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WATER AND SANITATION  
FOR HEALTH PROJECT



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**EVALUATION OF PRACTICAL  
TRAINING OF  
SANITATION AGENTS:  
SINE-SALOUM PRIMARY  
HEALTH CARE PROJECT  
SENEGAL**

**WASH FIELD REPORT NO. 44**

**JUNE 1982**

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search Triangle Institute;  
University of North Carolina  
at Chapel Hill.

**Prepared For:  
USAID Mission to the Republic of Senegal  
Order of Technical Direction No. 78**

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June 4, 1982

T-78

Mr. David Shear  
Mission Director  
USAID  
Dakar, Senegal

Attn: Dr. Michael White

Dear Mr. Shear:

On behalf of the WASH Project I am pleased to provide you with ten (10) copies of a report on Evaluation of Practical Training of Sanitation Agents: Sine-Saloum Primary Health Care Project.

This is the final report by Thomas Leonhardt and Felix Awantang and is based on their trip to Senegal in February 1982.

This assistance is the result of a request by the Mission on January 9, 1982. The work was undertaken by the WASH Project on January 19, 1982 by means of Order of Technical Direction No. 78, authorized by the USAID Office of Health in Washington.

If you have any questions or comments regarding the findings or recommendations contained in this report we will be happy to discuss them.

Sincerely,

Dennis B. Warner, Ph.D., P.E.  
Director  
WASH Project

cc. Mr. Victor W.R. Wehman, Jr.  
S&T/HEA

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WASH FIELD REPORT NO. 44

SENEGAL

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SANITATION AGENTS:  
SINE-SALOUM PRIMARY HEALTH CARE PROJECT  
SENEGAL

Prepared for USAID Mission to the Republic of Senegal  
Under Order of Technical Direction No. 78

Prepared by:

Thomas C. Leonhardt

and

Felix Awantang

June 1982

Water and Sanitation for Health Project  
Contract No. AID/DSPE-C-0080, Project No. 931-1176  
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## EXECUTIVE SUMMARY

In order to strengthen the practical training program for the sanitation technicians (Techniciens d'Assainissement Itinerant--TAIs) in the Sine-Saloum Primary Health Care Project, USAID/Dakar requested technical assistance through the WASH Project. Under the resulting WASH Order of Technical Direction No. 78, an environmental sanitarian and a trainer provided assistance in designing and implementing a two-week practical on-site training program. The expressed goals of this training program, as formulated by the on-site staff in Kaolack, were to acquaint the TAIs with simple sanitation interventions which they could undertake in their districts (focusing on latrines, wells, mud stoves, and sanitary elimination of waste) and to instill in the TAIs a spirit of willingness to work at the village level as agents of development.

By building on the theoretical knowledge of the TAIs acquired during two years of study at the Khombole School of Sanitation and by helping the TAIs develop skills in community development, the training program was designed to enhance the TAI's effectiveness in the rural milieu as motivator, supervisor, and co-worker of the village level personnel. In this enhanced role they would in turn increase the likelihood that the project will achieve its ultimate goal of providing primary health care interventions beneficial to all the villagers.

Initially in Senegal the consultants aided the local staff in the design and implementation of the training program. First they explored the factors that influence the selection of appropriate methods and activities for the training. The educational background of the TAIs, their practical knowledge acquired over the past two years, and on-the-job skills needed for successful execution of their work were among the factors studied.

With the assistance of the WASH staff in Washington, reference materials had been gathered to help the consultants with the technical aspects of the training. These were left on-site for future use. Other pretraining activities, including analyzing the program of the Khombole school and interviewing the TAIs presently working in the field, helped the consultants select appropriate training activities. Observation of the last part of a training of trainers program given by the same training staff enabled the consultants to become familiar with the training methods used by the staff.

Because much of the training program for the TAIs had already been planned before the arrival of the consultants, the consultants' contributions were limited to the presentation of

one technical lesson on the disinfection of wells and gathering random feedback from the local staff on the process, strategies for increasing the technical content of the program, and suggestions were made for some technical objectives for practical training. All parties were essentially in agreement about what constitutes a viable and useful practical training. The present program should be judged a success.

Once the training program was completed, the consultants drew upon the content and methods of that training to recommend future activities, both technical and educational, for the on-going training of the TAIs. Since an accurate job description/task analysis for the TAIs does not exist at present, one should be developed before further training activities are planned. To aid the project, the consultants drew up a list of feasible sanitation interventions which the TAIs might be expected to undertake and also made specific recommendations about future activities. These activities should not only expand the TAIs' technical competencies, but should also provide opportunities for motivation and self-realization.

Issues and concerns surrounding future primary health care interventions in Senegal include the training of personnel, the militarization of the Service d'Hygiene, the eventual take-over of the project by the Ministry of Health (MOH) appropriate roles for AID involvement, and how to apply the lessons learned in the Sine-Saloum Primary Health Care Project to other health programs now in the planning stage. Three issues need to be addressed immediately.

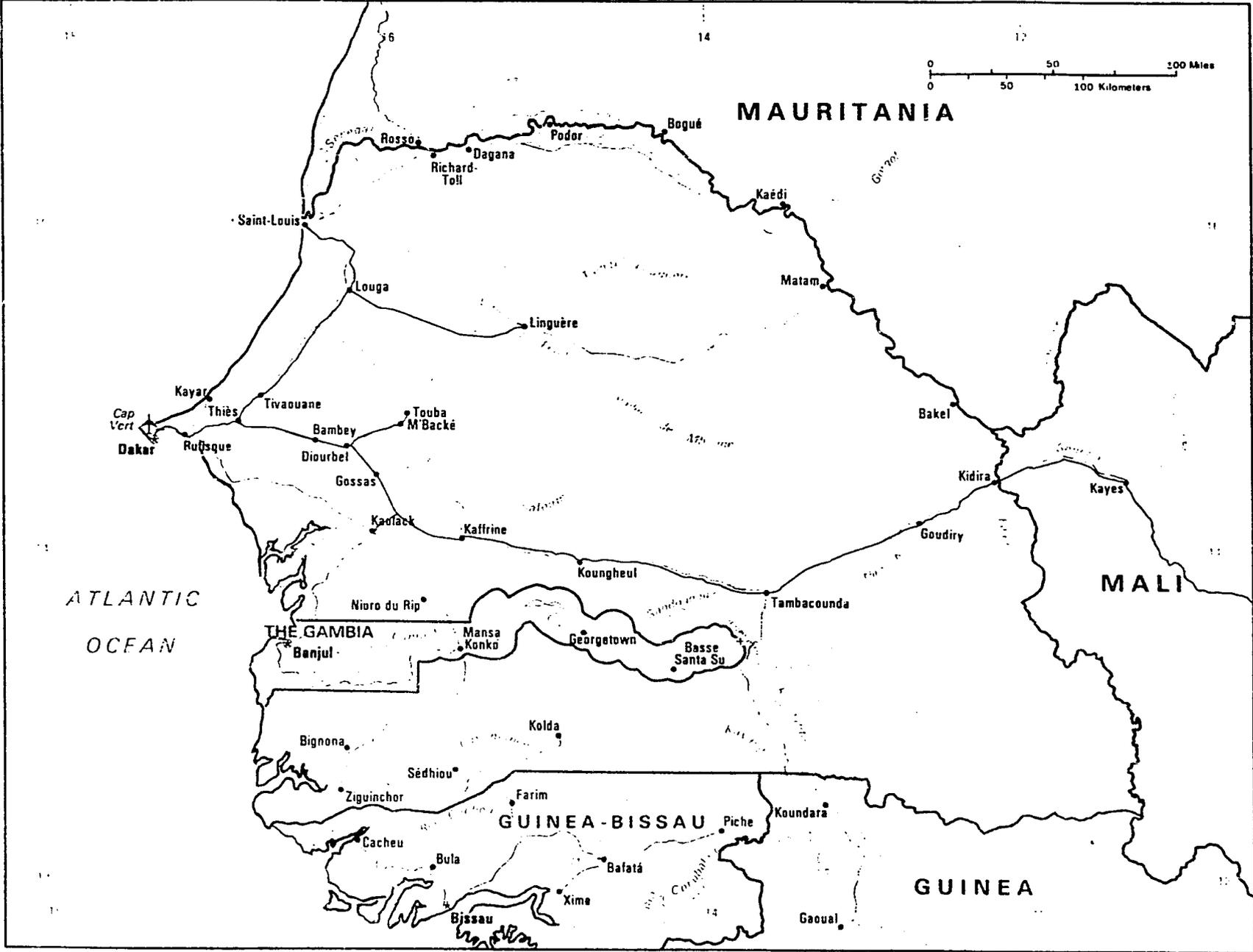
- Position descriptions for the TAIs need to be developed and analysis of discrete tasks for each position needs to get underway as soon as possible.
- The project needs additional technical assistance, particularly someone on site who can offer advice and expertise in the areas of sanitation and environmental health to the staff and to the TAIs.
- The water problem in the Sine-Saloum region merits the special attention of government officials. For a proposal for involving the TAIs see Chapter 4.

Everyone connected with the Sine-Saloum Primary Health Care Project showed an impressive amount of energy, devotion, and caring. When some of the basic issues, problems and concerns are addressed, there is no reason that this project cannot achieve some of its laudable and ambitious goals.

## ACKNOWLEDGEMENTS

The authors of this report wish to acknowledge the help and support of the following people: the logistics staff of WASH, especially Carol Rabin and Yolanda Fields for their help during the short period of time before departure; Barbara Furst and Karla Lindstrom for helping with the report; Raymond Isely and Craig Hafner of WASH, and Peace Corps OPTD/ICE for all the technical materials made available to us; Sally Coghlan, WASH librarian, for providing booklets, handouts, and other documentation; and Helen O'Brien, Mary Morgan and Kathy Parker; Mike White, Mary Diop, and the entire Office of Health USAID/Dakar who supported us in the field; Aida Lo and Sangone Mboup, to whom we are especially indebted for their hospitality in Koalack and who allowed us to become a part of the training program; the entire training staff in Kaolack for their patience and understanding; and the TAIs who patiently answered all our questions.

# Senegal



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## Chapter 1

### INTRODUCTION

The Sine-Saloum Primary Health Care Project of USAID/Dakar, administered jointly with the Ministry of Health (MOH), is a grass roots, village-based health project developed around the concept of self-sustaining health huts staffed by village residents. A village hygienist first aide person (hygieniste-secouriste) is responsible for treating minor problems requiring first aid and for dispensing certain medications such as aspirin and antimalarials. A traditional birth attendant (matrone) attends most births in the village.

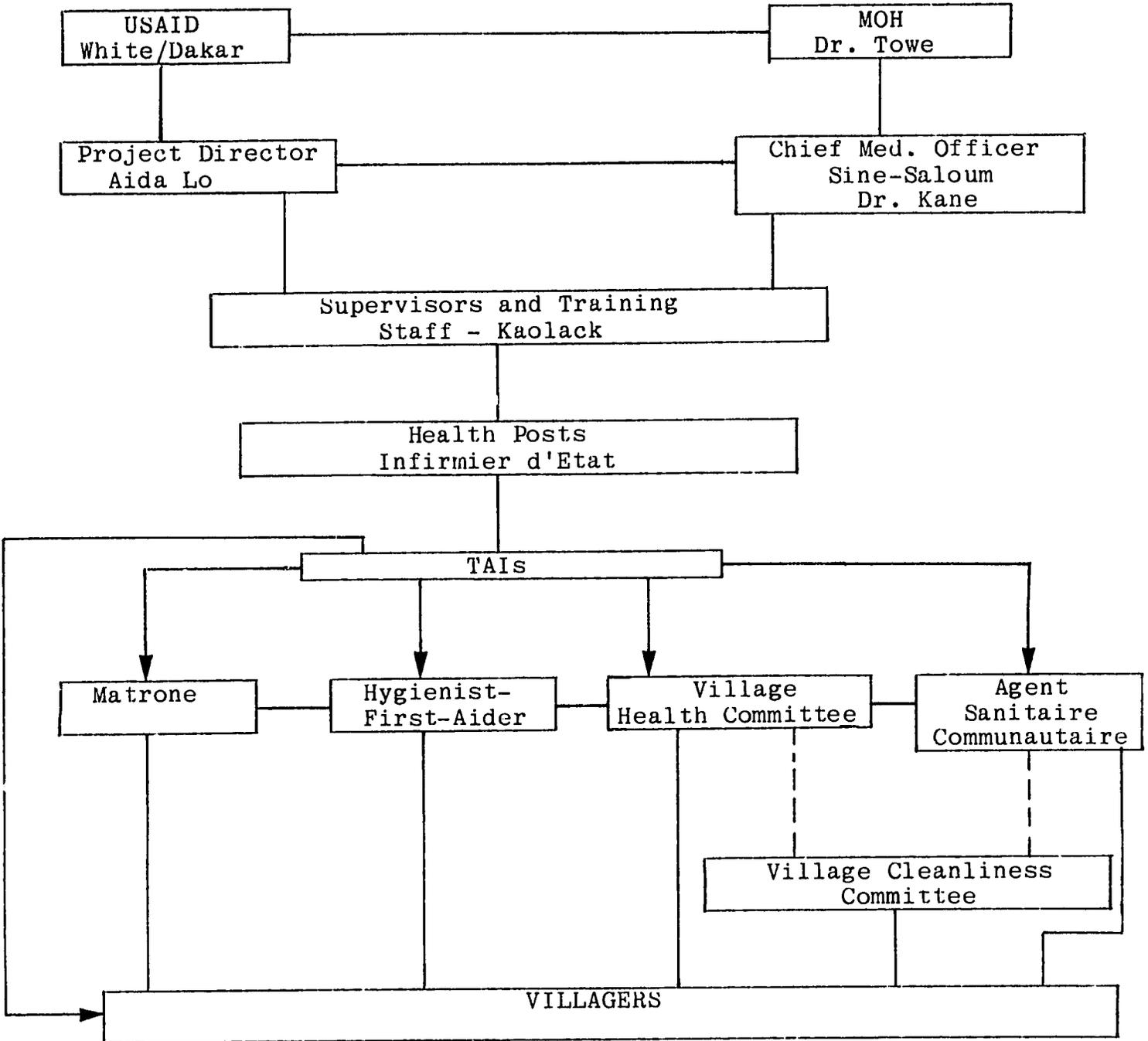
A voluntary village health committee oversees the activities of the health hut. During periodic visits to the village itinerant sanitation technicians (techniciens d'assainissement itinerant--TAIs) from the MOH work with this committee and the villagers to improve basic health conditions. These TAIs train the village health workers and promote activities such as well projects, construction of latrines and mud stoves, and sanitary disposal of waste matter.

The TAIs represent the first salaried level of MOH field personnel at the village level and thus serve as the link between the MOH regional office in Kaolack and the surrounding villages. TAIs are trained at the Khombole School of Sanitation. Following graduation, they receive two weeks of practical on-site training before being assigned to the field. The first graduates are currently in the field and a second class will follow soon.

Because much of the TAI training at the Khombole school is theoretical, the on-site project staff and Chief Physician, Dr. Kane, recommended to USAID/Dakar that the two-week practical training program be strengthened to increase the effectiveness of the TAIs in the field. Under the resulting WASH Order of Technical Direction No. 78 (Appendix A), two technical advisors, an environmental sanitarian and a trainer, were engaged to review and evaluate the training program to date, participate in the training program currently in progress, and make recommendations for improving the training program in the future. The scope of work originally included five tasks, but was expanded by USAID/ Senegal to include the following seven activities:

1. Assist the project training team to prepare this year's practical training program.
2. Participate as a trainer in the actual program.

Table of Organization  
Sine-Saloum Primary Health Care Project



3. Analyze the strengths and weaknesses of the training approach of the project and recommend changes to be implemented in the next training cycle.
4. Offer advice on the use of materials for the training and make arrangements for getting these to the sites.
5. After studying this training program and the TAI responsibilities, make recommendations on the type of on-going supervision and periodic refresher courses necessary to increase job effectiveness.
6. Survey available technical materials for use during the training.
7. Analyze the two-year program at the Khombole school and make recommendations on how to include more practical training in the curriculum.

In addition, two modifications to the scope of work were made after the arrival of the consultants. These changes were related to the design of the program and the future training program at the Khombole school.

The first change to the scope of work resulted from a reduced need for consultant participation in designing the training program. By the time the consultants arrived in fact most of the program had been designed and arrangements had been made for technical interventions. Materials (cement and tools) had been purchased and distributed to the villages, or the villagers had the necessary materials on hand.

The second modification concerns the Khombole school. In interviews with two Senegalese officials, Mr. Thiam, Administrative Office of the Khombole School of Sanitation, and Dr. Ba, Director of Training of the Ministry of Health, it was learned that they viewed the school at Khombole as having concluded its accord with USAID by posting the two agreed-upon graduating classes to the project. The school is now ready to resume its normal three-year program of training sanitation workers under the new "militarization" plan for the Service d'Hygiene.

Taking into account these two changes in the scope of work, the staff and consultants identified the following goals for the training program:

- Familiarize the TAIs with practical sanitation interventions that can be carried out at little or no cost in the villages, focusing on four areas--wells, latrines, mud stoves, and sanitary elimination of waste.

- Help the TAIs develop skills in community development, including a commitment to work in rural areas.

Achievement of these goals will strengthen the role of the TAI which is central to the success of the Sine-Saloum Primary Health Care Project.

This report addresses the three primary areas of consultant activity: pre-training, training, and post-training concerns.

## Chapter 2

### PRE-TRAINING CONCERNS AND RESEARCH

#### 2.1 Introduction

The technical advisors arrived in the field two weeks before the start of the practical training program to gather information on which to base their recommendations for modifications in the design and implementation of the program. Pertinent information included the proposed job description for a TAI, the TAI's relative position in the civil service hierarchy, some of the environmental health problems which the TAI is expected to address, and the nature of the formal and informal training the TAIs received prior to the practical training program. An additional objective of this pre-training period was to assess the nature and quality of training at the Khombole school. These variables influence the technical content and training methods of the program.

