Measures to make Horikawa River Limpid

Implementation by Nagoya City

Sep. 27th 2014

Nagoya City
Greenification & PublicWorks Bureau
River Dep. River Plannning Div.

■ Reservation of Water Source

◆ Use of Shallow Ground Water
Upstream area of Horikawa River

Reservation of Water Source

◆ Use of Shallow Ground Water
Upstream area of Horikawa River

Reservation of Additional Water Source（FY2014）

◆ Upstream of Shiga Bridge
0.01 m3/s of water will be added（March 2015）

Improvement of Water Quality

◆Removal of Sludge

FY 1994～2013

146,000 m^3 of sludge had been removed

Reservation of Water Source

◆Use of Reclaimed Wastewater

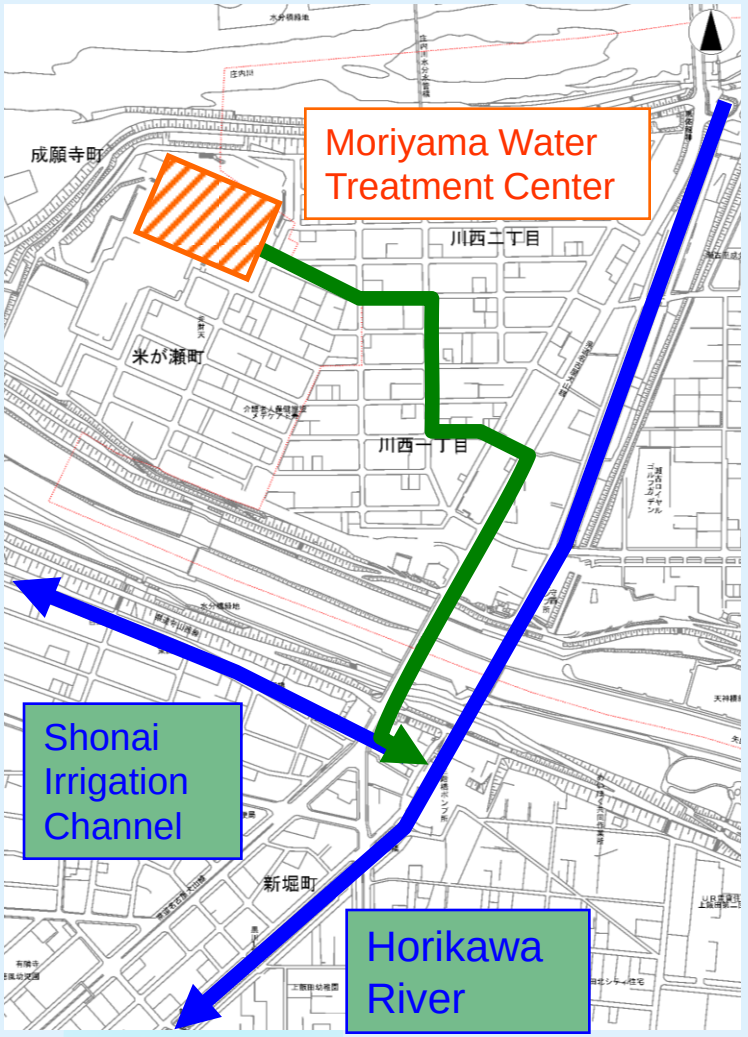
Max. 4,000m^3**/day** of wastewater reclaimed at Moriyama Water Treatment Center has been conducted into Horikawa River （since Aug. 2011）

Flat membrane unit in the aerobic tank
(400 sheets × 12 units)

Upper membrane case
(cartridge storing 200 sheets)

Lower membrane case
(cartridge storing 200 sheets)

