सं०: डब्ल्यू-11044/01/2012-सीआरएसपी(खंड-II)

भारत सरकार

पेयजल एवं स्वच्छता मंत्रालय

एनबीए प्रभाग

12वॉ तल, पर्यावरण भवन,
सीजीओ काम्प्लैक्स, लोधी रोड,
नई दिल्ली, 110003
दिनांक: 12.08.2014

सेवा में,

प्रधान सचिव/सचिव
ग्रामीण जलापूर्ति के प्रभारी, सभी राज्य/संघ राज्य क्षेत्र

विषय: डीआरडीओ बायो-डायजेस्टर शौचालयों के कार्यान्वयन के संबंध में।

महोदय/महोदया,

मुझे यह स्मरण कराने का निदेश हुआ है कि दिनांक 26.07.2012 को पेयजल एवं स्वच्छता मंत्रालय (एमडीडब्ल्यूएस) और रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) के बीच ''बायोडायजेस्टर/बायो टैंक शौचालयों के कार्यान्वयन'' पर एक एमओयू (समझौता ज्ञापन) पर हस्ताक्षर किया गया था ताकि ग्रामीण क्षेत्रों में स्वच्छता की सेवाएं उपलब्ध कराने में इस तकनीक के उपयोग का प्रसार किया जा सके। इस संबंध में लिए गए निम्नलिखित निर्णय राज्यों/सघ राज्य क्षेत्रों के सूचनार्थ प्रस्तुत हैं:-

1. राज्य को एक पूर्ण शौचालय इकाई के लिए बायोडायजेंसर टैंक और ऊपरी ढ़ांचा सहित डीआरडीओ मॉडल अपनाने अथवा केवल बायोडायजेस्टर टैंक और इंट मोरटार से बना ऊपरी ढांचा अपनाने की छूट दी जाए।

2. परियोजना के लिए निर्मिल भारत अभियान (एनबीए) के दिशा-निर्देश ही आधार हों, जिसमें एनबीए दिशा-निर्देशों के समान ही बायोडायजेस्टर शौचालयों के लिए भी उसी प्राकर का वित्तीय प्रोत्साहन शामिल हो। एनबीए के अंतर्गत निर्धारित तथा मनरेगा के अंतर्गत स्वीकृत लागत के अलावा अतिरिक्त लागत राज्य सरकारों द्वारा पूरा की जाए।

निम्नलिखित संलग्न हैं:

क. बायो-डायजेस्टर तकनीक पर एक टिप्पणी।

ख. बायो-डायजेस्टर और पारम्परिक सेप्टिक टैंक के बीच तुलनात्मक टिप्पणी।

ग. टीओटी धारकों की सूची.

भवदीय

(क्रिस्टीना कुजूर)

अवर सचिव (एनबीए)

संलग्नक: यथोक्त

प्रति:

I. राज्य समन्वयक, एनबीए, सभी राज्य/संघ राज्य क्षेत्र।

II. श्री लोकेन्द्र सिंह, निदेशक (तकनीकी) डीआरडीओ, डीआरडीओ भवन, नई दिल्ली-011-23017752

III. तकनीकी निदेशक, एनआईसी, एमडीडब्ल्यूएस-मंत्रालय की वैबसाइट पर डालने हेतु।

BIODIGESTER (GREEN TOILET) TECHNOLOGY FOR ECO-FRIENDLY DISPOSAL OF HUMAN WASTE UNDER DIFFERENT SITUATIONS

The major proportion of ill health in India can be attributed to lack of safe drinking water, poor sanitation and hygiene practices. Water pollution, the root cause of most of the water borne diseases, is caused by human waste. A number of diseases with high morbidity and mortality are wide spread in the communities specially living in unsuitable environmental conditions in urban slums and vast rural areas. The major diseases are diarrhoea, cholera, shigellosis, *E coli* diarrhoea, poliomyelitis, typhoid, viral hepatitis and dysentery. Of these, diarrhoeal diseases alone cause more than 6,00,000 deaths annually. Diseases caused by faeco-orally transmitted enteric pathogens account for 10% of total burden of disease in India. Statistics indicate that intestinal group of diseases claims about 5 million lives and about 50 million people suffer from these diseases every year. The situation is not different in most of the other developing countries.

The situation with respect to availability of toilets and waste treatment is very serious in the country. None of the cities,including metros, have complete sewage treatment system and waste is directly being discharged into the rivers. Most of the houses, which have toilets, discharge the liquid waste into open drains or into soak pits which contaminate the surface or underground drinking water sources. In the absence of central sewage system, septic tanks provide the partial solution to the problem but the application of technology on wider scale is restricted due to assorted reasons like unaffordable cost by poor people, space requirement and periodic evacuation. Current census data (2011) of the country revealed the shocking figures on sanitation in spite of developments in the areas of economy, education, communication, power, connectivity, housing and living standard. Only 46.9 % of the total 246.6 million households have toilet facilities. Of the rest, 3.2% use public toilets and 49.8% ease themselves in the open. Although, the role of culture and traditions cannot be denied for this grim situation, lack of education, awareness, money constraints and poor planning are the major contributing factors.

