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HG-005
Private Participation in Environmental Services

THE PERFORMANCE MONITORING UNIT AT ONAS

Final

Prepared for

Regional Housing and Urban Development Office/
Near East and North Africa (USAID)

Prepared by

PADCO and Société d'Ingénierie pour le
Développement Economique et Social (SIDES)

Jean-Pierre Beaumont
Imed Eddine Nouri

15 December 1994

PROVIDES GOVERNMENTS AND PRIVATE CLIENTS WITH SERVICES IN PLANNING, HOUSING, MANAGEMENT, FINANCE, ECONOMICS, ENVIRONMENT, GEOGRAPHIC AND OTHER INFORMATION SERVICES, AND TRAINING.

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TABLE OF CONTENTS

Executive Summary iii

1 Introduction 1
1.1 Objectives 1
1.2 Terms of Reference 1
1.3 The Organization of the Study 2

2 The Purpose of the Performance Monitoring Unit 2
2.1 The Role of the PMU 2
2.2 Future Development of the PMU's Role 3

3 Description of Specific Monitoring Tasks 3
3.1 Overview 3
3.2 Current Situation 7
3.3 New Context 7
3.4 Distribution of Tasks 8

4 PMU Organizational Structure and Operations 9
4.1 The Organizational Structure of the PMU 9
4.2 PMU Procedures 11

5 Number and Qualifications of PMU Personnel 16
5.1 The Local Network Operation PMU 16
5.2 The Local Treatment Plant Operation PMU 16
5.3 The Central PMU 16

6 PMU Material Resources 17

7 PMU Training Needs 18

8 The PMU Budget 19

9 Frequency of Use of PMU Documents 21
9.1 Special Regulations 21
9.2 Readers' Committee 21
9.3 Guidelines for Conducting the Monitoring Program 22
9.4 Description of the Performance Analysis Method 22
9.5 Technical Support to the Regional Departments 22
9.6 Transfer of Information to the Private Sector 22
9.7 Feedback to the Designers 22

ANNEXES

Annex A Terms of Reference
Annex B List of Persons Interviewed
Annex C Example of the Monthly Activity Report: Network
Example Request Form
Annex D Method for Calculating the Performance of a Treatment Plant
Annex E Overview of the Training Course for Liquid Waste Technicians
Internship Program at the Maintenance Workshops
Internship Program at the Central Laboratory
Annex F The PMU within the ONAS Organigram

THE PERFORMANCE MONITORING UNIT AT ONAS
Executive Summary

The purpose of this study is to define the role, organizational structure, and procedures of the Performance Monitoring Unit (PMU) at the National Sanitation Agency (ONAS). The main function of the PMU is to monitor performance in services provided by the private sector in operating liquid waste facilities (networks and treatment plants).

The terms of reference have defined six complementary topics: examining the roles of the PMU in order to determine the specific tasks involved, defining the PMU's organizational structure, determining the number and the qualifications of its personnel, defining its material resources, evaluating its training needs and preparing a summary analysis of its budget.

The study highlights the technical, administrative and financial components involved in performance monitoring, noting which ones most directly involve the PMU. The study also suggests several possible ways in which the role of the PMU could develop.

The study includes a detailed list of activities related to the monitoring of operations and maintenance. Three kinds of activities are described: those related to contract management, those related to the operation of the networks and those related to the operation of the treatment plants. While the last two kinds of activities are the exclusive province of the PMU, the PMU and other ONAS departments are simultaneously involved in contractual activities.

The list allows activities already in existence at ONAS to be distinguished from new activities involving the PMU. It also provides a survey of the entities responsible for each of the activities.

The study proposes a light structure for the PMU, i.e., a central unit to prepare the documents required for performance monitoring and analysis, and local units to monitor the operator's day-to-day activities. This structure is well suited to the scenario in which the PMU gradually takes on monitoring responsibilities for the facilities to be transferred to the private sector in the coming years. The local units are small, and therefore easier to set up and move, while the central unit ensures that the performance monitoring is uniform, and is able to learn lessons from each of the pilot projects.

The PMU's procedures are implicit in the detailed list of activities related to the monitoring of operation. The study nevertheless provides additional details on many activities in order to eliminate ambiguity.

The study also proposes job descriptions for the positions required by the PMU, and the number of individuals necessary both for the central unit and for each local unit. Material resources provisions in the form of premises, furniture, vehicles, and computer and communications equipment are also proposed. One chapter briefly discusses training needs for PMU personnel.

The study proposes a budget estimate for the PMU for the years 1995 through 1999. This budget is based on a scenario in which twelve pilot projects are implemented during this period. The assumptions on which this budget is based are nevertheless clearly defined, so it can easily be readjusted to fit other scenarios.

Finally, the study provides additional details on how frequently PMU documents are to be used or revised.

1 Introduction

1.1 Objectives

The Government of Tunisia is demonstrating increasing commitment to greater private sector participation in the delivery of urban environmental services. The National Sanitation Agency (ONAS[1]), the main operator in the liquid waste sector, already entrusts most studies, as well as the construction of new facilities, to the private sector. ONAS is now interested in expanding private sector participation to include project operation and financing.

The objective of the present study is to define the role, organizational structure and procedures of an ONAS administrative unit to be established called the "Performance Monitoring Unit" (PMU), the main function of which is monitoring performance in services provided by the private sector in operating liquid waste facilities (networks and treatment plants).

Furthermore, the conclusions of the study will inform the development of a national strategy for private sector participation in environmental services, particularly in the area of liquid waste.

This study was financed through HG-005, Private Participation in Environmental Services (PACT reference: 3.B.IV).

1.2 Terms of Reference

The terms of reference of the study break it down into six complementary topics.

The first consists of examining the PMU's administrative, financial and technical roles, in order to define the specific tasks each of these involves. The study should distinguish new tasks from those that are currently carried out by ONAS. It should also specify the division of labor between the PMU and other ONAS departments.

The second consists of defining the PMU's organizational structure, that is, its internal structure and its position within the ONAS hierarchy, as well as its procedures. In this context the study must describe the PMU's various internal documents and those to be routed to other departments, as well as how frequently they are to be used. The study must also specify the nature of the contact with the private sector.

The third area relates to the number and the qualifications of the PMU's personnel.

The fourth is directed toward determining what material resources the PMU requires, with regard to premises, furniture, utilities, transportation and computers.

The fifth topic deals with evaluating the PMU's training needs.

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[1] *Office National de l'Assainissement.*

And finally, the last topic calls for a summary analysis of the PMU's budget, including both the cost of goods and equipment required and annual operating costs.

The terms of reference are attached as Annex A.

1.3 The Organization of the Study

Initially, a series of interviews were conducted with ONAS officials and specialists outside ONAS to become familiar with their current roles in liquid waste management in Tunisia. The administrative, financial, and technical aspects were approached from various angles in accordance with the experience of each of the people interviewed.

Additional information was gathered from two previous studies, the standards and requirements study and the market study, both carried out under the HG-005 program.

Analyzing this information made it possible to compile a detailed list of tasks relating to monitoring ONAS' current operations, and at the same time supplement it to take private sector participation into account.

Once the specific tasks had been defined, those of a technical and an administrative nature were assigned to the PMU. The tasks of a financial nature, as well as certain administrative tasks related to contractual activities remain the responsibility of existing ONAS administrative units. We consider this division to be in harmony with ONAS' current structure, and to be easily adaptable to its most probable short- and medium-term evolution.

It was then possible to define a suitable scenario for the PMU's organizational structure and procedures, as well as its personnel, training, material resource and budgetary resource needs.

2 The Purpose of the Performance Monitoring Unit

2.1 The Role of the PMU

The PMU's primary function is to examine the quantity and quality of the services provided by the private sector in the operations and maintenance (O&M) of liquid waste facilities (networks and treatment plants).

The PMU's specific activities have a very strong technical component. Performance monitoring necessarily involves monitoring the company's activities and analyzing the methods it uses and the results it obtains. Such monitoring can only be done by individuals who are specialized in the field. Certain activities may have an administrative connotation, but they are classified as part of the PMU's technical function, since they require specific technical knowledge from the individuals performing them.

Clearly, any monitoring activity involves an administrative role related to managing the circulation of information. An important part of the PMU's activities are therefore of an administrative nature.

The PMU can be exempted from all financial responsibilities. These activities are currently carried out by ONAS with regard to private sector involvement studies and construction. ONAS can therefore undertake these activities just as efficiently for O&M, provided that the PMU is able to regulate the quantity and quality of services provided by private enterprise.

2.2 Future Development of the PMU's Role

In the short term, the PMU's role is limited to monitoring the companies that will participate in the pilot projects planned under the HG-005 project. Their relatively limited number should allow the PMU to perfect its monitoring methods, test them in real situations, and improve them based on the lessons learned from these projects.

In the mid-term, the monitoring methods perfected by the PMU can be applied to all the facilities operated by ONAS; this will involve determining effluent and operation requirements and putting monitoring programs into place for each group of facilities. Such an approach will make it possible to compare ONAS' performance to that of the private sector with reference to the same baseline.

As the PMU develops its expertise with the private sector, it will be able to clearly identify the conditions necessary for transferring O&M responsibility to the private sector. In addition, it will have the additional advantage of being in a position to carry out performance analyses of facilities operated directly by ONAS, allowing the PMU to point ONAS in the right direction in choosing the plants to be entrusted to private firms.

