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SOMALIA PROGRAMME

ASSESSMENT REVIEW OF THE JOWHAR WATER SUPPLY SYSTEM

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EXECUTIVE SUMMARY

The civil war that followed the overthrow of the Siad Barre regime in 1991, resulted in the destruction and vandalisation of major infrastructures, notably *WATER SUPPLY SYSTEMS*. Generators and submersible pumps installed at pumping stations, pipes, wells, storage tanks and other accessories were often prime targets of inter-clan hostilities. The Jowhar Town Water Supply System, built in 1981-1982 by GTZ Germany to provide safe and adequate water supply to the population of Jowhar town, was vandalized like many other infrastructures in Somalia, during the civil war of the early 1990s. The system is located in Jowhar town of the Middle Shabelle Region of Somalia. The town is also the headquarters of the self-appointed Middle Shabelle Regional Authority and the Jowhar District Council, situated on the banks of the Shabelle River, approximately 90 km North of Mogadishu. As a result, most of its 30,000 inhabitants were forced to draw water from the polluted Shabelle River.

In October of 1995, it became clear that some of the problems faced by the population of Jowhar town, including the occurrence of cholera and other water borne related diseases, was due to lack of adequate clean and potable water supply. Thus in July 1996, with financial assistance from the European Union, implementation of the rehabilitation of the Jowhar town water supply system started through to September 1997. This also included the provision of technical support.

Then came the issue of operation and management of the system. The governor and the councilors recommended an inter-clan approach in the identification and selection process of a management system and structure. Thus, fourteen prominent businessmen from within the Jowhar community and representing an acceptable cross-section of the clans were invited to form a private company that would operate, manage, repair and maintain the water system. UNICEF provided training sessions to company's employees on how to manage and maintain the system and how to collect fees for water usage. In addition, locally elected water and environmental sanitation (WES) committees were also trained on how to improve the hygiene practices amongst the population through the provision of good water use and sanitation hygiene education, increase community awareness on the need for safe water and acted as a link between the community and the system, undertaking sometimes conflict resolution issues.

The plan worked. With a contract from the local government and technical advice from UNICEF, the FARJANO (*"Spring Heaven"*) Company started operation in August 1997. Their responsibilities included amongst others: the operation and management of the system and the implementation of extension works. The FARJANO Company, through efficient management of the water system and revenue collected from water users, accomplished this expanded objective by rehabilitating six water distributing points, constructing seven water distributing points and connecting one hundred and ninety five households to the system. Additional strengths of FARJANO Company include adequate bookkeeping systems and practices in place, commitment, and capital and clan based support. Furthermore, as a result of the inter-clan approach in operating and managing the system and subsequent ownership by the community, it is less vulnerable to vandalism in case of inter-clan hostilities. As a consequence of FARJANO's capability and trust between them and the community, they have been operating a sale and a maintenance spare part shop for handpumps and intends to take contracts for future water supply rehabilitation/extensions works in middle Shabelle Region. Most importantly, twenty-four out of the twenty-eight water point operators are women.

Since August 1997, about 13,000 inhabitants of Jowhar town had unlimited access to safe and potable water supply, thus reducing the incidences of water borne diseases such as cholera, improving the health of the communities, reduction in time spent by women and girls in search of clean water, and the provision of employment opportunities for community members.

The system produces 300M^3 of water daily and FARJANO sells it at the following prices: 5000 Somalia Shillings per cubic meter to water distribution operators and household consumers and 6000 Somalia Shillings per cubic meter to agencies. FARJANO currently reinvests initial profits into systems' expansion and in rehabilitating other infrastructures such as schools with good sanitation facilities. If relative peace continues to hold in this part of Somalia that would allow the operation and management of the water system, safe and adequate water will flow to the whole of Jowhar town and its environs. This complimented by community awareness and the provision of good water use and sanitation hygiene related education to water users, provision of sanitation facilities and garbage disposal pits, would eventually reduce the incidences of water borne and related diseases.

I. Introduction

UNICEF has been active in the Water and Environmental Sanitation Sector of Somalia since the overthrow of the Siad Barre Government in 1991. Since 1991 to the present, UNICEF in close collaboration and partnership with local authorities, community-based groups, national and international Non-Governmental Organisations and sister UN agencies have been actively implementing water and environmental sanitation projects in all zones of Somalia. Typically the type of interventions which UNICEF provided from 1991 through to 1999 were in response to the emergency water and environmental sanitation needs of the different zones. Generally, UNICEF installed temporary water distribution systems in internally displaced person's and refugee camps. Other interventions included the construction and rehabilitation of major water systems, including piped mini-systems, dug wells with handpumps, in the area serving thousands of beneficiaries. In addition, UNICEF constructed sanitation facilities (twin latrines) for some selected schools and in internally displaced person's camps. However, recently, UNICEF Somalia's Water and Environmental Sanitation programme has witnessed a shift from emergency interventions to a more sustainable approach to water system development that included the participation and involvement of the community in all phases of the projects through sensibilisation sessions. Furthermore, training of local authorities and WSS committee members in the management, repair and maintenance of water supply systems and the promotion of a community service management system and good water use and environmental sanitation related hygiene education have had significant impact. However, UNICEF maintains it's capacity to respond to emergencies in the most timely and efficient manner.

In response to the water supply and environmental sanitation needs of the people of Jowhar town, UNICEF with financial assistance from the European Union agreed to rehabilitate the Jowhar Town Water Supply System and put in place a community water management teams responsible for the management, repair and maintenance of the system. The assistance also included the rehabilitation of two government owned buildings to be used as the project headquarter.

II. Purpose of Assessment

In October 1995, it became clear that some of the problems faced by the population of Jowhar town, including the occurrence of cholera and other water borne related diseases, were due to lack of adequate clean and potable water supply. Thus in July 1996, implementation of the rehabilitation of the Jowhar town water supply system started and was completed in September 1997. Since August 1997, about 23,256 persons of Jowhar town have had unlimited access to safe and potable water supply, thus reducing the incidences of water borne diseases such as cholera, thus contributing in improving the heath of the communities. Furthermore, there has been reduction in the time spent by women and girls in search of clean water and the provision of employment opportunities for community members. Most importantly for the first time in local history, rival clans were brought together to work for the sole benefit of their communities. It is against this background that UNICEF Somalia has decided to learn from the successes and constraints of the Jowhar town water supply system by conducting an assessment review that will incorporate the following:

- Engineering works done on the rehabilitation of the system by UNICEF,
- Existing and operating management set up of the FARJANO company,
- Any system expansions done by FARJANO and costs involved,

- Existing financial systems in place with all checks to help ensure transparency and accounta[illegible]
- Analyse existing skills prevalent within the management structure and define future support needs that will enable FARJANO to continue to operate and deliver a sustainable water supply system,
- Analyse existing system coverage.

From the findings of the assessment:

- Prepare a story of the water supply system and its management with special emphasis on the successes to be shared with donors and the media.

III. History of UNICEF's Involvement in the Jowhar Town Water Supply System and Expansions Done by FARJANO Company and Related Costs Involved

UNICEF first assessed the Jowhar Town Water Supply System (JTWSS) in 1995, with the original objective being only to rehabilitate and repair the system to function as close as to its primary capacity as possible. Implementation started in November 1996 through to September 1997 and during this time, UNICEF accomplished the following engineering works:

- Drilling of two new boreholes (yield is in excess of 70m^3/hr) at Horsed and Hanti Wadaag (average depth of 90m deep) respectively, installation of new submersible pumps (Type: Grundfos, Specifications: discharge rate is 60m^3/hr) and generators (Type: Specifications: capacity is 40kva, 32kw and has a three phase connection) and the construction of the necessary and required protective and operational buildings and infrastructures such as one building housing the generator and a resting room for the pump attendant that is also used as a store, another building used for toilet and washing purposes, and a room used as a security post;

- New rising mains were installed that connected the borehole pumps with the existing elevated water reservoir,

- Fifteen of the then existing forty water distribution points were rehabilitated and those not targeted disconnected and capped off. One agency was therefore connected to the system,

- All existing private (household and public buildings) connections installed by the then Somalia Water Authority identified, disconnected and capped off,

- All removed bolts and nuts replaced with new ones and missing and non-functioning fittings renewed,

- Replacing only four of the sixty four damaged gate valves on the system including their boxes and covers,

- On completion of all rehabilitation works, the water system was tested and any defects identified were rectified. After testing and rectification, the system was flushed, chlorinated and flushed again before commissioning and handed over,

- A study to identify appropriate methods of structuring a community water management committee on ways to raising and managing revenue collected from users was completed. The outcome of the study enabled UNICEF to select an appropriate management and maintenance operation structure,

- [illegible] 3 committees have been [illegible] sanitation [illegible] respect [illegible] maintaining the water supply and the community's awareness [illegible] through mobilisation sessions on the benefits of using safe water, maintaining the environment around water collecting points, and promoting good health and hygiene practices amongst the community.