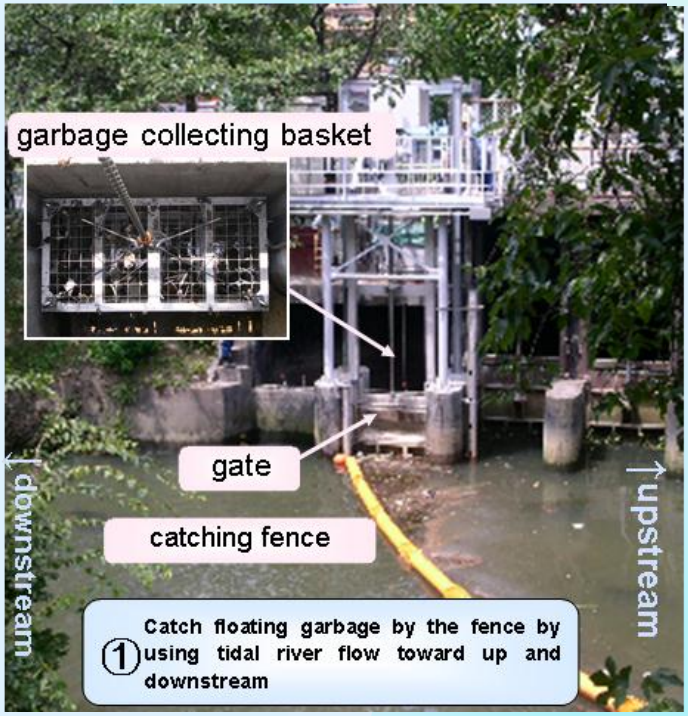
Flat membrane unit



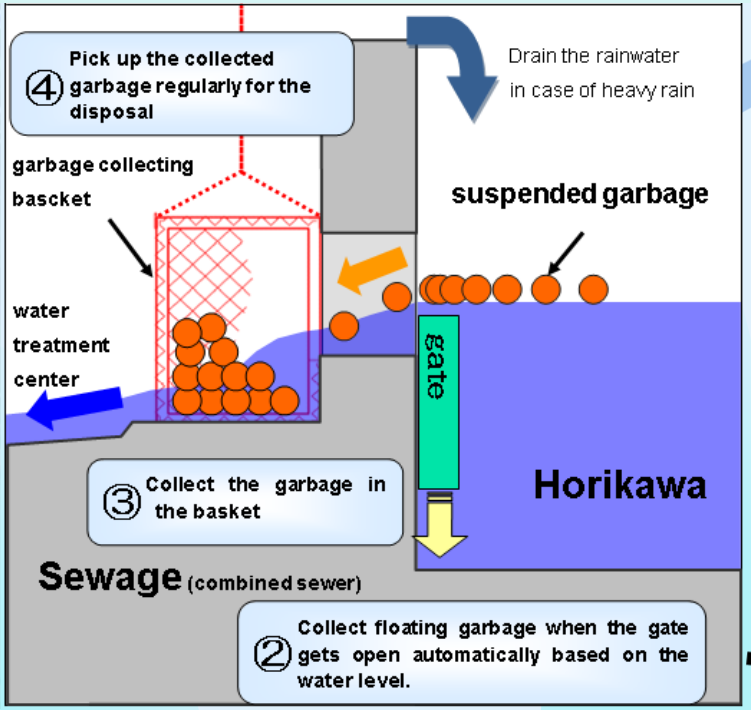
※Reclaimed wastewater is conducted during irrigation season(Apr.-Oct.)

