ 750.-

66.The following Units were investigated:

a) One man unit, district based, uses a bicycle for transport, does not have a workshop (only handtools), serves 50 pumps

b) One man Unit, district based, use a motorcycle for transport, does not have a workshop (only handtools), serves 200 pumps

c) Three men unit, regional based, use motorcycle for transport, does have a basic workshop and a pick-up, serves 500 pumps

d) Medium size unit, regional based, use motorcycle for transport, does have a reasonably equipped workshop and a pick-up, serves 2000 pumps

e) Large size unit, covers several regions, use motorcycle for transport, does have one well equipped and two small workshops and 3 pick-up, serves 4000 pumps (this would be about a privatized GWSC Maintenance Unit)

f) same as above but additional 3 maintenance rigs for well maintenance (present operation of GWSC Maintenance Unit, but much streamlined)

Unit	Personnel	Pumps served	Wells serviced	Annual Cost $	Income $	Profit $
a) Small Bicycle	1	50	0	1,817.-	1,953.-	136.-
b)Small Motorcycle	1	200	0	7,243.-	7,813.-	570.-
c) Medium	3	500	0	32,184.-	21,875.-	-10,309.-
d) Large	11	2,000	0	95,931.-	87,500.-	-8,431.-
e) Very Large GWSC MU	26	4,000	0	179,278.-	179,000.-	-278.-
f) Very Large GWSC MU	35	4,000	320	393,666.-	419,000.-	25,344.-

67. It appears that the options a) and f) would be the most promising to be followed. Option a) a very small enterprise (area mechanic) with the part time activity to inspect, maintain and repair handpumps. This option is discussed below .

68. Option a) Area mechanics, would support the rural communities in O&M. Even though the regular inspections would provide a basic work load to the area mechanics, the economic base for such a work is not sufficient to support a mechanic full time. The pumps are too dispersed to allow a mechanic to serve a reasonable number which would allow him to make a living. The mechanic will be equipped with a bicycle or use public transport. The number of pumps served would about 50. The suppliers would be advised to appoint small entrepreneurs who are already operating in a related field (car/motorcycle mechanics, household articles repairers, etc) as their district representatives. The area mechanic will then be a part-time pump mechanic and can generate other income. The risk in this approach is that the pump repairs will have a low priority for the mechanic and will, therefore, receive reduced service.

69. In order to perform the (preventive maintenance) inspections the area mechanic would need to be certified by CWSSD. For this he would have to undergo the specified training. The training of area mechanics would be left to the supplier under the guidelines for pre-qualification. The area mechanic would be the district representative of a supplier and as such be registered with the DWST.

70. Option f) GWSC Maintenance Unit, it appears that the proposed continuation of the

restructured and eventually privatized GWSC Maintenance Unit would be economically viable, if it is well managed and commercially run. However the unit would need to expand its scope and also offer services to repair and maintain piped systems.

VI Spare Part Distribution

71. Spare Parts Distribution, The pre-qualified suppliers will be have to set up a network of spare parts outlets. It is not possible to prescribe a definite way how these would be achieved. However each pre-qualified supplier will have to establish at least one spare part sales centre in every district he is operating. The distribution network could have the following appearance:

a. The national supplier manufactures/imports the pumps as well as the spare parts required. He keeps fully comprehensive stocks of the spares in his central store.

b. In each region the regional representative (who sells and installs pumps for the national supplier) will keep adequate stocks of spare parts. These spare parts will be given to the regional dealer by the national supplier. Thus the investment and with it the financial risk will be carried by the national supplier/manufacturer. The regional dealer will pay a deposit of (let´s say) 20% of the value of the spares that he has in stock. The margin for the regional dealer could be about 30% of the sales price. The quantity of spare parts in stock would have to be sufficient to cover at least 80% of all breakdowns. In the case that the components would not be in stock with the regional dealer, he should be able to order the parts within one week from the national supplier. The regional dealer would sell the spare parts either directly to communities or through the appointed area mechanic. The bulk of the spare parts sales would be parts that are to be replaced during the (preventive maintenance) inspection. This would allow the regional dealer to plan fairly explicitly what annual turn over on spares can be expected. These planning figure would help the national dealer to establish the demand for spare parts on national level.