If ONAS decides to form a promotion group to facilitate private sector participation in the operation of its facilities, the PMU can provide this group with the necessary technical support.

Because of its expertise in analyzing the performance of liquid waste facilities, the PMU is called on to actively participate in developing new specific standards for these facilities, or to review the current standards and adapt them as much as possible to real conditions.

3 Description of Specific Monitoring Tasks

3.1 Overview

For the sake of clarity, the specific monitoring tasks have been divided into three general categories: contractual activities, those related to operating networks, and those related to operating treatment plants. A description of the activities related to the monitoring of operation is included following as Table 1 below.

The first column indicates whether the activity is an existing ONAS activity or a new one. Certain activities have been classified as "new (N)," essentially because they involve new content. On the other hand, certain PMU activities have been classified as "existing (E)" because they are closely related to activities currently performed by ONAS.

The second column gives a brief description of the activity. It is followed by three columns classifying the activity according to three types of role: technical (T), administrative (A), and financial (F). The last column specifies which ONAS department should perform the activity.

Table 1
Description of Activities Related to Monitoring Operations and Maintenance

E/N	Activity	Type			Action
		T	A	F	
	CONTRACTUAL ACTIVITIES				
E N	Preparation of the terms of reference: • Administrative scope of work • Technical scope of work	 •	 •		 ONAS PMUc
E	Publication of the request for proposals		•		ONAS
E	Opening of submissions (Bid Evaluation Committee)		•		ONAS
E	Bid Evaluation Committee	•			PMUc
E	Check by PSMC		•		PSMC
E	Internal Market Committee		•		IMC
E	ONAS Board of Directors			•	ONAS
E	Notification to the winner		•		PMUc
E	Signing of the contract		•		ONAS
E	Monthly activity memo	•			PMUl
E	Interim balance		•		PMUc
E	Contractual verification		•		PSMC
E	Monthly payments			•	ONAS
E	Final annual balance		•		PMUc
E	Final annual official acceptance		•		PMUc
N	Enactment of codicils	•			PMUc+l
E	Offer to renew		•		PMUc
E	Official renewal		•		ONAS

E/N	Activity	Type T	Type A	Type F	Action
E	Final official acceptance		•		PMUc
E	Reimbursement of the security deposit			•	ONAS
N E	Resolution of disputes - 1st stage; - if not resolved in the 1st stage		• •		PMUc ONAS
	NETWORK OPERATIONS AND MAINTENANCE				
N	Formulation of the operation requirements		•		PMUc
N	Preparation of the monitoring program	•			PMUc
N	Implementation of the monitoring program	•			PMUc+1
N	Preparation of guidelines for conducting the monitoring program	•			PMUc
E	Approval of the annual plan	•			PMUc+1
E	Preparation of a standardized design for the monthly report	•			PMUc
E	Monitoring of day-to-day activities	•			PMUl
E	Receiving unblocking requests		•		PMUl
E	Preparation of the request form		•		PMUl
N	Transmittal of the form to the subcontractor		•		PMUl
N	Receiving the form following the intervention		•		PMUl
E	Keeping the request monitoring log		•		PMUl
N	Receiving the monthly report		•		PMUl
N	Validation of the monthly report	•			PMUl
N	Transmittal of the monthly report to the central PMU		•		PMUl
N	Compiling data from the monthly report		•		PMUc
N	Monthly monitoring analysis	•			PMUc
N	Action pursuant to this analysis		•		PMUc
E	Production of annual reports	•			PMUc
N	Technical support to regional departments	•			PMUc
N	Transfer of information to the private sector		•		PMUc
N	Articulation of personnel training needs	•			PMUc+1
N	Feedback to designers	•			PMUc

E/N	Activity	Type			Action
		T	A	F	
	TREATMENT PLANT OPERATIONS AND MAINTENANCE				
N	Calculating the effluent requirements	•			PMUc
N	Formulation of effluent and operation requirements		•		PMUc
N	Preparation of the monitoring program	•			PMUc
N	Implementation of the monitoring program	•			PMUc+l
N	Preparation of guidelines for conducting the monitoring program	•			PMUc
N	Description of the performance analysis method	•			PMUc
E	Approval of the annual plan	•			PMUc+l
E	Preparation of a standardized design for the monthly report	•			PMUc
E	Monitoring day-to-day activities	•			PMUl
N	Receiving the monthly report		•		PMUl
N	Validation of the monthly report	•			PMUl
N	Transmittal of the monthly report to the central PMU		•		PMUl
N	Compiling data from the monthly report		•		PMUc
N	Monthly monitoring analysis	•			PMUc
N	Action pursuant to this analysis		•		PMUc
E	Production of annual reports	•			PMUc
N	Technical support to regional departments	•			PMUc
N	Transfer of information to the private sector		•		PMUc
N	Articulating personnel training needs	•			PMUc+l
N	Feedback to designers	•			PMUc

E existing activity
N new activity
T technical
A administrative
F financial

PMU Performance Monitoring Unit
PMUc Central PMU
PMUl Local PMU
PMUc+l joint action by central and local PMU
IMC Internal Market Committee
PSMC Permanent Secretaryship to the Market Committee
ONAS Main office department already performing a similar activity

3.2 Current Situation

ONAS' contractual activities related to the monitoring of O&M are currently limited, since the agency operates its own facilities. For all practical purposes, however, most of the contractual activities in a private sector operation context would remain similar to those related to carrying out studies or construction. For this reason most of the activities in Table 1 have been classified as "existing (E)."

In addition, Decree No. 89-442 of April 22, 1989, regulating public markets, modified by Decree No. 90-557 of March 30, 1990, stipulates the conditions that apply to contracts entered into by the government, local public collectives, public entities of an administrative nature and public enterprises for the purpose of carrying out construction, provision of supplies, services or studies. The contractual process to which ONAS must adhere is based on these two laws, and also applies to private sector O&M services.

Many of the network operation monitoring activities are classified as "existing (E)," because ONAS already monitors its own network operation activities. Some of them involve technical knowledge (the approval of the annual plan, the preparation of a standardized design for the monthly report, monitoring the day-to-day activities and producing annual reports) while others are administrative in nature (receiving unblocking requests, preparing the work order and keeping the request monitoring log).

Some treatment plant O&M monitoring activities are also classified as "existing (E)" for the same reasons as above. These activities are technical in nature and are the same as for the networks.

3.3 New Context

In the context of private sector participation in the area of liquid waste treatment in Tunisia, ONAS will have to conduct new monitoring activities.

For the most part, the activities termed "contractual" are existing activities. However, three of them can be considered new. The preparation of the technical scope of work is one, because it involves several new activities (the requirements and the monitoring program). Another is enacting new codicils to O&M contracts. And finally, the third is the resolution of disputes in their first stage, due to the novelty of the type of contract.

For the record, we highlight the existence of Law No. 93-42 of April 26, 1993, promulgating the Arbitration Code. Up to now, recourse to arbitration has been noted in a clause of the specifications, but it was subject to interpretation; it has almost never been used by or against ONAS. ONAS has been able to come to an amicable agreement in almost all disputes in which it has been engaged.

There are more new activities directly related to the operations and maintenance of networks by the private sector. But several of them are administrative in nature, and involve exchanges

of information between the private operator and ONAS, or among the various ONAS departments.

The others are technical in nature. They involve formulating the operating requirements, preparing and implementing the monitoring program, preparing general guidelines for conducting the monitoring program, and validating and analyzing the monthly reports prepared by the private operators.

Finally, other new activities are: formulating recommendations on personnel training needs for this private operator monitoring component, providing technical support to the regional departments and giving feedback to the designers.

Treatment plant operation also involves many new activities. As above, several of them are administrative in nature, and involve information exchange. The others are mainly technical in nature. In addition to the activities mentioned for networks, effluent requirements must be calculated and formulated. Likewise, a description of the performance analysis method is needed in order to avoid conflicts with the private operators in interpreting the monitoring program results as they relate to fulfilling the requirements.

Some activities of a technical nature require more detailed explanations. They will be revisited in section 4.2 of this report.

3.4 Distribution of Tasks

With the exception of administrative and financial tasks directly related to contractual activities, which will be handled by the existing ONAS departments, the PMU is responsible for all other tasks aimed at the monitoring of O&M carried out by the private sector.

In theory, for network O&M, a zone transferred to the private sector should correspond approximately to that of an ONAS center. For ONAS, this entails eliminating the corresponding center.

But ONAS remains responsible for contact with the clients. In the case of unblocking requests, it is better for the PMU to undertake the job of interfacing with the clients, so it may remain the only contact point for the company responsible for operating the network.

However, new connections to the public sewer system in a zone operated by a private company will not necessarily be made by the same private company. In such cases, the PMU administrative officer for the territory could usefully perform this client contact function for the nearest regional district, receiving the requests for new connections. ONAS can thus stay as close as ever to its clients, making it possible to share certain expenses (the administrative officer's salary, the premises, furniture, telephone, etc.) with the local PMU unit and the regional district. Other activities related to making new connections can be conducted from a neighboring ONAS center, at least while private sector participation is limited to pilot

projects. Later, ONAS must study this element carefully: if operations and new connections are geographically coordinated, the PMU could monitor both activities.