Removal and Inflow reduction of Pollutants

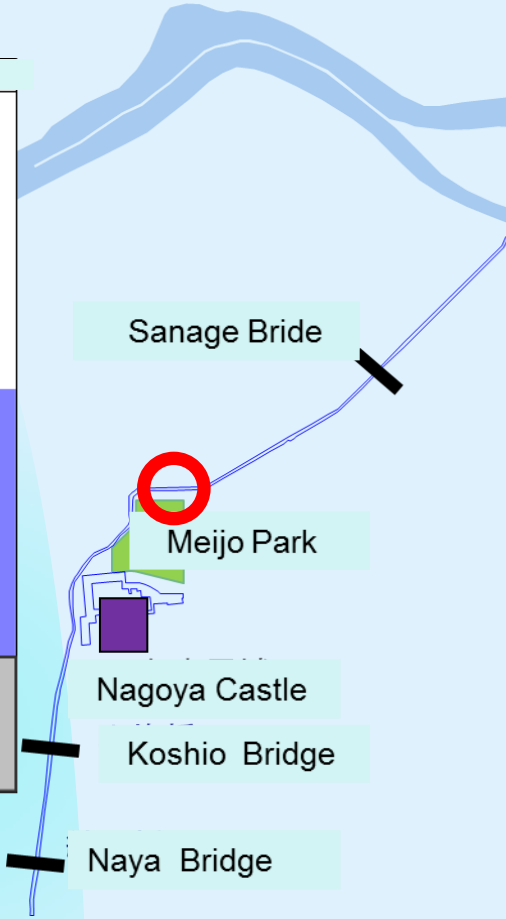
◆Garbage Catcher（below Johoku Bridge）



Situation of the facility



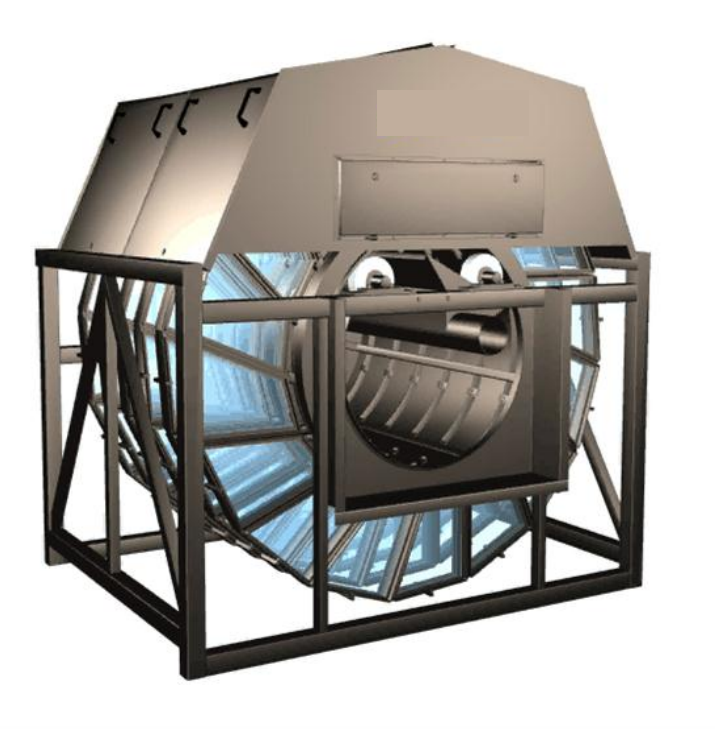
Cross section image



FY 2013 collection result　0.8t

Removal and Inflow reduction of Pollutants

◆ Advanced water treatment in Meijo Water Treatment Center



Filtering equipment (disc filters) removes fine particles remaining in treated water.

	Average before introduction (2007～2009)		Average (2011～2013)
BOD	5.5	22% down	4.3
SS	3.3	Over 70% down	1.0

Removal and Inflow reduction of Pollutants

◆ Control of combined sewer overflow

Rain-water reservoirs (RWR) for pollution control are constructed for storing rainwater temporarily and decreasing pollution load.

