

A New and Superior Sewage Treatment System

May 30, 2019

株式会社  San Yu Co., Ltd

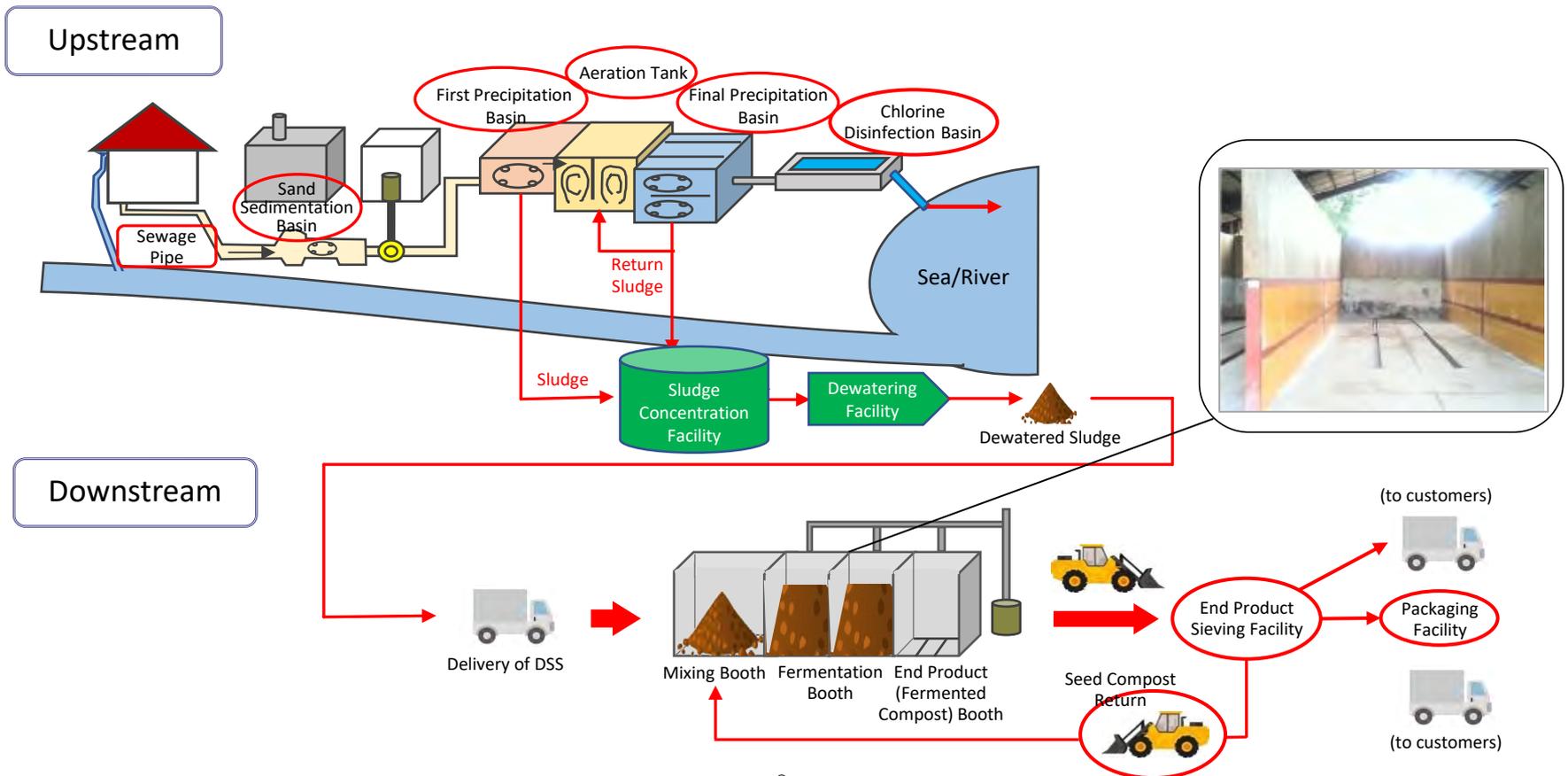
Developer and Owner of the Technology

 **GreenARM** Green ARM Co., Ltd.

Business Strategy Planner and
Advocate of the Technology for India

We have developed an innovative new sewage sludge composting technology that can deliver cheap, efficient and safe disposal of sewage sludge without any of the damaging emissions or negative costs to the environment caused by conventional disposal methods used in many countries, both advanced and less advanced, and in particular in China. This new technology is known as the Kagoshima Dewatered Sewage Sludge Disposal ('DSSD') Method.

Sewage disposal flow can be divided into two stages, 'upstream' sewage gathering and dewatering, and 'downstream' disposal. Our technology, the Kagoshima Dewatered Sewage Sludge Disposal ('DSSD') Method, which is proven over the long term, delivers a superior method of downstream disposal that is lower in cost and more environmentally friendly than conventional methods.