4 PMU Organizational Structure and Operations

4.1 The Organizational Structure of the PMU

The PMU is called upon to maintain relationships with the private companies that will become involved in the operation of ONAS facilities, as well as with other ONAS departments and with the clients. Its structure must therefore reflect this division. For this reason we recommend that it consist of a central unit located at the head office and local units devoted to each territory operated by the private sector.

After consultation with ONAS staff, we also recommend that the local PMU answer not only to the central PMU, but also to the office of the district within which it operates.

In order to maximize the benefits accruing from such an arrangement, it is essential that the role of the technical officer be well defined and focus primarily on monitoring the performance of the private firm. In addition, the tools and methods used by the technical officer must be consistent with the guidelines developed by the central PMU.

Provided that the above conditions obtain, this arrangement has a number of advantages. First, it encourages a more rapid integration of the positive innovations introduced by the private firm into other district services. Second, it facilitates faster communication between the district and the contractor; when the district receives user requests for hook-ups, unblocking, etc., it can transmit them more quickly to the private firm. Locating the PMU in the district also frees up the administrative officer to work on other district tasks. Finally, the proximity of the district to the PMU facilitates the recruitment of new PMU personnel.

An organigram showing the relation of the central and local PMUs to other ONAS administrative units is attached as Annex F.

4.1.1 The Local Network Operation PMU

It is essential for the PMU to exert a strong presence in order to monitor a private operator's day-to-day activities. The PMU should also safeguard the quality of service provided to the clients by maintaining a local monitoring unit, as close as possible to the current office of the ONAS center.

The PMU should be able to clearly determine whether private operation produces a service on an equal level with that provided by ONAS before transferring operations to the private sector. Thus, the monitoring of the private operator's day-to-day activities should resemble ONAS' own current self-monitoring. This self-monitoring is currently carried out locally by each center's "operations" foreman. This job description thus seems appropriate for the local PMU, particularly in the context of the pilot projects.

In addition to the technical officer, the local PMU should also include an administrative officer to serve as a point of contact with the clients for unblocking requests, as well as carry out the administrative activities required by the central unit. But, as noted in section 3.4 on the distribution of tasks, such an administrative officer posted to a local PMU can usefully be shared with the nearest district of the regional department to provide close client contact for other activities, such as receiving requests for new connections.

4.1.2 The Local Treatment Plant Operation PMU

For the treatment plants, client contact need not be as close as for the networks. Moreover, the activities related to operation take place at set locations that are well defined (the treatment plants, pumping stations and sites for the disposal of sludge and other waste). Finally, most medium-sized and large treatment plants serve a territory that encompasses more than one ONAS regional center. For all these reasons, the local PMU could even be housed at the existing regional department office closest to the treatment plant. The administrative officer already posted at the office could then be responsible for receiving the monthly reports from the private operator and the documents sent to the local PMU by the central unit.

In the phase following the pilot projects, the technical officer of a local PMU could be given responsibility for monitoring the performance of more than one treatment plant (between three and five), depending on the distance between them, their size and the type of treatment used: it requires more time to monitor a large automated treatment plant (activated sludge) than a small, more simple facility (aerated or non-aerated lagoons).

4.1.3 The Central PMU

For the purpose of ensuring uniformity in the PMU's monitoring of private operators, it is essential that all monitoring activities be designed and directed by a single unit; this makes a central PMU a necessity. The role of this central unit can be seen clearly in the description of specific tasks summarized in Table 1 above. This role includes a high-level technical component in designing monitoring methods, preparing technical documents and analyzing the performance of the private operators from a broader standpoint than that of day-to-day monitoring.

On the other hand, the central unit must maintain a certain distance from each of the private operators in order to preserve a higher degree of impartiality in dealings with them.

Another role of the central unit is to draw lessons from experiences with private operators for the purpose of fine-tuning its methods and interventions. This is a particularly important role in the context of the pilot projects. In order to fully realize this goal, all information must flow into a single unit so that it can be analyzed not only in detail, but also from a broader viewpoint.

When it has perfected its methods and tools through monitoring the pilot projects, the scope of the central PMU can be broadened, as described in section 2.4, making it possible to homogenize liquid waste treatment facilities on the national scale.

Beginning with the first few months of the pilot projects, the central PMU can begin compiling information that could be of interest to the regional departments in their operations. It must then communicate that information.

The central PMU's role of collecting, analyzing and transferring technical and administrative information requires it to coordinate its activities with those of its partners (the local PMUs, private operators and other ONAS departments both at the main office and at the regional departments). In order to facilitate this coordination, we recommend that the PMU report to the ONAS Director of Coordination.

4.2 PMU Procedures

In order to accomplish its mission, the necessary technical and administrative tools must be available to the PMU. Clearly, the contract signed between ONAS and the private operator constitutes the official and legal basis that makes the PMU's tools effective.

These necessary tools were stated implicitly above in the description of the PMU's activities. Some of them, however, merit additional attention.

4.2.1 Technical Scope of Work

This section of the request for proposals contains the following four parts as a minimum:

- effluent requirements (treatment plants);
- operation requirements;
- the monitoring program; and
- a detailed description of the relevant facilities.

The first three parts were described in detail in the study on standards and requirements.

The description of the relevant facilities is essential if only for the purpose of defining the subject of the contract to be signed with a private company. But it is equally essential for the PMU, allowing it to carry out a complete analysis of the performance of the facilities, as well as the performance of the operator. This is a very important distinction. For example, the performance of a treatment plant may not allow the operator to fulfill the effluent requirements, although the operator fulfills all the obligations of its contract and makes the best of the particular treatment plant (very high hydraulic and/or organic overloads, or equipment that proves inadequate). The PMU must be able to distinguish between the two types of performance.

For a treatment plant or a network, the description of the facilities must be a synthesis of the design criteria (the clients served and the corresponding estimates, flows and overload) on which their construction was based, as well as a technical description of the main components of the facilities.

For a treatment plant, this description requires a diagram to be prepared synthesizing each part of the process, accompanied by a concise technical summary of each of the physical (civil engineering) and mechanical (instrumentation and controls, electricity, motors, aeration, etc.) components.

For networks, a simplified flow chart must be prepared illustrating the route traveled by the wastewater from the client to the treatment plant. It must be subdivided by basin corresponding to each overflow point (pumping station outlet, stormwater, etc.) and state the characteristics of each basin (number of current and future clients served, as well as the corresponding flows). An overall diagram must show the main structure of the network. The detailed diagrams need not be included in the request for proposals, but must be made available to the successful tenderer when the O&M contract is signed.

4.2.2 Preparation of a Standardized Design for the Monthly Report

ONAS currently has such a design for networks and treatment plants (a copy is included in Annex C). The PMU must therefore revise these designs to adapt them to the new conditions and take into account the effluent and operation requirements, as well as the monitoring programs. The new designs (networks and treatment plants) will be tested in the first pilot projects and can be improved in light of the results thereof.

4.2.3 Implementation of the Monitoring Program

At least two weeks after the private company initiates operations in the zone, a meeting must take place between the PMU (central and local) and the company for the purpose of explaining the terms of the monitoring program. This is an essential step for the two parties to see eye to eye and to avoid misunderstandings. When changes are made to the monitoring program during the execution of the contract, another meeting should take place. This kind of meeting can result in minor changes to the monitoring program that facilitate both parties' respective tasks.

4.2.4 Preparation of Guidelines for Conducting the Monitoring Program

This activity should not be confused with the monitoring of day-to-day activities. It consists of the drafting of guidelines by the central PMU for the technical and administrative officers of the local units on how to organize their work (documenting tasks, defining priorities, the nature and frequency of communications with the private companies and the central PMU, etc.). This activity has been classified as a technical activity, although it does include a strong administrative component.

4.2.5 Monitoring Day-to-Day Activities

In the very short term, i.e., for the first pilot projects, the choice of experienced technical officers should make it possible for the local PMU to fulfill its role. However, when other pilot projects are implemented, the central PMU, with the help of the first local PMU technical officers' experience in the field, should draft a guide on methods for qualitative and quantitative monitoring of the service provided by the private company. This is necessary to ensure uniformity among the various local PMUs and mitigate the effects a possible shortage of experienced technical officers.

4.2.6 Preparation of the Request Form

Annex C presents a copy of the request form currently in use at ONAS' plants. The central PMU should design a new, somewhat more detailed form (in particular, the section for describing the situation should include a list of the most frequently occurring problems, with a box for the administrative officer to check off the problem; the word "other" must be included in the list, and a line for explanations should be provided). Improving the form to facilitate monitoring would also be helpful (for example, institute memo-books or numbered forms presented in triplicate (one for the complainant, one for the private operator and a control copy for the administrative officer).

4.2.7 Keeping the Request Monitoring Log

To facilitate request monitoring, it would be useful to design a request monitoring log with a line for each request to summarize all the steps taken in the intervention and make it easier to monitor and collect statistical data. The minimum information to be recorded for each of the summary lines is: the request number, date and time, a summary of the problem (including a standardized list), the nature of the intervention, and the date and time completed. When this information is transferred to the central PMU, it can be recorded in a computer file and processed to facilitate performance analysis.