   The regional dealer would work very closely with the area mechanics who are his principal outlet for spare part sales. The area mechanics would carry out the annual (preventive maintenance) inspection during which the fast wearing parts of the handpumps and piped supply systems are replaced at a scheduled, regular basis. The area mechanic would have a margin of (let´s say) 20% on all the spares that he replaces. He would not stock any other spare parts other then those that he has to replace during the (preventive maintenance) inspections. He would have to order by the regional dealer any other spare part required for repairs outside the scheduled maintenance. The distribution network would need to be set up in such a way that (95% of the) spare parts could be available at the area mechanic in less than a week. The fact that the area mechanic would have an economic interest in the parts he exchanges would make his work more economically viable and would greatly contribute to his motivation to visit the facilities in the predetermined intervals for the (preventive maintenance) inspections.

72. The GWSC Maintenance Unit (as discussed above) could be an inter-regional outlet for spare parts. By the fact that the unit covers a vast number of pumps. it could make a sales contract to act as the spare parts distribution network for one (or more) suppliers. The system would be the same, the maintenance unit would be selling the spare parts on commission for the suppliers with a margin of approx. 30%. This would allow the Unit to come nearer to its goal of being commercially viable and

for the suppliers it would provide a well established, far reaching network to distribute spares.

73. CWSSD would prepare a list of recommended spare parts sales prices for all the standardized pumps. This list would be reviewed and agreed on annually together with the pre-qualified suppliers/manufacturers. The price list would be published as recommended prices so that the communities would know what the spare parts cost.

COST HANDPUMP MAINTENANCE

Handpump Maintenance		
Handpump inspections	No:	50
Handpump repairs	No:	9
Well Maintenance:		
Wells redeveloped	No:	0

Personnel:

Manager	0		WS Mechanic	0
Administrator	0		Pump Mechanic	1
Accountant	0		Rig Operator	0
Supervisor	0		Driver	0
Storekeeper	0		Guard/Helper	0

Equipment:

Transport:			Workshop:	
4x4 Car	0		Lathe	0
Pick-up	0		Drilling MC	0
Truck	0		ARC Welding set	0
Bicycle	1		OXY Welding Set	0
Maintenance Rig	0		Hacksaw	0
Pumptest Equip.	0		Compressor	0
Tool Sets	1		Generator	0
			Handtools	1

Office/Store:

Computer	0
Furniture/Desk	0
Storage Racks	0
Sundry	1

NOTES:

Interest Rate:	10	%
Echange Rate:	600	Cedis/$

COST CALCULATION:

CAPITAL COST FOR EQUIPMENT

			Unit Cost $	Cost $	Total $
Transport					
	0	4x4 Car	25,000	0	
	0	Pick-up	20,000	0	
	0	Truck	60,000	0	
	1	Bicycle	400	400	
	0	Maintenance Rig	120,000	0	
	0	Pumptest Equip.	15,000	0	
	1	Toolsets	400	400	800
Equipment					
	0	Lathe	15,000	0	
	0	Drilling MC	4,000	0	
	0	ARC Welding set	3,000	0	
	0	OXY Welding Set	2,000	0	
	0	Hacksaw	3,000	0	
	0	Compressor	6,000	0	
	0	Generator	3,000	0	
	1	Handtools	400	400	400
Office/Store					
	0	Computer	4,000	0	
	0	Furniture/Desk	300	0	
	0	Storage Cabinets	200	0	
	1	Sundry	48	48	48
		Total Equipment Cost			1,248

FIXED COST:

Depreciation:		Life (years)	Depreciation $	Total $
0	Cars	4	0	
0	Truck	5	0	
1	Bicycle	5	106	
0	Maintenance Rig	8	0	
0	Pumptest Equip.	5	0	
1	Tools	3	161	
	Workshop Equip.	8	75	
0	Computers	3	0	
	Office Equip.	6	0	
	Store Equip.	10	0	341
Rent:				
			per annum	
	Office		0	
	Workshop		0	
	Housing Mgr		0	
	Housing Staff		0	0
Capital Cost:				
	Interest on Capital			125
	Interest Working Capital			36
FIXED COST (without interest on Capital)				377

RUNNING COST:

