

Emergency Intervention: Huambo City Water System

AOT-G-00-00-00064-00/Angola

Final Report



Prepared by
Development Workshop
For the
Office of Foreign Disaster Assistance
United States Agency for International Development
December 2001

Table of Contents

Acronyms	i
Reporting Summary	ii
1 Project Overview	1
2 Project performance	2
2.1 Results in relation to planned activities	2
2.2 Improving water supply quality and reliability	5
2.3 Completion of building works, establishment of OMM systems.....	5
2.4 Impact on Local Capacity	5
2.5 Security Situation and Context.....	6
2.6 Government participation	6
2.7 Problems Encountered and Solutions Applied.....	7
3 Expenditures.....	8

List of Tables

Table 1 Logical Framework Analysis.....	3
Table 2 Financial Report	9

Acronyms

DW	Development Workshop
EPASH	Empresa Provincial de Agua e Saneamento do Huambo (provincial water and sanitation company)
GIS	Geographic Information Systems
IDPs	Internally displaced persons
SC	Servicos Comunitarios (Community Services Department)
UCAH	Humanitarian Assistance Coordination Unit
WFP	World Food Programme

Reporting Summary

Final Report

Organization: Development Workshop Mailing Address: P.O. Box 1834 Guelph, Ontário Canada N1H 2L8	Date: December 2001 Contact Person: Maribel Gonzales Telephone: (519) 763 3978 Fax: (519) 821-3438 Internet Address: devworks@web.ca
--	---

Program Title: Emergency Intervention for Huambo City Water System
Grant No. AOT-G-00-00064-00/Angola
Location: Huambo city province of Huambo
Country/Region: Angola/Southern Africa
Disaster/Hazard: Insufficient water for survival for a large population in a war-besieged city
Period Covered by Report: 1 April 2001 to 31 December 2001

Summary

Objective: To increase the quantity and quality of piped water supply to an estimated 130,000 direct war affected beneficiaries in the Huambo municipal area by improving power supply to intake and pumping stations and training staff in maintaining water quality.

Results:

- **Distribution of increased water to the city**

After the principal rehabilitation work of the project was completed in December 2000, treated water was being pumped by the project to the city at 500m³/hour for an average of 10-12 hours per day continuously. Beneficiaries were receiving on average 38 litres per person per day exceeding the project target of 20 litres per person per day. Except for the COALFA former IDP centre, which was vacated in August 2000, all envisaged areas of the city was being supplied with piped water.

- **A system of water treating and testing system established**

The raw water is being fully treated with aluminium sulphate and chlorine. Two EPASH staff members have been trained by the project to do bacteriological testing. Bacteriological testing is being made on a periodic basis on the raw and treated water.

- **Improved electrical supply to water supply system**

Repairs to the Cuando hydroelectric station have been completed. The station now supplies energy to the Kulimahala water treatment centre. Technical difficulties were encountered in adapting the old system to electronic regulators so it was decided to regulate the generators manually. The cable system connecting Sao Joao transformer station to the Sao Jose relay station has been finished. The transformers of Sao Joao and Rua de Comercio have also been installed.

Electric power was being supplied for 30 days per month, 50 percent more than the original target of 20 days a month. When power supply was disrupted in September due to a sabotage incident at Cuando, the government moved fast to replace the damaged transformer and restored power. Power was quickly restored and the system was functioning normally until a second incident with another transformer occurred. The Government has purchased two new transformers, which are being installed presently.

- **A preventative and corrective maintenance system established**

No problems have occurred in the main distribution line.

- **Impact on the capacity and morale of staff in EPASH.**

By playing a supportive rather than a lead role the project has invigorated staff and raising their confidence about their work. Overall the project had a significant positive impact on the capacity and morale of EPASH staff.

- **Government participation**

The participation of the provincial government in the project has been exemplary although it had required a lot of work on Development Workshop's part to make sure the different parties followed through on their commitments for government contributions to the project. The latter was a slow and difficult process but critical in getting all project partners engaged for longer-term sustainability of service provision. The government ended up contributing more than what it originally committed to if both its financial and material (equipment, staff) contributions are taken into account. The government has clearly shown that it can be a very good partner.