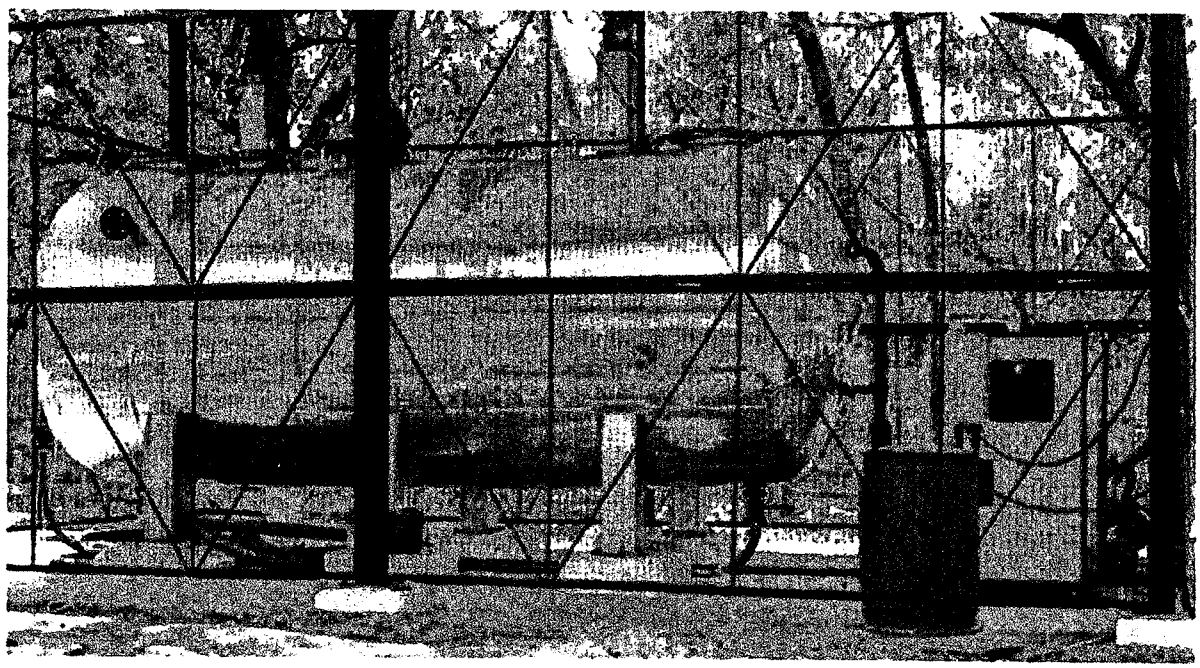
Why and how DRDO developed human waste disposal technologies

First and prime goal/ responsibility of DRDO is to develop the technologies for meeting the requirement of Armed Forces. However spin- off benefits are transferred to civil sector also. During 1984, when Indian Army positioned itself at Siachen Glacier, the problem of human waste disposal became a serious issue due to prevailing subzero ambient temperature (-30 to -50^{0}c). Such a low temperature does not allow natural microbial decompositon of waste which continues accumulating throughout the ice layers and risks the soldier's health as ice being the single drinking water source for him beside aesthetic nuisance. Various options were experimented by Indian Army based on suggestions by institutions/ agencies like chemical

treatment and incineration but being practically unsuccessful, the task of biodegradation was assigned to DRDE Gwalior. In the absence of any prevalent (national /international) technology DRDO developed BIODIGESTER TECHNOLOGY for application in low temperature high altitude areas that was subsequently modified and expanded to plains and mobile systems.

Anaerobic microbial consortium

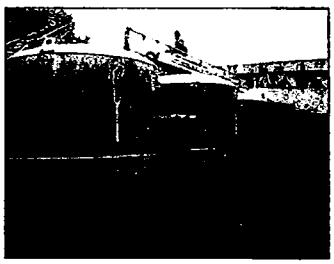
Anaerobic microbial consortium has been developed by acclimatization of slurry of biogas plants operating at low temperature areas and further modified by incorporating the bacteria isolated from Antarctica, Siachen and other emote high altitude locations. The microbial consortium (inoculums) works in a wide temperature range (5-50 ⍰C), resist temperature fluctuation, freezing-thawing and also tolerate the limited quantity of antiseptics. The mother culture is being maintained at DRDE Gwalior by operating two reactors, one of size 14 m^3 and another of 75 m^3.