- Two government owned buildings are rehabilitated.

The extent of UNICEF's involvement depended on the amount of funds available. However, during implementation UNICEF noted that the system could be extended to further serve beneficiaries in the Jowhar township area and it's environs. The FARJANO Company, through efficient management of the water system and revenue collected from water users, accomplished this expanded objective by rehabilitating six water distributing points, constructing seven, and connecting one hundred and ninety five households and four agencies for a total cost ranging between USD13,000-USD35,750 (USD400-USD500 for rehabilitating or constructing a water collecting point depending on length of service pipeline, USD40-USD150 for household connections depending on the length of service pipeline). This figure represents between 16% to 44% percentage of it's total revenue of USD81,092 collected from August 1997 through to May 1999.(USD9,683 was collected from August through to December 1997, USD48,034 was collected during 1998 and USD23,375 was collected from January through to May 1999). Those rehabilitation/construction works implemented by FARJANO served the most densely populated sections of the town, who were primary targets for cholera and other water borne related diseases. Household connections were also at an affordable price.

Tables 1 shows the quantity of water produced annually and total revenue collected since the system started operating in August 1997. Prevailing average exchange rates have been used for the calculations. The devaluation effect of the Somali Shilling is being neutralized by the similar averages.

Table 1: Quantity of Water Produced Annually, and Total Revenue Collected

Serial No.	Year of Operation	Quantity of Water Produced (M^3)	Unit Cost (So.Sh.)	Unit Cost (USD)	Total Cost (USD)	Remarks
1	1997	14,671	5,000	0.66	9,683	Average Exchange rate of 1USD=So.Sh.7,960, from August to December only is used.
2	1998	69,615	5,000	0.69	48,034	Average Exchange rate of 1USD=So.Sh.7,262, for the whole year.
3	1999	37,103	5,000	0.63	23,375	Average Exchange rate of 1USD=So.Sh.7,926, for January to May.
4	*TOTAL*				*81,092*	

It must be mentioned that no sanitation facilities such as latrines and garbage disposal pits were constructed by UNICEF under this project, though attempts were made to ensure efficient management, repair and maintenance of the water system through the formation and training of water management committees and the promotion of good water use and environmental sanitation related hygiene practices amongst the beneficiaries.

I. Assessment Methodology

The aim of this assessment was to:

A) Determine the JTWSS's components and design,
B) Ascertain the number of system users,
C) Pinpoint the system's faults,
D) Identify the quantity of water the system is able to deliver vs. demand,
E) Pinpoint the system's management structure, including WES committees and their effectiveness and any financial system in place to ensure transparency and accountability,
F) Identify and analyse existing skills involved in the management of the system,
G) Offer recommendations to improve the system.

In short, the assessment's intent was to identify facilitating factors contributing to the successful operation and management of the water system and any constraints encountered during the process, provide objective recommendations as to what the FARJANO future needs are to deliver safe and adequate water supply to the intended beneficiaries, and what UNICEF's response to those identified needs will be. It should be noted that the assessment provides no data on water quality, though it will attempt to relate the outbreak of Cholera with the system's output.

The assessment was performed by the following team members over a 5-day period from September 12 through to September 17, 1999 including a data collection period. The composition of the team was dynamic, as different members performed different assignments over the assessment period.

Assessment Team

Dr. Abdulai KaiKai:	UNICEF Consultant-Water Resources and Environmental Management Specialist – Team Leader
Abdi Ehri Kulle:	Director, Technical and Operations Department, FARJANO
David Sido Eli Sido:	Secretary/Translator, FARJANO
Sheik Ali:	UNICEF WES Training Officer
Ayan Mohad Abdi:	UNICEF WES Training Officer

The assessment technique was to physically confirm all system components and their functions, this included noting the condition and details of components, measuring key system elements and observing flow and pumping rates within the system and documenting water wastage, system damage and defects. In addition to confirm the existence of the water management and WES committees, the team met with representative members and discussed their roles and responsibilities, the type of training they have received and the gaps needed to facilitate their effective performance. The assessment team is extremely grateful to the Chairman/Managing Director and the Technical/Operations Director for their honest and helpful contributions to the information gathering process.

A. Narrative of the Jowhar Town Water Supply System's Components & Design

The Jowhar Town Water Supply System, built in the early 1980s by GTZ Germany to provide safe and adequate water supply to the population of Jowhar town, was vandalized like many other infrastructures in Somalia, during the civil war of the early 1990s. The system is located in Jowhar town of the Middle Shabelle Region of Somalia. The town is

[illegible] the headquarters of the self-proclaimed Middle Shabelle Regional [illegible] Jowhar District Court [illegible], situated on the [illegible] of the Shabelle River, approximately 90 km North of Mogadishu. It is currently supplied by one borehole, namely the Hanti Wadaag, located in the western section of Jowhar town. It [illegible] has the following features:

- Hanti Wadaag Borehole; very high output – sixteen point six seven liters per second (16.67 l/s or 60m³/hr).

This borehole supply potable water to two, 225m^3 storage tanks located in Horsed and Hanti Wadaag villages respectively. These two storage tanks in turn provide a total of five main/primary supply lines each which are known as follows: The Horsed tank supplies the Horsed Village Line, the Buulo Shiek Village Line, and the Kulmis village line, whilst the Hanti Wadaag tank supplies the Hanti Wadaag Village Line, the Kulmis village line and UN agencies such as UNICEF. Both tanks in addition provide two secondary lines leading to Kulmis village on the right and MSF-Spain on the left. There are no connections to the Sugar factory, which was also vandalized during the civil war. At each of the pumping stations, there is a 200 liter tank that supplies water to one tap, a toilet and a shower facility.

The table below shows an estimate of the total length of primary, secondary and tertiary pipe lines, their types and dimensions.

Table 2: Total length of Pipe Lines, their Types and Dimensions

Serial No.	Pipe Diameter/Size (mm)	Type of Pipe	Total Length (m)
1	50***	PVC	1,668
2	100	PVC	2,528
3	150	PVC	4,640
4	*TOTAL*		*8,836*

**** There are a number of 50mm PVC pipe connections to water points, whose distances are not known, thus total length of pipe lines could be more than 8.836km.*

Horsed Village Line

The Horsed Village line is one of the primary lines of the JTWSS supplying water to the population of Horsed village. The line starts as 150mm PVC pipes, reduces to 100mm PVC pipes and connects to 50mm PVC pipes, that served ten existing water distribution points, out of which four were rehabilitated by UNICEF and two by FARJANO company. In addition, FARJANO company constructed one water distribution point and connected ninety nine households to the system.

These seven public water distributing points and ninety nine private household connections, serve about 516 families. The table below indicates the total number of water points, their locations, users and their status.

