

# **Dam Maintenance Using a Combination of Grab Dredger and Slurry Pump**

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**on 15, Jun, 2016 in Miami**

# Introduction

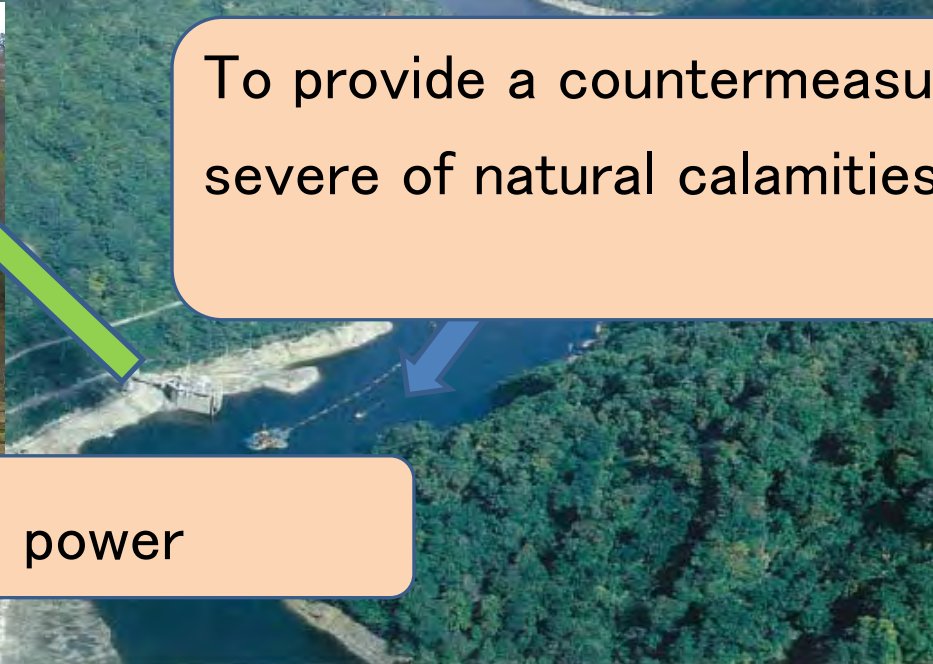
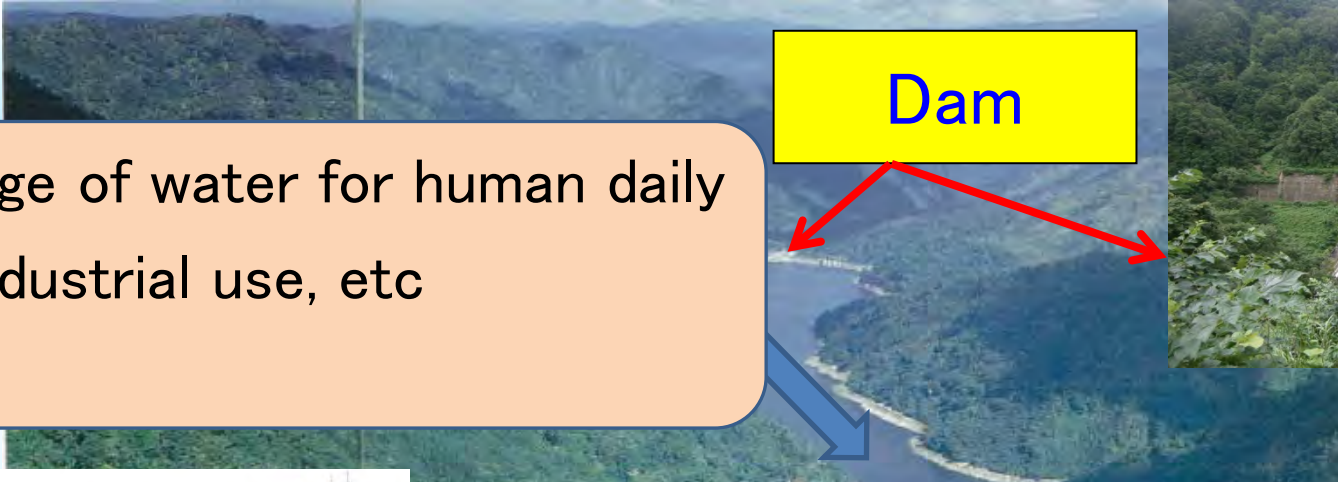
## Main Purpose to construct a Dam