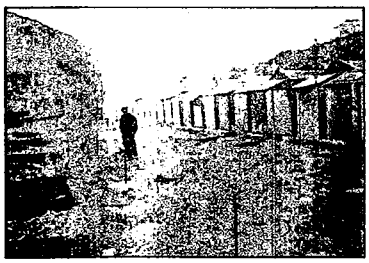


Biodigesters for soil bound high altitude regions

Metal/FRP digesters have been made for snow bound areas like Leh, kargil and Drasswhich bear the temperature in the range of 0 to -50 ⍰C. These areas are not permanently covered by ice and experience snow during the winter only. These biodigesters are of cylindrical shape, incorporate immobilization matrix and does not require any heating device. The biodigesters are installed underground and charges only initially with the bacterial consortium. The main

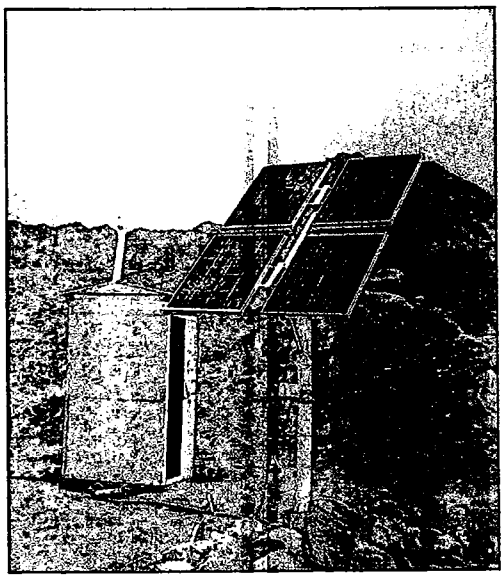
tank is connected to existing toilets. The one m^3 digesters can treat the waste of 20-25 personnel whereas, 2 m^3 size biodigester is suitable for use of 50-60 personnel. Alternative models with pre-fabricated shelters containing toilets (4 Nos.) on the top of main tank overcome the problems of freezing of inlet pipe during the winter. A large number of biodigesters have been installed in Leh, Kargil, Drass, Sikkim, Arunachal Pradesh, etc.





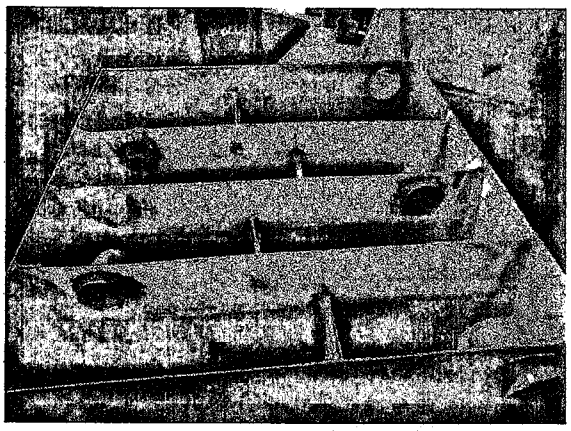
Biodigesters for Glaciers

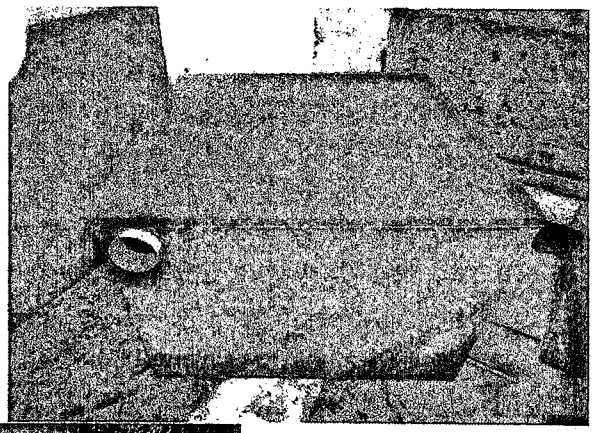
These areas have thick layer of ice throughout the years and the temperature varies from -30 to -50 ⍰C. The biodigesters have been made of stainless steel (SS) and insulated with thick layer of PUF to retain the desired heat. The heating is provided by using 4 nos of solar panels (75 W each), oil immersed heaters and a thermostat. These systems have inbuilt toilet seat (one no) and the shelter. The technology has been proven in North and Southern Glacier as well as in other parts of Jammu and Kashmir.



Biodigesters for plain areas

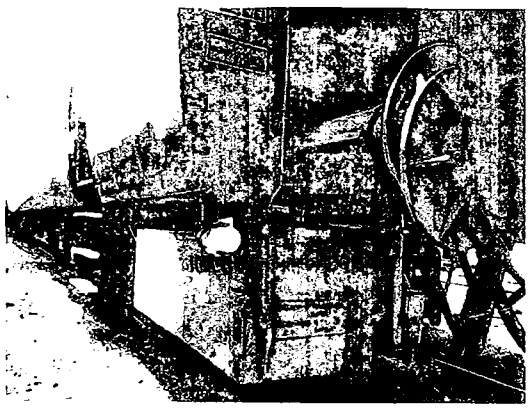
Metal and FRP based digesters have been made of assorted sizes (0.5-2.0m^3) and are of rectangular and cylindrical shapes. The design involves longer path by providing partitions, immobilization matrix and chemical treatment, if required. Such systems have been installed at Lakshadweep, Gwalior, Gurgaon, Delhi, Sagar and other places.