Table [illegible] Total Number of Operational Water Distributing Points, their locations, Users and Status

Designation	Location of Water Point/Section	Number of Users/Families	Status, Condition of Water Point	Others
PT14	N/A	N/A	Not rehabilitated	N/A
PT15	N/A	N/A	Not rehabilitated	N/A
PT16	N/A	N/A	Not rehabilitated	N/A
PT17	Section III	71	Rehabilitated by UNICEF, platform has cracks, thus need repairs, drainage outlet to be constructed.	Water point users are low mainly because many cattle herders live in this section and their are many household connections.
PT18	Section III	214	Rehabilitated by UNICEF, platform has cracks, thus need repairs, drainage outlet to be constructed.	Information board show an example of hygiene education located close to the water point.
PT19	Section II	119	Rehabilitated by UNICEF, platform has cracks, thus need repairs, drainage outlet to be constructed.	Roofing of operator's shelter needs repairs.
PT10	Section I	71	Rehabilitated by FARJANO, only 6 of the 10 faucets are operational, concrete body needs repair, drainage outlet to be constructed.	Water point users are low due unavailability of sufficient funds to pay for water and also many stay close to the canal.
PT11	Section I	95	Rehabilitated by UNICEF, platform has cracks, thus need repairs, drainage outlet to be constructed.	
PT12	N/A	N/A	Not rehabilitated	N/A
PT40	Section III	143	Rehabilitated by FARJANO, drainage outlet to be constructed.	-
PT43	Section IV	119	Emergency construction by FARJANO, however, concrete body, platform and drainage outlet to be constructed.	
Household	All Sections	99	Connected by FARJANO	
TOTAL I		***928***		

Buulo Shiek Village Line

The Buulo Shiek Village line, also one of the primary lines of the JTWSS supplies water to the population of Buulo Shiek village. The line starts as 100mm PVC pipes and connects to 50mm PVC pipes that served four existing water distributing point out of which only two were rehabilitated by UNICEF. One emergency construction and twenty seven households were connected to the system by FARJANO company. The table below indicates the total number of water points, their locations, users and their status.

Table 4: Total Number of Operational Water distributing Points, their locations, Users and Status

Designation	Location of Water Point/Section	Number of Users/Families	Status/Condition of Water Point	Others
PT1	Section I	79	Rehabilitated by UNICEF, platform has cracks, thus need repairs, surrounding has to be kept clean, drainage outlet to be constructed.	Water users are low in this section due to many household connections. Operator's shelter needs repairs.
PT2	N/A	N/A	Not rehabilitated	N/A
PT3	Section I	48	Rehabilitated by UNICEF, platform has cracks, thus need repairs, drainage outlet to be constructed.	Water users are low in this section due to many household connections.
PT39	N/A	N/A	Not rehabilitated	
PT42	Section II	41	Emergency construction by FARJANO, however, concrete body, and drainage outlet to be constructed.	Operator shelter to be constructed. Water point users are low mainly because many cattle herders live in this section and their are many household connections.
Household	All Sections	27	Connected by FARJANO	
TOTAL II		*195*		

Hanti Wadaag Village Line

The Hanti Wadaag Village line, also one of the primary lines of the JTWSS supplies water to the population of Hanti Wadaag village. The line starts as 200mm PVC pipes, reduces to 150mm and 100mm, connects to 50mm PVC pipes and served seven public water distributing points and three secondary lines. The three secondary lines served a total of fourteen water collecting points. Out of the twenty one water distributing points in this village, only seven were rehabilitated with UNICEF assistance and four by FARJANO company. FARJANO also implemented four emergency constructions in response to the outbreak of cholera in Jowhar town. Furthermore, a total of forty households connections were implemented by FARJANO. The table below indicates the total number of water points, their locations, users and their status.

Table 5: Total Number of Operational Water Distributing Points, their locations, Users and Status

Designation	Location of Water Point/Section	Number of Users/Families	Status/Condition of Water Point	Others
PT18	N/A	N/A	Not rehabilitated	N/A
PT18BIS	Section I	357	Emergency construction by FARJANO, however, concrete body, platform and drainage and drainage outlet to be constructed.	Construction of water operator's shelter required.
PT19	Section I	95	Rehabilitated by UNICEF, need to maintain the surrounding of the water	User family size is low because most of the families get their drinking water supply from donkey carts

			[illegible] clean [illegible] drainage [illegible] to be constructed.	vendors [illegible] wash out is broke
PT20	Section I	143	Rehabilitated by FARJANO and drainage outlet to be constructed.	Sometim[illegible] this water point [illegible] weekly, [illegible] 100m^3.
PT21	Section IV	21	Rehabilitated by FARJANO, two faucets broken are to be replaced, and drainage outlet to be constructed.	Water operator's shelter need repairs.
PT21BIS	Section IV	155	Emergency construction by FARJANO, however, concrete body, platform and drainage and drainage outlet to be constructed.	Construction of water operator's shelter required.
PT22	Section IV	50	Rehabilitated by UNICEF, concrete platform has minor cracks that needs repair, and drainage outlet to be constructed.	
PT23	Section V	250	Rehabilitated by UNICEF concrete platform has minor cracks that needs repair, and drainage outlet to be constructed.	
PT24	Section V	150	Rehabilitated by FARJANO, platform, drainage and other concrete works needs improvement and drainage outlet to be constructed.	
PT24BIS	Section V	87	Emergency construction by FARJANO, however, concrete body, platform and drainage and drainage outlet to be constructed.	Constructed originally for donkey carts vendors, though families also use it now.
PT25	Section V	108	Rehabilitated by UNICEF, concrete platform has minor cracks that needs repair, and drainage outlet to be constructed.	Most of the families living close to this water point use canal water for washing.
PT26	N/A	N/A	Not rehabilitated	N/A
PT27	N/A	N/A	Not rehabilitated	N/A
PT28	N/A	N/A	Not rehabilitated	N/A
PT29	N/A	N/A	Not rehabilitated	N/A
PT30	N/A	N/A	Not rehabilitated	N/A
PT31	Section III	143	Rehabilitated by UNICEF concrete platform has minor cracks that needs repair, and drainage outlet to be constructed.	Information board shown an example of hygiene education located close to the water point.
PT32	N/A	N/A	Not rehabilitated	N/A
PT33	Section III	202	Rehabilitated by UNICEF concrete platform has minor cracks that needs repair, and drainage outlet to be	One missing faucet to be replaced.

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	N.A	Not rehabilitated	N/
[illegible]	Section II	107	Rehabilitated by FARJANO concrete platform has minor cracks that needs repair, and drainage outlet to be constructed.	Fence and operator's [illegible] need repairs
PT36	N/A	N/A	Not rehabilitated	N/
PT37	N/A	N/A	Not rehabilitated	N/A
PT38	Section II	450	Rehabilitated by UNICEF concrete platform has minor cracks that needs repair, and drainage outlet to be constructed.	Information board shows an example of hygiene education located close to the water point
PT44	Section I	75	Emergency construction by FARJANO, however, concrete body, platform and drainage and drainage outlet to be constructed.	
Household	All Sections	40	Connected by FARJANO	
TOTAL III		*2483*		

Kulmis Village Line

The Kulmis village is served by two primary lines; one from the Horsed tank and the other from the Hanti Wadaag tank. One of the lines starts as 150mm PVC pipes, then reduces to 100mm, supplied five water distributing points, whilst the other line starts as 150mm PVC pipes, then reduces to 100mm PVC pipes, supplied ADRA and MSF-Spain. Out of the five water distributing points on this sub network, only two were rehabilitated with UNICEF assistance. FARJANO company also constructed one water distributing point during the emergency outbreak of cholera and connected twenty nine households to the system. The table below indicates total number of water points, their locations, users and their status.