4.2.8 Validation of the Monthly Report

The monthly report is prepared by the operator, who submits it to the local PMU. Before sending it to the central PMU, the technical officer must examine it closely to ensure that it accurately represents the service provided by the operator during the month (from the quantitative viewpoint) and that the data and results included in it are reliable and representative (from the qualitative viewpoint). This aspect of the technical officer's duties is certainly the most important, and each of his activities must reflect it.

4.2.9 Compiling Data from the Monthly Report

The monthly report should be detailed enough for a complete analysis to be performed for each case. But it is not necessary to compile all the information contained in it. The PMU should carefully choose the information to be transferred to computer file, in order to make a

fast and precise analysis of the performance of the facilities and operators possible. It is important to cull the data each month so the development of the situation can be monitored as closely as possible and the accumulation of a backlog can be avoided, which quickly becomes very difficult to catch up on.

4.2.10 The Monthly Monitoring Analysis

The monthly monitoring analysis should make it possible to determine whether the facilities and the private operator are performing up to requirements. It should be repeated that the performance evaluation method must be described clearly in order to avoid any ambiguity for the private operator. Annex D presents additional comments on evaluating a treatment plant's environmental performance.

4.2.11 Action to be Taken Pursuant to this Analysis

As soon as the PMU becomes aware of a problem (late or incomplete monthly reports, unsatisfactory service provided by an operator, failure to meet effluent requirements), it must immediately inform the operator of the situation in writing and ask it what measures it intends to take to remedy the situation. Written communications are essential in a contractual context.

Initially, the central PMU will have to be responsible for all written communications with the operator. However, based on the lessons learned in the first few months, the central unit will be able to delegate certain written communications to the local unit, at least those that can usefully be carried out using standardized forms on which only the appropriate box(es) need to be checked, and the form dated and signed (for example, to give notification of a delay in submitting a report or a minor omission in conducting the monitoring program).

The central PMU should also institute an efficient system for monitoring this correspondence, so that not too much time passes before more aggressive action is taken with the operator in the case of serious problems. It is important that the operator sense that the PMU has an immediate interest in its performance and that of the facilities. However, this interest must be expressed with enough tact that the operator does not feel harassed.

4.2.12 Production of Annual Reports

ONAS has been producing fairly detailed annual reports for several years. The PMU can certainly use them as a model in preparing its own annual reports. However, it must adapt them to cover all the elements cited in the operation contract (effluent and operation requirements, the monitoring program, the quality and quantity of the service provided by the operator), and its own activity (the production of internal monitoring documents, interventions with the operators, etc.), as well as lessons learned from the past year's operations. The PMU must produce its reports quickly at the end of each year, since certain data supplied in them will have to be incorporated into the annual reports summarizing all ONAS activities.

If the monitoring methods developed by the PMU are also applied to facilities operated by ONAS (effluent and operation requirements, monitoring programs, etc.) after the pilot projects have been implemented, the PMU could be called upon to produce a larger share of ONAS' annual reports. In fact, the PMU could produce statistics relating to the facilities' operational and environmental performance, including a technical analysis of these statistics. However, drawing recommendations from this analysis regarding ONAS general policies remains the province of the Department of Development.

4.2.13 Technical Support to the Regional Departments

This PMU activity consists of analyzing the operational methods used by the private companies for the purpose of passing on relevant information to the regional departments, making it possible for the regional operations management offices to take advantage of positive innovations implemented by the private companies.

4.2.14 Transfer of Information to the Private Sector

The PMU should draft internal documents specifying the methods it uses for monitoring private operators. It should prepare targeted versions of these documents (effluent and operation requirements, monitoring programs, instructions regarding conducting monitoring programs, a description of the technical content of the special regulations, etc.) for the private companies that express an interest in becoming involved in facility operation. The aim of these documents should be to clarify the nature of O&M contracting and to allow interested companies to prepare themselves to enter this new field.

4.2.15 Articulation of Personnel Training Needs

Because of the new activities the PMU will be called upon to perform, personnel training needs merit special attention, mainly during its first few years of operation. This subject will be treated in section 7 of this report.

4.2.16 Feedback to the Designers

In order to help facilities designers avoid duplication of error, the PMU should institute a method of identifying design specifications that cause problems or complications during operation. One practical way of proceeding consists of creating a list of problems linked to facilities operation. This list could be broken down into several sections relating to the various facilities components. Such a list can be created and regularly updated on the basis of the comments recorded in the monthly reports, but primarily through the local PMU technical officer, who can get verbal descriptions of the problems encountered from the operator.

It is essential that this list be distributed among the designers; this is the reason for the list's existence. But it is important to present the problems that are encountered objectively, insisting on the constructive nature of the list.

5 Number and Qualifications of PMU Personnel

Section 4.1 on the organizational structure of the PMU gave a brief description of each of the positions required, on the one hand, at the local unit level for network and treatment plant operation, and on the other, at the central unit level. In theory, the local PMUs will all be the same size, trimmed down to the essential. The size of the central PMU will remain constant during the pilot projects, and could increase as a result of expanding O&M contracting out to other ONAS facilities.

5.1 The Local Network Operation PMU

Two employees are sufficient for the local network operation PMU: a technical officer whose qualifications correspond the those of an "operations" foreman, and an administrative officer. Part of the administrative officer's job of receiving requests for new connections could be assigned to the regional district.

5.2 The Local Treatment Plant Operation PMU

A single employee is sufficient for treatment plant monitoring, since client contact is much more limited, and operational activities are concentrated within a limited area: a technical officer whose qualifications correspond the those of an operations foreman. This officer could be responsible for monitoring more than one treatment plant.

5.3 The Central PMU

In the short-term, the PMU will have to manage the pilot projects, of which there are very few (six networks and six treatment plants). The PMU could fulfill its function with two engineers, assisted by a technician. The qualifications required for each are as follows:

- Senior Engineer (six years of university-level study) specializing in liquid waste collection and/or treatment;
- Facilities Engineer (four years of university-level study) with training in civil engineering and/or hydraulics;
- Management Information Systems Technician

Ideally, the engineers' abilities should complement each other. One should be better at synthesizing data and giving feedback on the conceptual level, while the other should be better at developing and implementing direct support tools in the local units, as well as supervising the work of these units.

It is also useful for their experience to be complementary. If the facilities engineer has professional experience in network operation, the senior engineer should have a fairly solid knowledge of treatment plant operation.

Each engineer must have a minimum of five years of experience. The senior engineer, who will be in charge of the PMU, could come from the Department of Development, and the facilities engineer could be recruited from the staff of the Operations Office. Both will thus have experience in conducting market studies and/or work performed by private organizations.

The management information systems technician should be able to institute and manage a database and institute a document management system, as well as carry out ordinary administrative duties. An essential prerequisite is familiarity with the word processing and spreadsheet programs used at ONAS.

In the medium term, change in the number of individuals assigned to the central PMU essentially depends on the pace of development of contracting out and the decision to implement the PMU's monitoring methods at ONAS-operated facilities. In addition, the geographic location of the facilities under the PMU's control has an influence on the number of people needed at the central PMU, since its engineers must travel periodically to check the work of the local PMUs, participate in training them and observe for themselves the service provided by the operator.

In fact, the need for recruiting other engineers for the central PMU depends, for facilities engineers, on the number of local network operation PMUs, and on the number of local treatment plant operation PMUs, for senior engineers. The experience of the engineers who will be brought on board to assist in the central PMU does not need to be as highly developed as during the implementation of the PMU, since these new engineers will be able to fall back on the experience of their predecessors and superiors in the hierarchy.

It is difficult to provide a very realistic criterion right now for the decision to increase the size of the staff of the central PMU. But we believe that the first increase should wait until the tenth local PMU (for each of the "network" and "treatment plant" subdivisions) has been set up. After that, adding a new engineer after groups of fifteen (15) local PMUs have been put into place can be considered. The geographical distribution of the local PMUs may be the source of changes in the solely number-based criterion.

6 PMU Material Resources

The light structure of the PMU does not require a great deal of material resources to perform its function. It can draw on the logistical resources available at the central and local offices of ONAS; these resources stand to be freed up to a large degree by the transfer of the operation of certain facilities to the private sector.

Thus, on the local level, the PMU will not need equipment in addition to what is available at the ONAS centers. Office and furnishing needs are even less. But these offices will have to be equipped with a telephone line and a fax machine, for the purpose of providing service to the clients and facilitating communications with the central PMU.

The technical officer will need a utility-type service vehicle for observation visits and monitoring on the territory.

On the central level, the PMU, which will be housed discreetly at the ONAS office, will require computer equipment for data processing. This could be limited in the short term to a 486 computer with database software (*dBase IV*, *FoxPro* or *Access*), as well as common word-processing and spreadsheet software.

The central PMU will need telephone lines reserved for its exclusive use, as well as access to a fax machine fairly close to its offices. At some point, the suitability of providing a dedicated fax line for the PMU must be considered.

Later, the PMU could benefit from the installation of a local computer network in the ONAS head office. Data exchange and electronic messaging can only make its communications more efficient.

Finally, both of the central PMU's engineers will need service vehicles for travelling to local PMUs and the operation sites they are responsible for monitoring.