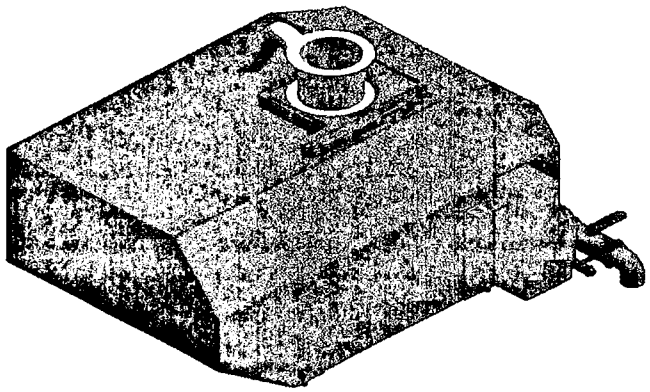




Biodigesters for Indian Railways

At the request of RDSO, Lucknow the task was undertaken during 2006 as a spin-off of high altitude technology using the above mentioned microbial consortium. The technology was modified to cope up the limited space available beneath the coaches. Thus, SS made biodigesters involve more number of compartments, higher volume of immobilization matrix, sludge settling device and chlorine treatment. Consequent upon MOU signed with railway ministry, different versions have been made to take care of public nuisance of throwing bottles and other non-biodegradable materials in the digester. Such biodigesters have been extensively subjected to field trials in different trains and different types of coaches. Finally, Indian railway has installed 100s of biodigesters and has planned for thousands for next financial year.





Bio-Tank System

The present biodigesters involve fabrication of main tank either of mild steel or FRP from industry and its transportation to the place of installation. As an alternative to overcome the cost of industry and transportation and to have longer life, a modified septic tank technology (**Bio-Tank**) has been developed. Bio-Tank construction is done at the site of its use by any local mason. It is *initially charged with anaerobic microbial consortium* (only once) and put up for use like any other septic tank. The Bio tank is also having the special designs for the microbial attachments. Number of benefits of this technology over conventional septic tank system can be enumerated as follows:

- Design wise, it is a simple rectangular tank having 1 to 4 partitions (lengthwise or breadth wise) keeping in mind of the treatments of various uses i.e., human waste &/or bathroom water &/or kitchen water. Construction is also very simple.
- The size of the Bio-Tank is approximately $1/3^{rd}$ of conventional septic tank and hence, material cost and space requirement for building the Biotank will be lower as compared to septic tank.
- Bio-Tank can be customized for use, either for single house or multistoried complexes.
- The technology works at wide range of temperature
- No need to evacuate the tank, which is required for conventional septic tank at periodic intervals.
- Comparatively, very little quantity of H_2S is produced as compared to septic tank.
- Toilet cleaning by routine cleansing agent in nominal quantity is permitted.
- If large number of toilets are connected, sufficient biogas can be generated, which can be used as an alternate energy source.
- Finally, the Bio-Tanks are maintenance free installations.

The alternative system also includes natural reed bed system to perform secondary treatment of the wastewater that is coming out of the biotank. The reed bed system comprises of bed of sand and pebbles along with reed plants capable of natural amelioration of the wastewater that

is coming out of the digester tank by *totally reducing smell, suspended particulates, pathogenic microorganisms (more than 99% of pathogens (disease causing bacteria)) and agents causing sudden nutrient enrichment &/or pollution* to the water bodies (eutrophication). BioTank cum Reed bed system is also used to treat the wastewater of kitchen and bathroom.

Natural reed plants-microbial consortium work efficiently at *wide range of temperature and effluent is very safe to discharge into environment* and may be used for irrigation purposes.

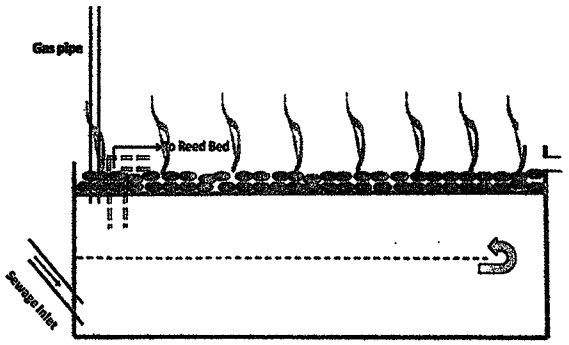
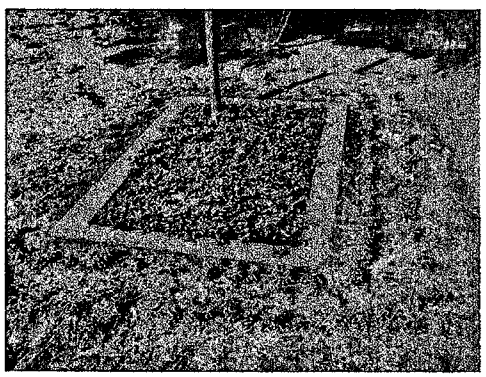