Personnel Cost:		Salary Cedis/month	$ per year	Total $
0	Manager	360,000	0	
0	Administrator	240,000	0	
0	Accountant	240,000	0	
0	Supervisor	180,000	0	
0	Storekeeper	100,000	0	
0	WS Mechanic	70,000	0	
1	Pump Mechanic	70,000	1,400	
0	Rig Operator	120,000	0	
0	Driver	80,000	0	
0	Guard/Helper	45,000	0	1,400
Running Cost:		Cedis per month	$ per year	
0	4x4 Car	300,000	0	
0	Pick-up	280,000	0	
0	Truck	540,000	0	
1	Bicycle	1,000	20	
0	Maintenance Rig	900,000	0	
0	Pumptest Equip.	75,000	0	
1	Workshop	0	0	
1	Office	1,000	20	40
TOTAL RUNNING COST				1,440
TOTAL COST				1,817

INCOME:

	Unit Cost	Total
Pump Inspection	25	1,250
Pump Repairs	75	703
Well Maintenance	750	0
Total Income		1,953

PROFIT	136

COST HANDPUMP MAINTENANCE

Handpump Maintenance		
Handpump inspections	No:	200
Handpump repairs	No:	38
Well Maintenance:		
Wells redeveloped	No:	0

Personnel:

Manager	0		WS Mechanic	0
Administrator	0		Pump Mechanic	1
Accountant	0		Rig Operator	0
Supervisor	0		Driver	0
Storekeeper	0		Guard/Helper	0

Equipment:

Transport:			Workshop:	
4x4 Car	0		Lathe	0
Pick-up	0		Drilling MC	0
Truck	0		ARC Welding set	0
Motorcycle	1		OXY Welding Set	0
Maintenance Rig	0		Hacksaw	0
Pumptest Equip.	0		Compressor	0
Tool Sets	1		Generator	0
			Handtools	1

Office/Store:

Computer	0
Furniture/Desk	0
Storage Racks	0
Sundry	1

NOTES:

Interest Rate:	10	%
Echange Rate:	600	Cedis/$

COST CALCULATION:

CAPITAL COST FOR EQUIPMENT

			Unit Cost $	Cost $	Total $
Transport					
	0	4x4 Car	25,000	0	
	0	Pick-up	20,000	0	
	0	Truck	60,000	0	
	1	Motorcycle	3,800	3,800	
	0	Maintenance Rig	120,000	0	
	0	Pumptest Equip.	15,000	0	
	1	Toolsets	400	400	4,200
Equipment					
	0	Lathe	15,000	0	
	0	Drilling MC	4,000	0	
	0	ARC Welding set	3,000	0	
	0	OXY Welding Set	2,000	0	
	0	Hacksaw	3,000	0	
	0	Compressor	6,000	0	
	0	Generator	3,000	0	
	1	Handtools	400	400	400
Office/Store					
	0	Computer	4,000	0	
	0	Furniture/Desk	300	0	
	0	Storage Cabinets	200	0	
	1	Sundry	150	150	150
		Total Equipment Cost			4,750

FIXED COST:

Depreciation:		Life (years)	Depreciation $	Total $
0	Cars	4	0	
0	Truck	5	0	
1	Motorcycle	2	2,190	
0	Maintenance Rig	8	0	
0	Pumptest Equip.	5	0	
1	Tools	3	161	
	Workshop Equip.	8	75	
0	Computers	3	0	
	Office Equip.	6	0	
	Store Equip.	10	0	2,425
Rent:				
			per annum	
	Office		600	
	Workshop		0	
	Housing Mgr		0	
	Housing Staff		0	600
Capital Cost:				
	Interest on Capital			475
	Interest Working Capital			118
FIXED COST (without interest on Capital)				3,143

RUNNING COST:

Personnel Cost:		Salary Cedis/month	$ per year	Total $
0	Manager	360,000	0	
0	Administrator	240,000	0	
0	Accountant	240,000	0	
0	Supervisor	180,000	0	
0	Storekeeper	100,000	0	
0	WS Mechanic	70,000	0	
1	Pump Mechanic	120,000	2,400	
0	Rig Operator	120,000	0	
0	Driver	80,000	0	
0	Guard/Helper	45,000	0	2,400
Running Cost:		Cedis per month	$ per year	
0	4x4 Car	300,000	0	
0	Pick-up	280,000	0	
0	Truck	540,000	0	
1	Motorcycle	75,000	1,500	
0	Maintenance Rig	900,000	0	
0	Pumptest Equip.	75,000	0	
1	Workshop	5,000	100	
1	Office	5,000	100	1,700
TOTAL RUNNING COST				4,100
TOTAL COST				7,243

