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Regional Programme for Pollution control in the Tanning Industry in South-East Asia

BIOMETHANATION OF FLESHINGS AND SLUDGE FROM TANNERY EFFLUENT TREATMENT PLANTS

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LIST OF SYMBOLS & ABBREVIATIONS

CETP	:	Common Effluent Treatment Plant
CLRI	:	Central Leather Research Institute
CO_2	:	Carbon dioxide
COD	:	Chemical oxygen demand
d	:	Day
GoI	:	Government of India
H_2S	:	Hydrogen Sulphide
INR	:	Indian Rupees
kg	:	Kilogram
kWh	:	Kilo watt-hour
LTM	:	Leather Technology Mission
MNES	:	Ministry of Non-conventional Energy Sources
m^3	:	Cubic meter
NB	:	Nominal bore
RePO	:	Regional Programme Office of UNIDO at Chennai
rpm	:	Revolutions per minute
t	:	Tonne
t/d	:	Tonne(s) per day
TS	:	Total solids
UNIDO	:	United Nations Industrial Development Organization
VFA	:	Volatile fatty acids
VS	:	Volatile solids

(Rate of exchange: 1 US $ = Rs. 46.80)

EXECUTIVE SUMMARY

With increasing pressure from the pollution control authorities, tanners in many countries of South East Asia region are faced with the urgent task of utilization or safe disposal of solid wastes from tanneries, particularly fleshings. Likewise, sludge generated by tannery effluent treatment plants has to be either put to use or safely disposed. These two issues were highlighted by the industry and government representatives of countries participating in the Regional programme at the time of the first coordinating and planning meeting held at Chennai, India in March 1996.

Meantime the Ministry of Non-conventional Energy Sources (MNES) of the Government of India had engaged Central Leather Research Institute (CLRI), Chennai, India to identify potential non-conventional sources of energy in the leather industry. The idea of biomethanation of sludge and fleshings was mooted by CLRI. However this did not make much progress due to lack of access to relevant technology. At this stage UNIDO's Regional programme revived the idea by suggesting that MNES might consider the technology adopted by a French tannery. Further discussion among MNES, CLRI and UNIDO's RePO resulted in finalizing a project for a semi-industrial scale biomethanation plant of 5 t/d capacity to be put up jointly by MNES, CLRI, UNIDO and CETP, Vishtec, Melvisharam, Tamil Nadu, India.

On the basis of a project report prepared jointly by Mr. Michel Aloy, CTC, Lyon, France (an international consultant of UNIDO) and Mr. S.D. Badrinath, a national consultant, the plant was constructed and commissioned by Enkem Engineers, a Chennai-based subcontractor. CLRI was given the responsibility for implementation and day-to-day management of the project and optimization of process parameters to achieve the envisaged gas yield and electrical energy. The plant has been operated regularly since its trial runs in December 1999. The personnel of the CETP have been trained in the operation and maintenance of the plant. Operational data for the period March 2000 to June 2001 is provided in the report (Annex 6).

According to the project report, 5 tonnes of input to the plant every day, comprising not less than 3 tonnes of fleshings and the remainder of sludge, of the characteristics specified in the report, providing about 585 kg of volatile solids, would yield 316 m^3 of biogas and in turn 700 kWh of electrical energy per day.

The performance of the plant has established the feasibility of treating fleshings and sludge in anaerobic digestors to produce biogas, which after scrubbing of the H_2S, can be used as fuel in a dual-fuel engine to generate electricity. However the gas generation until now has been much lower than the volume envisaged in the project report. The report contains details of the characteristics of fleshings and sludge charged to the digestors, volume of gas generated vis-à-vis projection and the many valuable lessons learnt. Details of the problems encountered – both process-related and mechanical – have been narrated. Being virtually the only operational plant of its kind in the world at present, constant efforts are underway to overcome the many process and technical problems and reach the optimum level of gas generation.

The performance of the plant, until now, has confirmed the following:

- The methane content of the gas generated is 60 – 70%.
- The gas yield corresponds to the volatile solids destroyed in the digester.
- The rate of volatile solids destroyed is in the range of 55 – 65%.

- The scrubber installed is capable of reducing H_2S level in the gas from 1% to less than 0.1%.
- The gas generated, after H_2S removal, has been successfully used to generate electricity in a dual fuel engine.

Based on the results obtained until now it can be stated that the gas generated by biomethanation of fleshings and sludge can be utilized to generate electrical energy, thus offering an avenue for disposal of these solid wastes. Further data on the performance of the plant will be collected by CLRI over the next few months before the design features of an upscaled plant can be finalized.

1. BACKGROUND

1.1. Raw trimmings and green/limed fleshings, which constitute bulk of the solid wastes generated in a tannery, are biodegradable. It has often been seen that in many tannery clusters in the developing countries of South East Asia such wastes are dumped haphazardly in the vacant areas around tanneries. Besides creating an unseemly sight, these putrefy, generate foul odour and pose a serious health problem. Though manufacturers of animal glue or animal feed protein or dog chew take away some quantity of such wastes, unacceptable modes of disposal of a sizeable quantity of such wastes in the region are not uncommon. Finding alternative, commercially attractive, options for utilization of these is an urgent task facing the tanning industry and the municipal authorities of the region.

1.2. Trimmings of raw hides and skins account for about 8 to 10% and fleshings, about 25 to 30% on the weight of raw stock. The characteristics of fleshings vary according to the origin of the raw material. The typical characteristics of fleshings resulting from Indian raw material at three locations may be seen in Table 1:

Table 1: Characteristics of limed fleshings collected from tanneries in Vellore district, Tamil Nadu, India

#	Parameter	Ranipet		Vaniyambadi	Melvisharam	
		Buffalo	Cow	Sheep skin	Buff calf	Cow calf
1.	pH	12.36	12.11	11.88	12.25	12.06
2.	Moisture	90.53	82.34	89.94	90.41	81.95
3.	Ash	0.183	0.474	0.229	0.349	0.225
4.	Volatile solids	0.817	0.526	0.771	0.651	0.775
5.	COD total	0.970	0.765	1.084	0.949	0.195
6.	Calcium as Ca (total)	0.127	0.077	0.116	0.236	0.078
7.	Sulphate as SO_4 (total)	0.00212	0.00539	0.00147	0.00045	0.00261
8.	Sulphide as S	0.00119	0.00269	0.00041	0.00011	0.00199
9.	Phosphorus as P	0.00021	0.00186	0.00145	0.00015	0.00019
10.	Ammonia Nitrogen as N	0.00272	0.00280	0.00233	0.00228	0.00451
11.	TKN	0.118	0.083	0.090	0.106	0.109
12.	Oil & grease	0.058	0.091	0.633	0.130	0.228

Note: All values except pH and moisture are expressed in w/w on dry weight basis. Moisture content is expressed in percentage.
Source: Detailed Project Report on "High rate bio-methanation of tannery fleshings and sludge" dated November 1997.

One of the potential options for utilization of the volatile solids in the fleshings is to convert these into biogas, which can be further used for generation of electricity.

1.3. Another solid waste, emanating from the effluent treatment plants, is the primary sludge. About 40% of this is organic matter, appropriate for conversion into biogas. A substantial quantity of sludge from effluent treatment plants is currently disposed in either safe landfills or dumped in the vacant lands, again causing an environmental hazard. Appropriate options for utilization of sludge have to be explored to help the industry of the region. The general characteristics of sludge from three common effluent treatment plants in Tamilnadu, India may be seen in Table 2:

Table 2: Characteristics of sludge from common effluent treatment plants in Vellore District, Tamil Nadu, India.

#	Parameter	mg/l			
		CETP Vaniyambadi	CETP Melvisharam	CETP Ranipet	Average
1.	pH	7.72	8.8	7.93	7.7 – 8.8
2.	Total solids	60574	24762	49820	45052.00
3.	Total ash	36861	13462	32276	27533.00
4.	Total volatile solids	23713	11300	17544	17519.00
5.	COD total	30682	22334	13762	22259.33
6.	COD soluble	3271	2419	852	2180.67
7.	Calcium as Ca	3965	910	1125	2000.00
8.	Sulphate as SO_4^{2-}	111	502	1207	606.67
9.	Total Sulphide as S	405	372	335	370.67
10.	Total Phosphorus as P	125	2.65	2.21	43.29
11.	Ammonia Nitrogen	530	420	340	430.00
12.	TKN	1758	1400	786	1314.67
13.	Sodium as Na	5210	2530	4120	3953.33
14.	Total Chromium as Cr	443	74	434	317.00
15.	Chloride as Cl	14000	5800	10000	9933.33

Note: All values except pH are expressed in mg/l, for primary liquid sludge
Source: Detailed Project Report on "High rate bio-methanation of tannery fleshings and sludge" dated November 1997.

1.4. The quantity of limed fleshings generated in tanneries in Tamil Nadu is given in Table 3.

Table 3: Quantity of limed fleshings generated in the tanneries in Tamil Nadu

#	Waste	Quantity generated in kg/d	
		Wet weight	Dry matter
1.	Limed fleshings	140,000	18,000

1.5. Under the regional programme of UNIDO, these two issues were specifically highlighted by the participating countries at the first coordination and planning meeting held in Chennai, India in March 1996 and viable solutions were sought.

1.6. Meantime, the Ministry of Non-conventional Energy Sources (MNES), Government of India had engaged Central Leather Research Institute (CLRI), Chennai to identify potential options for generation of energy from non-conventional sources in the tanning industry. The idea of generating biogas and electricity from fleshings and sludge was mooted by CLRI. However, in the absence of process technology, this idea did not make any headway. At this stage UNIDO's RePO, in consultation with its international expert, Mr. Michel Aloy of CTC France, suggested to CLRI and MNES that the technology adopted by a French tannery in this regard could be looked at. Following extensive discussions among MNES, CLRI and UNIDO's RePO a memorandum of understanding was entered among MNES, CLRI, UNIDO's RePO and CETP- Vishtec, Melvisharam, India for putting up a semi industrial scale plant of 5 t/d capacity. MNES, in cooperation with RePO, UNIDO, Chennai, engaged Mr. Michel Aloy of CTC France and Mr. S.D. Badrinath, a national consultant to prepare a project report for a 5 t/d biomethanation plant, the inputs consisting of not less than 3 t/d of fleshings and the remainder of sludge. The project report was considered by MNES in December 1999 and approved. CLRI was engaged by MNES to implement the project, oversee its day-to-day

management and optimization of various parameters. UNIDO's RePO agreed to provide technical assistance and participate with limited financial contribution.

2. PRINCIPLE OF BIOMETHANATION

Anaerobic or methane fermentation is brought about by populations of complex bacteria. Substances such as municipal sewerage, vegetable wastes and industrial wastes emanating from sugar mills, slaughterhouses, etc. contain substantial quantity of organic matter and therefore yield themselves to biomethanation.

The various forms of degradation of complex organic matter in the anaerobic process go through three distinct phases, namely,

- Hydrolysis and acidogenesis phase
- Acetogenesis phase
- Methanogenesis phase

The first phase is performed by a wide variety of bacterial species and results in a mixture of volatile fatty acids, neutral compounds such as ethanol and gaseous products such as CO_2 and hydrogen.

The acetogenesis phase refers to acetate production and is brought about by bacteria, which produce hydrogen. Thus this phase is sensitive to the presence of hydrogen.

Methane-producing microorganisms bring about the methanogenesis phase. Two general methods of methanogenesis are identifiable. In the first, hydrogen and carbon dioxide form water and methane. In the second, acetate is broken down into CO_2 and methane (CH_4). It is the second method, which produces about 70% methane.

The composition of gas generated depends on the composition of the substrate and conditions of operation. Gas production is the simplest criterion to measure the quality of digestion. It depends on two main factors, namely, temperature and retention time.

3. OBJECTIVES

The objectives of this initiative are:

- To evaluate the technology for generation of bio gas from wet limed fleshings and primary sludge from a tannery effluent treatment plant in conditions prevailing in the developing countries of South East Asia;

- To evaluate the quality and volume of gas produced with reference to the raw material fed and to assess the quantum of electrical power generated;

- To obtain relevant data for finalizing the design features for up scaling the plant.

4. IMPLEMENTATION ARRANGEMENTS

One of the main objectives of the Ministry of Non-conventional Energy Sources (MNES) of the Government of India is to identify potential non-conventional energy sources. From its own point of view, the Ministry considered tannery wastes as one such source. Their interest in taking up a project of this nature stemmed from this objective. MNES is the major stakeholder in the project.

Tanners of South East Asian region have been faced with the problem of safe disposal or proper utilization of both these wastes – fleshings and sludge. With increasing pressure from the pollution control authorities in many countries of the region, they had to find an urgent solution. Accordingly, they approached UNIDO Regional Programme for assistance in this regard. The focus of tanners is to find a cost-effective mode of utilization or safe disposal of these wastes.

The Central Leather Research Institute (CLRI), Chennai, India, had been engaged by the MNES for identifying and implementing projects utilizing tannery wastes for generation of electricity.

Against this background, MNES, CLRI and UNIDO joined together to undertake the project in cooperation with the Common Effluent Treatment Plant at Melvisharam. Pursuant to this convergence of interests, the following actions were taken:

- A MOU was signed between Ministry of Non-conventional Energy Sources, Government of India, Leather Technology Mission of Central Leather Research Institute, Chennai, RePO, UNIDO, Chennai and the potential beneficiary in August 1997 (Annex 1).

- A cost sharing arrangement was agreed upon – MNES contributing 60% of the cost of project, CLRI - LTM (17.5%), UNIDO (17.5%) and the beneficiary (5%).

- An international consultant, in cooperation with a national consultant, prepared a project report. MNES & UNIDO's Regional Programme had commissioned this project report. The international expert presented the report to all signatories to the MoU in December 1997 (Annex 2).

- Detailed engineering, construction, erection and commissioning of the plant was done by Enkem Engineers, Chennai, an Indian subcontractor, selected on the basis of an open tender, with regular technical guidance of the international consultant. CLRI assumed the responsibility for day-to-day management of the project while UNIDO's Regional Programme was involved in the committee constituted to oversee and monitor the project implementation and later its operation and maintenance.

5. CHRONOLOGY OF EVENTS

Details of dates by which important benchmarks were reached in the implementation of the project are given below:

#	Bench mark activity	Date
1.	Signing of MoU between MNES, CLRI, UNIDO and beneficiary	August 1997
2.	Submission of Detailed Project Report by the international expert to MNES	December 1997
3.	Selection of Turnkey contractor for preparation of detailed engineering drawings and implementation of the project.	October 1998
4.	Completion of civil works.	July 1999
5.	Erection and commissioning of fleshing grinder	September 1999
6.	Completion of fabrication and installation of structures	October 1999
7.	Painting, hydraulic pressure testing of pipelines, testing of pumps	October 1999
8.	Completion and installation of instruments, laying of pipelines, erection of pumps, etc.	November 1999
9.	Installation of automation system	November 1999
10.	Erection of Dual Fuel generator set	November 1999
11.	Trial run & commissioning of the plant except dual fuel engine, boost up blower and H_2S scrubber	December 1999
12.	Trial run and testing of dual fuel engine and boost up blower	January 2000
13.	Operation and maintenance of the biomethanation plant by the turnkey contractor and evaluation of performance of biomethanation plant	January 2000
14.	Civil works, erection, testing of H_2S scrubber unit	March 2000
15.	Commissioning of H_2S scrubber unit and the generator engine in dual fuel mode	March 2000

6. BASIC DETAILS OF THE PLANT

6.1 Location

The plant is located in the CETP-Vishtec at Melvisharam in Vellore District, Tamil Nadu, India. Melvisharam, which is 125 km from Chennai, is an important tannery cluster. The location map and layout of the plant may be seen at annex 3 & 4. The tanneries in Melvisharam mainly process cattle hides. The tanneries of this cluster have come together and formed a company, Visharam Tanners Enviro Control Company Ltd. (Vishtec, in short) for the collection and treatment of effluent discharged by them. Though this CETP has been designed to treat 3400 m^3/d, the average volume of effluent received in the plant for treatment at present is less than 1000 m^3/d. The CETP has a laboratory where routine wastewater analyses are done. Apart from this pilot plant for the biomethanation of fleshings and primary sludge, the CETP has been assisted under UNIDO's regional programme in the following areas:

- Construction of a model safe landfill
- Installation of a pilot reed bed system
- Composting of sludge
- Automatic monitoring of some aspects of the treatment process of the CETP

A view of the Biomethanation Plant at Melvisharam, Tamil Nadu, India

6.2 Key design features

The biomethanation plant can take in a maximum loading of 5 t/d. The volume of each of the two digestors connected in series is 65 m^3. At a loading rate of 5 t/d, the designed retention time of the material in the digestors is 26 days.

The key design parameters are as under:

Maximum loading rate	=	5 t/d
Total solids / day	=	700 kg/d
Total VS/day	=	585 kg/d
Expected biogas production	=	316 m^3/d
Methane production	=	65-70% of biogas produced
Electrical energy generation	=	700 kWh/d

6.3 Equipment and instruments installed

Except the meat mincer (fleshing grinder), which was imported from Denmark, all other equipment and instruments were procured or fabricated locally by the subcontractor. Details of equipment and instruments installed in the plant are given in Table 4 and 5.

Table 4: Machinery and equipment installed at the plant

#	Description	Qty. – Nos	Make / Supplier
1.	Fleshing grinder 1000 kg/h, 30 kW motor	1	Wolfking, Denmark
2.	Agitator 100 rpm, 5.5 kW motor	1	Enkem
3.	Mixing tank, 10 m^3	1	Enkem
4.	Submersible pump, 10 m^3/h centrifugal, non clog type	1	Kishore
5.	Digestor feeding pump, 15 m^3/h screw	1	Kishore
6.	Scum breaking pump, 320 m^3/h centrifugal	4	PD pumps
7.	H_2S scrubber unit, 15-25 m^3/h	1	Indian Institute of Science, Bangalore
8.	Digestor unit, 65 m^3	2	Enkem
9.	Gas holder 108 m^3	1	Enkem
10.	Dual Fuel Engine, 65 kVA	1	Greaves

11.	Air compressor 9.1 m^3/h at 7 kg/cm^2	1	Elgi
12.	Dryer of air compressor 9.1 m^3 at 7 kg/cm^2	1	Thermal Engineering
13.	Purge pot	1	Enkem
14.	Digestor feed / drain tank, 1 m^3	2	Enkem
15.	Flame arrestor, 100 NB	3	Rank controls
16.	Flame arrestor, 80 NB	2	Rank controls
17.	Gas flare, 25 m^3/h	1	Enkem
18.	Breather valve 100 NB	3	Rank controls
19.	Pressure release valve 80 NB	4	Micon

Table 5: Instruments installed at the plant

#	Description	Qty-Nos.	Make/Supplier
1.	Temperature sensor - Pt - 100 type - Range 0 - 100^{0}C Transmitter model - 244 EH-E5-X1 Indicator model – CUTEIND – ST	4	Rosemount
2.	Instrumentation panel	1	ARCEE Automatic
3.	Portable pH meter - Model pH 330 - with technical buffer solutions & integrated temperature sensor	1	WTW
4.	ORP meter - Dust and water proof pocket pH/mV meter with Redox combined electrode	1	WTW
5.	Gas flow meter - Orifice type with DP transmitter and indicator & totaliser - 10 - 25 m^3/hr DP transmitter model -151DRF22B1 Indicator & totaliser model - SMART TOT ∑	1	BALIGA (Orifice) ROSE MOUNT (Transmitter) MCIH (Indicator)

Other equipment installed include: Gate valves, ball valves, needle valves, non return valves, gas valves, limit switches, etc.

6.4 Capital cost

The capital cost of the project is INR 15.34 million as per details below:

Civil works:	INR 750,000
Mechanical:	INR 12,235,000
Electrical works:	INR 530,000
Others:	INR 1,820,000
Total:	**INR 15,335,000**

6.5 Process description

A flow chart of the process is enclosed at Annex 5.

Fleshings brought from tanneries is stored on a concrete platform and aired off for a minimum duration of 24 hours to oxidise residual sulphide. Then it is taken to the mincer for grinding. The mincer is fitted with two sets of hole plates and knives. Fleshings are cut to the size of 6 mm in the grinder and charged into the preparation tank.

Fleshings received at the plant from tanneries await grinding

The preparation tank is fed with primary sludge (about 4% solids) obtained directly from the treatment plant. A mixer keeps the solids in suspension. The moisture content of the mixture of minced fleshings and sludge is 85-90%.

The entire operation of the plant is fully automated with a microprocessor based Programmable Logic Control (PLC) system. To ensure proper functioning of the digestion process, the different mixing cycles are synchronized through the PLC system.

FRP coated platform from where fleshings is charged into the grinder

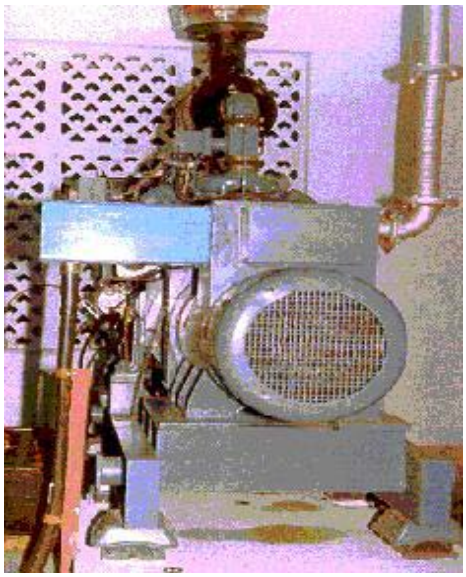
The mixture from the preparation tank is fed into Digestor 1 through a volumetric screw pump to ensure that the addition takes place in a regulated manner. A centrifugal pump is used for mixing the contents of the digestors. For each loading in digestor 1, an equivalent volume of discharge is effected from digestor 2. A screw pump pumps the digested slurry to the sludge drying beds.

The system is expected to effectively degrade the organics in the fleshings to the extent of destroying 60% of VS. The expected gas yield is @ 0.9 m^3 per kg of VS destroyed.

As safe use of biogas in a dual fuel engine requires removal of hydrogen sulphide (H_2S), the generated gas is passed through a H_2S scrubber unit. It reduces the H_2S level in the gas from about 1% to less than 0.1%.

The biogas is mixed with diesel in the ratio 70:30 and used as fuel in the generator. The power generated is used for operating the biomethanation plant and an aerator (30 HP) in the CETP.

H_2S Scrubber Unit



Dual Fuel engine

6.5 Process of commissioning

Filling the digestors with water to check all hydraulic devices and pipelines was the first step in the start-up of the bio-reactor. Cow dung with 13-15% total solids and volatile solids ranging from 70 – 80% was fed to the digestors as seeding material to start the digestion phase. Loading was done volumetrically in batches of 1 m^3. The automation system installed in the plant was observed to function well. The sequence of operation and duration of each operation were checked. After feeding about 12 tonnes of seeding material, feeding of fleshings and primary sludge was started. The quantity of the material fed was progressively increased. When the quantity of fleshings and sludge fed to the digestor in a day increased to 1.5 tonnes and 1.0 m^3 respectively, gas generation was in the range of 25 – 30 m^3/d.

The H_2S scrubber unit was trial run. Initial problems encountered were sorted out by the service personnel of Indian Institute of Science, Bangalore, suppliers of the scrubber. The scrubber was found to reduce the H_2S level in the biogas from 1% to < 10 ppm.

7. OPERATION OF THE PLANT: 01 JAN 2000 – 30 JUNE 2001

Since commissioning, the plant has been operated regularly. Being the first working plant of its nature, many operational and maintenance problems had been encountered. The ensuing paragraphs provide details of operation of this plant in the period 1 January to 30 June 2001, problems faced and the performance of the plant vis-à-vis the design features.

7.1 Operational controls - measurement and monitoring of different parameters

The following operational controls had been followed during the period March 2000 to June 2001.

- Analysis of the fleshings and primary sludge fed into the system for % moisture, % total solids and composition of total solids, namely, the volatile and fixed solid contents.
- Analysis of samples drawn from feed and drain chambers and the four compartments of the digestors for % moisture, % total solids, % volatile solids in total solids and total alkalinity.

The CO_2 level in the generated biogas had been monitored regularly. The volume of gas generated – m^3/d – had been measured. The H_2S level in the gas, after treatment in the H_2S scrubber unit, had also been monitored regularly.

7.2 Brief details of operation

During January 2000, for most of the days, the feed was limited to one tonne of fleshings per day. Feeding of primary sludge had to be temporarily discontinued consequent to clogging of the 110 mm ϕ pipe connecting the two digestors. Towards the last week of January, feeding of primary sludge was resumed and by end of January, the daily feed constituted one tonne of fleshings and 500 litres of primary sludge.

During the month February 2000, the quantity of feed was gradually increased to

1.5 tonnes of fleshings
1.0 tonne of primary sludge

The CO_2 level in the generated gas was measured once in 2 days and H_2S level once in a week.

The CO_2 level in the biogas was between 28 and 36 % and H_2S ranged from 0.6 – 0.9%.

The volume of gas generated was about 25-30 m^3/d. As the gas generation was observed to be low, it was decided to measure the quantity of feed accurately, analyse samples drawn from feed/drain tanks and the different compartments of the digestors for the following characteristics:

- pH
- Total solids
- Volatile solids

On analysis, it was realized that the volatile solids in the fed material – fleshings and primary sludge - were lower than what had been assumed in the DPR. The low VS content of feed was traced to:

- ☞ the type of fleshings received from different tanneries and the type of wastewater treated in the CETP supplying the primary sludge.
- ☞ origin of the rawhides yielding the fleshings.
- ☞ type of liming practised – prolonged less sulphide method or the rapid method.

The feed rate was maintained at 1.5 to 2.0 m^3/d depending on the availability of fleshings. It was gradually increased and by the middle of June 2000, it reached a rate of 5 m^3/day – 3 tonnes of minced fleshings and 2 m^3 of primary sludge. The gas production, however, did not increase with the increase in feed.

While the feed rate was gradually increased to the capacity level of 5 m^3/d, over flowing of the material from digestor 1 through the U tube was noticed. On examination, the overflowing substance was found to be a frothy matter. This matter entered the gas line too. The operation was stopped and no feeding was done for a few days. After cleaning the gas line the operation of the plant was resumed.

The performance of the plant in May and June 2000 was reviewed with Mr. M. Aloy, international expert, in July 2000. On analysing the data, the following points emerged:

- There was a sudden increase in the VS loading in June compared to May. From an average feeding rate of about 160 kg/d of VS in May, it shot up to > 450 kg/d on a few days in June.
- This shock loading was suspected to have caused the frothing problem in digestor 1.

Mr. Aloy recommended maintaining feed rate on the basis of VS loading and not on volumetric monitoring. During the months of July and August 2000, the grinder was not operational on most of the days on account of frequent breaking of cutter wheel assembly. Consequently, feeding was limited to 2 m^3 of primary sludge on alternate days. The gas production was in the range of 45 – 50 m^3/day.

Feeding of fleshings was restarted in September 2000 with the locally fabricated cutter wheel assembly mounted on the grinder. Feeding was done on the basis of VS loading. On average, 2 m^3/day of feed comprising minced fleshings and primary sludge mixed in the ratio of 3:2 was given maintaining the VS loading rate in the range of 80-105 kg/day.

As gas yield continued to be in the region of 40 - 50 m^3/d, it was felt that the population of the bacteria responsible for the methenogenesis phase was low and hence cow dung was fed to the system for a few days in January 2001. By the end of January 2001, the gas production increased to 70 – 75 m^3/d. Operation of the plant was continued and the gas yield during February 2001 increased to 80 – 90 m^3/d.

In Table 3, month-wise cumulative data relating to total solids and volatile solids in the feed and the drained material, volume of gas generated, specific gas generation with respect to VS destroyed, etc. are given for the period March 2000 to June 2001.