Fig: BioTank cum Reed Bed system: in this fig., biotank is horizontally separated by an incomplete partition wall. The water from the biotank, (after travelling the long path) is released into reed bed. The water from the reed bed may be stored to a tank for further use or may be released directly to the agro fields for irrigation.



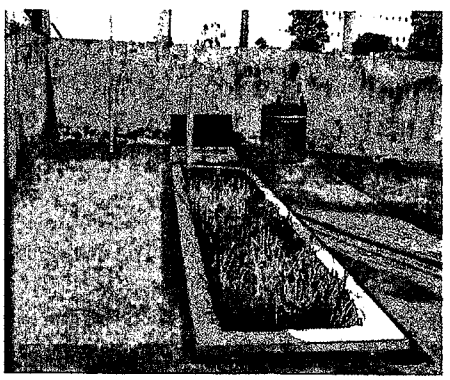


Fig.BioTank cum Reed Bed systems functioning at Defence Research Laboratory, DRDO, Tezpur, Assam

COMPARISON BETWEEN BIODIGESTER & CONVENTIONAL SEPTIC TANK

SEPTIC TANK:

The Septic Tank is a device commonly used in areas with no connection to main sewage pipes provided by local governments or private corporations. The term "septic" refers to the anaerobic bacterial environment that develops in the tank which decomposes or mineralizes the waste discharged into the tank. A septic tank generally consists of a tank (or sometimes more than one tank) of between 4000 and 7500 liters in size connected to an inlet wastewater pipe at one end and a septic drain field at the other. Today, the design of the tank usually incorporates two chambers (each of which is equipped with a manhole cover), which are separated by means of a dividing wall that has openings located about midway between the floor and roof of the tank. Waste water enters the first chamber of the tank, allowing solids to settle and scum to float.

The settled solids are anaerobically digested, reducing the volume of solids. The liquid component flows through the dividing wall into the second chamber, where further settlement takes place, with the excess liquid then draining in a relatively clear condition from the outlet. Waste that is not decomposed by the anaerobic digestion eventually has to be removed from the septic tank, or else the septic tank fills up and undecomposed wastewater discharges directly to the drainage field. Not only is this bad for the environment but, if the sludge overflows the septic tank into the leach field, it may clog the leach field piping or decrease the soil porosity itself, requiring expensive repairs. How often the septic tank has to be emptied depends on the volume of the tank relative to the input of solids, the amount of indigestible solids, and the ambient temperature (as anaerobic digestion occurs more efficiently at higher temperatures).

The main problem with septic tank is that bacterial fermentation of the waste is not complete as the process is neither completely aerobic nor completely anaerobic. In such situation, only facultative type of bacteria do the job resulting into large quantity of sludge and H_2S gas which is foul smelling. Sludge has to be removed which smells badly at the place of disposal.

BIODIGESTER:

To overcome the problems of septic tank, biodigester technology have been developed which employs anaerobic microbial consortium that performs fermentation under anaerobic conditions in anoxic environment provided in the tank. Being completely anaerobic process the process of organic matter biodegradation is almost complete (99%) and there is hardly any sludge generation or H_2S production.

The biodigester is readymade device (fermenter) made of mild steel / FRP / LDPE. This is a closed container and only treated effluent comes out of the outlet besides biogas coming out of the gas pipe.

It is composed of 2 components – (i) The anaerobic microbial consortium which is formulated from group of bacteria that are very efficient to perform the bio-degradation of the human waste in wide range of temperature and in presence of toxic chemicals. (ii) The vessel in which fermentation is carried out with the help of bacteria is called bio-digester.
The bio-digester is the device in form of a container (rectangular / circular) made of FRP / SS / Mild Steel / Concrete / Plastic etc. which carries out the fermentation of the human waste under anaerobic conditions employing the anaerobic microbial consortium (seeding material). It is connected to the existing toilets or can be housed below the toilet pan to save the space. The designing varies with the place of application like insulated / non-insulated, single user / multiple users, quantity of water used. It is only initially charged with the seeding material (microbial consortium / anaerobic microbial consortium / bacteria / inoculum) which continues multiplying with the usage of toilet. Whatever quantity of bacteria is passed out in effluent the same quantity is maintained in the tank due to multiplication of bacteria.

The immobilization material (PVC) is provided in the main tank which provides attachment site for the bacteria so they are maintained in higher numbers and there is no wash out. Thus enhancing the rate of fermentation of waste. The process inactivates pathogens (disease causing microbes) also.

