



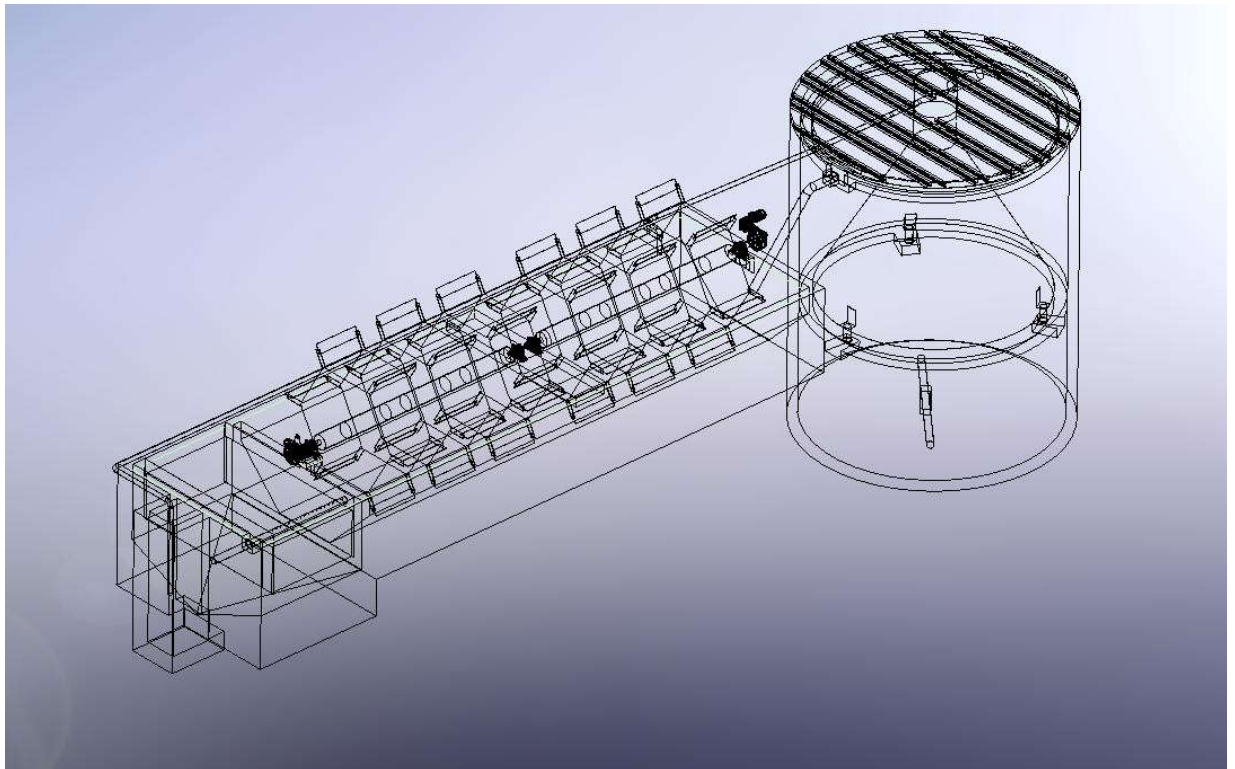
# C.M.C

Chaudronnerie Métallerie du Centre

# BIONYL PROCESS

**BIOLOGICAL WASTEWATER TREATMENT  
BY FIXED CULTURE**

CAPACITY 50 to 3000 P/E



*Non contractual document*

*Edition November 2016*



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## Presentation of BIONYL process

*The purpose of this document is to introduce one of our wastewater treatment solution for collectivities having a capacity of 50 to 3000 p/e.*

*This process is adapt for small and mid-size collectivities such as : hotels, resorts, communities, industries, etc...*

*The **BIONYL** process is based on low load biological treatment suitable for a fixed aerobic bacterial flora.*

*The **BIONYL** process allows also development of free bacterium in the biomass that increases the efficiency of treatment.*

### **Process T1 :**

*The residual effluents (urban, industrial) with a summary pretreatment (screening, sifting, degreasing, ..) enter in the BIONYL.*

### **Process T2 :**

*In order to avoid the pretreatment items, it is possible to install a decanter digester at the beginning of the process.*

*The feeding should be done with screened and de-sanded water.*

*The output of this process is approximately about 30% for BOD5 and COD and 50% for suspended matters.*



## Description of the process T1

### \* FEED OF WATER

Wastewaters are screened, degreased, cleaned and sent to the buffer basin.