Indicator and Current Measure:

The Kulimahala intake/treatment station piped water was being distributed on a daily basis, except for a brief period following a sabotage incident in September and at the time of writing the system is down waiting the installation of new transformers that the Government has purchased. The piped water distribution started on December 10, 2000. On average the volume pumped into the distribution system is about 500 cubic meters per hour. The system works an average of 10-12 hours per day.

Budget:	\$438,801.00
Cumulative Expenditures to date:	\$442,640.71
Balance:	\$-15385.00

1 PROJECT OVERVIEW

The project sought to establish a safe reliable water supply for vulnerable residents and displaced people in the city of Huambo in South Central Angola. Specifically it aimed to increase the quantity and quality of piped water supply to an estimated 130,000 direct beneficiaries. Rehabilitation of the Cuando hydroelectric power station improved the supply of electricity to the intake/treatment station at Kulimahala, a relay supply pumping station (S.José) and two pumping and distribution stations (Rua do Comércio and Cidade Alta) in the city. The rehabilitated water system began to function continuously from December 2000. It is independent of the city's generators powered by imported diesel, which is subject to shutdowns. Thus, the quantity and reliability of water supply has been improved. Upgrades in equipment and consumable supplies at the Kulimahala intake/treatment station and provision of training in water testing and quality monitoring have improved water quality. A preventive maintenance and monitoring system has been established and training provided to the government staff.

Originally, thirty thousand of the beneficiaries were to have been internally displaced people (IDPs) living in a large camp (Coalfa)¹ and in smaller groups with family and friends in residential zones; 100,000 were resident populations living within 500 meters of the rehabilitated main water lines. Because of the on-going security situation, the resident populations were often more vulnerable than the displaced that still have access to food distribution.

Since 1975 Huambo has always been at the centre of the conflict in Angola. In 1993 a 55-day siege heavily damaged the city's entire infrastructure. The renewed war in late 1998 brought heavy fighting in the surrounding towns, sporadic shelling in the city, and a new influx of large numbers of IDPs. Water resources could not meet the sudden increase in demand. The water supply for the IDPs comes primarily from hand-dug wells, and protected springs constructed or rehabilitated through DW programmes. Wells are not an appropriate technology for urban water supply; the supply and the volume of water available are inadequate for basic hygiene, especially in the dry season.

The piped water system had not functioned for eight to ten years prior to 1998 when the provincial government invested in some improvements. Although rainfall is usually high (1400 mm annually except in the dry season months of July to September), damage in the piped water system and shortages in key items such as step-down electricity transformers and fuel has resulted in the system having to be often shut down. Reduced access to water and the contamination of wells have made waterborne diseases a serious concern.

Program activities are located in Huambo City in the province of Huambo in South Central Angola. Precise geo-reference for the location is as follows:

Latitude: 15° 45''
Longitude: 12° 45''

¹ The government subsequently decided to close the Coalfa camp and transferred the IDPs to Casseque, an area five kilometres from Coalfa and beyond the reach of the existing piped water distribution network.

2 PROJECT PERFORMANCE

2.1 Results in relation to planned activities

The project became fully operational in April 2000.² Early on in the project it became clear that it would not be possible to finish the work within the original time frame a no-cost extension was thus sought. Table 1 shows the logical framework analysis for the project with the results indicated after each indicator.

The project began to deliver water as planned to the city of Huambo in December 2000 and final work in Cuando Hydroelectric station was finished in March 2001 but further delays were encountered arising from technical problems in adapting new electronic regulators to the old generators. On the basis of recommendations from the project consultant engineer, it has been decided to maintain a manual regulation system for the generators.

Rehabilitation of the intake/treatment station at Kulimahala River was finished (filtration tanks cleaned, transformers placed, roof rehabilitated, several pumps and electric motors rehabilitated) by March 2001. Water is being pumped to the city after passing through a sedimentation, filtration and chemical treatment (aluminium sulphate and chlorine treatments).

Electric power from Cuando Hydroelectric Power station was supplying power to the Kulimahala water treatment at 50 percent more than the original target of 20 days a month.

