O & M MANUAL

FOOD WASTE BASED BIOGAS PLANT

CAPACITY: 10 KG /DAY

AT

MIT ALANDI .

						BY: HYDRO-BIOTECH SYSTEMS. PUNE
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						TITLE: O & M MANUAL
00	10.02.16	ST	FIRST ISSUE		MMK	BIOGAS PLANT
REV	DATE	BY	DESCRIPTION	APP	NAME	

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A BIOGAS PLANT

I. WHAT IT IS AND HOW IT IS USEFUL

Bio fuels are renewable energy sources from living organisms. All biofuels are ultimately derived from plants, which use the sun's energy by converting it to chemical energy through photosynthesis. When organic matter decays, burns, or is eaten, this chemical energy is passed into the rest of the living world. In this sense, therefore, all life forms and their by-products and wastes are storehouses of solar energy ready to be converted into other usable forms of energy.

The kinds and forms of the by-products of the decay of organic matter depend on the conditions under which decay takes place. Decay (or decomposition) can be aerobic (with oxygen) or anaerobic (without oxygen). An example of anaerobic decomposition is the decay of organic matter under water in certain conditions in swamps. Aerobic decomposition yields such gases as hydrogen and ammonia. Anaerobic decomposition yields primarily methane gas and hydrogen sulfide. Both processes produce a certain amount of heat and both leave a solid residue that is useful for enriching the soil. People can take advantage of the decay processes to provide themselves with fertilizer and fuel. Composting is one way to use the aerobic decay process to produce fertilizer. And a methane digester or generator uses the anaerobic decay process to produce both fertilizer and fuel.

One difference between the fertilizers produced by these two methods is the availability of nitrogen. Nitrogen is an element that is essential to plant growth. As valuable as compost is, much of the nitrogen held in the original organic materials is lost to the air in the form of ammonia gas or dissolved in surface runoff in the form of nitrates. The nitrogen is thus not available to the plants.

In anaerobic decomposition the nitrogen is converted to ammonium ions. When the effluent (the solid residue of decomposition) is used as fertilizer, these ions affix themselves readily to soil particles. Thus more nitrogen is available top lands.
The combination of gases produced by anaerobic decomposition is often known as biogas. The principle component of biogas is methane, a colorless and odorless gas that burns very easily. When handled properly, biogas is an excellent fuel for cooking, lighting, and heating.

A biogas digester is the apparatus used to control anaerobic decomposition. In general, it consists of a sealed tank or pit that holds the organic material, and some means to collect the gases that are produced.

Many different shapes and styles of biogas plants have been experimented with: horizontal, vertical, cylindrical, cubic, and dome shaped. One design that has won much popularity, for reliable performance in many different countries is presented here. It is the Indian cylindrical pit design. In 1979 there were 50,000 such plants in use in India alone, 25,000 in Korea, and many more in Japan, the Philippines, Pakistan, Africa, and Latin America. There are two basic parts to the design: a tank that holds the slurry (a mixture of manure and water); and agas cap or drum on the tank to capture the gas released from the slurry. To get these parts to do their jobs, of course, requires provision for mixing the slurry, piping off the gas, drying the effluent, etc. In addition to the production of fuel and fertilizer, a digester becomes the receptacle for animal, human, and organic wastes. This removes from the environment possible breeding grounds for rodents, insects, and toxic bacteria, there by producing a healthier environment in which to live.

II. DECISION FACTORS

Applications: * Gas can be used for heating, lighting, and cooking.
* Gas can be used to run internal combustion engines with modifications.
* Effluent can be used for fertilizer.

Advantages: * Simple to build and operate.
* Virtually no maintenance--25-year digester lifespan.
* Design can be enlarged for community needs.
* Continuous feeding.
* Provides a sanitary means for the treatment of organic wastes.

Disadvantages: * Produces only enough gas for a family of six.
* Depends upon steady source of manure to fuel the digester on a daily basis.
* Methane can be dangerous. Safety precautions should be observed.

CONSIDERATIONS

Several other considerations are:

* The gas plant will produce 6-7 cubic meters of gas per day on the daily input from 100 kg waste food.

* The fermentation tank will have to hold approximately 7 cubic meters in a 1.5 X 3.4 meters deep cylinder.

* A gas cap to cover the tank should be 1.4 meters in diameter X 1.5 meters tall.

