



Training of Gaba 2 treatment works personnel

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THE GABA 2 Training Contract between NWSC and SAFEGE (in association with Water Training International) began in October 1992 for a period of 6 months and was increased to a total of 11 months early in 1993.

The lack of time between starting the training and commissioning the plant (2.5 months) was the major constraint. The trainees had to be able to operate the plant after commissioning. But, some had never seen a treatment plant, working before in other industries or having been recruited straight from school.

This was complicated by the fact that no training could be done on site until just before commissioning as the contractors were still installing and testing their equipment. This was the problem facing the training team of five expatriates and three NWSC Trainers.

Phasing of training

Phase 1

In October-November 1992, classroom training was provided for supervisors, operators and craftsmen. Four senior staff attended a six-week training programme in the U.K., where plants similar to Gaba 2 were studied.

Phase 2

The staff moved to Gaba 2 at the end of November 1992 operators were deployed under a shift system and operated the plant under the supervision of the contractors. The training team helped the contractors with the training and helped operators apply their knowledge and skills to the equipment. The training team also produced procedures for plant operations.

Phase 3

From 14 December 1992 when the plant was handed over, to 20 January 1993 operators worked a 3 shift system and were supervised and trained by the contractors. The training team prepared a programme of on-site training based on the operating procedures. Training was then carried out up to 26 February 1993. Then, an assessment of the operators was made by early April. Craftsmen and laboratory staff were trained by the contractors until mid February. Then, their training was completed and assessed by early April.

Phase 4

The training contract was extended from April to August 1993. The extension was used for retraining of operations

staff who had gaps in their knowledge or lacked experience.

The training programme

The programme (see Figure 1) provided training for all staff as shown below:

The plant engineer*, the plant superintendent*, the chemist*, the workshop superintendent*, 4 shift overseers, 40 plant attendants, 1 laboratory assistant, 1 laboratory attendant, 6 electricians, mechanics and mates. Also, six-weeks training in the U.K. was run by W.T.I. for the staff shown thus * above.

Classroom training of supervisors

A two week course (5-15 Oct.) was held at the NWSC training centre for managers and overseers on water treatment, safety and supervisory skills.

Overseas training

This training (2 November - 11 December) at W.T.I. in U.K. focused on water treatment processes, (similar to those used at Gaba 2), use of chlorine (and safety apparatus), stores management, job analysis and plant management. Visits were made to three Water Companies.

Classroom training of operators

This training (19 October - 20 November) took place in Jinja as the *Vocational Training Institute* located there provided the necessary facilities for classrooms and housing of all trainees, and included visits to the waterworks there. But, as the works were run down and very different from Gaba 2, training was mainly theoretical. The group of 54 trainees was divided into four groups. Group "A" consisted of potential supervisors and laboratory staff. Groups "B" and "C" consisted of those with Mechanical and Electrical qualifications, and Group "D" were the operations group.

Week 1 was common to all four groups and was devoted to water treatment processes. Weeks 2 to 5 Groups were split up as follows:

Group A	Week 2 Effective supervision
	Week 3 Instructional skills
	Week 4 Electrical and mechanical technology
	Week 5 Water chemistry, instrument technology, supervisory training

Groups B/C	Week 2	Basic electrical and mechanical technology
	Week 3	Basic electrical and mechanical technology
	Week 4	Water treatment processes
	Week 4	Instrument technology, basic chemistry
Group D	Week 2	Water treatment processes
	Week 3	Basic electrical/mechanical technology
	Week 4	Electrical and instrument technology
	Week 5	Gaba 2 water treatment process

Familiarising of overseers/craftsmen with Gaba 2

From 23rd November to 7th December the overseers and craftsmen moved to Gaba 2 where they worked under the supervision of the plant contractors.

Work was divided into four main sections: Raw Water Intake (RWI), Clarifiers and Filters (C&F), Chemical Dosing and Chlorination (CHD), Treated Water Pumpouse (TW).

Based on the test results during the previous five weeks, the training team recommended who should fill the various posts at Gaba 2. The staffing was agreed by NWSC.

Familiarisation of operators with Gaba 2

On December 7th the plant operators moved to Gaba 2. For the first week they worked a two shift system and from 14th December a three shift system. The shift rota, the allocation of operators to shifts, and a system of rotation of duties within each shift was drawn up by the project staff. In the first week the shifts were supervised and trained by the contractors. The two shifts off-duty were given familiarisation training by the training team. From December 14th when the plant was handed over, to mid January the operators worked a three shift system and were trained by the contractors' staff.

Preparation of operating procedures

An analysis of the plant operators tasks was made and work began in early January on the preparation of operating procedures. This was done by the training team with the help of the plant management and the contractors' staff.