Dam

To storage of water for human daily water, industrial use, etc

To provide a countermeasure to the severe of natural calamities

To generate electrical power



# Major obstacles to construct a New Dam to increase electrical power, etc

Construction site location

Problem by accessibility for transportation of materials, etc



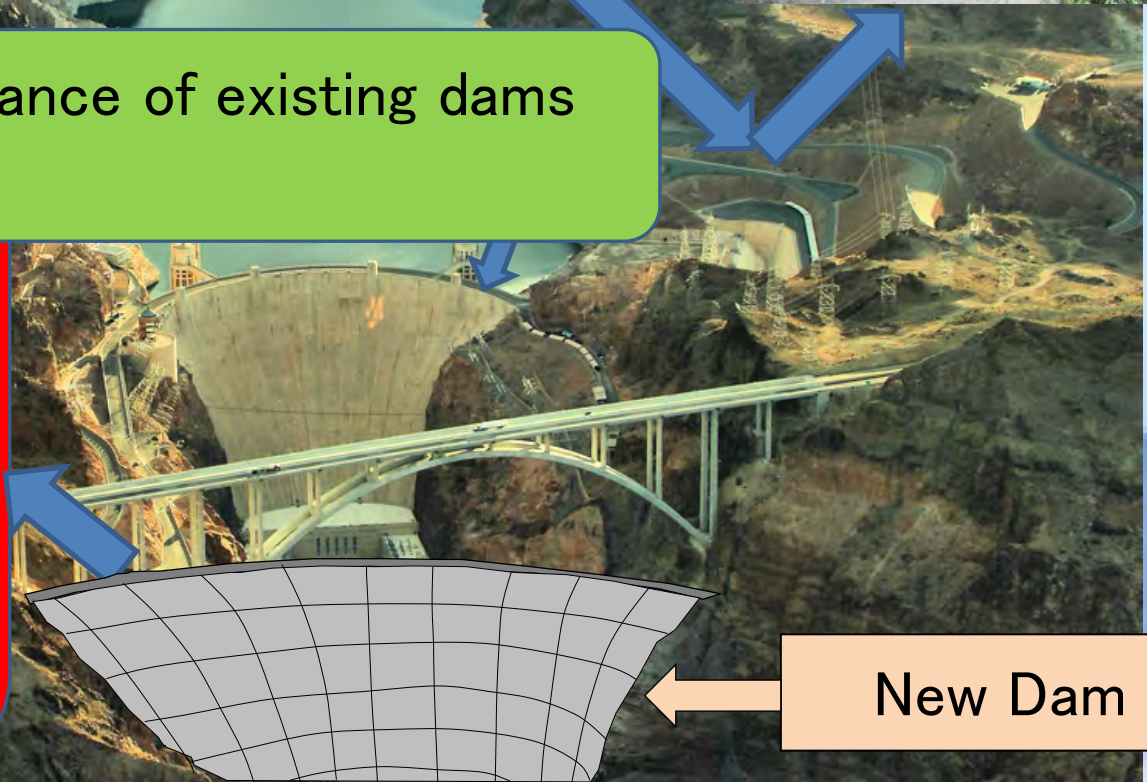
Maintenance of existing dams