Comparison of Size of Septic Tank with Biodigester

S. No.	No. of Users	*Volume of Septic Tank (m^3)	Volume of Biodigester (m^3)
1	5	1.12	0.7
2	10	1.8	1.2
3	15	2.34	1.7
4	20	3.28	2.3
5	50	10	6
6	100	19.87	9
7	150	30	12
8	200	39.6	14
9	300	60	17

*Volume of septic tanks is based on the assumption that tanks are cleaned annually. Larger sized tanks are required if tanks are to be cleaned at 'longer durations'

There are following advantages of biodigester technology over conventional septic tanks tank:

i. **Space requirements:** Size of biodigester for fixed number of users is lower than the size of conventional septic tanks, so they can be installed in space constrained areas also tank (please refer table above).

ii. **Cost:** The installation cost of biodigester will always be lower than conventional tank (please refer table above). Further biodigester does not require any cleaning hence there is no recurring cost as against septic tank.
IHHL: For 5-7 persons, the size of Bio digester varies in the range of 700 litres to 1000 litres. Depending on the material used for construction, the approximate cost of Bio digester (sub structure) will be

(a) Rs.15, 000/- for Pre-fabricated structure (FRP/HDP) of volume 700 litres
(b) Rs.12, 000/- for Cement and Brick structure of volume 1000 litres and
(c) Rs.10, 000/- for Pre cast cement structure of volume 1000 litres.

The actual cost can be obtained directly from industries (ToT holders) to which DRDO has transferred the technology (list enclosed).

iii. **Quality of effluent:** Effluent quality of biodigester is much better than the conventional septic tank in terms of BOD, COD, Colour, Pathogenicity, Smell, etc.

iv. **Use of Toilet cleaning agents:** Use of cleaning agents (in justified quantity) is permitted in biodigester but not recommended in septic tank.

v. **Effluent Gas:** The gas coming out of septic tank is mainly CO_2 and H_2S whereas from biodigester is biogas composed of mainly CO_2 and Methane. The biogas can be used as energy source whereas gas of septic tank foul smells and only adds to the pollution.

vi. **Installation:** The biodigester can be installed in any geoclimatic locations in the country where as septic tank has a limitation for place of installation.

vii. **Eco-friendly:** The dischargefrom the septic tank (gas, sludge and liquid) adds to the environmental pollution as waste material, whereas effluent liquid and gas from biodigestercan be used for irrigation and energy purposes, respectively.

viii. **Maintenance:** The biodigesters once installed do not require cleaning or any other maintenance whereas septic tanks require regular cleaning which in most of the cases is manual and unethical.

SNo	Name and Address of Firms	Contact Details
9.	CBS Technologies Pvt. Ltd. 48-C, Pocket-C (HIG) SFS Flats, SFS Flots, MayurVihar, Phase-III, **Delhi** – 110096.	Shri Sanjay K. Agarwal, GMD **Mob.** 09350536534 **Tel. No.:** 011 – 23524833, 22613408 **Fax No.:** 011 – 22360733, 22613362 **Mobile:** 9350536534 Email: cbs.director1@gmail.com; cbstechnologment.com; cbsenergy@gmail.com **Web:** www.cbsenergy.com
10.	Rail Tech 5625, Qutab Road, **New Delhi** -110055	**CP :** Mr. Kunal Jain **Mob:** 9810499839 **Ph:** 011-23610733/23524833 **Fax:** 23610733 **Email:**kunal.jain@railtechnindia.com; railtech@railtechindia.com **Web:** www.railtechindia.com
11.	Pushpa Enterprises, A-5/24 Pashcim Vihar **New Delhi** – 110063.	**CP:** G.C. Gupta (Proprieter) **Ph:** 011-25286550 **Mobile:**9312173313,9811012792, 9811012793 **Email:**sanju5sanam@yahoo.co.in
12.	Samudra Shipyard (P) Ltd., PB No. 10 Chemical Industrial Estate, **Aroor–688534**(Kerala)	**CP:** Dr. SudhakaranJeevan, (Chairman & CEO) **Phone:** 4782874027, 2873927, 2875279 **Fax:**0478-2872942, 2873466
13.	Alfa System & Services, E-19-C, Sector 8,**Noida-** 201301 UP	**CP:** MrAdhirKhanna **Phone:** 0120-4574871-74 **Mob:**9810149545 **Fax** : 0120-4574873 **Email:** alfa@alfaairtech.com **Web:** www.alfaairtech.com
14.	Shree Ram Raja Wood Packers, 905-906, Silver, Estate, University Road, **Gwalior**-474009	**CP:** Mr Mahesh Agrawal , Proprieter **Mob** : 9301107052; 9229204910 **Fax:** 0751-4011811
15.	Go Green Solution Pvt., Ltd., 1. Samarth Nagar (w), Ajni Sq., Wardha Road, **Nagpur** – 15.	**CP: Mr. SatishRehpade** **Tel. No:** 0712–2250021 **Fax:** 0712–2252597 **Mob.:** 09975032331 **E-Mail:** info@gogreensol.com **Web site:** www.gogreensol.com