What is the Kagoshima DSSD Method ?

The Kagoshima DSSD Method uses naturally occurring thermophilic aerobic bacteria (usually called 'YM bacteria', named after the discoverer) in compost (likewise 'YM compost') to deliver decomposition of organic waste matter through natural fermentation. The reduction rate by volume of raw vegetable waste exceeds 95%.

Why is the Kagoshima DSSD Method important ?

Unlike conventional incineration disposal methods which consume oil to burn dewatered sewage sludge and inevitably produce damaging emissions gases, the Kagoshima DSSD Method works by natural fermentation and produces no dioxins, dioxin-like compounds, NO_x , methane gas or odours as well as far fewer CO_2 emissions.



How does it work ?

When dewatered sewage sludge is mixed with active compost containing thermophilic aerobic bacteria, fermentation occurs naturally at temperatures of up to approximately 100° C. No additives or additional heat are required. Mixing is required once a week and fermentation is complete within approximately 45 days. The residue remaining after fermentation can be used as organic fertiliser or as soil improvement additives.

The compost required for each iteration is regenerated automatically through the fermentation process, so only an initial investment in seed compost is usually required. Pathogenic bacteria are practically all wiped out during the fermentation process. During the 38 years in which the Kagoshima DSSD Method has been in continuous use, not a single case of E. coli has been reported at completion of fermentation. All plant seeds are also destroyed during fermentation. No leached liquids are produced. Mould does not grow on the surface of the compost.



Delivery of DSS



Wheel-loader Work for Mixing



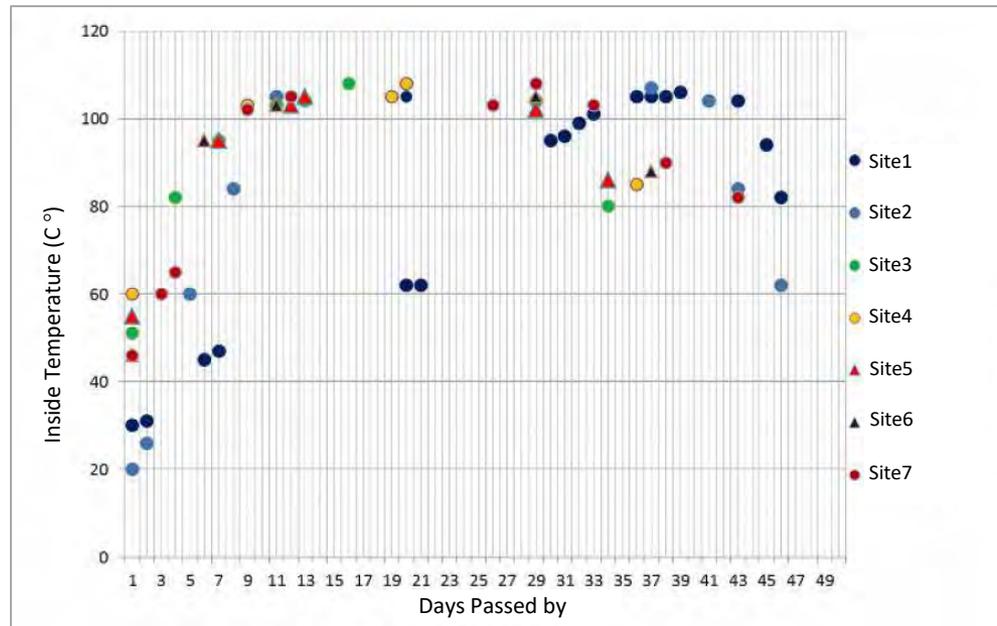
Wheel-loader Work for Digging up



High Fermentation Temperature & Vapor



Fermented Compost



Inside Temperature over Time

Number of Bacterial Cells detected in 1 g of the YM Compost Soil
(No E. coli and Archaeal microorganism detected)

Sample names	Mesophilic Cells	Thermophilic cells	Mesophilic spores	Thermophilic spores	Escherichia coli	Archaeal microorganism
Ishidu	3.8×10^7	8.8×10^6	1.7×10^7	2.6×10^6	0	0
Nanto 1	1.1×10^7	9.6×10^6	9.6×10^6	3.9×10^6	0	0
Nanto 2	2.4×10^6	4.4×10^6	4.2×10^6	5.7×10^6	0	0
Kochi	3.0×10^7	1.7×10^6	2.5×10^7	2.5×10^7	0	0

Fully tested and registered

The Kagoshima DSSD Method has been used successfully in Kagoshima City in Japan for downstream treatment of all sewage generated daily in the city since 1981. The Method was developed by Mr. Masaichi Yamamura who discovered the live bacteria. The specific thermophilic aerobic bacteria have been identified, registered and deposited in the major international culture collections including ATCC, DSM and JCM. Examples of the newly discovered strains are *Calditerricola satsumensis* YMO81 and *C. yamamurae* YMO722.