Huge investment

① Countermeasure

environ. Issue,

② Construct New Dam by long const. period, etc



New Dam

# Major issues to maintain existing dams

Natural flooding causing siltation & wa

w of



Water Intake  
screen

Dam

Power Building

Generator

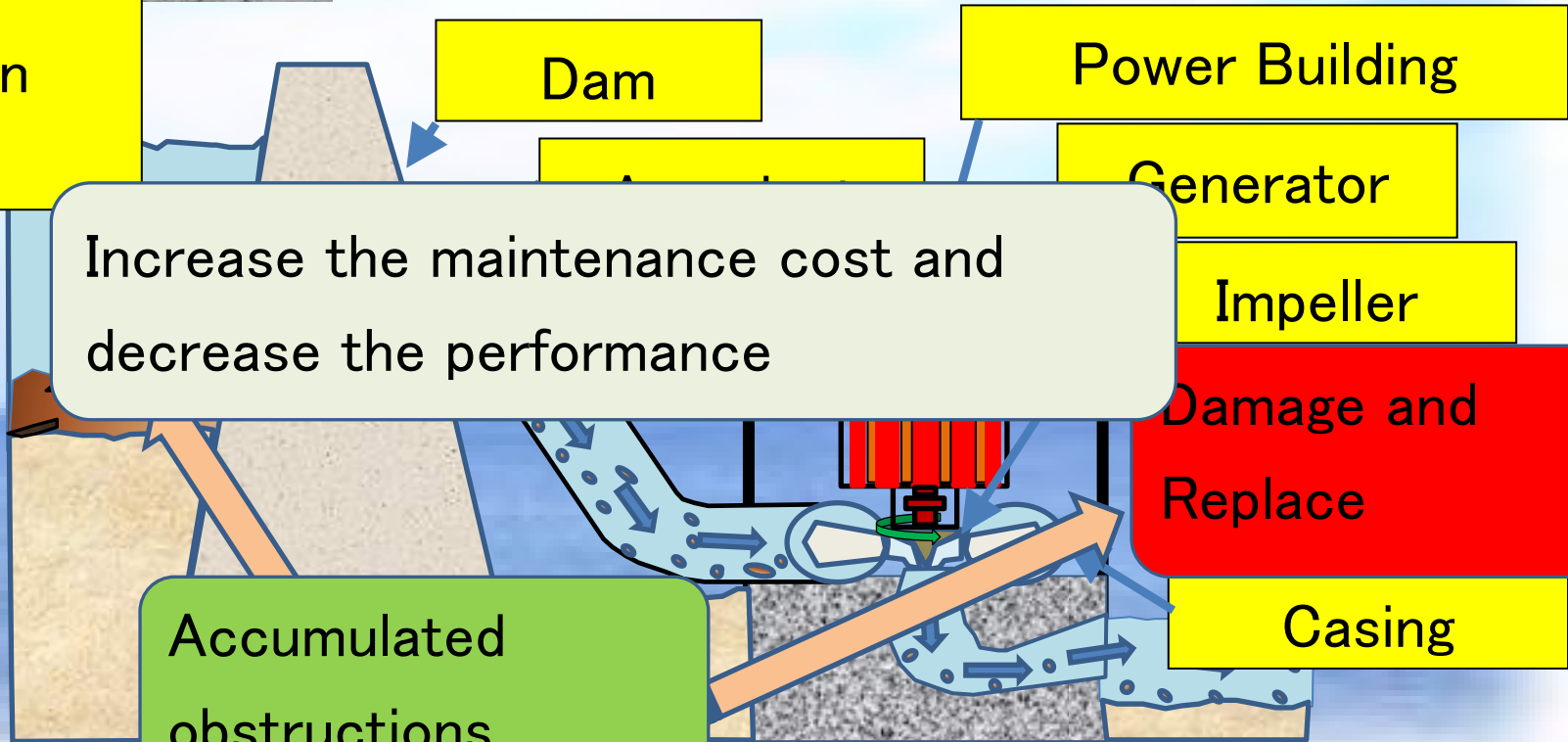
Impeller

Damage and  
Replace

Casing

Increase the maintenance cost and  
decrease the performance

Accumulated  