By 19th February complete sets of operating procedures were given to the Plant Manager, Shift Overseers, Training Staff and NWSC. Copies were also kept at each work station.

On-site training of plant operators

A programme of on-site training in the various procedures was drawn up and commenced on 20th January. Training was done in shift groups for shifts not on duty. Each day two groups were trained, the off-duty shift and the shift about to go on night duty. Training was completed by 26th February, 1993.

Training sessions covered one major task or two smaller task areas. Sessions started in the training room with a description of the task, reasons for carrying it out and any technical principles involved. Training then continued on site at the point where the task is carried out. The operational procedure was demonstrated, then trainees questions were answered and the trainers ensured that everyone understood.

During the extension, trainers used results of the performance assessment to identify any gaps in trainee's knowledge or skills, then on-site training was given to fill in these gaps.

Questions were invited from 9 operators who needed more hands-on training.

On-site training of craftsmen

From 14th December craftsmen worked with the contractors' staff when they were adjusting, maintaining or repairing plant. They prepared an inventory of all electrical/mechanical plant before preparing a Preventative Maintenance Plan. A lubrication schedule, pump running schedule and a recommended list of tools and equipment were also prepared. Training took place from 15 February to 12 March and during the extension.

Training of laboratory staff

After handover, training of laboratory staff was given by the contractor on monitoring procedures. The Chemist had 6 weeks training in the U. K. The Laboratory Technician and Laboratory Assistant were trained with the operational staff in Jinja and at Gaba 2.

They were also trained to carry out routine tests such as pH, turbidity, chlorine residual, colour determination, alkalinity, hardness, jar tests and measuring of concentration of alum and soda ash solutions. During the extension, training was given in resolving problems due to deterioration of water quality such as:

- colloids and organic matter need more alum due to algae blooms and water hyacinth;
- in June and July, every year the plant is invaded by millions of small shrimps causing serious difficulties for filtration. The shrimps breed in the clarifiers. This was stopped by prechlorination of the water;
- soda ash contains a lot of impurities causing blockage in the injection line.

Other training

The training team helped the plant management during the early days of running the new plant. In particular advice was given to the chemist on chemical dosing and to the Workshop Superintendent on the Maintenance programme.

Training was organised for the overseers and operators on duty during the commissioning ceremony on 23rd January 1993 when President Museveni was guest of honour.

Management training

In addition to overseas training, the Gaba 2 management team were trained on site to:

- Solve problems as and when they cropped up.
- Develop management skills by workshops lasting 3 hours dealing with: effective meetings, effective communication, planning, delegation, job descriptions, organigram for Gaba 2 staff, managing individual work and managing time.

Workshops showed that several persons were “serving two masters”. So there was a need for a complete review of the organigram for Gaba 1 and Gaba 2 staff providing greater autonomy to the Plant Engineer and his management team, particularly for procurement of chemicals and spare parts.

Planned preventive maintenance programme

During the extension a preventive maintenance programme was drawn up and operators were trained to follow it. They carried out the work, but further training was needed. However, no specialised tools and equipment were available. This limited the work that could be done.

Assessment and evaluation**Assessment of operators**

Assessment of operators on routine tasks took place from 25 February to 7 April including retraining and testing of any operator not yet competent.

In addition to practical assessments, written papers with multiple-choice questions were set to test background knowledge of operators.

Assessment of the 45 operators and overseers gave the following results:

- 15 : Satisfactory in all areas
- 2 : Satisfactory in practice but weak on theory
- 28 : Weak but satisfactory after retraining.

Successful trainees received certificates from the Managing Director of N.W.S.C.

Assessment of craftsmen

This was done as for operators. The craftsmen and mates were all considered very competent.

Evaluation of training

Evaluation took place at three different levels:

Reaction

Was the training well received by the participants? After classroom training, the trainees filled in a course assessment form. The responses indicated a high level of satisfaction.

Learning

During classroom training three test papers were taken, one on water treatment processes, one on electrical plant and one on mechanical plant. Most participants got satisfactory results in these tests.

All trainees kept learning logs in which they noted down what they had learnt each day. This provides a useful record for the trainee and indication to the trainers of what has been learnt.

Performance

Each trainee was assessed on his performance of each of the routine tasks.

Constraints on training**Plant commissioning**

Gaba 2 operations team had inadequate time for training on site prior to takeover. Also, training given by contractors was minimal. So, the training team had extra work to fill the gaps.

Logistics at Jinja

The transport provided by NWSC for the training was erratic and facilities provided for the trainees at the Vocational Training Institute left much to be desired.

Facilities at Gaba 2

From 1st March the training office was moved to a temporary site office with no electricity supply. A temporary connection was made by a cable from the plant which kept tripping out. Also, there were no facilities and no comfort in these offices.