Table 3: Month-wise operational data

Month	No. of feed days	Feed				Drain		VS destroyed		Gas production volume, m^3		Specific gas production
		Volume M^3	Total solids, kg	Volatile solids, kg	VS on TS	Total solids, kg	Volatile solids, kg	kg	%	Total	Average /day	
Mar, 00	24	47.5	3810	2227	58.5%	3258	1214	1013	45	839.46	27.08	0.83
Apr, 00	18	28.1	2507	1712	68.3%	1631	631	1081	63	1220.51	40.68	1.13
May, 00	24	45.0	3450	1880	54.5%	2175	844	1036	55	1391.00	44.87	1.34
Jun, 00	25	81.0	6323	3874	61.3%	1499	648	3226*		1445.00	48.17	0.45
Jul, 00[#]	-	-	-	-	-	-	-	-		1477.13	47.65	-
Aug, 00	13	25.7	2041	1280	62.7%	1315	515	765	60	1672.39	53.95	2.19
Sep, 00	21	47.0	3815	2159	56.6%	2359	925	1234	32	1305.55	43.52	1.06
Oct, 00	13	34.3	2857	1480	51.8%	1842	608	872	31	1182.68	38.15	1.36
Nov, 00[#]	4	13.0	1042	591	56.7%	578	323	268	26	525.61	17.52	1.96
Dec, 00	27	69.8	5747	2810	48.9%	3070	972	1838	65	934.75	30.15	0.96
Jan, 01	22	52.5	4857	2642	54.4%	2574	1015	1627	62	1407.00	45.39	0.86
Feb, 01	23	84.3	8462	4291	50.7%	4789	1945	2346	55	2193.25	78.33	0.93
Mar, 01	13	43.7	5509	3076	55.8%	1549	536	2540	83	1939.50	62.56	0.76
Apr, 01	22	78.2	9573	4317	45.1%	4332	1486	2831	66	2322.00	77.40	0.82
May, 01	15	89.0	8929	4750	53.2%	4047	1418	3332*		1258.00	40.58	0.38
Jun, 01	9	41.0	4990	2588	51.9	2620	960	1628	63	739.78	24.66	0.45

Note:

** "Shock loadings" caused overflowing of material from the digestor 1 in June 2000, May 2001 and June 2001.*

[#]Due to breakdown of the grinder (cutter wheel assembly) feeding of fleshings was discontinued in July and November 2000.

8. PROBLEMS ENCOUNTERED

8.1 Problems relating to grinder

The grinder installed at the site is of Danish make. The machine is able to grind the wet limed or green fleshings fed into it to the required particle size of 6 mm very smoothly and effectively. 4 spare sets of cutter wheel and blades had been supplied along with the machine. The breaking of blades was first encountered in March 2000 after about three months of regular operation of the grinder. Before end of June 2000, it broke four more times. The broken part was replaced by spares that were available. As importing spares from Denmark was a time-consuming and costly exercise, it was decided to develop a vendor locally for the fabrication and supply of cutter wheels. An engineering company having a fairly well equipped workshop at Vellore was identified and after ascertaining the metallurgical characteristics of the material of construction of the item, a counter sample was developed. This was tried on the grinder and found to be of acceptable quality. Further improvements were effected and 4 sets of cutter wheel assembly were fabricated and supplied by the Vellore-based vendor. The locally made items were found to be satisfactory in quality. The grinding was as smooth, noiseless, effective and quick as obtained using the imported ones.

Data relating to disruption of operation of the plant due to breaking of cutter wheel assembly of the grinder is given in Table 6.

Table 6 History of cutter wheel-related break down of grinder

#	Dates		Remarks
	Breaking	Made operational	
1.	11 March 2000	11 March 2000	Readily available imported spare was mounted.
2.	11 May 2000	11 May 2000	Readily available imported spare was mounted.
3.	20 May 2000	20 May 2000	Readily available imported spare was mounted.
4.	27 June 2000	27 June 2000	Readily available imported spare was mounted.
5.	29 June 2000	03 August 2000	A fresh spare had to be imported and mounted. Developmental work with local vendor was started simultaneously.
6.	09 August 2000	26 August 2000	Locally fabricated one was mounted.
7.	19 October 2000	04 November 2000	Locally fabricated one was mounted.
8.	16 November 2000	25 November 2000	Locally fabricated one was mounted.
9.	28 November 2000	29 November 2000	Locally fabricated one was mounted.
10.	07 February 2001	09 February 2001	Locally fabricated one was mounted.
11.	17 February 2001	19 February 2001	Locally fabricated one was mounted.
12.	05 March 2001	07 March 2001	Locally fabricated one was mounted.
13.	07 April 2001	09 April 2001	Locally fabricated one was mounted.
14.	12 April 2001	14 April 2001	Locally fabricated one was mounted.
15.	22 April 2001	24 April 2001	Locally fabricated one was mounted.
16.	03 May 2001	04 May 2001	Locally fabricated one was mounted.
17.	04 May 2001	06 May 2001	Locally fabricated one was mounted.

18.	11 May 2001	13 May 2001	Locally fabricated one was mounted.
19.	23 May 2001	25 May 2001	Locally fabricated one was mounted.
20.	27 May 2001	29 May 2001	Locally fabricated one was mounted.

With frequent breaking of cutter wheels, the following control measures have been implemented:

- Fleshings received from tanneries to be thoroughly checked for presence of any metallic object or stones.
- The rate of grinding to be maintained as recommended by the supplier to avoid overstraining the knives.

8.2 Availability of fleshings

Tanning activity in tanneries is affected by fluctuations in the international trade in leather. Tanneries work overtime during the busy months of a year and have much less work during the dull phases. There were 'dull phases' during the period of observation when tanneries in Melvisharam did not work to capacity. There was no soaking in many units during such periods and it was difficult to find the required quantity of fleshings in Melvisharam. Fleshings had to be brought from Ranipet a nearby tannery cluster during such periods to maintain regular feeding of the digestor. However availability of fleshings for the plant has never been a serious problem.

8.3 Inconsistency in the quality of fleshings

Raw hides from different sources are processed in the Melvisharam cluster. Apart from locally procured wet salted hides, raw hides imported from Europe, CIS countries, Africa and Australia are processed in the tanneries at Melvisharam. Consequently, the characteristics of the fleshings received in the plant vary widely from batch to batch and from day to day. It is seen that fleshings obtained from hides of European / Australian origin have a much higher VS content than those got from hides of Indian origin. With the quantity of feed controlled volumetrically, such inconsistencies in the VS content resulted in "shock loadings" leading to the frothing and foaming problem and overflow of the frothy matter from the digestor. Sometimes the frothy matter entered the gas line too. To avoid such 'shock loadings', it was decided to control the feed quantity on the basis of VS loading from August 2000.

8.4 Digester overflow and frothing problem

The designed feed rate of 5 m^3/day was started during 1st week of June 2000 and the frothing and overflow problems started after 8 days of continuous feeding (5 m^3/day). The 5 m^3/day feeding was also performed during May 2001 continuously for a period of 19 days and the overflow problem re-started. The occurrence of overflow / frothing problems on the 20th day had been attributed to the following reasons.

The scum or foamy fatty material accumulation above the scum funnel could not be sensed and identified and therefore the gas pipeline got choked preventing the biogas flow to the gas holder. The developed buoyancy force in the digester due to the blockage of gas pipeline by scum or foamy material and the accumulation of VFA with organic loading were perceived to be the causes of digester overflow. It has therefore been proposed to build a sensor mechanism to identify the scum or foamy fatty material above the scum funnel in the digester before it reached to the gas pipeline. The digester overflow problem leads to the termination

of digester feeding process for about 10 days. The digester overflow problem is also attributed to the persisting inequilibrium between the acetogenic and methanogenic microbial population in the digester, which could be inferred by the recorded VFA concentration of 15,000 – 20,000 mg/l during the overflow time. Consequently, the accumulation of VFA due to continuous feeding of 5 m^3/day (400 kg VS/day) has to be modified to 4 m^3/d (300 kg VS/d). This will provide for longer retention time for VFA to be converted to biogas as the methanogens are slow growing microbes. However, the indices/circumstances attending the overflow problem and effective preventive measures are being further evaluated to reduce the digester downtime.

9. PERFORMANCE OF THE PLANT

Against the projected gas yield of 320 m^3/d for a daily input of 5 m^3 of feed – 3 m^3 of fleshings and 2 m^3 of sludge – the gas yield actually obtained in the plant is low. The maximum gas yield recorded in a day was 96 m^3 on 26 February 2001. It has largely remained in the range of 40 – 50 m^3/d on most of the days during the last 18 months of regular operation of the plant. However the feed rate too was not uniform and regular throughout. While problems arising from breakdown of the grinder and non-availability or irregular availability of fleshings contributed to disruption of work now and then and eventually affected gas generation, the following factors have been identified as responsible for the low gas yield:

- The acidogenesis phase of the anaerobic reaction appeared to be satisfactory as ascertained by the analysis of samples drawn from the different compartments of the digestors. However, the methanogenesis phase of the reactors needed investigation. When the VS loading increased progressively, the volume of gas generated increased. However, when the gas production was over 60 m^3/d, the matter inside the digestors began to overflow. Consequently the feeding had to be stopped and the gas yield eventually came down to 20 – 30 m^3/d. When the overflowing took place the VFA (volatile fatty acid) content of the matter in the digestors was in the region of 16000 – 17000 mg/l. This raised the doubt whether the population of the methane-producing bacteria was adequate. In January 2001,when the digestors overflowed and the VFA content was found to be 17000 mg/l, cow dung was fed to the digestor for a few days to help improve the population of methane-producing microorganisms. This attempt produced good result – the gas yield improved from about 40 m^3/d to 70 – 75 m^3/d. Perhaps feeding of a more appropriate seed material may help improve the population of methane-producing microorganism and eventually the gas yield. CLRI, the agency responsible for daily operation of the plant, is further investigating this aspect.

- The fleshings and the primary sludge constituting the feed are analysed for total solids and VS content daily. From the data available, it is seen that the VS content of fleshings generally vary from 45% to 70%. This is far less than the value considered in the DPR, namely 90% for fleshings. The VS content of the combined feed, as seen from Table 3 ranges from 45% to 68% as against 83.6% assumed in the DPR.

- The maximum electricity generated in a day is 315 kWh.

But for the low gas yield, the plant is functioning well and the results obtained over the period January 2000 to June 2001 confirm the following:

- The methane content of the gas generated is 60 – 70%, carbon dioxide 20 – 35% and H_2S about 1%.
- The gas yield has been found to correspond to the volatile solids destroyed in the system.
- The actual rate of VS destroyed is in the range of 55 – 65%.
- The scrubbing of the biogas in the H_2S scrubber system reduces the H_2S level from to 1% to less than 0.1%.
- The generated gas, after removal of H_2S in the scrubber system, has been successfully used as fuel in the dual fuel engine for generation of electricity.

The average monthly cost of operation of the plant until now is INR 55,000.

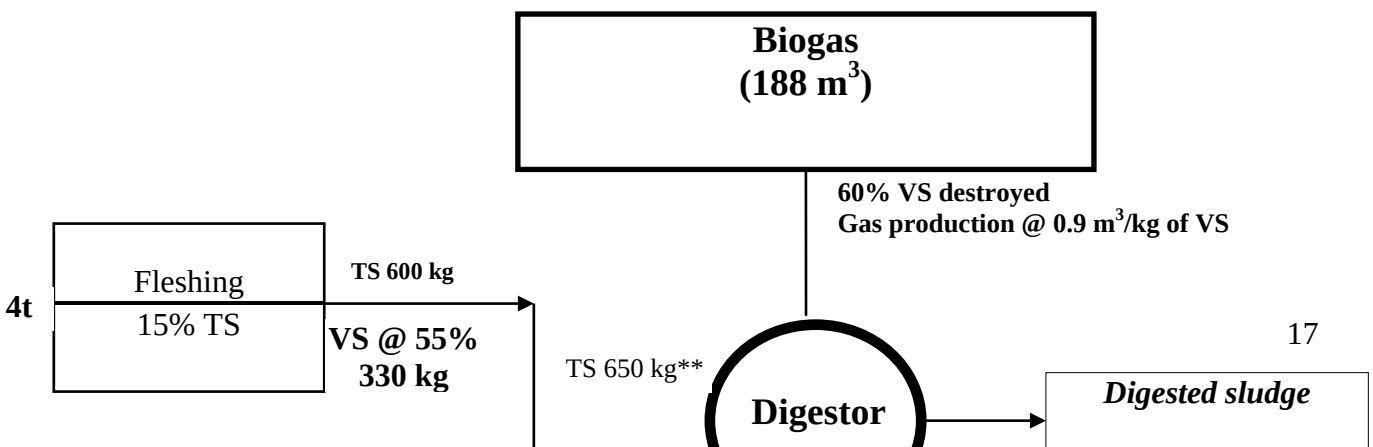
10. LESSONS LEARNT

Over the last many months of regular operation of the plant, the following lessons have been learnt.

- Feed has to be measured in terms of volatile solids and not in terms of volume only. This is necessary to avoid shock loadings.
- The maintenance of the mechanical equipment, particularly the grinder, requires greater attention. Thorough screening of the fleshings to remove foreign objects before feeding to the grinder is necessary. Feeding the fleshings in the stipulated manner to the mincing chamber is essential to avoid over straining the knives and to prevent breaking of the cutter wheel assembly.
- All sources of supply of fleshings have to be categorised in terms of the quality of fleshings. This will help prevent shock load risks.
- Developing local sources for supply of essential spares such as cutter wheel for the grinder is useful as it saves time, helps avoid long waits and is much less expensive compared to the option of importing spares from overseas suppliers.

11. FUTURE

With the feasibility of biomethanation of wet limed fleshings and sludge from effluent treatment plants for generation of biogas and electricity having been established, it is now important to optimize yield of gas & electrical energy. As the VS content in the fleshings available in Melvisharam cluster is about 55%, it has been decided in consultation with Mr. Michel Aloy that future efforts should target a gas yield of about 180-190 m^3/d as shown below:



If the performance of the plant in Melvisharam is optimised to yield biogas at the rate of 180 – 190 m^3/d, this option of utilisation of limed fleshings, an untanned solid waste of tanning industry and sludge, a solid waste of the ETPs, is likely to become popular, not only in the tannery clusters of Tamil Nadu, India but in other countries of the region as well.

A realistic cost-benefit analysis is feasible only after the plant performance is stabilized and the yield of gas and electricity are optimized for the given quality of inputs.

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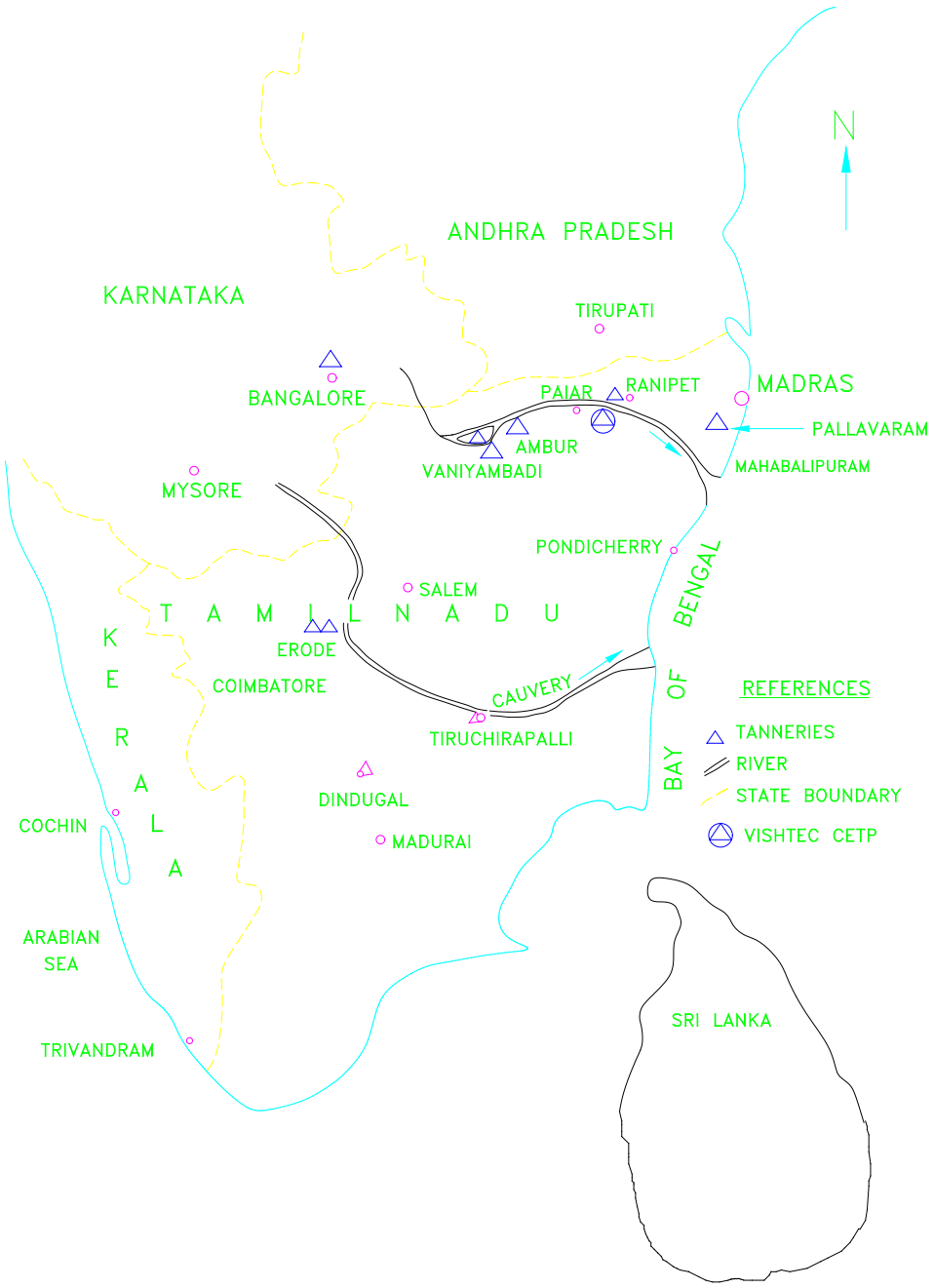
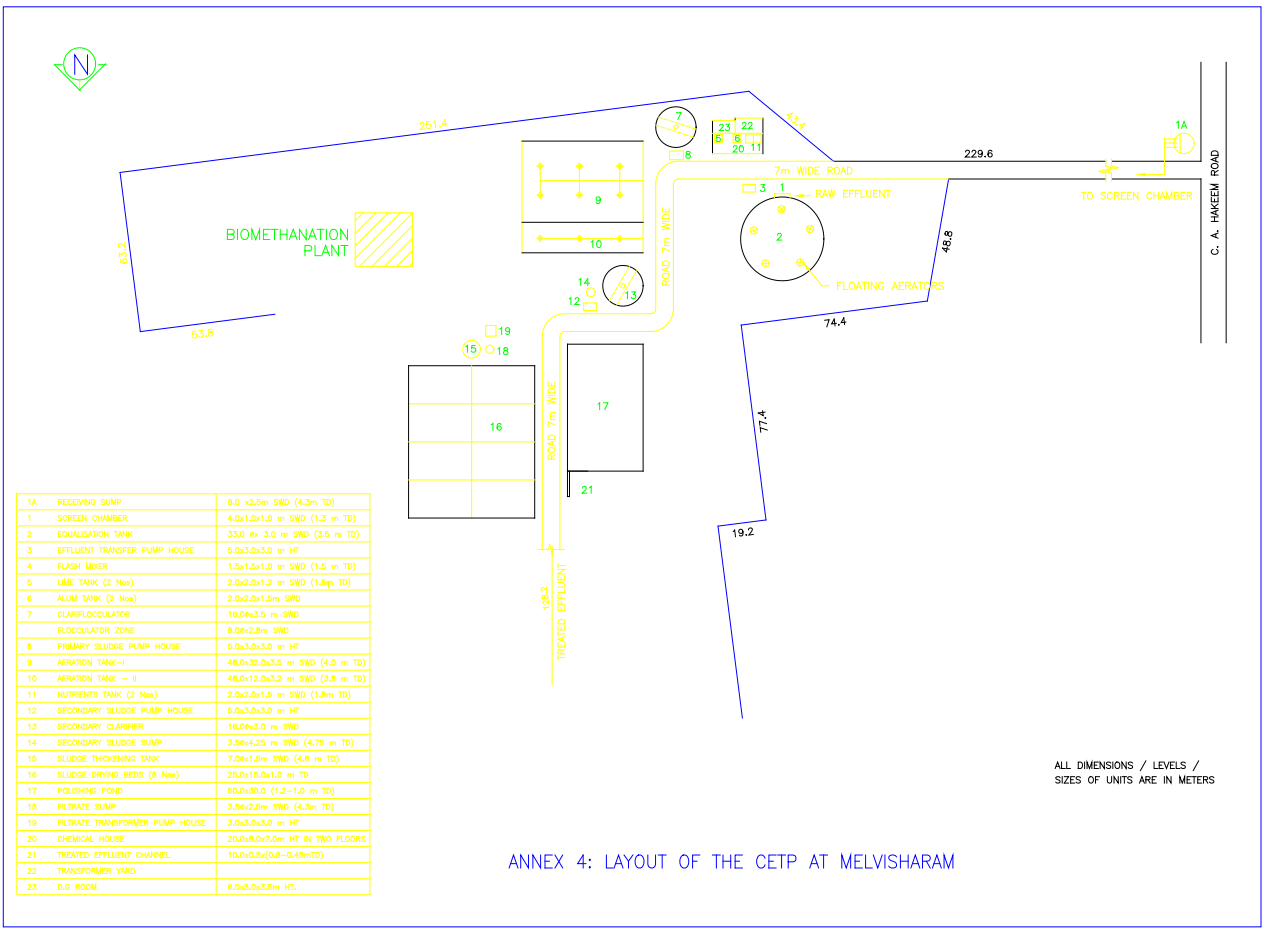
2. Central Leather Research Institute, Chennai, India.
3. Enkem Engineers P. Ltd. Chennai, India.
4. Mr. Mladen Bosnic, Consultant
5. CETP-Vishtec, Melvisharam, India.
6. Tanners of Melvisharam
7. Indian Institute of Science, Bangalore, India.

ANNEX 3: LOCATION MAP

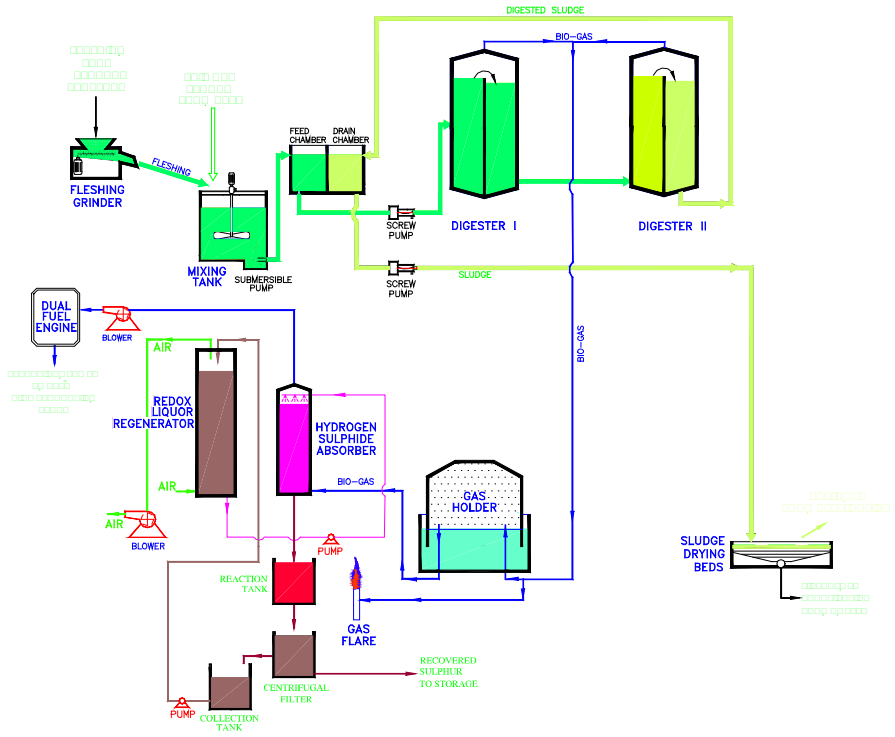




1A	RECEIVING SUMP	8.0 x2.5m SWD (4.3m TD)
1	SCREEN CHAMBER	4.0x1.0x1.0 m SWD (1.3 m TD)
2	EQUALISATION TANK	33.0 dx 3.0 m SWD (3.5 m TD)
3	EFFLUENT TRANSFER PUMP HOUSE	5.0x3.0x3.0 m HT
4	FLASH MIXER	1.5x1.5x1.0 m SWD (1.8 m TD)
5	LIME TANK (2 Nos)	2.0x2.0x1.2 m SWD (1.8m TD)
6	ALUM TANK (2 Nos)	2.0x2.0x1.5m SWD
7	CLARIFLOCCULATOR	16.0dx3.5 m SWD
	FLOCCULATOR ZONE	8.0dx2.8m SWD
8	PRIMARY SLUDGE PUMP HOUSE	5.0x3.0x3.0 m HT
9	AERATION TANK–I	48.0x32.0x3.5 m SWD (4.0 m TD)
10	AERATION TANK – II	48.0x12.0x3.2 m SWD (3.8 m TD)
11	NUTRIENTS TANK (2 Nos)	2.0x2.0x1.5 m SWD (1.8m TD)
12	SECONDARY SLUDGE PUMP HOUSE	5.0x3.0x3.0 m HT
13	SECONDARY CLARIFIER	16.0dx3.0 m SWD
14	SECONDARY SLUDGE SUMP	3.5dx4.25 m SWD (4.75 m TD)
15	SLUDGE THICKENING TANK	7.0dx1.5m SWD (4.8 m TD)
16	SLUDGE DRYING BEDS (6 Nos)	25.0x16.0x1.0 m TD
17	POLISHING POND	50.0x30.0 (1.2–1.0 m TD)
18	FILTRATE SUMP	3.5dx2.5m SWD (4.3m TD)
19	FILTRATE TRANSFORMER PUMP HOUSE	5.0x3.0x3.0 m HT
20	CHEMICAL HOUSE	20.0x8.0x7.0m HT IN TWO FLOORS
21	TREATED EFFLUENT CHANNEL	10.0x0.8x(0.8–0.45mTD)
22	TRANSFORMER YARD	
23	D.G ROOM	6.0x8.0x3.5m HT.

