

国土交通省 NETIS登録番号 HR-100010-A  
国土交通省 NETIS登録番号 QSA-090005-A

**Highly Concentrated and Thin Layer Dredging Technology** using  
**Mud Suction and Pneumatic Transport Systems**

# Revitalization of Rivers, Ponds, and Lakes

**29 November, 2012; EGM on Sustainable Urban Development**

Member, Japan Dredging & Pneumatic Transport  
Association

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URL <http://n-oyanagi.com/>

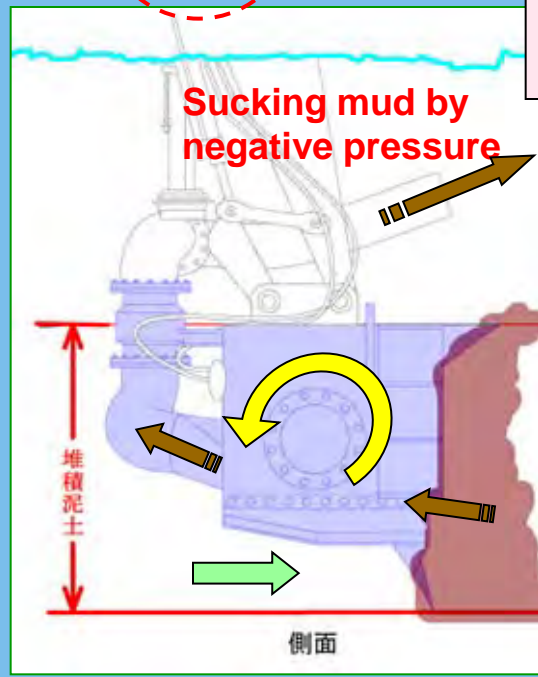
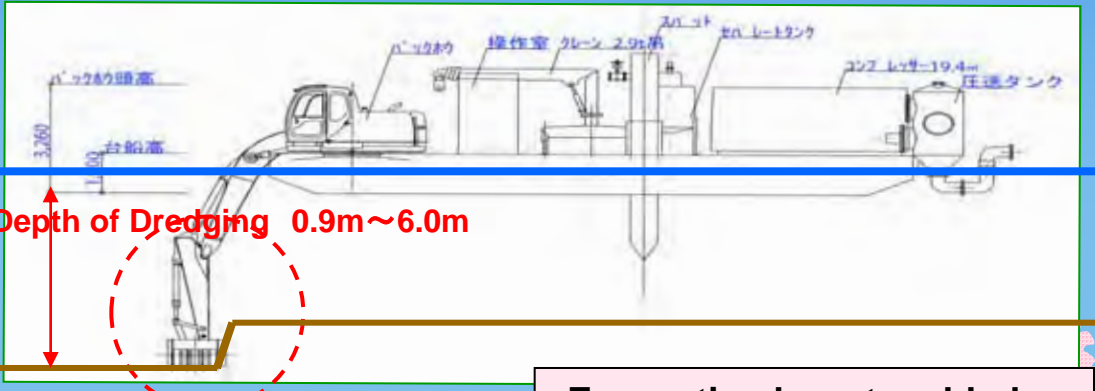
# Environmental Protection in Maintenance Dredging

- ❖ **Issues in Conventional Technologies** : Pump dredging is most popular and suited for large scale dredging. It vacuums mud at the bottom and transports through pipes; but since it vacuums water together, it would discharge large amount of excess water in the end, also **causing water contamination**.
- ❖ **Environmental Protection Type Dredging Methods** : A high density (consists over 60% mud) dredging method which can overcome the issues above. By using **special mud vacuum devices** with **negative pressure** it can consecutively collect high density mud into the tank. (**NETIS:HR-100010-A**)
- ❖ **Realities in Environmental contamination** : **Most damaging to the environment is the sludge surface**. we co-developed a **CCG Dredgeing method** and technology which allows dredging only thin layers of the surface, without causing any secondary contamination . (**NETIS:QSA-090005-A**)

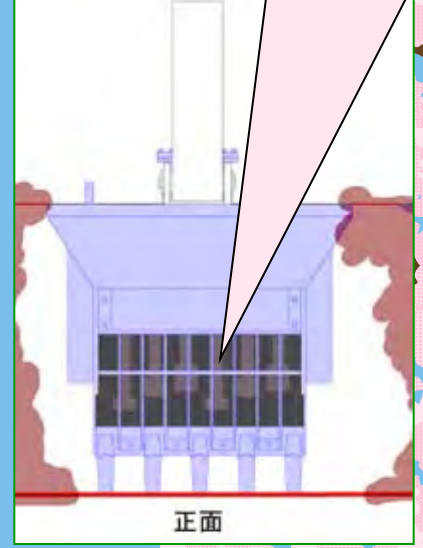
# Thin Layer Dredging; which made dredging of floating sludge possible (vacuum mouse)