IV. PRECONSTRUCTION CONSIDERATIONS

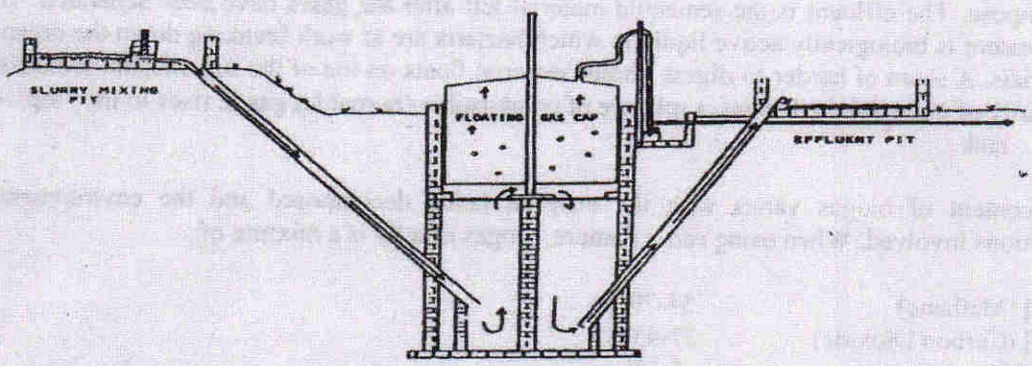


Figure 1. 3-Cubic Meter Biogas Digester

the design presented here <figure 1> is most useful for temperate or tropical climates. It is an 8-cubic meter plant that requires the equivalent of the daily wastes of 10-12 cattle. Other sizes are given for smaller and larger digester designs for comparison.

This digester is a continuous-feed (displacement) digester. Relatively small amounts of slurry (a mixture of manure and water) are added daily so that gas and fertilizer are produced continuously and predictably. The amount of manure fed daily into this digester is determined by the volume of the digester itself, divided over a period of 30-40 days. Thirty days is chosen as the minimum amount of time for sufficient bacterial action to take place to produce biogas and to destroy many of the toxic pathogens found in human wastes.

BY-PRODUCTS OF DIGESTION:

PROPERTIES		NATURE/USE
GAS	BIOGAS	COMBUSTIBLE GAS
FIBROUS	SCUM	INSULATOR
LIQUID	SUPERNATANT	BIOLOGICALLY ACTIVE
SOLID/LIQUID	EFFLUENT	FERTILIZER
SOLID	INORGANIC SOLIDS (Sand/Gravel)	

Table 1. Anaerobic Decomposition of Organic Material in Biogas Digesters

Table1.Show the various stages of decomposition and the forms of the material at each stage. The inorganic solids at the bottom of the tank are rocks, sand, gravel, or other items that will not decompose. The effluent is the semisolid material left after the gases have been separated. The supernatant is biologically active liquid in which bacteria are at work breaking down the organic materials. A scum of harder-to-digest fibrous material floats on top of the supernatant. It consists primarily of plant debris. Biogas, a mixture of combustible (burnable) gases, rises to the top of the tank.

The content of biogas varies with the material being decomposed and the environmental conditions involved. When using cattle manure, biogas usually is a mixture of:

[CH_4] (Methane)	54-70%
[CO_2] (Carbon Dioxide)	27-45%
[N_2] (Nitrogen)	5-3%
[H_2] (Hydrogen)	1-10%
[CO](Carbon Monoxide)	0-.1%
[O_2] (Oxygen)	0-.1%
[H_2S](Hydrogen Sulfide)	

Small amounts of trace elements, amines, and sulphur compounds.

The largest, and for fuel purposes the most important, part of biogas is methane. Pure methane is colorless and odorless. Spontaneous ignition of methane occurs when 4-15% of the gas mixes with air having an explosive pressure of between 90 and104 psi. The explosive pressure shows that biogas is very combustible and must be treated with care like any other kind of gas. Knowledge of this fact is important when planning the design, building, or using of a digester.

LOCATION

There are several points to keep in mind before actual construction of the digester begins. The most important consideration is the location of the digester. Some of the major points in deciding the location is:

* DO NOT dig the digester pit within 13 meters of a well or spring used for drinking water. If the water table is reached when digging, it will be necessary to cement the inside of the digester pit. This increases the initial expense of building the digester, but prevents contamination of the drinkingsupply.