Table 6: Total Number of Operational Water Distributing Points, their locations, Users and Status

Designation	*Location of Water Point/Section*	*Number of Users/Families*	*Status/Condition of Water Point*	*Others*
PT13	Section III	95	Rehabilitated by UNICEF, drainage outlet to be constructed.	Operator's shelter need repair and most families living close to this water point get water supply from donkey cart vendors, whilst others have private household connections.
PT14	N/A	N/A	Not rehabilitated	N/A
PT15	N/A	N/A	Not rehabilitated	N/A
PT16	Section II	50	Rehabilitated by UNICEF concrete platform has minor cracks that needs repair, and drainage outlet to be constructed.	Most families living close this water point cannot afford the cost of paying for water, use JTWSS water only for drinking and canal or river water for other domestic purposes such as washing.
PT17	N/A	N/A	Not rehabilitated	N/A
PT41	Section I	71	Emergency construction by FARJANO, however,	

			concrete body, platform and drainage and drainage canal to be constructed.
Household	Kulmis	29	Connected by FARJANO
TOTAL IV		*245*	

Table 7: Estimated Total Number of Families Per Village

Serial No.	Name of Village	Estimated Total Number of Families
1	Horsed	928
2	Buulo Shiek	195
3	Hanti Wadaag	2483
4	Kulmis	245
5	*GRAND TOTAL*	*3,851*

Others

UNICEF connected one agency to the system, whilst FARJANO connected four agencies (UNDP, CEFA, ADRA, and MSF-Spain).

B. System Users

The general population of Jowhar town are the beneficiaries of the system. Every attempt to confirm an accurate summation of users was utilized during the assessment, although it is acknowledged that these estimates are at best, an approximate appraisal of actual system users.

Table 8: Estimated Total Number of Actual System Users

Village/Institution/Office	*User Population*
Horsed	5,568
Buulo Shiek	1,170
Hanti Wadaag	14,898
Kulmis	1,470
Others**	150
TOTAL	***23,256***

*** UN agencies and INGOs,*
Household estimates are included in village figures,
Estimate of 6persons/family is used.

In determining the amount of water used per person per day, though WHO recommends a daily requirement of 20 liters per person, the estimated 30,000 inhabitants of Jowhar town are realistically using a average of 10 liters per person per day. Thus with a maximum user population of approximately 23,256, we obtain the quantity of 233 M^3/day of water needed to satisfy the users.

Population of System Users

Data and information on actual system users is currently not available with Farjano and is very difficult to determine. Thus, in an effort to come up with an estimate of actual system users, information and data on weekly water consumption was used. The following steps were used:

- Let us assume that the weekly water sale from water point #5 is 20 M^3,
- This figure was multiplied by 1000 and divided by 7, to obtain water consumption in L/day, i.e. (20*1000)/7 ~ 2857 L/day,
- Using an average daily requirement of 10 L/person, for 2857 L/day, the total number persons is = 2857/10 ~ 286 persons,
- Using an estimate of 6 persons/family in Somalia,
- The total number of families is approximately = 286/6 ~ 48 families.

It must be mentioned that this is a very crude methodology of estimating actual system users. Actual system users' is difficult to determine because of the nomadic culture of most inhabitants of Buulo Shiek and Kulmis villages. This is further exercebated by the fact that current total population of Jowhar town is not known.

C. Narrative of System Faults, Assessment Findings

A thorough physical investigation of the distribution/supply lines, pumping stations, reservoirs and water collection points was performed by the assessment team, in order to determine the results of this section. In general, it was discovered that the system is highly efficient with no instances of open free-flowing taps, faulty taps and major leakages in the main reservoir. However, it was discovered that the 225 M³ reservoir at Hanti Wadaag has a minor crack half way it s height and the two, 200 litre tanks located at the respective protective compounds have no control mechanism against overflow (float valve).

The following eight proposals are a summary of the system's flaws and the consequences for the system's delivery capacity.

1. The foremost problem with the JTWSS is that though it is well designed, only one of the boreholes (Hanti Wadaag) is currently in use. The second borehole at Horsed produces salty water that is rejected by the population. If this situation continues, it will have negative implications for a growing population and a private enterprise like FARJANO.

2. Another point to consider is that since the system was rehabilitated and handed over, an additional generator was never provided as backup, in case of major break down. The company is currently using the generator and pump at Horsed as standby. In addition, extension of the system to poorer communities will require using 100mm or 200mm PVC pipes for the primary supply line. FARJANO company, in only two years of its operation will not be in the position to purchase such equipment and materials.

3. Only four of the sixty four gate valves are operational, making it difficult for FARJANO to carry out repair and maintenance without comprimsing the supply of

safe water to the communities. Generally, entire villages or stations have to go without water for a considerable length of time for repairs to improve it. However, to make the repair of these gate valves cost effective, a detailed assessment of all sixty gate valves is recommended.

4. Neither FARJANO management team nor other community management teams were provided either formal or non-formal system and financial management training. It must be emphasized that previous management experiences and skills of the FARJANO team in particular have been in other sectors/disciplines, other than that of water supply systems. Furthermore, they were never involved in the rehabilitation planning and implementation of the JTWSS.

5. Despite the operation of only one borehole, the unavailability of an additional generator, the lack of formal and non-formal system and financial management training to FARJANO members, the system is operating at a very productive level. The only striking example of system wastage and disrepair was found at the main reservoir at Hanti Wadaag and others that are indexed below. These examples when compiled in the aggregate, indicate a system wastage at the very most of 12 M^3/day.

6. However, 25% of the total income is either re-invested into the water system or invested in other community projects, such as school construction with sanitation facilities. In addition, 10% is used for office management and maintenance, 15% for repair/maintenance of the water system including purchase of fuel, whilst 50% is for personnel cost (this includes directly employed staff and water point operators).

7. At the official hand over of the system to FARJANO, UNICEF provided another submersible pump for backup purposes.

8. Despite the devaluation of the local current, FARJANO has maintained the initial costs of So.Sh.5,000 and So.Sh.6,000 for water sold since August 1997. Furthermore, they are charging both water point operators and household users the same cost of So.Sh.5,000 per cubic meter of water.

Catalog of Findings:[1]

- the 20 L tanks at the operational compounds have no float valve, thus a minimal wastage of 1.0 M^3/day occurs any time the tank is full,
- reservoir (R1) at Hanti Wadaag village is leaking at a distance half way, conservative wastage could be put at 1.0 M^3/day,
- No other leakages were identified on the network, though a conservative wastage could be put at 5% of total daily production, estimated at 10 M^3/day,
- All drainage boxes don't have covers and outlets, resulting in a breeding ground for mosquitoes,
- One and two faucets at water points 33 and 21 respectively are missing, needs to be replaced,
- Four of the ten faucets at water point 10 need to be replaced,
- Washout valve is broken at water point 19,
- Most of the communities living close to the river and/or canal collect only drinking water from the JTWSS, mainly due to the unavailability of sufficient funds to pay for

[1] If a system component is not mentioned it was found to be in working order.

water, [illegible] on the practical side, [illegible] typically other consumption [illegible] liters per person [illegible] used.

The assessment team would like to acknowledge that the evaluation of the JWTSS is by no means exhaustive, practical considerations such as security limited the ability to complete a comprehensive study of the system.

The assessment does provide a good overall picture of the system and its elements. Clearly, with a system loss of 12 M³/day already discovered, further investigations are unlikely to produce new trends in system characteristics.

D. System Capacity (Quantity)

As stated in the Assessment Methodology, one of the aims of the evaluation is to determine actual system capacity vs. user's requirements. The principal data needed is: number of users, quantity of water per user and system output. The number of users is discussed in section C, the quantity of water per user is assumed to be 20 liters per person per day, as per WHO requirements, and the system output is calculated through the data retrieved through this assessment as discussed in section A.

The total estimated maximum number of users on the JTWSS is 12,732 people, therefore at 20 liters/day per person we can assume that a total of 255 M³/day is needed to satisfy the potable water requirements of the users.

Analysis I

In determining the system output from only one borehole we observe the following:

Total Boreholes Output for 24 hours (Q)[2] =

(Horsed Borehole 0 l/s) + (Hanti Wadaag Borehole 16.67 l/s)

Q = 16.67 L/S or,

Cubic Meter Output/Day = (16.67l/s)(86,400 seconds/day) = 1,440,288 l/d or,

1,440 M³/day

Total System Storage Capacity = 2 reservoirs with a total capacity of 450 M³ (225 M³ each)

Total User Demand = 233 M³/day

Clearly, from the preliminary analysis of supply and demand we can see that supply far exceeds demand (1,440 M³ - 233 M³ = 1,207 M³ in excess). The total storage capacity of 450 M³ would obviously accommodate the remaining flow, while the rest would be lost to spillage and overflow.