ALL DIMENSIONS / LEVELS / SIZES OF UNITS ARE IN METERS

ANNEX 4: LAYOUT OF THE CETP AT MELVISHARAM



ANNEX 5: FLOW DIAGRAM OF BIOMETHANATION PLANT AT VISHTEC, MELVISHARAM

Annex 6

OPERATIONAL DATA

Period: 28 March to 27 April 2000

I. FEED MATERIAL

1. Fleshing

Date	Weight, (tonnes)	% Moisture	% TS	Composition of solid matter	
				% VS	% FS
28	-	85.7	14.3	82.2	17.8
29	-	84.1	15.9	52.9	47.1
30	-	81.0	19.0	52.9	47.1
31	-	83.8	16.2	66.9	33.1
01	-	85.2	14.8	64.2	35.8
04	-	86.6	13.4	53.3	46.7
05	-	83.4	16.6	68.7	31.3
06	1.500	87.07	12.03	85.01	14.99
07	0.900	82.39	17.61	65.76	34.24
08	0.900	87.45	12.55	55.87	44.13
10	1.300	87.87	12.13	81.90	18.10
12	1.500	86.55	13.45	64.78	35.22
15	1.150	79.36	20.64	68.76	31.24
18	1.750	77.80	22.20	71.10	28.90
19	0.773	73.10	26.90	64.90	35.10
21	1.080	-	28.48	68.16	-
22	0.950	-	24.45	67.17	-
25	1.230	62.28	37.72	73.01	26.99
26	0.900	70.10	29.90	64.92	35.08
27	1.085	71.39	28.61	65.39	34.07

2. Primary sludge

Date	Volume (m^3)	% Moisture	% TS	Composition of solid matters		Total Alkalinity mg/l
				% VS	% FS	
28	1.0	98.2	1.8	78.8	21.2	-
29	1.0	95.7	4.3	38.7	61.3	-
30	1.0	95.6	4.4	31.4	68.6	-
31	1.0	95.6	4.4	31.5	68.5	-
01	1.0	95.8	4.2	32.3	67.7	-
04	1.0	95.6	4.4	33.7	66.3	-
05	1.0	96.1	3.9	37.2	62.7	-
06	1.0	96.59	3.41	27.99	72.01	15625
07	0.7	95.61	4.39	40.27	59.73	18403
08	0.7	97.61	2.39	30.42	69.58	-
10	0.9	98.35	1.65	24.60	75.40	4861
12	1.0	96.82	3.18	40.31	59.69	21528
15	0.7	96.03	3.97	46.68	53.32	61111
18	1.1	95.90	4.10	43.60	56.40	29514
19	0.5	96.50	3.50	35.50	64.50	34028
21	0.8	-	6.09	45.72	-	-

22	0.7	-	3.68	30.89	-	-
25	1.0	93.92	6.08	41.49	58.51	-
26	0.6	93.24	6.76	36.58	63.42	-
27	0.8	96.60	3.40	41.20	58.80	-

3. Material in feed chamber

Date	Volume m^3	pH	% Moisture	% TS	Composition of solid matter		Total Alkalinity, mg/l
					% VS	% FS	
28	2.00	8.7	92.2	7.8	87.7	12.3	-
29	2.00	9.3	89.5	10.5	93.8	56.2	13450
30	2.00	9.4	96.2	3.8	44.9	55.1	11300
31	2.00	10.2	88.0	12.0	59.9	40.1	-
01	2.00	9.4	89.2	10.8	56.5	43.5	-
04	2.00	11.4	91.1	8.9	55.1	44.9	7000
05	2.00	9.6	92.4	7.6	56.1	43.9	10750
06	2.00	9.91	92.66	7.64	60.98	39.02	-
07	-	7.23	90.35	9.65	58.14	41.86	-
08	-	7.87	80.09	19.91	58.47	41.53	-
10	-	7.08	92.31	7.69	76.30	23.70	-
12	-	8.26	92.24	7.76	47.98	52.02	-
15	1.50	9.85	86.19	13.81	59.91	40.09	-
18	2.30	9.13	89.40	10.60	57.80	42.20	-
19	1.50	7.48	93.80	6.20	56.30	43.70	-
21	1.50	-	-	13.50	73.20	-	-
22	1.50	7.20	-	15.52	62.60	-	-
25	2.75	8.27	88.24	11.76	62.21	37.79	-
26	1.50	9.40	84.43	15.57	59.11	40.89	-
27	1.50	9.21	70.48	29.52	79.00	21.00	-

II. DRAINED MATERIAL

1. Material in drain chamber

Date	Volume m3	pH	% Moisture	% TS	Composition of solid matter		Total COD mg/l	Soluble COD mg/l
					% VS	% FS		
28	2.00	7.5	92.7	7.3	29.1	71.9	-	-
29	2.00	7.4	93.6	6.4	45.3	54.7	-	-
30	2.00	7.4	92.5	7.5	42.8	57.2	53240	10480
31	2.00	7.5	93.6	6.4	40.4	59.6	-	-
01	2.00	7.5	93.3	6.7	44.2	53.8	47890	-
04	2.00	7.6	92.5	7.5	36.9	63.1	50933	6852
05	2.00	7.6	94.6	5.4	36.7	63.3	39352	16647
06	2.00	7.80	93.81	6.19	34.13	65.87	40278	16111
07	-	7.65	92.29	7.71	34.30	65.70	34375	16250
08	-	7.86	92.07	7.93	35.40	64.60	-	-
10	-	7.66	93.93	6.07	29.30	70.70	49653	17639
12	-	7.64	94.08	5.92	40.42	59.58	54167	21389
15	1.50	7.68	89.04	10.96	35.07	64.93	-	-
18	2.30	7.84	86.00	14.00	34.50	65.50	26389	10000

19	1.50	7.76	82.50	17.50	17.00	82.99	56944	16667
21								
22	1.50	8.02	-	2.86	38.48	-	-	-
25	2.75	7.68	91.91	8.09	36.71	63.29	49306	18889
26	1.50	7.78	91.50	8.50	44.36	55.63	84375	17361
27	1.50	7.77	92.13	7.87	35.52	64.48	-	-

III. MATTER IN DIGESTORS

1. Sample drawn from Compartment No. 1

Date	**pH**	**Temp ^{o}C**	**% Moisture**	**% TS**	**Composition of solid matter**		**Total COD mg/l**	**Total Alkalinity mg/l**	**S^{2-} mg/l**
					% VS	**% FS**			
28	7.2	31.5	-	-	-	-	31816	12225	266.9
29	7.3	32.7	96.95	3.05	42.17	57.83	63370	15150	199.0
30	7.4	32.5	95.13	4.87	47.11	52.89	-	14950	262.5
31	7.5	32.0	96.83	3.17	50.95	49.05	21527	15050	209.0
01	7.5	29.4	-	-	-	-	-	-	201.4
04	7.4	32.5	96.21	3.80	39.02	60.98	20903	20500	-
05	7.5	33.6	97.92	2.08	38.64	61.36	26945	21750	314.4
06	7.47	33.5	97.07	2.93	38.19	61.81	37778	20750 33200	326.16
07	7.50	33.2	97.27	2.76	46.70	53.30	21111	23832	377.60
08	7.44	34.1	96.50	3.50	40.54	59.46	31389	-	-
10	7.51	34.6	97.03	2.97	44.60	55.40	29444	22500 23324	480.00
11	7.52	34.4	97.60	2.40	50.10	49.90	32500	24832	312.00
12	7.45 7.59	34.1 34.6	96.90	3.10	45.10	54.90	26111	18500 24332	356.00
13	7.53	35.9	98.00	2.00	51.40	48.60	32500	19250	316.00
14	7.53	36.4	97.60	2.40	39.60	60.40	-	18500	286.04
15	7.61	35.3	97.00	3.00	-	-	-	17000	258.46
17	7.55	34.5	95.60	4.40	48.38	51.62	46389	17500	233.60
18	7.66	33.1	96.20	3.80	40.40	59.60	27222	-	325.12
19	7.57	36.4	96.30	3.70	36.60	63.40	38611	28666	58.72
20	7.59	33.7	97.00	3.00	40.40	59.60	28611	27832	-
21	7.61	34.6	-	-	-	-	-	-	247.36
22	7.74	-	-	3.72	39.61	-	46944	34998	263.87
25	7.53	38.8	-	3.28	44.31	-	35000	23499	187.92
26	7.64	36.9	-	4.13	40.70	-	-	30332	294.00
27	7.59	37.2	-	3.60	46.76	-	35000	-	298.08

2. Sample drawn from Compartment No. 2

Date	**pH**	**Temp. ^{o}C**	**% Moisture**	**% TS**	**Composition of solid matter**		**Total COD mg/l**	**Total Alkalinity mg/l**	**S^{2-} mg/l**
					% VS	**% FS**			
28	7.3	30.8	-	-	-	-	58134	13650	290.1
29	7.4	32.5	96.67	3.33	23.33	76.67	43689	14250	183.2
30	7.4	32.9	-	-	-	-	-	14750	199.0
31	7.5	31.7	98.23	1.77	44.20	55.80	20348	15750	181.6

01	7.5	29.1	-	-	-	-	-	15250	226.2
04	7.4	32.9	97.56	2.44	37.62	62.38	19861	20250	-
05	7.5	33.1	97.94	2.06	34.64	65.36	25560	19250	294.8
06	7.54	33.4	96.10	4.90	34.49	65.51	28125	19000 40600	393.60
07	7.51	33.2	94.40	5.60	43.36	56.64	12222	27499	402.40
08	7.49	33.6	95.31	4.69	33.12	66.88	34722	-	-
10	7.52	34.2	96.69	3.31	42.15	57.85	34722	14500 22824	512.00
11	7.54	34.3	97.70	2.30	51.40	48.60	30000	23666	376.00
12	7.49 7.55	34.0 34.6	97.10	2.90	44.00	56.00	26944	18500 25832	396.00
13	7.57	35.3	97.80	2.20	44.60	55.40	25833	18000	276.00
14	7.54	36.1	97.20	2.80	43.60	56.40	-	17900	251.12
15	7.61	35.2	95.60	4.40	-	-	-	16800	241.12
17	7.64	34.5	95.90	4.10	42.01	57.99	56667	17500	171.20
18	7.69	33.1	94.60	5.40	32.80	67.20	30278	-	216.96
19	7.61	36.5	96.20	3.80	34.30	65.70	37778	26000	183.68
20	7.60	34.1	96.00	4.00	37.20	62.80	31389	29832	-
21	7.57	34.2	-	-	-	-	-	-	222.59
22	7.84	-	-	2.55	43.87	-	34722	24998	239.20
25	7.57	39.9	-	2.74	44.73	-	29444	25925	302.16
26	7.60	36.8	-	3.12	48.50	-	38333	-	314.40
27	7.62	36.6	-	3.10	51.99	-	30000	-	447.12

3. Sample drawn from Compartment No. 3

Date	**pH**	**Temp. °C**	**% Moisture**	**% TS**	**Composition of solid matter**		**Total COD mg/l**	**Total Alkalinity mg/l**	**S^{2-} mg/l**
					% VS	**% FS**			
28	7.3	31.3	-	-	-	-	23568	14200	164.6
29	7.3	32.1	97.96	2.04	57.87	42.13	41721	14750	99.8
30	7.4	32.3	96.99	3.01	47.02	52.96	-	15150	111.7
31	7.4	31.4	98.17	1.83	48.82	51.18	22500	15350	122.8
01	7.5	28.9	-	-	-	-	-	15750	140.3
04	7.5	32.5	97.52	2.48	38.56	61.44	20,417	19800	-
05	7.6	33.2	97.78	2.23	35.85	64.15	30,278	18500	236.0
06	7.60	33.1	97.86	2.14	35.48	64.52	37778	19000 28800	239.92
07	7.60	32.7	98.62	1.38	51.79	48.21	36111	19333	272.80
08	7.57	33.9	96.76	3.24	34.53	65.47	25833	-	-
10	7.59	34.0	97.83	2.17	42.77	57.23	24444	11750 22491	304.00
11	7.62	34.2	97.60	2.40	54.00	46.00	23611	18999	284.00
12	7.57 7.63	33.2 34.1	97.90	2.10	42.50	57.50	24722	17500 22332	272.00
13	7.65	34.9	97.80	2.20	43.90	56.10	28333	17500	264.00
14	7.63	35.5	97.70	2.30	37.50	62.50	-	17800	220.10
15	7.71	35.2	96.10	3.90	-	-	-	17100	221.12
17	7.75	33.9	97.60	2.40	44.85	55.15	40278	16500	258.56

18	7.79	32.7	96.30	3.70	41.10	58.90	26111	-	196.16
19	7.75	34.8	97.20	2.80	33.90	66.10	31944	25000	192.00
20	7.78	33.7	96.00	4.00	44.60	55.40	22778	27332	-
21	7.70	34.9	-	-	-	-	-	-	230.81
22	8.09	-	-	1.86	44.01	-	28611	21665	135.04
25	7.66	39.0	-	2.28	40.83	-	24167	22000	269.52
26	7.70	36.4	-	3.02	35.40	-	36944	-	352.80
27	7.70	36.4	-	1.90	45.73	-	22778	-	398.16

4. Sample drawn from Compartment No. 4

Date	**PH**	**Temp. °C**	**% Moisture**	**% TS**	**Composition of solid matter**		**Total COD mg/l**	**Total Alkalinity mg/l**	**S^{2-} mg/l**
					% VS	**% FS**			
28	7.3	31.4	-	-	-	-	36137	14500	148.40
29	7.3	32.1	97.95	2.05	54.48	45.42	34243	14750	103.80
30	7.3	32.3	96.82	3.18	47.21	52.79	-	14300	95.80
31	7.4	31.5	98.37	1.63	41.70	58.30	22500	15400	126.70
01	7.4	29.1	-	-	-	-	-	15000	103.50
04	7.5	31.7	97.51	2.49	35.74	64.26	20208	18500	-
05	7.5	32.3	96.95	3.05	37.59	62.41	23056	20000	204.60
06	7.6	31.3	97.84	2.16	37.71	62.29	32500	18500 29200	216.40
07	7.7	30.3	98.30	1.70	47.88	52.12	31111	20165	226.40
08	7.58	32.1	96.55	3.45	36.19	63.81	24167	-	-
10	7.61	33.9	97.81	2.19	41.65	58.35	25833	8750 23824	252.00
11	7.66	34.3	97.90	2.10	52.70	47.30	27778	17999	292.00
12	7.59 7.65	33.3 34.0	97.40	2.60	50.10	49.90	27500	16760	214.99
13	7.64	34.1	97.50	2.50	42.50	57.50	33889	18000	288.00
14	7.64	35.2	97.10	2.90	37.60	62.40	-	18200	197.40
15	7.72	35.0	95.20	4.80	-	-	-	17300	171.20
17	7.76	34.1	98.20	1.80	44.68	55.32	29722	17500	167.40
18	7.78	33.1	97.10	2.90	38.10	61.90	21111	-	154.56
19	7.76	34.9	98.80	1.20	30.50	69.50	32222	16666	192.00
20	7.79	33.7	98.70	1.30	44.00	56.00	21111	19000	-
21	7.78	34.8	-	-	-	-	-	-	226.72
22	8.07	-	-	1.80	43.49	-	26111	19165	247.36
25	7.70	38.2	-	2.43	41.44	-	26667	22332	269.52
26	7.71	36.5	-	2.91	35.20	-	25278	-	455.28
27	7.72	36.2	-	2.10	43.66	-	21667	-	385.92

IV. GENERATION OF BIOGAS

Date	**Volume, m^3/day**	**Composition**	
		% CO_2	**% H_2S**
28	18.00	39	0.8
29	22.00	39	0.6
30	17.20	-	-
31	17.50	-	-
01	19.70	-	-

02	22.50	-	-
03	29.50	-	-
04	36.50	35	0.6
05	27.00	-	-
06	32.00	-	-
09	31.76	-	-
10	48.25	-	-
11	46.00	-	-
12	48.65	-	-
13	48.60	-	-
14	43.50	-	-
15	45.25	26	0.8 – 1.0
16	45.00	-	-
17	43.00	-	-
18	41.00	-	-
19	45.25	-	-
20	46.50	-	-
21	43.75	-	-
22	42.50	-	-
23	57.90	-	-
24	53.50	-	-
25	43.50	-	-
26	50.23	-	-
27	55.50	-	-
28	56.00	-	-
29	57.00	-	-
30	50.00	-	-

OPERATIONAL DATA

Period: 01 to 31 May 2000

I. FEED MATERIAL

1. Fleshing

Date	Weight, tonnes	% Moisture	% TS	Composition of solid matter	
				% VS	% FS
02	0.989	80.96	19.04	67.37	32.63
03	1.200	88.60	11.40	54.30	45.70
04	0.700	75.87	24.13	70.18	29.82
05	1.228	91.16	8.84	59.86	40.14
09	0.425	74.50	25.50	59.18	40.82
10	0.872	77.35	22.65	84.41	15.59
11	1.585	76.86	23.14	83.14	16.86
12	1.794	89.96	10.04	49.26	50.74
13	2.100	86.06	13.94	56.53	43.47
15	2.100	87.90	12.10	55.04	44.96
16	2.100	82.22	17.78	75.53	24.47
18	1.700	86.85	13.15	53.63	46.37
19	2.100	87.48	12.52	56.49	43.51
20	2.100	88.13	11.87	57.29	42.71
22	3.000	89.15	10.85	56.93	43.07
23	2.166	90.01	9.99	64.41	35.59
24	2.096	-	-	-	-
25	1.500	-	-	-	-

2. Primary sludge

Date	Volume m^3	% Moisture	% TS	Composition of solid matter	
				% VS	% FS
02	0.8	94.89	5.11	29.29	70.71
03	0.8	98.30	1.70	24.60	75.40
04	0.5	97.66	2.34	28.66	71.34
05	0.8	97.95	2.05	26.75	73.25
09	0.3	95.66	4.34	35.71	64.29
10	0.6	90.86	9.14	26.71	73.29
11	1.0	85.20	14.80	28.80	71.20
12	1.2	97.80	2.20	28.92	71.08
13	1.4	97.96	2.04	30.96	69.04
15	1.5	96.24	3.76	21.42	78.58
16	1.5	93.56	6.44	24.45	75.55
18	1.2	96.45	3.55	36.48	63.52
19	1.7	94.71	5.29	35.61	64.39
20	1.7	95.88	4.12	34.20	65.80
22	1.5	91.83	8.17	35.51	64.49
23	1.5	93.46	6.54	27.01	72.99

3. Material in feed chamber

Date	Volume m^3	pH	% Moisture	% TS	Composition of solid matter	
					% VS	% FS
02	1.5	-	88.77	11.23	59.38	40.62
03	2.0	10.14	91.30	8.70	49.40	50.60
04	1.0	6.87	86.79	13.21	57.99	42.01
05	2.5	11.67	95.21	4.79	46.53	53.47
09	1.0	6.94	90.12	9.88	59.76	40.24
10	1.5	7.82	91.60	8.40	53.27	46.73
11	2.5	7.71	88.24	11.76	68.71	31.29
12	3.0	11.33	89.39	10.61	52.89	47.11
13	3.0	11.56	92.69	7.31	46.02	53.98
15	3.0	11.32	92.72	7.28	51.37	48.63
16	3.0	11.32	88.19	11.81	55.76	44.24
18	3.0	11.45	91.70	8.30	55.29	44.71
19	3.0	-	91.67	8.33	49.91	50.09
20	3.0	11.62	91.49	8.51	54.00	46.00
22	3.0	10.79	91.90	8.10	53.47	46.53
23	3.0	11.53	92.31	7.69	54.35	45.65
24	3.0	-	-	-	-	-
25	3.0	-	-	-	-	-

II. DRAINED MATERIAL

1. Material in drain chamber

Date	Volume m^3	pH	% Moisture	% TS	Composition of solid matter		Total COD mg/l	Soluble COD mg/l
					% VS	% FS		
02	0.75	-	-	-	-	-	-	-
03	2.00	7.90	92.70	7.30	31.60	68.40	66071	21571
04	1.00	7.86	92.60	7.40	36.73	63.27	-	-
05	2.50	7.90	93.42	6.58	34.86	65.14	50357	11428
09	1.00	7.78	95.00	5.00	36.46	63.54	45357	15000
10	1.50	7.70	91.87	8.13	38.01	61.99	68214	14143
11	2.50	7.90	94.15	5.85	33.06	66.94	-	-
12	3.00	-	93.32	6.68	35.04	64.96	-	-
13	3.00	7.66	94.36	5.64	40.14	59.86	-	-
15	3.00	7.75	88.04	11.96	41.71	58.29	167143	34643
16	3.00	7.66	89.13	10.87	45.81	54.19	-	-
18		7.84	97.22	2.78	36.78	63.22	28571	13714
19	-	-	96.91	3.09	35.13	64.87	42857	11143
20	3.00	7.70	94.51	5.49	40.27	59.73	100000	23429
22	3.00	7.89	97.22	2.78	47.18	52.82	-	-
23	3.00	7.72	94.35	5.65	34.12	65.88	-	-

III. MATTER IN DIGESTORS

1. Sample drawn from Compartment No. 1

Date	pH	Temp. °C	% Moisture	% TS	Composition of solid waste		Total COD mg/l	Total Alkalinity mg/l	S^{2-} mg/l
					% VS	% FS			
01	7.63	36.7	97.50	2.50	43.17	56.83	32778	24629	287.49
02	7.62	37.3	-	-	-	-	34000	24807	455.11
03	7.65	36.3	97.20	2.80	38.2	61.8	28571	26345	-
04	7.65	34.6	96.86	3.14	37.53	62.47	34285	21153	588.00
06	7.66	33.9	97.24	2.76	40.5	59.5	34285	27114	300.00
08	7.66	34.5	97.40	2.60	39.81	60.19	-	22884	396.00
09	7.67	33.9	97.30	2.70	35.89	64.11	27143	-	-
10	7.74	33.1	96.00	4.00	38.58	61.42	36000	-	226.00
12	7.58	36.9	96.45	3.55	45.02	54.98	-	-	375.00
13	7.67	37.2	94.75	5.25	41.74	58.26	-	-	-
16	7.57	37.2	-	-	-	-	48000	28268	430.14
17	7.63	37.0	95.50	4.50	34.68	65.32	42000	-	290.43
18	7.61	34.4	95.45	4.55	40.45	59.55	64571	-	285.82
19	7.56	36.5	97.70	2.30	41.36	58.64	31142	-	388.00
20	7.65	35.3	94.97	5.03	43.59	56.41	54286	-	-
24	7.59	37.3	-	-	-	-	51143	29999	-

2. Sample drawn from Compartment No. 2

Date	pH	Temp. °C	% Moisture	% TS	Composition of solid waste		Total COD mg/l	Total Alkalinity mg/l	S^{2} mg/l
					% VS	% FS			
01	7.60	37.1	97.80	2.20	38.73	61.27	35556	23333	275.39
02	7.60	39.8	97.20	2.80	29.09	70.91	32285	272884	492.01
03	7.68	36.5	97.40	2.60	33.80	66.20	-	-	-
04	7.70	34.2	96.35	3.65	39.11	60.89	24857	25384	456.00
06	7.68	33.9	97.03	2.97	36.92	63.08	34857	20384	312.00
08	7.70	34.3	97.81	2.19	38.66	61.34	-	-	376.00
09	7.70	33.9	97.60	2.40	37.86	62.14	37143	28076	-
10	7.73	32.7	96.60	3.40	36.89	63.11	35714	22699	226.00
12	7.65	36.1	96.92	3.08	45.71	54.29	-	-	274.00
13	7.63	36.5	97.51	2.49	19.38	80.62	-	-	-
16	7.61	37.2	97.35	2.65	41.53	58.47	39714	27307	343.30
17	7.66	36.2	96.30	3.70	-	-	41143	-	315.02
18	7.66	34.9	96.09	3.91	37.81	62.19	40286	-	426.58
19	7.59	36.0	95.65	4.35	34.53	65.47	33143	-	335.70
20	7.61	35.7	97.30	2.70	45.87	54.13	34571	-	-
24	7.61	36.9	-	-	-	-	53714	28460	-
30	7.74	32.3	-	-	-	-	-	-	-
31	7.76	33.7	-	-	-	-	-	-	-

3. Sample drawn from Compartment No. 3

Date	pH	Temp. °C	% Moisture	% TS	Composition of solid waste		Total COD mg/l	Total Alkalinity mg/l	S^{2-} mg/l
					% VS	% FS			
01	7.71	37.0	97.90	2.10	34.92	65.08	26667	22962	283.46
02	7.7	38.9	98.20	1.80	29.11	70.89	23428	23461	394.02
03	7.76	36.1	97.50	2.50	34.10	65.90	36285	24807	-
04	7.77	34.0	96.53	3.47	36.03	63.97	36286	19422	464.00
06	7.79	34.3	97.99	2.01	38.59	61.41	28000	24230	368.00
08	7.8	34.6	97.33	2.67	34.06	65.94	-	23076	268.00
09	7.79	34.4	97.50	2.50	40.77	59.23	26286	-	-
10	7.8	33.3	96.70	3.30	31.82	68.18	35429	-	242.00
12	7.72	36.1	97.58	2.42	39.53	60.47	-	-	347.00
13	7.66	36.5	97.58	2.42	38.69	61.31	-	-	-
16	7.67	37.0	96.96	3.04	41.42	58.58	41143	31153	275.33
17	7.69	36.3	96.76	3.24	34.62	65.38	37714	-	292.42
18	7.72	34.7	97.49	2.51	41.40	58.60	31143	-	400.56
19	7.73	36.1	97.91	2.09	41.02	58.98	22286	-	339.50
20	7.63	35.0	97.55	2.45	39.04	60.96	24857	-	-
24	7.68	36.8	-	-	-	-	37428	28653	-
30	7.79	32.7	-	-	-	-	-	-	-
31	7.78	33.9	-	-	-	-	-	-	-

4. Sample drawn from Compartment No. 4

Date	pH	Temp. °C	% Moisture	% TS	Composition of solid matter		Total COD mg/l	Total Alkalinity mg/l	S^{2-} mg/l
					% VS	% FS			
01	7.74	37.1	98.10	1.90	33.94	66.06	36944	21851	259.26
02	7.69	38.1	98.10	1.90	32.10	67.90	25428	24230	467.19
03	7.77	36.1	97.70	2.30	36.60	63.40	22285	23845	-
04	7.78	34.2	96.95	3.05	42.82	57.18	23143	19038	464.00
06	7.81	34.5	98.01	1.99	37.46	62.54	29142	24230	344.00
08	7.8	34.5	97.69	2.31	37.88	62.12	-	23076	308.00
09	7.76	34.6	97.60	2.40	36.99	63.01	28000	-	153.00
10	7.79	33.5	97.20	2.80	35.44	64.56	29143	-	379.00
12	7.72	36.2	97.69	2.31	39.94	60.06	-	-	-
13	7.69	36.3	97.25	2.75	38.98	61.02	-	-	-
16	7.67	37.0	96.71	3.29	39.25	60.75	39143	29422	282.88
17	7.73	36.2	97.46	2.54	43.25	56.75	38286	-	288.64
18	7.74	34.9	97.70	2.30	38.23	61.77	27714	-	362.96
19	7.67	36.0	97.11	2.89	41.16	58.84	24000	-	350.80
20	7.69	35.4	97.83	2.17	38.63	61.37	24286	-	-
24	7.68	36.7	-	-	-	-	39714	27884	-
30	7.77	32.5	-	-	-	-	-	-	-
31	7.77	33.7	-	-	-	-	-	-	-

IV. GENERATION OF BIOGAS

Date	Volume, m^3/d	Composition	
		% CO_2	% H_2S
01	50.00	-	-
02	48.25	-	-
03	54.75	-	-
04	40.75	-	-
05	39.75	-	-
06	47.25	-	-
07	44.00	-	-
08	37.00	-	-
09	36.40	-	-
10	35.75	-	-
11	44.25	-	-
12	42.54	-	-
13	48.44	-	-
14	46.21	-	-
15	48.14	-	-
16	29.26	-	-
17	50.27	-	-
18	52.00	-	-
19	47.72	-	-
20	37.07	-	-
21	38.00	-	-
22	39.00	-	-
23	45.50	-	-
24	50.25	-	-
25	53.75	-	-
26	47.00	-	-
27	49.00	-	-
28	46.20	-	-
29	49.25	-	-
30	45.25	-	-
31	48.00	-	-

OPERATIONAL DATA

Period: 01 to 30 June 2000

I. FEED MATERIAL

1. Fleshing

Date	Weight tonnes	% Moisture	% TS	Composition of solid matter	
				% VS	% FS
01	2.100	-	-	-	-
02	2.100	-	-	-	-
03	2.100	-	-	-	-
04	2.100	-	-	-	-
05	2.100	-	-	-	-
06	2.100	-	-	-	-
07	3.000	67.22	32.78	84.99	15.06
08	3.000	81.26	18.74	71.17	28.83
10	2.214	71.49	28.51	57.40	42.60
13	1.740	82.87	17.13	69.47	30.53
17	1.800	80.42	19.58	76.68	23.32
18	3.000	83.49	16.51	62.69	37.31
19	3.000	-	-	-	-
20	3.000	69.19	30.81	83.98	16.02
21	3.000	77.54	22.46	75.06	24.94
22	3.000	70.63	29.37	86.76	13.24
23	3.000	70.63	12.20	54.52	45.48
24	3.000	-	-	-	-
25	2.400	-	-	-	-
28	3.000	65.98	34.02	78.46	21.54
29	2.140	54.76	45.24	78.82	21.18

2. Primary sludge

Date	Volume, m^3	% Moisture	% TS	Composition of solid matter	
				% VS	% FS
01	1.5	-	-	-	-
02	1.5	-	-	-	-
03	1.5	-	-	-	-
04	1.5	-	-	-	-
05	1.5	-	-	-	-
06	1.5	-	-	-	-
07	2.0	98.53	1.47	39.31	60.69
08	2.0	98.39	1.61	42.34	57.66
10	1.5	93.18	6.82	62.75	37.25
13	1.5	95.69	4.31	48.75	51.25
17	1.5	96.58	3.42	33.50	66.50
18	2.0	96.25	3.75	30.64	69.36
19	2.0	93.71	6.29	30.63	69.37
20	2.0	95.88	4.12	39.51	60.49
21	2.0	95.91	4.09	32.86	67.14
22	2.0	96.11	3.89	28.44	71.56

23	2.0	95.64	4.36	23.88	76.12
24	1.2	-	-	-	-
25	3.5	-	-	-	-
28	2.0	-	-	-	-
29	1.2	96.03	3.97	34.22	65.78

3. Material in feed chamber

Date	Volume m^3	pH	% Moisture	% TS	Composition of solid matter	
					% VS	% FS
01	3.0	-	-	-	-	-
02	3.0	-	-	-	-	-
03	3.0	-	-	-	-	-
04	3.0	-	-	-	-	-
05	3.0	-	-	-	-	-
06	3.0	-	-	-	-	-
07	5.0	-	87.64	12.36	58.75	41.25
08	5.0	7.83	91.82	8.18	56.58	43.42
09	-	7.12	-	-	-	-
10	3.0	-	82.29	17.71	67.75	32.25
13	3.0	10.22	89.39	10.61	58.31	41.69
17	2.0	-	90.63	9.37	61.17	38.83
18	5.0	-	91.50	8.50	50.53	49.47
19	5.0	-	88.30	11.70	60.98	39.02
20	5.0	8.91	84.05	15.95	70.06	29.94
21	5.0	8.99	89.30	10.70	57.36	42.64
22	5.0	9.45	88.87	11.13	57.94	42.06
23	5.0	-	91.82	8.18	51.51	48.49
24	5.0	8.64	-	-	-	-
25	3.5	-	-	-	-	-
28	4.8	8.17	87.61	12.39	67.04	32.96
29	2.0	6.72	82.21	17.79	70.50	29.50