* Try to locate the digester near the stable (see Figure 2) so excessive time is not spent transporting the manure. Remember, the fresher the manure, the more methane is produced as the final product and the fewer problems with biogas generation will occur. To simplify collection of manure, animals should be confined.

* Be sure there is enough space to construct the digester. A plant that produces 3 cubic meters of methane requires an area approximately 2 X 3 meters. If a larger plant is required, figure space needs accordingly.* Arrange to have water readily available for mixing with the manure.

* Plan for slurry storage. Although the gas plant itself takes up a very small area, the slurry should be stored either as is or dried. The slurry pits should be large and expandable.

* Plan for a site that is open and exposed to the sun. The digester operates best and gives better gas production at high temperatures (35[degrees] C or 85-100[degrees]F). The digester should receive little or no shade during the day.

* Locate the gas plant as close as possible to the point of gas consumption. This tends to reduce costs and pressure losses in piping the gas. Methane can be stored fairly close to the house as there are few flies or mosquitoes or odor associated with gas production.
Thus, the site variables are: away from the drinking water supply, in the sun, close to the source of the manure, close to a source of water, and close to the point where the gas will be used. If you have to choose among these factors, it is most important to keep the plant from contaminating your water supply. Next, as much sun as possible is important for the proper operation of the digester. The other variables are largely a matter of convenience and cost: transporting the manure and the water, piping the gas to the point of use, and so on.

HEATING AND INSULATING DIGESTERS

To reach optimum operating temperatures (30-37[degrees]C or 85-100[degrees]F), some measures must be taken to insulate the digester, especially in high altitudes or cold climates. Straw or shredded tree bark can be used around the outside of the digester to provide insulation. Other forms of heating can also be used such as solar water heaters or the burning of some of the methane produced by the digester to heat water that is circulated through copper coils on the inside of the digester. Solar or gas heating will add to the cost of the digester, but in cold climates it may be necessary.

PREPARE THE MIXING AND EFFLUENT TANKS

* Build or improvise a mixing tank to be placed near the outside opening of the inlet pipe. Likewise, provide a container at the outlet to catch the effluent. Some provision may also be made for drying the effluent as the plant goes into full production.

SYSTEM DESCRIPTION

The Principle:
The segregated waste food is brought to the plant site in bins and containers. It is loaded on a sorting platform and residual undesirable portion if any is further segregated.

Pre –Conditioning of Waste:

This segregated waste is loaded in to a **loading table.** This waste will be fed in to **Crusher** along with water with 1:1 proportion so that homogenous slurry of the waste will be formed.
This slurry will be transferred to Primary Digester.

Pre Digester:

NisrgaRuna biogas technology works on the Tri phasic decomposition of waste.

First stage being a Hydrolysis, where micro organisms start breaking higher molecule organic chains in to smaller molecular chains which helps in to further decomposition.
After crushing, pulverized waste enters in to Pre digester where acidification step starts where mesophlic aerobic bacteria convert organic feed material in to various organic acids. These bacteria being a mesophlic type, higher temperature will help in their better functioning. To achieve this, hot water generated by solar water heaters/ or other appliances (by client) will be added in this tank.
To keep the required aerobic environment, air supply by means of air compressor & aeration grid will be provided in this tank.

Secondary Digester:

This is the main digester where methane producing bacteria does the main job to convert organic acids formed in the pre digester in to Methane, CO2, H2O, H2S & digested sludge along with new bacteria.
Biogas is a combination of Methane, CO2, H2S & water vapors.
However in the Nicaraguan technology, due to aerobic activities, sulphates present in the waste get converted to stable sulphate compounds hence H2S formation is somewhat less as compared to conventional single reactor Biogas systems.
Supernatant or overflow from the Secondary digester will be collected in the Outlet chamber from where it will be fed to Manure Pits for dewatering of sludge which will be atmospherically dried & can be used as manure.
The biogas is collected in a floating dome or Gas holder which kept above the secondary digester. To avoid the escape of gas from this secondary digester, water seal (jacket) arrangement will be provided around this dome.
Collected Bio gas will be transferred by means of gravity to the utilization points.
For plant safety, at required points in Gas pipe line, flame arrestors will be provided. Biogas utilization system comprises of biogas piping and biogas burners.

OUTPUT AND PRESSURE

The gas cap drum floating on the slurry creates a steady pressure on the gas at all times. This pressure is somewhat lower than that usually associated with other gases that are under pressure but is sufficient for cooking and lighting.