7 PMU Training Needs

The head of the ONAS Training Division provided us with an overview of the training course for sanitation technicians, a summary of the training program in the maintenance workshops, and a sheet summarizing the internship program for lab assistants at the central laboratory. These documents are presented in Annex E.

These programs form an attractive basis for the job description of a local PMU technical officer. But the hours allocated to the various subjects should be redistributed, or training in measurement and treatment plant operations monitoring should be added. The internships at the workshop or laboratory could be cut down, since a local PMU technical officer would not have to perform such activities, but should be able to determine whether the operator performs satisfactorily.

Generally speaking, the local PMU personnel can participate in ONAS' existing training programs to strengthen their weak points and make them more effective on the job (further academic training, foreign language courses as required).

They will require specific training in monitoring the execution of an O&M contract (explanations of the terms of the contract and the requests for proposals, and of the private operator's responsibilities).

Specific training in performance monitoring is likewise essential (sampling methods, calibrating measurement instruments, manipulation and preservation of samples, methods for monitoring the quality of cleaning operations).

Finally, specific training on the monitoring programs imposed on the private operator and on the method of analyzing performance is also fundamental for a technical officer.

The administrative officer should also be familiar with the role of the local PMU and of his role in particular, and be updated on changes likely to occur as the PMU acquires practical experience.

For the central unit, specific operation contract management training must be acquired. The engineers should familiarize themselves in detail with the terms of the specifications and the provisions of the contract.

All central PMU personnel must have basic computer training (databases, word-processing and spreadsheets) and periodic advanced courses.

The management information system technician must keep up to date on developments applicable to document management.

Finally, the PMU technical personnel (engineers and local PMU officers) must be informed of the terms of Tunisian effluent standards, as well as changes made to them.

8 The PMU Budget

The PMU budget will be given only for the period during which it is responsible for the performance monitoring of the pilot projects, i.e., for a period of five years beginning in 1995.

This budget is based on the following assumptions:

1. Office premises: 10 m^2 per person, i.e., 30 m^2 for the central PMU, 20 m^2 for a network local PMU and 10 m^2 for a treatment plant local PMU. Unit cost: 10 TD/m^2/month.
2. Furniture: PMUc: 300 TD/person
   PMUl: 150 TD/person
3. TFSE: (outside services) 20% of the cost of the premises
4. Supplies: 10% of the cost of the premises
5. Vehicles: Purchase, Utility vehicle - 12,500 TD; Service vehicle - 17,500 TD
   Maintenance (fuel, spare parts, repairs) - 1,500 TD/year/vehicle
6. Salaries (including expenses)

Senior Engineer:	750 TD/month	central PMU
Facilities Engineer:	600 TD/month	central PMU
MIS Technician:	400 TD/month	central PMU
Technical Officer:	400 TD/month	local PMU
Administrative Officer:	300 TD/month	local PMU

All costs are expressed in 1995 TD. The budget estimate assumes that the central PMU and the two local units (one network and one treatment plant) will be set up in 1995. Two other network local units and two treatment plant local units are added in 1997. To complete the pilot projects, three network local PMUs and three treatment plant local PMUs are added in 1998.

The purpose of the budget estimate is simply to provide an order of magnitude for the PMU's annual operating costs. Optimization of the budget was not attempted. On the contrary, it is a ballpark estimate, since the details that would make optimization possible are not known at the time of this writing. Some of these details are: the location of the networks and treatment plants chosen for the pilot projects; possible office space, furniture and vehicles needed in addition to what is provided by ONAS; whether and how to divide the expenses of an administrative officer between the PMU and another ONAS department; the possibility of placing more than one treatment plant under the observation of one technical officer in the pilot projects; etc.

Thus, the budget estimate presented in Table 2 excludes several potential scenarios. It therefore provides a generous estimate of the PMU's budgetary needs.

Table 2
PMU Budget Estimate 1995-1999

Item	1995	1996	1997	1998	1999	Total
Central PMU						
1. Premises	3,600	3,600	3,600	3,600	3,600	18,000
2. Furniture	900	--	--	--	--	900
3. TFSE	720	720	720	720	720	3,600
4. Supplies	360	360	360	360	360	1,800
5. Vehicles - purchase	35,000	--	--	--	--	35,000
- maintenance	3,000	3,000	3,000	3,000	3,000	15,000
6. Salaries	21,000	21,000	21,000	21,000	21,000	105,000
Subtotal	64,580 DT	28,680 DT	28,680 DT	28,680 DT	28,680 DT	179,300 DT
Local PMU (network)						
1. Premises	2,400	2,400	7,200	14,400	14,400	40,800
2. Furniture	300	--	600	900	--	1,800
3. TFSE	480	480	1,440	2,880	2,880	8,160
4. Supplies	240	240	720	1,440	1,440	4,080
5. Vehicles - purchase	12,500	--	25,000	37,500	--	75,000
- maintenance	1,500	1,500	4,500	9,000	9,000	25,500
6. Salaries	8,400	8,400	25,200	50,400	50,400	142,800
Subtotal	25,820 DT	13,020 DT	64,660 DT	116,520 DT	78,120 DT	298,140 DT
Local PMU (treatment plant)						
1. Premises	1,200	1,200	3,600	600	7,200	13,800
2. Furniture	150	--	300	450	--	900
3. TFSE	240	240	720	1,440	1,440	4,080
4. Supplies	120	120	360	720	720	2,040
5. Vehicles - Purchase	12,500	--	25,000	37,500	--	75,000
- Maintenance	1,500	1,500	4,500	9,000	9,000	25,500
6. Salaries	4,800	4,800	14,400	28,800	28,800	81,600
Subtotal	20,510 DT	7,860 DT	48,880 DT	85,110 DT	47,160 DT	165,520 DT
TOTAL	**110,910 DT**	**49,560 DT**	**142,220 DT**	**230,310 DT**	**153,960 DT**	**686,960 DT**

The total budget for the last three years, when all twelve pilot projects are underway, is 526,190 TD. This represents 43,874 TD, or an average of 45,000 TD per pilot project. Clearly, savings are possible and even probable, as mentioned above. In the mid-term, the possibility of monitoring two network contracts could also be considered, provided that there are two neighboring sectors controlled by the PMU.

9 Frequency of Use of PMU Documents

The frequency of use of PMU documents is implicit in their descriptions given above. The names of some documents explicitly state how often they are used, e.g., the monthly and annual reports. But in order to avoid confusion, the frequency of use or revision of several documents used in specific activities is provided below.

9.1 Special Regulations

This document involves the preparation of the following four documents:

- the formulation of the effluent requirements (treatment plants);
- the formulation of the operation requirements (networks and treatment plants);
- the monitoring program (networks and treatment plants);
- a detailed description of the facilities.

All these documents must be prepared before each request for proposals. The monitoring program, however, must be revised annually, as long as this revision does not involve additional expense for the operator. Clearly, these same documents must be updated for each new request for proposals at the end of a contract.

9.2 Readers' Committee

The central PMU participates in editing the readers' report and in editing each request for proposals. There is only one report per request for proposals, and its frequency therefore depends on the duration of each contract.

9.3 Guidelines for Conducting the Monitoring Program

The PMU prepares two kinds of guidelines for conducting the monitoring program: one relating to networks and the other relating to treatment plants. Both of these documents must cover all the contracts awarded. They should be revised annually, at least during the pilot projects. In the mid-term, revision once every three years is sufficient.

9.4 Description of the Performance Analysis Method

Here, too, the performance analysis for networks must be distinguished from the one for treatment plants. In the short term, they should be revised annually, and in the mid-term revision once every three years is sufficient. However, especially in the case of networks, the method should be adapted to the type of contract.

9.5 Technical Support to the Regional Departments

Essentially, a document must be produced summarizing the attributes of the methods employed by private operators, for the benefit of the regional departments that operate networks and treatment plants themselves. Two documents will, in fact, be necessary: one for networks and one for treatment plants. The first document should be produced after the first year of operation by a private company, and revised each year.

9.6 Transfer of Information to the Private Sector

Section 4.2.14 describes the content of a general information document directed at companies interested in network and/or treatment plant operation. Clearly, this document must be updated each time a change is made to one of its components. This updating should be done annually.

9.7 Feedback to the Designers

This activity can be effected using a list dealing with facilities operation. This list should be produced after the first year of the PMU's existence, and updated as problems arise. The PMU should publish the list annually.

Annexes

Annex A
Terms of Reference

The purpose of this study is to permit ONAS to develop the capacity to monitor the private sector provision of services that it formerly provided. The PMU, once structured, will operate around the norms, performance standards, and data universe being established in the Task 3 of this Delivery Order.