II. DRAINED MATERIAL

1. Material in drain chamber

Date	Volume m^3	pH	% Moisture	% TS	Composition of solid matter		Total COD mg/l	Soluble COD mg/l
					% VS	% FS		
01	3.0	-	-	-	-	-	-	-
02	3.0	-	-	-	-	-	-	-
03	3.0	-	-	-	-	-	-	-
04	3.0	-	-	-	-	-	-	-
05	3.0	-	-	-	-	-	-	-
06	3.0	-	-	-	-	-	-	-
07	5.0	-	96.57	3.43	43.33	56.67	-	-
08	5.0	7.65	98.26	1.74	45.17	54.83	-	-
10	3.0	7.80	93.57	6.43	45.40	54.60	-	-
13	3.0	7.63	97.05	2.95	46.87	53.13	-	-
17	2.0	-	93.03	6.97	41.37	58.63	-	-
18	5.0	-	97.28	2.72	40.62	59.38	-	-

19	5.0	-	97.57	2.43	40.91	59.09	-	-
20	5.0	7.70	97.35	2.65	39.69	60.31	-	-
21	5.0	7.90	97.00	3.00	40.78	59.22	-	-
22	5.0	7.60	97.15	2.85	44.58	55.42	-	-
23	5.0	-	97.25	2.75	47.79	52.21	-	-
24	5.0	7.54	-	-	-	-	-	-
25	3.5	-	-	-	-	-	-	-

IV. MATTER IN DIGESTORS

1. Sample drawn from Compartment No. 1

Date	**pH**	**Temp. °C**	**% Moisture**	**% TS**	**Composition of solid matter**		**Total COD mg/l**	**Total Alkalinity mg/l**	**S^{2-} mg/l**
					% VS	**% FS**			
06	7.61	32.0	96.04	3.96	47.8	52.20	42857	-	-
07	7.51	30.9	96.45	3.55	46.46	53.54	44000	-	-
08	7.41	33.4	96.50	3.50	51.64	48.36	47428	-	380.00
09	7.41	34.9	96.83	3.17	44.40	55.60	-	-	212.00
10	7.41	33.9	97.04	2.96	46.48	53.52	-	-	448.00
12	7.48	33.1	96.30	3.70	44.93	55.07	66.571	-	180.00
13	7.58	33.5	97.57	2.43	43.50	56.50	50000	-	-
14	7.54	35.1	96.86	3.14	44.24	55.76	-	-	328.00
15	7.54	34.5	97.10	2.90	43.78	56.22	47692	-	498.00
16	7.52	35.2	95.70	4.30	43.93	56.07	71692	-	247.00
17	7.59	34.7	96.48	3.52	45.86	54.14	59230	-	289.50
19	7.57	34.1	95.66	4.34	48.35	51.65	59615	-	-
20	7.50	34.6	95.91	4.09	44.43	55.57	41154	-	332.00
21	7.29	30.3	94.75	5.25	49.25	50.75	80385	35455	328.00
22	7.29	32.5	95.50	4.50	48.70	51.30	96923	35819	332.00
23	7.57	31.1	95.28	4.72	44.75	55.25	61153	35909	300.64
24	7.55	32.9	95.80	4.20	43.00	57.00	-	-	315.77
26	7.36	34.0	95.80	4.20	43.82	56.18	73461	30728	327.63
27	7.39	32.4	96.46	3.54	40.43	59.57	38846	-	339.48
29	7.41	28.9	95.77	4.23	46.13	53.87	43846	29637	216.50
30	7.36	30.1	95.22	4.78	47.83	52.17	50385	-	86.56

2. Sample drawn from Compartment No. 2

Date	**pH**	**Temp. °C**	**% Moisture**	**% TS**	**Composition of solid matter**		**Total COD mg/l**	Total Alkalinity **mg/l**	**S^{2-} mg/l**
					% VS	**% FS**			
01	7.87	32.7	-	-	-	-	-	-	-
02	7.84	33.6	-	-	-	-	-	-	-
03	7.91	31.6	-	-	-	-	-	-	-
06	7.64	31.7	97.19	2.81	44.44	55.56	30285	-	-
07	7.54	30.7	96.99	3.01	45.19	54.81	-	-	-
08	7.45	32.9	96.85	3.15	50.62	49.38	33142	-	420.00
09	7.45	34.8	96.78	3.22	47.43	52.57	40857	-	444.00
10	7.47	33.8	96.78	3.22	47.04	52.96	-	-	404.00

12	7.53	38.0	96.60	3.40	44.23	55.77	66000	-	224.00
13	7.50	33.5	97.74	2.26	35.09	64.91	38857	-	-
14	7.56	35.1	96.65	3.35	44.00	56.00	-	-	344.00
15	7.56	34.6	96.80	3.20	41.87	58.13	52923	-	545.00
16	7.59	34.8	96.87	3.13	41.45	58.55	70769	-	259.14
17	7.58	34.6	96.79	3.21	42.70	57.30	51153	-	410.00
19	7.65	34.1	95.27	4.73	47.69	52.31	76923	-	-
20	7.51	34.3	96.32	3.68	42.10	57.90	39231	-	336.00
21	7.38	30.1	95.50	4.50	47.86	52.14	73462	34182	344.00
22	7.33	32.5	95.15	4.85	48.05	51.95	48077	34000	312.40
23	7.44	31.4	96.60	3.40	45.61	54.39	78076	32273	320.24
24	7.42	32.7	96.00	4.00	40.61	59.39	-	-	288.11
26	7.45	33.5	96.37	3.63	40.87	59.13	60384	28723	347.39
27	7.50	32.8	97.10	2.90	39.70	60.30	37692	-	268.35
28	-	3.08	73.72	96.92	26.28	-	-	-	-
29	7.44	28.4	96.03	3.97	47.61	52.39	-	-	-
30	7.38	30.3	-	-	-	-	-	-	-

3. Sample drawn from Compartment No. 3

Date	**pH**	**Temp. °C**	**% Moisture**	**% TS**	**Composition of solid matter**		**Total COD mg/l**	**Total Alkalinity mg/l**	**S^{2-} mg/l**
					% VS	**% FS**			
01	7.84	32.7	-	-	-	-	-	-	-
02	7.82	33.6	-	-	-	-	-	-	-
03	7.87	31.6	-	-	-	-	-	-	-
06	7.76	31.6	97.54	2.46	41.49	58.51	38571	-	-
07	7.72	30.9	97.66	2.34	40.83	59.17	-	-	-
08	7.67	32.4	97.24	2.76	47.80	52.20	31428	-	432.00
09	7.62	34.4	97.16	2.84	43.67	56.33	36285	-	256.00
10	7.60	33.7	97.68	2.32	45.32	54.68	-	-	184.00
12	7.64	33.6	95.8	4.20	44.00	56.00	49714	-	196.00
13	7.62	33.6	95.8	4.20	41.85	58.15	40571	-	-
14	7.64	35.1	97.27	2.73	44.41	55.59	-	-	292.80
15	7.68	34.6	95.56	4.44	42.01	57.99	-	-	401.00
16	7.69	34.6	95.56	4.44	38.63	61.37	58153	-	308.00
17	7.72	34.4	97.43	2.57	43.56	56.44	38461	-	213.00
19	7.73	34.4	97.1	2.90	46.02	53.98	35769	-	-
20	7.75	34.2	97.21	2.79	41.58	58.42	30769	-	289.00
21	7.71	30	96.7	3.30	39.05	60.95	55385	32000	265.36
22	7.62	32.4	96.28	3.72	45.04	54.96	47692	31455	-
23	7.64	32.8	96.48	3.52	45.07	54.93	67692	29545	320.24
24	7.60	32.8	96.48	3.52	45.07	54.93	-	-	312.72
26	7.57	33	96.568	3.43	41.02	58.98	66153	27273	296.01
27	7.63	32.5	97.21	2.79	40.18	59.82	34615	-	307.87
29	7.68	28.4	95.63	4.37	46.58	53.42	38077	30182	307.87
30	7.72	30.3	96.83	3.17	42.32	57.68	36538	-	193.26

4. Sample drawn from Compartment No. 4

Date	pH	Temp. °C	% Moisture	% TS	Composition of solid matter		Total COD mg/l	Total Alkalinity mg/l	S^{2-} mg/l
					% VS	% FS			
01	7.88	33.5	-	-	-	-	-	-	-
02	7.82	33.5	-	-	-	-	-	-	-
03	7.89	31.5	-	-	-	-	-	-	-
06	7.75	31.5	97.84	2.16	41.43	58.57	30000	-	-
07	7.72	30.2	97.54	2.46	39.96	60.04	-	-	-
08	7.65	32.7	97.39	2.61	49.26	50.74	41428	-	379.00
09	7.59	34.2	97.43	2.57	45.52	54.48	32571	-	296.00
10	7.57	33.7	97.62	2.38	47.16	52.84	-	-	348.00
12	7.65	32.5	97.00	3.00	41.47	58.53	35285	-	204.00
13	7.64	33.1	97.23	2.77	45.18	54.82	38857	-	-
14	7.64	34.8	97.61	2.39	44.20	55.80	-	-	320.00
15	7.65	34.7	97.10	2.90	41.71	58.29	53230	-	296.00
16	7.68	34.8	97.00	3.00	42.08	57.92	48307	-	247.00
17	7.73	34.2	97.36	2.64	39.47	60.53	29230	-	358.00
19	7.75	33.7	96.70	3.30	46.92	53.08	33461	-	-
20	7.76	33.9	96.97	3.03	37.27	62.73	30000	-	281.00
21	7.75	30.1	96.97	3.03	49.17	50.83	46154	28909	320.00
22	7.63	32.2	96.66	3.34	45.87	54.13	44231	33637	300.64
23	7.63	31.3	96.73	3.27	36.37	63.63	60384	28182	304.66
24	7.60	32.9	96.50	3.50	42.71	57.29			288.11
26	7.58	33.0	97.09	2.91	44.14	55.86	55384	25273	288.11
27	7.67	32.6	97.38	2.62	37.92	62.08	28461		252.54
29	7.41	28.4	97.34	2.66	38.78	61.22	37308	27455	110.27
30	7.36	30.4	96.84	3.16	40.79	59.21	31154		82.61

IV. GENERATION OF BIOGAS

Date	Volume, m^3/d	Composition	
		% CO_2	% H_2S
01	38.00	-	-
02	43.00	-	-
03	48.00	-	-

04	50.25	-	-
05	58.75	-	-
06	48.00	-	-
07	36.75	27	1
08	48.00	-	-
09	59.29	-	-
10	59.61	-	-
11	62.30	-	-
12	46.59	-	-
13	41.77	-	-
14	52.50	-	-
15	44.00	-	-
16	57.28	-	-
17	54.46	-	-
18	39.00	-	-
19	40.00	-	-
20	40.43	-	-
21	76.68	-	-
22	63.91	-	-
23	67.90	-	-
24	37.50	-	-
25	11.75	-	-
26	16.25	-	-
27	20.00	-	-
28	42.75	-	-
29	38.00	-	-
30	48.00	-	-

OPERATIONAL DATA

Period: 01 to 31 July 2000

I. MATTER IN DIGESTORS

1. Sample drawn from Compartment No. 1

Date	pH	Temp, °C	% Moisture	% TS	Composition of solid matter		Total Alkalinity mg/l	Total COD mg/l	S^2 mg/l
					% VS	% FS			
01	7.34	32.2	95.89	4.11	46.68	53.32	29091	47692	339.48
03	7.40	30.6	95.98	4.02	47.55	52.45	-	-	-
04	7.49	27.7	95.89	4.11	44.94	55.06	27818	41923	237.48
05	7.52	28.9	95.69	4.31	44.33	55.67	28364	30462	316.00
06	7.57	31.0	96.90	3.10	49.15	50.85	28909	40308	340.24
08	7.62	31.9	96.39	3.61	46.63	53.37	29273	43692	336.00
10	7.67	33.0	96.18	3.82	43.39	56.61	-	-	328.00
11	7.78	30.4	95.99	4.01	44.04	55.96	31455	51692	332.00
12	7.79	31.0	95.91	4.09	44.08	55.92	30000	43461	248.00
13	7.79	31.8	96.46	3.54	47.26	52.74	29091	50769	269.00
14	7.81	31.5	96.07	3.93	47.46	52.54	29637	46538	302.00
15	7.82	33.0	96.41	3.59	42.22	57.78	31692	50000	262.00
16	7.84	32.5	-	-	-	-	-	-	-
17	7.86	33.1	95.83	4.17	48.09	51.91	32109	53846	-
18	7.79	35.0	96.35	3.65	41.76	58.24	31483	47692	-
19	7.84	33.3	96.14	3.86	41.95	58.05	30832	53461	321.44
20	7.81	35.3	96.59	3.41	42.81	57.19	30821	51154	305.70
21	7.84	34.7	96.51	3.49	42.98	57.02	31457	45000	341.04
22	7.87	32.0	96.58	3.42	46.67	53.33	29363	45384	364.56
24	7.83	34.1	96.32	3.68	43.00	57.00	30499	43846	-
25	7.89	31.0	96.30	3.70	43.59	56.41	30499	48077	-
26	7.92	29.5	96.03	3.97	45.90	54.10	29790	45769	-
27	7.88	32.8	96.58	3.42	40.01	59.99	29686	44615	338.08
28	7.86	33.4	96.67	3.33	44.27	55.73	27916	35769	-
29	7.87	32.3	96.10	3.90	46.55	53.45	29082	38846	-
31	7.87	32.5	96.13	3.87	44.01	55.99	30140	57692	-

2. Sample drawn from Compartment No. 2

Date	pH	Temp, °C	% Moisture	% TS	Composition of solid matter		Total Alkalinity mg/l	Total COD mg/l	S^{2-} mg/l
					% VS	% FS			
01	7.36	32.5	96.22	3.78	47.64	52.36	28182	50000	331.58
03	7.46	30.6	-	-	-	-	-	-	-
04	7.54	27.9	96.40	3.60	45.42	54.58	26909	39615	257.24
05	7.60	28.9	96.58	3.42	43.95	56.05	25455	32308	166.00
06	7.58	30.9	96.54	3.46	43.20	56.80	30091	48923	312.58
08	7.62	31.4	96.48	3.52	44.56	55.44	28909	59385	324.00
10	7.71	33.0	96.41	3.59	45.97	54.03	27273	-	273.00
11	7.81	30.3	96.31	3.69	46.13	53.87	27818	47692	328.00

12	7.82	30.9	96.61	3.39	41.36	58.64	28864	56153	287.60
13	7.79	31.7	96.26	3.74	49.01	50.99	29318	49615	291.00
14	7.82	31.0	96.26	3.74	44.44	55.56	27000	51923	368.40
15	7.82	32.7	96.56	3.44	40.29	59.71	32526	53846	291.00
16	7.81	32.8	-	-	-	-	-	-	-
17	7.86	33.0	96.32	3.68	47.71	52.29	31275	46538	-
18	7.80	35.1	96.01	3.99	44.38	55.62	31900	45769	-
19	7.87	33.4	96.50	3.50	40.83	59.17	31665	51923	297.92
20	7.83	35.1	96.86	3.14	39.50	60.50	32903	48846	309.68
21	7.84	34.2	96.58	3.42	42.47	57.53	31874	44615	344.96
22	7.89	32.2	96.80	3.20	45.72	54.28	29259	44230	344.96
24	7.84	33.7	96.27	3.73	39.68	60.32	29832	45000	-
25	7.90	31.2	96.63	3.37	43.92	56.08	29499	56538	-
26	7.93	29.6	96.16	3.84	46.77	53.23	30415	41923	-
27	7.88	32.8	96.48	3.52	40.41	59.59	31040	41923	306.46
28	7.86	32.0	96.34	3.66	44.24	55.76	29166	38077	-
29	7.87	32.7	97.05	2.95	45.83	54.17	28124	45384	-
31	7.86	32.2	96.02	3.98	43.13	56.87	30624	53077	-

3. Sample drawn from Compartment No. 3

Date	**pH**	**Temp, ^{o}C**	**% Moisture**	**% TS**	**Composition of solid matter**		**Total Alkalinity mg/l**	**Total COD mg/l**	**S^{2-} mg/l**
					% VS	**% FS**			
01	7.64	31.8	96.46	3.54	42.61	57.39	28637	41153	343.44
03	7.67	30.8	96.05	3.95	46.99	53.01	-	-	-
04	7.72	28.0	96.02	3.98	42.98	57.02	28182	39615	201.92
05	7.67	29.2	96.15	3.85	42.63	57.37	26546	31077	206.00
06	7.73	30.6	96.50	3.50	45.41	54.59	30000	58462	284.91
08	7.71	31.8	96.52	3.48	44.31	55.69	30364	67692	328.00
10	7.72	33.0	96.51	3.49	47.14	52.86	26818	-	269.00
11	7.81	30.7	96.21	3.79	45.59	54.41	29091	48615	269.00
12	7.82	30.8	96.94	3.06	43.14	56.86	28409	51153	255.20
13	7.80	31.9	96.42	3.58	43.46	56.54	30000	47692	280.00
14	7.82	31.2	96.57	3.43	46.87	53.13	26737	49615	339.60
15	7.81	32.7	96.88	3.12	42.84	57.16	31066	51538	248.00
16	7.82	32.8	-	-	-	-	-	-	-
17	7.85	33.4	96.72	3.28	45.71	54.29	29607	40769	-
18	7.79	35.1	96.73	3.27	42.16	57.84	30858	46153	-
19	7.88	33.3	96.50	3.50	42.60	57.40	31457	44615	282.24

20	7.81	34.7	96.96	3.04	40.61	59.39	29571	43462	344.96
21	7.86	34.3	96.92	3.08	43.74	56.26	29582	40769	356.72
22	7.87	33.0	96.75	3.25	48.89	51.11	28738	50000	337.12
24	7.85	33.2	96.31	3.69	41.40	58.60	28499	55769	-
25	7.91	31.0	96.80	3.20	45.88	54.12	29499	47308	-
26	7.93	29.9	96.41	3.59	46.83	53.17	29999	46154	-
27	7.86	32.6	96.77	3.23	41.22	58.78	30624	47307	270.89
28	7.81	34.3	96.46	3.54	43.75	56.25	28124	35769	-
29	7.85	32.7	96.70	3.30	45.04	54.96	30207	42307	-
31	7.87	32.2	96.39	3.61	40.91	59.09	28769	35769	-

4. Sample drawn from Compartment No. 4

Date	pH	Temp. °C	% Moisture	% TS	Composition of solid matter		Total Alkalinity mg/l	Total COD mg/l	S^{2-} mg/l
					% VS	% FS			
01	7.64	31.8	96.61	3.39	43.76	56.24	28637	42692	307.87
03	7.69	30.8	96.62	3.38	47.50	52.50	-	-	-
04	7.73	27.8	96.49	3.51	45.25	54.75	26182	50000	-
05	7.72	29.2	96.22	3.78	43.68	56.32	27273	26154	292.00
06	7.72	30.5	96.72	3.28	43.77	56.23	29455	41846	249.34
08	7.68	31.7	96.41	3.59	46.88	53.12	29818	40923	324.00
10	7.75	32.9	96.67	3.33	43.29	56.71	26818	-	320.00
11	7.81	30.7	96.42	3.58	44.79	55.21	28000	43385	320.00
12	7.81	30.7	96.72	3.28	43.68	56.32	28637	59615	276.80
13	7.81	31.9	96.40	3.60	48.54	51.46	29091	51153	256.00
14	7.82	31.3	96.67	3.33	47.46	52.54	26909	46538	258.80
15	7.82	32.9	96.80	3.20	42.37	57.63	31275	50769	256.00
16	7.82	33.1	-	-	-	-	-	-	-
17	7.84	33.4	96.52	3.48	46.24	53.76	30232	49230	-
18	7.80	35.3	96.58	3.42	43.90	56.10	31275	43461	-
19	7.86	33.0	96.63	3.37	41.39	58.61	31040	44230	-
20	7.80	34.9	97.02	2.98	41.20	58.80	29675	43077	329.28
21	7.84	34.4	96.61	3.39	50.80	49.20	30207	45000	333.20
22	7.86	33.1	97.02	2.98	47.29	52.71	27697	42692	309.68
24	7.84	33.5	96.93	3.07	43.87	56.13	28832	43461	-
25	7.91	31.2	96.62	3.38	46.72	53.28	29999	53077	-
26	7.94	29.8	96.45	3.55	46.90	53.10	30207	43077	-
27	7.87	32.5	96.81	3.19	42.00	58.00	29999	41153	314.46
28	7.85	34.1	96.71	3.29	40.14	59.86	27082	29615	-
29	7.87	32.2	96.20	3.80	44.30	55.70	29790	36538	-
31	7.87	31.9	96.62	3.38	44.65	55.35	28124	37308	-

II. GENERATION OF BIOGAS

Date	Volume, m^3/d	Composition	
		% CO_2	% H_2S
01	54.75	-	-
02	30.00	-	-

03	35.25	-	-
04	21.75	-	-
05	35.36	-	-
06	36.25	-	-
07	33.65	-	-
08	52.10	-	-
09	40.61	-	-
10	42.36	-	-
11	42.00	-	-
12	45.00	-	-
13	45.50	-	-
14	46.50	-	-
15	50.00	-	-
16	51.00	-	-
17	50.25	-	-
18	56.90	-	-
19	55.00	-	-
20	59.00	-	-
21	62.70	-	-
22	44.50	-	-
23	60.00	-	-
24	52.75	-	-
25	54.65	-	-
26	52.75	-	-
27	51.25	-	-
28	53.30	-	-
29	52.95	-	-
30	48.80	-	-
31	60.25		

OPERATIONAL DATA

Period: 01 to 31 August 2000

I. FEED MATERIAL

1. Fleshing

Date	**Weight, tonnes**	**% Moisture**	**% TS**	**Composition of solid matter**	
				% VS	**% FS**
03	0.80	70.80	29.20	64.67	35.33
08	1.53	61.15	38.85	90.62	9.38
09	0.50	71.99	28.01	72.03	27.97
26	1.00	83.24	16.76	70.20	29.80

2. Primary sludge

DATE	**Volume, m^3**	**% Moisture**	**% TS**	**% VS**	**% FS**
01	2.0	96.71	3.29	43.25	56.75
03	1.0	96.56	3.44	36.75	63.25
08	1.0	97.19	2.81	36.66	63.34
09	0.5	93.66	6.34	41.79	58.21
11	2.0	93.83	6.17	41.17	58.83
14	2.0	96.84	3.16	37.79	62.21
16	2.0	95.77	4.23	39.75	60.25
18	2.0	97.81	2.19	24.25	75.75
21	2.0	97.54	2.46	32.46	67.54
23	2.0	94.60	5.40	41.32	58.68
25	2.0	95.42	4.58	37.23	62.77
26	1.0	95.43	4.57	32.90	67.10
30	2.0	95.83	4.17	33.21	66.79

3. Material in feed chamber

DATE	**Volume, m^3**	**pH**	**% Moisture**	**% TS**	**Composition of solid matters**	
					% VS	**% FS**
01	2.0	7.84	96.71	3.29	43.25	56.75
03	1.5	11.69	85.79	14.21	59.00	41.00
08	3.0	9.11	80.55	19.45	81.74	18.26
09	1.2	9.12	77.02	22.98	80.23	19.77
11	2.0	7.62	93.83	6.17	41.17	58.83
14	2.0	7.63	96.84	3.16	37.79	62.21
16	2.0	7.69	95.77	4.23	39.75	60.25
18	2.0	8.16	97.81	2.19	24.25	75.75
21	2.0	8.24	97.54	2.46	32.46	67.54
23	2.0	8.21	94.60	5.40	41.32	58.68
25	2.0	8.03	95.42	4.58	37.23	62.77
26	2.0	11.61	87.21	12.79	72.65	27.35
30	2.0	8.12	95.83	4.17	33.21	66.79

II. DRAIN MATERIAL

1. Material in drain chamber

Date	Volume, m^3	pH	% Moisture	% TS	% VS	% FS
01	2.0	7.78	94.42	5.58	43.15	56.85
03	1.5	7.87	94.34	5.66	42.85	57.15
08	3.0	7.89	93.51	6.49	37.92	62.08
09	1.2	7.85	93.93	6.07	37.22	62.78
11	2.0	8.05	94.03	5.97	37.98	62.02
14	2.0	7.83	94.97	5.03	38.14	61.86
16	2.0	7.85	96.93	3.07	40.96	59.04
18	2.0	7.93	96.14	3.86	40.58	59.42
21	2.0	8.00	93.95	6.05	36.24	63.76
23	2.0	7.97	95.10	4.90	38.78	61.22
25	2.0	7.92	95.50	4.50	37.92	62.08
26	2.0	8.07	96.83	3.17	40.30	59.70
30	2.0	8.02	94.01	5.99	39.87	60.13

III. MATTER IN DIGESTORS

1. Sample drawn from Compartment No. 1

Date	pH	Temp. °C	% Moisture	% TS	Composition of solid matters		Total Alkalinity mg/l	S^{2-} mg/l
					% VS	% FS		
01	7.86	33.7	96.38	3.62	42.75	57.25	32070	-
02	7.85	32.4	96.36	3.64	44.95	55.05	31287	-
03	7.84	32.5	95.51	4.49	45.73	54.27	-	-
04	7.89	33.5	95.97	4.03	46.66	53.34	-	-
05	7.87	33.0	96.06	3.94	42.91	57.09	-	-
07	7.88	30.3	95.91	4.09	41.45	58.55	-	-
08	7.87	31.1	94.75	5.25	50.35	49.65	-	-
09	7.88	2.94	-	-	-	-	-	-
11	7.74	33.1	96.97	3.03	41.35	58.65	-	225.72
12	7.73	32.6	95.67	4.33	45.33	54.67	34580	-
14	7.80	30.7	95.07	4.93	40.25	59.75	34840	292.00
15	7.81	30.5	96.49	3.51	44.84	55.16	-	-
16	7.83	31.9	95.98	4.02	44.09	55.91	29380	269.00
17	7.83	31.6	96.15	3.85	42.17	57.83	30030	-
18	7.87	30.0	96.77	3.23	45.75	54.25	-	-
19	7.88	29.8	95.99	4.01	44.91	55.09	31980	312.00
21	7.89	30.2	96.26	3.74	39.30	60.70	29945	265.00
22	7.98	27.1	96.44	3.56	44.92	55.08	-	-
23	7.94	28.4	96.50	3.50	43.59	56.41	29945	-
24	7.92	29.4	95.36	4.64	41.68	58.32	32065	-
25	7.93	30.5	96.51	3.49	44.14	55.86	27560	278.00
26	7.92	30.5	96.34	3.66	39.40	60.60	30210	-
28	7.95	32.0	94.13	5.87	58.18	41.82	-	295.00
29	7.91	31.1	96.70	3.30	43.00	57.00	27560	-
30	8.00	30.2	96.79	3.21	42.08	57.92	26765	-

31	7.90	32.1	96.67	3.33	44.74	55.26	28620	240.00

2. Sample drawn from Compartment No. 2

Date	pH	Temp. °C	% Moisture	% TS	Composition of solid matters		Total Alkalinity mg/l	S^{2-} mg/l
					% VS	% FS		
01	7.85	33.4	96.24	3.76	42.61	57.39	31862	-
02	7.87	32.2	96.54	3.46	43.56	56.44	30821	-
03	7.85	32.8	96.24	3.76	43.32	56.68	-	-
04	7.88	33.6	96.19	3.81	48.66	51.34	-	-
05	7.87	33.1	96.38	3.62	44.44	55.56	-	-
07	7.86	30.8	96.23	3.77	41.81	58.19	-	-
08	7.85	31.0	95.68	4.32	-	-	-	-
09	7.87	29.6	-	-	-	-	-	-
11	7.75	33.0	97.16	2.84	41.62	58.38	-	249.44
12	7.75	32.0	96.06	3.94	46.91	53.09	33020	-
14	7.81	30.8	95.72	4.28	40.95	59.05	33020	237.00
15	7.81	30.1	96.75	3.25	44.39	55.61	-	-
16	7.81	32.0	96.20	3.80	45.12	54.88	29900	249.00
17	7.83	31.6	96.62	3.38	43.14	56.86	29640	-
18	7.84	30.0	96.99	3.01	44.28	55.72	-	-
19	7.89	30.1	96.50	3.50	42.82	57.18	32760	249.00
21	7.90	30.4	-	-	-	-	29415	229.00
22	7.99	27.3	96.82	3.18	42.81	57.19	-	-
23	7.94	28.7	96.70	3.30	42.33	57.67	30210	-
24	7.93	29.6	96.68	3.32	43.23	56.77	31270	-
25	7.93	30.8	96.84	3.16	40.36	59.64	27692	246.00
26	7.94	30.5	-	-	-	-	31005	-
28	7.94	32.0	96.63	3.37	38.33	61.67	-	240.00
29	7.96	30.8	97.24	2.76	41.52	58.48	27825	-
30	7.99	31.1	96.82	3.18	38.32	61.68	26765	-
31	8.00	31.7	96.61	3.39	39.97	60.03	29836	261.00