We established in section C that nearly 12 M³/day is lost to wastage or 1% of system output or 5% of the user demand. User requirements utilize 16% of the system output, 31% is stored at any given time with the remaining 52% is lost to possible spillage at the water points.

Table 9: Daily Borehole Yield Versus User Demand, Storage, Wastage and Possible Spillage

SERIAL No.	ITEM DESCRIPTION	QUANTITY (M³/DAY)	PERCENTAGE (%)	REMARKS
1	Total Borehole Output	1,4[illegible]	100	
2	User Demand	23[illegible]	16	
3	Wastage	12	1	
4	Storage	45[illegible]	31	
5	Possible Spillage	745	52	This quantity of water can further serve about 12,412 families in case of system expansion

Analysis II

However, the current running hours for the generator is 5 hours, this gives the borehole output to be as follows:

Total Boreholes Output for 5 hours (Q)³ =

(Horsed Borehole 0 l/s) + (Hanti Wadaag Borehole 16.67 l/s)

Q = 16.67 L/S or,

Cubic Meter Output/Day = (16.67l/s)(18,000 seconds/day) = 300,060 l/d or,

300 M³/day

Total System Storage Capacity = 2 reservoirs with a total capacity of 450 M³ (225 M³ each)

Total User Demand = 233 M³/day

Clearly, from the preliminary analysis of supply and demand we can see that supply far exceeds demand (300 M³ - 233 M³ = 67 M³ in excess). The total storage capacity of 450 M³ would obviously accommodate the remaining flow.

We established in section C that nearly 12 M³/day is lost to wastage or 4% of system output or 5% of the user demand. User requirements utilize 78% of the system output, 18% is stored at any given time while nothing is lost to common spillage at the water points.

Table 10: Daily Borehole Yield Versus User Demand, Storage, Wastage and Possible Spillage

SERIAL No.	ITEM DESCRIPTION	QUANTITY (M^3/DAY)	PERCENTAGE (%)	REMARKS
1	Total Borehole Output	300	100	
2	User Demand	233	78	
3	Wastage	1	1	
4	Storage	55	18	
5	Spillage	0	0	No spillage is recorded

The findings of the assessment clearly indicate two facts, one the system appears to have a sufficient quantity of water for user demands and two the spillage is high if pumping takes place for 24 hours, demonstrating possibility and need for extensions. However, if the system is pumped for only 5 hours, as it is now, spillage is zero. If the second borehole at Horsed is operational, pumping for 5 hours only will also produce an additional 300 M^3 of water or an additional 1,440 M^3, if water is pumped for 24 hours. Difficulty in gathering actual number of water users/water point could also explain the current high spillage in analysis

V. Community Mobilsation/Involvement, Training and Education

To ensure the long term success and sustainability of the project a *Community Mobilisation/Involvement, Training and Education* component was introduced. The main activities of this component were to involve the community in improving the overall sanitation condition of the town, create awareness amongst the communities about the need for safe water through the provision of good water use and sanitation related hygiene education and other fundamental public health messages. In addition, water and environmental sanitation committees were formed at the village level (details shown in table 11) and trained in basic repair/maintenance of handpumps, cholera control, prevention and chlorinating techniques (details of type of training are shown in table 12).

Table 11: WES Committees Formed in Jowhar District

Name of District	Name of Village	Total Number of WES Committee Members	Total Number of Women	Total Number of Men	Year of WES Committee Formation
Jowhar	Myako	10	5	5	1998
Jowhar	Baroa Weyne	30	15	15	1998
Jowhar	Rageyle	20	10	10	1998
Jowhar	Abdi Geledi	1	4	8	1998
Jowhar	Damosho	20	7	13	1998
Jowhar	Baodley	20	10	10	1998
Jowhar	Halgan	20	14	6	1998
Jowhar	Dorole	10	5	5	1998
Jowhar	Gedobarkan	10	5	5	1998
Jowhar	Bayahow	20	9	11	1998
Jowhar	Daymosame	20	10	10	1998
Jowhar	Julale	20	10	10	1998
Jowhar	Bodale	20	10	10	1998

Jowhar	Bulesh Hilad	10	5		1998
Jowhar	Tounire	10	6	[illegible]	1998
Jowhar	Lamowan	11	7	[illegible]	1998
Jowhar	Magadley	10	5		1998
Jowhar	Murvole	10	5	2	1998
Jowhar	Jarirow	20	10	10	1998
Jowhar	Nukoy	31	22	9	1998
Jowhar	Banoney	20	10	10	1998
Jowhar	Janeo Mubarak	20	10	10	1998
Jowhar	Sabon	20	10	10	1998
Jowhar	Rageylow	20	10	10	1998
Jowhar	Bagdad	21	10	11	1998
Jowhar	Biyo Adde	20	10	10	1998
TOTAL	*26*	*455*	*234*	*221*	

Table 12: Types of Training Provided in Jowhar District

Region	*District*	*Village*	*Type of Training Sessions*	*Target Group*	*Quantity of Target Group*
Middel Shabelle	Jowhar	Biyo Ade	System management	Borehole Operators	7
Middle Shabelle	Jowhar	Jiriiroe	System management	Borehole Operators	7
TOTAL					*14*

However, Cholera out break figures, as in table below, indicated an increase of cholera outbreak during the system's first year of operation. This could be attributed to the large population movement from Mogadishu and nearby villages to Jowhar town, the difficulty in changing in people's behavior and the lack of sufficient funds to pay for water. However, a downward trend was noted in cholera outbreak figures during the system's second year of operation, mainly due to community awareness campaign on the need for safe water and the provision of education on good water use and sanitation hygiene practices.

Table 13: Cholera Outbreak Figures

Serial No.	*Year*	*Cholera Outbreak Figures*	*Remarks*
1	1997	300	
2	1998	587	2.2% Fatality rate (13 deaths reported)
3	1999	84	
4	***TOTAL***	*971*	

Source: INTERSOS Somalia (An Italian medical NGO operating the regional hospital in Jowhar Town)

However, physical observation of the town surroundings reveal the need for a much concerted effort in removing rubbish and ensuring it's proper disposal. Furthermore, all drainage boxes need outlets and covers to be constructed, if the outbreak of cholera and other water borne disease is to be kept low. Most importantly, there is a need to develop a systematic and more focused training and education process and schedules that could be monitored. To ensure long term sustainability in terms of management, repair and maintenance, it is proposed that village water committees and water point committees are

[illegible] and [illegible] the [illegible] system management, [illegible] maintenance and the provision of [illegible] water use and sanitation hygiene related education.