INCOME:

	Unit Cost	Total
Pump Inspection	25	5,000
Pump Repairs	75	2,813
Well Maintenance	750	0
Total Income		7,813

PROFIT	570

COST HANDPUMP MAINTENANCE

Handpump Maintenance		
Handpump inspections	No:	500
Handpump repairs	No:	125
Well Maintenance:		
Wells redeveloped	No:	0

Personnel:

Manager	0		WS Mechanic	0
Administrator	0		Pump Mechanic	2
Accountant	0		Rig Operator	0
Supervisor	1		Driver	0
Storekeeper	0		Guard/Helper	0

Equipment:

Transport:			Workshop:	
4x4 Car	0		Lathe	0
Pick-up	1		Drilling MC	0
Truck	0		ARC Welding set	1
Motorcycle	2		OXY Welding Set	1
Maintenance Rig	0		Hacksaw	0
Pumptest Equip.	0		Compressor	0
Tool Sets	1		Generator	0
			Handtools	1

Office/Store:

Computer	0
Furniture/Desk	1
Storage Racks	0
Sundry	1

NOTES:

Interest Rate:	10	%
Echange Rate:	600	Cedis/$

COST CALCULATION:

CAPITAL COST FOR EQUIPMENT

			Unit Cost $	Cost $	Total $
Transport					
	0	4x4 Car	25,000	0	
	1	Pick-up	20,000	20,000	
	0	Truck	60,000	0	
	2	Motorcycle	3,800	7,600	
	0	Maintenance Rig	120,000	0	
	0	Pumptest Equip.	15,000	0	
	1	Toolsets	400	400	28,000
Equipment					
	0	Lathe	15,000	0	
	0	Drilling MC	4,000	0	
	1	ARC Welding set	3,000	3,000	
	1	OXY Welding Set	2,000	2,000	
	0	Hacksaw	3,000	0	
	0	Compressor	6,000	0	
	0	Generator	3,000	0	
	1	Handtools	400	400	5,400
Office/Store					
	0	Computer	4,000	0	
	1	Furniture/Desk	300	300	
	0	Storage Cabinets	200	0	
	1	Sundry	1,182	1,182	1,482
		Total Equipment Cost			34,882

FIXED COST:

Depreciation:		Life (years)	Depreciation $	Total $
1	Cars	4	6,309	
0	Truck	5	0	
2	Motorcycle	2	4,379	
0	Maintenance Rig	8	0	
0	Pumptest Equip.	5	0	
1	Tools	3	161	
	Workshop Equip.	8	1,012	
0	Computers	3	0	
	Office Equip.	6	69	
	Store Equip.	10	0	11,930
Rent:				
			per annum	
	Office		2,400	
	Workshop		0	
	Housing Mgr		0	
	Housing Staff		0	2,400
Capital Cost:				
	Interest on Capital			3,488
	Interest Working Capital			494
FIXED COST (without interest on Capital)				14,824

RUNNING COST:

Personnel Cost:		Salary Cedis/month	$ per year	Total $
0	Manager	360,000	0	
0	Administrator	240,000	0	
0	Accountant	240,000	0	
1	Supervisor	180,000	3,600	
0	Storekeeper	100,000	0	
0	WS Mechanic	70,000	0	
2	Pump Mechanic	120,000	4,800	
0	Rig Operator	120,000	0	
0	Driver	80,000	0	
0	Guard/Helper	45,000	0	8,400
Running Cost:		Cedis per month	$ per year	
0	4x4 Car	300,000	0	
1	Pick-up	280,000	5,600	
0	Truck	540,000	0	
2	Motorcycle	75,000	3,000	
0	Maintenance Rig	900,000	0	
0	Pumptest Equip.	75,000	0	
1	Workshop	8,000	160	
1	Office	10,000	200	8,960
TOTAL RUNNING COST				17,360
TOTAL COST				32,184