3. Sample drawn from Compartment No. 3

Date	pH	Temp. °C	% Moisture	% TS	% VS	% FS	Total Alkalinity mg/l	S^{2-} mg/l
01	7.85	33.4	96.34	3.66	44.99	55.01	29988	-
02	7.87	32.3	96.44	3.56	43.35	56.65	29779	-
03	7.85	33.0	96.60	3.40	44.09	55.91	-	-
04	7.85	34.1	96.96	3.04	46.77	53.23	-	-
05	7.84	33.0	97.02	2.98	44.43	55.57	-	-
07	7.89	30.5	96.77	3.23	40.13	59.87	-	-
08	7.85	31.6	-	-	-	-	-	-
09	7.90	29.0	-	-	-	-	-	-
11	7.82	32.7	96.90	3.10	40.91	59.09	-	249.44
12	7.87	32.0	96.75	3.25	39.31	60.69	29640	-
14	7.91	30.8	96.52	3.48	38.34	61.66	30160	281.00
15	7.93	29.8	96.76	3.24	39.67	60.33	-	-
16	7.92	31.6	96.20	3.80	45.12	54.88	29900	249.00

17	7.92	31.2	96.99	3.01	41.62	58.38	27820	-
18	7.93	30.0	3.09		41.22	58.78	-	-
19	7.94	29.7	2.97		41.35	58.65	27820	229.00
21	7.96	30.5	2.89		40.33	59.67	27692	237.00
22	8.06	27.4	3.00		41.75	58.25	-	-
23	7.98	28.6	2.60		42.84	57.16	28232	-
24	7.97	29.7	2.71		42.21	57.79	28355	-
25	7.95	30.4	2.80		-	-	27030	231.00
26	7.96	30.4	-		-	-	28355	-
28	7.96	31.8	3.37		39.50	60.50	-	210.00
29	7.97	31.0	2.80		41.15	58.85	27957	-
30	7.97	30.8	3.46		39.32	60.68	27825	-
31	8.01	31.8	3.00		40.47	59.53	28350	278.00

4. Sample drawn from Compartment No. 4

Date	**pH**	**Temp, ^{o}C**	**% Moisture**	**% TS**	**% VS**	**% FS**	**Total Alkalinity, mg/l**	**S^{2-}, mg/l**
01	7.87	33.2	96.41	3.59	41.62	58.38	30196	-
02	7.86	32.2	96.16	3.84	42.6	57.4	29363	-
03	7.85	32.9	95.60	4.40	41.21	58.79	-	-
04	7.85	33.4	96.99	3.01	46.24	53.76	-	-
05	7.83	33.2	96.81	3.19	44.03	55.97	-	-
07	7.86	30.5	96.85	3.15	44.16	55.84	-	-
08	7.84	30.8	97.11	2.89	42.96	57.04	-	-
09	7.91	29.3	-	-	-	-	-	-
11	7.81	32.7	96.82	3.18	40.04	59.96	-	237.58
12	7.88	31.8	96.78	3.22	38.22	61.78	29900	-
14	7.92	30.8	96.69	3.31	41.28	58.72	29640	241
15	7.93	29.9	96.79	3.21	41.57	58.43	-	-
16	7.93	31.8	95.98	4.02	44.09	55.91	29380	269
17	7.92	31.2	96.81	3.19	39.35	60.65	28340	-
18	7.93	29.9	96.98	3.02	41.67	58.33	-	-
19	7.97	29.9	97.17	2.83	41.25	58.75	27040	233
21	7.96	30.1	-	-	-	-	28090	265
22	8.05	27.4	97.0	3.0	41.96	58.04	-	-
23	7.97	28.5	97.2	2.8	43.66	56.34	28355	-
24	7.98	29.4	96.69	3.31	43.80	56.20	27560	-
25	7.97	30.7	97.19	2.81	40.18	59.82	26765	210
26	7.96	30.2	96.88	3.12	39.00	61.00	27825	-
28	7.95	31.5	96.66	3.34	40.89	59.11	-	253
29	7.98	30.6	96.99	3.01	40.46	59.54	28355	-
30	7.99	30.8	97.10	2.90	41.00	59.00	28220	-
31	8.00	30.0	96.92	3.08	39.46	60.54	27000	303

IV. GENERATION OF BIOGAS

Date	**Volume, m^3/d**	**Composition**	
		% CO_2	**% H_2S**
01	60.50	-	-
02	59.75	-	-
03	54.50	-	-
04	63.75	-	-
05	50.75	-	-
06	63.75	-	-
07	52.00	-	-
08	55.25	-	-
09	56.50	-	-
10	60.00	-	-
11	58.00	-	-
12	58.00	-	-
13	72.00	-	-
14	60.00	-	-
15	59.27	-	-
16	61.92	-	-
17	55.00	-	-
18	51.00	-	-
19	51.20	-	-
20	57.00	-	-
21	48.00	-	-
22	43.00	-	-
23	43.50	-	-
24	45.00	-	-
25	50.00	-	-
26	47.75	-	-
27	53.00	-	-
28	48.00	-	-
29	47.00	-	-
30	42.00	-	-
31	45.00		

OPERATIONAL DATA

Period: 01 to 30 September 2000

I. FEED MATERIAL

1. Fleshing

DATE	Weight, tonnes	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
06	1.00	80.43	19.57	71.17	28.83
07	1.50	87.12	12.88	64.58	35.42
08	1.00	-	-	-	-
09	1.00	-	-	-	-
13	1.25	85.53	14.47	-	-
14	1.30	-	-	-	-
15	1.00	-	-	-	-
16	3.00	83.56	16.44	62.81	37.19
18	1.00	83.19	16.81	62.00	38.00
21	1.60	78.99	21.01	72.36	27.64
22	1.71	90.40	9.60	68.15	31.85
26	2.00	83.68	16.32	60.63	39.37
28	2.10	84.49	15.51	59.94	40.06
29	2.00	83.20	16.80	62.16	37.84
30	3.00	82.73	17.27	56.14	43.86

2. Primary sludge

DATE	Volume, m^3	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
01	2.0	96.49	3.51	41.58	58.42
04	2.0	93.83	6.17	43.26	56.74
06	1.0	96.67	3.33	39.06	60.94
07	-	93.45	6.55	45.77	54.23
08	1.0	-	-	-	-
09	1.0	-	-	-	-
11	1.0	97.13	2.87	40.09	59.91
13	1.0	96.87	3.13	-	-
14	0.7	-	-	-	-
15	1.0	-	-	-	-
16	2.5	95.63	4.37	44.31	55.69
18	1.0	93.4	6.6	48.11	51.89
21	1.1	94.62	5.38	49.72	50.28
22	1.5	94.61	5.39	39.39	60.61
26	1.7	96.36	3.64	26.63	73.37
28	1.7	94.79	5.21	44.79	55.21
29	1.3	97.84	2.16	29.15	70.85
30	2.3	97.35	2.65	34.07	65.93

3. Material in feed chamber

DATE	Volume, m^3	pH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
01	1.0	7.46	96.49	3.51	41.58	48.42
04	2.0	7.71	93.83	6.17	43.26	56.74
06	1.0	9.26	91.79	8.21	54.69	45.31
07	3.0	-	91.77	8.23	56.32	43.68
08	2.0	9.57	92.04	7.96	63.06	36.94
09	2.0	9.48	91.09	8.91	58.50	41.50
11	1.0	8.09	95.52	4.48	39.66	60.34
13	2.0	10.81	83.88	16.12	57.16	42.84
14	2.0	11.42	89.5	10.50	58.50	41.50
15	2.0	11.20	91.35	8.65	59.50	40.50
16	3.0	10.60	91.02	8.98	61.56	38.44
17	2.0	11.12	90.85	9.15	60.11	39.89
18	2.5	10.94	90.71	9.29	57.90	42.10
19	3.0	9.81	95.59	4.41	45.68	54.32
21	3.0	11.64	91.89	8.11	58.69	41.31
22	2.5	10.94	92.74	7.26	59.06	40.94
23	1.5	10.09	92.61	7.39	59.65	40.35
26	3.0	11.80	91.06	8.94	52.95	47.05
28	3.0	11.79	92.44	7.56	59.35	40.65
29	3.0	11.98	93.01	6.99	52.63	47.37
30	2.5	11.96	92.71	7.29	55.48	44.52

II. DRAINED MATERIAL

1. Material in drain chamber

DATE	Volume, m^3	PH	% Moisture	% TS	Composition of drained matters	
					% VS	% FS
01	2.0	7.97	95.29	4.71	38.92	61.08
04	2.0	7.95	94.47	5.53	37.46	62.54
06	1.0	-	96.67	3.33	39.03	60.97
07	3.0	-	96.34	3.66	35.23	64.77
08	2.0	8.00	95.09	4.91	39.29	60.71
09	2.0	-	95.85	4.15	37.80	62.20
11	1.0	8.00	96.64	3.36	40.28	59.72
13	2.0	8.08	93.92	6.08	38.19	61.81
14	2.0	8.13	94.29	5.71	37.53	62.47
15	2.0	-	95.13	4.87	37.80	62.20
16	3.0	7.96	94.19	5.81	36.99	63.01
17	2.0	-	95.88	4.12	37.30	62.70
18	2.5	7.96	96.35	3.65	38.35	61.65
19	3.0	8.03	96.21	3.79	43.63	56.37
21	3.0	8.00	93.51	6.49	41.02	58.98
22	2.5	8.09	94.61	5.39	39.39	60.61
23	1.5	8.04	94.02	5.98	37.84	62.16
26	3.0	8.05	94.88	5.12	36.45	63.55
28	3.0	7.75	93.68	6.32	40.77	59.23
29	3.0	7.65	95.10	4.90	39.85	60.15

30	2.5	8.11	94.45	5.55	47.47	52.53

III. MATTER IN DIGESTORS

1. Sample drawn from Compartment No. 1

Date	**pH**	**Temp. °C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**	**S^{2-} mg/l**
					% VS	**% FS**		
01	7.94	32.9	96.74	3.26	37.89	62.11	30510	-
02	7.96	32.5	96.70	3.30	43.69	56.31	-	-
04	7.98	32.4	96.30	3.70	41.50	58.50	30510	123
05	7.98	31.6	-	-	-	-	-	-
06	7.95	33.3	96.17	3.83	40.96	59.04	32620	-
07	8.00	33.0	95.83	4.17	45.99	54.01	32310	-
08	7.89	30.6	95.33	4.67	44.32	55.68	35370	-
09	7.84	31.5	94.22	5.78	49.06	50.94	37537	293
11	7.78	30.2	94.43	5.57	47.44	52.56	40818	-
12	7.86	32.7	95.88	4.12	43.31	56.69	32156	-
13	7.98	-	95.58	4.42	-	-	-	-
14	7.98	-	-	-	-	-	-	-
16	7.88	-	95.16	4.84	40.27	59.73	37012	-
18	7.84	32.2	94.26	5.74	45.26	54.74	39375	-
19	7.81	31.2	95.39	4.61	44.90	55.10	37537	307
20	7.82	32.0	94.63	5.37	41.16	58.84	37012	-
21	7.79	32.0	93.69	6.31	42.35	57.65	30450	-
22	7.94	30.8	95.76	4.24	44.92	55.08	33600	-
23	7.97	30.1	96.19	3.81	40.82	59.18	36487	324
25	7.91	29.1	95.24	4.76	43.03	56.97	34125	-
26	7.97	29.4	94.79	5.21	37.84	62.16	-	-
27	8.00	28.2	96.28	3.72	39.01	60.99	-	-
28	7.96	29.1	96.91	3.09	42.76	57.24	-	-
29	7.84	31.1	95.62	4.38	46.30	53.70	32010	-
30	8.05	26.2	93.65	6.35	42.86	57.14	38316	-

2. Sample drawn from Compartment No. 2

Date	**pH**	**Temp. °C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**	**S^{2-} mg/l**
					% VS	**% FS**		
01	7.98	33.0	96.96	3.04	38.70	61.30	30780	-
02	7.96	32.6	97.02	2.98	39.27	60.73	-	-
04	7.98	33.0	96.36	3.64	39.67	60.33	30240	65
05	8.00	32.1	-	-	-	-	-	-
06	7.95	33.5	-	-	-	-	28350	-
07	8.03	32.6	96.33	3.67	43.38	56.62	29970	-
08	7.95	33.1	96.18	3.82	42.56	57.44	30510	-
09	7.98	31.4	96.40	3.60	43.95	56.05	31762	251
11	7.93	32.5	96.69	3.31	41.65	58.35	33862	-
12	7.90	32.8	96.43	3.57	41.69	58.31	27825	-
13	7.99	-	-	-	-	-	-	-
14	7.99	-	-	-	-	-	-	-

16	7.93	-	-	-	-	-	32550	-
18	7.93	33.1	-	-	-	-	34650	-
19	7.96	31.3	96.34	3.66	41.69	58.31	34387	341
20	7.91	32.1	96.06	3.94	40.92	59.08	35437	-
21	7.92	32.0	-	-	-	-	29137	-
22	7.95	30.8	-	-	-	-	31237	-
23	7.96	30.9	94.80	5.20	40.67	59.33	-	350
25	7.95	29.0	96.99	3.01	47.23	52.77	32025	-
26	8.01	29.7	96.62	3.38	38.05	61.95	-	-
27	8.06	28.3	96.43	3.57	40.10	59.90	-	-
28	7.99	29.9	96.88	3.12	39.20	60.80	-	-
29	7.95	31.4	96.48	3.52	43.64	56.36	30797	-
30	8.05	26.2	96.39	3.61	39.68	60.32	30555	-

3. Sample drawn from Compartment No. 3

Date	**pH**	**Temp. ^{o}C**	**% Moisture**	**% TS**	**Composition of solid matter**		**Total Alkalinity mg/l**	**S^{2-} mg/l**
					% VS	**% FS**		
01	8.01	32.7	96.93	3.07	35.85	64.15	29970	-
02	7.99	32.4	97.06	2.94	37.72	62.28	-	-
04	8.01	32.2	96.86	3.14	38.80	61.20	28350	90
05	8.03	31.8	-	-	-	-	-	-
06	8.01	33.2	-	-	-	-	27000	-
07	8.04	32.5	97.16	2.84	42.63	57.37	27810	-
08	7.99	33.2	96.99	3.01	39.98	60.02	27810	-
09	8.02	31.4	96.77	3.23	42.46	57.54	26775	222
11	8.02	32.0	96.79	3.21	39.55	60.45	28087	-
12	7.97	32.9	96.56	3.44	39.06	60.94	26775	-
13	8.05	-	-	-	-	-	-	-
14	8.06	-	-	-	-	-	-	-
16	7.93	-	-	-	-	-	27562	-
18	8.01	32.8	-	-	-	-	28087	-
19	8.04	30.4	96.38	3.62	36.96	63.04	26512	312
20	8.10	31.3	96.53	3.47	37.46	62.54	27300	-
21	8.03	31.7	-	-	-	-	28350	-
22	8.00	30.5	-	-	-	-	26512	-
23	8.10	30.6	-	-	-	-	-	337
25	8.00	30.8	95.20	4.80	44.24	55.76	28350	-
26	8.06	29.4	96.28	3.72	38.05	61.95	-	-
27	8.06	28.5	97.00	3.00	37.33	62.67	-	-
28	8.00	29.8	97.04	2.96	38.47	61.53	-	-
29	7.96	31.4	97.10	2.90	40.07	59.93	26675	-
30	8.11	26.2	97.00	3.00	33.58	66.42	25220	-

4. Sample drawn from Compartment No. 4

Date	**pH**	**Temp. ^{o}C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**	**S^{2-} mg/l**
					% VS	**% FS**		
01	8.00	32.7	96.93	3.07	35.85	64.15	29700	-

02	7.99	32.4	97.03	2.97	37.80	62.20	-	-
04	8.01	32.5	96.94	3.06	39.00	61.00	27540	166
05	8.04	31.8	-	-	-	-	-	-
06	8.01	33.2	97.22	2.78	38.03	61.97	27270	-
07	8.05	32.5	97.15	2.85	42.14	57.86	27270	-
08	7.99	33.2	96.88	3.12	39.22	60.78	27540	-
09	8.03	31.5	96.67	3.33	41.27	58.73	25462	209
11	8.02	32.4	96.85	3.15	40.09	59.91	26775	-
12	7.98	32.9	96.90	3.10	38.84	61.16	26643	-
13	8.06	-	96.55	3.45	-	-	-	-
14	8.06	-	-	-	-	-	-	-
16	7.93	-	97.09	2.91	-	-	27037	-
18	8.01	32.7	96.76	3.24	36.39	63.61	27562	-
19	8.04	30.9	94.54	5.46	37.18	62.82	26200	-
20	7.99	31.5	96.93	3.07	38.58	61.42	27562	-
21	8.01	31.8	95.70	4.30	42.36	57.64	28612	-
22	8.02	30.3	97.14	2.86	39.57	60.43	26250	-
23	8.00	30.4	96.09	3.91	37.40	62.60	31237	-
25	8.00	30.5	96.21	3.79	44.15	55.85	26512	-
26	8.04	29.3	96.25	3.75	36.10	63.90	-	-
27	8.08	28.2	97.15	2.85	25.50	74.50	-	-
28	8.00	29.1	97.21	2.79	38.23	61.77	-	-
29	7.96	31.2	97.14	2.86	39.55	60.45	25947	-
30	8.10	26.0	97.58	2.42	27.62	72.38	25462	-

IV. GENERATION OF BIOGAS

Date	**Volume, m^3/d**	**Composition**	
		% CO_2	**% H_2S**
01	43.00	-	-
02	38.50	-	-
03	42.00	-	-
04	35.00	-	-
05	35.00	-	-
06	38.00	-	-
07	38.00	-	-
08	43.50	-	-
09	41.85	-	-
10	45.00	-	-
11	45.00	-	-
12	44.00	-	-
13	52.00	-	-
14	59.00	-	-
15	40.00	-	-
16	39.50	-	-
17	50.25	-	-
18	48.00	-	-
19	45.00	-	-
20	55.00	-	-
21	47.00	-	-
22	46.60	-	-
23	41.67	-	-

24	50.20	-	-
25	43.50	-	-
26	44.98	-	-
27	35.00	-	-
28	34.00	-	-
29	40.00	-	-
30	45.00	-	-

PDU/4 – OPERATIONAL DATA

Period: 01 to 31 October 2000

I. FEED MATERIAL

1. Fleshing

Date	Weight, tonnes	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
05	4.0	84.50	15.50	69.96	30.04
10	2.0	83.20	16.80	64.67	35.33
11	2.0	84.77	15.23	58.32	41.68
12	2.0	83.28	16.72	74.42	25.58
13	2.0	80.83	19.17	58.39	41.61
14	2.0	87.79	12.21	68.00	32.00
16	2.0	84.27	15.73	48.22	51.78
17	2.0	82.50	17.50	55.01	44.99
18	2.0	82.29	17.71	56.69	43.31
19	1.8	80.79	19.21	53.64	46.36

2. Primary sludge

DATE	Volume, m^3	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
05	2.7	97.28	2.72	41.76	58.24
10	1.5	96.60	3.40	36.38	63.62
11	1.5	96.20	3.80	36.75	63.25
12	1.5	98.49	1.51	15.59	84.41
13	1.5	95.28	4.72	37.13	62.87
14	1.4	94.88	5.12	48.22	51.78
16	1.6	97.60	2.40	27.00	73.00
17	1.6	97.30	2.70	27.04	72.96
18	1.5	95.44	4.56	36.43	63.57
19	1.5	96.84	3.16	27.85	72.15

3. Material in feed chamber

DATE	Volume, m^3	pH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
02	2.5	11.76	94.62	5.38	54.94	45.06
03	1.0	10.45	93.48	6.52	54.86	45.14
05	3.0	11.72	91.30	8.70	63.15	36.85
06	2.0	11.83	92.86	7.14	56.19	43.81
10	3.0	11.86	91.74	8.26	48.37	51.63
11	2.8	11.78	92.45	7.55	50.12	49.88
12	3.0	11.83	92.29	7.71	53.20	46.80
13	3.0	11.78	92.00	8.00	49.84	50.16
14	3.0	11.41	91.32	8.68	45.10	54.90
16	3.0	10.01	89.67	10.33	40.28	59.72
17	3.0	11.45	90.42	9.58	67.02	32.98
18	3.0	10.50	90.43	9.57	48.00	52.00
19	2.0	11.35	91.10	8.90	47.25	52.75

II. DRAINED MATERIAL

1. Material in drain chamber

DATE	Drain, m^3	PH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
02	2.5	8.07	94.17	5.83	35.96	64.04
03	1.0	8.00	96.48	3.52	33.87	66.13
05	3.0	8.03	94.72	5.28	36.95	63.05
06	2.0	8.01	96.09	3.91	47.29	52.71
10	3.0	8.07	95.30	4.70	35.83	64.17
11	2.8	8.06	94.33	5.67	35.87	64.13
12	3.0	8.33	93.89	6.11	30.91	69.09
13	3.0	8.10	94.87	5.13	23.58	76.42
14	3.0	8.08	93.88	6.12	32.66	67.34
16	3.0	8.09	92.96	7.04	29.75	70.25
17	3.0	8.09	95.50	4.50	30.60	69.40
18	3.0	8.07	93.38	6.62	32.14	67.86
19	2.0	8.09	97.05	2.95	33.70	66.30

III. MATTER IN DIGESTORS

1. Sample drawn from Compartment No. 1

Date	pH	Temp. °C	% Moisture	% TS	Composition of solid matters		Total Alkalinity mg/l	S^{2-} mg/l
					% VS	% FS		
02	7.92	25.3	95.47	4.53	37.83	62.17	38072	-
03	7.92	29.2	95.86	4.14	39.30	60.70	37102	-
04	7.90	30.1	95.83	4.17	38.17	61.83	-	-
05	7.93	29.2	95.42	4.58	37.40	62.60	-	-
06	7.94	28.0	95.06	4.94	41.59	58.41	-	-
07	7.71	28.6	95.15	4.85	36.14	63.86	-	-
09	7.88	30.2	95.61	4.39	36.60	63.40	-	-
10	7.99	26.3	94.63	5.37	34.95	65.05	-	-
11	7.97	29.8	96.40	3.60	39.33	60.67	38750	-
13	7.94	30.2	96.50	3.50	39.77	60.23	-	-
14	7.78	-	95.30	4.70	-	-	-	-
16	7.84	-	95.60	4.40	34.04	65.96	-	-
17	7.75	-	95.10	4.90	34.04	65.96	-	-
18	7.84	-	94.26	5.74	42.48	57.52	-	-
19	7.88	-	94.13	5.87	33.60	66.40	-	-
20	7.80	-	94.72	5.28	39.55	60.45	-	-
21	7.80	-	93.03	6.97	38.50	61.50	-	-
23	7.88	-	95.29	4.71	38.26	61.74	-	-
24	8.04	-	94.90	5.10	32.26	67.74	-	-
25	7.94	-	94.90	5.10	44.44	55.56	-	-
26	7.94	-	93.18	6.82	38.21	61.79	-	-
27	7.96	-	93.18	6.82	42.21	57.79	-	-
30	8.05	-	93.84	6.16	31.37	68.63	-	-
31	7.95	28.7	91.68	8.32	32.82	67.18	-	-

2. Sample drawn from Compartment No. 2

Date	pH	Temp. °C	% Moisture	% TS	Composition of solid matters		Total Alkalinity mg/l	S^{2-} mg/l
					% VS	% FS		
02	7.92	28.2	95.47	4.53	38.78	61.22	34192	-
03	7.94	29.1	95.86	4.14	37.56	62.44	37502	-
04	7.91	30.8	95.83	4.17	40.50	59.5	-	-
05	7.92	29.5	95.42	4.58	37.40	62.6	-	-
06	8.02	28.1	95.06	4.94	-	-	-	-
07	7.98	28.6	95.15	4.85	35.15	64.85	-	-
09	7.91	30.2	95.61	4.39	37.87	62.13	-	-
10	8.02	27.8	94.63	5.37	38.08	61.92	-	-
11	8.01	-	96.40	3.60	38.69	61.31	36500	-
13	8.02	30.5	96.52	3.48	36.83	63.17	-	-
14	7.95	-	95.80	4.20	36.07	63.93	-	-
16	7.86	-	95.50	4.50	37.46	62.54	-	-
17	7.97	-	95.40	4.60	32.10	67.90	-	-
18	7.95	-	95.26	4.74	32.57	67.43	-	-
19	8.00	-	94.84	5.16	33.00	67.00	-	-
20	7.91	-	95.06	4.94	35.27	64.73	-	-
21	7.94	-	95.12	4.88	34.76	65.24	-	-
23	7.90	-	96.20	3.80	32.80	67.20	-	-
24	7.95	-	95.50	4.50	35.96	64.04	-	-
25	7.97	-	95.90	4.10	38.92	61.08	-	-
26	7.95	-	95.96	4.04	29.29	70.71	-	-
27	7.98	-	95.83	4.17	35.65	64.35	-	-
30	8.07	-	95.79	4.21	29.41	70.59	-	-
31	8.04	31.2	96.41	3.59	32.40	67.60	-	-

3. Sample drawn from Compartment No. 3

Date	pH	Temp, °C	% Moisture	% TS	Composition of solid matters		Total Alkalinity, mg/l	S^{2-} mg/l
					% VS	% FS		
02	8.02	28.4	96.57	3.43	38.70	61.30	30072	-
03	8.02	29.1	96.96	3.04	40.81	59.19	27887	-
04	8.00	30.0	97.33	2.67	38.84	61.16	-	-
05	8.00	29.4	96.92	3.08	37.10	62.90	-	-
06	8.06	28.3	-	-	-	-	-	-
07	8.05	28.5	96.93	3.07	32.90	67.10	-	-
09	7.90	29.9	97.21	2.79	36.06	63.94	-	-
10	8.00	30.1	96.63	3.37	35.60	64.40	-	-
11	7.99	30.1	97.00	3.00	35.49	64.51	31500	-
13	8.05	30.7	96.02	3.98	40.37	59.63	-	-
14	8.06	-	96.20	3.80	30.39	69.61	-	-
16	8.02	-	95.70	4.30	29.06	70.94	-	-
17	8.07	-	95.90	4.10	30.55	69.45	-	-
18	8.03	-	96.00	4.00	29.83	70.17	-	-
19	8.08	-	96.87	3.13	32.25	67.75	-	-

20	8.01	-	95.90	4.10	31.74	68.26	-	-
21	8.07	-	96.00	4.00	32.84	67.16	-	-
23	8.02	-	96.00	4.00	30.02	69.98	-	-
24	8.06	-	96.20	3.80	37.55	62.45	-	-
25	8.03	-	95.70	4.30	37.64	62.36	-	-
26	8.00	-	95.92	4.08	28.20	71.8	-	-
27	8.02	-	96.32	3.68	26.72	73.28	-	-
30	8.08	-	96.55	3.45	31.04	68.96	-	-
31	8.05	29.2	96.53	3.47	33.64	66.36	-	-