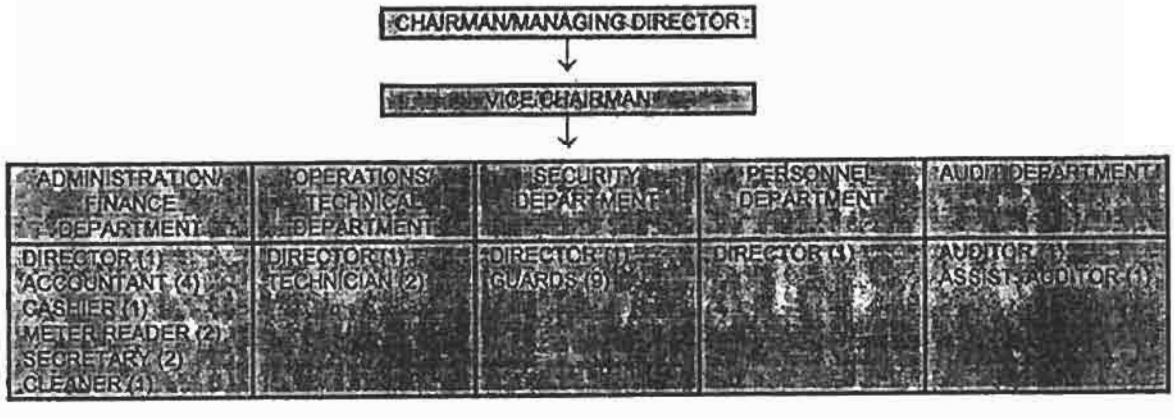
VI. System Management of the Jowhar Town Water Supply System

A. System Management Structure

To overcome the traditional clan-based problems that could result in insecurity and possible vandalism of the system, the Governor and the District Commissioner recommended a non-clan approach in the identification and selection process of a management system and structure. Thus, fourteen prominent business men from within the Jowhar community and representing an acceptable cross-section of the clans were invited to form a private company that would operate, manage, repair and maintain the water system. These fourteen business men form the board of directors, whose primary responsibilities is directing the affairs of the company. They were not supposed to be involved in the day to day operation of the system. However, eleven of the fourteen board members are directly employed by the company in different capacities. Below is the organigram shown the management structure of the water system:

The day to day management of the Jowhar Town Water Supply System is headed by a Chairman and is comprise of the following members (see organigram below):

- Chairman/Managing Director,
- Vice Chairman and Operations/Technical Director,
- Administration Director,
- Security Director,
- Personnel Director,
- Audit Director,



Each of these Directors are responsible for managing and supervising the day to day activities and staff working in their departments and report to the chairman/managing director, whilst departmental staff report to their various directors.

At present, the company has the following full time employees.

Table 14: Total Number of Directly Employed FARJANO Staff

Serial No.	Name of Department	Quantity of Employees	Remarks
1	Chairman	1	
2	Administration/Finance	11	Director of Department is also Vice Chairman.
3	Operations/Technical	3	
4	Security	10	Director and nine guards.
5	Personnel	1	
6	Audit	2	
7	***TOTAL***	***27***	

Only one of the above mentioned staff is female. In addition, the company employs five casual labour staff, who assists in various aspects of the company, especially in the repair and maintenance of the system.

B. System Maintenance

Fuel filter is changed twice every month, while, the oil and oil filter are changed once monthly. However, there was no mention of a regular maintenance schedule for the submersible pump.

On the availability of tools and materials to carry out maintenance, FARJANO company has in stock tools and materials in the warehouse that enables them to undertake maintenance.

There are no indications of free-flowing faucets as mentioned in section C, though a number of water points' platforms need repairs (see A, Tables 3, 4, 5, 6).

C. Water Point Management

Each water point is operated and managed by an operator, who have had previous experiences with the then Somalia Water Authority. His/her primary responsibilities are to sell water to the community and submit all amounts collected to the company accountant on a weekly basis, keep the surroundings of the water point clean, and undertake minor repairs and maintenance. Furthermore, h/she is to report any major leakage and breakdown to the company. A monthly fee of 10% of all water sales is paid to the operator. According to Somalia labour law of #65 of 18 October 1972, an additional 10% of the monthly income is also paid as benefit. Out of the current total number of 28 operators, 24 of them are women. As of September 12, 1999, a total of 15,745 M^3 of water has been extracted from the borehole at Hanti Wadaag for drinking. This water was also used during flushing and testing periods. Sales of water from the Jowhar Town Water Supply System are relatively high during the dry season and relatively low during the rainy season.

FARJANO charges each water point operator and private household connection the sum of five thousand Somalia Shillings for every cubic meter and a sum of six thousand Somalia Shillings for every cubic meter for agencies.

VII. Financial Management of the Jowhar Town Water Supply System

To ensure transparency and accountability in the financial management of the JTWSS, the following checks have been instituted:

A. Water Point Operation

Every water collecting point has been designated a reference number, e.g. PT21 and PT21BIS. PT21BIS is a water point constructed by FARJANO during the emergency cholera out break.

Water meters have been installed at all borehole outlets and water distributing points. This enables management to check the quantity of water sold as against the quantity produced.

Operations and sales at each water point are monitored on a weekly basis. Every Sunday morning, water meter readings are noted in the presence of the particular operator. This data is then submitted to the accountant, who calculates the amount the operator has to pay using Form A. As an incentive, a 2M^3 bonus for every 50M^3 water sold is given to the operator. Every form completed has a reference number for audit purposes.

B. Household Connection

As mentioned in section III, household connections cost between USD40 and USD150 per household depending on the length of the service pipeline. Persons requesting household connections submit a written request to the company. The company's technicians carry out a survey and prepare a detailed cost estimate using Form B for the client. If the client is satisfied with the survey and the associated costs, an invoice is prepared by the Administration/Finance department using Form C. The client is expected to pay the full amount before connection is implemented. There is an alternative that allows clients to pay in installments.

As with public water collecting points, each household is fitted with a water meter and an anti-return valve. The meter reading is noted at the beginning and end of each month and submitted to the company accountant for processing using Form D. The said amount is sent to the client for payment. Receipt number and date of payment are recorded on the form for audit purposes.

C. Purchasing of Fuel

Fuel is an important commodity used at all stages of the project cycle. Being scarce and expensive in Somalia, FARJANO company developed a system that controls the purchase and use of fuel. The form indicated as Form E, shows the following:

- Date,
- Station where fuel was purchased,
- Vehicle number,
- Quantity of Petrol/Diesel purchased (L),
- Oil (Kg),
- Grease (Kg).

Each purchase is approved by the Chairman and the Director, Administration/Finance department. The person receiving the said amount also signs, confirming that the said amount was paid to him.

D. Income and Expenditure

All income and expenditure transactions are reported on a daily basis using Form F. This form indicates the date the transaction took place, item description, whether an income or expenditure and the total amount. This form is signed by the Administration/Finance Director, the Accountant, and the Cashier in case of an income to the company and the client in case of an expenditure.

This form has three copies; one copy is held by the account section, one submitted to the audit department, and the third copy is held by the client.

E. Daily Cash Register

The cashier completes a daily cash register that shows all income and expenditure transactions with account and voucher numbers, including item description. The cash register, (Form G) shows on a daily basis, the company's statement balance, reflecting actual cash balance.

E. Warehouse Management

Warehouse management is supervised by the Operations/Technical department, whose Director approves the movement of materials in and out of the store. Each material is provided with a Bin card that records all material movement, date, quantity of material in stock and balance at any one time, and the signature of the issuing officer. Materials available in the warehouse include spare parts for pipe connection such as bends, water meters, and gate valves.

VIII. Facilitating and Hindering Factors

A SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis was conducted with the FARJANO company with the objective of defining Opportunities that exist for the Jowhar Town Water Supply System and the possible Threats (if any) that lie ahead. Also, identified were the Strengths and Weaknesses prevalent within the FARJANO team to undertake the current work load and any future expansions.

Opportunities

- Despite the lack of sufficient funds by families living close to the river and canal to pay for water from the JTWSS, the impact of the water system is perhaps in one way reflected in the reduction of cholera incidences over the past two years in Jowhar town. Opportunities therefore exist for expansion to other areas serving poorer communities. The population is willing to pay for water provided adequate supply is guaranteed at all times.
- Furthermore, the water system has provided employment for a number Somalis, especially women, who form 80% of the water point operators. Most of these women are able to undertake other small enterprise ventures by re-investing their salaries.
- A new cadre of grass roots technicians can be trained as caretakers of water collecting points, whilst village water committee members can also acquire skills on how to plan, implement, monitor and evaluate water supply systems.
- Most importantly, for the first time in the recent history of the region, rival clans came together to provide safe and adequate water for domestic purposes to the people of Jowhar Town. Water is used as a tool for promoting good local governance. As a result, water system components are not vandalized or destroyed during outbreaks of

[illegible] in [illegible] town [illegible] [illegible] [illegible] to the [illegible] system. If this [illegible] [illegible] for another two years, [illegible] could be replicated in other areas with modifications to suit the practical considerations on the ground. Water could be used as a tool for promoting peace and reconciliation.