INCOME:

	Unit Cost	Total
Pump Inspection	25	12,500
Pump Repairs	75	9,375
Well Maintenance	750	0
Total Income		21,875

PROFIT	(10,309)

COST HANDPUMP MAINTENANCE

Handpump Maintenance		
Handpump inspections	No:	2,000
Handpump repairs	No:	500
Well Maintenance:		
Wells redeveloped	No:	0

Personnel:

Manager	1		WS Mechanic	1
Administrator	0		Pump Mechanic	6
Accountant	1		Rig Operator	0
Supervisor	0		Driver	1
Storekeeper	1		Guard/Helper	0

Equipment:

Transport:			Workshop:	
4x4 Car	1		Lathe	0
Pick-up	1		Drilling MC	1
Truck	0		ARC Welding set	1
Motorcycle	6		OXY Welding Set	1
Maintenance Rig	0		Hacksaw	0
Pumptest Equip.	0		Compressor	1
Tool Sets	1		Generator	1
			Handtools	1

Office/Store:

Computer	1
Furniture/Desk	3
Storage Racks	1
Sundry	1

NOTES:

Interest Rate:	10	%
Echange Rate:	600	Cedis/$

COST CALCULATION:

CAPITAL COST FOR EQUIPMENT

		Unit Cost $	Cost $	Total $
Transport				
1	4x4 Car	25,000	25,000	
1	Pick-up	20,000	20,000	
0	Truck	60,000	0	
6	Motorcycle	3,800	22,800	
0	Maintenance Rig	120,000	0	
0	Pumptest Equip.	15,000	0	
1	Toolsets	400	400	68,200
Equipment				
0	Lathe	15,000	0	
1	Drilling MC	4,000	4,000	
1	ARC Welding set	3,000	3,000	
1	OXY Welding Set	2,000	2,000	
0	Hacksaw	3,000	0	
1	Compressor	6,000	6,000	
1	Generator	3,000	3,000	
1	Handtools	400	400	18,400
Office/Store				
1	Computer	4,000	4,000	
3	Furniture/Desk	300	900	
1	Storage Cabinets	200	200	
1	Sundry	3,456	3,456	8,556
	Total Equipment Cost			95,156

FIXED COST:

	Depreciation:	Life (years)	Depreciation $	Total $
2	Cars	4	14,196	
0	Truck	5	0	
6	Motorcycle	2	13,137	
0	Maintenance Rig	8	0	
0	Pumptest Equip.	5	0	
1	Tools	3	161	
	Workshop Equip.	8	3,449	
1	Computers	3	1,608	
	Office Equip.	6	207	
	Store Equip.	10	33	32,791
	Rent:			
			per annum	
	Office		8,400	
	Workshop		0	
	Housing Mgr		0	
	Housing Staff		0	8,400
	Capital Cost:			
	Interest on Capital			9,516
	Interest Working Capital			1,540
	FIXED COST (without interest on Capital)			42,731

RUNNING COST:

	Personnel Cost:	Salary Cedis/month	$ per year	Total $
1	Manager	360,000	7,200	
0	Administrator	240,000	0	
1	Accountant	240,000	4,800	
0	Supervisor	180,000	0	
1	Storekeeper	100,000	2,000	
1	WS Mechanic	70,000	1,400	
6	Pump Mechanic	120,000	14,400	
0	Rig Operator	120,000	0	
1	Driver	80,000	1,600	
0	Guard/Helper	45,000	0	31,400
	Running Cost:	Cedis per month	$ per year	
1	4x4 Car	300,000	6,000	
1	Pick-up	280,000	5,600	
0	Truck	540,000	0	
6	Motorcycle	75,000	9,000	
0	Maintenance Rig	900,000	0	
0	Pumptest Equip.	75,000	0	
1	Workshop	30,000	600	
1	Office	30,000	600	21,800
	TOTAL RUNNING COST			53,200
	TOTAL COST			95,931

INCOME:

	Unit Cost	Total
Pump Inspection	25	50,000
Pump Repairs	75	37,500
Well Maintenance	750	0
Total Income		87,500

PROFIT	(8,431)

COST HANDPUMP MAINTENANCE

Handpump Maintenance		
Handpump inspections	No:	4,000
Handpump repairs	No:	1,000
Well Maintenance:		
Wells redeveloped	No:	0