Table 3. On the following page, shows gas consumption by liters/hour.

1	2	3(*)
Gas cooking	2" diameter burner	280
	4" diameter burner	395
	4" diameter burner	395
Gas lighting	1 mantle lamps	78
	2 mantle lamps	155
	3 mantle lamps	190
Refrigerator	18" X 18" X 12"	78
Running engines	Converted diesel	350-550 hp/hr

(*)Liters/hour

Note: These figures will vary slightly depending on the design of the appliance used, the methane content of the gas, the gas delivery pressure, etc.

Table 3. Application Specification for Gas Consumption

VI. VARIOUS APPLICATIONS OF BIOGAS AND DIGESTER BY-PRODUCTS ENGINES

Internal Combustion

Any internal combustion engine (*) can be adapted to use methane. For gasoline engines, drill a hole in the carburetor just near the choke and introduce a 5mm diameter tube connected to the gas supply through a control valve. The engine may be started on gasoline then switched over to methane while running, or vice-versa. For smooth running of the engine, the gas flow should be steady. For stationary engines this is done by counterbalancing the gas cap. (Refer to Table 3 on page 8 for gas consumption).

Diesel

Diesel engines are run by connecting the gas to the air intake and closing the diesel oil feed. A spark plug will have to be placed where the injector normally is and arrangement made for electricity and spark timing. Modifications will vary with the make of the engine. One suggestion is to adapt the full-pump mechanism for timing the spark. Some authorities recommend that when running the internal combustion engines, the gas be first purified. This is done by bubbling it through lime water, to remove carbon dioxide, and through iron filings, to remove hydrogen sulphide.

Fertilizer

The sludge product of anaerobic decomposition produces a better fertilizer and soil conditioner than either composted or fresh manure. The liquid effluent contains many elements essential to plant life: nitrogen, phosphorous, potassium, plus small amounts of metallic salts indispensable for plant growth.

Methods of applying this fertilizer are numerous and conflicting. The effluent can be applied to crops as either a diluted liquid or in a dried form. Remember that although 90-93% of toxic pathogens found in raw human manure are killed by anaerobic decomposition, there is still a danger of soil contamination with its use. The effluent should be composted before use if the slurry contains a high proportion of human waste. However, when all factors are considered, the effluent is much safer than raw sewage, poses less of a health problem, and is a better fertilizer.

The continued use of the effluent in one area tends to make soils acidic unless it is diluted with water (3 parts water to1 part effluent is considered a safe mixture). A little dolomite or crushed limestone added to the effluent containers at regular intervals will cut down on acidity. Unfortunately, limestone tends to evaporate ammonia; so it is generally best to keep close watch over the amount of effluent provided to crops until the reaction of the soil and crops is certain.

Improvised Stove
Because gas pressure is low, it will be necessary to modify existing equipment or build special burners for cooking and heating. A pressure stove burner will work satisfactorily only after certain modifications are made to the burner. The needle-thin jet should be enlarged to 1.5mm. To make a burner out of 1.5cm water pipe, choke the pipe with a metal disc having a center hole with a diameter of 1.5 to 2mm. An efficient burner is a tin can, filled with stones for balance, having six1.5mm holes in the top. The gas enters through a pipe choked to a 2mm orifice. Or fill a Chula or Lorena stove with stones and insert a pipe choked to a 2mm orifice. If possible, it is best to use a burner with an adjustable air inlet control. The addition or subtraction of air to the gas creates a hotter flame with better use of available gas.

Lighting
Methane gives a soft, white light when burned with an incandescent mantle. It is not quite as bright and glaring as a kerosene lantern. Lamps of various styles and sizes are manufactured in India specifically for use with methane <See image>. Each mantle burns about as bright as a 40-watt electric bulb.

Some biogas appliances manufactured by an Indian firm are:

* Indoor hanging lamp
* Indoor suspension lamp
* Outdoor hanging lamp
* Indoor table lamp
* Stoves and burners
* Bottle siphons and pressure gauges

VII. MAINTENANCE
A digester of this type is virtually maintenance free and has a life of approximately 25 years. As

long as cow or other animal manure is used, there should be no problems. Vegetable matter can also be used for methane production but the process is much more complex.