NETIS:HR-100010-A  
 Highly Concentrated and Thin Layer Dredging Technology  
 using Mud Suction and Pneumatic Transport Systems



Excavating by rotary blades having water stoppage effect





Monitors the depth and angle of the Vacuum Mouth;  
depth of dredging completed location is shown by 25mm  
in different colors

NETIS:QSK-090005-A

GCS900 Dredging guidance systems



# Effectively used in environmental construction in various city rivers in Japan; meeting diverse needs for improvement of cities. 。

1968年弁天潟公園整備(新潟県)から2012年9月現在まで約400,000m<sup>3</sup>の実績があります





# Rivers in Tokyo by using the **Mud Suction and Pneumatic Transport Systems**



**泥土吸引ポンプ  
圧送システム  
(東京都仕様)**

A central blue diamond-shaped box containing the title of the system in white text.



# Features of Mud Suction and Pneumatic Transport Technology Systems

## A Combination of Pneumatic Transport System and Negative pressure dredging technology

### 1、Transports dredged mud/soil by pneumatic pressure through a pipeline

(maximum transport ability : Longest distance=3,466mkm, Highest height=52m)

### 2、Will dredge only thin layers of sludge horizontally

### 3、the negative pressure vacuum system will not mix the bottom of the river/lake and will prevent turbid

### 4、Will dredge high density sludge with suction of less water (\*proved 80% mud ratio)

### 5、Transportation of mud is done by dedicated pipeline; will prevent environmental damage (odor, transport)

### 6、Intake of effluent water is small; the work can be done in a small area, and sundrying of mud is possible

### 7、An environmentally feasible dredging which enable less barrier for materializing the work

→ the dredge barge can be knocked down and transported by truck to the site; and be reassembled

→ the pipeline generates less effluent water and dredge transportation by a pipeline assures less restriction to location sites

→ low structure(height:1.20m, highest from bottom:3.26m)and easy to work and pass under bridges