#### 2.2 Job Description, Knowledge and Skill Characteristics of the TAI

##### 2.2.1 Environmental Health Personnel in Senegal

The Ministry of Health in Senegal is currently in the process of reorganizing its health service (Service d'Hygiene). In the new civil service hierarchy the TAIs will fit into one of five newly created personnel categories. These categories are described below beginning with the most senior.

- Sanitary engineers (ingenieurs sanitaires) will be graduates of the Technical University of Dakar. Their positions are at the highest level of decision-making both in Dakar and in the newly restructured Service d'Hygiene.
- Senior sanitation technicians (techniciens superieurs d'assainissement) will occupy mid-management level positions in Dakar and in the regions. These technicians will also be trained at the Technical University and will have the rank of officer.
- Sanitation technicians (techniciens d'assainissement) will work at the regional and departmental levels. They will receive one year of training at the military school in Kaolack (Ecole de Sous-Officiers) and two years at Khombole. They will be non-commissioned officers.

- Sanitation agents (agents d'assainissement) will serve at the rural community level and in urban centers. They will act as "squad leaders" of the field activities and will be trained for two years at St. Louis.
- Sanitation auxiliaries (auxiliaires sanitaires) will perform specialized duties as squad leaders both at the rural community level and in urban areas. They will be trained for one year in St. Louis.

### 2.2.2 Outline of the Job Description

The sanitation technician or TAI conducts a variety of environmental health activities in the Sine-Saloum Primary Health Care Project. The job description of the sanitation technician includes the following official responsibilities:

- Records statistical data
- Maintains an up-to-date map of his area
- Reports the occurrence of transmissible diseases
- Organizes a work plan
- Makes home visits
- Undertakes health education activities
- Evacuates patients from villages to health posts
- Undertakes environmental health activities
- Assists in the provision of potable water
- Helps prevent disease through the control of vectors
- Implements latrine projects
- Disinfects polluted water
- Organizes the training of village health workers
- Supervises the village health workers
- Replaces absent nurses at the health post.

The TAI carries out these duties from the health post where he usually has office space in his capacity as assistant nurse. His community health and sanitation activities are supposed to be conducted throughout the geographical area served by the health post.

The sanitation technician in Nioro du Rip, for example, is theoretically responsible for activities in about 133 villages while the technician in Latmingue should ideally operate in 81 villages. In reality most technicians undertake meaningful activities in only a few of these villages.

The training of the village hygieniste is a primary task of the TAI requiring familiarity with the responsibilities of the village hygienist as well as training skills. The village hygienist, who is elected by the village, is responsible for the following:

- The cleanliness of the village health hut.
- The maintenance of all materials in his care.
- Receiving courteously all villagers requesting assistance and making home visits.
- Referring to his supervisor all problems beyond his competence.
- Informing the village chief or authorities of necessary activities required to bring sanitation conditions of villages up to the level of villages with health huts.
- Supervising village sanitation activities with the assistance of the village health committee (provision of potable water, latrines, fecal pollution control, solid waste disposal, prevention of accidents, and food protection).
- Preparing a monthly program for review by a supervisor.
- Organizing health education sessions for the village with the first aid provider and the midwife.
- Keeping an activity register or record book up to date and presenting it every week to the village health committee.
- Informing the village health committee of planned temporary absences from the villages and also informing them well in advance if he intends to resign from the post, so that a replacement can be sought.

The job descriptions of the hygienist and sanitation technician reflect the importance of the sanitation problem in the development of the knowledge, skills, and performance characteristics of the environmental health agent. Consideration of water and sanitation-related problems is critical for developing an environmental health cadre at various levels of government and in local communities.

### 2.3 The Nature and Quality of the TAI Training at the Khombole School of Sanitation

Before considering the appropriateness of a practical training program, a brief review of the training that has influenced the knowledge, skills, and performance characteristics of the current TAIs is appropriate. A review of the nature and quality of the TAI training at the Khombole school provides perspective in determining what changes can be realistically expected.

A brochure on the sanitation school at Khombole reveals some of the problems the school faces. These problems have had a direct impact on the graduates who participated in the practical training program in Kaolack.

#### 2.3.1 The Faculty at Khombole

The permanent full-time faculty at Khombole consists of one sanitary engineer (who is also director of the School), one senior public health technician (technicien superieur en sante publique), four sanitation technicians (graduates of Khombole), and a laboratory technician.

Part-time faculty who commute from Dakar, Thies, and Bambey include the following personnel:

- One sanitary engineer
- One mathematics professor
- Four senior technicians
- One chemistry and physics professor
- Four physicians
- One social educator
- One veterinary nurse

The most striking problem with the faculty is the shortage of full-time, appropriately qualified teachers who reside at Khombole and are available to the students on a continuous basis. Transportation problems associated with part-time faculty have been cited as one of the major problems of the training program.

#### 2.3.2 The Curriculum

The official curriculum of the current program at Khombole covers two years of training.

## First Year

- Mathematics
- Chemistry
- Public Health Administration
- Anatomy and Physiology
- General Biology
- Entomology
- Parasitology
- Personal Hygiene
- First Aid Care
- Epidemiology and Control of Transmissible Diseases
- Notions of Civil Engineering
- Elements of Topography

## Second Year

- Introduction to Public Health
- Health Education
- Nutrition
- Housing and Housing Hygiene
- Control of Disease Vectors
- Food Hygiene
- Demographic and Health Statistics
- Elements of Epidemiology
- Public Water Supply (Urban and Rural)
- Chemistry and Microbiology of Drinking Water
- Disposal and Treatment of Solid Wastes (Urban and Rural)

The following list of the approximate number of hours devoted to each subject in the Khombole curriculum was derived from interviews with several TAIs from the second graduating class:

### First Year

Civil Engineering	10 classes of 2 hours each
Anatomy	20-25 classes of 3 hours each
Health Care	20-25 classes of 3 hours each

Health Care Seminar	One month of classes
Parasitology	10 classes of 2 hours each
Entomology	10 classes of 2 hours each
Vectors	10 classes of 2 hours each
Personal Hygiene	3 classes of 2 hours each
Mathematics, Physics and Chemistry	10 classes of 3 hours each

### Second Year

Infectious Diseases	20 classes of 2-3 hours each
Parasitic Diseases	20 classes of 2-3 hours each
Elimination and Treatment of Waste Material	30 classes of 2-3 hours each
Water Chemistry and Microbiology	15 classes of 2-3 hours each
General Prophylaxis	10 classes of 2-3 hours each
Statistics	8 classes of 2-3 hours each
Food	5-8 hours
Nutrition	5-8 hours
Environmental Hygiene	5-8 hours
Topography	5-8 hours
Health Education	10 days

This two-year program represents an accelerated course; the usual program at Khombole is three years in length. Practical training accompanying these academic areas of instruction is organized in a pilot zone in the Thienaba Arrondissement surrounding Khombole. Organizations that have been used for practical training or are being considered for use include the Hygiene Service in the Ministry of Health (Service d'Hygiene), the National Water Company of Senegal (Societe Nationale d'Exploitation des Eaux du Senegal, SONEES), and the solid waste removal company in the city of Dakar (Societe Africaine de Diffusion et de Promotion, SOADIP). The current group of graduate technicians also spent nearly two months providing health care at a health post.

### 2.3.3 Problems

The problems faced by the Khombole school in retaining a qualified full-time and devoted faculty and in organizing a curriculum responsive to the sanitation needs of urban and rural Senegal are common to other countries in Africa. In addition to the usual budgetary, space and equipment problems, the faculties of such institutions are usually either over-qualified in sanitation systems which are inappropriate for local conditions, or they are not adequately qualified to teach or develop alternative systems. The authorities at Khombole are aware of these problems and are working with limited funds to improve the training.

The quality of training offered at Khombole was also reviewed by studying students' lecture notes. All the elements of a traditional curriculum in environmental health and sanitation appear to be covered in the training program. However, a disproportionate emphasis is placed on water and sanitation systems that would be unsuitable for the rural population of Senegal (or 68 percent) given the country's current financial and socioeconomic conditions.

Because the sanitation technician is currently expected to provide nursing services, the emphasis on human anatomy and physiology may be justified. As the TAI concentrates his efforts on community sanitation problems, some of the anatomy and physiology background will become superfluous.

#### 2.3.4 Conclusion

The present conception of the knowledge, skills, and performance characteristics of the TAI has been influenced by the former health care strategy which emphasized curative medicine, but which is now gradually moving toward preventive medicine in general and environmental health and sanitation in particular.

Until very recently, the community-level sanitation agent (agent d'assainissement), a worker at a level one step below the TAI, was half nurse and half sanitation agent. These individuals were trained in health care for one year in St. Louis and in sanitation for one year in Khombole. Officials at the MOH are planning for future sanitation agents to be trained exclusively in sanitation. The TAI will be trained in Khombole for three years (one of them in Kaolack) and will receive only a few months of nursing instruction.

Also under consideration is a program to make hygiene service agents paramilitary personnel. Sanitation students will first undergo one year of military training at Kaolack before completing the last two years at Khombole. Introducing military discipline into the curriculum as an approach to retaining personnel in rural areas appears to be the main objective of this new feature of the program.

The current sanitation technician is more of a sanitarian than a nurse in his knowledge and skill compared to the sanitation agent who serves as half nurse half sanitarian. This "polyvalence" in skills and knowledge has its advantages and disadvantages for primary health care. Because the emphasis on curative medicine still prevails in some quarters of the medical establishment, polyvalence can be detrimental to the work of the sanitation personnel at the community level.

Environmental health and sanitation activities are by their nature unglamorous, and very often quite bothersome to

villagers who may not fully appreciate their significance in the prevention of disease. A polyvalent health agent who must organize a community to implement projects that the residents do not perceive as important is likely to rely on the use of medical skills with more immediately apparent success in the treatment of disease. Many of the practicing sanitation technicians in the field admit to spending most of their time treating patients in the health posts.

## Chapter 3

### THE PRACTICAL TRAINING PROGRAM

#### 3.1 Introduction

The purpose of the two-week practical course is to help the TAIs gain experience in such project-related activities as latrine construction, well protection, and composting and to instill in each sanitation technician a desire to become a "development agent." Since preparations for the course had been nearly completed by the time the two consultants arrived, they were unable to modify its design significantly. They were able, however, to evaluate the course and to offer on-going feedback to the program staff in both the technical and pedagogical areas. In addition, they demonstrated how to disinfect wells using locally available bleach.

The opening section of this chapter assesses the strengths and weaknesses of various segments of the training program. Sections 3.1 and 3.2 address the methodology and content of the program. Section 3.3 offers techniques for improving the training process, and Section 3.4 outlines specific modifications in course content to enhance the transfer of needed technical skills and knowledge to the TAIs.

#### 3.2 Positive Aspects of the Training Program

Although the staff members were fatigued, the enthusiasm of the opening remarks was contagious. It was evident that the training staff firmly believed in the goals and purpose of the project and the training program, and they communicated their commitment to the participants.

The training staff's use of fact sheets (fiches techniques) is an excellent way to sum up work accomplished in the field. By recording procedures and steps in the various construction and educational activities, a permanent record is established and a document produced that will be helpful to the TAIs in the field. Future training staff should continue to use this procedure.

Drawing up and elaborating on an action plan for sanitation (plan d'action d'assainissement) is, like the fiche technique, an excellent idea. These plans will serve the TAIs as a foundation and starting point for their field work and should be used and refined in future training.

The trainers were responsive to the moods of the group. When it was evident that the trainees were fatigued after three days of physical labor, the training staff changed the program. If extensive practical training is planned for

future seminars, periods of less strenuous work should follow periods of physical labor.

The trainers understand and use the basic components and philosophical underpinnings of training methodology. An example of this is their application of the theory of parallel systems; efforts were being made to conduct the training program in the way the trainers wanted the trainees to conduct their activities in the field--in an open participatory style.

Both participants and staff agreed that the goals of the program had been met. In the TAIs' final evaluation of the program the number of positive comments far outweighed the negative ones.

The closing session of the program was very well done. Trainee morale was given a definite boost when the TAIs saw the results of the week's work tabulated on a chart. This technique also provided positive reinforcement for later work.

### 3.3 The Training Process

Technical content forms only part of a training program; the training process, the means by which the content is transmitted in terms of information and skills to the trainees, is also important. In a training program that has as one of its goals the development of a spirit and a willingness to work as an extension or community worker (animateur) it is of vital importance that the methods employed during the training promote enthusiasm and are consistent with the methods that the trainees will use once they are in the field. In the following section, major aspects of the training process are discussed including planning and design, logistics, staff development, methodology, and evaluation.

#### 3.3.1 Planning and Design of the Training Program

Some trainers say that as much time should go into the planning and evaluation of a training program as goes into its implementation. Because of limited time, this practical training directly followed a training-of-trainers program. In the future, every effort should be made to allow enough time between training sessions to permit adequate planning time and reduce staff fatigue.

Goals set by the staff determine the design of a training event and the planned activities. In this case, there was ample discussion and agreement on the overall goals of the program. This goal setting contributed to the successful planning of activities despite the time constraints. Each trainee activity in some way contributed to the realization of the goals.

Prior to setting up any training program, a careful needs analysis should be done. If properly executed, a needs analysis will help the training staff prevent a situation in which trainer and trainee expectations are at variance. A needs analysis also allows the staff to plan many or most of the activities before the start of the actual program because needs are known and can be translated into specific objectives.

Periods of open time should be scheduled in training program. An open period before field trips will allow discussion and demonstration of the technical aspects of whatever activity is to be undertaken. Since technical aspects often bear on health considerations, this relationship needs to be demonstrated and understood by the trainees before embarking on the activity. This time will also allow TAIs to ask questions and gain a clearer understanding of what they are going to do once they are in the village.

Time also should be allotted for interaction among the TAIs and the technical agents invited to help in the training. Such an opportunity will permit mutual exploration of goals, purposes, and methods of work. As many participants as possible need to be involved. In this particular program, although time constraints made it difficult, it might have been helpful to have included a TAI in the planning process.

Because of the nature of the training schedule, there was little time for on-going staff evaluation of the program. Periodic assessments should be conducted throughout the program so that the trainers can keep their fingers on the pulse of the program and make necessary adjustments.

If TAIs are asked to survey village priorities and develop a work plan, as they were in this program, large blocks of time need to be scheduled to allow the team to carry out their plans. This aspect of the training has to be balanced with logistical considerations and the availability of specialized technical agents. Unfortunately there was a feeling among many of the trainees that it was necessary to adhere rigidly to the formal schedule, thus compromising their plan of action drawn up with the villagers.

### 3.3.2 Logistics

In general the logistics were handled well. Transporting people to and from villages on schedule is difficult, and often coordinators have no control over technical assistants who arrive late. Trainees usually expect a schedule to be followed, with sessions beginning and ending on time, and, if changes are to be made, they like to be consulted.

The provision of meals and water for the trainees in the villages was carefully explained by the staff. One of the working groups was unable to successfully resolve this problem. Coordinators need to be sensitive to these kinds of difficulties and be ready to assist the group leaders (encadreurs) when necessary.

The training room at the Service d'Hygiene is inappropriate and not conducive to good learning. The lighting is poor. Electrical outlets are insufficient for good audio-visual work, and the furniture is in poor condition. Improvements should be made if training is to take place there in the future.

### 3.3.3 Staff Development

Staff development is an essential part of any training program. Because the staff serves as a model of behavior, care must be taken by the program directors to see that its staff is performing at optimum levels. A staff should avail itself of the opportunities presented by a training program to perfect its training skills. Questions which need to be resolved concerning staff development include: Who can (or is willing) to play the devil's advocate, that is, ask the probing questions such as "How are things going?", "Is this the best we could do?", "Why didn't that work?", "Whose responsibility is it to check the cars every morning?", or "What might have been an easier way to conduct that exercise?"

Other staff development concerns are: filling in for a missing or fatigued staff member, enabling the staff to engage in a process of self-examination, and helping staff members who might be having difficulty with group dynamics.

If the TAIs are expected to support each other in the field, it is important that the training staff successfully model mutually supportive behavior during the training.

### 3.3.4 Training Methodology

Recognized techniques and methods used by experienced trainers enhance the flow of technical content to the trainees and, where applicable, should be incorporated more extensively into the two-week training course. This section identifies some of the more promising techniques.

#### Discussion of Participant Expectations

Participant expectations should be discussed freely in the opening session. In this way participants' feelings about what they would like to gain from the training are made public and

can be compared with staff expectations. Unmet expectations which can block a good training program can thus be avoided.

### Internal Program Consistency

The purpose of each training activity and its relationship to other activities and to the overall goals of the program should be explained clearly to the trainees. Objectives must be established for each individual session and each visit to a village and should be discussed in advance with the trainees. Objectives must be established for each individual session and each visit to a village and should be discussed in advance with the trainees. This procedure began with the action ban-ak-suuf (mud stoves programme) and should be extended to all sessions. Often trainers neglect to explain objectives toward the end of a training program, assuming that they are obvious by then. Such is not always the case.

### Assignment of Specific Training Tasks

The requirements and dimensions of all tasks assigned to the trainees need to be precisely communicated, either as a handout or on the blackboard. Testing whether or not the trainees have understood the task can be accomplished by asking, "Did you understand the task?" or "Are there any questions?" Adults are often reluctant to embarrass themselves by asking for help. After the trainees have started working, the facilitator should go from group to group to see how they are handling the task. Trainers should be accessible and let it be known that they can be used as resources if help is needed.