From December 10, 2000 until the second incident of damage to the transformer, treated water was flowing to the city, at the rate of 500m³/hr and for an average of 10-12 hours a day. Except for the COALFA ex-IDP centre all targeted areas are being supplied with piped water. The government decided to transfer the major concentration of IDPs from the camp at the Coalfa factory site to Casseque, an area five kilometres from Coalfa and beyond the reach of the existing piped water distribution network. Thus the profile of the target population was modified. In addition to the original intended beneficiaries, a part of the resident population of Huambo City (estimated at 400,000 plus) benefited from the project.

The project has had a significant impact on building capacity and boosting morale among the staff of EPASH. It also has introduced a greater level of transparency in contract management and procurement.

The participation of the provincial government in the project has been exemplary especially when considered against the very weak capacity of government agencies in Angola particularly at the provincial level. The government contributed more to the project than what it initially committed to (in financial and material terms). The government has shown that it can be a very good partner when provided selected critical inputs. However, getting the participation of the different stakeholders required a substantial investment of time by DW in engaging project partners to assume their respective roles. This along with the technical difficulties accounted for delays in the project. The vision of the project was not to deliver a "turn key" service but instead it was for the project partners to have ownership of the project.

² The project agreement was signed on the 10th of March but the transfer of funds was delayed in part due to lack of familiarity with USAID procedures, this being the first USAID grant received by the organisation.

Table 1 Logical Framework Analysis

	Narrative	Indicators	Assumptions
Goal	To establish a safe, reliable water supply for Huambo city and surrounding bairros		<ul style="list-style-type: none"> • That the security conditions will permit full operations. See Section 6.2.1 • That the existing management capacity in EPASH is maintained
Objectives	To increase the quantity and quality of piped water supply to vulnerable population groups	<ul style="list-style-type: none"> • Not less than 20 l/person/day within displaced camps* and peri-urban areas supplied <u>(the direct beneficiaries were receiving on average 38 l/person/day until the incidents with the transformers)</u> • Not less than 0.5 mg/l residual chlorine at point of collection <u>(Chlorine measurements have not been undertaken on a regular basis and thus it difficult to ascertain the chlorine content at points of collection.)</u> 	That existing skilled staff in EPASH continues to work there.
Results	1. Improved electrical supply to water supply system.	<ul style="list-style-type: none"> • Not less than 10 hours per day <u>(Electric was being supplied for 10-12 hours per day until the transformer incidents)</u> • Not less than 20 days per month <u>(30days/month of supply achieved until the incidents with the transformers)</u> 	Hydro-electric scheme at Cuando has the capacity to supply sufficient energy into this system
	2. Establish a system of water testing	<ul style="list-style-type: none"> • Not less than 1 test per week (for faecal coliform) at point of collection within displaced camps and peri-urban areas <u>(Periodic measurements show no feacal coliform in water at water collection points. EPASH is till to set up its own regular weekly tests)</u> • Not less than 1 test per day at the intake/treatment works <u>(Test is being done on an irregular basis.)</u> 	That the consumables are available post project finance.
	3. Establish a maintenance system (preventative and corrective)	<ul style="list-style-type: none"> • Not more than 2 days response time to problem within principal distribution main <u>(No problem has occurred until the incidents on the transformers)</u> • Not more than 10 days per month with problems in the principal distribution main <u>(No days with problems in the principal distribution main until the incidents with the transformers)</u> 	Staff has sufficient motivation and security conditions facilitate a consistent work programme.

	Narrative	Indicators	Assumptions
Results	4. Improved quality of water provided	<ul style="list-style-type: none"> • Not more than 1 colony of faecal-coliform per test at point of collection within camps and peri-urban areas. <u>(The periodic tests made were all negative and therefore no bacterial presence in the water).</u> • Not less than 0.5mg/l residual chlorine at the point of collection within camps and peri-urban areas . <u>(Tests by EPASH indicated that the chlorine content was about 1mg/l regular testing still to be established).</u> 	The distribution system is in good enough condition for these tests to be meaningful.
	5. Increased water distributed in peri-urban Huambo.	<ul style="list-style-type: none"> • Not less than 20 l/person/day to and not less than 25 days/month within displaced camps and peri-urban areas supplied.. <u>(On the average the direct beneficiaries, that is 130000, were receiving about 38 l/person/day and for 30 days a month until the incidents with the transformers.)</u> • Not less than 50% water reserves stored for 10 days / month. <u>(The reservoirs were ready very late and thus it is premature to obtain results on this indicator.)</u> 	Staff have sufficient motivation and security conditions facilitate a consistent work programme

*As stated previously, part of the original 30,000 target beneficiaries at the IDP camp in Coalfa got moved out by the government to an area beyond the reach of the piped water distribution system.