The contractor shall meet with various concerned entities within the GOT, Ministry of Environment, and ONAS and prepare a set of recommendations regarding the following:

a. The role of the PMU — The role of the PMU is to manage the contracts that ONAS will establish with private sector entities, as subcontractors or concessionaires, to perform services. The unit will perform administrative, financial, and technical roles: the role of the contractor is to identify each of the tasks required for each of these three categories, and identify those that are new to ONAS, versus those that are currently being performed by ONAS in some form or another. In this regard, the contractor will make recommendations regarding the appropriate division of labor between the PMU and the other concerned entities of ONAS.

b. Organization and Methods of Functioning of the PMU — The contractor shall define the internal organization of the PMU, and its place within the overall structure of ONAS. It will recommend the types and frequency of reports and documents to be prepared and the schedule for circulating them both within and outside of the PMU. The contractor shall also define the nature and frequency of contacts between the PMU and the private contractors.

c. Personnel Structure — The contractor shall recommend the qualifications, experience, and numbers of employees necessary for the effective functioning of the PMU, taking into account the need for the PMU to be able to draw "lessons learned" from the first pilot privatization projects, and be able to generalize them throughout the country.

d. Equipment and Materials — The contractor shall make recommendations regarding the transport, communication, and computerization and office needs of the PMU.

e. Training Needs — The contractor shall make recommendations regarding the type and quantity of training necessary for the effective functioning of the PMU.

f. Budget — The contractor shall make recommendations regarding the initial and ongoing operating budget necessary for the effective functioning of the PMU.

Annex B

LIST OF PERSONS INTERVIEWED

ONAS	Mr. Abid, Head of the Planning and Statistics Division of the Office of Development.
	Mr. Salah Boukef, Head of the Training Division.
	Mr. Rezguy, Head of the Auditing and Management Monitoring Department.
	Mr. Maacha, Director of Operations of the Greater Tunis Regional Department
	Mr. Messoussi, Deputy Director of the Legal and Administrative Department
	Mrs. Amel Jrad Fantar, Director of the Central Laboratory
	Mr. Aniba, Head of the Budget Division of the Office of Development
	Mr. Hamouda, Head of the "Construction 2" Division of the Greater Tunis Regional Department
	Mr. Khalil Attia, Head of the (Sousse) Center Department
PSMC	Mr. Ezzeddine Trabelsi, Director of the Permanent Secretaryship to the Market Committee
EICO	Mr. Larbi Khrouf, President

Annex C

Example of the Monthly Activity Report: Network
Example Request Form

OFFICE NATIONAL DE L'ASSAINISSEMENT
DIRECTION DE L'EXPLOITATION

D.R. : Centre
Sce : District Sousse
Centre : H^m Sousse / Z.T

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COMPTE RENDU MENSUEL D'ACTIVITE
— RESEAU —

ONAS
DIRECTION DE L'EXPLOITATION
09 OCT 1994
645

Mois de : Avril Annee : 1994

Observations du Chef de Centre :

- Il faut remplacer le compresseur Ingersoll qui est en mauvais état.
- Suite à l'extension du reseau de 20% (oued El Kila + Zône de la plage), il est urgent de renforcer l'effectif du Centre.

Observations du Chef de Service	Observations du Directeur Régional :

Le Chef du Centre	Le Chef du Service Régional
Date 6/5/94	Date : 10/5/94
Visa :	Visa :

Centre Technique H. Sousse

28

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I. PERSONNEL DU CENTRE

1	EFFECTIF TOTAL	35
2	OUVRIERS PERMANANTS	7
3	JOURNEES D'OUVRIERS	156
4	JOURNEES DE CONGE ANNUEL	25
5	JOURNEES DE CONGE DE MALADIE	-
6	JOURNEES D'ACCIDENT DE TRAVAIL	-
7	JOURNEES REPOS COMPENSATEUR	-
8	JOURNEES DE REPOS DIVERS	-
9	JOURNEES D'ABSENCES IRREGULIERES	-
10	JOURNEES DE RENFORT POUR AUTRES CENTRES	5
11	JOURNEES D'OUVRIERS NETTES	122
12	HEURES DE TRAVAIL NETTES	958
13	HEURES SUPPLEMENTAIRES	87
14	HEURES OCCASIONNELLES	2687
15	HEURES DE RENFORT DES AUTRES CENTRES	-
16	TOTAL DES HEURES DE TRAVAIL	3732

II. RESEAU EXPLOITE

	RESEAU EXPLOITE FIN DU MOIS PRECEDENT	ML	REGARD	AVALOIR	B.Egout	Nat°
1	EU	60433	2041	1		
2	EP	664	22	48		
3	RU					
4	TOTAL	61097	2063	49		
	EXTENSIONS DU MOIS					
5	CENTRE	42	2			
6	SOUS TRAITANT					
7	DIV/DPT					
8	AUTRES					
9	TOTAL EXTENSION	42	2			
	TOTAL RESEAU FIN DU MOIS					
10	EU	60475	2043	1		
11	EP	664	22	48		
12	RU					
13	TOTAL	61139	2065	49		

(1)

III. BRANCHEMENT

1	N° DE BRANCHEMENTS DEBUT DE MOIS	3818
2	DEMANDE EN INST D'EXECUTION DEBUT DU MOIS	2
3	DEMANDE EN INST DE PAIEMENT DEBUT DU MOIS	138
4	DEMANDE DU MOIS RECUES	15
5	DEMANDES DU MOIS PAYEES	3
6	DEMANDES EN INSTANCES DE PAIEMENT	150
7	DEMANDES EXECUTEES PAR CENTRE	4
8	DEMANDES EXECUTEES PAR SOUS TRAITANT	-
9	DEMANDES EXECUTEES PAR DIV/DPT	-
10	DEMANDES EXECUTEES PAR AUTRES	-
11	TOTAL	4
12	DEMANDES EN ATTENTE D'EXECUTION FIN DU MOIS	1
13	N° DE BRANCHEMENTS FIN DU MOIS	3922

IV. REFECTION & REHABILITATION

A. AMENAGEMENT ET RENOUVELLEMENT DU RESEAU

		NOMBRE	REGARD	AVALOIR	B.E	ML
1	CENTRE		1			
2	AUTRES					
3	S.TOTAL		1			

B. AMENAGEMENT ET RENOUVELLEMENT DU BRANCHEMENT

		NOMBRE	ML	REGARD	AVALOIR	B.B
4	CENTRE	3	12			2
5	AUTRES					
6	S.TOTAL	3	12			2

V. CURAGE SYSTEMATIQUE

A. CURAGE MECANISE		ML	REGARD	AVALOIR	B.E	B.BR	NAT°	BOUES
1	EU	7680	86	-		176		10
2	EP							
3	RU							
4	TOTAL	7680	86			176		10

B. CURAGE MANUEL		ML	REGARD	AVALOIR	B.E	B.BR	NAT	BOUES
5	EU		825	-	-	2053	-	10
6	EP							
7	RU							
8	TOTAL		825			2053		10

VI. DEBOUCHAGE

1	RECLAMATIONS RECUES	32
2	INTERVENTIONS MECANISEES SUR RESEAU	2
3	INTERVENTIONS MANUELLES SUR RESEAU	4
4	INTERVENTIONS MECANISEES SUR BRANCHEMENTS	-
5	INTERVENTIONS MANUELLES SUR BRANCHEMENTS	26
6	TOTAL DES INTERVENTIONS	32
7	TOTAL DES INTERVENTIONS PAYANTES	1

VII. CURAGE DE CAMPAGNE

	ML	REGARD	AVALOIR	B.E	B.BR	BOUES
RESEAUX						
CANAUX						
OUVRAGES						

VIII. REPARTITIONS DES HEURES DE TRAVAIL

1	EXTENSIONS	168	13
2	REFECTION	177	5
3	CURAGE MECANISE	333	10
4	CURAGE MANUEL	1417	38
5	BRANCHEMENT	214	6
6	DEBOUCHAGE	430	11
7	AUTRES	638	17
8	TOTAL	3732	100

(1) : 1er : Rue Direction 1er 2e Kribi.
1er : Rue [illegible]

79

IX FONCTIONNEMENT ET RENDEMENT DES ENGINS SPECIAUX

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ENGIN	FONCTIONNEMENT			OUVRAGES-CURES						RENDEMENT MINIMUM			RENDEMENT MAXIMUM			MOYEN/JOUR			CARBURANT		Nbr VID	Observations
	Marc	Repo	Pan	ML	REG	AVA	BE	B.BR	m³ boue	ml	Ov	m³ boue	ml	Ov	m³ boue	ml	Ov	m³ boue	GO	Ess		
Lizy Nouvelle 505 FEV	7			1680	—	—	—	—	—	850	—	—	1450	—	—	1097	—	—	—			
Ide Jaxx 35134	15	-	-	—	86	-	—	174	10	—	4	0,2	—	35	1,2	—	17	0,7	—			
Cater 6325 Grue à bennes	24	6	-	—	821	—	—	2019	10		56	0,2	—	160	1	—	120	0,4	—			

• Nbr Vidange : nombre de vidange des citernes

30

X Avancement des travaux de curage :

Désignation Secteur	ml		Regard		Avaloir		B.E.		m³ boue		Observations
	Pr	Ré	Pr	Ré	Pr	Ré	Pr	Ré	Pr	Ré	
H^m - Sous/Z T	900	768	1200	911							

XI. Travaux d'Assainissement en cours de réalisation par des promoteurs ou autres

PROMOTEURS	DESIGNATIONS	DEBUT DES TRAVAUX	FIN PROBABLE DES TRAVAU
DIET (Bénéfaid)	Assainissement de la zone de la plage	Juillet 93	Juillet 94
AFT/(Lotissement)	Réhabilitation du réseau de la Route Touristique	Novembre 93	—
AUTRES			

XII. Commentaires

• **Curage :** Il faut renforcer l'équipe de Curage

• **Débouchage :** Nombre de réclamation a légèrement augmenté par rapport au mois précédent (32).