Operational problems

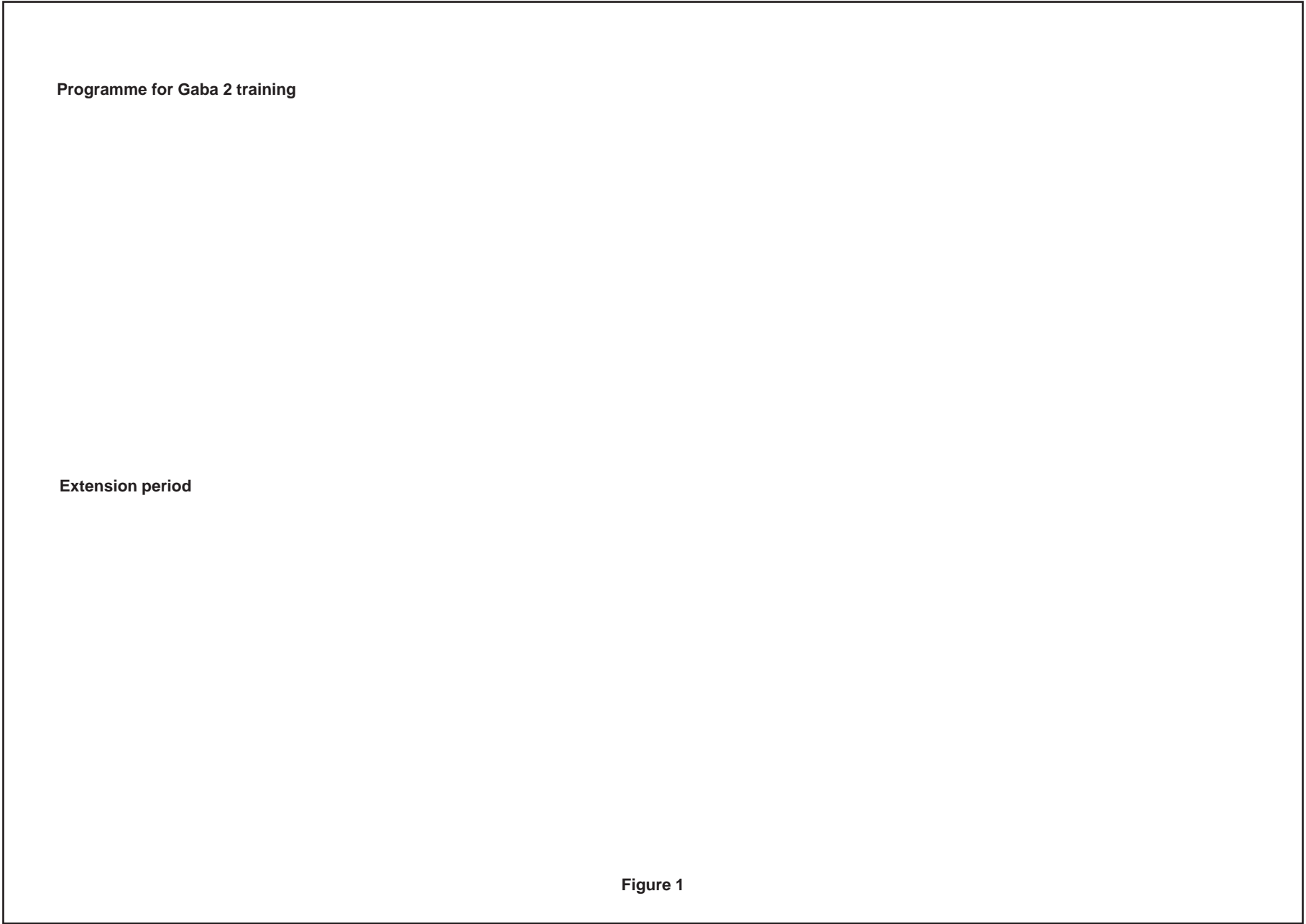
Problems came up which led to amendments to operations procedures. Main problems were

- the inlet penstocks could not be closed completely and were very hard to operate,
- sump pumps were inadequate for draining,
- intake screen hoists were undersized,
- clarifier sludge bleed pipes were too small and had no draining valves,
- automatic washing of the filters often failed,
- blockages occurred in the soda ash dosing line.

Conclusions

The main objective of the contract was to train Gaba 2 staff to operate the plant before hand-over in December 1992. This was done and three years later, the plant is still being operated properly, without any help from expatriates.

This is a reflection not only on the effectiveness of the training by SAFEGE/W.T.I. but also on the quality of the staff selected by NWSC and the effort they made to get the most from the training, funded by the European Community.



Programme for Gaba 2 training

Extension period

Figure 1