2.2 Improving water supply quality and reliability

The building works for the rehabilitation of the intake/treatment station at Kulimahala River has been completed and the system of intake and treatment is working well. Treated water is currently being pumped to S.Pedro, S.João, Cidade Baixa, Benfica, Académico and Cidade Alta. Tanker trucks continue to transport water from the intake station in Kulimahala River to zones not yet served by the piped water system.

The water goes through sedimentation, filtration, and chemical treatment. With the installation of the compressor and the chlorine dosing machine the previously reported traces of contamination has been overcome.

Six progressive starters for large electric motor-driven pumps in the new station, at Kulimahala (Central Nova) and two each at the Rua de comercio and S. Joao transformers have also been installed. One remaining starter is being kept as a reserve.

Two technicians from EPASH (Provincial State Company for Water) were trained in water testing for faecal contamination using a portable system. The testing kit (Oxfam Del Agua) includes materials for sample collection, chemicals and an incubator. EPASH still has make tests on a regular basis.

2.3 Completion of building works, establishment of OMM systems

Basic works on the old intake and treatment station at Kulimahala are now complete. Sedimentation and filtration tanks have been cleaned and refilled with clean sand and gravel. Electrical cables have been repaired. Two pumps - one for raw water and one for treated water - have been repaired.

The station now pumps water to the town using electricity from the Cuando Hydropower Station.

Inventory of the existing water supply reticulation system and putting it in a map has been completed. The computer work involved to convert the inventory information into a GIS is 85% complete. The remaining 15% are due to mistakes in scanning some maps of some areas and some verification field visits to some peripheral parts of the city, which are being done at time of writing. The GIS will provide the basic information for the preventive maintenance and monitoring systems and is part of Development Workshop's ongoing work with the provincial water authorities.

2.4 Impact on Local Capacity

The project is the first major externally funded initiative for the provincial water unit. It is having a significant impact on building capacity and boosting morale within EPASH. With DW playing a supportive role and providing only the critical inputs, the project has invigorated EPASH staff and they have taken ownership of the project. Staff has collectively realised that they had the skills and the knowledge to repair the system but the lack of resources was frustrating. With the injection of critical inputs, they demonstrated significant creativity in parts substitution and in manipulating the state bureaucracy to effect financial resource transfers to the project. It was also observed that heightened staff morale generated increased levels of activity in other projects. For

instance, repair of the erosion threatening the water line in Caala (a nearby town) was done with renewed vigour.

Having secured this grant in aid has given the staff greater leverage in negotiating with the Huambo Provincial Government. EPASH was able to insist on a level of transparency in the management of contracts and procurement that is currently unusual and difficult to do.

Technical staff from the contracted company worked alongside local staff. Repairs were completed and maintenance schedules established. The one drawback is that all the local staff is elderly and most are over retirement age. There is recognition that the knowledge and skills must be passed on but the reorganisation of the public service has put a moratorium on new recruitment.

A big part of the rehabilitation on the old part of the Kulimahala station was entirely done by EPASH. The workmanship was of high quality and costs were borne by EPASH from their budget. At the same time EPASH has started to contemplate the implementation of a cost-recovery system and ways of keeping the system working in a sustainable way (i.e., without needing big investments from outside, but using resources collected from the consumers).

2.5 Security Situation and Context

While there was a rapid deterioration in the security situation in Huambo in 1999 that seriously affected the implementation of all programmes, from mid 2000 the overall, the security situation has been continuously improving. From daily artillery bombardment at the beginning of the project to rare guerrilla attacks today, (when these occur they are farther away from the city). The only exceptional attack that occurred in the project area was the dynamite incident of the transformers at Cuando on September 10, 2001. Following this incident the security situation at the station has been reinforced. The immediate surroundings of the electrical transmission line poles are mined and are thus relatively safe from sabotage.

Humanitarian activities have expanded to outlying areas. However, it was observed that the number of IDPs arriving from remote zones has been on the rise.