obstructions



## Demands from Owner

To remove such obstruction

To prevent any disposed obstacles from flowing back to intake

We proposed our combined method using in-house technology and experience

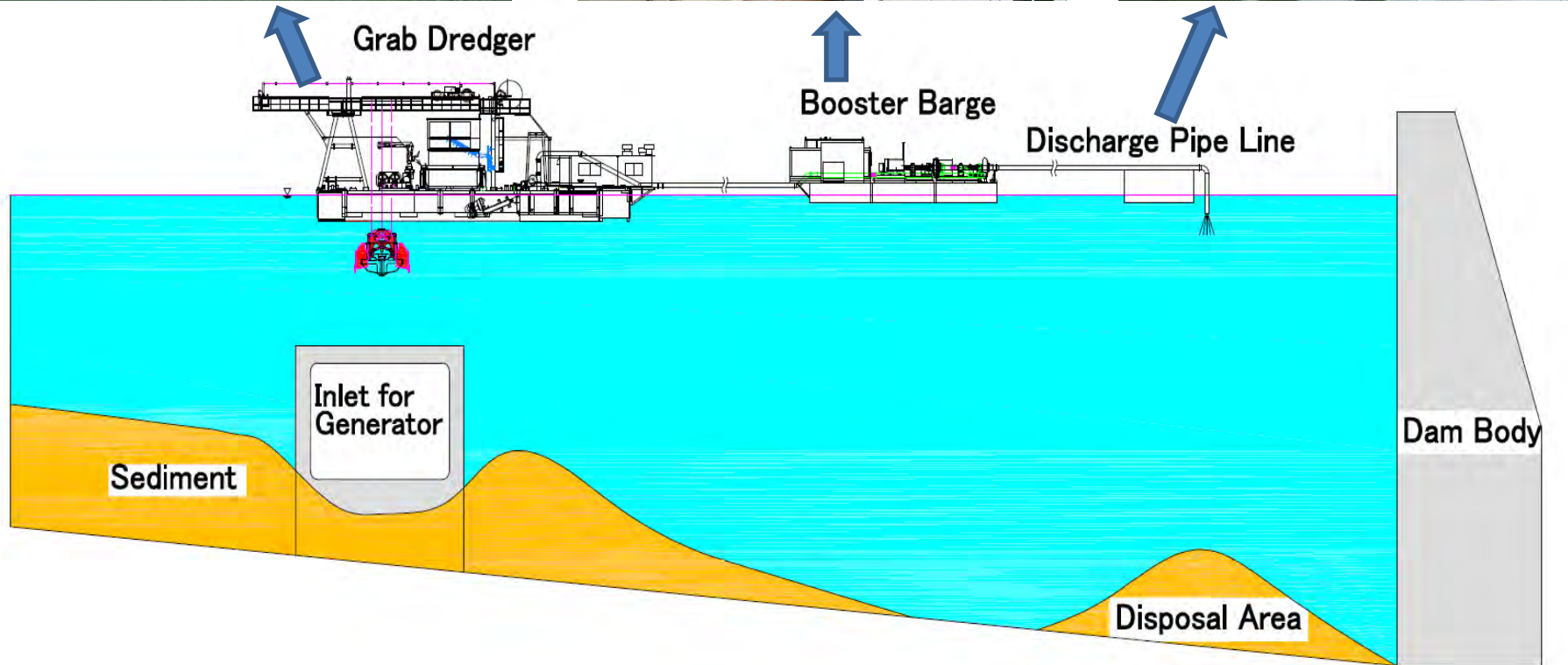
Grab Dredger

Sand and soil removal and segregating, etc

Slurry Pump





Sand and soil discharge to suitable dumping area using an inboard pump and booster pumps