List of the TOT holders for Stationery Bio-digester (Plain Areas)

SNo	Name and Address of Firms	Contact Details
1.	HindustanMetal Industries Sh RadheshBjawan, OppShujabadBhawan, NaiSarak, **Gwalior**-474001	**CP:**Mr Ashok K. Hayaran, GM **Ph:** 0751-2627140, 2627295 **Fax:** 0751-2327492 **Email:** hmlgwr@sancharnet.in
2.	Flotech Engineering and Trading Services 47, SunkadaKatte, Magadi Road, **Bangalore**	**CP:**Mr M.C. Shyamsukha, CE
3.	Alfa Therm Limited 6, Community Centre, Mayapuri, Phase-I, **New Delhi** – 110064	**CP:** MrHarjot Singh Chatha **Tel. No:** 011-28115222, 28116222 **Mob:** 9810060029 **Fax No.:** 011-28115396 **Email.:** alfatherm@vsnl.com; harjot@alfatherm.in
4.	S.B. Equipments 309 Durga Chambers, 1333 D.B. Gupta Road, Karol Bagh **New Delhi** – 110005	**CP:** Kamal Goyal **Tel. No.:** 011-28754365/ 8905 **Mob:** 9891088850 **Fax:**011-22485572 **Email:** gylkamal@rediffmail.com;sbequipment@rediffmail.com
5.	Mohan Rail Components (P) Ltd., Opp. Rail Coach Factory, Hussainpur,**Kapurthala**– 144602	**CP :** Amandeep Singh (Dir-Operations) **Tel. No.:** 01822– 506763; **Fax No.:** 01822–227311 **Mob.:** 09876740403 **Email:** aman@mrcpl.com **Web:**http://mrcpl.com
6.	Thakar Equipment Company 66, Okhla Industrial Estate, (Phase-II), **New Delhi** –20	**CP:** Madhu S Thakar **Tel. No.** 011-26847280, 26820723 **Mob:** 9810078028 **Fax No.** 011-26827232 **Email:** admin@thakareqpt.com; msthakar@airtelmail.in **Web:** www.thakareqpt.com
7.	Omax Autos Limited Plot No.-26, (4 Bays), Institutional Area, Sector-32,F **Gurgaon** – 122001 (HR).	**Ph.** 0124-403250505 **Fax No.:** 0124-2580016/ 4032506
8.	Escorts Limited , 11, Scindia House, Connaught Circus, **New Delhi** -110001.	**CP:** Vinod Mishra **Tel. No.:** 011-2293235, 4193235, 2284623 **Fax No.:** 0129-2232148, 2283069 **Mob.:** 09818845516, 09650544611

SNo	Name and Address of Firms	Contact Details
16.	Anjana Steel Industries Pvt., Ltd., Dhirganga More, NH-2 Delhi Road, Baidyabati, **Distt.-Hoogly (WB)**	**CP:**MrPawanDhanuka CEO **Phone:** 033-22264688/89/90 : 033-26324103 **Fax:** 033 4006 2785 **Email:** advd@adelectrosteel.net
17.	E-Pack Polymers, 2584 Rohatgi Mansion, 2nd Floor, Hamilton Road, **Delhi**-110006	**CP:** Col Harpreet Singh Sethi **Ph:** 011 23916882 **Fax:** 011 23953687 **Mobile:** 9818666038
18.	Super Flow Engg. Corp., Parking No.1, Transport Nagar, **Gwalior**	**CP:**Baljeet Singh Rana, **Ph:** 0751-4070318 **Fax:** 0751-4076318 **Mob:** 9827008027, 9229231711 **Email:** superflow97@gmail.com **Web:** www.sfecorporation.com
19.	MaanEnviro Technologies, Plot No.38-39 MangalmurtiNaulakha Sq. Nemawar Road, **Indore**	**CP:** Manish Goyal, CEO **Ph:** 0731-2405888 **Mob:**9425937636;9406622388 **Email:** info@maanenviro.com
20.	Banka Enterprises A-111, Express Apartment, Lakdi-Ka-Pool, **Hyderabad** – 500004.	**CP:**Mrs. Namita Banka **Fax. No.** : 040-66688028 **Mobile:** 09246880060
21.	Besco Limited (Foundry Division) 7th Floor, Poonam, 5/2 Russel Street, **Kolkata** – 700071	**CP:** V S Pandey, AGM (Marketing) **Ph:** 033-23766421; 033-22276784, 22263964 **Mob:** 9899125178 **Email::** besco_limited@hotmail.com **Fax:** 033-22261406
22.	Arkin Creations Pvt Ltd H-127, Ist Floor, Residency Greens, Greenwood City, South City-1, Gurgaon-122001	**CP:** ShManojJha, MD **Ph:**09650682111, **Mob:**09818432020 **Email:**arkincreations@gmail.com **Web:** www.arkin.org.in
23.	Real India LifetechPvt Ltd Vasantha Chambers, Pent House, 5-10-173, FtehMaidan Road, Basheerbagh, Hyderabad	**CP:** DrShesheer Kumar, Director **Mob:** 9704567315
24.	Vibhu Composite Works Yamuna Nagar-135001 (Haryana)	**CP:** MrVivek Gupta, MD **Mob:** 9812021442
25.	SVK Green Tech Pvt Ltd B-121, Green Avenue, Sector-71, Noida-201303	**CP:** MrPrashant Kumar, Director **Ph:** 0120-2484101-105 **Fax:** 0120-2484107 **Mob:** 9811041529