# Negative pressure vacuuming and pneumatic transport system Flow

## 泥土吸引圧送システム、フロー図

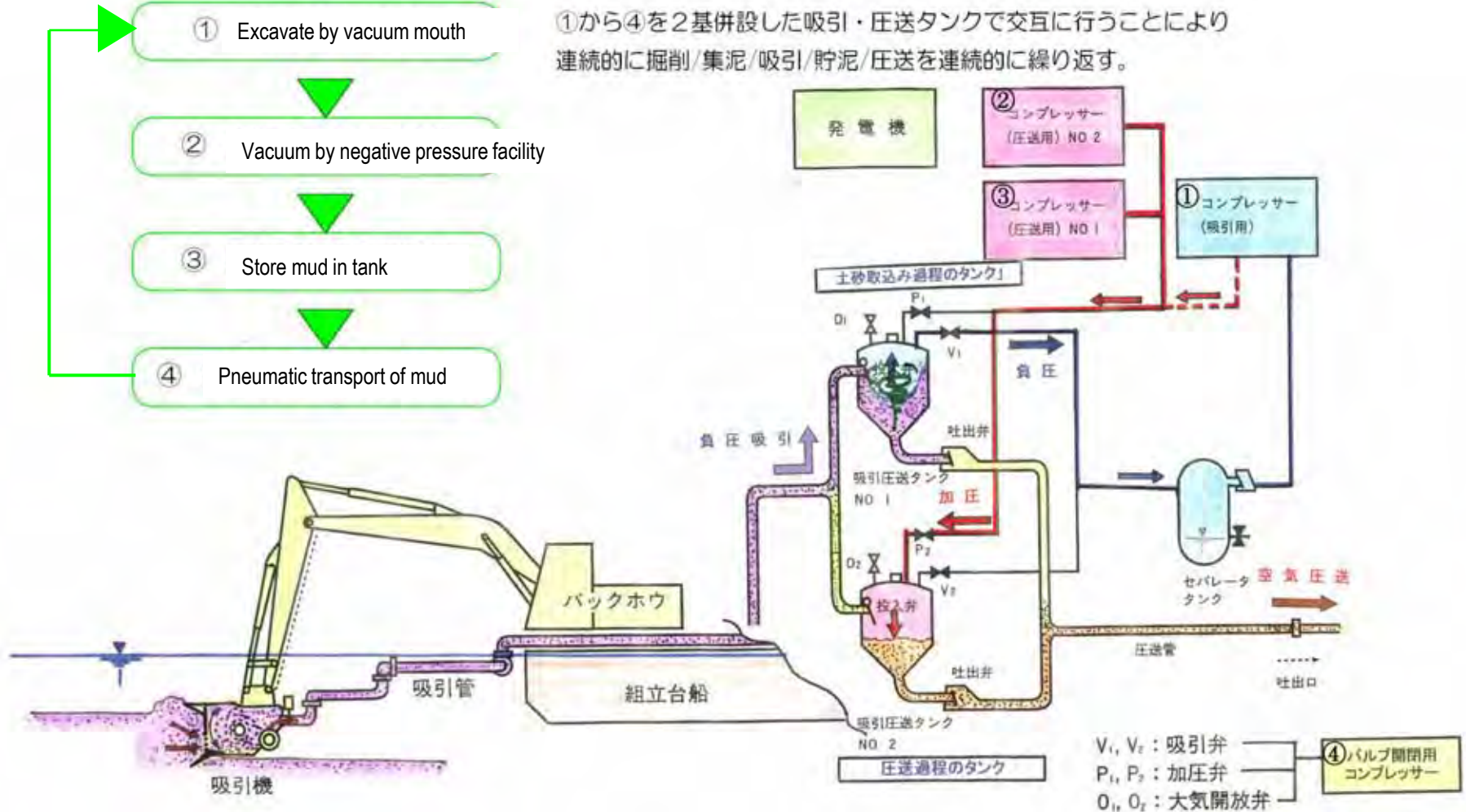
① Excavate by vacuum mouth

② Vacuum by negative pressure facility

③ Store mud in tank

④ Pneumatic transport of mud

①から④を2基併設した吸引・圧送タンクで交互に行うことにより連続的に掘削/集泥/吸引/貯泥/圧送を連続的に繰り返す。





# Dredging work is possible in any conditions

- a) in areas where certain depth is secured (0.9m)では → mud suction pneumatic transport barge type
- b) in shallow water e.g. lakes, marshes → mud suction pneumatic transport amphibious type
- c) in locations where pneumatic transport onsite is not possible → longer distance transport with reloading barges



Unit Barge method (Niigata)



Amphibious Type (Niigata)



Barge reloading type (Tokyo)

# Mud suction method made possible to work under low bridges



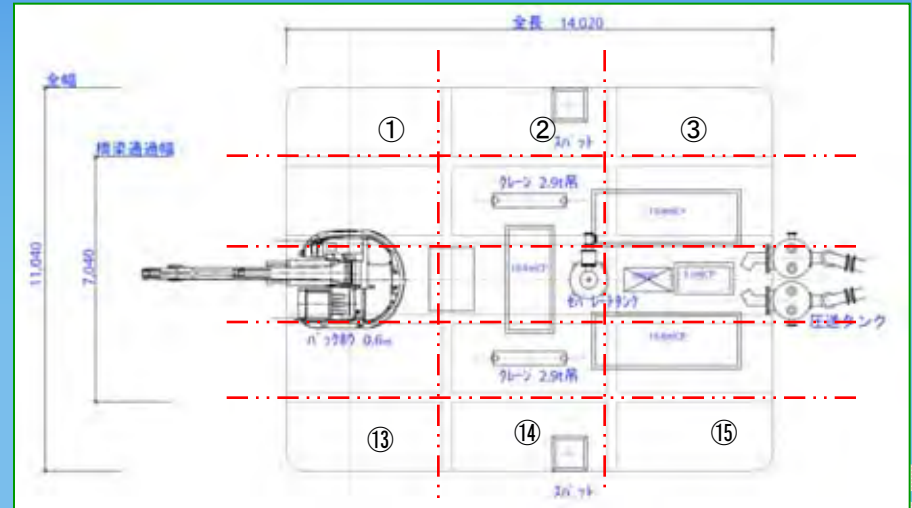
Work using mud suction floating boats (barges)



