

INTERNATIONAL REFERENCE CENTRE
FOR COMMUNITY WATER SUPPLY AND
SANITATION (IRC)

**SOURCES FOR SANA'A WATER SUPPLY
(SAWAS Project)**

PROGRESS REPORT 92-3 (No. 12)

REPORT PERIOD

JULY - SEPTEMBER 1992

National Water and Sanitation Authority
P.O. Box 104
SANA'A
The Republic of Yemen

TNO Institute of Applied Geoscience
P.O. Box 6012
2600 JA DELFT
The Netherlands

823-YESA 92-10726

1. INTRODUCTION

This twelfth quarterly progress report of the SAWAS Project covers the period July - September 1992. This period has been the second quarter of the third phase of the SAWAS Project (SAWAS-3), whose starting date was 1 April 1992.

2. BUDGET

During the report period, SAWAS ran on a technical assistance budget (Netherlands contribution) of NLG 3.969.500,--. This budget is complemented by a financial contribution of the Government of Yemen amounting to YER 8.000.000,--, according to the Plan of Operations for SAWAS-3 of September 1991. The former budget (Netherlands contribution) has been allocated to complete the technical activities described in Chapter 4 of the Plan of Operations, with exception of the assessment of deep sandstone aquifers in the Sana'a area (technical activity described in Section 4.4 of the Plan of Operations).

The latter activity will be paid out of two distinct budgets: a technical assistance budget, that bears the costs of preparations for and supervision of the deep sandstone drilling, and a financial assistance budget for a comprehensive drilling and well testing contract. The latter two budgets are still to be allocated by the Netherlands Ministry of Development Cooperation.

Meanwhile, a letter of commitment to the third phase of the SAWAS Project was signed on 8 August by the Minister of Planning and Development of the Republic of Yemen and by the Ambassador of the Kingdom of the Netherlands.

3. MANAGEMENT

The two staff members of the Yemeni SAWAS team, who took (unpaid) leave in the previous quarter, did not return to NWSA in the report period. Mr Mohamed Najji, geohydrologist in charge of monitoring groundwater levels, rainfall and streamflow, got a one-year leave from NWSA. In the report period he succeeded to get temporary employment in Kuwait. The leave of Mrs Lutfia Abdul Gafoor, hydrologist in charge of computer storage and processing of data on groundwater levels, rainfall and streamflow has been extended for a non-definite time.

Conclusions and recommendations about allowances, appointments and the extent to which SAWAS staff members match the requirements of the third phase of the SAWAS Project, arrived at in last May by Mr Mohamed Al-Selwi (acting head of NWSA's Water Resources Department) and Mr Wim van Dalfsen (SAWAS teamleader), have been submitted to Mr Mohamed Al-Fusail (Director General NWSA) and partly discussed with him in a meeting on 24 August. The Director General concurred with all recommendations brought up in

this meeting. At the end of the report period, however, SAWAS staff members were still awaiting materialization by NWSA of the recommendations.

In absence of Mrs Lutfia Abdul Gafoor and Mr Mohamed Naji, their tasks have been performed by Mr Klaas de Groot (Dutch Associate Expert to SAWAS). At the same time, Mr Abdul Baqi Al-Mansub and Mr Ahmed Mohamed Nasser (both assistant geohydrologists to SAWAS) were prepared to take a share of the routine tasks of Mrs Lutfia Abdul Gafoor and Mr Mohamed Naji. Due the involvement of Mr Klaas de Groot in geohydrologic data acquisition and processing, he could spend only a small fraction of his time to revive the PlanPerfect worksheet application for the Sana'a Branch (SB) of NWSA.

The telephone line 1 231 371 of the SAWAS office has not been available during the whole report period. By the end of this period, however, NWSA had committed itself to pay the outstanding telephone bill in order to get the above telephone line again available.

4. ACTIVITIES

4.1 Activities to support the optimal use of the existing Western and Eastern Wellfields

4.1.1 **Monitoring for operational purposes**

The monitoring activities for operational purposes are routinely carried out by the Water Resources Department (WRD) and the Sana'a Branch (SB) of NWSA.

4.1.2 **Advising on pumps and conveyance system**

Mr Klaas de Groot (SAWAS associate expert) started to prepare a course on pump-optimization using the PlanPerfect worksheet application, developed before in SAWAS-2.

4.1.3 **Aquifer modelling and interference/impact assessment**

A start has been made with the report of the model study. It concerns the chapters on geology, geohydrological schematization and description of the model. The first modelling results will be obtained when updated data on abstractions in the northern part of the Sana'a Basin, especially in the areas around the wellfields, have become available.