4. Sample drawn from Compartment No. 4

Date	**pH**	**Temp. ^{o}C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**	**S^{2-} mg/l**
					% VS	**% FS**		
02	8.05	28.4	97.25	2.75	38.64	61.36	27887	-
03	8.02	29.0	97.45	2.55	36.14	63.86	27645	-
04	8.00	30.2	97.29	2.71	40.18	59.82	-	-
05	7.99	29.6	97.15	2.85	34.00	66.00	-	-
06	8.10	28.1	96.30	3.70	38.33	61.67	-	-
07	8.04	28.1	96.42	3.58	32.85	67.15	-	-
09	7.98	29.3	97.21	2.79	35.76	64.24	-	-
10	7.99	30.1	96.79	3.21	36.86	63.14	-	-
11	8.01	24.7	97.20	2.80	36.45	63.55	31000	-
13	8.05	30.5	95.65	4.35	34.00	66.00	-	-
14	8.05	-	97.50	2.50	35.52	64.48	-	-
16	8.03	-	96.90	3.10	30.07	69.93	-	-
17	8.07	-	96.10	3.90	30.71	69.29	-	-
18	8.02	-	95.29	4.71	28.40	71.60	-	-
19	8.09	-	95.99	4.01	31.60	68.40	-	-
20	8.02	-	96.65	3.35	32.17	67.83	-	-
21	8.07	-	97.26	2.74	33.84	66.16	-	-
23	8.02	-	95.35	4.65	29.37	70.63	-	-
24	8.04	-	95.80	4.20	29.41	70.59	-	-
25	8.05	-	95.60	4.40	29.01	70.99	-	-
26	8.01	-	96.54	3.46	26.61	73.39	-	-
27	8.02	-	95.61	4.39	26.44	73.56	-	-
30	8.09	-	96.16	3.84	30.80	69.20	-	-
31	8.06	30.2	96.87	3.13	34.51	65.49	-	-

IV. GENERATION OF BIOGAS

Date	**Volume, m^3/d**	**Composition**	
		% CO_2	**% H_2S**
01	40.75	-	-
02	35.67	-	-
03	44.15	-	-
04	40.00	-	-
05	41.00	-	-
06	41.00	-	-
07	34.00	-	-
08	38.75	-	-

09	39.00	-	-
10	33.00	-	-
11	35.00	-	-
12	34.00	-	-
13	38.00	-	-
14	39.00	-	-
15	42.00	-	-
16	45.00	-	-
17	43.00	-	-
18	44.00	-	-
19	44.50	-	-
20	44.50	-	-
21	37.50	-	-
22	37.50	-	-
23	38.00	-	-
24	41.00	-	-
25	39.00	-	-
26	37.00	-	-
27	34.10	-	-
28	34.50	-	-
29	32.01	-	-
30	27.50	-	-
31	28.25		

OPERATIONAL DATA

Period: 01 to 30 November 2000

I. FEED MATERIAL

1. Fleshing

Date	Weight, tonnes	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
08	2.00	82.86	17.14	55.78	44.22
11	1.34	83.02	16.98	60.59	39.41
16	1.35	80.69	19.31	54.90	45.10
29	1.50	81.88	18.12	70.22	29.78

2. Primary sludge

DATE	Volume, m^3	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
08	1.5	95.79	4.21	36.68	63.32
11	1.0	94.91	5.09	34.48	65.52
16	1.2	95.13	4.87	40.37	59.63
29	1.0	95.79	4.21	35.71	64.29
30	2.0	96.59	3.41	33.91	66.09

3. Material in feed chamber

DATE	Volume m^3	pH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
08	3.0	11.19	90.31	9.69	50.60	49.40
11	2.0	11.28	90.12	9.88	51.91	48.09
16	2.0	11.95	89.80	10.20	51.10	48.90
29	2.0	7.40	87.64	12.36	72.31	27.69
30	2.0	6.92	94.88	5.12	57.25	42.75

II. DRAINED MATERIAL

1. Material in drain chamber

DATE	Volume m^3	pH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
04	2.0	-	-	-	-	-
08	3.0	8.10	97.28	2.72	30.87	69.13
11	2.0	8.24	93.22	6.78	33.40	66.60
16	2.0	8.13	93.86	6.14	32.90	67.10
29	2.0	8.18	93.90	6.10	44.88	55.12
30	2.0	8.13	94.19	5.81	34.01	65.99

III. MATTER IN DIGESTORS

1. Sample drawn from Compartment No. 1

Date	**pH**	**Temp °C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**	**S^{2-} mg/l**
					% VS	**% FS**		
01	8.03	27.7	94.83	5.17	32.40	67.60	-	-
02	8.04	29.6	90.63	9.37	29.14	70.86	57575	-
03	8.09	29.5	94.11	5.89	31.61	68.39	49735	-
04	8.01	31.1	90.24	9.76	32.46	67.54	66687	-
06	8.01	30.7	93.56	6.44	34.35	65.65	-	-
07	8.02	27.6	94.11	5.89	32.99	67.01	-	-
08	8.00	29.5	92.45	7.55	33.00	67.00	-	-
09	8.00	28.2	93.29	6.71	29.97	70.03	52440	-
10	8.09	29.0	96.11	3.89	30.79	69.21	45600	-
11	8.02	29.0	94.25	5.75	31.18	68.82	49020	-
13	8.04	26.7	93.44	6.56	32.42	67.58	51870	-
14	8.01	27.8	96.16	3.84	30.71	69.29	40110	-
15	7.97	26.9	93.85	6.15	35.35	64.65	38640	-
16	8.02	25.6	94.86	5.14	32.76	67.24	41790	-
17	8.07	24.0	94.05	5.95	34.85	65.15	52275	-
18	8.02	28.5	93.06	6.94	32.68	67.32	54570	-
20	8.04	25.5	93.53	6.47	30.49	69.51	51510	-
21	8.06	24.5	93.65	6.35	37.85	62.15	45900	-
22	8.07	25.7	93.85	6.15	33.10	66.90	49980	-
23	8.02	26.9	93.96	6.04	33.16	66.84	48195	-
24	8.13	20.0	95.50	4.50	30.48	69.52	-	-
25	8.09	25.0	94.12	5.88	31.80	68.20	51232	-
27	8.09	25.7	93.64	6.36	34.47	65.53	52965	-
28	8.1	20.9	94.42	5.58	30.18	69.82	47025	-
29	8.09	24.6	94.33	5.67	30.08	69.92	52717	-
30	8.1	20.8	94.80	5.20	35.72	64.28	45540	-

2. Sample drawn from Compartment No. 2

Date	**pH**	**Temp. °C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**	**S^{2-} mg/l**
					% VS	**% FS**		
01	8.03	30.6	96.74	3.26	35.57	64.43	-	-
02	8.06	29.7	96.72	3.28	33.68	66.32	42450	-
03	8.08	29.6	95.99	4.01	34.61	65.39	38710	-
04	8.05	26.2	96.45	3.55	35.40	64.60	43120	-
06	8.04	26.0	95.70	4.30	32.95	67.05	-	-
07	8.08	21.7	96.83	3.17	-	100.00	-	-
08	8.06	29.5	96.73	3.27	31.96	68.04	-	-
09	8.09	29.8	96.47	3.53	31.50	68.50	34770	-
10	8.11	27.5	96.62	3.38	34.29	65.71	32775	-
11	8.06	29.1	96.36	3.64	35.38	64.62	31350	-
13	8.07	28.7	95.85	4.15	37.28	62.72	36480	-
14	8.06	28.0	96.85	3.15	34.76	65.24	26250	-

15	8.05	26.8	96.71	3.29	36.05	63.95	28770	-
16	8.08	25.3	96.91	3.09	33.75	66.25	22050	-
17	8.09	26.1	96.61	3.39	35.97	64.03	32640	-
18	8.09	25.5	95.91	4.09	38.58	61.42	35190	-
20	8.07	26.2	96.30	3.70	32.59	67.41	36210	-
21	8.08	26.8	95.92	4.08	42.24	57.76	34935	-
22	8.12	26.2	96.66	3.34	32.97	67.03	35445	-
23	8.09	22.2	96.27	3.73	33.28	66.72	-	-
24	8.10	27.4	94.04	5.96	31.81	68.19	-	-
25	8.11	27.7	96.55	3.45	32.50	67.50	35640	-
27	8.09	25.3	96.37	3.63	33.53	66.47	36135	-
28	8.10	23.8	96.69	3.31	31.25	68.75	34897	-
29	8.09	25.8	95.94	4.06	31.11	68.89	36877	-
30	8.10	22.7	97.57	2.43	39.25	60.75	33907	-

3. Sample drawn from Compartment No. 3

Date	**pH**	**Temp. ^{o}C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**	**S^{2-} mg/l**
					% VS	**% FS**		
01	8.05	27.5	96.89	3.11	35.62	64.38	-	-
02	8.07	29.4	96.72	3.28	32.56	67.44	34548	-
03	8.12	29.4	96.64	3.36	32.64	67.36	33565	-
04	8.05	28.0	96.74	3.26	35.38	64.62	36995	-
06	8.05	30.4	96.30	3.70	31.97	68.03	-	-
07	8.09	24.0	96.87	3.13	32.56	67.44	-	-
08	8.08	29.2	96.67	3.33	33.63	66.37	-	-
09	8.06	29.7	-	-	-	-	37905	-
10	8.12	28.8	96.86	3.14	30.68	69.32	33630	-
11	8.09	26.6	96.96	3.04	30.57	69.43	35625	-
13	8.12	25.6	96.39	3.61	33.71	66.29	36195	-
14	8.06	28.8	96.86	3.14	36.8	63.20	26250	-
15	8.10	25.3	97.00	3.00	33.11	66.89	24360	-
16	8.11	24.9	96.89	3.11	32.92	67.08	22890	-
17	8.10	24.9	96.46	3.54	32.75	67.25	30345	-
18	8.09	28.6	96.63	3.37	31.42	68.58	34170	-
20	8.11	24.1	97.06	2.94	30.52	69.48	37995	-
21	8.09	27.4	96.33	3.67	37.22	62.78	35190	-
22	8.14	26.1	96.34	3.66	29.94	70.06	37485	-
23	8.11	23.7	96.66	3.34	32.27	67.73	-	-
24	8.12	24.0	96.95	3.05	29.26	70.74	-	-
25	8.15	21.2	96.26	3.74	31.58	68.42	37620	-
27	8.11	28.6	95.87	4.13	31.69	68.31	39105	-
28	8.12	24.2	97.11	2.89	32.40	67.60	31927	-
29	8.13	25.9	96.41	3.59	31.52	68.48	32422	-
30	8.10	21.8	96.63	3.37	43.88	56.12	30937	-

4. Sample drawn from Compartment No. 4

Date	pH	Temp. ^{o}C	% Moisture	% TS	Composition of solid matters		Total Alkalinity mg/l	S^{2-} mg/l
					% VS	% FS		
01	8.05	28.5	96.81	3.19	34.92	65.08	-	-
02	8.07	29.2	96.86	3.14	30.74	69.26	34790	-
03	8.10	29.6	96.82	3.18	32.98	67.02	31360	-
04	8.07	30.2	95.84	4.16	33.54	66.46	39690	-
06	8.04	28.5	96.21	3.79	31.84	68.16	-	-
07	8.09	23.4	96.83	3.17	32.25	67.75	-	-
08	8.08	27.6	96.76	3.24	31.94	68.06	-	-
09	8.07	29.7	96.48	3.52	8.00	92.00	36480	-
10	8.11	26.7	96.86	3.14	30.84	69.16	32755	-
11	8.09	28.8	96.69	3.31	31.58	68.42	28785	-
13	8.11	25.1	96.69	3.31	32.23	67.77	34770	-
14	8.06	28.5	94.06	5.94	33.90	66.10	25410	-
15	8.09	24.3	97.00	3.00	31.57	68.43	21840	-
16	8.11	23.7	97.12	2.88	31.21	68.79	22050	-
17	8.11	23.9	96.54	3.46	32.58	67.42	31365	-
18	8.10	24.8	96.75	3.25	31.87	68.13	33660	-
20	8.10	25.3	96.38	3.62	29.93	70.07	32130	-
21	8.09	27.3	96.31	3.69	38.31	61.69	23205	-
22	8.13	24.8	96.30	3.70	30.27	69.73	35190	-
23	8.12	19.2	97.26	2.74	32.26	67.74	30855	-
24	8.12	25.5	96.48	3.52	29.03	70.97	-	-
25	8.13	27.4	96.83	3.17	31.02	68.98	33660	-
27	8.12	28.2	95.65	4.35	30.59	69.41	38610	-
28	8.14	24.4	97.00	3.00	30.45	69.55	31432	-
29	8.14	23.2	96.89	3.11	30.12	69.88	31432	-
30	8.13	24.8	96.69	3.31	41.06	58.94	29947	-

IV. GENERATION OF BIOGAS

Date	Volume, m^3/d	Composition	
		% CO_2	% H_2S
01	27.75	-	-
02	25.36	-	-
03	25.00	-	-
04	22.00	-	-
05	23.40	-	-
06	20.00	-	-
07	16.00	-	-
08	17.00	-	-
09	17.00	-	-
10	19.00	-	-
11	17.00	-	-
12	19.00	-	-
13	22.00	-	-
14	21.00	-	-
15	21.00	-	-

16	18.00	-	-
17	21.60	-	-
18	15.00	-	-
19	16.50	-	-
20	17.00	-	-
21	19.50	-	-
22	14.00	-	-
23	13.00	-	-
24	13.00	-	-
25	15.00	-	-
26	12.50	-	-
27	11.00	-	-
28	9.00	-	-
29	5.00	-	-
30	13.00	-	-

OPERATIONAL DATA

Period: 01 to 31 December 2000
1. FEED MATERIAL

1. Fleshing

Date	Weight, tonnes	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
01	1.2	-	16.23	56.27	-
02	2.5	-	15.49	56.51	-
04	1.0	-	11.29	57.35	-
05	1.8	90.43	9.57	63.30	36.70
06	1.5	83.49	16.51	64.40	35.60
07	0.7	83.83	16.17	58.27	61.73
08	1.0	85.76	14.24	55.65	44.35
09	0.7	84.87	15.13	58.09	41.91
12	1.0	84.25	15.75	53.52	46.48
13	1.5	83.26	16.74	52.90	47.10
15	1.3	80.73	19.27	64.85	35.15
16	2.1	84.88	15.12	53.48	46.52
18	1.8	85.29	14.71	63.43	36.57
19	1.5	87.31	12.69	62.59	37.41
20	1.5	86.13	13.87	52.14	47.86
21	0.8	85.97	14.03	53.25	46.75
26	2.0	95.78	14.22	63.10	36.90
27	1.5	81.19	18.81	50.88	49.12
28	1.0	83.16	16.84	52.41	47.59
30	1.8	84.35	15.65	57.25	42.75

2. Primary sludge

DATE	Volume, m^3	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
01	1.0	95.22	4.78	43.61	56.39
02	1.5	95.63	4.37	42.10	57.90
03	2.0	95.33	4.67	40.30	59.70
04	1.3	93.82	6.18	24.84	75.16
05	1.6	95.18	4.82	35.03	64.97
06	1.5	95.05	4.95	28.79	71.21
07	1.5	93.95	6.05	31.75	68.25
08	0.9	-	-	-	-
09	1.0	96.33	3.67	30.58	69.42
10	2.0	97.33	2.67	23.90	76.10
12	1.4	94.28	5.72	35.11	64.89
13	1.5	94.26	5.74	35.73	64.27
15	1.5	-	-	-	-
16	2.0	94.87	5.13	42.22	57.78
17	2.0	94.98	5.02	37.03	62.97
18	2.3	94.57	5.43	35.51	64.49
19	2.0	93.66	6.34	39.50	60.50
20	1.5	97.74	2.26	21.75	78.25

21	1.0	95.65	4.35	32.19	67.81
22	2.0	95.76	4.24	23.03	76.97
23	2.0	96.56	3.44	29.90	70.10
25	2.0	95.52	4.48	29.77	70.23
26	2.2	92.97	7.03	30.02	69.98
27	1.8	95.02	4.98	35.81	64.19
28	1.4	94.27	5.73	40.57	59.43
29	2.0	93.11	6.89	38.32	61.68
30	2.0	93.76	6.24	38.09	61.91

3. Material in feed chamber

DATE	Volume m^3	pH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
01	2.00	10.93	90.20	9.80	55.01	44.99
02	2.50	11.70	90.29	9.71	54.31	45.69
03	2.00	11.51	94.31	5.69	43.40	56.60
04	2.00	11.75	93.54	6.46	43.76	56.24
05	3.00	11.89	93.98	6.02	61.08	38.92
06	3.00	12.08	91.98	8.02	53.50	46.50
07	2.50	11.88	91.30	8.70	55.52	44.48
08	1.50	11.59	89.82	10.18	53.73	46.27
09	2.00	12.16	92.49	7.51	47.13	52.87
10	2.00	8.56	91.21	8.79	45.95	54.05
12	2.00	10.72	90.96	9.04	49.10	50.90
13	3.00	10.82	88.94	11.06	51.91	48.09
15	4.00	10.25	91.44	8.56	46.65	53.35
16	3.50	11.91	90.98	9.02	44.52	55.48
17	2.00	9.13	93.97	6.03	41.01	58.99
18	3.50	10.64	92.12	7.88	48.82	51.18
19	3.50	11.44	92.43	7.57	50.14	49.86
20	3.00	11.95	91.98	8.02	48.96	51.04
21	1.75	10.82	91.04	8.96	45.33	54.67
22	2.00	8.79	95.50	4.50	33.89	66.11
23	2.00	8.09	96.56	3.44	29.90	70.10
25	2.00	7.91	95.52	4.48	29.77	70.23
26	3.50	10.03	90.73	9.27	53.21	46.79
27	3.00	11.90	91.15	8.85	47.44	52.56
28	3.00	-	90.38	9.62	48.79	51.21
29	2.00	9.26	92.16	7.84	46.31	53.69
30	3.50	11.17	87.57	12.43	49.14	50.86

II. DRAINED MATERIAL

1. Material in drain chamber

DATE	Volume, m^3	PH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
01	2.00	8.19	97.22	2.78	36.42	63.58
02	2.50	8.05	97.05	2.95	38.80	61.20
03	2.00	-	95.91	4.09	31.54	68.46

04	2.00	8.08	95.55	4.45	27.50	72.50
05	3.00	8.22	94.43	5.57	31.31	68.69
06	3.00	8.02	97.24	2.76	22.85	77.15
07	2.50	8.21	94.30	5.7	33.60	66.40
08	1.50	8.03	94.73	5.27	31.23	68.77
09	2.00	8.10	94.23	5.77	34.76	65.24
10	2.00	8.17	94.04	5.96	31.91	68.09
12	2.00	7.96	95.45	4.55	31.23	68.77
13	3.00	8.00	94.79	5.21	31.89	68.11
15	4.00	7.97	94.62	5.38	27.65	72.35
16	3.50	7.98	95.18	4.82	35.26	64.74
17	2.00	7.99	95.69	4.31	32.38	67.62
18	3.50	8.03	96.66	3.34	28.01	71.99
19	3.50	7.97	95.90	4.1	35.41	64.59
20	3.00	8.01	95.25	4.75	32.43	67.57
21	1.75	7.98	95.50	4.5	33.45	66.55
22	2.00	7.99	97.16	2.84	30.04	69.96
23	2.00	7.95	95.04	4.96	31.18	68.82
24	2.00	-	-	-	-	-
25	2.00	7.87	95.83	4.17	31.12	68.88
26	3.50	7.94	97.26	2.74	30.07	69.93
27	3.00	7.99	95.68	4.32	34.54	65.46
28	3.00	-	95.38	4.62	31.01	68.99
29	2.00	8.02	95.11	4.89	32.73	67.27
30	3.50	8.26	95.33	4.67	28.89	71.11

III. MATTER IN DIGESTORS

1. Sample drawn from Compartment No. 1

Date	**pH**	**Temp. ^{o}C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**	**S^{2-} mg/l**
					% VS	**% FS**		
02	8.03	22.4	-	-	-	-	44135	-
04	8.00	22.9	-	-	-	-	44377	-
05	7.96	-	-	-	-	-	41085	-
07	7.99	-	94.34	5.66	38.04	61.96	45045	-
08	7.79	-	94.90	5.1	34.61	65.39	41828	-
09	7.94	-	95.26	4.74	36.29	63.71	37372	-
11	7.82	-	94.66	5.34	35.07	64.93	45292	-
12	7.76	25.7	94.54	5.46	38.05	61.95	45540	-
13	7.92	26.2	-	-	-	-	-	-
14	7.86	26.0	-	-	-	-	45788	-
15	7.94	27.0	94.97	5.03	32.19	67.81	44798	-
16	7.95	27.0	94.72	5.28	34.62	65.38	40590	-
18	7.91	24.0	93.79	6.21	33.94	66.06	44055	-
19	7.92	27.0	92.45	7.55	42.56	57.44	45045	-
20	7.86	28.0	94.85	5.15	33.40	66.60	-	-
21	7.76	27.0	94.56	5.44	34.37	65.63	41580	-
22	7.81	27.0	94.93	5.07	35.90	64.10	-	-
23	7.75	26.5	95.57	4.43	35.34	64.66	-	-

25	7.74	-	96.41	3.59	34.87	65.13	37920	-
26	7.80	27.0	94.95	5.05	34.35	65.65	41280	-
27	7.97	26.3	94.85	5.15	30.40	69.60	-	-
30	7.88	25.9	94.65	5.35	32.25	67.75	41520	-

2. Sample drawn from Compartment No. 2

Date	pH	Temp. °C	% Moisture	% TS	Composition of solid matters		Total Alkalinity mg/l	S^{2-} mg/l
					% VS	% FS		
02	8.04	-	-	-	-	-	32495	-
04	8.06	-	-	-	-	-	27160	-
05	7.99	-	-	-	-	-	33165	-
07	8.00	-	96.66	3.34	39.08	60.92	30195	-
08	7.93	-	95.97	4.03	43.12	56.88	27473	-
09	7.93	-	96.32	3.68	40.92	59.08	32670	-
11	7.87	-	96.40	3.60	36.55	63.45	31680	-
12	7.87	26.3	96.57	3.43	30.52	69.48	33165	-
13	7.88	27.7	-	-	-	-	-	-
14	7.92	25.0	-	-	-	-	35888	-
15	7.95	26.0	97.35	2.65	29.63	70.37	27225	-
16	7.96	28.0	96.27	3.73	38.87	61.13	26730	-
18	8.01	25.0	95.71	4.29	40.34	59.66	30195	-
19	7.93	28.0	95.74	4.26	42.09	57.91	35393	-
20	7.89	27.0	95.86	4.14	40.74	59.26	-	-
21	7.85	28.0	95.21	4.79	43.61	56.39	29453	-
22	7.81	27.5	95.76	4.24	37.34	62.66	-	-
23	7.77	26.0	96.59	3.41	36.57	63.43	-	-
25	7.79	-	96.79	3.21	33.02	66.98	30240	-
26	7.83	28.0	96.46	3.54	32.73	67.27	31200	-
27	7.98	26.8	96.00	4.00	34.87	65.13	-	-
30	7.94	25.8	95.34	4.66	44.74	55.26	30480	-

3. Sample drawn from Compartment No. 3

Date	pH	Temp. °C	% Moisture	% TS	Composition of solid matters		Total Alkalinity mg/l	S^{2-} mg/l
					% VS	% FS		
02	8.10	21.9	-	-	-	-	32252	-
04	8.13	19.8	-	-	-	-	28615	-
05	8.10	-	-	-	-	-	30690	-
07	8.09	-	97.92	2.08	35.17	64.83	28710	-
08	8.07	-	97.11	2.89	33.28	66.72	27720	-
09	8.09	-	97.59	2.41	30.44	69.56	26482	-
11	7.98	-	97.71	2.29	31.21	68.79	25740	-
12	7.97	26.0	97.65	2.35	27.24	72.76	26235	-
13	7.94	26.8	-	-	-	-	-	-
14	8.01	26.0	-	-	-	-	26978	-
15	8.00	26.0	98.02	1.98	28.31	71.69	24255	-
16	7.96	27.2	97.37	2.63	29.63	70.37	26483	-
18	8.07	25.0	97.55	2.45	30.19	69.81	26483	-
19	8.00	28.0	96.63	3.37	34.18	65.82	26730	-

20	7.99	27.0	97.17	2.83	31.55	68.45	-	-
21	7.98	27.0	97.23	2.77	32.72	67.28	26235	-
22	7.97	27.5	97.31	2.69	33.22	66.78	-	-
23	7.92	26.2	96.88	3.12	33.47	66.53	-	-
25	7.93	-	96.64	3.36	31.21	68.79	27360	-
26	7.91	27.5	97.16	2.84	32.72	67.28	25920	-
27	7.96	26.7	96.96	3.04	30.73	69.27	-	-
30	7.99	25.9	96.84	3.16	32.01	67.99	27600	-

4. Sample drawn from Compartment No. 4

Date	**pH**	**Temp. ^{o}C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**	**S^{2-} mg/l**
					% VS	**% FS**		
02	8.09	23.3	-	-	-	-	31525	-
04	8.11	20.8	-	-	-	-	28857	-
05	8.12	-	-	-	-	-	30195	-
07	8.09	-	97.94	2.06	33.12	66.88	26482	-
08	8.05	-	97.37	2.63	32.71	67.29	24008	-
09	8.06	-	97.76	2.24	30.36	69.64	24750	-
11	7.99	-	97.74	2.26	30.80	69.20	25245	-
12	7.99	26.0	97.76	2.24	27.83	72.17	25245	-
13	7.95	26.0	-	-	-	-	-	-
14	8.00	27.0	-	-	-	-	25740	-
15	7.97	26.5	97.94	2.06	28.55	71.45	23513	-
16	8.00	27.0	97.48	2.52	30.15	69.85	25988	-
18	8.06	24.0	97.73	2.27	30.83	69.17	24503	-
19	7.98	28.0	96.30	3.70	37.35	62.65	25988	-
20	7.96	28.0	97.12	2.88	31.80	68.20	-	-
21	7.96	25.5	97.41	2.59	31.94	68.06	24750	-
22	7.96	27.5	97.40	2.60	33.20	66.80	-	-
23	7.91	26.0	97.56	2.44	32.92	67.08	-	-
25	7.91	-	97.26	2.74	28.54	71.46	26160	-
26	7.91	27.4	97.19	2.81	32.49	67.51	25440	-
27	7.95	26.6	96.88	3.12	30.14	69.86	-	-
30	7.99	25.6	97.04	2.96	30.91	69.09	26880	-

IV. GENERATION OF BIOGAS

Date	**Volume, m^3/d**	**Composition**	
		% CO_2	**% H_2S**
01	13.00	-	-
02	18.50	-	-
03	18.50	-	-
04	19.50	-	-
05	25.00	-	-
06	29.00	-	-
07	32.00	-	-
08	31.50	-	-
09	34.00	-	-
10	34.00	-	-
11	31.25	-	-

12	33.50	-	-
13	42.75	-	-
14	36.50	-	-
15	32.25	-	-
16	32.75	-	-
17	29.25	-	-
18	28.00	-	-
19	28.50	-	-
20	30.00	-	-
21	32.75	-	-
23	37.00	-	-
24	35.00	-	-
25	35.00	-	-
26	30.25	-	-
27	32.25	-	-
28	28.25	-	-
29	27.50	-	-
30	27.00	-	-
31	34.00	-	-

OPERATIONAL DATA

Period: 01 to 31 January 2001

I. FEED MATERIAL

1. Fleshing

Date	Weight, tonnes	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
03	1.50	82.33	17.67	60.22	39.78
04	1.00	84.90	15.10	58.88	41.12
05	1.00	84.65	15.35	54.42	45.58
06	2.00	87.15	12.85	57.75	42.25
09	1.00	82.14	17.86	62.85	37.15
10	1.00	82.16	17.84	67.38	32.62
11	1.20	84.12	15.88	54.98	45.02
12	1.00	86.19	13.81	50.63	49.37
13	1.50	87.74	12.26	49.02	50.98
15	1.50	83.20	16.80	53.59	46.41
16	1.50	83.61	16.39	51.77	48.23
18	1.50	84.21	15.79	50.41	49.59
19	1.25	84.44	15.56	57.65	42.35
23	2.00	84.85	15.15	63.81	36.19
24	1.50	72.63	27.37	72.12	27.88
25	1.80	76.98	23.02	59.56	40.44
28	1.00	80.30	19.70	67.50	32.50

2. Primary sludge

DATE	Volume, m^3	% Moisture	% TS	% VS	% FS
01	2.0	93.53	6.47	38.50	61.50
03	2.3	95.79	4.21	36.64	63.36
04	2.0	93.96	6.04	34.69	65.31
05	1.0	93.85	6.15	41.44	58.56
06	2.0	94.85	5.15	39.36	60.64
09	1.0	93.07	6.93	36.64	63.36
10	1.0	93.46	6.54	32.32	67.68
11	1.5	90.14	9.86	31.77	68.23
12	1.5	90.75	9.25	33.20	66.80
13	2.0	95.92	4.08	33.58	66.42
15	2.0	94.70	5.30	31.40	68.60
16	2.0	96.26	3.74	32.39	67.61
18	2.0	96.51	3.49	37.76	62.24
19	1.4	95.84	4.16	41.43	58.57
23	2.0	95.52	4.48	53.69	46.31
24	1.4	96.97	3.03	42.36	57.64
25	1.8	96.81	3.19	39.71	60.29