However, a number of threats do exist.

Threats

- Benefits of expansion could be hampered by the poor drainage conditions within Jowhar town. Drainage boxes are currently without outlets and covers, and proper drainage ditches are nonexistence. Thus, certain sections of the town become completely inundated during the monsoon periods.
- Continued unrest in the region may lead to an increase in fundamentalism and banditry and reduce the capacity of people by increasing their vulnerability. Families will not be able to meet their needs and the status of women will deteriorate. There will also be fatigue amongst the donor community.

Strengths

- Inter-clan approach in the selection of the Management and Maintenance Company for the JTWSS.
- Non interference by the local authorities in the operation of the system. Final decisions are taken within the company for all issues.
- Trust between the community and the company members on one hand and between UNICEF and the community on the other hand.
- The company members are committed to providing essential services such as the provision of water supply to their communities and are determined to demonstrate that water could be used as a means of fostering local governance.
- Twenty four out of the twenty eight existing water point operators are women.
- Adequate bookkeeping systems and practices to ensure accountability and transparency.

Weaknesses

- Compared with the amount of work involved in operating and managing the JTWSS, there are many directly employed company staff. The consequences of this are that low water sales during the rainy season obliges the company to use part of it's savings to pay for personnel cost.
- Lack of system and financial management training for FARJANO staff.
- Lack of computer and photocopier facilities.
- Lack of transportation facilities such as bicycles for meter readers.
- Finally the lack of a back up generator.

IX. Recommendations

The Jowhar Town Water Supply System is in need of an overhaul. Continued neglect would render the system's future ability to function at it's best. The following repairs are imperative:

- repair of the 220 M^3 reservoir at Hanti Wadaag,
- rehabilitation of the borehole at Horsed,
- repair of all remaining sixty gate valves,
- installation of float valves on the two, 200 L tanks,

- repair of all broken/damaged faucets,
- construction of a protective concrete wall around the pumping stations (currently has a barbed wire fence),
- repair of minor cracks on concrete platforms,
- construct covers and outlets for all existing drainage boxes,
- construction of a concrete block, platform and drainage with outlet and cover on all water points constructed by FARJANO,
- construction of garbage disposal pits at selected sites within Jowhar town (site to be selected by community),
- re numbering all existing operational water collecting points,
- update the Jowhar water system map to reflect current design and components.

Furthermore, the following are proposed:

- a sound operational and maintenance plan is prepared for the system.

- the provision of a stand by generator and a significant number of 100mm and/or 200mm PVC pipes for extension purposes (exact quantity to be determined),

- for the reduction in the number of direct company employees, the following is proposed:

Table 15: Personnel Review: Current Versus Proposed Number

Serial No	Name of Department	Current Number of Employees	Proposed Number of Employees	Remarks
1	Chairman	1	1	Chairperson can also be Director of Admin./Finance department.
2	Operation/Technical	3	2	Director and one technician
3	Administration/Finance	11	5	Accountant (1), Cashier (1), Meter Reader (1), Secretary (1), Cleaner (1).
4	Personnel	1	0	Merge with Admin/Finance department.
5	Security	10	10	No changes, however some the guards at the pumping stations can also perform the duties of Generator Attendants.
6	Audit	2	1	Only one Auditor is sufficient.
7	*TOTAL*	*27*	*19*	

This will decrease the percentage of the total revenue expenditure used for personnel costs. However, it is very evident that this will be a very difficult decision for FARJANO to implement.

- the personnel and Administration/Finance departments should be merged into one department.

- a Memorandum Of Agreement (MOA) is signed between the community, the authorities, FARJANO and UNICEF at the start of any project implementation. This

MoA will outline the roles and responsibilities of partners before, during and after project implementation.

- facilitate the formation and training of village water committees and water point committees to assist in the management, repair and maintenance of the water system and water collecting points. Topics must include the following: *planning, investigation of current water use and sanitation hygiene practices amongst the water users, system management (including financial management), repair/maintenance, and finally the provision of good water use and sanitation hygiene related practices.* Water point committee members will in turn provide water users good water use and sanitation hygiene related education, including the relationship between use of clean and adequate water and good health.

- zonal UNICEF WES teams to be restructured to reflect the technical and training components, developing a systematic and focused community mobilisation/involvement, training and education document, training of staff on how to plan, implement and monitor/evaluate sessions.

- provision of system and financial management training to FARJANO staff members, and the donation of a computer to facilitate proper documentation. Staff should also be trained in use of computer.

- To further reduce the incidences of cholera and other water borne diseases by ensuring proper collection and disposal of garbage and to improve the system user coverage through community sensibilisation sessions.

- Increase the number of system users and consider using different water rates per cubic meter for water point operators and household users.

With the requisite rehabilitation of the Horsed Borehole completed, the output will increase by an additional 300 M^3/day if pumped for 5 hours and 1,440 M^3/day if pumped for 24 hours.

X. Conclusion

Summarizing the findings we can observe that presently the system is able to properly provide water to its current and future users. The efficiency will be further enhanced through the needed rehabilitation of the Horsed Borehole. Calculations prove that the boreholes supply are quite adequate.

As regards the proposal of extending the system to benefit additional users, UNICEF states that no promises were made for UNICEF to implement such a project. UNICEF does acknowledge that expanding the system through additional supply lines would increase the flow. Looking ahead, due to certain population increases and therefore user demand, this augmentation could be a feasible option in the future.

The issue of the sixty gate valves has to be solved soonest, if needed repairs are to be implemented without comprising the supply of water to beneficiaries.

UNICEF proposes that, in the interest of the people of Jowhar and continued amiable relations with the Regional and Town Authorities and FARJANO, UNICEF may undertake the following activities to support the JTWSS:

- UNICEF will assist FARJANO in preparing and establishing a sound operational and maintenance plan for the system,
- UNICEF Zonal WES teams to be restructured to reflect the technical and training components, develop a systematic and focused community mobilisation/involvement, training and education document, training of staff on how to plan, implement and monitor/evaluate sessions,
- UNICEF will provide system and financial management training sessions for FARJANO management staff,
- UNICEF will hold system management training sessions for village and water point committee members,
- UNICEF will hold repair and maintenance training sessions for the two FARJANO technicians and caretakers of village and water point committees on system maintenance,
- UNICEF will hold good water use and sanitation hygiene education sessions for village water committee and water point committee members, and will ensure that water point committee members in turn provide similar educational sessions to water users.
- UNICEF to supply an additional generator and reasonable number of 100mm and 200mm PVC pipes,
- UNICEF donate a computer and printer to ensure documentation of financial systems and facilitate easy and quick reference.
- UNICEF will also donate six walkie talkies.
- UNICEF request ADRA to rehabilitate the Horsed Borehole and repair some of the remaining sixty gate valves as per original project document,
- UNICEF to construct the protective concrete wall around both pumping stations,

UNICEF will also requests FARJANO to undertake the following:

- repair of the 225 M^3 reservoir at Hanti Wadaag,
- installation of float valves on the two, 200 L tanks,
- repair of all broken/damaged faucets,
- construction of outlets and covers on all drainage boxes,
- repair of minor cracks on concrete platforms,
- construction of a concrete body, platform, drainage with outlet and cover on all water points constructed by FARJANO,
- reduction of directly employed staff members, as recommended,
- re numbering of all existing and operational water distributing points and up date the water system map to show current components and design

In addition, FARJANO should ensure that yearly audit of financial systems and practices are carried out.

These recommended action points would render the system's future ability to function at it's best, enhance the management capability of the FARJANO team and other community water management committees, ensure that water systems surroundings are kept clean and that waste water is properly disposed off. Most importantly, the continued operation and management of the water system would promote good local governance amongst rival clans in the provision of essential services to their respective communities.

UNICEF also hopes that the authorities and FARJANO understand that they are not in a position to lay supply lines to benefit additional users, and has no intention of ever doing so.