The wastewaters are lifted by a constant flow cellular wheel which is calculated according to the daily flow to be treated.

### \* WATER INLET

The water arrives in the BIONYL, biological treatment unit, where the wastewater is mainly purified.

### \* BIONYL

The turning drums are composed of 6 modular elements which can be easily dismantled. Each element contains an inert biologically and chemically material. It has been duly tested and approved by the institute of search and applied chemistry.

Thanks to the turning movements, the necessary immersion and aeration allow also development of bacterium flora.

The slow rotation avoids aerosols dispersion as well as undesirable smell.

The supports conduits of the bacterial culture are self-cleaning. A cleaning with a low-pressure nozzle is recommended once a month.

This system is insensitive to the extended shutdowns, it can re-start immediately because it remains perfectly equilibrated.



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Each level develops 800 or 1000 m<sup>2</sup> of active surface according to the type of equipment.

Two types of equipments (P et S) are available :

- P : with shaft for drums support for process < 3 levels
- S : without shaft for drums support

## \* **MOTORISATION**

The driving is done by a geared motor with hollow shaft coupled to the drive shaft.  
For mechanical reasons, the type P can't exceed 3 levels for each motorisation.

BIONYL which is composed of several levels has independent drums.

The low speed motorization guarantees reliability, longevity and silent operating.

## \* **CLARIFIER**

After the BIONYL, water is admitted in the lamellar settling basin to separate treated water and sludge.  
Recirculation permits to bleed them to the sludge thickener tank with a set of valves.

## \* **SLUDGE TANK**

The tank permits to thicken sludge with a special drain.  
This one sends the filtrates back in the buffer basin.

According to the regulations, another tank must be planned for the storage.

## **Nota :**

According to the place of installation, the BIONYL can be covered.



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## Description of process T2

### \* **FEED OF WATER**

The de-sanded and screened wastewater goes in the decanter digester composed of 2 treatment areas.

- anaerobic and storage area (area to digest organic matters)
- separated settling area

The dimensioning of this device is very important to obtain the expected output. (30% on the BOD and COD and 50% on the suspended matters)

The sludge storage in the anaerobic reserve must allow autonomy of 6 months.

Nevertheless, it is suitable to decant each 3 months in order to keep a stable volume of bacterial activity.

In any circumstance, the stock hasn't to be empty. A part of seed has to be kept in order to re-start quickly the fermentation.

### \* **DIMENSIONNING FOR AN OPTIMAL OUTPUT**

Screening at the breakdown threshold of 2 cm

Settling basin rate of climb : 1 to 1,5 m/h

Settling basin volume : 45 L /PE

Digester volume : 150 l/PE

#### **Dimensionning :**

- Separate sewer system / peak flow
- Single sewerage system / peak flow



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## Installation in urban, rural and industrial sites

This compact and modular equipment is characterized by :

- a reduced ground coverage
- a perfect environmental integration thanks to the possibility of having a covering hood or to be installed in a building

No aerosol

No noise

No smell

Energy saving

Minimal investment, operation and  
maintenance costs





## Technical details

### \* **BUFFER TANK – PROCESS T1**

The buffer tank is planned to spread a daily flow on 20 hours, the 4 hours remaining are in reserve.

### \* **ACTIVATION BIONYL – PROCESS T1 and T2**

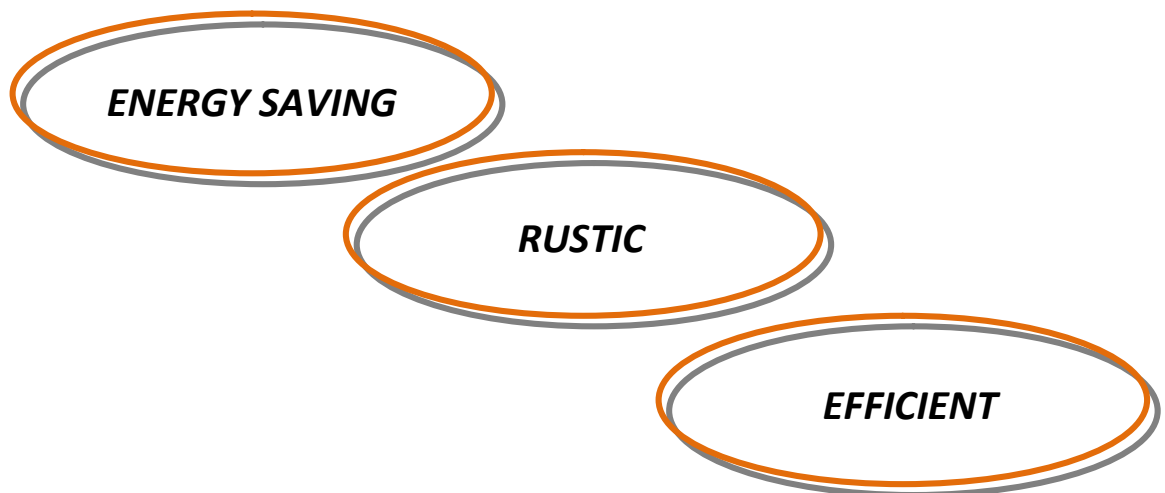
BIONYL process is based on the principle of a fixed culture on the filling support. Free bacteriums are also in the biomass.