Personnel:

Manager	1		WS Mechanic	1
Administrator	0		Pump Mechanic	11
Accountant	1		Rig Operator	0
Supervisor	3		Driver	3
Storekeeper	3		Guard/Helper	3

Equipment:

Transport:			Workshop:	
4x4 Car	1		Lathe	0
Pick-up	3		Drilling MC	1
Truck	0		ARC Welding set	3
Motorcycle	11		OXY Welding Set	3
Maintenance Rig	0		Hacksaw	1
Pumptest Equip.	0		Compressor	1
Tool Sets	1		Generator	1
			Handtools	3

Office/Store:

Computer	1
Furniture/Desk	8
Storage Racks	3
Sundry	1

NOTES:

Interest Rate: 10 %

Echange Rate: 600 Cedis/$

COST CALCULATION:

CAPITAL COST FOR EQUIPMENT

		Unit Cost $	Cost $	Total $
Transport				
1	4x4 Car	25,000	25,000	
3	Pick-up	20,000	60,000	
0	Truck	60,000	0	
11	Motorcycle	3,800	41,800	
0	Maintenance Rig	120,000	0	
0	Pumptest Equip.	15,000	0	
1	Toolsets	400	400	127,200
Equipment				
0	Lathe	15,000	0	
1	Drilling MC	4,000	4,000	
3	ARC Welding set	3,000	9,000	
3	OXY Welding Set	2,000	6,000	
1	Hacksaw	3,000	3,000	
1	Compressor	6,000	6,000	
1	Generator	3,000	3,000	
3	Handtools	400	1,200	32,200
Office/Store				
1	Computer	4,000	4,000	
8	Furniture/Desk	300	2,400	
3	Storage Cabinets	200	600	
1	Sundry	6,168	6,168	13,168
	Total Equipment Cost			172,568

FIXED COST:

Depreciation:		Life (years)	Depreciation $	Total $
4	Cars	4	26,815	
0	Truck	5	0	
11	Motorcycle	2	24,085	
0	Maintenance Rig	8	0	
0	Pumptest Equip.	5	0	
1	Tools	3	161	
	Workshop Equip.	8	6,036	
1	Computers	3	1,608	
	Office Equip.	6	551	
	Store Equip.	10	98	59,353
Rent:				
			per annum	
	Office		12,000	
	Workshop		0	
	Housing Mgr		0	
	Housing Staff		0	12,000
Capital Cost:				
	Interest on Capital			17,257
	Interest Working Capital			2,925
FIXED COST (without interest on Capital)				74,278

RUNNING COST:

Personnel Cost:		Salary Cedis/month	$ per year	Total $
1	Manager	360,000	7,200	
0	Administrator	240,000	0	
1	Accountant	240,000	4,800	
3	Supervisor	180,000	10,800	
3	Storekeeper	100,000	6,000	
1	WS Mechanic	70,000	1,400	
11	Pump Mechanic	120,000	26,400	
0	Rig Operator	120,000	0	
3	Driver	80,000	4,800	
3	Guard/Helper	45,000	2,700	64,100
Running Cost:		Cedis per month	$ per year	
1	4x4 Car	300,000	6,000	
3	Pick-up	280,000	16,800	
0	Truck	540,000	0	
11	Motorcycle	75,000	16,500	
0	Maintenance Rig	900,000	0	
0	Pumptest Equip.	75,000	0	
1	Workshop	40,000	800	
1	Office	40,000	800	40,900
TOTAL RUNNING COST				105,000
TOTAL COST				179,278

INCOME:

	Unit Cost	Total
Pump Inspection	26	104,000
Pump Repairs	75	75,000
Well Maintenance	750	0
Total Income		179,000

PROFIT	(278)

COST HANDPUMP MAINTENANCE and WELL MAI COST CALCULATION:

Handpump Maintenance		
Handpump inspections	No:	4,000
Handpump repairs	No:	1,000
Well Maintenance:		
Wells redeveloped	No:	320

Personnel:

Manager	1		WS Mechanic	1
Administrator	0		Pump Mechanic	11
Accountant	1		Rig Operator	3
Supervisor	3		Driver	6
Storekeeper	3		Guard/Helper	6