- The biogas plant should be installed in clean place.
- The air is removed from the gasholder and pipes before use.
- Prevent gas leakage and pipe leakage. Leaks can detect by putting soap py water over suspected leaks (often at joints). If bubbles appear then it is certain that there is leak.
- The biogas should burn with blue flame.
- The stretch of gas pipe between biogas plant and stove should be straight. If there is any slack in the pipe, the water would accumulate and block the movement of gas. Before disconnecting the pipe close the gas knock and remove the water.
- Gasholder should be rotated daily.
- Recycling of slurry: The principle is to add a little of the old slurry to the fresh slurry in order to seed it with bacteria. Not enough research has been done on this, but it appears that approximately for every 100 liters of fresh slurry about 2 liters of old slurry can be added. This will speed up and increase gas production.

A trouble-shooting guide is listed below for possible problems that may be encountered.

POSSIBLE TROUBLES

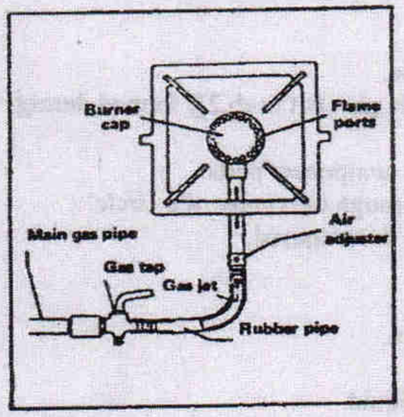
Defect	May be caused by	Remedy
No gas. Drum won't rise.	a) No bacteria	add some bacteria (seeder)
	b) Lack of time	Patience! Without bacteria, it may take four or five weeks
	C) Slurry too cold	Use warm water. Cover plant with plastic tent or use heating coil.
	d) Insufficient input	Add right amount of slurry daily.
	e) Leak in drum or pipe	Check seams, joints, and taps with soapy water.
	f) Hard scum on slurry blocking gas	Remove drum: clean locking slurry surface. With sliding-drum plants, turn drum slightly to break crust.
No gas at stove	a) Gas pipe blocked plenty in drum.	Open escape cock, by condensed water

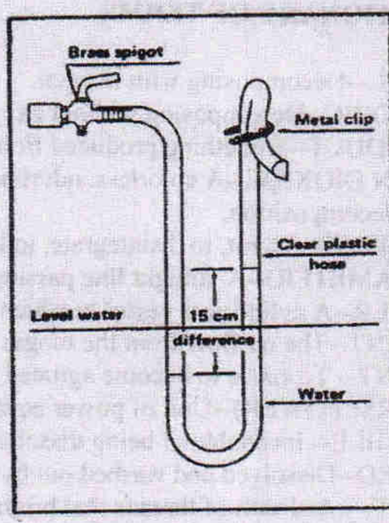
	b) Insufficient Increase	Increase weight on drum
	c) Gas inlet blocked by scum	Remove drum and clean inlet. Close all gas-taps. Fill gas line with water; apply pressure through moisture escape. Drain water.
Gas won't burn	a) Wrong kind is Slurry too thick or too thin being formed.	Measure accurately. Have patience.
	b) Air mixture	Check burner gas jet to make sure it is at least 1.5mm.
Flame soon dies	a) Insufficient Increase weight on drum. b) Water in line jar	Check moisture escape Drain gas line.
Flame begins far	c) Pressure too high	Remove weights from drum. Counterbalance
	d) Air mixture	Choke gas inlet at stove to 2mm (thickness of 1" long nail).

VIII. TEST GAS LINES FOR LEAKS

Checking for gas leaks is done by closing all gas taps including the main gas tap beside the gas holder, except for one. Then to the open tap, a clear plastic pipe about a meter long is attached, and a "U" is formed. The lower half of the "U" is filled with water. Using a pipe attached to a second tap, pressure is applied until the water in the two legs of the "U" is different by15cm. The second tap is then closed. The "U" is now what is called a "manometer."

If the water level out when the second tap is closed, a leak is indicated and can be sought out by putting soapy water over possible leaks, such as joints, in the pipe work. <See image>





OPERATIONAL INSTRUCTIONS

Do's

1. The non biodegradable materials like plastic bags, glass, metals etc should be sorted out prior to loading.
2. Check the pH once in a week with the help of pH paper. The pH should be in the range of 6.5 to 8.5. In case if it shows below 6.5, stop loading till pH improves to 7. In immediate actions on drop of pH: addition of alkali & complete recycling the same. Regular addition of urea, (.5kg per 100 kg) would help as the feed stock is deficient nitrogen.
3. Do keep a watch on the outlet of the fermenter. It is an indicator for removal of sludge from the bottom of the fermenter.
4. Do keep a watch on loading pattern. Consistency in quantity is the key smooth running of the plant.