### Setting Goals

Trainees should practice setting clear goals that can be achieved within realistic time frames, and with agreed upon indicators of success.

### Group Process Skills

Group process skills need to be developed and practiced. As opportunities arise for problem solving on the part of the staff, group process skills are called into play. These skills involve finding a solution to an existing training problem by devising activities that will address the issue. For example, how can groups be stimulated to participate in a training program that they might perceive as being at odds with their personal interest? If a practical training program is going to involve manual labor (digging wells or building latrines), how can the staff convince and motivate the trainees to participate fully? Other problems requiring the development of group process skills include divergence of opinion, personality conflicts, and hostility on the part of a participant.

## Small Group Dynamics

Small group dynamics are a critical element in the success of any training program. Because so much work is accomplished in small groups, it is essential that people be able to get along, work together, and solve problems. A training staff should model this kind of behavior and should also provide adequate leadership for small groups when group members themselves are not well versed in process (maintenance) techniques. Assistant trainers (encadreurs) should be helped to develop these kinds of skills for future work in training programs.

## Brainstorming

Brainstorming is a very useful technique and should play a large part in any adult training program. It allows people to express ideas without inhibition. It provides practice in small group dynamics when group members are asked to arrange priorities and an opportunity for a thorough and intensive exploration of a topic. It is not an easy technique to master, but it allows the trainer to become more of a facilitator and less of an information provider.

## Use of Case Studies

Along with brainstorming, the effective use of case studies can contribute to the overall effectiveness of an adult training program. Not only does the case study allow for group speculation on how the case can be approached, but it can also serve as a vehicle for strengthening intra-group dynamics. In the case of training for TAIs, it also would be a good opportunity for them to enhance their knowledge of actual case histories.

### 3.4 Training Content

#### 3.4.1 Guidelines for Selecting Technical Content

Technical content consists of information to be acquired in the form of knowledge and skills by the trainees. The practical training course for the TAIs should build on their existing skills and knowledge and should be based on a detailed task breakdown of their job descriptions. The program should reinforce relevant aspects of their formal training at Khombole and compensate for any significant imbalance or omissions in the program. The technical content should enable the TAI to train and supervise village health workers by familiarizing him with basic training procedures and ensuring that he understands their purpose.

### 3.4.2 Recommended Technical Objectives of Training

The recently completed two-week training course showed strength in most technical areas but did not emphasize sufficiently technical recall, evaluation, and procedures for the training of trainers. These subjects should be emphasized in upcoming refresher courses for TAIs who are now in the field. Future practical training courses should include the technical objectives discussed below.

#### Technical Recall

Technical recall knowledge and skills should be supplemented and reinforced. Many relevant technical topics, appropriate for prevailing socioeconomic conditions, were given little emphasis at Khombole. Included among these topics are:

1. various kinds of latrines;
2. biological technical, social and economic factors in the choice of a latrine system for a given community;
3. cement, sand, and gravel mix ratios for various uses, such as construction of latrine slabs and well margins;
4. use of manual pumps in open wells and the construction of water storage cisterns; and
5. natural filtration of river water through slow sand filters and infiltration galleries.

Specific activities for improving technical skills should be incorporated into the training course:

- Summary handouts outlining the main design features, advantages, disadvantages, and choice criteria should be prepared for each type of technology recommended.
- A brief review session of main design features should be held before students go out to the field and construct a system. Once in the field the selection of a specific system for construction should be a decision left to the groups of trainees in consultation with villagers.
- Brief reviews of completed projects should be held with students stating their reasons for choosing particular systems.
- Simple demonstrations, such as sand filters, can be constructed at the training site, rather than in villages to maximize the use of time.

## Planning Skills

Program planning skills, particularly in the implementation of an environmental health program, need greater emphasis throughout the practical training. Topics covered should include the gathering of relevant baseline data, setting priorities, considering administrative needs for program implementation, preparing a multi-village work plan for building administrative support, and using data in a work plan.

## Skills in Conducting a Social Diagnosis

There are several steps in conducting what Steuart & Rull (WASH Technical Paper #3, March, 1981) term a "social diagnostic". These procedures help the sanitarian become familiar with his community and also increase the community's trust of the sanitation worker. They should be understood and practiced by all outreach personnel.

Subgroups within the larger community should be identified. These units may be characterized by "a common allegiance, language, sense of identity, extended kinship and discernable interpersonal networks." The village power structure should be identified--formal and informal leaders, decision makers, influential persons, and change agents--along with any factions (religious or lay) wielding power. Since traditional medical people often play a role in the community's perception of health, efforts should be made to identify any healers, diagnosticians, and diviners.

When a new program is introduced into a community, power functions often undergo a change. The sanitation workers should always be on the lookout for new individuals and groups to contribute to program development.

Through this understanding of village dynamics and by establishing and maintaining the trust of the villagers on a personal basis, the sanitation worker will be able to work more effectively with his community.

## Skills in Bringing About Social and Behavioral Change

It is important that outreach workers be able to motivate villagers if they are to bring about change in knowledge, attitude, and practice. The following skills will promote social and behavioral change:

- Guiding and facilitating group discussions to enhance group responsibility.
- Allowing a group within the community, rather than the sanitation agent, to become responsible for the program.

- Reconciling group opinion and mediating conflict.
- Working with other development agents to develop a broad health education program.
- Using appropriate ways to present information in as nondidactic a way as possible.

#### Skills in Developing a Support System and Acting as a Resource Link

These skills are essential if the TAI's activities are to have a lasting impact. Training should emphasize the importance of the following skills:

- Supporting the village committee until it is independent.
- Acting as a link to outside resources.
- Serving as a technical back-up resources in health and sanitation-related matters.
- Assuring continuity of surveillance and monitoring of water systems.

#### Skills in Evaluation

The sanitation worker should be able to understand the "nature and contribution of a program evaluation component, intrinsic to program operations and activities" and be able to use this evaluation "as a means for continuous program improvement and effectiveness" (Steuart and Rull). As far as possible, he should involve the village committee in the design and application of the evaluation procedures and use the evaluative process as a means for developing greater commitment to the overall program. The worker should become familiar with both process and outcome evaluation concepts and be able to react appropriately and with flexibility to signs of delay or other problems.

#### Training Skills

Because an important part of the TAIs' work involves training the village hygieniste-secouriste and interacting with the village health committee and the community sanitation agent (agent sanitaire communautaire), a presentation of basic training skills should be included in the technical sessions. These could include but not be limited to: conducting effective needs analyses, formulating educational objectives, designing appropriate learning activities, and understanding basic training methodologies.

## Chapter 4

### POST-TRAINING ACTIVITIES AND RECOMMENDATIONS

#### 4.1 Introduction

This chapter suggests ways to strengthen the project through improvements in the existing training program and recommends guidelines for future training of the TAIs so as to increase their effectiveness in the field. The first section discusses the need to reach a consensus on the specific job description of the TAI and suggests a procedure for accomplishing this task. The second section offers examples of the health and sanitation interventions most likely to be expected of a TAI. The chapter concludes with recommendations for improving the design of future training programs for the TAIs.

#### 4.2 Developing an Improved Job Description for the TAI

There is an immediate need for the project staff to develop an accurate and detailed job description for the TAIs, based on the duties and responsibilities of the position and the health interventions most likely to be expected of sanitation technicians. The official job description in Section 2.2.2 does not correspond to the operational duties and responsibilities of the position as described by many of the current TAIs.

This apparent contradiction was revealed by an informal survey conducted with six TAIs from the first group, which has been in the field for one year, and with six TAIs from the second group, which has been in the field for one month. When asked to define their duties, they offered the following responses:

- Educate the people
- Travel (itineraire)
- Formulate work plans
- Write reports
- Train the ASC (agent sanitaire communautaire)
- Practice curative medicine
- Case finding (depistage)
- Work on the areas of latrines, wells, stoves, sanitation and waste disposal
- Demonstrate various theories to the villagers

- Provide nutrition education
- Inspect meat and village markets
- Give talks to "animate" the villagers
- Supervise the health hut (case de sante)
- Help the midwife (matrone)
- Battle against disease carriers
- Perform administrative duties
- Help the villagers to analyze their needs
- Receive requests from the villagers
- Replace the chef de poste when he is absent

Before training activities are resumed, the differences between the TAI's conception of the position and the project team's conception of the position should be reconciled. Following this, the training needs can be derived from the various tasks required of the position.

The best way of arriving at an accurate and appropriate job description for the TAI is to assemble the principal parties involved in the project and to seek a consensus among them. Such a group might include (but not be limited to): Aido Lo, Sangone Mboup, superviseurs and chefs de poste, Dr. Mike White and relevant USAID personnel, ministry officials, Dr. Kane, and Madame N'Diaye, specialists in sanitation and training, and representatives of the TAIs. Representatives from the training institutions and the Ministry of Social Development, the Rural Water Service, and the Agricultural Extension Service involved in community organization might participate also.

During one of the TAIs' "study days" (journee d'etudes), a facilitator should help the TAIs agree on a description of their tasks. Then representatives of the TAIs should be chosen to attend this session with the understanding that field realities need to be reconciled with administrative priorities and that probably a compromise job description and task analysis will be the end result of the meeting. Before the meeting, all participants (facilitators, supervisors and TAIs) should undertake the following activities:

- Review existing documents.
- Define the primary health problems and those which are in the domain of the TAI.

- After defining health problems, set priorities and develop strategies.
- Define actions which might be useful in solving those health problems.
- Identify training already conducted.
- Follow a TAI in his work over a period of time.
- Look at the institutions currently involved in the training with an eye toward defining the kinds of capabilities necessary to fulfill any short-term training needs for TAIs.
- If the project is to be expanded or terminated, determine the kinds of regional needs that are created and decide if the institutions, as they now exist, are satisfying those needs.

#### 4.3 Feasible Sanitation Interventions

The program at Khombole and the general emphasis on curative health care in Senegal have been influential in shaping the current knowledge, skills, and performance characteristics of the TAIs. However, the nature of the sanitation problems that they are expected to solve should take precedence when developing the job description and task analyses for the TAIs.

This report focuses on rural sanitation problems as a part of rural primary health care interventions of the Sine-Saloum project. The village sanitation problems are presented in the form of feasible practical activities that can be implemented by the sanitation technician. Many of these problems can be turned into tasks and thus become objectives in a TAI workplan.

##### 4.3.1 Water-Related Interventions

The sanitation technician should take an inventory of all wells in the villages in his geographical area and undertake the following activities where inadequacies are discovered:

- Build protective headwalls 70 cm high around wells lacking these margins to prevent surface water pollution of the well water.
- Build sloping concrete aprons 1.5-2 m wide around the well to drain adequately all spill water.
- In villages with several wells, organize the

villagers to designate wells for watering animals and wells for human water needs.

- Organize the building of animal watering troughs 10-15 meters away from the well if special animal watering wells cannot be designated.
- Encourage villagers to stop using animals to haul water out of wells. Coras trailing in the dust behind an animal pollute the water when they to back into the well.
- Install several pulley systems over the well with permanent communal cords and using rubber or metal brackets. There is no way to control well contamination caused by individual pulleys, ropes, and buckets that are stored in dust or near livestock droppings.
- Organize villagers to deepen a well.
- Chlorinate a well starting either with the local bleach (eau de Javel) or with another bleaching powder of known strength.
- Estimate the amount of water available to the villagers and their livestock, in terms of liter per capita per day or the livestock equivalent by kind of livestock.
- Assist individuals in developing and maintaining private wells at a sanitary level consistent with their economic status.
- Organize the building of demonstration sand filters which should be kept in the health hut where medicines are prepared and distributed.
- Establish with the village chief, health committee and local administrator a well-publicized communal well-use policy.

#### 4.3.2 Excreta Disposal

The sanitation technician should be able to perform the following activities to improve excreta disposal in the villages in his domain:

- Organize the building of latrines at all public institutions where they are lacking. Priority should be given to schools, mosques, churches, and the village health hut.

- Organize the promotion of family latrines.
- Provide technical advice on latrine types that may overcome some of the traditional reluctance to allow children to use latrines--for example, the ventilated, improved pit latrine (VIP), where it is affordable, with child-sized adaptations where feasible.
- Determine the circumstances under which each of the following latrines are most suitable: traditional pit latrine, VIP, and pour flush latrine.
- Offer technical advice in the construction of each kind of latrine mentioned above.
- With the village chief, health committee, and the sous-prefet, establish a village policy on latrine construction, possession, and use.

#### 4.3.3 Garbage and Livestock Manure Management

The sanitary management of livestock and livestock manure, which is used extensively in agriculture, presents a serious problem in the project area. Numerous piles of horse manure could be seen in the project villages that were visited. The sanitation technician must be able to perform the following tasks:

- Organize the villagers in the digging of storage/composting pits in which household garbage and animal manure can be dumped.
- Offer advice on the process of composting, for example, the arrangement and frequency of turning and watering the compost pile to achieve a temperature (50-60 degrees C) lethal to pathogenic bacteria and cysts.
- Identify local wastes rich in nitrogen and carbon suitable for composting.
- Determine proper carbon-nitrogen ratios in the composting process.
- Time the composting activity, so as to maximize its fertilizer value.
- Collaborate with the agricultural extension agent on the sanitary management of this valuable agricultural resource.
- Set up a system for the proper collection, storage, and treatment of horse manure that is deposited

throughout the village (mixing it with straw, for example) if it is not used for composting.

- Set up a village system for the management of domestic livestock to prevent widespread roaming of animals.

#### 4.3.4 Housing Hygiene

Few villages are planned in regard to communal sanitation needs. Once houses are built without attention to health concerns there is little that can be done. As houses are demolished and reconstructed, the sanitation technician can offer advice on an individual basis on the following health aspects of housing:

- Ventilation needs
- Lighting Needs
- Protection against vermin (mice, rats, roaches, etc.)
- Structures for the clean storage of utensils and perishable and non perishable foods
- Suitable structures for holding drinking water pots
- Space and privacy needs

#### 4.3.5 Market Sanitation in Rural Markets

Market sanitation is focussed primarily on the hygienic handling and display of perishable or ready-to-be-consumed food. The sanitation technician should organize the villagers to work with local health administrative officers to establish simple enforceable sanitary rules and to promote the following standards:

- Require all sellers of ready-to-eat foods to cover these foods properly (e.g., fermented milk).
- If utensils are used in dispensing foods to buyers, require some washing facilities with enough rinsing water.
- In cooperation with the local livestock agent, insure that only healthy animals are slaughtered for meat.
- Require the construction of raised (70cm) permanent wooden or cement structures for the sale of meats.
- Prevent the slaughtering of animals and the sale of meats in the dust or on the ground.

#### 4.3.6 Disease Vector Control

Mosquitoes are the main disease vectors in the area and breed primarily in the rainy season. Some villages are subject to flooding or flood waters which remain which exacerbates the vector breeding problem. Sanitation technicians can organize villagers to perform the following inexpensive activities to reduce mosquito breeding areas:

- Fill up holes and ditches that retain flood water. (Mud blocks for housing construction are usually made out of these ditches.) If possible, modify and convert appropriately located ditches into manure/garbage storage pits.
- Obtain from local gas stations used crank case and motor oil which can be put in the water in permanent breeding sites and after prolonged flooding.

Such activities in the areas of water, excreta disposal, garbage and livestock manure management, housing hygiene, market sanitation, and disease vector control are environmental health interventions that could be effective in most project villages at this time. In certain villages, some of these interventions have already been introduced and are becoming part of routine communal activities. The above lists are not exhaustive and do not include activities that require capital and technological resources beyond the scope of the average project village. Sanitation technicians have no budgets and cannot undertake projects that the villages cannot finance.

It would be naive to assume that the interventions listed above can be implemented only through persuasive health education talks. Some sanitation technicians have developed with the local administrative officers legal sanctions of fines for individuals violating sanitary codes established by the village health committees. Persuasive health education discussions should remain the primary tool in bringing about change, but the legal sanctions or fines should not be forgotten as an important tool to encourage compliance. The importance of obtaining the support of the health committee in applying sanctions cannot be overemphasized.

A distinction should be made between individual and community sanitation obligations. Administrative sanctions and fines are best used as a last resort to enforce community sanitation obligations. Persuasive health education at individual, household, and community levels should remain the keystone to change in personal hygiene and sanitation.

#### 4.4 Future Training and Technical Activities

With regard to training and technical activities the following are recommended:

##### 4.4.1 Water Problems

The water problems in the project area are acute and constitute a severe limitation to potential improvements in community sanitation and individual hygiene. On one occasion when villagers were asked by a senior administrative officer what their priorities were, they presented their concerns in the following terms:

Priority number one: water

Priority number two: water

priority number three: water

It would further the goals of the Water and Sanitation Decade if some project funds were used to improve the water resources in particularly disadvantaged villages. Sanitation technicians should be encouraged to identify especially needy villages for assistance. Funds could be used for well deepening where safe ground water already exists or to buy cement and pay traditional and resident well diggers who are trained to descend 20 and more meters into these wells. Sanitation agents could coordinate these mini-projects directly with the project office in Kaolack.

##### 4.4.2 Technical Support

The sanitation technicians currently lack technical support and supervision in their nonmedical activities. One way to avoid the technical isolation and the resulting deterioration of knowledge and skills is to have periodic refresher seminars for the sanitation technicians. A two-week seminar every six months would help to keep morale high, offer a forum for the exchange of ideas, and allow for peer and self-evaluation.

Successful, practical interventions would constitute good practical training materials for new graduates from Khombole. The following activities would enhance the knowledge and skills of the TAIs:

- Study a specific sanitation or health topic with a specialist.
- Carry out in-depth work in the Wolof language, especially as it is spoken in the villages.

- Gain experience in creating and using visual aids (puppets, flannelboards, posters, and drawings).