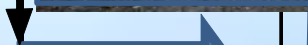
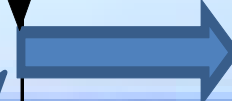
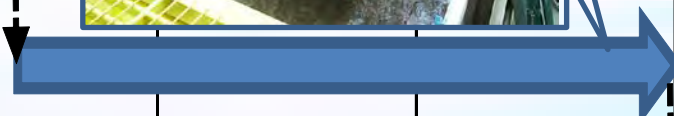
# Characteristic of this method



Typical Section of Overall Construction Operation

# Typical Schedule for Dam Dredging of 50,000m<sup>3</sup>

Month	Jun	Jul	Aug	Sep	Oct	Nov
Items						
Preparation & Assemble						
Trial & Dredging						
Dismantling						
Countermeasure during winter						

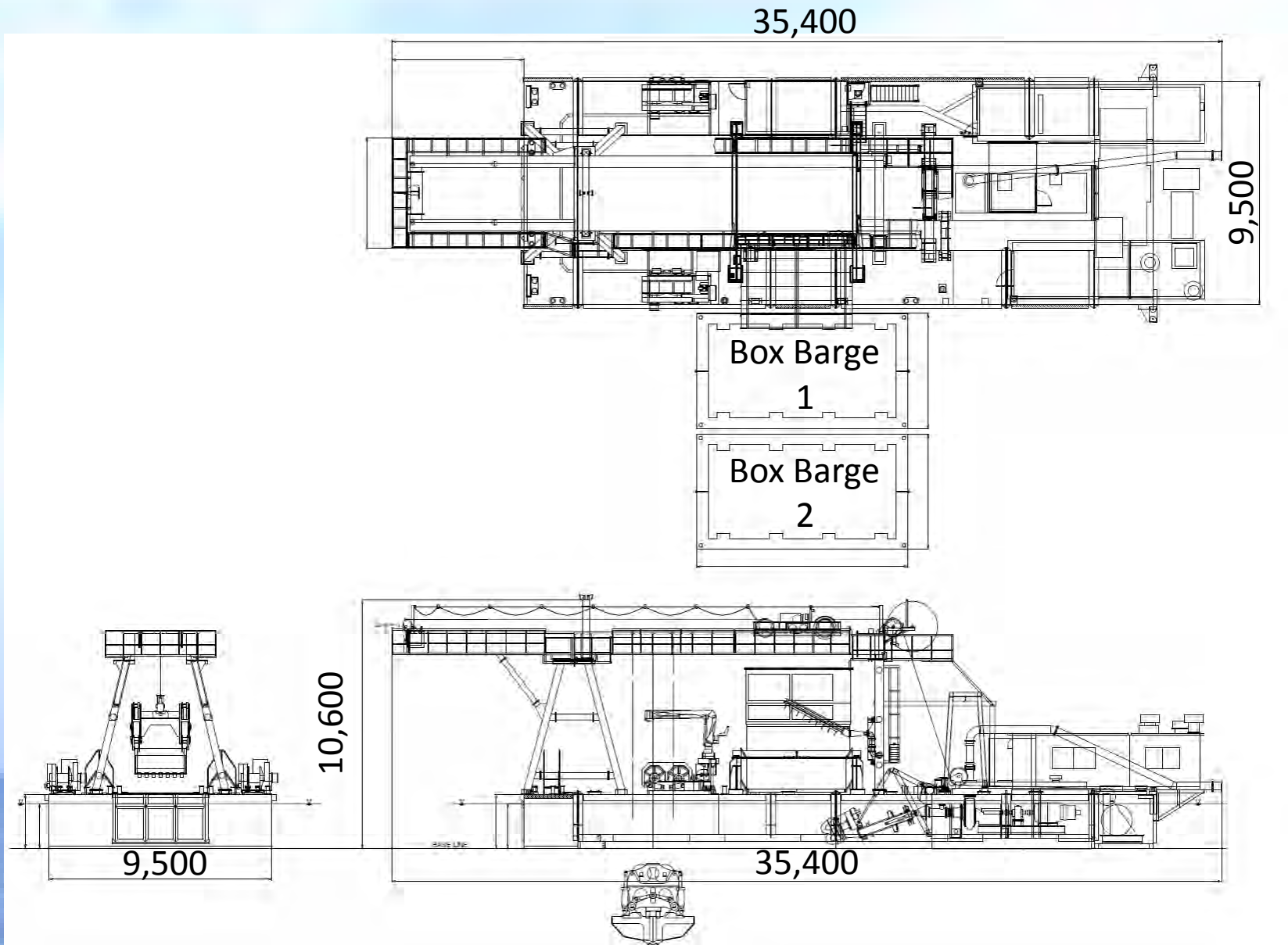


# CONSTRUCTION OUTLINE AND EQUIPMENT SPECIFICATION

## Specifications of Major Equipment

Name	Main equipment	Quantity
Grab Dredger	Grab bucket by Hydraulic type( 5.5m <sup>3</sup> )×1set	1 set
	Main pump( 240kW)×1set	
Booster Barge	Booster Pumps (300kW)× 2 sets	1 set
Discharge pipe line	Offshore Pipe line( φ300×6,000L/set)	2,500m
	Floater (6,000L/set)	
	Rubber Sleeve (φ300×900L/set)	
Box Barge to carry obstructions	Loading capacity(19.6 KN)	2sets