Don'ts

1. Don't allow any unauthorized person to enter the plant premises.
2. Do not allow necked flame like smoking, burning match sticks etc in the plant premises.
3. Do not load the waste dry, add adequate quantity of water. Normal ratio should be 1:1 ratio.
4. Don't use hand or sticks or pipe to push down the waste in the sink, use only the plunger.
5. Don't overload the plant. Adhere to the schedule of loading thrusts preventing shock loading.
6. Don't load the plant if pH is below 6.

IX. DICTIONARY OF TERMS

AEROBIC--Decomposing with oxygen.
ANAEROBIC--Decomposing without oxygen.
BY-PRODUCT--Something produced from something else.
CARBON DIOXIDE--A colorless, odorless, incombustible gas ([CO.sub.2]) formed during organic decomposition.
DECOMPOSE--To rot, to disintegrate, to breakdown into component parts.
DIA (DIAMETER)--A straight line passing completely through the center of a circle.
DIGESTER--A cylindrical vessel in which substances are decomposed.
EFFLUENT--The outflow from the biogas storage tank.
FERMENT-- To cause to become agitated or turbulent.
HP (HORSEPOWER)--Unit of power equal to 747.7 watts.
INSOLUBLE-- Incapable of being dissolved.
LEACHED--Dissolved and washed out by a percolating liquid.
MANTLE- - A sheath of threads that brightly illuminates when heated by gas.
METHANE--An odorless, colorless, flammable gas ([CH.sub.4]) used as a fuel.
NITRATES--Fertilizers consisting of sodium and potassium nitrates.
NITROGEN--A colorless and odorless gas ([N.sub.2]) in fertilizers.
ORGANIC WASTES--Waste from living organisms or vegetable matter.
SCUM--A filmy layer of waste matter that forms on top of liquid.
SEEDER--Bacteria used to start the fermentation process.
SEPTIC TANK -- A sewage disposal tank in which a continuous flow of waste material is decomposed by anaerobic bacteria.
SLUDGE--A thick liquid composed of 1: 1: 1 mixture of manure, seeder, and water.
SUPERNATANT--Floating on the surface.
TOXIC PATHOGENS -- Harmful or deadly agents that cause serious disease or death.

OPERATION

Keep log of operations for at least the first six weeks, then periodically for several days every few months. This log will vary with the technology, but should include full requirements, outputs, duration of operation, training of operators, etc. Include special problems that may come up--a damper that won't close, gear that won't catch, procedures that don't seem to make sense to workers, etc.

MAINTENANCE

Maintenance records enable keeping track of where breakdowns occur most frequently and may suggest areas for improvement or strengthening weakness in the design. Furthermore, these records will give a good idea of how well the project is working out by accurately recording how much of the time it is working and how often it breaks down. Routine maintenance records should be kept for a minimum of six months to one year after the project goes into operation. <See report
2>

MAINTENANCE

Labor Account

Name	Hours & Date	Repair Done	Also down time Rate?	Pay?
1				
2				
3				
4				
5				
		Totals (by week or month)		

Materials Account

Item	Cost	Reason Replaced	Date	Comments
1				
2				
3				
4				
5				
Totals (by week or month)				

X. STEPS IN CASE OF EMERGENCY

1. PH value has fallen below 6.
Action: Stop loading the plant. Keeps the plant running in auto mode. If the PH improves in a day or two, commence loading. If it does not improve, switch off the plant and inform the supplier.

2. Any leakage in the gas pipeline is detected.
Action: Switch off the main switches and inform Maintenance Department and seal the leakage. Ensure no naked light in the vicinity of leak.

3. Overflow due to internal chocking of pipeline of the plant.
Action: Put the auto manual switch in manual position and ensure that pump is switched off. Detect the reason for overflow and remove the material obstructing the smooth passage in the pipeline. Test the plant by starting the pump in manual mode if everything is O.K.. put it in auto mode.