If possible, some Khombole staff should be invited to attend such sessions and participate in the discussions. Such exposure may motivate the Khombole staff to modify some aspects of their curriculum.

Ideally, if funds are sufficient, a senior sanitation technician should provide technical assistance to and supervise the seminars. This would insure some continuity between the refresher seminars and would offer support to the TAIs in the field.

The activities recommended in Sections 4.4.3 through 4.4.7 would enhance TAI job performance greatly.

#### 4.4.3 Creation of a Manual

A manual written by the TAIs would be useful as a training tool for future seminars.

#### 4.4.4 Documents

In addition to the various documents, booklets, and pamphlets distributed to the TAIs, it is recommended that each agent receive a copy of Manual for Sanitary Technicians (Manual du Technicien Sanitaire) published by WHO and available from WHO headquarters in Geneva.

#### 4.4.5 Establishment of Campaigns Based on a Single Health Theme

TAIs would collectively select a health theme--the importance of latrines in the prevention of hookworm infection, for example. Pre-campaign statistics on hookworm would be shared among the TAIs in selected villages and among the TAIs and the villagers. The TAIs and villagers would develop a time frame for an all-out effort and elicit help from local officials. After the campaign, post-effort statistics would be shared and the results tabulated.

#### 4.4.6 Establishment of Programs and Methods for Motivating TAIs

Deserving and motivated TAIs should be sent abroad (for example to Lome or Yaounde) to pursue further studies. Paid trips should be provided to other primary health care projects in Senegal and abroad. Highly qualified TAIs should be used to help teach, organize, and counsel other TAIs. TAIs should be

invited to accompany project officials to conferences (as grassroots representatives) where pertinent issues are being discussed. The possibilities of extending higher education credits to TAIs based on their work in the field and having special qualifying examination (concours) set up based on knowledge gained in the field should be explored. Such an arrangement, might help to alleviate some of the "dead-end" aspects of a TAIs career.

#### 4.4.7 Cross-Fertilization

The TAIs should be encouraged to visit each other and should have access to agents working in other development programs in the same region. Since most of the processes used in "animation" (extension of community work) are the same (only the content differs), it would be helpful for the TAIs to see how other agents operate. Cross-fertilization efforts would include visits to SODEVA (Regional Development Agency for the Groundnut Basin), Ministère de la Promotion Humaine (Ministry of Social Development), CERER, and Maison Familiale (Family Welfare Program).

## Chapter 5

### CONCLUSION

During the six weeks in Senegal the consultants attempted to make substantive contributions to the project. The original purpose of the training program was to strengthen the TAIs effectiveness in the field, thereby reinforcing the primary health care interventions of the Sine-Saloum project.

With some modifications to the original scope of work the consultants tried to respond to the needs of the program--gathering pre-training materials and information, helping to design and implement the training program, analyzing and assessing the program, and offering suggestions as to how it might be improved from a technical and educational standpoint. The consultants developed a list of recommendations for future activities including the following three points for immediate attention:

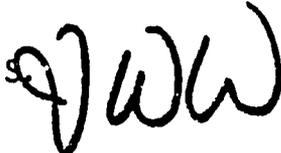
- Clearly define the TAI's job and specific tasks.
- Provide the project with technical assistance.
- Address the critical water problem in the Sine-Saloum region.

In this report, the consultants have offered suggestions for helping the project begin the job identification and job enhancement processes and a strategy for helping the TAIs deal with the water problem.

APPENDIX A.

WATER AND SANITATION FOR HEALTH (WASH) PROJECT  
ORDER OF TECHNICAL DIRECTION NUMBER 78  
January 19, 1982

TO: Dennis Warner, Ph.D., P.E.  
WASH Contract Project Director

FROM: Victor W.R. Wehman, Jr., P.E., R.S.   
A.I.D. WASH Project Manager  
A.I.D./S&T/HEA/CWSS

SUBJECT: Provision of Technical Assistance Under WASH Project Scope of Work  
for U.S. A.I.D./Senegal

REF: A) Dakar 192, dated January 9, 1982  
B) Scope of Work

1. WASH contractor requested to provide technical assistance to U.S. A.I.D./Dakar as per reference A (paragraphs 3A through E) and reference B, Scope of Work.
2. WASH contractor/subcontractor/consultants authorized to expend up to seventy-five (75) person days of effort over a four (4) month period to accomplish this technical assistance effort.
3. Contractor authorized up to seventy (70) person days of international and/or domestic per diem to accomplish this effort.
4. Contractor to coordinate with AFR/DR/HN (Dr. James Shepperd), AFR Senegal Desk Officer, AFR/DR/ENGR (Jack Snead) and U.S. A.I.D. Project Officer. Copies of this OTD as well as progress and ETA information should be provided as requested by S&T/HEA or Africa Bureau.
5. Effort is to be an intensive one involving both assessment and operational training or operational development of training materials. Contractor to produce a task analyses and a set of performance objectives and suggested activities for each objective on the knowledge and skill needed by trainees to carry out each task under on-the-job conditions in water and sanitation, i.e., tasks.
6. Contractor authorized to provide up to two (2) international round trips from consultants home base through Washington, D.C. for briefing to Dakar, Senegal and return to home base through Washington, D.C. for debriefing and final report preparation.
7. Contractor authorized local travel within Senegal to accomplish technical assistance request. Contractor authorized to rent car(s), or conveyances as appropriate and necessary to accomplish technical assistance. Mission is encouraged to support local travel requirements of team if appropriate and available. Contractor authorized to utilize Mission vehicles if Mission provides these resources.
8. Contractor authorized to obtain secretarial, graphics or reproduction services in Senegal or WASH Coordination and Information Center in U.S. as

necessary to accomplish tasks. These services are in addition to the level of effort specified in paragraphs two and three above, but NTE \$2,800 without approval of A.I.D. WASH Project Manager.

9. Contractor is authorized to supervise installation of training devices and train locals in installation, operation, maintenance and hygenic features/procedures of devices. Training devices cost and installation to be paid for by U.S. A.I.D./Senegal Rural Health Project (685-0210).

10. WASH contractor will adhere to normal established administrative and financial controls as established for WASH mechanism in WASH contract.

11. WASH contractor should definitely be prepared to administratively or technically backstop field consultants and subcontractors.

12. Contractor to provide final draft report on scope of work to Mission before leaving Mission insuring that Mission and host government organizations comments and concerns are properly reflected in the draft final document. Final report due within thirty (30) days of receipt of comments from Mission and host government.

13. A debriefing should be held within thirty (30) days of return to the U.S.

14. Mission should be contacted immediately and technical assistance initiated before or about January 26, 1982 upon coordination with Mission. Insure travel authorization obtained.

15. Appreciate your prompt attention to this matter. Good luck.

ORIGINAL  
COPY

# Department of State

TELEGRAM

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ACTION AID-35

A) PREVIOUS LONG TERM WORK EXPERIENCE IN FRANCOPHONIC WEST AFRICA.

ACTION OFFICE SINE-01

INFO AFFW-04 AFCH-03 AFDR-06 AAST-01 AFDA-01 KELO-01 HAST-01  
DO-01 AFPH-01 /020 42 39

B) PREVIOUS EXLARIENCE TRAINING VILLAGE LEVEL HEALTH WORKERS.

INFO OCT-00 AF-10 AHAD-01 /046 W

C) FSI 3/3 FRENCH SPEAKING LEVEL.

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O 091050Z JAN 82  
FM AMEMBASSY DAKAR  
TO SECSTATE WASHDC IMMEDIATE 2228  
INFO AMEMBASSY ABIDJAN  
AMEMBASSY BAHAKO

6. ALL EXPENSES RELATED TO THE CONSULTANTS WORK MUST BE BORNE BY THE WASH PROJECT. BRAY

UNCLAS DAKAR 00192

AIDAC

SECSTATE FOR ST/HEALTH/VICTOR WEHMAN, AFR/DK/HEALTH  
ABIDJAN FOR REDSO  
BAHAKO FOR SDPT

E.O. 12065: N/A

SUBJECT: SENEGAL RURAL HEALTH (635-0210) - TRAINING OF SANITATION AGENTS - THE WASH PROJECT.

1. THE SUBJECT PROJECT WILL BEGIN THE PROJECT ORIENTED TRAINING OF THE SECOND GROUP OF SANITATION AGENTS 8 FEBRUARY. THESE AGENTS HAVE ALREADY RECEIVED TWO YEARS OF ACADEMIC TRAINING AT THE KHOMBOLE SCHOOL. THIS TRAINING WILL BE VERY PRACTICAL - HOW ONE CONSTRUCTS LATRINES, PROTECTS WELLS, CREATES COMPOSTING SITES, BUILDS SAFE WOOD BURNING STOVES ETC. THE TRAINING PROGRAM WILL LIKEWISE STRESS THE SANITARIAN'S RESPONSIBILITIES AS A PLANNER, TRAINER AND SUPERVISOR OF THE VILLAGE LEVEL HYGIENIST/SECOURISTE WHO IS TRAINED AS PART OF THE PROJECT. FYI - THE SANITARIAN WORKS HAND IN HAND WITH THE DISPENSARY NURSE AS A SUPERVISOR OF THE VILLAGE HEALTH TEAM.

2. USAID/SENEGAL REQUESTS ST/HEALTH TO ASK THE WASH GROUP TO PROVIDE ONE OR TWO CONSULTANTS KNOWLEDGEABLE ABOUT SANITATION ISSUES, AND THE TRAINING OF VILLAGE LEVEL HEALTH WORKERS WHO CAN ACCOMPLISH THE SCOPE OF WORK LISTED BELOW.

3. SCOPE OF WORK

A) ASSIST THE PROJECT TRAINING TEAM PREPARE THIS YEAR'S PRACTICAL TRAINING PROGRAM.  
B) PARTICIPATE, AS A TRAINER, IN THE PROGRAM.

C) ANALYZE THE STRENGTHS AND WEAKNESSES OF THE PROJECT TRAINING TEAM'S APPROACH TO THIS TYPE OF TRAINING PROGRAM AND RECOMMEND CHANGES TO BE MADE PRIOR TO NEXT SUCH TRAINING CYCLE.

D) OFFER ADVICE ON THE USE OF MATERIALS FOR SUCH TRAINING.

E) AFTER STUDYING THIS INITIAL TRAINING PROGRAM AND THE SANITARIAN'S RESPONSIBILITIES, THE CONSULTANT SHOULD MAKE VERY SPECIFIC RECOMMENDATIONS AS TO THE TYPE OF ONGOING SUPERVISION AND PERIODIC RECYCLAGE THAT WILL BE NECESSARY.

4. LEVEL OF EFFORT - ONE OR TWO CONSULTANTS FOR THREE TO FOUR WEEKS TO BEGIN ASAP AFTER 26 JANUARY.

5. QUALIFICATIONS

*Received ST/Health (Wehman) 1/12/82*  
*Received to WASH 4/12/82*

**BEST AVAILABLE DOCUMENT**

UNCLASSIFIED

*RAY  
ISE 1/9*

*WASH  
D. R. [unclear]*

SCOPE OF WORK  
OTD 78  
Senegal Rural Health Training of Sanitation Agents

1. Either prior to or immediately after their arrival, the WASH Team and A.I.D./Dakar will assemble as much as possible of the following information:
  - a. Trainee background.
    - 1) Number of trainees. - 20
    - 2) Work experience of each trainee as a sanitation agent. - 1 mo.
    - 3) Work experience of each trainee in practical skills (i.e., carpentry, mason, plumber, mechanic, etc.). none
    - 4) Anticipated assignment of each trainee (location, duties, type of personnel to be supervised, programs to be managed, decision making responsibilities, etc.). TAI (see job description + task analysis)
    - 5) Academic background of each trainee. 2 years Khombole after BEPC?
  - b. Copies of curricula, course descriptions, lesson plans, laboratory experiments, field trips which describe the two-year program just completed by trainees at the Khombole School. } ✓
2. ~~The WASH Team and A.I.D./Dakar, if appropriate, will attempt to assemble at least four persons who are considered outstanding sanitation agents. That is they will have demonstrated over a period of at least two years the knowledge and skills required of a sanitary agent. If possible, these persons should have also demonstrated their ability as trainers. These persons should be free, if possible, to work full-time with the WASH Team in collecting data, developing and implementing the training program.~~
3. The Wash Team and A.I.D./Dakar, if possible, will arrange for construction materials, tools, transportation and sites for trainees to construct each of the types of latrines, composting pits, wells, spring captations, etc., that will be included in the training program. The WASH Team will not discuss or construct safe wood burning stoves. OK
4. Prior to arrival, the WASH Team will collect information and training materials in French or English that will assist with the development and implementation of the effort. Possible sources are:
  - a. Carlo Riefeldt/World Bank.
  - b. Leo Roy/WHO/Brazzaville.
  - c. Alex Redekopp/WHO/Geneva.
  - d. Joe Haratani/NE/TECH.
  - e. Jim Bell/Peace Corps.
  - f. Mary Morgan/IRW.
  - g. ENDA/Dakar.
5. Upon arrival in Senegal, depending upon available time and resources, team will carry out the following activities with the four sanitation agents assigned to them, plus other personnel made available for the effort:

- a. Task analysis of all activities sanitarians are responsible for — <sup>OK</sup> (including planning, training, reporting, motivating, supervising, and collaborating with health personnel).
  - b. Develop performance objectives for the tasks identified above, including the conditions under which the action must be performed and the standard to which it must be performed. <sup>?</sup>
  - c. Suggest training activities to accomplish these objectives. } *recyclage*
  - d. Suggest evaluation techniques to measure trainee performance. }
6. For the practical training course, using a subset of a, b, c and d above as background:
- a. Develop a curriculum, lesson plan, training activities and make assignments for who is responsible for what during training. } ✓
  - b. Develop logistics plans for transport of materials, tools, and trainees to work sites for practical work experience. }
  - c. Assess local training staff as to their performance as trainers, and as time permits, assist in improving their skills as trainers. }
7. During training program, WASH Team will:
- a. Assist with training of trainees. ✓
  - b. Assist with upgrading knowledge and skills of trainers. ✓
  - c. Evaluate existing two-year program and suggest ways to incorporate practice into the curricula, i.e., to find ways to include the material in this special effort into the two-year program. ✓
8. Upon conclusion of the training, the WASH Team will prepare a report. A draft should be left with the Mission before departure. Within thirty (30) days of receipt of comments from the Mission and GOS, the report should be finalized. The report should contain, but not be limited to:
- a. Copy of existing curricula for sanitation agents. —
  - b. Selection procedure for candidates for program. —
  - c. Task analysis for sanitation agents. —
  - d. Performance objectives, suggested sample training activities, and evaluation techniques for these tasks. —
  - e. Training program as implemented. —

- f. Analysis of training program implemented. —
- g. Analysis of existing two-year curriculum and suggested changes. } Secondary
- h. Recommendations for future activities for preparing sanitation agents. - yes

## APPENDIX B

### Itinerary - Felix Awantang

Sat. January 23	:	Depart Monrovia 12:00 a.m.
Sat. January 23	:	Arrive Dakar 11:00 p.m.
Tues. January 26	:	Depart for Kaolack
Tues. February 2	:	Depart Kaolack for Dakar
Sun. Februray 7	:	Return to Kaolack
Sat. February 20	:	Depart Kaolack for Dakar
Tues. February 23	:	Trip to Khombole
Tues. March 2	:	Leave Dakar for Monrovia

### Itinerary - Thomas Leonhardt

Sat. January 23	:	Depart DCA for NYC 4 p.m./Dakar
Sun. January 24	:	Arrive Dakar 10 p.m.
Tues. January 26	:	Depart for Kaolack
Tues. February 2	:	Depart for Dakar
Sun. February 7	:	Return to Kaolack
Sat. February 20	:	Depart Kaolack for Dakar
Tues. February 23	:	Trip to Khombole
Fri. March 5	:	Depart Dakar for DCA 1:50 a.m.
Fri. March 5	:	Arrive McLean 11 a.m.

(Consultancy for WASH completed Sunday, Februray 28, 1982)

## APPENDIX C

### Officials Visited

#### USAID

Dr. Michael White, USAID Health Officer  
Mrs. Mary Diop, USAID Health Office Assistant  
Ms. Dawn Liberi, IDI

#### PROJECT STAFF, KAOLACK

Dr. Ismalia Kane, Regional Medical Officer  
Mrs. Aida Lo, Project Coordinator  
Mr. Sangone Mboup, Training and Animation Coordinator  
Mr. Peter Halpert, Project Administrator  
Mrs. Diop, Training Assistant, supervising midwife  
Mrs. Amsatou N'Diaye, Training Assistant and supervising nurse  
Mr. Cisse, Training Supervisor  
Mr. Fai, Training Supervisor  
Mr. Beram Gathi N'Diaye, nioro department health supervisor  
MR. Felix Badji, Sanitation technician at tawa  
MR. Mbaye Ka, Sanitation technician at koutal  
MR. Mademba Ssne, Sanitation technician at latmingue  
Mr. Abdou Karim Gueye, Sanitation technician at ndoffane

#### MINISTRY OF HEALTH

Dr. Ba, Director of Training and Planning  
Dr. Toure, Director of Public Health

#### KHOMBOLE SCHOOL OF SANITATION

Mr. Alioune B. Thiam, Administrator

## APPENDIX D

### Immediate Feedback to Program Coordinators

Since most of the training design had been completed before the consultants' arrival, there was not a great deal of opportunity for input before or during the training program itself. Nor was there a staff evaluation of the training after its completion. Therefore it was felt that some sort of feedback was necessary for the program coordinators. It was decided that this feedback would take the form of a preliminary rough draft for a training design based closely on the program which had just been completed, thus allowing the coordinators to see where things might have been done differently. This design was not intended to be a full-fledged training design, nor should it be used as it is presently drawn-up. It should serve as a model for other training programs when used with the specific recommendations and suggestions found in this report. What follows is a translation of the model training for practical skills for TAIs left in Kaolack with Aida Lo and Sangone Mboup.