### \* **FINISHING - PROCESS T1 and T2**

According to the discharge level wanted, it could be justified to add a finishing device. It can be a lagoon which surface is 150 m<sup>2</sup> per Kg of BOD5 to be eliminated, and a depth of 1.5 m.

A tertiary treatment could allow the re-use of waters in industrial water.

BIONYL is :





## Exemples :

### **NORMAL OPERATING CONDITIONS BIONYL TYPE 1000**

Active surface 1000 m<sup>2</sup>/level

Driving motor power : P = 0.37 kW

Volumic load applied : Vc = 1.5 Kg BOD5/M3/J (According to objectives D1 ou D2)

Specific surface : S/s = 180 m<sup>2</sup>/m3

Eliminated BOD5 : 24 x 1.5 x 0.9 = 32.4 Kg/J  
Applied load 8 g BOD5/ m<sup>2</sup>/j objective D1  
4 g BOD5/ m<sup>2</sup>/j objective D2

Indicative electric consumption : 0.37 x 24 = 9 kW/J

*For a lifted and treated effluent, the consumption of energy is about 0.88 kw/kg BOD5 eliminated (according to the chosen objective D1 or D2)*

### **NORMAL OPERATING CONDITIONS BIONYL TYPE 800**

Active surface 800 m<sup>2</sup>/level

Volume : 4.8 m3

S = 4.8 x 180 = 865 m<sup>2</sup>

ONE DRUM.

Volumic load = 1.5 Kg BOD5/m3/J (according to objective D1 or D2)

Specific surface = 180 m<sup>2</sup>/m3

865 x 8 = 6.9 Kg BOD5/J  
Applied load 8 g/ m<sup>2</sup> / j objective D 1  
4 g/ m<sup>2</sup> / j objective D 2

Indicative electric consumption for the BIONYL : 0.25x24 = 6 Kw/J

For a lifted and treated effluent, the consumption of energy is about 0.86 Kw/Kg BOD5 eliminated (according to chosen objective D1 or D2)





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## WATER PHASIS T1

Flow control with a buffer tank.

Lifting with a low flow pump

By-pass planned in the buffer tank or in the lifting tank.

### \* PRETREATMENT

Sifting : advised

Grit removal : according to the origin of water

Degreasing : according to the origin of water

### \* PRIMARY TREATMENT

Not applicable

### \* DEGASSING

According to hydraulic profile.

### \* CLARIFIER

Static with possible flow meter.

On important installations we can have a scraped settling basin for several BIONYL lines installed in parallel.



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## SLUDGE PHASIS

### \* RECIRCULATION

With a pump installed at the lamellar settling basin.

### \* FILLING

Sludge are pumped (from 3 g/l to 5 g/l) to the tank with the recirculation pump.  
Pumping of 0.5 m<sup>3</sup>/h once a week for 5 modules.

### \* SLUDGE TANK

Drained with return of the filtrates at the unit head.  
The dryness fluctuates from 8 to 12 g/l according to the sludge composition.