Anchor barge	D51.5KW,8.82KN(Lifting capacity)	1 set
Power facility for construction	3φ-AC6KV/AC3KV-1,500KVA-50Hz	1 set





Arrangement of dredger



(Lowering of floating part)



(Assemble of floating part)



(Insert of Hopper part)



(Insert of Pump room part)



(Completion of lower part)



(Assemble of upper part)



(Assemble of girder part)



(Completion of Dredger Barge)

# Assembling procedure





(Lowering of floating part)



(Assemble of floating part)



(Insert of Hopper part)



(Insert of Pump room part)



(Completion of lower part)



(Assemble of upper part)



(Assemble of girder part)



(Completion of Dredger Barge)

# Assembling procedure



# Dredging, dismantle and countermeasure during winter



Trial before dredging



Video of Actual Dredging

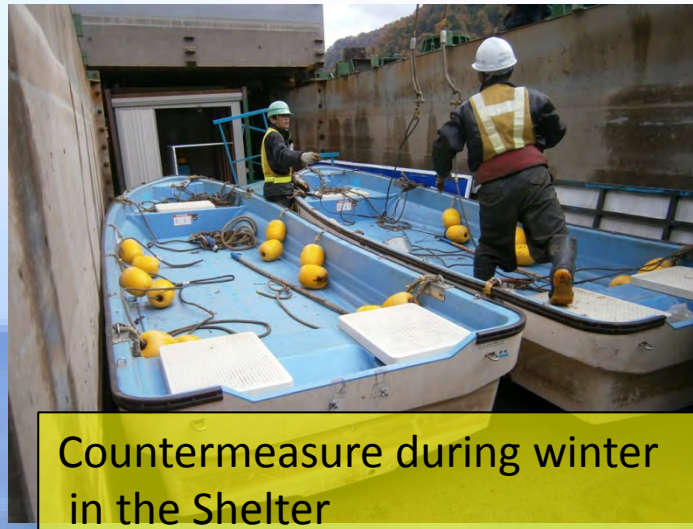
# Dredging, dismantle and countermeasure during winter