Specific session objectives were not included with the suggestions for procedure and rationale. With a training such as this the staff needs to decide beforehand whether or not to use behavioral objectives and then set about to evolve their own set of objectives for each session.

### Model Training for Practical Skills--TAIs

The training has two primary objectives:

- 1) The acquisition of simple sanitation techniques for use in a rural environment.
- 2) To help the TAIs develop an "agent of change spirit" in order to help the villagers take an active role in improving their environment.

The training program presented is based on the following assumptions:

- 1) The TAIs will establish a sanitation activity work plan with the villagers during the training.
- 2) The initial visits to the villages were made before the training started.
- 3) There was a participants' needs analysis conducted.

- 4) The training staff was in basic agreement on the two goals.
- 5) All logistics questions were worked out before the beginning of the program.

Things to remember when planning any training program:

- 1) The more a training program flows and holds together, the more likely it will achieve its goals.
- 2) To maintain cohesion and flow the training staff should:
  - a) Remember the rule of parallel systems "The setting up and the carrying out of a training programme must be done in the same way that the trainees will set up and carry out their program in the field."
  - b) Be sure each objective doesn't contradict the general training philosophy.
  - c) Be sure that the methods you will use to evaluate the trainees and the objectives you set for each activity are compatible.

If the training team sets up behavioral objectives for the training activities, it should be ready to evaluate the trainees using objective criteria. If objectives are set up based on what you hope to achieve, you can not ask trainees to submit to an objective evaluation at the conclusion of the training.

- d) Keep in mind the rules for adult learning as much as possible.
- e) Remain flexible.
- f) Use a wide variety of methods.
- g) Remember the importance of logistics for a smooth running training.
- h) Follow the steps for setting up a training program
  - needs analysis
  - setting up of a training philosophy and some primary objectives,
  - planning and the secondary (educational) objectives to meet these objectives,
  - carry out the training plan,
  - evaluation (can be done at any stage),
  - follow-up,
  - re-analyzes of needs for future trainings.

Suggested Schedule of Activities  
First Week

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
<ol style="list-style-type: none"> <li>1. Welcome &amp; introduction to the training</li> <li>2. Presentation of staff and participants</li> <li>3. Brainstorm: Expectations for the Training Discussion: Two Major Goals</li> <li>4. Explanation of the program</li> <li>5. Formation of working groups</li> <li>6. Small group work</li> <li>7. Administrative details</li> <li>8. Village visit</li> </ol>	<ol style="list-style-type: none"> <li>1. Small group Work</li> <li>2. Large group Work</li> <li>3. Discussion &amp; development "The 6 Steps"</li> <li>4. Village visit</li> </ol>	<p>Practical Work in the Villages</p>			<ol style="list-style-type: none"> <li>1. Review of the week</li> <li>2. Fiches Techniques</li> </ol>
				<p>Remain in the village for Ban-ak-suuf</p>	

Suggested Schedule of Activities  
Second Week

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
<p>1. Large &amp; small group work</p> <p>-----o-----</p> <p>2. Ban-ak-suuf in the village</p>	<p>Ban-ak-suuf</p> <p>(Also placement of the squatting slab; finishing touches on the latrine)</p>	<p>Ban-ak-suuf</p>	<p>1. Fiche Technique for the ban-ak-suuf</p> <p>2. Disinfecting a well (or other technical talks)</p> <p>-----o-----</p> <p>3. Video</p>	<p>1. Video</p> <p>-----o-----</p> <p>2. Last village visit</p>	<p>1. Review of the week</p> <p>2. Evaluation of the program</p> <p>3. Evaluation (testing of the trainees)</p> <p>4. Recommendations</p> <p>5. Closing</p>

Training Program for TAIs  
February 8-20, 1982 Week I - Calendar

Monday 2/8	Tuesday 2/9	Wednesday 2/10	Thursday 2/11	Friday 2/12	Saturday 2/13
<p><u>a.m.</u></p> <p>Introduction to the training and presentation of the objectives</p> <p>Review of the week's program</p> <p>Presentation of new personnel</p> <p>Basic information on Ban-ak-suuf</p> <p>Identifying the needs into working groups</p> <p>Administrative &amp; logistic questions</p> <p>-----o-----</p> <p><u>p.m.</u></p> <p>Village visit with Ban-ak-suuf Technicians</p>	<p>Practicum: Ban-ak-suuf</p>	<p>Practicum: Ban-ak-suuf</p>	<p>Preparation of the "fiche technique" for BAS</p> <p>Report-out</p> <p>Expose: the 6 steps in conducting a sanitation activity</p> <p>-----o-----</p> <p><u>p.m.</u></p> <p>Discussion: Details &amp; Elaboration of the plan (activity)</p> <p>Group work: Plug in one of the major themes (latrines, wells, stoves, waste) to the above plan.</p>	<p>Village visit: Preparation of the villages for "Dispose of Waste" Activity</p> <p>-----o-----</p> <p><u>p.m.</u></p> <p>Technical Presentation by F. Awantang: "How to disinfect a well with bleach &amp; powdered chlorine."</p> <p>Report out from Thursday afternoon</p>	<p>Review of the week</p> <p>Discussion Positive &amp; Negative happenings during the week. How to correct the negative.</p> <p>-----o-----</p>

Training Program for TAIs  
February 8-20, 1982 Week II - Calendar

Monday 2/15	Tuesday 2/16	Wednesday 2/17	Thursday 2/18	Friday 2/19	Saturday 2/20
<p>Video taping of selected TAI's delivering talks</p> <p>Feedback</p> <p>-----o-----</p> <p>Village visit</p> <p>Begin work on the sanitation activities with the villagers</p>	<p>Village</p> <p>Wells Latrines</p> <p>Pouring of squatting plates and wells casings</p> <p style="text-align: center;">↓</p>	<p>Village</p> <p style="text-align: center;">↓</p>	<p>Village</p> <p style="text-align: center;">↓</p>	<p>Evaluation:</p> <p>Each group is to draw up a detailed plan for carrying out a sanitation activity (wells) (latrines) (ovens) (waste removal)</p> <p>-----o-----</p>	<p>Review of the week</p> <p>Suggestions for improving the training</p> <p>Recommendations for further activities</p> <p>Closing ceremony</p> <p>-----o-----</p>

## Daily Training Program for TAIs

### February 8

#### Morning

- Introduction the training (Sangone Mboup)
- Accent placed on practical, "hands on" aspect
- Discussion of the two main objectives
  - 1) To acquire simple sanitation techniques adapted to the rural environment
  - 2) To acquire the spirit of a change agent in order to induce the population to actively participate in the improvement of their environment.
- Discussion of the subject "What can constitute obstacles to your work as a TAI?" Discussion focused on ways of thinking that can impede the TAI and his work with the villagers.
- Pep talk about the role of the TAI by Sangone Mboup
- Review of the 2 objectives to underscore the important words by Aida Lo.
- Pep talk about the project by Aido Lo
- Distribution of the weekly schedule and explanation of how the 2 weeks will go. Explanation of how to repay villagers for lunch.
- Basic concepts involved in the construction of a Ban-ak-suuf: Presentation by a TAI.  
Discussion: How to talk about the advantages and disadvantages of the BAS with the villagers.
- The TAIs were divided into work groups
- Logistics and administrative details

#### Afternoon

- Three CERER agents were introduced to the group
- Village visit: Did the tests, assembled materials, etc.

### February 9 and 10

- Each group worked on BAS with a CERER agent according to the plan established with the villagers and the group.

### February 11

- Each village group prepared a fiche technique for the BAS
- Report-out
- Expose: "How to make a fiche technique (in general) by Saugone
- Discussion; "What are the 6 steps necessary to successful conduct a sanitation activity?" (Saugone)
- Group discussion: "What are the different parts for each of the 6 steps?"
- Small group work: For each of the 4 themes (wells, latrines, stoves and waste disposal [composting]) what are the subject-specific details necessary for the implementation of that theme in the 6 step schema?

### February 12

#### Morning

- Village visit: Begin the animation process for waste disposal

#### Afternoon

- Felix "How to desinfect a polluted well."
- Report out from yesterday's small group task.

### February 13

#### Morning only

- Review of the week (small group work) "After having drawn up an activity plan (for stoves) and working in the village for 3 days, what are the positive and negative aspects of your achievements?"
- Report out
- Discussion "How to circumvent negative factors and play up positive experiences when working in the village."

### February 15

#### Morning

- Introduction to videotaping
- Volunteers give talks while being taped
- Playback and feedback

Afternoon

- Village visit: To start work based on Friday's visit (waste disposal and composting)

February 16, 17, 18

Morning and afternoon

- Village visits: Work on wells and latrines according to each groups plans. Each group was accompanied by an agent from the Service Hydraulique.

February 19

Morning

- Evaluation: Each working group was to design a sanitation activity from beginning to end based on the 6 steps.

Afternoon

- Village visit: Final visit to wind up work; thank the villagers; discuss maintenance needs for stoves, wells, latrines, etc.

February 20

Morning

- Videotape replay of an animation session from one of the villages
- Feedback
- Evaluation of the stage (negative and positive aspects) by the TAIs and staff.

## Monday First Day, First Week

1. Welcome and introduction to the training given by the trainers.  
Objective: Inform the trainees (Ts) about the project's history, their role as TAls etc.
2. Introduction of the personnel and Ts. One of the head trainers should have the other staff members introduce themselves if this has not already been done. The Ts should also introduce themselves and give some background information.
3. Brainstorming of training expectations and discussion of the training goals.

Objective:

### Procedure:

The trainer should ask the Ts to brainstorm their expectations about the program. These are recorded.

The trainer should then post and discuss the staff's goals for the program. Discussion should follow. Unrealistic expectations should be dealt with here.

### Rationale:

It is very important to allow Ts the chance to have input into their training, especially if a needs analysis has not been done. Staff and trainees should be in general agreement about the overall direction the training will take.

4. Explanation of the two weeks

### Procedure:

After distributing the schedule of events, the trainer should go over the activities day by day. Let it be known that there is a certain amount of flexibility in the program.

### Rationale:

One of the basic tenets of adult education is that adult trainees prefer to know where they are going. They also like to have an idea about the course content and what will be asked of them.

5. Dividing the Ts into groups

Procedure:

If for logistical or other concerns, the group has been divided prior to the arrival of the trainees, the lists should be posted. If not, the trainers should try to randomly group the Ts.

6. Small groups activity:

Procedure:

With the new working groups, ask each to brainstorm the topic: "What kinds of attitudes and/or situations can block the work of a TAI?"

Have each group designate a reporter. Allow 15-20 minutes.

After the allowed time, ask the groups to come up with at least one solution to each obstacle (15 to 20 minutes).

If time allows, ask each reporter to report out his group's ideas. If not, have notes posted for discussion later.

Rationale:

It is important to groups who are going to work together to have the opportunity to get acquainted. This is easily accomplished by assigning them to work on a "neutral" task.

7. Administrative details.

Lunch

8. Village visit

Procedure:

(The villagers have been forewarned of the arrival of the Ts). Discussion before departure: "How to go about discovering a village's priorities."

Tuesday, Second Day, First Week

1. Small Group Work

Using the information collected in the village

Procedure:

Set up a plan for sanitation activities using the following model

Needs	Problems	Resources	Activities	Observations
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2. Large Group Work

Each team will present its work to the large group for discussion.

3. Large Group Work

"How to conduct a sanitation activity: the 6 steps"

Procedure:

Using a combination of group discussion and lecture, list and then elaborate the 6 steps for conducting a sanitation activity.

- Information animation
- Available resources
- Organizing the villagers
- Carrying out the activity
- Evaluation
- Follow-up

Optional activities (suggestions):

- After elaborating each step, ask the trainees to become more specific, i.e. tie the general plan to one of the "themes" (stoves, wells, latrines or composting).
- After elaborating each step, ask the trainees to estimate how long it will take to accomplish each part of their plan--a time table.

#### 4. Village Visit

This is the outing to help the villager focus their energies on their first priority activity. The trainees should gather materials, help decide where to place latrines, etc. (Steps 2 and 3).

Note: This part of the training is very important. It is during this phase that the TAI will develop and follow a plan of action

##### Optional activity

- Help the Ts develop behavioral objectives for their work.

Wednesday, Thursday, Friday First Week

##### Practical Work in the Villages

It was noted during the week that the TAIs seemed to have a good grasp of the necessary technical details to build latrines, well casings, etc. perhaps it would be helpful to provide them with reminders before going out or with a short discussion session about construction details (see Felix's recommendations). Sending out technical agents to the villages with the TAIs is a good idea. However, attention needs to be paid that they don't do the work of the TAIs.

On Friday afternoon, before leaving the village, the villagers should be reassembled and thanked for their participation. Preparations can be made for working on the Ban-ak-suuf.

Saturday, Day Six, First Week

1. Review of the weeks activities.
2. Preparation (in large or small groups) of fiches techniques for each sanitation activity (latrines, wells, or composting) to serve as a technical review and to tie up the week's activities.

Monday, Day One, Second Week

1. Small Group Work

"After having seen the realities involved in field work, revise your work plan"

Rationale:

After any activity, it is important for the TAIs to take stock of what happened; how did, what was planned actually turn out? This process of self-evaluation is a necessary part of any TAI's work in the field.

Option:

The trainer may want to post the revised plans for discussion.

2. Large Group Work

Ask each team to share with the large group an experience it had while working in the field.

Discussion.

3. Village Visit for Ban-ak-suuf

Tests, foundation, gathering materials, preparing the villagers, etc.

Tuesday and Wednesday, Second Week

Practicum: Ban-ak-suuf

It will be during this time that working group members can participate in the construction of stoves.

Also, finishing off any tasks from last week such as placing the squatting slab, casings, etc.

Thursday, Day Four, Second Week

1. In class, preparation of the fiche technique for the BAS.

2. Technical Courses

According to some of the expectations that the Ts' brainstormed the week before, the staff can arrange to invite guest speakers to the session to give further technical information.

3. Videotaping Talks

With the VTR, individual TAIs were filmed giving talks. They were given feedback on their delivery styles. (Efforts must be made to keep the commentary objective).

Friday, Day Five, Second Week

1. Continue working with VTR

2. Last Village Visit

Assemble to thank the villagers. Final chance for talks, etc.

Saturday, Day Six, Second Week

1. Review of the week
2. Evaluation of the training by the participants
3. Optional: Evaluation (testing) of the participants
4. Recommendations for future trainings
5. Closing

Go back over the expectations generated at the beginning. Take a look again at the goals. Discussion "Where they met?"

REPUBLIQUE DU SENEGAL

MINISTERE DE LA SANTE PUBLIQUE

PROJET DE LOI FIXANT LE STATUT  
DU PERSONNEL DU SERVICE NATIONAL  
DE L'HYGIENE.

EXPOSE des MOTIFS

Le plan de restructuration du Ministère de la Santé Publique, mis en oeuvre par le Gouvernement de la République du Sénégal, entraîne des modifications, voire des réformes au niveau des services et de leur fonctionnement.

C'est ainsi que le secteur de l'hygiène qui constitue un des aspects essentiels de la politique du Gouvernement en matière de Santé publique a fait l'objet d'une nouvelle réorganisation en fonction des missions qui lui sont dévolues à savoir :

- 1°/- veiller à la salubrité publique (urbaine et rurale) et à l'hygiène collective ;
- 2°/- assurer la prophylaxie des épidémies et des endémies ;
- 3°/- créer et maintenir un environnement propice à une hygiène de vie correcte ;
- 4°/- appliquer correctement la réglementation en vigueur en matière d'hygiène et d'assainissement.

.../...

Une analyse comparative des structures et du fonctionnement du service d'hygiène avant et après l'Indépendance a permis de conclure la nécessité de réorganiser celui-ci et de le doter d'un personnel à statut militarisé, à l'instar des services de Police et de Douane.

La militarisation du cadre s'explique par diverses raisons :

1°/- Elle permet la revalorisation du cadre qui, en comparaison avec ce qu'il était avant 1960, s'est déprécié au fil des ans et ne répond plus aux objectifs à lui assignés.

2°/- Elle donne au service des moyens d'atteindre une meilleure efficacité surtout en matière de répression des infractions de l'hygiène; partant elle assurera un meilleur contrôle du respect des dispositions législatives et réglementaires.

La militarisation répond également au souci de voir le service fonctionner aussi bien, sinon mieux qu'avant l'Indépendance, avec des moyens suffisants et une application rigoureuse de la réglementation en vigueur-

C'est donc, compte tenu de tout ce qui précède, qu'il est préconisé la création d'un corps des agents de l'hygiène, dont le statut fait l'objet du présent projet de loi.

PROJET de loi fixant le statut du personnel  
du Service national de l'Hygiène.

L'Assemblée nationale a délibéré et adopté en sa séance  
du ..... la loi dont la teneur suit :

TITRE PREMIER

Dispositions générales

Article premier - Le personnel du Service national de l'Hygiène est chargé, seul ou conjointement avec d'autres corps, d'assurer :

- le respect et l'exécution de la réglementation en matière d'hygiène dans les agglomérations urbaines et en zone rurale;
- la recherche et la constatation des infractions en matière d'hygiène;
- la surveillance aux frontières et le contrôle de la circulation des personnes en matière d'hygiène sanitaire ;
- l'assistance aux autorités administratives dans le domaine de l'hygiène et de la salubrité publique.

Article 2 - Le personnel du Service national de l'Hygiène est réparti en cinq corps hiérarchisés :

- Le corps des officiers de l'hygiène ou ingénieurs du génie sanitaire ;
- le corps des techniciens supérieurs du génie sanitaire ;
- le corps des sous-officiers de l'hygiène ;
- le corps des agents de l'hygiène ;
- le corps des auxiliaires de l'hygiène.

