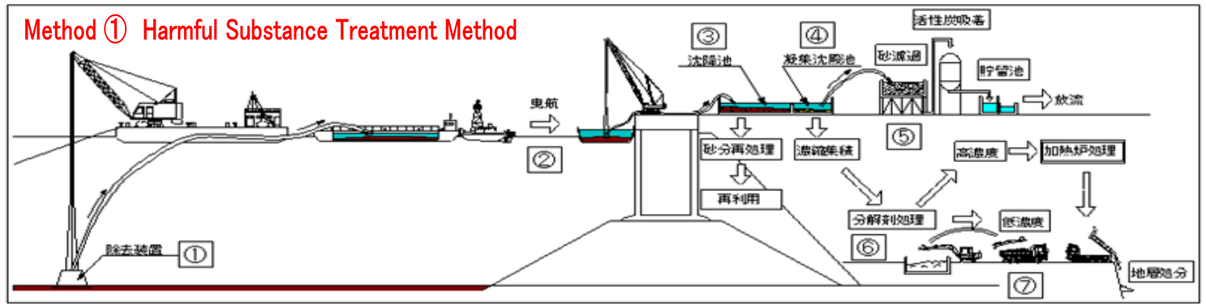
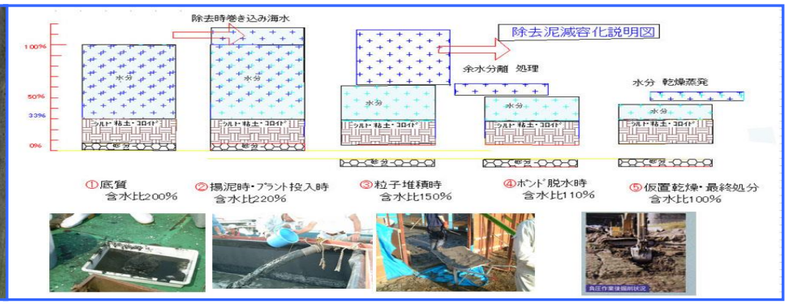
Characteristics of Sea Bottom Sludge Treatment Method





1.【Cost Reduction】 *The plant can be installed anywhere!

Depend on the width of construction ground and capability, it's allowable to install the treatment facility and leads to the saving of cost.

☆In case of the construction groudn is vacant and wide, the pool combined with filtration system can be installed, and the sludge and sea water are separated on the location.(Method ②)

☆In case of the construction ground is vacant and narrow, the filtration plant can be installed, and the sludge and sea water are separated on the location. (Method ③)

2.【Volume reduction of dredged soil】 *The disposal amount of soil and sand will be reduced and lead to the saving of cost.

It's efficient for overall cost reduction since there will be no need of a large diposal facility.

3.【Efficient simultaneous processing method】 *The organic sustances, harmful dioxin and environmental hormones (TBT) are all treated at the same time!

After the harmful substances sedimented on the bottom of sea surface and in the water are separated into sea water and soil in the simple plant, the sulfide and environmental hormones are treated at the same time.(Method ①)


Method ②Wide Area Ground Treatment


Method ③Narrow Area Ground Treatment (No-chemicals use) – Submarine Cleaner (SMC) Method 【Recyclable Dredging System】

【Recyclable Dredging System】 The sea water after removed of sand and silt in the ground facility will be reused for the injection water of Submarine Cleaner.

Inquiry

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SUBMRINE CLEANER(SMC)METHOD

(Patent:Sea Bottom Soil Removal System by a Sealing Suction Method of Thin Layer)

* A Device, by which capable of efficiently removing 10cm-thickness of sedimental organic substance and a dross layer without causing turbidity

Awarded: The Thirteenth Excellance Award of National Technology Development Sector of MLIT!

(Minister of Land, Infrastructure and Transport Award)

SEA BOTTOM SLUDGE TREATMENT METHOD

(Patent: Treatment Method for Harmful substance of sea bottom sludge containing organotin compound, Sea Bottom Sludge Removal System)

* A Combined Method of performing the detoxification and volume reduction treatment for organic sediment and environmental hormones of bottom layer

Awarded:The First Excellence Award of Fisheries Infrastructure Development Sector!


Setting Apparatus


Sludge-Pumping


Water Treatment

Undertake for: Preminary Investigation ~ Bottom Soil Removal: Treatment ~ Follow-up Survey

Collaborated Research and Development among industry, university and government 【Recommended by: Association of All-Japan Fishing Port Construction】

Kyushu University, Nagasaki University, Ehime University Society for Sea-area Environmental Improvement Technology Research

Characteristics of Submarine Cleaner Method

1. 【10cm-deep bottom-surface thin layer dredging】 * Thin-layer dregding only for 10cm～15cm deep
   Capable of removing the amount ot the 10cm-deep bottom surface layer of soil, organic matter and/or floating mud.
2. 【Prevent from secondary dispersion】 *Thin-layer dredging without causing turbidity
   The system is sealed up; therefore, there will be no trouble of secondary dispersion of the harmful substances calling for no pollution measures comparing to the existing grab method.
3. 【High content of sludge】 *Capable of pumping up the bottom sediment efficiently
   Capability of pumping the bottom surface layer (silt) and sea water at the same time- 60% of sludge content. (Wet weight)
4. 【Volume reduction of dredged soil】 *The amount of soil and sand disposal is to be reduced.
   It's effecitve for cost reduction since there will be no need of a large diposal facility depend on the amount of soil dredged.