In September, training on groundwater modelling started. There was only one trainee, Mr Mohamed Mayas (SAWAS hydrogeologist). The other SAWAS staff members to follow the training, Mrs Lutfia Abdul Gafoor and Mr Mohamed Naji, were on leave.

4.2 Monitoring groundwater levels in SAWAS exploratory wells

Groundwater level monitoring continued routinely in the Hyziaz and Dar Salm exploratory wells. Readings obtained from the Al-Sabeen Park exploratory wells have been analyzed in order to find the cause of the malfunction.

4.3 Assessment of deep sandstone aquifers in the Sana'a area

In absence of a budget, no activities were carried out.

4.4 Assessment of the potential for surface water development from Wadi Kharid

4.4.1 Monitoring rainfall and streamflow in the catchment area

Rainfall data have been recorded and collected. Repair/completion of the baseflow station was performed by Sheikh Sharian Sahlol of Al-Maadi village. Both stilling wells of the peak-flow station have been provisionally equipped with pressure transducer and digital recorder.

4.4.2 Assessment of interference and impacts of source development

No activities were carried out.

4.4.3 Refine/amend previous estimates of surface water development potential

Postponed until additional data have become available.

4.5 Assessment of the potential for surface water development from Upper Wadi Surdud

4.5.1 Monitoring rainfall and streamflow in the catchment area

Rainfall data have been recorded and collected. The rainfall station at Bab Dayan was shifted to another place, after its guard had informed SAWAS that its position was not safe in view of recent high floods of the Wadi Surdud. The flow measuring stations for the Upper Wadi Surdud have been redesigned, and the logistics and details of its construction were finalized.

4.5.2 Development of a technical concept for water abstraction and transport

No activities were carried out.

4.5.3 **Assessment of interference and impacts of source development**

No activities were carried out.

4.5.4 **Inventory and analysis of water rights**

No activities were carried out.

4.5.5 **Refine/amend previous estimates of surface water development potential**

No activities were carried out.

4.6 Analysis of the possible allocation to Sana'a of water from the Marib reservoir

No activities were carried out.

4.7 Periodic adjustment of the "Water Sources Planning Model"

No activities were carried out.

4.8 Training and capacity building

Training on groundwater flow modelling by Mr Elderhorst was continued. The only attendant was Mr Mohamed Mayas. On-the-job-training on hydrometric data acquisition and processing was given by Mr De Groot. Attendants were Mr Abdul Baqi Al-Mansub and Mr Ahmed Mohamed Nasser.

Mr Elderhorst started work on a course manual on groundwater flow modelling, whereas Mr De Groot started work on a course manual on MS-DOS and on the Pump Optimization application of PlanPerfect.

4.9 Activities not scheduled in the Plan of Operations

In September, SAWAS made its spare sensor for relative humidity and temperature (SKYE Instruments Sensor SKH 2011 S/N 4679) available to the General Department of Hydrogeology (GDH) of the Ministry of Oil and Mineral Resources (MOMR) for a comparative test program.

5. **EQUIPMENT**

5.1 Lost equipment

On July 13, the SAWAS Toyota Saloon with plate number 5066 was lost to a robber's gang on the Marib road, while driving from the Wadi Kharid project area towards Sana'a. This robbery has been reported to the Royal Netherlands Embassy and, through NWSA, to the Investigations Department in Sana'a.

The MAGELLAN NAV 5000 handheld GPS Receiver (S/N 1A002796) was lost, carried with the robbed SAWAS 5066 vehicle.

5.2 Office equipment

The following items were purchased by the SAWAS Project and received in the report period:

Qty	Description	Specification
1	Office desk (2 adjacent tables with drawers)	
1	Norton Editor	Version 2.0
1	Norton Commander	Version 3.0
1	Norton Utilities	Version 6.01
	Installation Disk	
	Utilities Disk 1	
	Utilities Disk 2	
	Emergency Disk	
1	PC-Tools	Version 7.1
	Disk 1	Install
	Disk 2	System/Security Utilities
	Disk 3	Data Recovery Utilities
	Disk 4	Hard Disk Backup
	Disk 5	DOS Shell & File Viewers
	Disk 6	Commute & Desktop
	Disk 7	Help
	Disk A	Windows Utilities
1	Excel for Windows	Version 4.0
1	Microsoft FORTRAN for DOS and OS/2 Systems	

5.2 Geohydrologic software

Qty	Description	Disk
1	MODFLOW/EM (2 Disks with Serial Number 551)	

5.3 Geohydrologic software documentation

Qty	Document
1	MODFLOW/EM, The USGS Three Dimensional Ground Water Flow Model Extended Memory Version for 80386 and 80486 Computers by MAXIMAL ENGINEERING SOFTWARE, INC.