Equipment:

Transport:			Workshop:	
4x4 Car	1		Lathe	1
Pick-up	4		Drilling MC	1
Truck	1		ARC Welding set	3
Motorcycle	11		OXY Welding Set	3
Maintenance Rig	3		Hacksaw	1
Pumptest Equip.	3		Compressor	1
Tool Sets	2		Generator	1
			Handtools	3

Office/Store:

Computer	2
Furniture/Desk	8
Storage Racks	18
Sundry	1

NOTES:

Interest Rate:	10	%
Echange Rate:	600	Cedis/$

CAPITAL COST FOR EQUIPMENT

		Unit Cost $	Cost $	Total $
Transport				
1	4x4 Car	25,000	25,000	
4	Pick-up	20,000	80,000	
1	Truck	60,000	60,000	
11	Motorcycle	3,800	41,800	
3	Maintenance Rig	120,000	360,000	
3	Pumptest Equip.	15,000	45,000	
2	Toolsets	400	800	612,600
Equipment				
1	Lathe	15,000	15,000	
1	Drilling MC	4,000	4,000	
3	ARC Welding set	3,000	9,000	
3	OXY Welding Set	2,000	6,000	
1	Hacksaw	3,000	3,000	
1	Compressor	6,000	6,000	
1	Generator	3,000	3,000	
3	Handtools	400	1,200	47,200
Office/Store				
2	Computer	4,000	8,000	
8	Furniture/Desk	300	2,400	
18	Storage Cabinets	200	3,600	
1	Sundry	22,050	22,050	36,050
	Total Equipment Cost			695,850

FIXED COST:

Depreciation:		Life (years)	Depreciation $	Total $
5	Cars	4	33,124	
1	Truck	5	15,828	
11	Motorcycle	2	24,085	
3	Maintenance Rig	8	67,480	
3	Pumptest Equip.	5	11,871	
2	Tools	3	322	
	Workshop Equip.	8	8,847	
2	Computers	3	3,217	
	Office Equip.	6	551	
	Store Equip.	10	586	165,911
Rent:				
			per annum	
	Office		20,000	
	Workshop		0	
	Housing Mgr		0	
	Housing Staff		0	20,000
Capital Cost:				
	Interest on Capital			69,585
	Interest Working Capital			5,555
FIXED COST (without interest on Capital)				191,466

RUNNING COST:

Personnel Cost:		Salary Cedis/month	$ per year	Total $
1	Manager	500,000	10,000	
0	Administrator	240,000	0	
1	Accountant	240,000	4,800	
3	Supervisor	180,000	10,800	
3	Storekeeper	100,000	6,000	
1	WS Mechanic	70,000	1,400	
11	Pump Mechanic	120,000	26,400	
3	Rig Operator	120,000	7,200	
6	Driver	80,000	9,600	
6	Guard/Helper	45,000	5,400	81,600
Running Cost:		Cedis per month	$ per year	
1	4x4 Car	300,000	6,000	
4	Pick-up	280,000	22,400	
1	Truck	540,000	10,800	
11	Motorcycle	75,000	16,500	
3	Maintenance Rig	900,000	54,000	
3	Pumptest Equip.	75,000	4,500	
1	Workshop	140,000	2,800	
1	Office	180,000	3,600	120,600
TOTAL RUNNING COST				202,200
TOTAL COST				393,666

INCOME:

	Unit Cost	Total
Pump Inspection	26	104,000
Pump Repairs	75	75,000
Well Maintenance	750	240,000
Total Income		419,000

PROFIT	25,334

COST WELL MAINTENANCE (regional)

Handpump Maintenance		
Handpump inspections	No:	0
Handpump repairs	No:	0
Well Maintenance:		
Wells redeveloped	No:	100

Personnel:

Manager	1		WS Mechanic	1
Administrator	0		Pump Mechanic	0
Accountant	0		Rig Operator	1
Supervisor	0		Driver	1
Storekeeper	1		Guard/Helper	3

Equipment:

Transport:			Workshop:	
4x4 Car	1		Lathe	0
Pick-up	0		Drilling MC	1
Truck	0		ARC Welding set	1
Motorcycle	0		OXY Welding Set	1
Maintenance Rig	1		Hacksaw	1
Pumptest Equip.	1		Compressor	0
Tool Sets	1		Generator	0
			Handtools	3