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## TECHNICAL DATAS

### ***Recyclables construction materials***

|   |   |
|---|---|
| Number of stages :                      | according to the inlet load               |
| Load per unit area :                    | 4g / 8g DBO5/m <sup>2</sup> /J            |
| Electric power :                        | average EH = 3 to 6 Kw*                   |
| Support :                               | modular elements filled PVC               |
| Axis support :                          | according to model P or S                 |
| Recirculation :                         | per pump = according to number of modules |
| Protection against frost :              | local or cover                            |
| Average time of stay of the effluents : | 6 H Bionyl                                |
| Rotation speed :                        | < 2 T/Mn                                  |
| Deposit in the Bionyl :                 | eliminated with continuous brazing        |
| Recirculation rate :                    | cyclic 100 à 200 %                        |
| Sludge production :                     | 27 g MS/ EH/J                             |
| Thickener tank :                        | stay time 8 days maxi                     |
| Sludge dehydration :                    | possibly sludge-drying bed                |

*\*According to treatment level*



## \* DENITRIFICATION

Example for 750 p/e

Addition of a compartment of 55 M3 between the buffer basin and the Bionyl.

## \* DEPHOSPHATATION

The dephosphatation can be obtained by iron salt injection in the Bionyl.

## \* ESTIMATED ANNUAL OPERATING COSTS

|                         | 400 E/p | 1000 E/p |
|-------------------------|---------|----------|
| Ordinary operating cost | 125     | 225      |
| Maintenance             | 130     | 145      |

(values 2008)





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## WARRANTY

- 1 year of warranty on parts and labour
- 5 years of warranty for the BIONYL parts
- 2 years for electro mechanical equipment (pumps, mixers, and other accessories)

***Nota :*** *The warranty is applicable only in the case that the guarantee call is justified and recognized by us. The wear parts are excluded.*





## Indicative values for the dimensioning of BIONYL activation T1.

| Indicative values for eNK1 D1 |                                      |                 |                                      |   |   |                                       |                                       |
|-------------------------------|--------------------------------------|-----------------|--------------------------------------|---|---|---------------------------------------|---------------------------------------|
| Ref BIONYL                    | Active surface m <sup>2</sup> /stage | Nb EP treated * | Electric consumption activation Kw/h | Sludge production Kg/Ms/j<br>27 g/ms/eh/j | Liquid sludge m <sup>3</sup> /j<br>10 g/l | Screen nominal flow m <sup>3</sup> /h | Screen Average flow m <sup>3</sup> /h |
| 803-1                         | 800                                  | 105             | 0.3                                  | 2.9                                       | 0.29                                      | 30                                    | 0.75                                  |
| 1003-1                        | 1000                                 | 133             | 0.37                                 | 3.6                                       | 0.36                                      | 30                                    | 0.9                                   |
| 803-2                         | 1600                                 | 210             | 0.6                                  | 5.7                                       | 0.57                                      | 30                                    | 1.5                                   |
| 1003-2                        | 2000                                 | 265             | 0.75                                 | 7.2                                       | 0.72                                      | 30                                    | 1.8                                   |
| 803-3                         | 2400                                 | 315             | 0.9                                  | 8.5                                       | 0.85                                      | 30                                    | 2.25                                  |
| 1003-3                        | 3000                                 | 400             | 1.1                                  | 10.8                                      | 0.110                                     | 30                                    | 2.7                                   |
| 803-4                         | 3200                                 | 420             | 1.2                                  | 11.34                                     | 1.14                                      | 30                                    | 3                                     |
| 1003-4                        | 4000                                 | 532             | 1.5                                  | 14.4                                      | 1.44                                      | 30                                    | 3.6                                   |
| 803-5                         | 4000                                 | 525             | 1.5                                  | 14.2                                      | 1.42                                      | 30                                    | 3.75                                  |
| 1003-5                        | 5000                                 | 665             | 1.85                                 | 18  | 1.8                                       | 30                                    | 4.5                                   |
| 803-6                         | 4800                                 | 630             | 1.8                                  | 17  | 1.7                                       | 30                                    | 4.5                                   |
| 1003-6                        | 6000                                 | 800             | 2.2                                  | 21.6                                      | 2.4                                       | 30                                    | 5.4                                   |
| 803-7                         | 5600                                 | 735             | 2.1                                  | 19.9                                      | 2   | 30                                    | 5.25                                  |
| 1003-7                        | 7000                                 | 930             | 2.6                                  | 25.2                                      | 2.5                                       | 30                                    | 6.3                                   |
| 803-8                         | 6400                                 | 840             | 2.4                                  | 22.7                                      | 2.3                                       | 30                                    | 6                                     |
| 1003-8                        | 8000                                 | 1065            | 3                                    | 28.8                                      | 2.9                                       | 30                                    | 7.2                                   |
| 803-9                         | 7200                                 | 945             | 2.7                                  | 25.5                                      | 2.6                                       | 30                                    | 6.75                                  |
| 1003-9                        | 9000                                 | 1200            | 3.3                                  | 32.4                                      | 3.3                                       | 30                                    | 8.1                                   |
| 803-10                        | 8000                                 | 1050            | 3                                    | 28.35                                     | 2.9                                       | 30                                    | 7.5                                   |
| 1003-10                       | 10000                                | 1330            | 3.7                                  | 35.9                                      | 3.6                                       | 30                                    | 9                                     |