3. Material in feed chamber

DATE	Volume, m^3	pH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
01	2.0	-	-	-	-	-
03	3.0	11.43	91.33	8.67	49.56	50.44
04	2.0	11.67	88.42	11.58	56.75	43.25
04	1.0	8.05	89.26	10.74	63.60	36.40
05	1.0	11.09	90.95	9.05	48.26	51.74
06	1.0	10.73	92.49	7.51	49.60	50.40
07	2.5	10.25	92.54	7.46	54.39	45.61
08	2.0	11.31	92.84	7.16	52.19	47.81
09	1.0	9.71	90.29	9.71	49.17	50.83
10	2.5	9.98	91.72	8.28	46.59	53.41
11	2.5	9.41	86.77	13.23	62.15	37.85
12	2.5	8.33	89.59	10.41	46.32	53.68
13	2.5	11.43	88.01	11.99	63.99	36.01
15	3.5	11.72	90.75	9.25	47.76	52.24
16	3.5	11.86	91.14	8.86	47.62	52.38
18	3.5	11.83	93.17	6.83	50.10	49.90
19	3.0	12.02	91.54	8.46	54.22	45.78
23	3.5	10.06	89.54	10.46	60.16	39.84
24	2.5	10.95	89.73	10.27	62.05	37.95
25	3.5	7.22	88.36	11.64	45.54	54.46
27	2.0	6.51	89.71	10.29	71.36	28.64
28	2.0	9.75	89.73	10.27	59.70	40.30

II. DRAINED MATERIAL

1. Material in drain chamber

DATE	Volume, m^3	pH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
01	2.0	7.88	97.62	2.38	67.44	32.56
03	3.0	7.98	97.42	2.58	29.48	70.52
04	3.0	7.98	97.18	2.82	33.41	66.59
05	3.0	8.13	96.96	3.04	31.26	68.74
06	3.0	7.98	97.25	2.75	31.10	68.90
07	3.5	7.91	96.95	3.05	32.87	67.13
08	3.0	7.97	98.22	1.78	32.29	67.71
09	3.5	8.10	96.15	3.85	38.61	61.39
10	3.5	7.87	94.97	5.03	37.92	62.08
11	3.5	8.02	98.15	1.85	33.51	66.49
12	3.5	8.01	97.46	2.54	31.87	68.13
13	3.5	7.84	95.75	4.25	39.20	60.80
15	3.5	7.89	93.83	6.17	41.01	58.99
16	3.5	7.85	95.67	4.33	41.84	58.16
18	3.5	7.81	94.83	5.17	41.36	58.64
19	3.0	7.91	96.79	3.21	37.83	62.17
23	3.5	7.84	94.72	5.28	40.54	59.46
24	3.5	7.46	94.20	5.80	45.59	54.41
25	3.5	7.83	95.02	4.98	45.08	54.92
27	2.0	7.85	94.67	5.33	43.59	56.41

28	2.0	7.80	94.80	5.20	40.92	59.08

III. MATTER IN DIGESTORS

1. Sample drawn from Compartment No. 1

Date	pH	Temp. ^{o}C	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
01	7.89	26.8	94.04	5.96	31.91	68.09
02	7.82	25.2	93.79	6.21	32.81	67.19
03	7.87	26.1	93.36	6.64	34.46	65.54
05	7.86	26.7	94.38	5.62	35.16	64.84
06	7.85	26.4	94.66	5.34	36.32	63.68
08	7.77	25.3	94.45	5.55	37.50	62.50
10	7.75	28.6	-	-	-	-
11	7.74	27.8	93.26	6.74	43.01	56.99
12	7.78	26.0	93.28	6.72	37.37	62.63
17	7.79	27.5	93.29	6.71	40.18	59.82
18	7.89	26.7	92.95	7.05	38.07	61.93
19	7.75	25.9	92.52	7.48	42.20	57.80
20	7.88	26.7	95.68	4.32	38.84	61.16
23	7.78	27.1	95.85	4.15	39.24	60.76
25	7.75	24.3	92.11	7.89	42.61	57.39
26	7.65	26.4	93.88	6.12	44.64	55.36
28	7.74	26.5	93.85	6.15	38.97	61.03
29	7.77	25.1	95.04	4.96	42.80	57.20

2. Sample drawn from Compartment No. 2

Date	pH	Temp., ^{o}C	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
01	7.79	26.9	94.57	5.43	39.27	60.73
02	7.85	26.8	96.04	3.96	35.81	64.19
03	7.92	27.8	95.43	4.57	40.08	59.92
05	7.89	27.3	95.10	4.90	43.38	56.62
06	7.86	26.7	95.08	4.92	43.75	56.25
08	7.78	28.0	95.08	4.92	49.46	50.54
10	7.78	28.5	-	-	-	-
11	7.75	28.1	95.26	4.74	42.33	57.67
12	7.79	26.1	93.62	6.38	44.69	55.31
17	7.80	27.3	94.92	5.08	44.57	55.43
18	7.90	27.1	92.92	7.08	43.51	56.49
19	7.72	26.3	94.62	5.38	44.45	55.55
20	7.78	27.0	94.42	5.58	42.00	58.00
23	7.68	26.9	95.00	5.00	38.79	61.21
25	7.85	25.1	94.59	5.41	41.15	58.85
26	7.54	29.0	93.60	6.40	42.13	57.87
28	7.83	27.0	92.71	7.29	39.57	60.43
29	7.78	25.3	94.61	5.39	43.14	56.86

3. Sample drawn from Compartment No. 3

Date	pH	Temp., ^{o}C	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
01	7.97	26.7	96.99	3.01	30.81	69.19
02	7.95	27.8	96.99	3.01	33.32	66.68
03	8.07	27.5	96.58	3.42	32.74	67.26
05	7.95	27.9	96.88	3.12	32.46	67.54
06	8.02	26.6	96.74	3.26	33.97	66.03
08	7.94	27.5	96.48	3.52	35.12	64.88
10	7.89	28.4	-	-	-	-
11	7.90	28.3	96.62	3.38	34.55	65.45
12	7.95	26.1	96.05	3.95	37.86	62.14
17	7.92	27.1	96.29	3.71	40.33	59.67
18	7.91	27.1	96.21	3.79	36.41	63.59
19	7.90	26.3	96.33	3.67	39.44	60.56
20	7.98	26.8	96.49	3.51	37.96	62.04
23	7.87	26.5	96.05	3.95	37.85	62.15
25	7.96	26.7	96.04	3.96	37.75	62.25
26	7.79	28.2	95.69	4.31	42.60	57.40
28	7.74	26.6	95.71	4.29	39.26	60.74
29	7.87	26.3	95.38	4.62	39.15	60.85

4. Sample drawn from Compartment No. 4

Date	pH	Temp, ^{o}C	% Moisture	% TS	% VS	% FS
01	7.97	26.7	96.49	3.51	30.50	69.50
02	7.93	27.9	96.94	3.06	33.64	66.36
03	8.00	27.4	96.62	3.38	32.97	67.03
05	7.95	27.6	97.07	2.93	31.82	68.18
06	8.02	26.7	96.83	3.17	32.21	67.79
08	7.97	27.5	96.76	3.24	32.34	67.66
10	7.90	28.4	-	-	-	-
11	7.90	27.8	96.48	3.52	34.06	65.94
12	7.95	25.9	96.71	3.29	33.48	66.52
17	7.93	26.8	96.52	3.48	37.95	62.05
18	7.92	27.0	96.15	3.85	35.94	64.06
19	7.91	26.4	95.98	4.02	38.28	61.72
20	7.92	25.9	96.56	3.44	36.33	63.67
23	7.85	27.5	95.98	4.02	37.31	62.69
25	7.89	23.7	96.05	3.95	37.09	62.91
26	7.78	28.4	95.83	4.17	39.43	60.57
28	7.81	26.5	95.65	4.35	38.18	61.82
29	7.87	25.8	95.72	4.28	39.64	60.36

IV. GENERATION OF BIOGAS

Date	Volume, m^3/d	Composition	
		% CO_2	% H_2S
01	29.75	-	-
02	32.75	-	-
03	34.50	-	-

04	37.25	-	-
05	40.25	-	-
06	34.00	-	-
07	40.00	-	-
08	41.00	-	-
09	41.00	-	-
10	40.00	-	-
11	39.75	-	-
12	37.00	-	-
13	43.75	-	-
14	42.00	-	-
15	37.50	-	-
16	49.00	-	-
17	46.00	-	-
18	47.00	-	-
19	43.50	-	-
20	42.50	-	-
21	50.00	-	-
22	50.00	-	-
23	49.00	-	-
24	55.00	-	-
25	61.50	-	-
26	63.75	-	-
27	64.75	-	-
28	55.25	-	-
29	50.00	-	-
30	53.25	-	-

OPERATIONAL DATA

Period: 01 to 28 February 2001

I. FEED MATERIAL

1. Fleshing

Date	Weight, tonnes	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
01	2.65	86.81	13.19	67.68	32.32
02	3.00	-	-	-	-
03	1.50	84.44	15.56	61.68	38.32
04	2.50	86.38	13.62	57.67	42.33
05	3.50	86.11	13.89	63.13	36.87
06	1.00	86.11	13.89	63.13	36.87
07	2.00	85.58	14.42	52.31	47.69
08	2.00	83.96	16.04	53.38	46.62
09	2.00	85.42	14.58	51.85	48.15
10	3.00	83.91	16.09	67.10	32.90
11	1.00	83.91	16.09	67.10	32.90
12	2.00	82.49	17.51	-	-
13	2.00	84.77	15.23	48.90	51.10
17	2.00	85.41	14.59	54.09	45.91
19	2.75	82.79	17.21	50.72	49.28
20	2.50	83.12	16.88	51.36	48.64
21	3.00	78.92	21.08	57.44	42.56
22	2.50	82.00	18.00	57.62	42.38
23	2.00	87.51	12.49	50.58	49.42
24	3.50	84.92	15.08	63.43	36.57
25	2.10	84.10	15.90	57.88	42.12
27	2.50	74.04	25.96	48.67	51.33
28	2.50	75.06	24.94	44.89	55.11

2. Primary sludge

DATE	Volume, m^3	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
01	2.00	94.85	5.15	44.34	55.66
02	2.00	-	-	-	-
03	1.00	91.39	8.61	45.20	54.80
04	1.50	95.86	4.14	41.18	58.82
05	2.50	92.87	7.13	35.64	64.36
06	0.60	93.62	6.38	38.11	61.89
07	2.00	94.42	5.58	38.80	61.20
08	2.00	91.11	8.89	46.16	53.84
09	2.00	94.34	5.66	38.01	61.99
10	2.50	95.81	4.19	42.75	57.25
11	1.00	95.85	4.15	39.64	60.36
12	1.00	95.37	4.63	40.95	59.05
13	1.00	91.99	8.01	39.68	60.32
17	2.00	95.79	4.21	41.79	58.21

19	2.25	94.11	5.89	41.36	58.64
20	1.50	-	-	-	-
21	2.50	95.44	4.56	40.36	59.64
22	1.50	-	-	-	-
23	1.50	94.79	5.21	37.34	62.66
24	2.00	-	-	-	-
25	1.80	93.12	6.88	42.31	57.69
27	2.00	95.26	4.74	36.94	63.06
28	2.00	95.13	4.87	43.26	56.74

3. Material in feed chamber

DATE	Volume, m^3	pH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
01	4.50	7.65	90.67	9.33	58.50	41.50
02	4.50	9.15	90.66	9.34	58.79	41.21
03	2.50	7.84	91.34	8.66	50.22	49.78
04	4.00	7.76	91.85	8.15	54.55	45.45
05	4.50	9.37	90.81	9.19	54.38	45.62
06	2.00	7.92	88.83	11.17	52.99	47.01
07	3.00	8.69	89.72	10.28	47.78	52.22
08	3.50	9.79	90.47	9.53	49.18	50.82
09	4.50	9.90	88.88	11.12	43.47	56.53
10	4.50	10.64	89.84	10.16	47.71	52.29
11	2.00	7.66	91.27	8.73	53.08	46.92
12	2.00	9.69	88.84	11.16	50.34	49.66
13	2.00	9.67	89.37	10.63	45.76	54.24
14	3.00	7.04	88.07	11.93	71.37	28.63
16	1.00	8.85	90.31	9.69	44.80	55.20
17	3.50	7.63	91.92	8.08	47.88	52.12
19	4.50	7.48	89.32	10.68	45.47	54.53
20	3.50	8.81	89.39	10.61	47.86	52.14
21	2.75	8.59	89.57	10.43	46.41	53.59
22	3.00	7.86	89.10	10.90	48.90	51.10
23	3.00	9.25	91.20	8.80	47.98	52.02
24	5.00	7.93	89.99	10.01	53.23	46.77
25	3.50	7.67	90.06	9.94	54.93	45.07
27	4.00	7.32	89.18	10.82	46.31	53.69
28	4.00	7.38	87.90	12.10	43.62	56.38

II. DRAINED MATTER

2. Material in drain chamber

DATE	Volume, ^{m3}	pH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
01	4.5	7.92	94.85	5.15	44.34	55.66
02	4.5	7.74	-	-	-	-
03	4.5	7.92	91.39	8.61	45.20	54.80
04	4.0	7.90	95.86	4.14	41.18	58.82
05	4.5	7.87	95.55	4.45	42.47	57.53
06	4.0	7.91	93.56	6.44	46.05	53.95

07	4.0	7.91	92.43	7.57	43.55	56.45
08	3.5	7.88	93.02	6.98	46.15	53.85
09	4.5	7.87	94.34	5.66	38.01	61.99
10	4.5	7.84	95.81	4.19	42.75	57.25
11	4.0	7.93	95.85	4.15	39.64	60.36
12	2.0	7.83	95.37	4.63	40.95	59.05
13	2.0	7.93	91.99	8.01	39.68	60.32
14	3.0	7.96	95.98	4.02	39.16	60.84
16	1.0	7.84	91.92	8.08	42.00	58.00
17	3.5	8.14	95.54	4.46	39.55	60.45
19	4.5	8.19	91.24	8.76	36.56	63.44
20	4.5	8.06	90.68	9.32	40.38	59.62
21	3.0	8.09	96.74	3.26	34.94	65.06
22	3.0	7.93	96.89	3.11	36.70	63.30
23	3.0	8.08	96.34	3.66	35.77	64.23
24	5.0	8.04	95.99	4.01	36.37	63.63
25	3.5	8.00	95.72	4.28	41.60	58.40
27	4.0	8.05	96.56	3.44	34.46	65.54
28	4.0	8.19	95.58	4.42	35.12	64.88

III. MATTER IN DIGESTORS

1. Sample drawn from Compartment No. 1

Date	**pH**	**Temp. °C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**
					% VS	**% FS**	
01	7.71	24.7	94.63	5.37	47.55	52.45	48953
02	7.59	29.6	93.56	6.44	41.34	58.66	-
03	7.66	30.1	95.74	4.26	38.13	61.87	-
05	7.78	28.0	95.22	4.78	41.55	58.45	-
06	7.80	27.5	93.27	6.73	39.85	60.15	52965
07	7.66	25.0	92.78	7.22	41.12	58.88	-
08	7.73	27.7	95.55	4.45	40.91	59.09	-
10	7.89	31.1	94.10	5.90	39.37	60.63	50290
12	7.80	30.1	88.29	11.71	40.44	59.56	-
13	8.01	27.4	94.91	5.09	40.54	59.46	-
16	7.86	29.4	91.43	8.57	39.79	60.21	-
19	7.89	30.0	93.86	6.14	38.34	61.66	-
20	7.85	29.3	91.35	8.65	39.28	60.72	53500
22	7.84	27.7	94.20	5.80	44.57	55.43	-
23	7.82	27.1	95.29	4.71	34.63	65.37	42532.5
24	7.87	26.7	91.88	8.12	44.30	55.70	-
28	7.90	29.3	94.73	5.27	35.83	64.17	-

2. Sample drawn from Compartment No. 2

Date	**pH**	**Temp. °C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**
					% VS	**% FS**	
01	7.69	23.8	93.29	6.71	46.47	53.53	50825
02	7.53	29.4	91.07	8.93	44.84	55.16	-

03	7.65	28.5	95.20	4.80	38.26	61.74	-
05	7.92	29.5	94.94	5.06	41.11	58.89	-
06	7.79	27.6	93.19	6.81	39.25	60.75	54035
07	7.68	25.2	91.87	8.13	43.55	56.45	-
08	7.72	29.3	93.92	6.08	38.86	61.14	-
10	7.85	30.5	93.12	6.88	49.08	50.92	42533
12	7.62	31.3	89.36	10.64	49.56	50.44	-
13	7.86	27.4	95.61	4.39	39.09	60.91	-
16	7.86	29.5	95.38	4.62	40.12	59.88	-
19	7.95	29.9	96.25	3.75	35.98	64.02	-
20	7.82	29.2	92.39	7.61	38.55	61.45	55372.5
22	7.87	28.4	95.70	4.30	38.09	61.91	-
23	7.96	29.9	95.39	4.61	35.69	64.31	39590
24	7.83	27.3	91.62	8.38	43.63	56.37	-
28	7.88	29.5	93.76	6.24	38.96	61.04	-

3. Sample drawn from Compartment No. 3

Date	**PH**	**Temp. °C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**
					% VS	**% FS**	
01	7.82	24.7	95.08	4.92	45.11	54.89	37985
02	7.75	29.3	95.27	4.73	39.20	60.80	-
03	7.75	31.3	95.73	4.27	39.52	60.48	-
05	7.92	27.7	95.75	4.25	39.42	60.58	-
06	7.87	25.2	95.12	4.88	39.15	60.85	35588
07	7.76	25.6	95.66	4.34	39.10	60.90	-
08	7.89	26.7	96.04	3.96	38.37	61.63	-
10	7.94	30.4	96.03	3.97	38.83	61.17	36280
12	7.84	30.2	95.88	4.12	36.58	63.42	-
13	7.97	27.4	95.66	4.34	38.82	61.18	-
16	7.92	28.7	95.32	4.68	38.70	61.30	-
19	7.89	28.8	96.48	3.52	33.44	66.56	-
20	7.98	28.9	94.51	5.49	37.84	62.16	41730
22	8.00	29.7	95.42	4.58	36.79	63.21	-
23	8.02	30.1	95.05	4.95	35.88	64.12	40660
24	8.04	27.4	95.49	4.51	38.58	61.42	-
28	8.02	29.5	94.86	5.14	37.40	62.60	-

4. Sample drawn from Compartment No. 4

Date	**pH**	**Temp. °C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**
					% VS	**% FS**	
01	7.83	24.3	95.89	4.11	42.81	57.19	33705.0
02	7.76	29.7	95.77	4.23	39.15	60.85	-
03	7.75	31.1	96.34	3.66	38.86	61.14	-
05	7.99	28.0	95.81	4.19	38.66	61.34	-
06	7.90	27.7	95.72	4.28	38.16	61.84	32100.0
07	7.80	25.8	96.08	3.92	40.14	59.86	-
08	7.88	28.2	96.28	3.72	37.92	62.08	-
10	7.94	30.1	96.36	3.64	39.27	60.73	35043.0

12	7.84	30.5	96.45	3.55	36.14	63.86	-
13	7.98	27.2	95.90	4.10	37.81	62.19	-
16	7.93	28.8	95.28	4.72	38.70	61.30	-
19	7.95	29.2	96.20	3.80	29.66	70.34	-
20	7.98	28.7	95.22	4.78	37.42	62.58	37717.5
22	7.96	28.8	95.85	4.15	35.19	64.81	-
23	7.98	30.0	95.79	4.21	35.62	64.38	36915.0
24	8.05	27.5	95.76	4.24	37.95	62.05	-
28	8.01	29.5	94.52	5.48	36.98	63.02	-

IV. GENERATION OF BIOGAS

Date	**Volume, m^3/d**	**Composition**	
		% CO_2	**% H_2S**
01	65.50	-	-
02	69.00	-	-
03	70.25	-	-
04	75.00	-	-
05	82.25	-	-
06	79.00	-	-
07	78.25	-	-
08	74.25	-	-
09	76.00	-	-
10	75.00	-	-
11	71.00	-	-
12	68.00	19	-
13	70.25	-	-
14	69.25	-	-
15	69.50	19	-
16	66.50	20	-
17	68.25	-	-
18	79.50	-	-
19	74.75	-	-
20	80.00	16	-
21	84.50	-	-
22	89.00	-	-
23	93.50	-	-
24	94.00	-	-
25	93.25	-	-
26	96.25	-	-
27	93.25	18	-
28	88.00	-	-

OPERATIONAL DATA

Period: 01 to 31 March 2001

I. FEED MATERIAL

1. Fleshing

Date	Weight, tonnes	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
01	3.50	85.58	14.42	49.05	50.95
02	2.30	85.25	14.75	58.09	41.91
03	3.25	74.25	25.75	56.57	43.43
05	3.00	77.60	22.40	40.77	59.23
10	3.75	67.33	32.67	66.19	33.81
12	4.00	63.71	36.29	71.38	28.62
13	3.00	73.57	26.43	78.92	21.08
24	1.70	83.27	16.73	68.34	31.66
26	1.40	84.91	15.09	58.39	41.61
27	2.40	79.34	20.66	45.61	54.39
29	2.00	70.74	29.26	37.78	62.22
30	3.00	84.88	15.12	58.22	41.78
31	2.50	79.75	20.25	47.71	52.29

2. Primary sludge

DATE	Volume, m^3	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
01	2.60	95.14	4.86	41.81	58.19
02	1.50				
03	2.25	94.44	5.56	41.92	58.08
05	2.00				
10	2.50	92.99	7.01	42.44	57.56
12	2.00	93.70	6.30	35.75	64.25
13	2.00	93.80	6.20	88.28	11.72
24	1.00	96.45	3.55	29.00	71.00
26	1.00	96.18	3.82	30.35	69.65
27	1.50	96.20	3.80	30.42	69.58
29	1.00	92.01	7.99	34.79	65.21
30	2.30	95.65	4.35	30.95	69.05
31	2.00	95.61	4.39	31.71	68.29

3. Material in feed chamber

DATE	Volume, m^3	PH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
01	3.0	8.31	89.98	10.02	45.33	54.67
02	4.0	7.04	90.75	9.25	50.07	49.93
03	4.5	7.05	83.27	16.73	47.37	52.63
05	4.0	7.69	86.50	13.50	54.54	45.46
10	5.0	6.81	84.83	15.17	66.96	33.04
12	4.0	7.09	84.87	15.13	65.69	34.31

13	3.5	7.46	87.09	12.91	65.92	34.08
17	2.0					
24	2.0	11.25	84.64	15.36	55.98	44.02
26	2.0	9.72	90.94	9.06	45.18	54.82
27	2.7	10.43	87.17	12.83	53.06	46.94
29	3.0	10.57	85.71	14.29	45.48	54.52
30	4.0	10.42	88.34	11.66	57.30	42.70
31	3.5	9.40	88.68	11.32	47.40	52.60

II. DRAINED MATERIAL

1. Material in drain chamber

DATE	Volume, m^3	pH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
01	3.0	8.00	94.73	5.27	33.66	66.34
02	4.0	8.06	95.71	4.29	36.60	63.40
03	4.5	8.06	95.84	4.16	32.71	67.29
05	4.0	8.07	94.70	5.30	33.72	66.28
10	5.0	8.00	95.53	4.47	32.56	67.44
12	4.0	7.96	95.21	4.79	32.58	67.42
13	3.5	7.92	95.34	4.66	38.72	61.28
29	3.0	8.00	95.29	4.71	30.50	69.50
30	4.0	7.92	93.54	6.46	38.33	61.67
31	3.5	7.83	95.49	4.51	30.29	69.71

III. MATTER IN DIGESTORS

1. Sample drawn from Compartment No. 1

Date	pH	Temp. ^oC	% Moisture	% TS	Composition of solid matters		Total Alkalinity, mg/l
					% VS	% FS	
01	7.76	32.7	90.71	9.29	42.76	57.24	54035
02	7.78	29.6	88.07	11.93	43.64	56.36	54570
05	7.80	26.1	91.93	8.07	40.80	59.20	
07	7.70	29.0	92.19	7.81	39.79	60.21	56940
08	7.98	29.3	93.87	6.13	38.07	61.93	
10	7.77	30.1	90.48	9.52	36.35	63.65	
12	7.82	30.2	92.93	7.07	42.32	57.68	
13	7.72	31.4	91.76	8.24	43.42	56.58	
17	7.78	26.4	91.37	8.63	41.79	58.21	
19	7.77	26.0	92.24	7.76	42.60	57.40	47430
20	7.75	32.4	89.94	10.06	44.38	55.62	51615
22	7.78	26.4	91.03	8.97	42.20	57.80	
23	7.74	33.0	94.81	5.19	40.22	59.78	49057
24	7.86	32.1	95.04	4.96	45.52	54.48	
26	7.80	31.3	85.73	14.27	40.61	59.39	
27	7.74	28.9	92.32	7.68	41.25	58.75	42315
28	7.78	30.5	94.13	5.87	39.88	60.12	
29	7.79	29.2	91.96	8.04	40.43	59.57	51150
30	7.80	32.1	93.97	6.03	39.35	60.65	

31	7.77	23.7	83.97	16.03	37.57	62.43	

2. Sample drawn from Compartment No. 2

Date	pH	Temp. °C	% Moisture	% TS	Composition of solid matters		Total Alkalinity, mg/l
					% VS	% FS	
01	7.78	32.2	85.78	14.22	43.32	56.68	48685.0
02	8.06	28.1	93.24	6.76	44.19	55.81	45742.5
05	8.16	26.2	94.02	5.98	40.33	59.67	
07	7.75	29.0	92.95	7.05	40.34	59.66	53040.0
08	7.75	29.3	94.04	5.96	38.82	61.18	
10	7.87	32.9	91.42	8.58	37.50	62.50	
12	7.82	30.5	91.93	8.07	41.21	58.79	
13	7.78	31.7	93.81	6.19	41.86	58.14	
17	7.78	30.9	93.99	6.01	42.59	57.41	
19	7.73	25.3	93.36	6.64	41.57	58.43	44407.0
20	7.79	32.3	94.17	5.83	40.33	59.67	50220.0
22	7.79	28.8	92.75	7.25	41.25	58.75	
23	7.81	33.0	95.21	4.79	41.98	58.02	36037.0
24	7.84	32.9	95.01	4.99	41.93	58.07	
26	7.79	29.2	95.00	5.00	41.17	58.83	
27	7.66	27.6	90.94	9.06	48.39	51.61	47430.0
28	7.71	27.8	93.20	6.80	42.20	57.80	
29	7.83	28.8	93.47	6.53	37.77	62.23	47430.0
30	7.75	32.7	88.10	11.90	41.06	58.94	
31	7.82	26.0	89.45	10.55	38.69	61.31	

3. Sample drawn from Compartment No. 3

Date	pH	Temp, °C	% Moisture	% TS	Composition of solid matters		Total Alkalinity, mg/l
					% VS	% FS	
01	7.96	32.2	94.08	5.92	41.19	58.81	46812.5
02	7.92	28.5	95.03	4.97	36.04	63.96	46277.5
05	7.67	25.9	87.86	12.14	40.13	59.87	
07	7.99	29.1	92.70	7.30	37.98	62.02	48360.0
08	8.02	29.3	91.78	8.22	39.22	60.78	
10	7.98	32.6	94.21	5.79	34.92	65.08	
12	8.01	30.5	93.94	6.06	39.23	60.77	
13	7.78	30.2	95.12	4.88	38.00	62.00	
17	7.88	31.0	94.85	5.15	37.43	62.57	
19	7.88	29.3	94.30	5.70	37.96	62.04	43477.0
20	7.84	31.2	94.91	5.09	39.06	60.94	47197.0
22	7.84	30.5	91.09	8.91	35.24	64.76	
23	7.90	33.0	93.65	6.35	43.91	56.09	41617.0
24	7.92	32.2	92.74	7.26	39.02	60.98	
26	7.91	33.7	93.16	6.84	40.31	59.69	
27	7.83	29.8	92.25	7.75	46.25	53.75	41617.0
28	7.84	26.6	93.99	6.01	42.14	57.86	
29	7.95	28.9	92.96	7.04	44.22	55.78	41152.0