.../...

Article 3 - Le Président de la République nomme aux grades et emplois du corps des officiers de l'hygiène ou ingénieurs du génie sanitaire. Il peut déléguer le pouvoir de nomination aux grades et emplois des autres corps au Ministre chargé de la Santé publique.

Article 4 - Il est interdit à tout membre du Service national de l'Hygiène en activité, d'exercer à titre professionnel une activité privée et lucrative de quelque nature que ce soit.

Article 5 - Il est interdit à tout membre du Service national de l'Hygiène, quelle que soit sa position, d'avoir, par lui-même ou par personne interposée, et sous quelque dénomination que ce soit, dans une entreprise soumise au contrôle des services dont il relève, auxquels il apporte son concours ou avec lesquels il est en relation, des intérêts de nature à compromettre son indépendance.

Article 6 - Lorsque le conjoint d'un membre du Service national de l'Hygiène exerce une activité privée lucrative, déclaration doit en être faite au Ministre dont il dépend. Le Ministre prend s'il y a lieu des mesures propres à sauvegarder les intérêts de l'Etat. Il peut s'opposer à l'exercice par le conjoint de certaines professions figurant sur une liste dressée par décret; s'il est passé outre à l'opposition, l'intéressé est rayé des cadres du Service national de l'Hygiène.

Article 7 - Le dossier individuel de chaque membre du Service national de l'Hygiène doit contenir toutes les pièces intéressant sa situation, et spécialement les notes qui doivent lui être attribués au moins une fois par an, dans les conditions fixées par décret. Les pièces du dossier sont enregistrées, numérotées et classées sans discontinuité. Les décisions de sanction positive ou négative sont versées au dossier individuel.

Article 8 - Les membres du Service national de l'Hygiène de tout grade, en activité, en position de disponibilité ou en détachement, sont soumis, en permanence, aux règles suivantes :

.../...

- 1° - ils ne sont ni électeurs, ni éligibles ;
- 2° - ils ne jouissent ni du droit de grève, ni du droit syndical ;
- 3° - leurs libertés d'expression, d'aller et de venir, de réunion et d'association sont limitées par décret en fonction des nécessités du service.

## TITRE II

### Recrutement

Article 9 - Nul ne peut être nommé dans le cadre du Service national de l'Hygiène :

- 1/ - s'il n'est pas de nationalité sénégalaise ;
- 2/ - s'il ne jouit pas de ses droits civiques ;
- 3/ - s'il n'est pas de bonne moralité ;
- 4/ - s'il n'a pas accompli son service militaire actif, en ce qui concerne le corps des auxiliaires et d'agents de l'hygiène ;
- 5/ - s'il n'est pas reconnu indemne de toute affection ouvrant droit à un congé de longue durée ;
- 6/ - s'il ne remplit pas les conditions physiques particulières fixées par décret ;
- 7/ - s'il n'est pas âgé de 21 ans au moins et de 28 ans au plus en ce qui concerne le recrutement direct ou 21 ans au moins et de 30 ans au plus en ce qui concerne le recrutement professionnel; sous réserve des dispenses prévues par décret ;
- 8/ - si sa candidature n'a reçu l'agrément de l'autorité ayant pouvoir de nomination.

Article 10 - Les membres du Service national de l'Hygiène sont recrutés dans les conditions fixées par décret :

- parmi les titulaires de certains diplômes ;
- parmi les agents de l'hygiène ayant réussi au concours professionnel pour le corps des sous-officiers.

.../...

Article 11 - Les candidats admis dans un des corps du Service national de l'hygiène par recrutement direct, effectuent un stage après leur scolarité dans une école de formation avant d'être titularisés. Pendant la durée de la scolarité et du stage et à l'issue de celui-ci, ils peuvent, sans formalités, être licenciés pour raisons disciplinaires ou insuffisance de travail.

Les candidats admis au concours professionnel effectuent la même scolarité. Pendant cette scolarité et à l'issue de celle-ci, ils peuvent être, sans formalités, réintégrés dans leurs corps d'origine pour les mêmes motifs que ceux mentionnés à l'alinéa premier. En cas de succès, ils sont titularisés dans le nouveau corps à l'échelon de début.

Toutefois, une indemnité différentielle dégressive sera attribuée à ceux des personnels dont l'indice afférent à l'échelon de début du corps d'accueil sera inférieur à l'indice détenu dans le corps d'origine.

### TITRE III

#### Rémunération

Article 12 - Tout agent du Service national de l'Hygiène a droit après service fait, à une rémunération comprenant :

- le traitement, le complément spécial de solde ;
- l'indemnité de résidence ;
- les suppléments pour charge de famille;
- l'indemnité de suggestion.

Le régime de rémunération est défini par décret; le traitement est fixé par référence à la valeur de l'indice de base de la grille des traitements publics.

.../...

#### TITRE IV

##### Avancement

Article 13 -A l'intérieur de chacun des corps, les emplois sont répartis en grade, l'effectif de chaque corps est réparti entre les grade selon les modalités définies par arrêté.

Article 14 -Les grades sont subdivisés en échelons. A l'intérieur d'un grade, le passage d'échelon à l'autre est automatique, compte tenu de l'ancienneté dans le service ou le grade, sauf application des sanctions prévues à l'article 19.

Article 15 - L'avancement de grade a lieu exclusivement au choix après inscription à un tableau d'avancement soit annuel, soit exceptionnel, dans les conditions fixées par décret.

Le tableau d'avancement est arrêté par l'autorité investie du pouvoir de nomination ; il est publié au Journal officiel. En cas d'épuisement en cours d'année du tableau d'avancement. Il pourra être établi un tableau complémentaire.

Les promotions sont prononcées dans les formes prévues à l'article 3.

#### TITRE V

##### Discipline

Article 16 -Les agents du Service national de l'Hygiène sont astreints à l'obéissance hiérarchique la plus totale et à une rigoureuse discipline. Ils sont à la disposition permanente de l'autorité publique qui les emploie.

Article 17 - Indépendamment des sanctions prévues à l'article 19, sont applicables aux membres du Service national de l'Hygiène, les dispositions concernant le temps de paix des articles 194, 195, 204, 205, 208, à 210, 212, 213, 218 à 221, 225, 227 229, 230 et 240 du Code de justice militaire pour l'Armée de Terre.

.../...

Pour l'application de l'article 194 du Code de justice militaire, constitue le délit de désertion le fait, pour un membre du Service national de l'Hygiène de n'avoir pas rejoint son affectation dans le délai de quinze jours après la date prescrite ou d'avoir abandonné son poste pour une durée supérieure à quinze jours.

Pour l'application des articles susmentionnés, les officiers de l'hygiène ou les ingénieurs du génie sanitaire sont considérés comme ayant rang d'officier; les techniciens supérieurs du génie sanitaire sont considérés comme des sous-officiers.

Article 18 - Le Tribunal de Première Instance de Dakar, la Cour d'appel et la Cour d'Assises siégeant à Dakar en formation spéciale sont compétents pour juger les crimes et délits visés à l'article 17. Les assesseurs ou jurés militaires sont remplacés par des assesseurs ou jurés membres du Service national de l'Hygiène désignés dans les conditions prévues par le Code de justice militaire.

Le Ministre de la Santé publique exerce les prérogatives dévolues par ce code au Chef d'Etat-Major général. Les fonctions de greffier sont assurés par les fonctionnaires du cadre des greffes et parquets. Les dispositions du titre premier du Code de justice militaire sont applicables à l'instruction et au jugement de ces affaires.

Article 19 - Indépendamment des punitions d'ordre intérieur prononcées dans les conditions définies par décret, les membres du Service national de l'Hygiène peuvent être frappés des sanctions disciplinaires suivantes :

- 1°/ - déplacement d'office ;
- 2°/ - abaissement d'échelon ;
- 3°/ - radiation du tableau d'avancement ;
- 4°/ - retrogradation ;
- 5°/ - exclusion temporaire sans traitement pour une durée n'excédant pas six mois ;
- 6°/ - radiation des cadres sans suspension des droits à pension ;
- 7°/ - radiation des cadres avec suspension des droits à pension.

.../...

Ces sanctions sont prononcées par l'autorité ayant pouvoir de nomination. Les sanctions figurant sous les numéros 3, 4, 5, 6 et 7 ne peuvent être prononcées qu'après avis motivé d'un conseil d'enquête dont la composition et le fonctionnement sont fixés par décret.

Avant l'intervention de l'une des sanctions disciplinaires prévues aux numéros 1 à 7 ci-dessus, l'intéressé doit être mis à même de présenter des explications sur les faits qui lui sont reprochés.

En cas de condamnation comportant la perte définitive de tout ou partie des droits civiques, l'intéressé est rayé des cadres sans formalités.

Article 20 - En cas de faute grave, l'autorité ayant pouvoir de nomination peut décider la suspension immédiate de l'intéressé, pour une durée ne pouvant excéder deux mois. Dans cette situation, l'agent concerné conserve le bénéfice de la solde de base pendant la durée de la suspension, à l'exclusion de toute indemnité autre que les avantages familiaux.

#### TITRE VI

#### POSITIONS

Article 21 - Les membres du Service national de l'Hygiène peuvent être placés dans les positions suivantes :

- 1°/ - en activité ;
- 2°/ - en service détaché ;
- 3°/ - en disponibilité.

Article 22 - Est assimilée à la position d'activité la situation des membres du Service national de l'Hygiène bénéficiant d'un congé ou d'une autorisation d'absence ou effectuant un stage de formation.

Le régime des congés et autorisation d'absence est fixé par décret.

.../...

Article 23 - Le détachement ne peut avoir lieu que dans les cas suivants :

- 1°/ - détachement auprès d'un office, d'une régie, d'un établissement public ou d'utilité publique d'une société nationale ou d'une société d'économie mixte ;
- 2°/ - détachement auprès des communes et des collectivités locales ;
- 3°/ - détachement auprès d'une administration publique de l'Etat ;
- 4°/ - détachement dans les services relevant d'un Etat étranger ou auprès d'organismes internationaux.

Article 24 - Tout détachement est prononcé soit d'office, soit sur la demande de l'agent, par l'autorité ayant pouvoir de nomination. Il est essentiellement révocable. En cas de détachement dans un emploi prévu par l'article 23, 3°, la décision de détachement doit être contresignée par le Ministre dont relève l'emploi du détachement et par le Ministre chargé de la Fonction publique.

Article 25 - Le détachement ne peut excéder cinq ans. Il peut toutefois être indéfiniment renouvelé par période de cinq ans, à la condition que les retenues pour pension aient été obligatoirement effectuées et versées au Fonds national de Retraite pour la période de détachement.

A l'issue du détachement, tout membre du Service national de l'Hygiène est obligatoirement réintégré dans son corps d'origine.

Article 26 - Dans les cas de détachement prévus à l'article 23 (1°, 2° et 3°), l'agent détaché perçoit la rémunération de base de son grade dans les corps du Service national de l'Hygiène et, le cas échéant, soit une indemnité de fonction correspondant à la nature de l'emploi, soit une prime de technicité.

Dans le cas de détachement prévus à l'article 23 (4°), l'agent détaché perçoit pendant le temps de cette situation les traitements et indemnités afférents à l'emploi dans lequel il est en service.

.../...

Dans tous les cas, la rémunération est supportée par l'organisme dont relève l'emploi du détachement.

Article 27 - La mise en disponibilité est prononcée par l'autorité ayant pouvoir de nomination :

- soit d'office, lorsque le membre du Service national de l'Hygiène, ayant épuisé ses droits aux congés pour maladie, ne peut reprendre son service;
- soit sur la demande de l'intéressé.

Article 28 - La durée de la disponibilité d'office ne peut excéder une année. Elle peut être renouvelée à deux reprises pour une durée égale. A l'expiration de cette durée, l'agent doit être, soit réintégré dans son corps, soit mis à la retraite.

Article 29 - La mise en disponibilité sur demande de l'intéressé ne peut être prononcée que si elle est compatible avec les nécessités du service, et seulement dans les cas suivants :

- 1° - accident ou maladie grave du conjoint ou d'un enfant;
- 2° - pour exercer une activité présentant un intérêt général ;
- 3° - pour convenance personnelle.

Cette mise en disponibilité n'est jamais un droit pour l'intéressé. Elle ne peut excéder trois ans, renouvelables une fois dans les deux premiers cas visés ci-dessus et un an, renouvelable une fois dans le troisième cas.

Article 30 - Tout membre du Service national de l'Hygiène mis en disponibilité sur sa demande n'a droit à aucune rémunération.

Il perçoit les deux tiers de sa rémunération lorsque la mise en disponibilité a été prononcée d'office pour maladie.

Dans ce dernier cas, il conserve le droit aux prestations à caractère familial.

.../...

Article 31 - A l'issue de la disponibilité, l'intéressé est réintégré de plein droit à l'une des trois premières vacances survenant dans son corps. S'il refuse cette réintégration, il est rayé des cadres sans formalités préalables.

## TITRE VII

### Cessation de fonctions

Article 32 - La perte de la qualité de membre du Service national de l'Hygiène résulte :

- 1°/ - de la démission régulière acceptée ;
- 2°/ - du licenciement ;
- 3°/ - de la radiation des cadres ;
- 4°/ - de l'admission à la retraite ;
- 5°/ - de la destitution prononcée par les tribunaux ordinaires à formation spéciale dans les cas prévus à l'article 17.

Article 33 - En cas de suspension d'emplois permanents occupés par des membres du Service national de l'Hygiène, ces derniers ne peuvent être licenciés qu'en vertu de décrets de dégagement des cadres prévoyant notamment les conditions de préavis et d'indemnisation des intéressés.

Article 34 - Tout membre du Service national de l'Hygiène qui a fait preuve d'insuffisance professionnelle est soit admis à faire valoir ses droits à la retraite, soit licencié.

La décision est prise par l'autorité ayant pouvoir de nomination après avis d'un conseil d'enquête dont la composition est fixée par décret.

Article 35 - L'admission à la retraite est prononcée :

- d'office, lorsque l'intéressé atteint la limite d'âge qui lui est applicable, ou dans le cas prévu à l'article 31 ;
- sur demande de l'intéressé.

.../...

Article 36 - Les limites d'âge des membres du Service national de l'Hygiène sont fixées par décret. La limite d'âge entraîne par elle-même la rupture du lien entre l'intéressé et le service. Les services éventuellement accomplis au-delà de la limite d'âge ne sont pas pris en compte pour le calcul de la pension de retraite.

Article 37 - Les membres du Service national de l'Hygiène bénéficient du régime général des pensions des fonctionnaires de l'Etat.

#### TITRE VIII

##### Dispositions diverses et transitoires

Article 38 - L'ensemble des fonctionnaires du cadre du Service national de l'Hygiène ne sont pas soumis aux dispositions de la loi n° 61-33 du 15 juin 1961 portant statut général des fonctionnaires.

Article 39 - Des décrets fixeront les modalités d'application de la présente loi.

REPUBLIQUE DU SENEGAL  
MINISTERE DE L'EQUIPEMENT  
ECOLE NATIONALE DU GENIE SANITAIRE  
DE  
KHOMBOLE

APPENDIX G

**P**ROGRAMME de **F**ORMATION  
des  
**T**ECHNICIENS du GENIE SANITAIRE

## P r e m i è r e   A n n é e

### Mathématiques :

- Entraînement au calcul numérique et au calcul mental.
  - + puissances entières
  - + puissances fractionnaires
  - + extraction de racines carrées
- Présentation graphique
- Calcul des surfaces et des volumes
- Rappel de géométrie plane et de trigonométrie élémentaire
- Equations et Inéquations du 1er degré
- Equations du 2ème degré
- Etude des fonctions :
  - $y = ax + b$
  - $y = ax^2 + bx + c$
  - $y = \frac{ax + b}{cx + d}$
- Travaux dirigés = Exercices d'application

### PHYSIQUE

- le poids, les forces, la masse
- Mesure des masses = balances
- travail, puissance
- Notion de température, dilatation linéaire des liquides
- Thermomètre
- propagation rectiligne
- réflexion, réfraction
- lentilles minces
- loupe, microscopes
- Intensité, quantité d'électricité
- différence de potentiel
- puissance - Effet Joule
- force électromotrice d'un générateur
- association de générateurs
- électrolyse
- piles, accumulateurs
- dynamo
- pression en un point d'un fluide
- écoulement permanent = vitesse, débit volumique et massique

- formule de Bernouille = application à l'écoulement dans une conduite forcée
- écoulement à surface libre = Régime uniforme : formule de Chozy
- Notions sommaires d'hydraulique souterraine

CHIMIE :

- Structure de la matière = atomes, molécules, ions
- Valence
- fonctions :
  - + acide
  - + base
  - + sels
- Notion pH
- Acides et bases forts et faibles
- Solutions "tampon"
- Oxydo-réducteurs - Application
  - + chlore
  - + eau de Javel
  - + permanganate
- les hydrocarbures = Généralités
  - + méthane
  - + éthylène
  - + acétylène
  - + benzène
- Fonctions
  - + acide
  - + alcool
  - + amine
- le phénol

Administration de la Santé Publique

- Les concepts fondamentaux de l'organisation de l'administration de la Santé Publique.

- Introduction au concept de la Santé Publique, signification, doctrine, conséquences.

La législation sanitaire Sénégalaise = Hygiène publique, les hôpitaux.

- Les institutions internationales de la Santé Publique : OCCGE - OMS - UNICEF.

- Le Ministère de la Santé Publique : organisation, fonctionnement.

- Les fonctions de l'Ingénieur Sanitaire, de l'Agent d'Assainissement.