\* Number of population equivalent treated in T1

For T2, we have to apply a coefficient of 0.7 for the decanter digester abatement.

Exemple :  $803-1 = \frac{105 EP}{0.7} = 150 EP$



## Indicative values for eNK2 D2

| 803-1   | 800   | 53  | 0.3  | 1.43 | 0.14 | 30 | 0.37 |
|---------|-------|-----|------|------|------|----|------|
| 1003-1  | 1000  | 66  | 0.37 | 1.8  | 0.18 | 30 | 0.46 |
| 803-2   | 1600  | 105 | 0.6  | 2.8  | 0.28 | 30 | 0.75 |
| 1003-2  | 2000  | 122 | 0.75 | 3.3  | 0.33 | 30 | 0.92 |
| 803-3   | 2400  | 158 | 0.9  | 4.3  | 0.43 | 30 | 1.1  |
| 1003-3  | 3000  | 188 | 1.1  | 5.1  | 0.53 | 30 | 1.4  |
| 803-4   | 3200  | 210 | 1.2  | 5.7  | 0.57 | 30 | 1.5  |
| 1003-4  | 4000  | 254 | 1.5  | 6.9  | 0.61 | 30 | 1.8  |
| 803-5   | 4000  | 265 | 1.5  | 7.2  | 0.72 | 30 | 1.9  |
| 1003-5  | 5000  | 320 | 1.85 | 8.7  | 0.87 | 30 | 2.3  |
| 803-6   | 4800  | 315 | 1.8  | 8.5  | 0.85 | 30 | 2.2  |
| 1003-6  | 6000  | 386 | 2.2  | 10.5 | 1    | 30 | 2.8  |
| 803-7   | 5600  | 370 | 2.1  | 10   | 1    | 30 | 2.6  |
| 1003-7  | 7000  | 452 | 2.6  | 12.2 | 1.2  | 30 | 3.2  |
| 803-8   | 6400  | 423 | 2.4  | 11.4 | 1.2  | 30 | 3    |
| 1003-8  | 8000  | 520 | 3    | 14   | 1.4  | 30 | 3.7  |
| 803-9   | 7200  | 476 | 2.7  | 12.9 | 1.3  | 30 | 3.4  |
| 1003-9  | 9000  | 585 | 3.33 | 15.8 | 1.6  | 30 | 4.2  |
| 803-10  | 8000  | 530 | 3    | 14.4 | 1.5  | 30 | 3.7  |
| 1003-10 | 10000 | 650 | 3.7  | 17.6 | 1.8  | 30 | 4.6  |

\* Number of population equivalent treated in T1

For T2, we have to apply a coefficient of 0.7 for the decanter digester abatement.

Exemple :  $803-1 = \frac{53 EP}{0.7} = 75 EP$

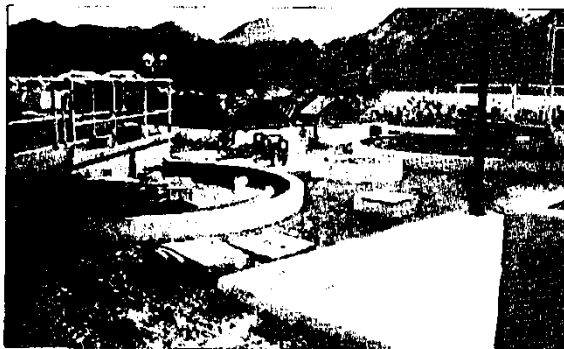


## ACTUALITÉ LOCALE ANSE MARCEL

### Environnement

#### L'écologie est en marche à Saint Martin

**M**ême si contrairement au reste de la France des mesures tendent à assurer la protection de l'environnement ont tardé à se mettre en place Ici, on pourrait mettre ça sur le



compte de l'éloignement, des initiatives ça et là volent le jour. Elles permettent de ne pas trop désespérer de l'avenir des beautés naturelles de l'île, mais elles mettent en avant les courageuses initiatives de certains décideurs qui ont déclaré la guerre à la fatalité.