Office/Store:

Computer	1
Furniture/Desk	2
Storage Racks	3
Sundry	1

NOTES:

Interest Rate:	10	%
Echange Rate:	600	Cedis/$

COST CALCULATION:

CAPITAL COST FOR EQUIPMENT

			Unit Cost $	Cost $	Total $
Transport					
	1	4x4 Car	25,000	25,000	
	0	Pick-up	20,000	0	
	0	Truck	60,000	0	
	0	Motorcycle	3,800	0	
	1	Maintenance Rig	120,000	120,000	
	1	Pumptest Equip.	15,000	15,000	
	1	Toolsets	400	400	160,400
Equipment					
	0	Lathe	15,000	0	
	1	Drilling MC	4,000	4,000	
	1	ARC Welding set	3,000	3,000	
	1	OXY Welding Set	2,000	2,000	
	1	Hacksaw	3,000	3,000	
	0	Compressor	6,000	0	
	0	Generator	3,000	0	
	3	Handtools	400	1,200	13,200
Office/Store					
	1	Computer	4,000	4,000	
	2	Furniture/Desk	300	600	
	3	Storage Cabinets	200	600	
	1	Sundry	5,916	5,916	11,116
		Total Equipment Cost			184,716

FIXED COST:

Depreciation:				
		Life	Depreciation	Total
		(years)	$	$
1	Cars	4	7,887	
0	Truck	5	0	
0	Motorcycle	2	0	
1	Maintenance Rig	8	22,493	
1	Pumptest Equip.	5	3,957	
1	Tools	3	161	
	Workshop Equip.	8	2,474	
1	Computers	3	1,608	
	Office Equip.	6	138	
	Store Equip.	10	98	38,816
Rent:				
			per annum	
	Office		20,000	
	Workshop		0	
	Housing Mgr		0	
	Housing Staff		0	20,000
Capital Cost:				
	Interest on Capital			18,472
	Interest Working Capital			1,800
FIXED COST (without interest on Capital)				60,616

RUNNING COST:

Personnel Cost:		Salary	$	Total
		Cedis/month	per year	$
1	Manager	500,000	10,000	
0	Administrator	240,000	0	
0	Accountant	240,000	0	
0	Supervisor	180,000	0	
1	Storekeeper	100,000	2,000	
1	WS Mechanic	70,000	1,400	
0	Pump Mechanic	120,000	0	
1	Rig Operator	120,000	2,400	
1	Driver	80,000	1,600	
3	Guard/Helper	45,000	2,700	20,100
Running Cost:		Cedis	$	
		per month	per year	
1	4x4 Car	300,000	6,000	
0	Pick-up	280,000	0	
0	Truck	540,000	0	
0	Motorcycle	75,000	0	
1	Maintenance Rig	900,000	18,000	
1	Pumptest Equip.	75,000	1,500	
1	Workshop	140,000	2,800	
1	Office	180,000	3,600	31,900
TOTAL RUNNING COST				52,000
TOTAL COST				112,616

INCOME:

	Unit Cost	Total
Pump Inspection	25	0
Pump Repairs	75	0
Well Maintenance	750	75,000
Total Income		75,000

PROFIT	(37,616)

REHABILITATION FUND

Assumptions: for the 6 Project Regions

No of Boreholes:	Total		8,800
with:	Deepwell Pump		5,600
	Shallow Well Pum		3,000
	Piped Systems		200
No of Hand Dug			4,000

Inspection Cost $
38
26
80
0

Exchange Rate $/Cedis
600

Cost of Major Repairs:			Cost /Repair $	Communit Payment/Re $	Frequency Years	Community Partizipation	Annual Cost	Rehabilitation Fund Payments $
	Borehole Rehabilitation	8,800	750	100	10	13%	660,000	572,000
	Deep Well Pump	5,600	900	250	9	28%	560,000	404,444
	Shallow Well Pump	3,000	400	180	6	45%	200,000	110,000
	Hand Dug Well Rehab.	4000	400	70	15	18%	106,667	88,000
	Piped Systems	200	10,000	2000	12	20%	166,667	133,333
					Total		1,693,333	1,307,778