SNo	Name and Address of Firms	Contact Details
26.	BSA Corporation Limited, Gat No. 2329, A/1, S No279,281,287, Wagholi, **Pune**, Maharashtra-412207	**CP:** MrBalasahebKadam, MD **Mob:** 9890186671, 9011080601
27.	Century Pharmaceuticals Ltd 406, World Trade Center, Sayajiganj, **Vadodara**- 390005	**CP:** MrJanak Seth, MD **Ph:** 0265-2361581/ 2361978/2362509 **Fax:** 0265-2226023
28.	Srikar Organics India Ltd Plot No 24, Near Chandamama hospital, Raghavendra Nagar, Nacharam, **Hyderabad**	**CP:** DrLingaSrinivasaRao, Chairman & MD **Ph:** 08008801951, 08008001858
29.	Eram Scientific Solutions (P) Ltd TC 9/1615, SRHM Road, Sasthamangalam, **Trivandrum**-695010	**CP:** Mr MS vinod, Exec. Director **Ph:** 0471-4062125 **Mob:** 9947122277
30.	SujayEnvirotech India Pvt Ltd C-840, Sumati Apartment, Near Shaniwarwada, ShaniwarPeth, **Pune**-30	**CP:** MrJayeshKantilalPhulphagar, MD **Mob:** 9011014444
31.	Mars Equipments Limited, India 28-A, VidhanSabhamarg, Burlington Xing, **lucknow** 226001(U.P), India	**CP:** Mr B N Tiwari, Director **Ph:** 0522-2418516 **Fax:** 0522-2418516 **Mob:** 9415510000
32.	Khandelwal Enterprises 18, Dhamani Market, Chaura Rasta, **Jaipur**-302113	**CP:** MR Deepak Khandelwal, Proprietor **Mob:** 9829013228 **Email:** khandelwalenterprises@rediffmail.com
33.	Waterlife India Private Limited Plot No 9, SAI NIDHI, 2nd Floor, Krishnapuri Colony, West Marredpally, **Secunerabad**-500026	**CP:** MrSudeshMenon, MD **Ph:** 040-27709889, 67292193 **Fax:** 040-27709889
34.	Ultra Dimensions Pvt Ltd #14-1-42, Ground Floor, Pragati's Regent, Nowroji Road, Maharanipeta, **Vishakhapatnam**-530002	**CP:**Mr LG trinadhaRao, Chairman & MD **Ph:** 0891-2505441, 2562490, 2529927 **Fax:** 0891-2714391
35.	MAK India Ltd 7/41-B, Avinashi Road, **Coimbatore**-641014	**CP:** MrManickamGounder, Chairman & MD **Ph:** 0422-4305000 **Fax:** 0422-4305060 **Mob:** 9994798884

SNo	Name and Address of Firms	Contact Details
36.	Bhilai Engineering Corporation Ltd Hathkoj Village, Industrial Area, **Bhilai**-490026, Distt- Durg, Chhattisgarh	**CP:** MrAvdhesh Kumar Mathur, Asst Manager (Marketing) **Ph:** 0788-4088100 **Fax:** 0788-2285499,2381140 **E-mail:** becinfo@bec-group.com **Web:** www.bec-group.com
37.	Frontier Sales Corporation Bamunimaidan Industrial Estate, 1st Bye-Lane, Opp. BhogaliJalpan, **Guwahati**-781004	**CP:** Mr Sunil Kathotia, Proprietor **Ph:** 0361-2655499 **Mob:** 9435010287
38.	Wahi Sons Pvt Ltd D5 Pushpanjali Farms, Bijwasan**New Delhi**-110061	**CP:**MrGautam Jain **Ph:** 0124-4340400 **Mob:** 9899859933
39.	Grandeur Business Solutions Pvt Ltd., D-228, Sarvodaya Enclave, Near IIT, Opposite Mother's International School, New Delhi-110017	**Mob:** 9871405752 9810137440