*Anse Marcel: rien ne se perd, tout se transforme..*

Vous-êtes vous déjà demandé pour quelles raisons ce site, même s'il bénéficie d'une situation géographique exceptionnelle, est aussi beau, aussi propre et aussi luxuriant ?..

La principale raison est qu'à l'Anse Marcel, l'environnement est l'un des soucis principaux de l'Association Syndicale des copropriétaires qui, depuis douze années, consacre une part de son budget annuel au nettoyage de la plage, à la protection de la faune et de la flore et à

l'épuration des effluents. Ce dernier point particulièrement important dans un contexte touristique mérite qu'on s'y attarde et ce, d'autant plus, que les stations d'épuration de Saint-Martin ont souvent

fait parler d'elles, pour leur inadéquation et leur sous-capacité à gérer une demande toujours plus pressante.

A l'Anse Marcel, on a pu faire face, ainsi après onze années de fonctionnement ininterrompu et près de 100 000 heures de marche, la station de procédé "aération prolongée" ou "Oxydation totale", a subi un complet lifting après le passage du cyclone Luis. C'est ainsi qu'afin d'assurer une longévité en regard de l'agressivité des effluents à traiter et de la proximité de la mer, l'ASAM a choisi une solution "tout inox" et a réinvesti 3 millions de frs en fonds propres dans la restructuration de la station.

#### Technique

La station d'activation 2000 équivalents/jour (2000 usagers) et de clarification filtration 3000 usagers (à terme) traite en moyenne 250 m<sup>3</sup>/jour d'effluents composés d'eaux usées, d'eaux vannes

et de très peu d'eau de ruissellement.

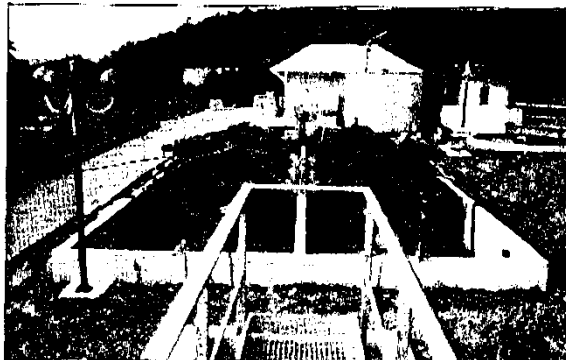
Après activation, épuration, clarification, filtration, chloration, l'eau récupérée (environ 4/5) est "lagunée" dans un bassin de 500 m<sup>3</sup> à 3 étages dans les quels sa qualité est encore améliorée par photosynthèse et oxygénation; Dans ces bassins prolifèrent plantes et faune aquatiques, la vertu principale de cette dernière étant de détruire larves et moustiques. La faune terrestre est également très présente car friande de faune marine.

Cette réserve de 500 m<sup>3</sup> d'eau est utilisée en permanence pour l'irrigation et l'arrosage des jardins et l'on comprend mieux ainsi la raison de la luxuriance de la végétation de l'Anse Marcel

avec les coupes de végétaux divers pour produire enfin, un compost de première qualité, que les jardiniers utilisent pour améliorer sans cesse la qualité du sol des jardins.

Pour mener à bien toutes ces opérations, pour en assurer également le fonctionnement tout au long de l'année et pour assurer enfin la pérennité de tels équipements dont le coût (même si l'écologie n'a pas de prix) est très élevé, une maintenance et une conduite de tous les instants de ces matériels sont nécessaires.

C'est une des missions dévolue à la société la société SIEM qui s'enorgueillit d'avoir contribué par le traitement d'environ 1.100.000 m<sup>3</sup> d'effluents en douze ans et la production d'environ 880.000



surtout lorsque l'on connaît le prix de l'eau à Saint-Martin, et en particulier le tarif appliqué aux hôtels.

De plus, avantage supplémentaire à cette "production d'eau" à faible prix, les boues créées par l'épuration sont épandues sur des lits de séchage puis récupérées. Elles sont alors mélangées à de la terre végétale avec les algues provenant du nettoyage quotidien de la plage et

m<sup>3</sup> d'eau d'arrosage pendant la même période, à la préservation de l'environnement et de la beauté de Saint-Martin en général et de l'Anse Marcel en particulier.