• **Maçonnerie :** Il faut remplacer le compresseur Ingersoll.

• **Autres :**

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ONAS

_____, le ___/___/ 199 ___ à___h

RECLAMATION N° .....

Pétitionnaire : .....

Situation : .....

Objet : .....

Travaux Confiés à : .....

Observations et Visa du Responsable .....

.....

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Annex D

Method for Calculating the Performance
of a Treatment Plant

Calculation Method for Analyzing the Performance of Activated Sludge Treatment Plants

1 Overview

The influent and effluent flows and loads undergo an initial evaluation. All treatment plants will be subject to a BOD_5 and SS effluent requirement for the year. They will also be subject to a requirement for an intermediate period, however, which can be quarterly, monthly or weekly depending on the treatment plant category (size). As a result, influent and effluent flows and loads must be evaluated for the year, as well as for the intermediate period.

In addition, the validity of the available analysis results must be assessed before a performance analysis is undertaken. In fact, certain results must be eliminated if they cannot be explained (for example, if the COD and BOD_5 parameters for the same sample are practically the same, there is reason to question seriously their validity; examining typical COD/BOD_5 ratios should make it possible to confirm the result's validity or eliminate this data; the BOD_5/SS and COD/SS ratios are other reference criteria for validating or rejecting a result). However, substantial variation in the composition of the wastewater received at the treatment plant is frequent for plants that receive a significant share of industrial wastewater; a result must therefore be next to impossible before the decision is made to eliminate it.

2 Influent

2.1 Average Influent Flow: F_{Iavg}

Average flows are obtained by taking the arithmetic average of "n" daily flows during the period. A monthly average is practical except where there is a weekly need. The annual or quarterly averages are then calculated from the monthly averages.

2.2 Average Influent Load: L_{Iavg}

2.2.1 Household Wastewater

A good estimate of the influent (or treated wastewater) load for a given period (annual, quarterly, monthly or weekly) is obtained by taking the arithmetic average of all available daily loads for that period. The latter are obtained by multiplying the concentration of an influent sample taken over a 24-hour period by the influent flow measured during the same 24-hour period. The average influent load is therefore calculated as follows:

$$L_{Iavg} = \text{the sum of } \frac{C_{Ii} \times F_{Ii}}{n}, \text{ for } i = 1 \text{ to } n$$

where n = the number of days of influent sampling

Except where there is a weekly need, a monthly average is practical for influent loads. But the calculation of the annual or quarterly average should take into account the number of values within each month that went into the monthly average.

Example:	January	n = 3	BOD_5 = 64 kg/d
	February	n = 3	BOD_5 = 56 kg/d
	March	n = 2	BOD_5 = 60 kg/d

$$L_{Iavg}: \frac{(3 \times 64) + (3 \times 56) + (2 \times 60)}{8} = 60 \text{ kg/d}$$

2.2.2 Wastewater with a High Percentage of Industrial Wastewater

Where the wastewater contains a high percentage of industrial wastewater, the results of the analysis must be weighted in the calculation to take substantial variations in these special users' effluents into account. In addition, if there are major seasonal variations, the origins of which are known, they should be taken into account in calculating the average load.

The calculation of the weighted average of all the results that go into the influent data should take into account the number of days per week the industry operates, if it does not operate seven (7) days a week.

Example: The industry operates all five (5) weekdays, but not on the weekends:

Wednesday	BOD_5 = 114 kg/d
Thursday	BOD_5 = 127 kg/d
Friday	BOD_5 = 103 kg/d
Saturday	BOD_5 = 45 kg/d
Sunday	BOD_5 = 51 kg/d

$$L_{Iavg}: \left[\frac{(114 + 127 + 103)}{3} \times \frac{5}{7}\right] + \left[\frac{(45 + 51)}{2} \times \frac{2}{7}\right] = 95.6 \text{ kg/d}$$

3 Effluent

3.1 Calculating Average Effluent Values

3.1.1 Average Effluent Flow: F_{Eavg}

Unless a treatment plant has an effluent flow measurement system that is as precise and reliable as the influent one, the average influent flows obtained by taking the arithmetic

average of "n" daily flows measured on entrance into the plant for the relevant period can be used as the F_{Eavg}.

3.1.2 Average Effluent Load: L_{Eavg}

Average effluent loads are determined on the basis of the values gathered during the period according to the same principle used for influent loads, but using the concentrations measured for the effluent (substitute C_{Ii} for C_{Ei} in the equation).

Example:	January	n = 3	BOD_5 = 5 kg/d
	February	n = 2	BOD_5 = 4 kg/d
	March	n = 3	BOD_5 = 2 kg/d

$$L_{Iavg}: \frac{(3 \times 5) + (2 \times 4) + (3 \times 2)}{8} = 3.6 \text{ kg/d}$$

3.1.3 Average Effluent Concentrations: C_{Eavg}

Average effluent concentrations are calculated on the basis of the average loads for the corresponding period as defined above, divided by the average flows for the same period.

Example: Average concentration for the first quarter

F_I (m^3/d) ⇒ January = 533; February = 518; March = 484

$F_{Iavgqtr}$ = 512 m^3/d

$$C_{Eavgqtr} = \frac{L_{Eqtr}}{F_{Iavgqtr}} = \frac{3.6 \text{ kg/d}}{512 \text{ m}^3/\text{d}} \times 1000 = 7 \text{ mg/l}$$

3.2 COD, BOD_5 and SS Analysis of the Effluent

3.2.1 Evaluation Period

For the COD, BOD_5 and SS parameters, flows, loads, concentrations and efficiency are calculated for the intermediate period (quarterly, monthly or weekly), as well as for the year, i.e., 12 consecutive months.

3.2.2 Calculating Quarterly and Annual Average Values

All calculations of quarterly or annual averages are based on the monthly effluent averages as defined in section 3.1.

A) The quarterly or annual average flow is calculated by taking the average of the monthly average effluent flows available for each quarter and for the year, i.e., 12 consecutive months.

B) The quarterly or annual average load is calculated by taking the average of the monthly average effluent loads available for each quarter and for the year, and weighting this average by the number of analyses available for each month.

C) The quarterly or annual average concentration is calculated by dividing the quarterly or annual average load by the quarterly or annual average flow, as applicable.

If all the required monthly flows are available for a given period, but analysis results are missing for one or more parameters, the average of the available monthly loads alone is representative of the relevant period. However, the average concentration for this period is calculated by dividing the average load that is representative of this period by the mean of the average monthly flows for the same period.

Example: Calculating average concentration for the third quarter.

MONTH	F_{Eavg} (m^3/d)	L_{Eavg} (kg/d)
July	510	6.5
August	560	---
September	600	8.7

$$C_E = \frac{(6.5 + 8.7) \div 2}{(510 + 560 + 600) \div 3} = 13.7 \text{ mg/l}$$

D) The quarterly or annual average efficiency is calculated from the following formulae:

$$R_{qtr} = \left[\frac{1 - L_{Eqtr}}{L_{Iqtr}}\right] \times 100$$

$$R_{yr} = \left[\frac{1 - L_{Eyr}}{L_{Iyr}}\right] \times 100$$

Where:
R_{qtr} = efficiency for the quarter
R_{yr} = efficiency for the year
L_{Eqtr} = average effluent load for the quarter
L_{Eyr} = average effluent load for the year
L_{Iqtr} = average influent load for the quarter
L_{Iyr} = average influent load for the year

3.2.3 Compliance with Requirements

Only BOD_5 and SS are subject to effluent requirements, compliance with which must be verified as follows:

A) The measured average effluent load must not exceed the assigned load for each quarter and for the year.

B) The same applies to concentration. However, if the concentration calculated for effluent exceeds the required concentration, it is still acceptable as long as it corresponds to a specific reduction in influent load as specified in the effluent requirements.

Calculation Method for Analyzing the Performance of Aerated Lagoon Treatment Plants

The calculation method is essentially the same as for activated sludge treatment plants. The monitoring program is less strict, however, since it is not necessary for someone to monitor this kind of treatment plant 24 hours a day. The intermediate monitoring periods for the BOD_5 requirement are thus slightly different, due to the more limited number of analysis results.

In addition, not all aerated lagoon type treatment plants are equipped with flow meters capable of accumulating daily effluent flows. This obstacle can easily be worked around by taking the influent flow measured for the last seven days, i.e., the flow for the day on which the sample is taken plus that for the six previous days, as the effluent flow to be used in calculating the load corresponding to each analysis result.

The number of analysis results that permit loads to be calculated is clearly insufficient for calculating efficiencies for the intermediate periods. A longer period must therefore be used to determine the influent loads to be used in calculating efficiency. Thus, the annual average load must be used for categories 1, 2, and 3, while the quarterly average load can be used for category 4.