Mr. Masaichi Yamamura



鹿児島市水道局業務委託受注証明書発行申請

平成29年10月16日

鹿児島市水道局長
秋野 博臣 様

鹿児島市城南町7番47号210
株式会社 山有
代表取締役 山村 正一



弊社が受注している下水汚泥堆肥化場堆肥化業務委託について、
下記のとおり受注証明の発行をお願い致します。

記

- ① 業務名： 下水汚泥堆肥化場堆肥化業務委託
- ② 業務概要： 鹿児島市公共下水道の処理場から発生する脱水ケーキを下水汚泥堆肥化場において堆肥化し、下水汚泥の緑農地利用を図るために行うものである
- ③ 業務内容： 南部処理場及び1号用地処理場から発生する全脱水ケーキの収集・運搬、堆肥化業務、販売事務及び在庫管理を行う。
- ④ 業務場所： 鹿児島市谷山港三丁目2番地4
- ⑤ 受注者名： 株式会社 山有 代表取締役 山村 正一
- ⑥ 受託期間： 単年度毎契約で1981年度から2017年度現在まで継続中
(なお、1981年度から1989年度までは、下水汚泥堆肥化場運転管理業務委託と肥料販売事務委託に分割受注、1990年度から1995年度までは下水汚泥堆肥化場運転管理業務委託に一本化され、1996年度から下水汚泥堆肥化場堆肥化業務委託に名称変更されている。)

業務委託受注証明書

平成29年10月17日

上記の通り相違ないと証明します。

鹿児島市鴨池新町1番10号
鹿児島市水道事業及び公共下水道事業管理者
水道局長 秋野 博臣



(Translation)

Request for the issuance of an official certificate of entrusted orders from the Waterworks Department of Kagoshima Municipality

16 October, 2017

Mr. Hiroomi Akino
Director General,
The Waterworks
Department, Kagoshima
Municipality

7-47-210, Jonan-cho, Kagoshima city
San Yu Co., Ltd.,
CEO, Masaichi Yamamura

This is a request for an official certificate of the entrusted orders from the Waterworks Department of Kagoshima Municipality, to San Yu Co., Ltd., for composting sewage sludge at the composting factory.

The details are as follows:

- 1. Entrusted Work: Composting Sewage Sludge at the Composting Factory
- 2. Work Description: Composting dehydrated sludge generated at the Public Sewer Facilities of Kagoshima Municipality and re-using sewage sludge for improving green field and agricultural land
- 3. Activities: Collection, Delivery, Composting, Sales and Stock Management of dehydrated waste generated at the South Treatment Site and the Treatment Site at No.1 Worksite. (Note: These facilities treat all the sewage waste collected in Kagoshima Municipality.)
- 4. Work Site: 3-2-4, Taniyama Kou, Kagoshima City
- 5. Order received by: San Yu Co., Ltd., CEO, Masaichi Yamamura
- 6. Entrusted Order Period: This is ongoing and has continued from FY 1981 to today, FY 2017, with an annual contract. (Entrusted orders were divided into the Entrusted Order for Operation and Management of the Sewage Sludge Composting Factory; and the Entrusted Order for Sales of Compost from FY 1981 to FY 1989. The latter was integrated into the Entrusted Order for Operation and Management of the Sewage Sludge Composting Factory from FY 1990 to FY 1995, which was named as the Entrusted Orders for Composting Sewage Sludge at the Composting Factory in FY 1996.)