Work using mud suction pneumatic transport equipment



# Dredge boats can be knocked down, transported and assembled /deassembled by cranes at the site



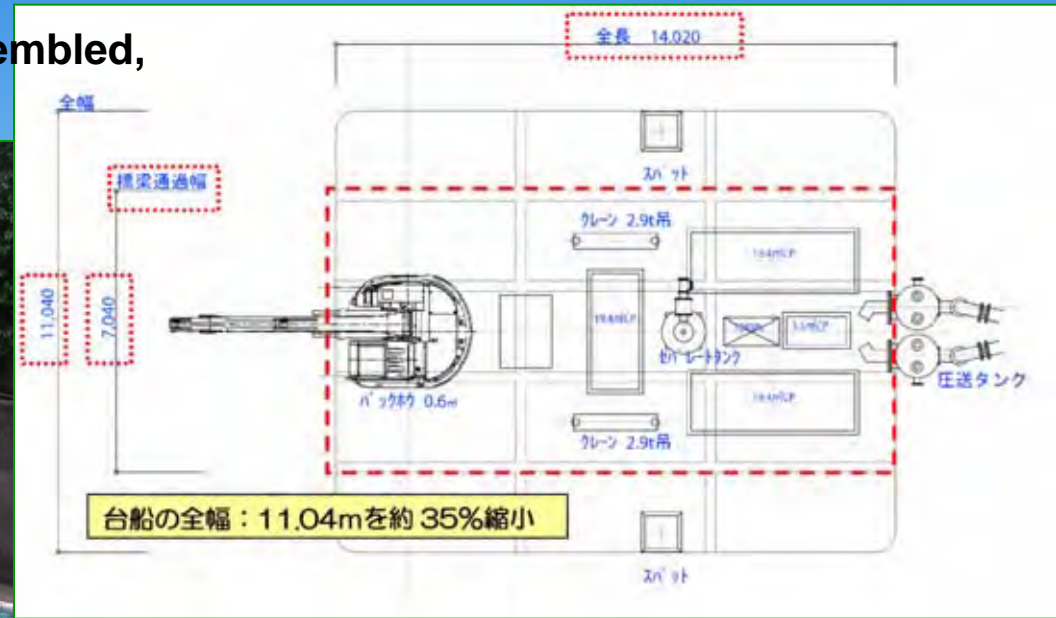
The dredging barge will be divided into 15 parts and delivered by truck





# Possible to work in narrow city rivers

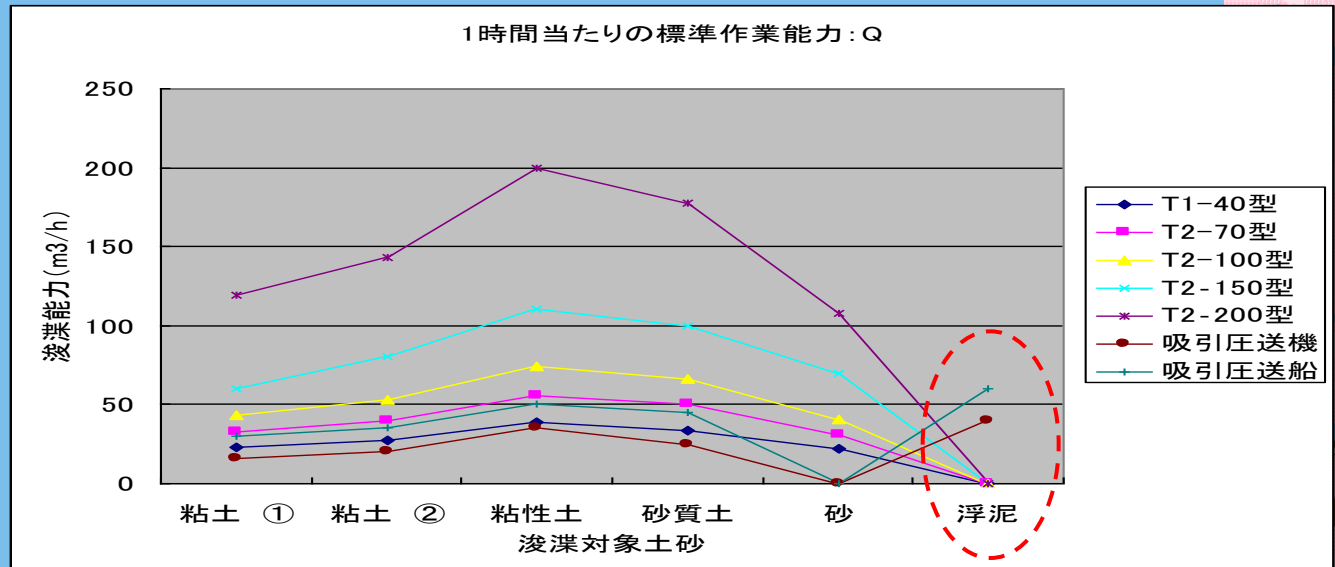
(Barges can be detached and re-assembled, moving up and down the river)