APPENDIX A

Calculation of Water Rate/M^3

In developing the cost of water per M^3 sold, FARJANO utilised the following formula:

$$\text{Cost of water/M^3} = \frac{(C + M + P)}{X}$$

Where,

C = Asset depreciation value in monetary terms,
M = Value of spare parts and other services in monetary terms,
P = Personnel cost,
X = Production in M^3

APPENDIX B

FINANCIAL FORMATS USED BY FARJANO

Form A: Format used to calculate weekly water point consumption and sales.

Form B: Format used by company technician to present outcome of survey and associated costs for household connections.

Form C: Format used by Administration and Finance department to inform client about the survey details and cost to be paid.

Form D: Format used to calculate monthly water consumption and cost for households.

Form E: Format used for fuel purchasing.

Form F: Format used for income and expenditure tracking.

Form G: Format used to record all daily cash transactions.

Shirkadda Farjano Jowhar

№ [illegible]051

Uruurinta Isticmaalka Biqaha

FORM A

M Geb	Kilo Saacadda	Qiimaalka Saacadda	Cadadka La Isticmaalay	Bonis	Cadadka La Xisaab Geliyey	Qiimaha M 3	[illegible]	[illegible]	[illegible]

SHIRKADDA FARIANO
JOWHAR

FARIANO COMPANY
JOWHAR

Ref .....

Subject: QUOTATION

Date .....

TO : _____

Item	Description	Unit price	TOTAL

SHIRKADDA FARJANO | FARJANO COMPANY

JOWHAR | JOWHAR

Ref. No _____ Date

INVOICE No _____

QAANSHEEGTO

Te: .....

Cadada Quantity	NOOCA Description	Qiimidkii Unit Price	Isku-geyn total

FORM D

SHIRKADDA FARJANO JOWHAR

Shaxda isticmaalka Biqaha Macaamiisha

Magac Sedexan _____ Taariikh _____

BILOW	DHAMAAD	ISTICMAALKA		QIIMAHA	LACAG BIXIN	
		BISHA	BIYAHA M.C	sh. so. 6000	N. D.	TAARIIKH
Wadar sh. so						

FORME

FARJANO COMPANY

Jowhar

BOONO № 30

Taariikhi. .....

Kaalinta .....

Gaadiidka Lam. .....

Bansiin Lts .....

Naafto Lts .....

Olio kgs .....

Grasso kgs .....

.....

.....

Waaxda Maamulka Guddoomiyaha shidaalka

....

QAAT X

.....

FORM F

Shirkadda Far jano
Jowhar

Date ..... No. 8101

WARQADDA LACAG QABASHO & BIXIN

TILMAAN	GELID	BIXID
Wadar sh. so.		

Madaxa Xisaabaadka HELID Madaxa Maamulka

SHIRKADDA FARJANO

JOWHAR

Taariikh .....

waaxda .....

FORM G

Qeybta .....

№ 851

Dhaq dhaqaaqa khasnadda Lamb, ...

N. xisaab	N. D. K.	Tilmaan	Gelid sh. so.	Bixid sh. so.	Haraa sh. so.

Khasnaji

APPENDIX C

SAFE WATER: A TOOL FOR PROMOTING INTER-CLAN COOPERATION IN SOMALIA

The civil war that followed the overthrow of the Siad Barre regime in 1991 resulted in the destruction and vandalisation of major infrastructure, notably water supply systems in most parts of the country.

Generators and submersible pumps installed at pumping stations, pipes, wells, storage tanks and other equipment became prime targets of vandalism and looting as clan hostilities spread. The Jowhar Town Water Supply System was constructed between 1981 and 1982 by the German technical cooperation agency, GTZ, to provide safe and adequate water supply to the population of Jowhar town of Middle Shabelle Region of Central Somalia. It too was not spared from vandalism after the fall of the central government. As a result, most of Jowhar's 30,000 inhabitants were forced to draw water from the polluted Shabelle River. Jowhar, which is the headquarters of the self-appointed Middle Shabelle Regional Authority and the Jowhar District Council, straddles the Shabelle River and is approximately 90 km north of Mogadishu.

In October 1995 it became clear that some of the problems faced by the population of Jowhar town including the occurrence of cholera and other water-borne diseases was due to lack of adequate clean and potable water supply. Thus, in July 1996, UNICEF Somalia with financial and technical assistance from the European Union began the rehabilitation of the Jowhar water supply system. This was completed in September 1997.

A major hitch however, was the issue of operation and management of the system. The Jowhar governor and local leaders after some discussions recommended an inter-clan approach to the identification and selection process of a management system and structure. Thus, 14 prominent businessmen from Jowhar representing an acceptable cross-section of the predominant clans were invited to form a private company that would operate, manage, repair and maintain the water system.

UNICEF trained the company employees on management and maintenance of the system and collection of fees. In addition, members of locally elected water and environmental sanitation (WES) committees were trained on how to improve hygiene practices among the population through the use of clean water. Training in health and hygiene education was also provided to increase community awareness on the need for safe water. All these initiatives acted as a link between the community and the

SCHEDULE OF REHABILITATION ACTIVITIES

ITEM DESCRIPTION	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
Rehabilitation of borehole at Horsed village									
Preparation of operational and maintenance plan									
Construction of concrete wall around pumping stations									
Reparation of gate valves									
System and financial management training sessions to FARJANO management staff									
Provision of additional generator									
Restructuring of WES section									
Development of a community mobilisation, training and education manual									
Training of WES staff									
Formation of village water committees (*VWCs*) and water point committee (*WPCs*)									
System management training sessions to VWCs and WPCs and WES committees									
Repair and maintenance training sessions to caretakers of WPCs and WES committees									
Provision of good water use and sanitation hygiene education to water users									
Repair of the 225 M^3 reservoir at Hanti Wadaag									
Installation of float valves on the two 200 L tank									
Repair of broken/damaged faucets									
Construction of covers and outlets for existing drainage boxes									
Repair of platform cracks									
Concrete works on all water distributing points constructed by FARJANO, including covers and outlets for drainage boxes									
Staff reduction									
Re numbering of all existing and operational water distributing points and update project map									

system and even helped resolve conflicts among the diverse clans since the people were bound by the common desire to have clean water.

The plan worked. With a contract from the local administration and technical advice from UNICEF, the Farjano ('Spring of Heaven') water company started operations in August 1997. Its responsibilities included amongst others: the operation and management of the system and the implementation of extension works. The Farjano Company, through efficient management of the water system and revenue collection from water users accomplished further rehabilitation of six water distribution points, constructed seven others and connected one hundred and ninety five households to the system.

In addition, the Farjano Company introduced adequate bookkeeping systems, which coupled with the members' commitment, capital and clan-based support has helped the system to continue running. Furthermore, as a result of the inter-clan approach in operating and managing the system and subsequent ownership by the community, it is less vulnerable to vandalism in case of inter-clan hostilities. As a consequence of Farjano's management and trust between the company and the local community, it has even set up a sales and a maintenance spareparts' shop for hand-pumps. In future, it intends to take up contracts for water supply rehabilitation and extension works in Middle Shabelle Region. Well acknowledging the key role played by women, Farjano has ensured that 24 out of the 28 water- point operators are women.

Since August 1997, about 23,256 inhabitants of Jowhar town have had unlimited access to safe and potable water supply, thus reducing the incidences of water-borne diseases, improved the heath of the community, reduced the time spent by women and girls in search of clean water and provided employment opportunities.

The system produces 300M^3 of water daily. Farjano sells the water at 5000 Somalia shillings per cubic metre to water distribution operators and household consumers and 6000 Somalia shillings per cubic metre to agencies. Farjano reinvests profits into systems' expansion and in rehabilitating other infrastructure such as schools. If relative peace continues to hold in this part of Somalia, safe and adequate water will flow to the whole of Jowhar town and its environs. This coupled with community awareness, clean water, improved sanitation and garbage disposal pits should eventually reduce the incidences of water-borne and related diseases in the community.