Dismantle of Dredger Barge



Dismantle of Booster Barge



Countermeasure during winter  
in the Shelter



Completion of Countermeasure  
during winter

Dismantling and countermeasure during winter

# MAIN FEATURES OF THE METHOD

**1. All parts transported by truck and assembled at site.**

**The site was limited area and access road is very narrow to transport to site.**



**Transportation of Equipment Parts**

## 2. High efficiency dredging by employing a grab bucket



Figure Dredging Operation

### 3. Installation of screen with high pressure water pump to rapidly separate sand from other obstruction



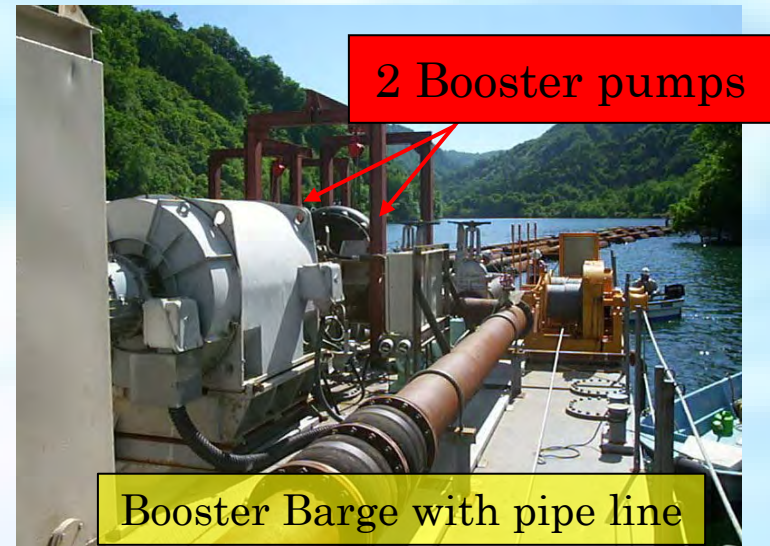
Video of Overall screen operated by hydraulic power



Screening for Separation of sand from other obstructions



## 4. Slurry discharge at long distance to prevent any obstruction from flowing back to intake generator



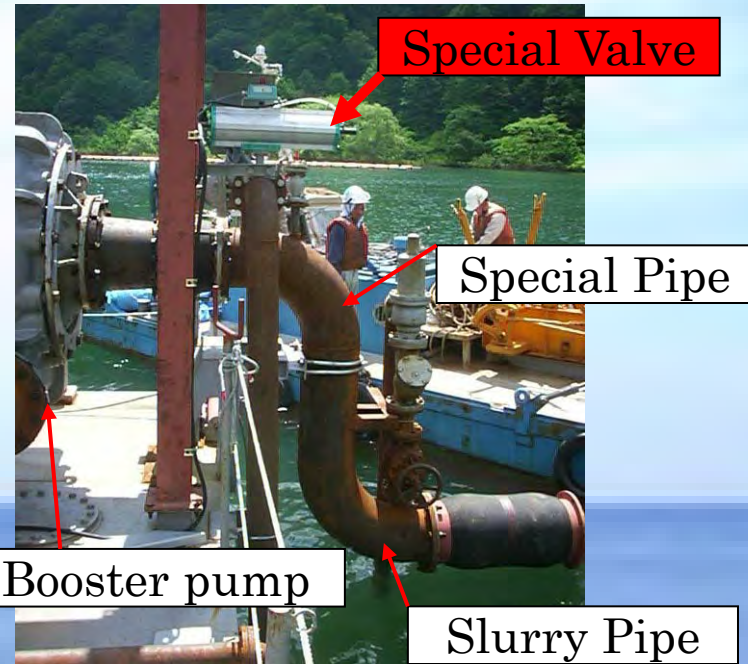
Long distance Discharge by main pump and booster pumps

## 5. Automatic remote control of booster pump including auxiliary equipment

Purpose : ① Unmanned operation, ② Countermeasure to cavitations.