30	7.86	30.1	92.99	7.01	41.34	58.66	
31	7.94	26.7	90.06	9.94	41.91	58.09	

4. Sample drawn from Compartment No. 4

Date	pH	Temp. °C	% Moisture	% TS	Composition of solid matters		Total Alkalinity, mg/l
					% VS	% FS	
01	7.95	32.0	95.30	4.70	34.52	65.48	43870.0
02	8.02	29.1	94.21	5.79	41.43	58.57	43602.5
05	8.10	26.3	93.49	6.51	38.17	61.83	
07	8.00	29.1	95.56	4.44	38.88	61.12	44980.0
08	8.01	29.3	93.80	6.20	26.78	73.22	
10	7.98	32.3	93.77	6.23	35.02	64.98	
12	8.01	30.3	94.26	5.74	36.34	63.66	
13	7.97	29.4	94.59	5.41	34.77	65.23	
17	7.89	30.4	90.76	9.24	38.84	61.16	
19	7.82	28.6	90.74	9.26	41.14	58.86	48592.0
20	7.84	32.1	93.08	6.92	40.37	59.63	44640.0
22	7.87	31.2	90.72	9.28	44.09	55.91	
23	7.89	33.0	93.70	6.30	41.35	58.65	40687.0
24	7.93	30.5	92.32	7.68	39.52	60.48	
26	7.88	30.9	94.39	5.61	38.09	61.91	
27	7.79	27.7	89.78	10.22	43.42	56.58	50917.0
28	7.85	28.6	94.33	5.67	39.36	60.64	
29	7.89	26.1	92.10	7.90	38.48	61.52	46732.0
30	7.87	30.6	88.61	11.39	39.42	60.58	
31	8.01	28.0	92.35	7.65	40.03	59.97	

IV. GENERATION OF BIOGAS

Date	Volume, m^3/d	Composition	
		% CO_2	% H_2S
01	90.25	-	-
02	95.00	-	-
03	90.50	-	-
04	84.00	23	-
05	89.00	-	-
06	89.25	-	-
07	89.75	-	-
08	82.25	-	-
09	75.50	-	-
10	75.50	-	-
11	67.75	-	-
12	73.25	23	-
13	67.75	-	-
14		-	-
15		-	-
16		-	-
17	55.50	-	-
18		-	-
19		-	-

20	47.50	-	-
21	46.00	-	-
22	51.00	-	-
23	40.75	23	-
24	53.00	21	-
25	47.50	-	-
26	54.25	20	-
27	74.50	20	-
28	78.25	-	-
29	78.25	-	-
30	81.00	21	-
31	84.00	-	-

OPERATIONAL DATA

Period: 01 to 30 April 2001

I. FEED MATERIAL

1. Fleshing

Date	**Weight, tonnes**	**% Moisture**	**% TS**	**% VS**	**% FS**
02	3.0	75.64	24.36	44.91	55.09
03	3.0	71.94	28.06	37.86	62.14
04	3.0	79.70	20.30	53.04	46.96
06	2.0	78.28	21.72	42.89	57.11
08	3.0	70.51	29.49	51.81	48.19
09	3.0	78.58	21.42	45.94	54.06
10	4.0	75.27	24.73	49.66	50.34
11	4.0	71.73	28.27	36.16	63.84
12	4.0	72.39	27.61	30.90	69.10
13	4.0	82.80	17.20	54.36	45.64
15	2.5	75.13	24.87	56.06	43.94
17	2.5	72.92	27.08	41.79	58.21
18	2.0	77.04	22.96	49.24	50.76
19	1.0	71.48	28.52	26.79	73.21
20	2.0	88.78	11.22	65.89	34.11
21	3.5	82.21	17.79	67.04	32.96
22	2.7	82.73	17.27	55.58	44.42
23	3.5	82.76	17.24	49.16	50.84
24	1.0	81.93	18.07	64.97	35.03
27	2.5	67.17	32.83	61.82	38.18
28	3.0	84.69	15.31	62.54	37.46
29	1.7	70.54	29.46	46.01	53.99

2. Primary sludge

DATE	**Volume, m^3**	**% Moisture**	**% TS**	**Composition of solid matters**	
				% VS	**% FS**
02	1.85	97.49	2.51	30.33	69.67
03	2.00	95.12	4.88	31.89	68.11
04	2.00	96.27	3.73	38.96	61.04
06	1.50	94.47	5.53	30.00	70.00
08	1.50	94.49	5.51	37.6	62.4
09	2.00	95.66	4.34	36.04	63.96
10	2.00	93.41	6.59	36.35	63.65
11	2.00	94.77	5.23	37.24	62.76
12	2.00	92.64	7.36	35.09	64.91
13	2.50	93.45	6.55	30.53	69.47
17	2.00	96.00	4.00	40.61	59.39
18	1.00	94.31	5.69	35.60	64.40
19	1.00	95.71	4.29	42.77	57.23
20	1.00	93.38	6.62	36.65	63.35
21	2.50	92.20	7.80	34.42	65.58
22	2.00	89.44	10.56	33.16	66.84

23	1.00	94.27	5.73	31.67	68.33
24	1.00	93.60	6.40	25.97	74.03
27	2.00	94.45	5.55	32.98	67.02
28	2.00	94.56	5.44	36.45	63.55
29	1.00	94.84	5.16	34.34	65.66

3. Material in feed chamber

DATE	Volume, m^3	pH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
02	2.0	9.30	88.69	11.31	48.22	51.78
03	5.0	7.41	84.50	15.50	37.54	62.46
04	4.0	8.20	87.86	12.14	43.21	56.79
07	-	8.99	87.92	12.08	40.54	59.46
08	3.0	9.07	84.25	15.75	45.45	54.55
09	5.0	7.98	87.37	12.63	48.77	51.23
10	5.0	7.84	87.39	12.61	47.58	52.42
11	5.0	8.75	86.93	13.07	45.99	54.01
12	5.0	8.52	87.13	12.87	41.29	58.71
13	4.5	8.50	89.14	10.86	47.15	52.85
17	3.5	8.04	87.17	12.83	35.38	64.62
18	2.7	10.82	77.04	22.96	49.24	50.76
19	1.5	11.65	86.60	13.40	33.83	66.17
20	2.5	9.39	91.13	8.87	52.18	47.82
21	5.0	8.16	93.32	6.68	48.21	51.79
22	3.5	9.01	87.53	12.47	40.87	59.13
23	4.0	8.18	91.93	8.07	35.77	64.23
24	2.0	-	89.30	10.70	52.01	47.99
27	3.5	7.47	90.98	9.02	52.14	47.86
28	4.0	8.68	88.21	11.79	55.80	44.20
29	2.0	7.35	83.54	16.46	44.50	55.50
30	2.0	7.39	87.26	12.74	43.72	56.28

II. DRAINED MATERIAL

1. Material in drain chamber

DATE	Volume, m^3	pH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
02	2.0	7.84	95.12	4.88	37.47	62.53
03	5.0	7.95	95.12	4.88	31.89	68.11
04	4.0	7.93	94.42	5.58	35.81	64.19
06	3.0	7.87				
09	5.0	7.97	95.66	4.34	36.04	63.96
10	5.0	7.98	93.41	6.59	36.35	63.65
11	5.0	7.93	94.77	5.23	37.24	62.76
12	5.0	7.97	92.64	7.36	35.09	64.91
13	4.5	7.92	93.45	6.55	30.53	69.47
15			92.78	7.22	29.97	70.03
17	3.5	7.90	94.02	5.98	34.92	65.08
18	2.7	7.82	94.90	5.10	43.55	56.45
19	1.5	7.86	93.59	6.41	32.24	67.76

20	2.5	7.79	93.38	6.62	36.65	63.35
21	5.0	7.92	92.20	7.80	34.42	65.58
22	3.0	8.05	89.44	10.56	33.16	66.84
23	3.5	8.27	94.27	5.73	31.67	68.33
24	2.0		93.60	6.40	25.97	74.03
27	2.5	7.96	94.45	5.55	32.98	67.02
28	3.0	7.83	94.56	5.44	36.45	63.55
29	2.0		94.84	5.16	34.44	65.56
30	2.0		95.53	4.47	30.97	69.03

III. MATTER IN DIGESTORS

1. Sample drawn from Compartment No. 1

Date	**pH**	**Temp, °C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**
					% VS	**% FS**	
02	7.76	29.3	92.23	7.77	40.75	59.25	
03	7.86	27.8	91.12	8.88	38.73	61.27	48825
04	7.77	29.4	93.03	6.97	38.98	61.02	
05	7.67	28.8	88.42	11.58	41.18	58.82	
06	7.68	33.1	87.15	12.85	32.85	67.15	
09	7.84	26.8	92.17	7.83	35.08	64.92	
10	7.70	27.5	91.37	8.63	32.58	67.42	
11	7.64	19.6	88.12	11.88	32.78	67.22	
13	7.65	26.7	86.78	13.22	32.17	67.83	
14	7.56	27.0					
15	7.72	29.0	88.50	11.50	31.00	69.00	
16	7.76	30.1	88.08	11.92	35.41	64.59	
17	7.79	31.0	89.73	10.27	33.38	66.62	
18	7.65	29.0	91.30	8.70	56.20	43.80	
20	7.71	30.3	85.07	14.93	33.64	66.36	
21	7.76	26.9	92.50	7.50	37.56	62.44	46500
23	7.79	28.1	89.75	10.25	32.24	67.76	54172
24	7.73	30.7	90.75	9.25	27.22	72.78	
25			90.44	9.56	53.71	46.29	
27	7.88	33.1	87.13	12.87	32.62	67.38	
28	7.67	29.3	85.23	14.77			

2. Sample drawn from Compartment No. 2

Date	**PH**	**Temp. °C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**
					% VS	**% FS**	
02	7.79	27.5	93.80	6.20	38.97	61.03	
03	7.84	28.1	93.35	6.65	38.39	61.61	43245
04	7.74	28.0	93.85	6.15	36.40	63.60	
05	7.72	26.8	91.33	8.67	39.53	60.47	
06	7.71	32.5	84.28	15.72	34.02	65.98	
09	7.75	28.0	88.72	11.28	34.38	65.62	
10	7.76	28.0	85.03	14.97	31.40	68.60	
11	7.84	21.1	85.12	14.88	33.07	66.93	

13	7.82	26.5					
14	7.65	23.0					
15	7.72	26.7					
16	7.78	30.1	84.91	15.09	37.60	62.40	
17	7.82	27.8					
18	7.71	28.0	91.40	8.60	40.50	59.50	
20	7.75	30.6	87.98	12.02	33.72	66.28	
21	7.73	27.4	90.36	9.64	36.77	63.23	51150
23	7.84	33.9	89.58	10.42	33.13	66.87	45105
24	7.71	33.3	87.60	12.40	25.72	74.28	
25			87.28	12.72	30.40	69.60	
27	7.80	33.5	86.16	13.84	31.12	68.88	
28	7.62	30.9	87.21	12.79			

3. Sample drawn from Compartment No. 3

Date	**pH**	**Temp, °C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**
					% VS	**% FS**	
02	7.88	27.5	94.34	5.66	39.83	60.17	
03	7.93	28.1	93.81	6.19	39.43	60.57	42547
04	7.87	30.2	94.18	5.82	38.34	61.66	
05	7.87	30.9	94.03	5.97	41.06	58.94	
06	7.86	32.9	93.04	6.96	37.71	62.29	
09	7.97	28.8	93.41	6.59	36.80	63.20	
10	7.91	27.4	92.56	7.44	38.12	61.88	
11	7.89	20.5	89.62	10.38	38.01	61.99	
13	7.95	27.4					
14	7.86	26.9					
15	7.95	28.5					
16	7.87	30.0	93.62	6.38	37.86	62.14	
17	7.87	29.0					
18	7.80	29.1	88.50	11.50	37.47	62.53	
20	7.81	31.0	92.25	7.75	33.98	66.02	
21	7.78	29.0	93.69	6.31	38.06	61.94	41850
23	7.90	34.0	92.85	7.15	34.36	65.64	44640
24	7.78	33.6	93.44	6.56	27.22	72.78	
25			91.32	8.68	31.27	68.73	
27	7.89	26.9	90.56	9.44	33.87	66.13	
28	7.83	25.8	91.29	8.71			

4. Sample drawn from Compartment No. 4

Date	**pH**	**Temp, °C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**
					% VS	**% FS**	
02	7.90	26.0	93.79	6.21	41.39	58.61	
03	7.96	28.5	94.13	5.87	37.66	62.34	39757
04	7.87	30.3	93.24	6.76	38.94	61.06	
05	7.87	30.5	93.21	6.79	46.38	53.62	
06	7.85	33.1	94.52	5.48	33.86	66.14	
09	7.93	32.0	93.18	6.82	37.47	62.53	

10	7.87	30.4	91.85	8.15	38.12	61.88	
11	7.97	18.3					
13	7.92	25.5	93.45	6.55	30.53	69.47	
14	7.86	26.6					
15	7.93	26.9	92.78	7.22	29.97	70.03	
16	7.87	29.0	92.29	7.71	37.27	62.73	
17	7.84	30.1	92.52	7.48	35.60	64.40	
18	7.85	28.0	94.90	5.10	43.55	56.45	
20	7.84	30.9	89.94	10.06	32.48	67.52	
21	7.82	28.2	92.59	7.41			40687
23	7.84	28.0	89.44	10.56	33.16	66.84	55567
24	7.84	30.1	93.60	6.40	25.97	74.03	
25			87.04	12.96	31.20	68.80	
27	7.83	28.7	90.50	9.50	30.21	69.79	
28	7.80	26.9	89.63	10.37			

IV. GENERATION OF BIOGAS

Date	**Volume, m^3/d**	**Composition**	
		% CO_2	**% H_2S**
01	85.00	24	-
02	86.00	-	-
03	83.25	-	-
04	91.25	-	-
05	92.50	-	-
06	91.50	21	-
07	92.00	-	-
08	86.00	-	-
09	84.00	-	-
10	90.00	-	-
11	93.25	-	-
12	69.50	24	-
13	70.50	-	-
14	72.00	-	-
15	65.50	-	-
16	60.00	25	-
17	66.75	25	-
18	66.00	-	-
19	68.00	-	-
20	65.75	-	-
21	67.00	24	-
22	68.00	24	-
23	51.00	24	-
24	75.00	23	-
25	52.00	-	-
26	50.50	24	-
27	61.25	-	-
28	59.25	23	-
29	56.50	-	-
30	53.75	-	-

OPERATIONAL DATA

Period: 01 to 31 May 2001

I. FEED MATERIAL

1. Fleshing

Date	Weight, tonnes	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
02	3.0	77.81	22.19	67.02	32.98
09	3.0	81.68	18.32	61.00	39.00
10	3.5	84.10	15.90	65.03	34.97
11	4.0	84.20	15.80	64.28	35.72
19	4.0	80.18	19.82		
20	3.2	80.86	19.14		
21	3.5	81.87	18.13	61.00	39.00
22	3.5	81.67	18.33	52.99	47.01
23	4.0	84.00	16.00	54.32	45.68
24	3.2	72.50	27.50	34.36	65.64
25	3.3	77.59	22.41	69.42	30.58
28	3.5	82.72	17.28	73.68	26.32
29	3.5	80.02	19.98	68.57	31.43
30	3.5	84.40	15.60	57.04	42.96
31	2.7	83.25	16.75	63.06	36.94

2. Primary sludge

DATE	Volume, m^3	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
02	2.5	94.08	5.92	38.95	61.05
09	2.5	95.64	4.36	37.51	62.49
10	2.3	92.72	7.28	30.20	69.80
11	2.0	95.38	4.62	32.26	67.74
19	2.5	94.39	5.61	42.91	57.09
20	2.5	94.08	5.92	42.90	57.10
21	3.0	95.64	4.36	38.93	61.07
22	2.5	93.76	6.24	34.05	65.95
23	2.5	93.05	6.95	34.75	65.25
24	2.5	95.19	4.81	37.97	62.03
25	2.5	93.50	6.50	33.74	66.26
26	2.5	92.46	7.54	34.15	65.85
28	2.5	92.99	7.01	36.84	63.16
29	2.5	81.68	18.32	5.33	94.67
30	2.5	94.67	5.33	18.32	81.68
31	2.0	80.47	19.53	19.72	80.28

3. Material in feed chamber

DATE	Volume, m3	PH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
02	5	8.25	88.04	11.96	58.82	41.18

03	5					
09	5	9.27	89.57	10.43	45.61	54.39
10	5	8.57	87.67	12.33	51.43	48.57
11	5	7.54	88.56	11.44	43.11	56.89
17	2					
19	5		88.08	11.92	51.07	48.93
20	5		88.12	11.88	50.45	49.55
21	5		88.71	11.29	45.77	54.23
22	5		91.23	8.77	48.85	51.15
23	4		90.73	9.27	60.97	39.03
24	5		88.93	11.07	53.59	46.41
25	5		87.33	12.67	59.60	40.40
26	5		87.06	12.94	63.58	36.42
27	5					
28	4		88.45	11.55	57.30	42.70
29	5		86.49	13.51	54.34	45.66
30	5		87.70	12.30	54.01	45.99
31	4		88.24	11.76	51.96	48.04

II. DRAINED MATERIAL

1. Material in drain chamber

DATE	Volume, m^3	pH	% Moisture	% TS	% VS	% FS
02	5.0	8.46	94.08	5.92	38.95	61.05
04	2.0	7.35	94.20	5.80	37.55	62.45
09	5.0	7.89	95.64	4.36	37.51	62.49
10	4.0	7.80	92.72	7.28	30.20	69.80
11	5.0	7.95	95.38	4.62	32.26	67.74
19	3.0		93.15	6.85	29.51	70.49
20	3.5		94.08	5.92	42.90	57.10
21	4.0		95.64	4.36	38.93	61.07
22	5.0		93.76	6.24	34.05	65.95
23	4.0		94.02	5.98	34.92	65.08
24	5.0		94.58	5.42	36.74	63.26
25	5.0		93.50	6.50	33.74	66.26
26	5.0		92.46	7.54	34.15	65.85
28	4.0		92.99	7.01	36.84	63.16
29	5.0					
30	5.0		94.74	5.26	34.23	65.77
31	4.0		94.00	6.00	32.02	67.98

III. MATTER IN DIGESTOS

1. Sample drawn from Compartment No. 1

Date	pH	Temp. ^oC	% Moisture	% TS	Composition of solid matters		Total Alkalinity mg/l
					% VS	% FS	
02	7.66	28.3	88.39	11.61	30.02	69.98	
03	8.13	30.9	88.92	11.08	25.86	74.14	

05	7.65	31.2	80.95	19.05	25.78	74.22	
07	7.66	30.1	90.84	9.16	35.43	64.57	55738
08	7.78	34.3	90.49	9.51	30.90	69.10	
10	7.84	30.5	90.72	9.28	32.63	67.37	
11	7.79	28.0	90.29	9.71	36.28	63.72	
13			91.99	8.01	31.61	68.39	
14			92.68	7.32	34.34	65.66	
16			84.29	15.71	25.88	74.12	
19			91.55	8.45	30.72	69.28	
23			91.08	8.92	32.82	67.18	
24			87.25	12.75	30.57	69.43	
26			84.81	15.19	35.83	64.17	
28			86.64	13.36	24.62	75.38	
29			93.27	6.73	50.04	49.96	
31			89.42	10.58	21.47	78.53	

2. Sample drawn from Compartment No. 2

Date	**pH**	**Temp, °C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**
					% VS	**% FS**	
02	7.64	27.3	83.98	16.02	27.82	72.18	
03	7.96	28.9	92.67	7.33	32.74	67.26	
05	7.55	31.7					
07	7.64	30.7	92.83	7.17	35.35	64.65	51653
08	7.79	33.9	90.78	9.22	24.34	75.66	
10	7.87	30.2	90.88	9.12	30.2	69.80	
11	7.76	27.4	89.54	10.46	35.28	64.72	
13			89.18	10.82	22.74	77.26	
14			93.29	6.71	32.09	67.91	
16			94.82	5.18	29.60	70.40	
19			92.27	7.73	31.62	68.38	
23			88.76	11.24	32.20	67.80	
24			81.46	18.54	44.60	55.40	
26			93.11	6.89	30.47	69.53	
28			75.43	24.57	22.12	77.88	
29			93.03	6.97	26.92	73.08	
31			86.74	13.26	13.35	86.65	

3. Sample drawn from Compartment No. 3

Date	**PH**	**Temp, °C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**
					% VS	**% FS**	
02	7.74	28.9	81.63	18.37	25.24	74.76	
03	7.95	27.3	90.61	9.39	26.83	73.17	
05	7.68	30.2					
07	7.65	28.2	94.62	5.38	36.31	63.69	50933
08	7.83	35.3	88.67	11.33	30.34	69.66	
10	7.90	30.5	92.75	7.25	30.33	69.67	
11	7.87	27.7	90.53	9.47	32.83	67.17	
13			90.45	9.55	26.04	73.96	

14			88.05	11.95	29.94	70.06	
16			90.50	9.50	26.38	73.62	
19			86.58	13.42	27.51	72.49	
24			83.82	16.18	27.46	72.54	
26			87.45	12.55	29.68	70.32	
28			86.83	13.17	27.03	72.97	
29			91.02	8.98	41.28	58.72	
31			92.22	7.78	35.69	64.31	

4. Sample drawn from Compartment No. 4

Date	**pH**	**Temp. °C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity mg/l**
					% VS	**% FS**	
02	7.69	28.4	88.60	11.40	28.64	71.36	
03	7.92	29.4	90.81	9.19	30.89	69.11	
05	7.71	32.9	73.64	26.36	30.56	69.44	
07	7.76	29.1	95.15	4.85	37.97	62.03	43965
08	7.83	33.4	90.70	9.30	31.55	68.45	
10	7.93	30.5	93.14	6.86	30.00	70.00	
11	7.82	28.1	93.32	6.68	35.46	64.54	
13			93.56	6.44	30.06	69.94	
14			92.76	7.24	31.08	68.92	
16			94.53	5.47	30.38	69.62	
19			92.77	7.23	33.68	66.32	
23			93.05	6.95	34.75	65.25	
24			92.33	7.67	31.35	68.65	
26			92.46	7.54	34.15	65.85	
28			91.85	8.15	35.58	64.42	
29			94.87	5.13	25.17	74.83	
31			94.67	5.33	47.46	52.54	

IV. GENERATION OF BIOGAS

Date	**Volume, m^3/d**	**Composition**	
		% CO_2	**% H_2S**
01	65.00	-	-
02	58.75	-	-
03	61.50	-	-
04	34.50	-	-
05	59.00	-	-
06	54.75	-	-
07	32.75	-	-
08	48.00	-	-
09	44.00	-	-
10	50.50	-	-
11	58.00	-	-
12	57.75	-	-
13	47.25	-	-
14	32.75	-	-
15	36.75	-	-
16	27.25	-	-

17	28.75	-	-
18	29.25	-	-
19	27.75	-	-
20	27.25	-	-
21	29.00	-	-
22	36.00	-	-
23	33.25	-	-
24	34.50	-	-
25	50.00	-	-
26	52.25	-	-
27	48.50	-	-
28	44.25	-	-
29	42.00	-	-
30	36.00	-	-
31	35.75	-	-

OPERATIONAL DATA

Period: 01 to 30 June 2001

I. FEED MATERIAL

1. Fleshing

Date	Weight, tonnes	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
01	3.5	84.88	15.12	63.12	36.88
02	3.2	77.30	22.70	73.48	26.52
04		77.20	22.80	55.01	44.99
05	3.5	83.25	16.75	63.06	36.94
06	3.0	83.25	16.75	63.06	36.94
07	3.0	76.00	24.00	35.51	64.49
08	3.2	84.91	15.09	58.39	41.61
26	2.0	88.89	11.11	65.63	34.37
27	2.0	88.89	11.11	65.63	34.37

2. Primary sludge

DATE	Volume, m^3	% Moisture	% TS	Composition of solid matters	
				% VS	% FS
01	2.5	93.93	6.07	47.341	52.659
02	2.3	93.28	6.72	46.50	53.50
04	2.7	95.19	4.81	42.72	57.28
05	2.5	95.44	4.56	50.56	49.44
06	2.3	92.33	7.67	37.11	62.89
07	2.5	94.19	5.81	50.93	49.07
08	2.7	96.13	3.87	30.35	69.65
26	2.0	92.32	7.68	38.53	61.47
27	2.0	92.32	7.68	38.53	61.47

3. Material in feed chamber

DATE	Volume, m^3	pH	% Moisture	% TS	% VS	% FS
01	5		88.07	11.93	55.17	44.83
02	5		88.23	11.77	53.60	46.40
04	5		89.24	10.76	44.83	55.17
05	5		88.21	11.79	55.80	44.20
06	5		89.32	10.68	62.50	37.50
07	5		82.80	17.20	42.70	57.30
08	5		87.17	12.83	53.06	46.94
26	3	9.03	88.36	11.64	53.95	46.05
27	3	7.95	90.20	9.80	59.15	40.85

II. DRAINED MATERIAL

1. Material in drain chamber

DATE	Volume, m^3	pH	% Moisture	% TS	Composition of solid matters	
					% VS	% FS
01	5		92.97	7.03	37.840	62.160
02	5		93.48	6.52	36.500	63.500
04	5		93.48	6.52	31.885	68.115
05	5		94.56	5.44	36.500	63.500
06	5		92.33	7.67	37.110	62.890
07	5		93.95	6.05	33.470	66.530
08	5		94.33	5.67	39.360	60.640
24	3	7.60	94.38	5.62	46.940	53.060
25	3	7.62	93.16	6.84	36.080	63.920

III. MATTER IN DIGESTORS

1. Sample drawn from Compartment No. 1

Date	pH	Temp, °C	% Moisture	% TS	Composition of solid matters		Total Alkalinity mg/l
					% VS	% FS	
02			83.79	16.21	34.56	65.44	
03			94.62	5.38	42.00	58.00	
04			92.75	7.25	35.63	64.37	
07			89.25	10.75			
16			90.61	9.39	43.60	56.40	
18			89.50	10.50	30.78	69.22	
19			88.13	11.87	30.93	69.07	
25			89.94	10.06	33.61	66.39	

2. Sample drawn from Compartment No. 2

Date	pH	Temp, °C	% Moisture	% TS	Composition of solid matters		Total Alkalinity mg/l
					% VS	% FS	
02			88.54	11.46	32.74	67.26	
03			91.7	8.3	38.14	61.86	
04			91.84	8.16	34.25	65.75	
07			92.52	7.48	34.51	65.49	
16			87.01	12.99	34.79	65.21	
18			91.21	8.79	37.62	62.38	
19			91.85	8.15	41.76	58.24	
25			89.73	10.27	33.56	66.44	

3. Sample drawn from Compartment No. 3

Date	pH	Temp, °C	% Moisture	% TS	Composition of solid matters		Total Alkalinity mg/l
					% VS	% FS	
02			88.28	11.72	25.22	74.78	

03			92.65	7.35	36.70	63.30	
04			92.66	7.34	33.67	66.33	
07			91.88	8.12	36.73	63.27	
16			92.24	7.76	45.65	54.35	
18			91.11	8.89	33.84	66.16	
19			92.16	7.84	37.45	62.55	
25			91.48	8.52	34.32	65.68	

4. Sample drawn from Compartment No. 4

Date	**pH**	**Temp, °C**	**% Moisture**	**% TS**	**Composition of solid matters**		**Total Alkalinity, mg/l**
					% VS	**% FS**	
02			91.43	8.57	43.49	56.51	
03			95.83	4.17	32.79	67.21	
04					34.05	65.95	
07					41.79	58.21	
16			91.73	8.27	42.72	57.28	
18			90.98	9.02	40.61	59.39	
19			91.00	9.00	40.63	59.37	
25			91.04	8.96	37.88	62.12	

IV. GENERATION OF BIOGAS

Date	**Volume, m^3/d**	**Composition**	
		% CO_2	**% H_2S**
01	45.750	-	-
02	43.750	-	-
03	39.500	-	-
04	20.000	-	-
05	28.150	-	-
06	30.250	-	-
07	32.500	-	-
08	41.750	-	-
09	25.750	-	-
10	27.500	-	-
11	20.500	-	-
12	19.000	-	-
13	18.000	-	-
14	19.250	-	-
15	17.500	-	-
16	17.000	-	-
17	20.000	-	-
18	17.500	-	-
19	15.000	-	-
20	21.000	-	-
21	21.125	-	-
22	21.000	-	-
23	23.00	-	-
24	18.250	-	-
25	23.750	-	-
26	23.500	-	-
27	17.500	-	-
28	24.250	-	-
29	23.750	-	-
30	24.000	-	-