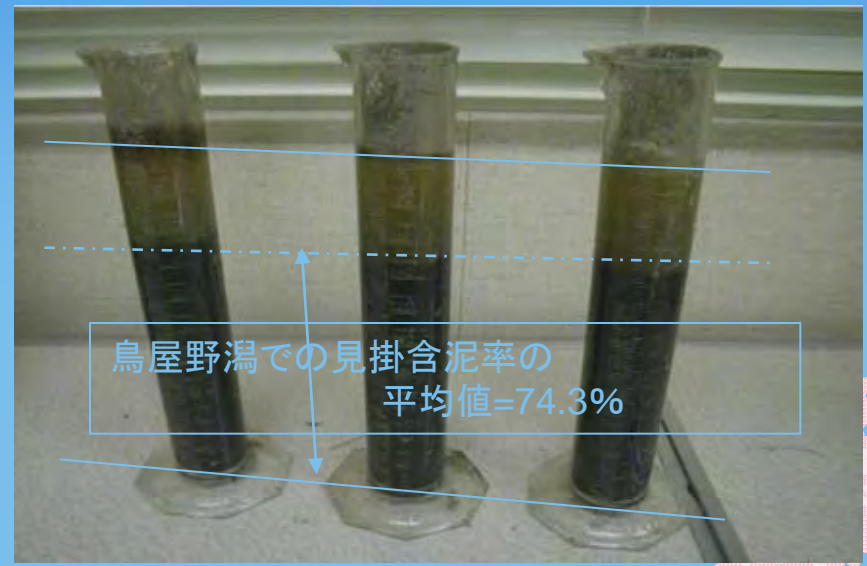
# Dredging and Pneumatic Transport Abilities (per hour)

method	Machine type	clay ①	Clay ②	Viscous soil	Sand soil	sand	Floating sludge
Pneumatic transport systems	T1-40型	23	27	39	34	22	0
	T2-70型	33	40	56	50	31	0
	T2-100型	43	53	74	66	41	0
	T2-150型	60	80	110	100	70	0
	T2-200型	119	143	200	178	108	0
Pumping transport systems	吸引圧送機	16	20	35	25	0	40
	吸引圧送船	30	35	50	45	0	60



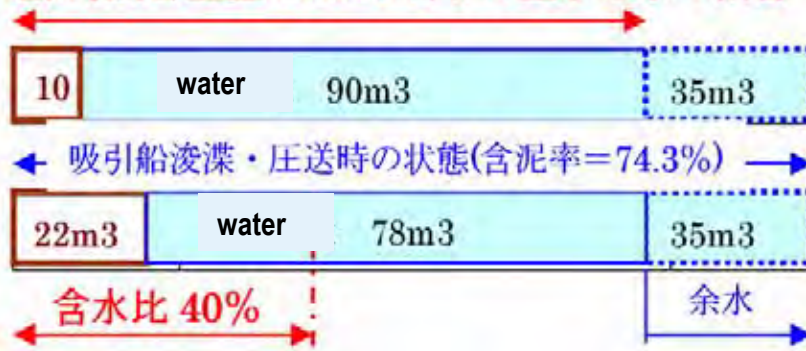
# Comparison of mud content in different dredging (tested in Niigata 2012,1,25)

(Mud content: ratio of sediment included in the mud mixed water when dredged.)



Water content at bottom 135.9~390.8%として

地山(底泥)土量 100m<sup>3</sup> 当りの土砂と水の割合



Water ratio 390.8%

135.9%

Mud suction boat dredging

Mud ratio =74.3%

Mud/Sand 10m<sup>3</sup> / 水 125m<sup>3</sup>  
 water

Mud/Sand 22m<sup>3</sup> / 水 113m<sup>3</sup>  
 water

Pumping boat dredging

Mud ratio max=20%

→水を 490m<sup>3</sup> 運搬  
 Transport water

→水を 478m<sup>3</sup> 運搬  
 Transport water



**thank you for your kind attention**

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