The various efficiencies can thus be calculated as follows:

PERIOD	CATEGORY	EFFICIENCY
Semiannual	1	$1 - \frac{L_{Esem}}{L_{Iyr}}$
Quarterly	2 and 3	$1 - \frac{L_{Eqtr}}{L_{Iyr}}$
Monthly	4	$1 - \frac{L_{Emth}}{L_{Iqtr}}$
Annual	1, 2, 3 and 4	$1 - \frac{L_{Eyr}}{L_{Iyr}}$

L_{Eyr} = Annual effluent load
L_{Esem} = Semiannual effluent load
L_{Eqtr} = Quarterly effluent load
L_{Emth} = Monthly effluent load
L_{Iyr} = Annual influent load
L_{Iqtr} = Quarterly influent load

Clearly, efficiencies can be calculated for all parameters for which analysis results are available. But compliance with requirements is noted only for parameters for which a requirement exists, i.e., for BOD_5 and fecal coliforms.

For fecal coliforms, it must be borne in mind that the requirement is verified on the basis of the **geometric** average of the entire body of results available for the period.

Annex E

Overview of the Training Course for Liquid Waste Technicians
Internship Program at the Maintenance Workshops
Internship Program at the Central Laboratory

PLAN GENERAL
DU STAGE DE FORMATION DES TECHNICIENS D'ASSAINISSEMENT

BEST AVAILABLE DOCUMENT

LABORANTINS

COURS PRATIQUES

- Laboratoire Central
- Laboratoire des Rejets Industriels
- Laboratoire STEP Cherguia
- Laboratoire Cotiere Nord

COURS THEORIQUES COMMUNS

MATIERES DE BASE

- Maths : 10h.00
- Physique : 20h.00
- Chimie : 20h.00
- Securite : 20h.00
- Education : 10h.00 environnementale

MATIERES DE SPECIALISATION

- Assainissement urbain : 20h.00
- Materiaux de construction : 20h.00
- Technologie des eaux : 10h.00
- Traitement des eaux usees : 40h.00
- Techniques de mesure et controle fonctionnement STEP Eau usee industrielle (pretraitement, provenance) : 30h.00
- Technique d'atelier : 20h.00
- Electricite : 30h.00
- Fonctionnement des installations d'assainissement : 20h.00

Test et Notation pour chaque Matiere

TECHNICIENS

COURS PRATIQUES

- STEP Cherguia
- STEP Sud Meliane
- D.M.E (Cherguia)
- D.M.M.R (" ")
- Centre d'expl.Medina–Bab Suika
- Centre d'expl.Menzah–Khadra et (station de pompage Monplaisir
- Administration (D.A.T)

Rapport de Stage pour chaque Unite et Notation

EXAMEN FINAL

1 – Electricite
2 – Assainissement urbain
3 – Chimie + Physique
4 – Fonctionnement des equipements
5 – Techniques de mesure et controle STEP
6 – Techniques d'atelier
7 – Traitement des eaux

PROGRAMME DE FORMATION DANS LES ATELIERS DE MAINTENANCE

TRAVAUX DE CHAUDRONNERIE (2) DEUX JO

REPARATION DES MOTEURS DIESELS (3) TROIS JO

(principe de fonctionnement et maintenance des moteurs)

I/ MAINTENCANCE DES : (1) UNE SEMAI

- Motopompes mobiles
- des cureuses à godets
- des groupes electrogènes de secours

MAINTENANCE DU MATÉRIEL D'ASSAINISSEMENT (3) TROIS SEMAI

(Equipements électromécaniques fixes)

- pompes
- groupes électropompes
- moteurs électriques
- réducteurs
- vis d'archimède
- clapets
- etc.....

INTERVENTIONS AVEC LES ÉQUIPES MOBILES DE MAINTENANCE (1) UNE À (2) DE SEMAINES

DANS LES STATIONS

Au cours de ce stage pratique, les agents doivent en même temps recevoir un formation sur le principe de fonctionnement et la conception du matériel en réparation et sur les différents types de transmission mécanique entre une motrice et une machine réceptrice./.

BEST AVAILABLE DOCUMENT

FICHE DE STAGE AU LABORATOIRE

BEST AVAILABLE DOCUMENT

NOM DU STAGIAIRE :

PROGRAMME DU STAGE PRATIQUE
AU LABORATOIRE CENTRAL

RESPONSABLE : Madame FERJANI
Monsieur CHAOUACHI

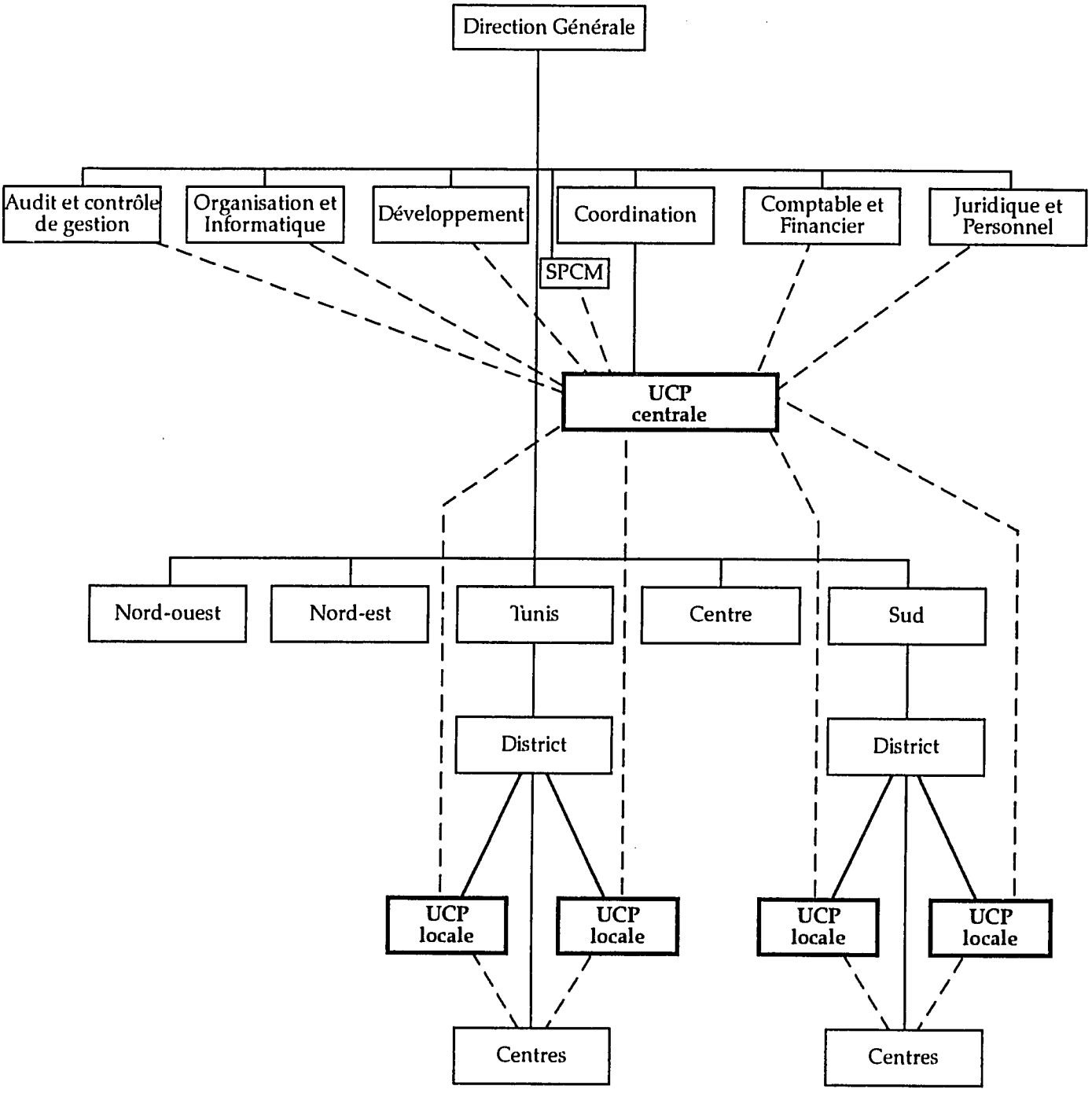
D U R E E : 3 Mois (288 heures)

TRAVAUX PRATIQUES A EFFECTUER PENDANT LE STAGE AU LABORATOIRE.	DUREE EN HEURES	AFFECTATION RESPONSABLE
Préparation des solutions étalons	7	
- Préparation des acides	7	
- Préparation des bases	7	
- Contrôle du PH par titration	8	
- Technique de pesage	7	
- Matière décantable	2	
- Résidu sec - MES	14	
- Perte au feu	2	
- Température	2	
- Valeur PH	2	
- Oxygène	4	
- Dosage du Ca - Mg - Sulfate	8	
- Conductivité	2	
- Etalonnage et entretien des appareils de mesure et des électrodes	24	
- DBO5 Manometrique	10	
- DBO5 Méthode de dillution	30	
- KMNO4	8	
- D C O - chlorure	16	
- Azote	24	
- Phosphore	24	
- Sulfure	8	
- Nitrite - Nitrate	16	
- Méthodes photométriques rapides		
NO3- Test rapide	8	
NO2- Test rapide	8	
NH4+ Test rapide	8	
PO4 3- " "		

Annex F

The PMU within the ONAS Organigram

Position et liens de l'UCP dans l'organigramme de l'ONAS



Légende:

- - - - - Lien fonctionnel
——— Lien hiérarchique