ERA HYDRO-BIOTECH ENERGY PVT. LTD.
Site Activity Report

Date: 20/11/2018
Project Site: MIT Alandi
Project Number: MIT Biogas Plant 20 KG/Day

Prepared by:- Parmeshwar

Subject: Biogas Plant Installation & testing

Sr.No	Description of activity	Start	Finish
1)	Biogas Plant Instaletain		
	workas is complites		
2)	Biogas testing workas		
	complites		
3)	Biogas comshning workas		
	combit Biogas birbarning		
	proparli Biogas testing is		
	complited		
*	Era Hydro Biotech Energy Pvt		
	Ltd Hereby Give the formal installation		
	completion of 20kg Biogas ~~plant~~		
	plant		
*	Now with this ownership of		
	the plant is transferred to the		
	client from Era Hydro Biotech		
	Energy Pvt Ltd		

Signatures: Era H.B.T
Parmeshwar Ladkat
20/11/18

Please provide pressure gauge.

P.N.Sutar
20/11/2018
Dr. P. N. Sutar

Era-Hydrobiotech Energy Pvt. Ltd. * Pune

MIT Academy of Engineering Alandi (D), Dist. Pune

ERA HYDRO-BIOTECH ENERGY PVT. LTD.
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	the plant is transferred to the		
	client from Era Hydro Biotech		
	Energy Pvt. Ltd		

Signatures: Era H.B.T Parmeshwar Ladkat

Era-Hydrobiotech Energy Pvt. Ltd. PUNE

MIT ACADEMY OF ENGINEERING ALANDI (D) DIST. PUNE

20/11/18

P.N. Sutar 20/11/2018
Dr. P. N. Sutar

Please provide pressure gauge.

7.1.3

AGREEMENT

This Agreement ("Agreement") is entered into for the period from 26th January 2018 to 26th December 2018

Between

MIT Academy of Engineering, Dehu Phata, Alandi, Pune – 412105, Maharashtra (herein after referred to as the "Institution") Party No.1

AND

SWaCH Pune Seva Sahakari Sanstha Maryadit, an autonomous fully owned cooperative of waste pickers in Pune which has its office at Old Kothrud Kachra depot, Paud Road, Kothrud, Pune - 411038 (herein after referred to as the "Party No. 2"). Party No.2

WHEREAS, the Institution Party No.1 is willing to donate the Electronic waste generated in their institution (as a part of Smart Campus Cloud Network project implemented by TERRE Policy Centre) by the staff, students and the Institution itself, to SWaCH Pune, Party No.2, in the period as mentioned above.

AND WHEREAS, the Institution requires professional services of a suitable agency to collect, recycle, and/or dispose of all Electronic waste, ("the said Wastes") resulting from the said Site on timely basis;

AND WHEREAS, Party No. 2 has assured the Institution, that it can ensure the provision of such services through regular tri-monthly collection or as and when the need be, in accordance with local, state and central regulations;

NOW THIS AGREEMENT WITNESSETH HEREAFTER

1. 1. The Party No. 2 hereby agrees to ensure that E-Waste generated in the premises of the Institution shall be sent for recycling / processing through authorised channels, at the address mentioned above for a period of 12 (Twelve) Months. The Institution shall receive a certificate in lieu of the E-Waste received by the Party No. 2.

1. 2. The logistics of bin placement, collection, transport etc. shall be conducted through the relevant handling service at such commercials as may be applicable.

2. 3. This agreement may be renewed for a subsequent term of 12 months or more by mutual consent in writing based on such consideration as may be agreed at the time of renewal. The parties may amend this agreement in writing.

3. 4. Notices: Any notice required or permitted to be given under this Agreement shall be in writing, shall be deemed duly given if delivered in person or if sent by registered Post, return receipt requested, on the address stated hereinabove.

4. 5. All disputes shall be referred to sole arbitration of the chief executive officer or director of the Party No. 2. Arbitration proceedings shall be governed by the Arbitration and Conciliation Act, 1996. Arbitration shall take place in Pune, Maharashtra, India in English.

5. 6. This agreement is subject to Indian Laws and any dispute arising out of the same shall be referred to the courts of appropriate jurisdiction within the city limits of Pune (Maharashtra, India) only.

IN WITNESS WHEREOF,

1. MIT Academy of Engineering, Dehu Phata, Alandi, Pune – 412105, Maharashtra (Party No.1) ____________

DIRECTOR
MIT Academy of Engineering
Alandi (D), Pune-412105.

2. SWaCH Cooperative (Party No.2) ____________