Éléments d'Anatomie et de Physiologie humaines

- Les tissus : morphologie et physiologie cellulaire des principaux tissus

- le squelette

- les articulations

- les muscles : constitution et physiologie

- l'appareil circulatoire

- l'appareil digestif

- l'appareil urinaire

- le système nerveux

- les organes des sens

- l'appareil génital

- les glandes endocrines

- Elimination des déchets

- Notions sur les équilibres entre milieux internes et externes - schéma des systèmes de régulation.

- Éléments de métabolisme cellulaire : anabolisme, catabolisme.

- Étude des réactions de l'organisme face :

+ à la fatigue

- aux agressions du milieu :

- température

- humidité

- pression

- Pollution atmosphérique

- bruit

- Seuils de contraintes admissibles - tolérances physiologiques

## Biologie Générale

- l'origine de la vie
- la Structure cellulaire
- la reproduction
- l'hérédité

## Entomologie

- Place de l'entomologie dans la parasitologie
- Classification des orthoptères
- les insectes anaploures (poux)
- les insectes oephaniptères (puces)
- les insectes hémiptères (punaises)
- les insectes diptères (mouches, moustiques)
- Arachnides acarions
- Crustacés copépodes

## Parasitologie

- Généralités sur le parasitisme simple et multiple - liaison avec l'écologie
- Modes d'introduction et de développement des parasites dans l'organisme humain.
- Cycles vitaux des principaux parasites
- Notion de symbiose végétative

## Hygiène Personnelle

- Notion d'Hygiène
- Définition
- Soins de la peau
- Soins des dents
- Soins des pieds
- Influence de l'air
- Influence du régime
- Influence du repas
- Influence du sommeil
- Influence de l'exercice physique
- Influence des postures
- Influence de l'élimination
- Qu'est-ce qu'une maladie ? Méthodes préventives

## Soins d'Urgence

- Pansements : asepsie : différents modes de stérilisation  
Antiseptie : les principaux antiseptiques  
Techniques de pansements  
Principaux bandages et écharpes
- Soins d'urgence :
  - Traumatisés : transport des fracturés, attelles, plâtres, extension
  - Hémorragie : Garrot
  - Brûlures, chocs, traumatismes crâniens, syncope, asphyxie, soins aux noyés, pendus, électrocutés
  - Premiers soins en cas de :
    - morsure de serpents, scorpions, chiens, empoisonnements
    - Trousses d'urgence

## Epidémiologie et Prophylaxie des maladies transmissibles

- Classification selon le mode de transmission :
  - Maladies à cycle ouvert
    - + Modes de transmission
      - aérologène
      - antérologène
      - cutanéomuqueux
  - Maladies à cycle fermé :
    - + Modes de transmission
      - par vecteurs
  - Maladies à cycle ouvert
    - + Transmission aérologène :
      - éruptives : rougeole
      - non éruptives : Tuberculose - méningite cérébrospinale
    - + Transmission antérologène :
      - Choléra
      - Dysenteries : bacillaire  
- amibienne
    - + Transmission cutanéomuqueux :
      - Variole
      - Lèpre
      - Trachome
      - Tréponématoses
      - Pilon

- Syphilis
- Rage
- Tétanos
- Charbon
- Maladies à cycle fermé
  - Vecteurs ailés : Trypanosomiasis
    - Paludisme
    - Filarioses (onchocercose, leish, bancroft, fièvre jaune)
  - Insectes cuticoles : fièvre récurrente à poux
    - pesto
    - typhus exanthématique
  - Tiques : rikettsioses
    - fièvre récurrente à tiques
  - Crustacés : dracunculose
  - Mollusques : bilharzioses

ALTERNANCES de GENIE - CIVIL

- Etude du choix d'un site pour la construction
- Technique de construction
  - Fondations
  - Coffrages
  - Travaux de maçonnerie, de menuiserie, de plomberie, d'électricité
- Choix des matériaux : béton, matériaux locaux

Eléments de Topographie et de levé

- Orientation - utilisation de la boussole
- Mesures des distances
- Mesures d'angles
- Nivellement

DEUXIEME ANNEE  
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INTRODUCTION DE LA SANTE PUBLIQUE

- La Santé Publique - Définition historique et relation avec les autres disciplines humaines
- Médecine de Soins et Médecine préventive
- Actions sanitaires et Sociales de Prévention

## E D U C A T I O N - S A N I T A I R E

- Définition de l'Education Sanitaire - Historique
- Rôle de l'Education Sanitaire dans la Santé Publique
- Justifications de l'Education Sanitaire
- Les Objectifs de l'Education Sanitaire
- Les Principes Généraux
- Les Agents Permanents en Education Sanitaire
- La formation des Educateurs Sanitaires
- Les facteurs de réussite en Education Sanitaire
  - + Connaissance du milieu
  - + Facteurs favorisants
  - + d'adaptation
  - + Les qualités de l'Educateur Sanitaire
- Techniques d'Education Sanitaire
  - Utilisation de :
    - moyens verbaux
    - moyens audio-visuels, démonstrations, conférences, exposés, discussions, moyens visuels divers : affiches, graphiques, photographies, films, maquettes, expositions
    - la presse : Radiodiffusion et Télévision
  - Notions sur la programmation en éducation sanitaire, choix des priorités
  - Evaluation d'un programme d'Education sanitaire : ses différents niveaux, ses difficultés, ses techniques

### Application :

Travail surveillé dans la population sur les problèmes particuliers tels que :

- Propreté de l'Habitat
- Eau
- Fôcil Fôcal
- Maladies transmissibles

/(/ U T R I T I O N

- Principes de Nutrition
- Les besoins nutritionnels théoriques :
  - + besoins calorifiques
  - + besoins en lipides
  - + besoins en glucides
  - + besoins en protéides
  - + besoins en sels minéraux
  - + besoins en vitamines
  - + besoins divers
- Les groupes d'aliments, table de composition, établissement de la ration, du menu.
- Etat de la Nutrition - Niveau de Santé
- Alimentation et développement
- Croissance de l'enfant : allaitement maternel, sevrage
- Pathologie nutritionnelle -
  - les carences Keshishkor, goitres, rachitisme et autres avitaminoses
- Les problèmes alimentaires dans les pays en voie de développement
- Caractères de l'alimentation sénégalaise et disponibilités alimentaires au Sénégal

Application

Travaux dirigés dans les villages avec le concours de la P.N.I. de Khombole.  
Etablissement de Menu par les villageois  
Discussions en groupes  
Présentation des différents éléments d'un menu complet  
Mode de préparation.



HYGIÈNE ALIMENTAIRE

- Généralités
- Conservation des denrées alimentaires
  - + Hygiène de la production alimentaire
  - + Conservation des denrées alimentaires
  - + les additifs alimentaires
  - + les matériaux en contact des aliments
  - + conditionnement et transport des denrées alimentaires
- Hygiène des Produits
  - + Lait et produits laitiers
  - + Oeufs
  - + Conserves
  - + Viandes
  - + Pâtisseries
  - + Produits de la mer
  - + Produits congelés
  - + Légumes
  - + Glace
  - + Pain
  - + Boissons

Application

Visite des marchés de Khombolo et de Touba Toul  
Inspection des viandes, des poissons

I - Introduction : Généralités

- Historique
- Définitions
- Importance
- Sources
- Domaines

II - Méthodologie :

• Elaboration des Statistiques Sanitaires

- Données statistiques
- Méthodes de collecte des données
- Dépouillement des données
- Présentation des données
  - + tableaux
  - + graphiques

• Analyse statistique élémentaire

- Principaux rapports
- Caractéristiques de tendance centrale
  - + mode
  - + médiane
  - + moyenne
- Caractéristiques de dispersion
  - + variance
  - + écart - type

III - Démographie

- Généralités
- Etat de la population
  - + méthodes de recensement de la population
  - + densité et composition de la population
- Mouvement de la population
  - + mortalité
  - + natalité
  - + fécondité
  - + nuptialité
  - + accroissement
  - + migration

ELEMENTS D' EPIDEMOLOGIE

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- Généralités
- Rappel de la Méthodologie épidémiologique
- Méthodes d'enquête épidémiologique
  - + les circonstances de l'enquête
  - + le déclenchement de l'enquête
  - + analyse de l'état épidémiologique et identification de l'état pathologique:  
circonstances de lieu, de temps, de personnes
  - + interprétation des recueillies
  - + action prophylactique et préventive
  - + évaluation de l'action sanitaire envisagée.

- I -- Introduction : Généralités
  - Importance de l'eau en Santé Publique
  - Règles générales
  - Cycle de l'eau
  - Besoins en eau
  - Définition de l'eau potable
  
- II -- Recherche de l'eau
  - Opérations préliminaires
  - Ressources en eau
    - + eaux pluviales
    - + eaux de surface
    - + eaux souterraines
  
- III -- Captage
  - des eaux pluviales
  - des eaux . . . de surface
    - + en rivières
    - + eaux accumulées
  - des eaux souterraines
    - + les sources
    - + les puits
    - + les forages
  
- IV -- Approvisionnement en eau des Zones rurales et des petites agglomérations
  - aménagement des points d'eau
  - systèmes d'exhaure
  - procédés domestiques de stockage et de purification
  - aménagement des lavoirs et des abreuvoirs
  
- V -- Approvisionnement en eau des villes
  - Traitement physico-chimique
  - Traitement bactériologique
  - Adduction -- Stockage -- distribution
  - Construction des réseaux
    - + Structure des réseaux
    - + Notions élémentaires de calcul de réseaux

- + matériaux utilisés en réseaux
- + construction, entretien et Surveillance des réseaux
- + points critiques des ouvrages
- + accessoires des réseaux
- + appareils publics de distribution
- + branchements particuliers

CHEMIE ET MICROBIOLOGIE DES EAUX  
DE BOISSON

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- A - Chimie des Eaux
- Qualités physico-chimiques d'une eau de boisson
  - Prélèvements
  - Principes d'analyses de potabilité physico-chimique
    - + pH - TA - TAC
    - + résistivité
    - + titre hydrotimétrique (TH)
    - + Matières organiques
    - + Chlore des chlorures
    - + Ammoniaque
    - + Nitrites
    - + Nitrates
    - + Chlore résiduel ou libre
  - Normes de potabilité physico-chimique d'une eau de boisson
- B - Microbiologie des Eaux
- Buts des analyses microbiologiques
  - Prélèvements
  - Techniques de l'analyse microbiologique
    - + Numération des germes totaux
    - + Recherche et numération des germes-tests de contaminations fécales
  - Normes de potabilité bactériologique des eaux de boisson

E-VACUATION et TRAIEMENT des (O)UATIERES USEES

Introduction : Généralités

- Définition et importance du problème
- les principes généraux

A - En milieu rural et dans les petites agglomérations

1. Elimination des Excréta

- Schéma épidémiologique
- Quantité à évacuer
- Evolution dans le sol
- Choix du système en fonction :
  - + des conditions de l'habitat
  - + du niveau économique et social
- Les latrines
  - + les règles générales
  - + caractéristiques techniques
  - + exécution
  - + estimation du coût
- Autres systèmes
- Les fosses septiques

B - En milieu urbain

- Principes
- Caractéristiques générales des eaux résiduaires d'origine urbaine
  - + composition
  - + nature
- Estimation de la quantité à évacuer
- Les réseaux d'égouts
  - + système unitaire
  - + système pseudo-séparatif
  - + systèmes séparatifs
- Avantages et inconvénients de ces différents systèmes
  - + tracé
  - + matériaux
  - + dimensionnement
  - + ouvrages annexes

- entretien de réseaux
- les traitements des eaux usées d'origine urbaine
  - + principes généraux
  - + traitements physiques
  - + traitements biologiques
    - lits bactériens
    - boues activées
    - étangs d'oxydation
    - lagunage
  - + traitement des résidus
  - + stérilisation des rejets
- contrôle des stations d'épuration
- les effets des déversements des eaux résiduaires dans les milieux récepteurs

## 2. Collecte et Traitement des Ordures Ménagères

- Définition
- Importance pour la Santé Publique
- Composition
- Collecte - Tonnage
- Transport
- Procédés de traitement
  - + décharge en mer
  - + décharge brute
  - + décharge contrôlée
  - + compostage
  - + incinération

## APPENDIX H

### LE BIEN-ÊTRE COUVERTURE SUR L'ECOLE NATIONALE DU GENIE SANITAIRE DE KAMBOLÉ

-o-o-o-CCC-o-o-o-o-

#### I - Introduction

La relation qui existe entre les conditions générales d'hygiène et l'état de santé d'une collectivité est souvent mal perçue par certaines personnes particulièrement celles vivant en milieu rural. Ainsi a-t-on pu constater que des enfants et même parfois des adultes malades venaient se faire traiter dans un dispensaire ou un poste de santé puis, une fois guéris, ils retournaient dans leur milieu naturel ; mais quelques mois plus tard, ils revenaient se faire soigner parce qu'atteints à nouveau des mêmes maladies.

Le problème qu'il fallait résoudre, devant cette situation, était donc celui de l'assainissement correct du milieu dans lequel vivaient ces individus. D'où la nécessité de former des agents avertis des problèmes d'hygiène et d'assainissement et capables d'aider les populations rurales à maîtriser certaines techniques d'assainissement et à respecter les règles élémentaires d'hygiène et de propreté.

C'est cette idée qui a donné naissance à l'Ecole Nationale du Génie Sanitaire dont nous nous proposons de décrire les différentes activités. Cette école a été créée en 1964 sur financement conjoint de l'UNICEF et de l'OMS, dans le cadre d'un projet signé entre le Gouvernement du Sénégal et ces organismes.

L'objectif de ce projet qu'on baptisait SENEGAL 0004, était de former des agents dont nous venons d'esquisser le profil et/ou même temps de créer une zone pilote où seraient tentées des expériences pratiques en matière d'assainissement.

#### II - Formation

##### 1 - Sanction régionale

A l'origine, l'école dépendait entièrement de celle des Agents Sanitaires de Saint-Louis en matière de recrutement de ses élèves. On recrutait donc par voie de concours, des élèves titulaires du C.E.P.C. (Certificat d'Etudes Primaires), qui, après une année de formation à Saint-Louis, essentiellement axée sur les soins de santé, étaient envoyés à Kambolé pour une année de spécialisation en matière d'assainissement. Après quoi, ils subissaient un examen de sortie qui leur conférait le titre d'Agent d'Assainissement.

Il a été formé environ 100 agents dans ce régime.

### 2 - Nouveau régime

L'école a inauguré depuis 1970 une nouvelle formule qui consiste à recruter directement, par voie de concours, des élèves titulaires du D.F.E.L. (Diplôme de Fin d'Etudes Moyennes) et à les former à l'école pendant deux ans. La formation est principalement axée, en première année sur les matières scientifiques de base qui sont : les mathématiques, la physique, la chimie et les sciences naturelles, afin de donner aux élèves les connaissances nécessaires à la compréhension des matières techniques qui constituent la pièce maîtresse de leurs cours en deuxième année.

Durant cette seconde année, l'accent est particulièrement mis sur la prophylaxie générale, la lutte contre les vecteurs anisés, l'éducation pour la santé, l'hygiène au milieu, l'approvisionnement public en eau potable, l'évacuation et le traitement des matières usées et la chimie des eaux. Ces cours théoriques sont consolidés par des travaux pratiques en laboratoire (analyses bactériologiques et chimiques des eaux), en atelier (construction de dalles de latrines et de filtres d'eau de consommation ; montage et démontage de pompes d'exhaure) et par des stages pratiques sur le terrain.

4 L'heure actuelle deux promotions d'une <sup>trontaine</sup> ~~vingt~~ d'élèves chacune, ont été formées dans ce régime et sont actuellement en expérimentation dans le projet " cases de santé " de l'U.S.A.I.D. au Sine Saloum.

### 3 - Corps professoral

L'enseignement est dispensé par un corps professoral composé de deux types de personnels :

un personnel permanent comprenant :

- Un Ingénieur du Génie Sanitaire
- Un Technicien Supérieur de Santé Publique
- Quatre Techniciens d'assainissement
- Un Laborantin

et un personnel vacataire composé de :

- Un Ingénieur du Génie Sanitaire
- Un Professeur de Mathématiques
- Quatre Techniciens Supérieurs
- Un Professeur de Physique et Chimie
- Quatre Médecins
- Un Educateur Social
- Un Infirmier Vétérinaire

Ce personnel vacataire nous vient de Dakar, Thiès et Serekh. A ce propos, il convient de souligner leur constante disponibilité et l'esprit d'aide et de <sup>coopération</sup> ~~solidarité~~ qu'ils ne cessent de manifester à l'endroit de l'école, malgré les difficultés rencontrées, particulièrement en matière de déplacement. En effet, ils n'ont pas toujours les moyens de se payer

le carburant nécessaire à leur transport et comme nous ne disposons d'aucun crédit à cet effet, on imagine leurs difficultés. Mais malgré tout, ils sont assez réguliers ; à l'occasion de leur écriture. C'est pourquoi nous ne perdons aucune occasion pour leur exprimer toute notre gratitude.

### III - Zône Pilote

Une zone pilote d'assainissement a été créée en 1966 dans l'arrondissement de Thiéna, autour de la ville de Khombole, dans le but de doter les populations concernées de certaines infrastructures hydrauliques et sanitaires et pour servir de terrain d'application aux méthodes techniques d'assainissement en relation avec le programme de formation de nos élèves.

- Les infrastructures installées dans la zone sont les suivantes :
- 32 puits aménagés et équipés de pompes manuelles ;
  - 558 latrines et
  - 100 fosses d'incinération-compostage.

Le projet s'étend sur 186 villages et son financement a été assuré par l'UNICEF.

L'entretien et les réparations du matériel sont à la charge d'une équipe technique basée à l'école et dirigée par le Directeur.