Truck convoys arriving from the coast to Huambo have increased in number and frequency; households have again started to invest as evidenced in more house and car repairs and new businesses.

In spite of these, however, the economic situation in the region is still very difficult. Unemployment, underemployment, high inflation rate, delays of several months in the payment of civil servants and shortage of fuel all contribute to the spread of poverty in the region. Food aid is still being distributed and the role of NGOs remains to be very important.

2.6 Government participation

The provincial government's role has surpassed all expectations and has proven that it could be a good working partner. The government transferred the equivalent of 35,354.71USD (in Kwanzas) of its USD 46,900 contribution to the project. It did not stop here for it bought three new transformers and is in the process of buying three new replacements following the dynamite incident. The acting Governor inspected the damage personally and beefed up the security in the site.

The Government is keen to participate in future projects in the water sector.

2.7 Problems Encountered and Solutions Applied

1. During the year 1999 there was a serious deterioration of security in Huambo. Early in the year the international humanitarian organisations and NGOs evacuated all expatriate and non-essential staff from Huambo. The city of Huambo fell under siege and was bombarded periodically by UNITA during much of the year. Flights of the World Food Programme were interrupted periodically and an air-bridge was mounted which put priority on the delivery of food and essential medicines. Delays were encountered in the start-up of the Huambo water supply rehabilitation due to these factors. By the second quarter of 2000, after the rains had stopped and a Government offensive was underway, the security situation improved to the point that the project implementation could be put fully underway.
2. The project strategy of employing private sector contractors in the technical aspects of rehabilitation of the project was also affected by the security situation in Huambo. Only when the security on the ground improved was the project able to bring non-humanitarian staff workers to Huambo. There was also reluctance on the part of private company contractors to send their personnel to Huambo, until the situation had stabilised.
3. The tendering process used by the project was time consuming to implement and executing a transparent process of selecting a contractor, which involved a bidding, and quotation procedure was relatively new for local government. The process was however very instructive and a valuable learning experience for all partners.
4. Due to the procedure of employing a contractor to implement many of the technical aspects of the project, it became evident that the selection and procurement of much of the project equipment be best incorporated into the same contract (therefore including the provision of technical assistance, delivery and installation of that same equipment). Therefore several budget lines were expended as single contracts and therefore reported as such in the project financial report. The air transport of the equipment was therefore included in the contract costs and funds budgeted for air transport were incorporated into equipment supply and installation costs.
5. As with many rehabilitation projects, new unanticipated problems were discovered once old equipment is dismantled for repair. Water systems when put under pressure after a long period of disuse invariably show new problems and leakages during the process of rehabilitation. The work plan of the Huambo project had to be regularly adapted to deal with these factors. Additional essential tasks had to be assumed within the work plan and parts ordered from abroad resulting in additional expenditures and extensions of execution time.
6. The return of UNITA to guerrilla war tactics in 2001 created new risks to humanitarian projects in Huambo province. In September a clandestine raid was made on the Cuando generating station and two transformers were sabotaged. The project team attempted to repair the damaged equipment in order to allow the system to work until the transformers could be replaced. Unfortunately the

team was only able to make temporary repairs to one of the transformers. The Government has subsequently purchased two new transformers and has increased the level of security protection for the Cuando station.

7. While cooperation with the Government has been very good on the project and the Government contribution to the project in cash and in-kind is an important indication of their commitment to the project, weak administrative procedures have led to long delays in securing Government's contributions. It is noted that a promised financial contribution from the Government of USD 10,000 is still outstanding. As mentioned elsewhere the project suffered a substantial shortfall due to currency exchange depreciation of the Government contribution.

3 EXPENDITURES

The project expenditure is generally within the global budget; USAID grant funds have been expended. The reported USD15,385 excess of expenditures relative to revenue received is due to:

- 1) An currency exchange loss of USD4,645 from the first government contribution of USD40,000 which was made in Kwanzas (converted to USD35,354).
- 2) The balance of USD 6,910 still outstanding from the government.

Under spending in some budget line items helped to compensate the over spending in the equipment line item, most of which had to be imported.

A detailed breakdown of the expenditures and variances for all the budget line items is shown in Table 2 below.