Certificate of the Entrusted Orders

17th October, 2017

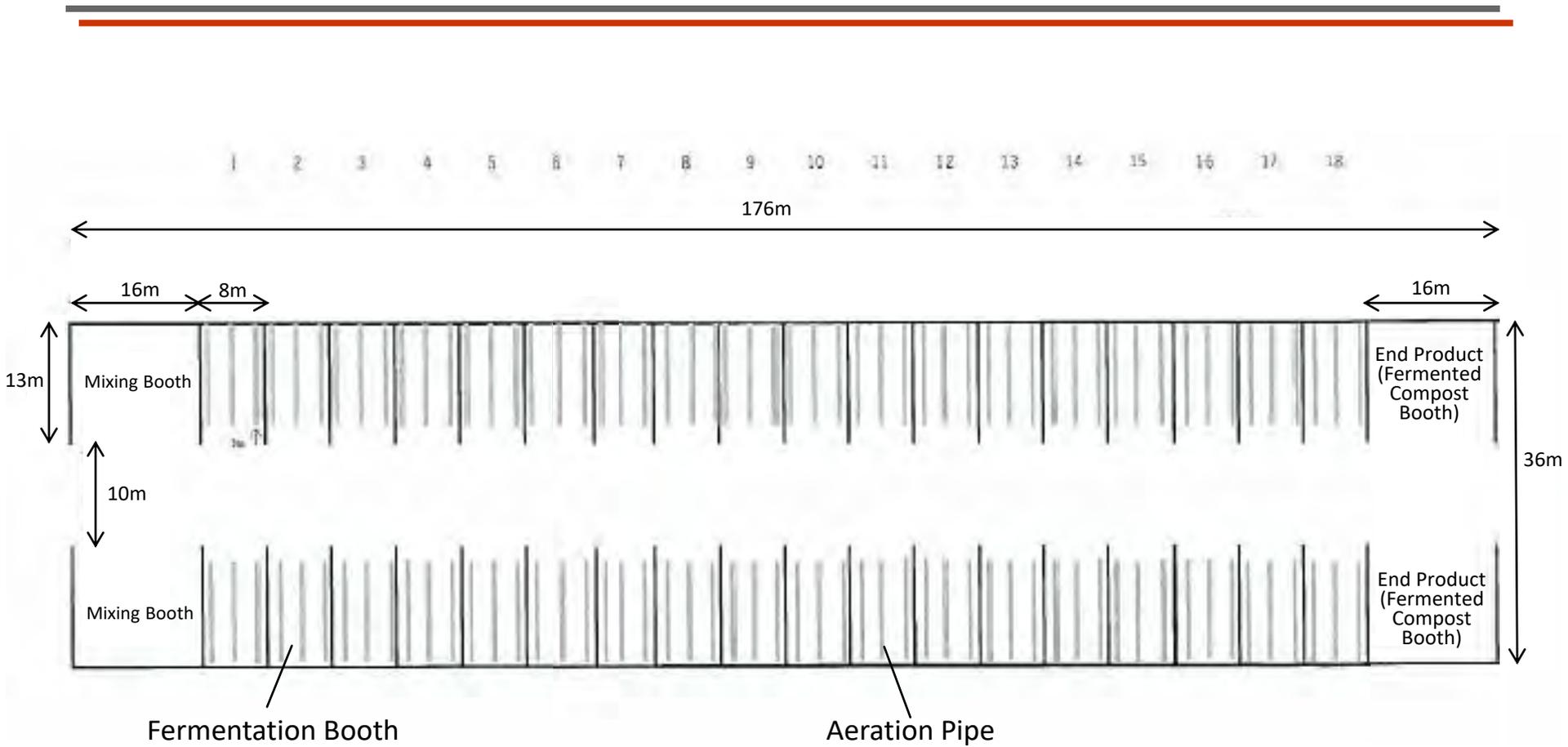
This is to certify that the facts written above are the truth.

Hiroomi Akino,
Director General, the Waterworks Department,
Administrator for the Water Supply Works and the
Public Sewage Works, Kagoshima Municipality
1-10, Kamoko Shin Machi, Kagoshima City

Factory Specifications for Kagoshima DSSD Method

The following are factory specifications for the Kagoshima DSSD Method based on empirical data:

1. Daily delivery of DSS (Dewatered Sewage Sludge) for fermentation: 100 tons
2. Seed compost required for 100 tons of DSS per day: 100 tons per day in case where slaked lime is used as a dewatering agent. In case where polymer flocculant is used, seed compost requirement will be greater.
3. Total seed compost required: 100 tons for daily DSS x 45 days (fermentation period) = 4500 tons.
4. 2 mixing booths of 16 m width x 13 m depth x 3 m height
5. 36 fermentation booths of 8 m width x 13 m depth x 3 m height (mixture volume gets smaller as fermentation proceeds and several mixtures can be combined towards the end of fermentation.)
6. A 10 m wide corridor between booth rows for a wheel-loader to work
7. 2 end product (fermented compost) booths of 16 m width x 13 m depth x 3 m height
8. Factory floor space of 6336 m² (8m x 13m x 18 x 2 + 10m x 8m x 18 + 16m x 13m x 2 x 2 + 10m x 16m x 2)
9. 3 aeration pipes for a fermentation booth
10. A blower for two fermentation booths and 2.8 KWH for a blower
11. 4 to 5 wheel-loaders



Factory Plane

Testimonial

Professor Tairo Oshima, President of the Japanese Society of Extremophiles (organisms that live in extreme environments), comments: ‘The bacteria discovered by Mr. Masaichi Yamamura and the composting technology using the bacteria have been a focal point of my interest as a microbiologist since I first met him decades ago. It should be noted that there is no other known composting technology that can match the several specific features of this technology.’



Prof. Tairo Oshima

Appendix

Aerobic High Temperature Composting Technology

Thank you