- Cette équipe comprend en outre,
- un Chef d'équipe (Technicien d'assainissement)
  - un Plombier
  - Deux Maçons
  - Deux Menuisiers
  - un Chauffeur et
  - un Faisatier

Les interventions se font à la demande des populations concernées et leur participation est requise pour l'achat des pièces détachées et des matériaux de construction éventuels ainsi que leur transport.

Des activités d'éducation pour la santé sont également menées dans la zone pilote par nos élèves, encadrées par un moniteur. Elles ont pour but de sensibiliser les villageois et de requérir leur participation à l'amélioration de leur propre santé.

Les thèmes abordés tournent autour des sujets suivants :

- le péril fécal ;
- l'hygiène de l'eau et les aliments ;
- le paludisme ;
- les diarrhées et
- la bilharziose.

Ils aident également les villageois à construire des latrines, des filtres d'eau potable et les fosses à ordures ménagères.

a) Description sommaire d'une latrine

Elle est composée : -  
- d'une fosse dont les parois sont consolidées par un enduit de ciment  
- d'une dalle servant à couvrir la fosse et à supporter l'usage et enfin  
- d'une superstructure dont le rôle est de protéger l'ouvrage et les usages contre les intempéries.

- Le latrine sert donc à emmagasiner les excréta-(urines, matières fécales) et à les isoler des mouches, rongeurs-et autres agents de transmission. Elle assure également leur digestion et les rend ainsi inoffensifs-en les transformant en matières minérales propres à fertiliser les terres cultivables.

b) Description sommaire d'un filtre :-

- Dans le souci d'utiliser des matériaux locaux-et peu onéreux, on superpose deux canaris dont les fonds sont perforés de trous-de  $\frac{1}{2}$  cm de diamètre (avec un clou) et l'on place alternativement dans-ces canaris des couches de graviers fins, de sable et de charbon de manière à ce que l'épaisseur totale atteigne 60 à 80 cm.-Les couches du canari supérieur sont-aménagées de manière à laisser un espace vide, au-dessus, servant à recueillir l'eau à filtrer

- Un tel filtre retient parfaitement les kystes, parasites, oeufs et autres matières en suspension, mais ne permet pas l'élimination-des-bactéries ; c'est pourquoi l'eau filtrée doit être bouillie ou désinfectée à l'eau de Javel avant consommation.

c) Description sommaire d'une fosse à ordures ménagères :-

- C'est une fosse à parois de briques servant à l'incinération des ordures en saison sèche et à leur compostage en saison humide. Elle est constituée de deux compartiments :

- l'un de 200 x 150 x 130 cm<sup>3</sup> de dimensions est équipé d'une grille et d'une-fenêtre d'aération (40 x 20 cm<sup>2</sup>); ce compartiment joue à la fois le rôle d'incinérateur et de composteur ;

- l'autre de 200 x 120 x 50 cm<sup>3</sup> de dimensions sert-exclusivement à recevoir les ordures non-combustibles comme les-boîtes-métalliques de conserve, -débris de poterie, bouteilles en verre-etc.. et à les stocker provisoirement on attendent leur enlèvement-et leur enfouissement.

Cette-fosse permet de résoudre correctement tous les problèmes de pollution engendrés par les ordures ménagères en milieu rural. Elle peut également être utilisée dans les potées communes et même dans les quartiers périphériques des grandes villes.

Ce projet a reçu un accueil très favorable de la part des populations. Elles manifestent de plus en plus un grand intérêt aux conseils qui leur sont prodigués et participent activement à certains travaux (constructions de latrines, aménagement de puits etc...). Au début, il fallait aller vers les villageois, maintenant ce sont les villageois eux-mêmes qui viennent vers nous pour demander conseils et assistance ; d'où la nécessité de dynamiser le projet et de l'étendre à toute la région voire tout le pays.

IV - Services d'accueil des Techniciens formés

- à l'issue de leur formation, nos élèves sont affectés dans les différents services publics et para-publics Sénégalais, spécialisés en matière de Puits, Assainissement ou Hygiène. C'est ainsi qu'on les retrouve :
  - au Ministère de la Santé (C.C.R., Service d'Hygiène, postes de santé)
  - au Ministère de l'Hydraulique et bientôt
  - à la SCIEES (Société Nationale d'Exploitation des Eaux au Sénégal)
  - à la SOADIF (Société Africaine de Diffusion et de Promotion) et
  - dans les Collectivités-locales.

À l'heure actuelle, la demande est plus forte que l'offre et la pression des services précités se fait de plus en plus sentir ; c'est ce qui nous amène à envisager un doublement d'effectif. Mais le projet qui a été élaboré dans ce sens par nos soins a été bloqué faute de financement.

S'agissant des problèmes rencontrés par les Techniciens en poste dans les C.C.R. (Centres d'Expansion Rurale) il convient de citer le manque de moyens de déplacement pour les campagnes de sensibilisation et d'éducation pour la Santé, ainsi que le manque de produits de désinfection des puits suspects de pollution. Il serait souhaitable pour eux de disposer d'un minimum de matériaux de construction ( ciment, fer, bois de coffrage etc ...) pour installer des latrines tests et pour réaliser quelques démonstrations dans les villages reculés.

V - Perspectives d'avenir

1 - Extension de l'école

Comme précédemment énoncé, un projet d'extension de l'école a été élaboré par nos soins et soumis à l'approbation des autorités compétentes. Son objectif est de promouvoir l'installation de locaux additionnels nous permettant d'augmenter notre capacité d'accueil et de pouvoir ainsi faire face aux demandes pressantes de certains services comme la SCIEES, le Service d'Hygiène et le Directeur des Puits Assainissement. En effet, chacun de ces services souhaite disposer d'un "quota" de personnel, mais le nombre actuel de nos locaux ne nous permet pas de satisfaire la demande de ces services.

Le projet a été approuvé et une entreprise adjudicataire a été désignée ; mais l'on assiste actuellement à un blocage de la banque de financement.

Nous souhaitons vivement que ce projet voit le jour afin que nous puissions donner satisfaction aux besoins exprimés chaque année par les services précités.

2 - Création de deux nouvelles sections

L'ouverture de deux nouvelles sections est programmée pour l'année 1988-1989. Il s'agit d'une section de formation de Techniciens de l'Hydraulique et d'une section de formation de Techniciens de l'Équipement Rural, qui viendront compléter celle de l'Assainissement. Cette création répond au souci du gouvernement de développer une politique active de l'eau par la formation de cadres techniques aptes à aider le monde rural dans la conception et l'exploitation d'ouvrages hydro-agricoles et sanitaires adéquats, seul moyen lui permettant d'atteindre l'auto-suffisance alimentaire et d'échapper à certaines calamités naturelles comme la sécheresse.

L'école portera alors le nom d'École Nationale de l'Hydraulique, de l'Équipement Rural et de l'Assainissement. Elle formera dans un tronc commun d'une année, des élèves issus des lycées et collèges et titulaires du D.F.T.M. Au cours de cette année de formation, l'accent sera mis sur les matières scientifiques de base comme la Mathématique, la Chimie, la Physique et les Sciences naturelles qui leur permettront de comprendre et de maîtriser les données techniques qui seront enseignées dans les classes suivantes.

Ce tronc commun éclatera ensuite en trois branches spécialisées : Hydraulique, Équipement Rural et Assainissement. L'orientation des élèves se fera suivant les aptitudes qu'ils auront à suivre telle ou telle filière compte tenu des degrés de compréhension manifestés en première année.

La deuxième année de chaque filière sera essentiellement consacrée aux cours théoriques et pratiques de la section concernée. Ces cours seront consolidés par des visites de chantiers et des séances d'entraînement à l'exercice du métier.

La troisième année sera subdivisée, pour chaque section, en trois phases :

- a) - Première phase, d'une durée de trois mois, consacrée sur la finition ou l'approfondissement de certains cours théoriques -
- b) - Deuxième phase, d'une durée de quatre mois, consacrée aux stages pratiques dans les services nationaux spécialisés dans les domaines intéressant la section considérée.

c) - Troisième-phase, d'une durée de deux mois, consacrée à la-préparation des mémoires de fin d'études et à l'organisation de l'examen de sortie.

Cette structure nécessite l'installation de nouveaux locaux et l'acquisition d'un matériel didactique adéquat. A cela s'ajoutent naturellement du personnel et des crédits pour l'exploitation. Une étude estimative du coût de cette-opération a été effectuée par nos soins et envoyée aux autorités compétentes-dépuis le 15 Janvier 1961 mais jusqu'à présent elle n'a pas connu de suite.

#### VI - Conclusion

Nous venons-de décrire brièvement-la situation-qui prévaut à l'Ecole Nationale du Génie-Sanitaire de Khombole ainsi que les activités qui y sont menées. Les élèves formés comme ceux en formation participent activement-à la lutte contre les maladies transmissibles et la morbidité en campagne, par des actions comme :

- l'éducation pour la santé des masses rurales;
- l'installation d'ouvrages sanitaires (latrines, fosses septiques, fosses à ordures ménagères) ;
- l'aménagement de puits-et points d'eau ;
- la confection de filtres à eau potable et
- la désinfection des eaux et des aliments.

L'extension de nos-domaines d'activités et le renforcement-de nos moyens ainsi que de nos effectifs-nous permettront sans nul doute de-réduire les effets néfastes des maladies qui ont longtemps disparu dans les pays développés mais qui continuent de faire des ravages dans nos-pays.

La santé étant un préalable à tout développement, les considérations qui précèdent montrent à suffisance que-nos activités s'inscrivent dans le cadre d'une-contribution indispensable au développement du pays. Il est donc souhaitable que-les autorités compétentes ainsi que les organismes humanitaires nous apportent aide et assistance dans la lutte que nous menons pour la santé et le bien-être social de nos masses paysannes./-

Birama NDIAZE

# APPENDIX I

ST. GEORGE'S ISLAND

FEBRUARY 1966 K. CLARKE

## Problème N° 1

Vous venez de constater dans un de vos villages que toute la population qui puise de l'eau dans un des trois puits de cet village a un excès des cas de diarrhée aigus. En inspectant le puit vous êtes convaincu que le puit est pollué. En cherchant les solutions pour ce problème vous avez pu procurer dans l'usine qui fabrique l'eau de Javel à Lourbel un produit poudreux s'appelle "Super chlor" ayant un teneur de 70 %.

a) Décrivez les solutions ou processus sociaux que vous allez apporter pour pouvoir désinfecter ces puits avec ce produit.

b) Calculer la quantité de ce produit que vous allez verser dans le puit pour le désinfecter.

Notions à savoir:

- a) Comment calculer le volume d'eau dans le puit
- b) chloro résiduel
- c) demande en chloro d'une eau
- d) temps de contact.

Volume d'eau:

Pour calculer le volume d'eau dans le puits c'est en effet, de calculer

$\pi = 3,14$   
 $r =$  rayon  
 $l =$  hauteur

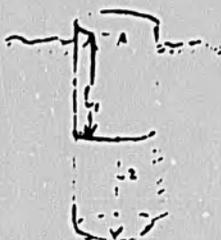


la formule est  $\pi r^2 l$

- $\pi = 3,14$  ou  $\pi$
- $r =$  diamètre intérieur divisé par deux cm ou m
- $l =$  hauteur de l'eau dans le puits.

$$\pi r^2 l = 4 \times l = \text{cm}^3 \text{ ou } \text{m}^3$$

Il faut donc deux mesures essentielles pour pouvoir calculer le volume d'eau dans le puit.  $r$  et  $l$ . La meilleure méthode de calculer la hauteur d'eau c'est par la méthode de différence.



$$L_1 - L_2 = \text{hauteur d'eau.}$$

Il suffit de descendre la corde jusqu'à la surface de l'eau pour avoir. Marquer cette pointe sur la corde avec quelque chose de lourd dans le puits de sorte à ce que la corde ne se déplace pas. Ensuite, remonter la corde jusqu'à la surface et mesurer l'espace entre ces deux marques.

PREPARATION D'UNE SOLUTION DE BASE AVEC LE PRODUIT "SUPER  
CHLOR 70"

Pour désinfecter une eau sale et beaucoup polluée, il faut une concentration en chlore dans l'eau de 50 mg / litre. Une concentration en chlore de 4 mg / l dans une eau plutôt propre (claire) mais polluée avec par exemple des kystes amoxbiens sera désinfectée en 30 minutes. D'habitude l'eau à boire bien chlorée contient 1,0 - 0,5 mg/l de chlore.

Pour préparer 10 litres de solution de base avec votre "super chlor 70" qui a une teneur en chlore de 5 g / litre, il faut savoir combien de grammes de ce produit à mettre dans 10 litres d'eau. Le calcul se fait comme suit.

$$\begin{array}{r} 1: \text{litre d'eau doit contenir } 5 \text{ gm/litre} \\ 10 \text{ litres d'eau aura } 10 \text{ litres} \times 5 \text{ gm} \\ \hline \text{litre} \\ = 50 \text{ gm} \end{array}$$

Mais le produit est à 70 %  
donc 50 gm diviser par 70 % =  $\frac{50 \text{ gm}}{0,70} = 71,42 \text{ g}$

Il faut donc 71,42 gm de superchlor 70 " dans 10 litre d'eau pour avoir une solution de base avec une teneur en chlore de 5 g / litre.

Avant inspect l'eau vous avez décidé que malgré le fait que l'eau soit polluée, elle n'est pas tellement sale c'est à dire, elle n'est pas riche en matière organique ( les débris organiques augmentent la demande en chlore de toute eau ). Donc il faut désinfecter l'eau près à niveau de 4 mg / litre.

Comment calculer le volume de votre solution de base ( 5 g/litre ) pour verser dans ce puits ayant un volume d'eau de 77 m<sup>3</sup> pour atteindre une concentration en chlore dans le puit d'à peu près 4 mg/litre d'eau ?

$$\left( \frac{4 \text{ mg}}{\text{litre}} \times \frac{1 \text{ litre}}{1000 \text{ mg}} \right) \times \frac{1 \text{ g}}{1000 \text{ mg}} \times \frac{77 \text{ m}^3}{1} \times \frac{1000 \text{ litres}}{\text{m}^3} = X \text{ litres de solution de base}$$

Donc d'après ce calcul vous mesurez X litre de votre solution de base verser dans le puit qui est hors l'eau pour le poisson et essayer d'agir l'eau avec la solution en contacte pour avoir une bonne dilution. Laissez le puits pour une période de 10 heures, ou plus.

En générale le goût de chlore se manifeste dans une eau ayant une concentration en chlore de 1 - 4 mg / litre. Dans ce cas il y aura certainement un goût de x chlore dans l'eau après cette désinfection.

- Comment diminuer le goût du chlore dans le puit après cette désinfection
- Verser un volume d'eau d'à peu près 77 m<sup>3</sup> / 13 pour diminuer la concentration en chlore.

fruit-il  
cet travail? -n Quel matériel en dehors du superchlore 70 " pour effectuer

- Il se peut que la concentration en chlore de 4 mg / litre dans le puit ne suffira pas pour désinfecter le puit. D'où viendra le problème? ( La demande en chlore d'une eau est la quantité de chlore nécessaire pour la désinfection de l'eau. La demande en chlore est composée de deux quantités. La quantité de chlore qui permettra des réactions chimiques, mais non-bactéricide. (Le chlore étant un agent oxydant très actif) et la quantité pour effectuer l'action bactéricide recherchée.)

- Quel sera le rôle du chef du village et le comité de santé pour effectuer cet travail?

- Quel sera le rôle de vos supérieur médical dans ce genre de travail?

### Problème 2

Dans le village de Ker Sannou, après une causerie avec les villageois sur la nécessité d'une bonne hygiène alimentaire pendant la période de sévère le chef de village a posé la question suivante: lui, il stock son eau à boire dans un fût et des canaris. Parmi les méthodes pour désinfecter l'eau discutée pendant la causerie ( ébullition, filtrage, désinfection avec eau de Javel ) il préfère acheter l'eau de javel à 135 frs par bouteille à Kaolack. pour désinfecter et protéger son eau contre la contamination ultérieure ( chlore résiduel ) mais quel volume d'eau de Javel il faut verser dans le fût, où le canaris et comment utiliser le chlore en général.

- Pour calculer le volume d'un fût il faut encore le formule ( )

$\pi r^2 l$

L'eau de Javel est une solution de l'hypochlorate de sodium ( NaOCL ) avec une concentration de 1 % .

Deux ou trois gouttes de cette solution dans un litre d'eau donne en générale une bonne protection. Il faut laisser reposer l'eau pendant 30 minutes avant de la boire.

-- Calculer le volume d' eau de Javel a mettre dans un fût avec , volume de  $\pi r^2 l$  et un canaris de 45 litres.

### Problème 3

- Comme vous le savez la quantité d'eau disponible ( indépendamment de sa quantité) a une forte influence sur l'état d'hygiène et par conséquence certaines maladies de la peau. La quantité d'eau disponible à une population est exprimée en générale en litre par tête. Les cibles pour la decennie d'eau potable sont exprimés en litre par tête. Le volume d'eau dans les puits varie avec les saisons avec un minimum dans la saison sèche. C'est à dire dans le formule  $\pi r^2 l$ , l est au minimum. Mais il dépend souvent sur deux facteurs. La vitesse de d'infiltration dans le puit. et la profondeur du puit.

Calculer pour votre village l'eau disponible à la population à un moment donné

$$\left( \frac{\pi r^2 l}{\text{puits}_1} + \left( \frac{\pi r^2 l}{\text{puits}_2} \right) + \left( \frac{\pi r^2 l}{\text{puits}_3} \right) \right)$$

le nombre d'habitant dans le village.

X = litre d'eau par tête

- Est-ce que ce chiffre reste le même pendant toute l'année et donne en soi-même une idée de l'eau disponible ?

- qu'est ce que vous pouvez faire pour augmenter cette quantité disponible. ?

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