☆Characteristics of Submarine Cleaner Method.

5 【Workable for soft ground】 *Unsinkable!.
By adujsting the balancing tank installed in the Cleaner, it's capable to perform without sinking even on the soft ground.

6. 【Speedy construction】 *Smooth and continuous construction!
By hoisting the suspended frame smoothly by a crane, it's possible to conduct the continuous construction.

7. 【Effect of cultivation】 *Effect of cultivation on the bottom sediment.!
The emission of jet flow will bring forth the effect of cultivation of the bottom sediment.

8 【Environmental-friendly method】 *Not causing a sinkhole!
Since thin layer is removed and conducting continuously, it prevents from generating depression influenced by oxygen deficiency in the bottom of sea.

☆Specification and Capability.

Item	Standard/Size	Standard Construction Area	Water Depth capable to construct
1. Large Cleaner	Diameter: 5,000mm	3，000㎡／Day	2. 0m～40m
2. Middle Cleaner	Diameter: 2,500mm	100m3／Day	0. 5m～40m
3. Small Cleaner	Diameter: 1,500mm	20m3／Day	0. 2m～20m

☆Examples of Usage.
Removing the sulfide contents sedimented on the bottom of nursry in the fishing port.
Removing the harmful substances sedimented on the bottom of the fishing ports and harbors.
Removing the organic matter sedimented on the bottom of the fishing ports and recovery construction of cultivating the fishing ports.
Removing the plankton cyst (dormat cells) that is known to cause the red tide.

Type of Submarine Cleaner (SMS) Method and Product Sales Performance

☆Past Performance:. FY 2003～Experimented in Tachibana-Bay and Omura-Bay, Nagasaki; Hakata Port, Fukuoka.
FY 2009:Fishing ground restoration project of Imari-Bay and peripheral; Ministry of Land, Infrastructure, Transport and Tourism(MLITT), Local furtherance business
FY 2009:Sludge removal construction of Hakata Port, Ministry of Land, Infrastructure, Transport, and Tourism (MLITT)
FY 2011:Demonstration for verification of sediment improvement as anti-red tide measures,Kagoshima Prefecturral Government; Removal of 82% plankton cyst.
FY 2012:Verification experiment for removing cesium-polluted sludge; Removal of 88% Cesium in the sediment
FY 2013:The Anti-Natural Disaster Construction in Komoda-Harbor, Nagasaki Prefecture Removal of bottom sand in the harbor. (Middle Cleaner)
FY 2013:Improvement Construction of the Main Country Road, the Ohseto-Saihi Line, Nagasaki Prefectural Office; Thin Bottom Layer Dredging in shallow water. (Middle Cleaner)
FY 2014:The Anti-Natural Disaster Construction in Tamanoura-Harbor, Nagasaki Prefecture Removal of bottom sand in the harbor. (Middle Cleaner)

Effect of Bottom Sediment Removal by Submarine Cleaner Method

☆ Capable of removing the plankton cyst (dormat cells) up to 82% that is known to cause the red tide. (Performed in Kagoshima Prefecture, 2011)
☆ Capable removing the cesium sedimented on bottom-surface layer without causing turbidity up to 88%. (Performed in Fukushima Prefecture, 2012)

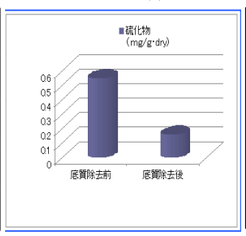
Before → After

The emission of jet flow brings forth the effect as well of cultivation of the sediment as

(Hakata Port, 2009)

☆The amount of sulfide is reduced after sludges are removed.

Item	Before bottom sediment removal	After bottom sediment removed	Decreasing Rate
Water Content (%)	210	131	38%
Sulfide (mg/g･dry)	0.548	0.155	72%
T- N (mg/kg･dry)	2850	1760	38%
T- P (mg/kg･dry)	730	580	21%



☆Effective for bottom sediment removal for overlaying sand preparation.

Item	Covering sand only	Covering sand after removal	Minimum limit of quantification
Water Content (%)	24.4	19.9	0.05
Sulfide (mg/g･dry)	0.017	<0.005	0.005
T- N (mg/kg･dry)	60	30	10
T- P (mg/kg･dry)	100	80	10

(Imari-Bay, 2009)