Remote control from Grab Dredger



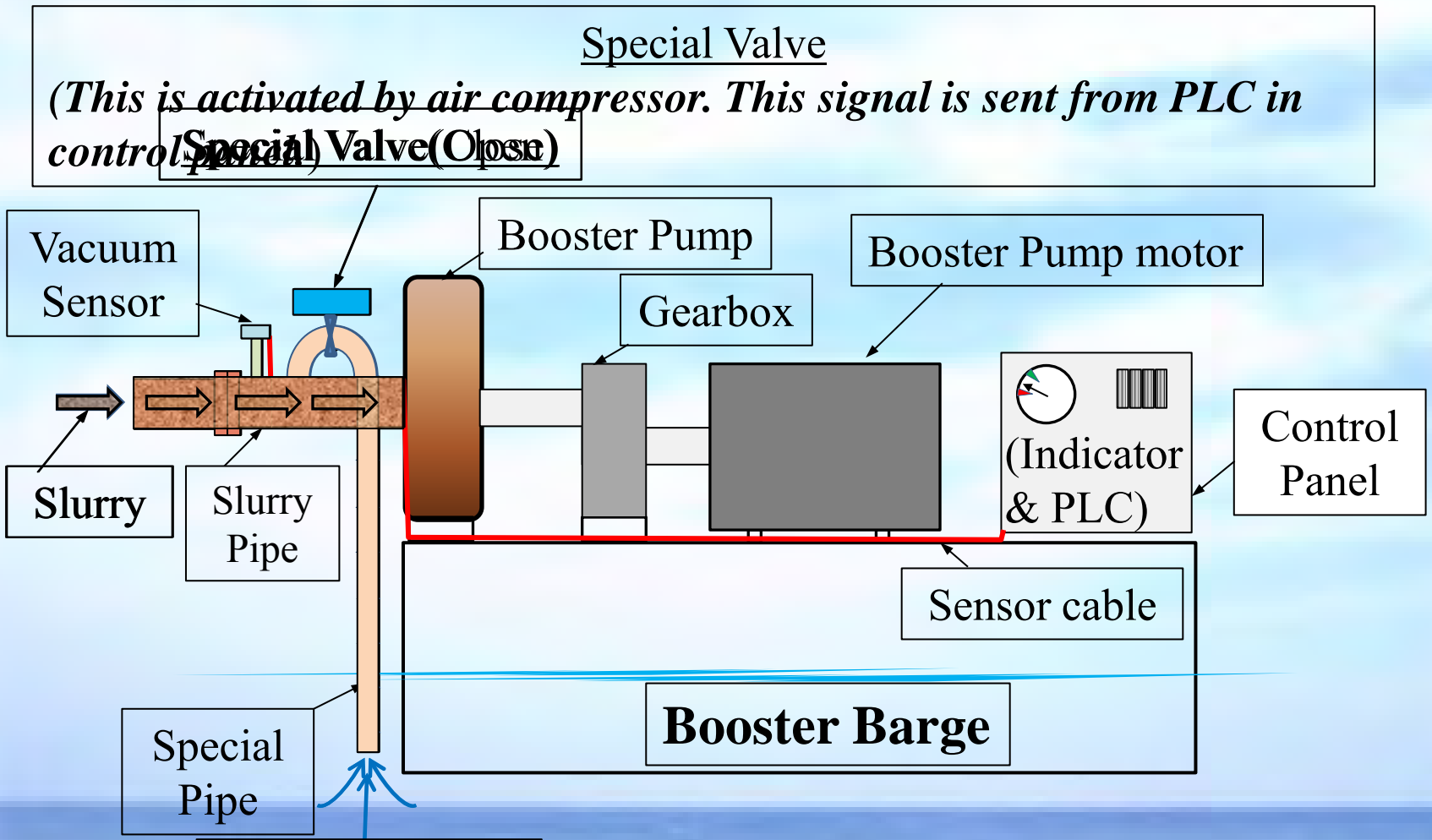
Special Valve

Special Pipe

Booster pump

Slurry Pipe

**Remote control operation**



*\* Suction Water Cavitations Opening and closing: Due to detection value by vacuum sensor with timer setting*

Figure Typical drawing of valve operation

# CONCLUSION

This method is suitable to dam maintenance and the adoption is expected to increase rapidly in the future.

As of 2015, this method has been performed with total production of about 1.5 million cubic meter and still continuing to employ.

Penta-Ocean will continuously investigate and develop this method for other needs.

to various site conditions.

Thank you very much!