Ozone RWR

Completed in 2006
（12,000m³）

Horikawa-Ugan RWR

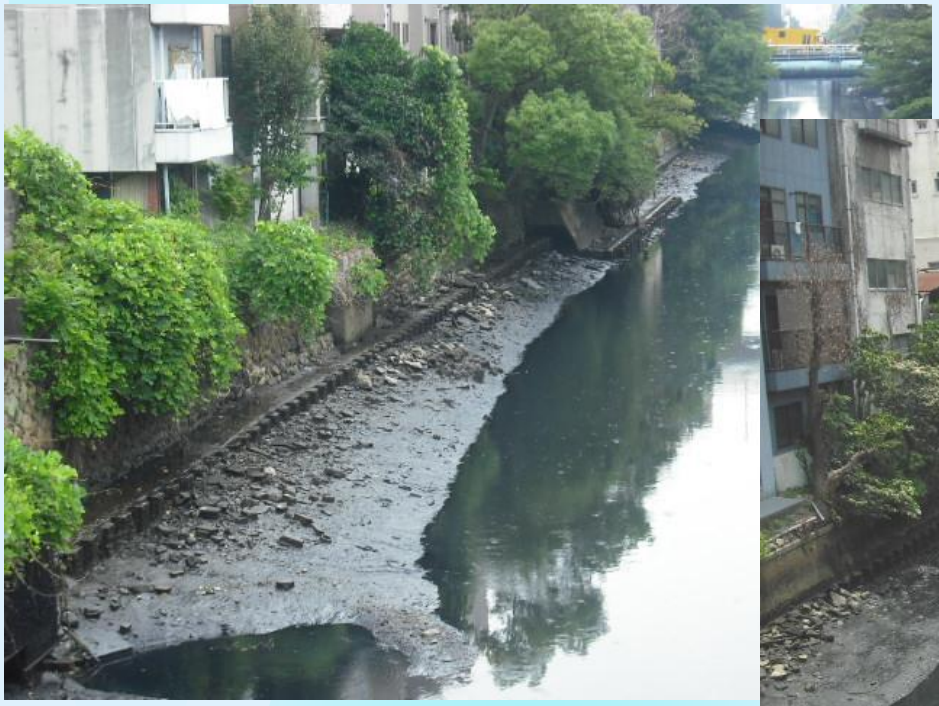
Completed in 2010
（13,000m³）

Horikawa-Sagan RWR

Under construction
（14,000m³）

Appearance of Sludge

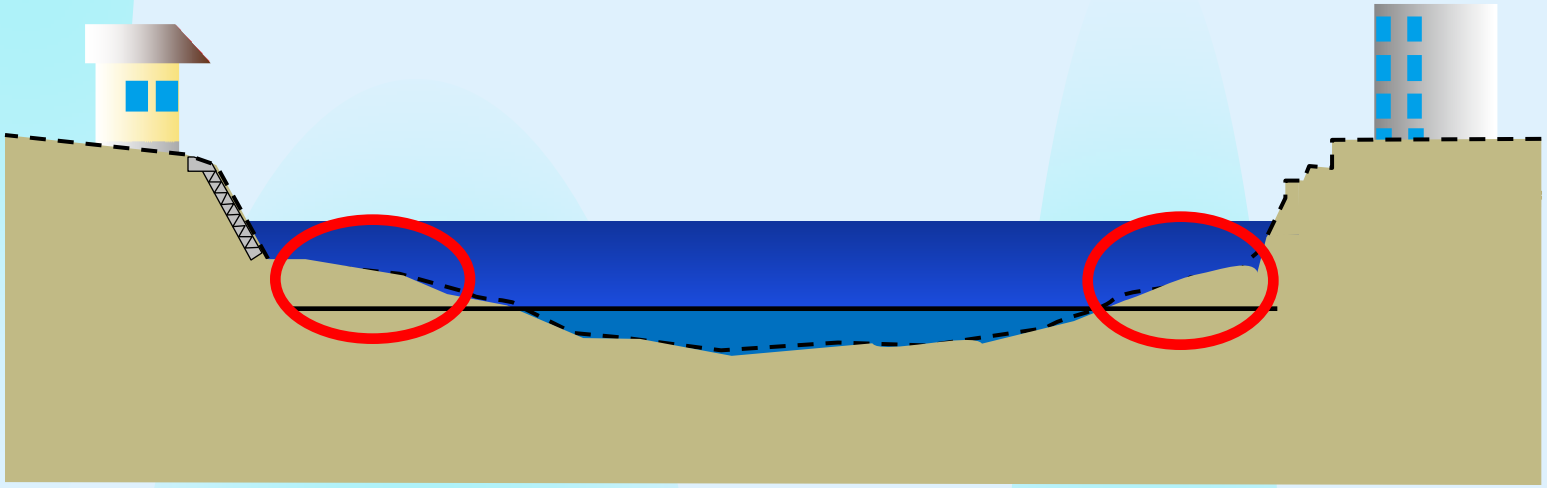
Sludge appears from river bed on ebb tide.



Toxic and stinking H_2S gasses pass out from exposed sludge.

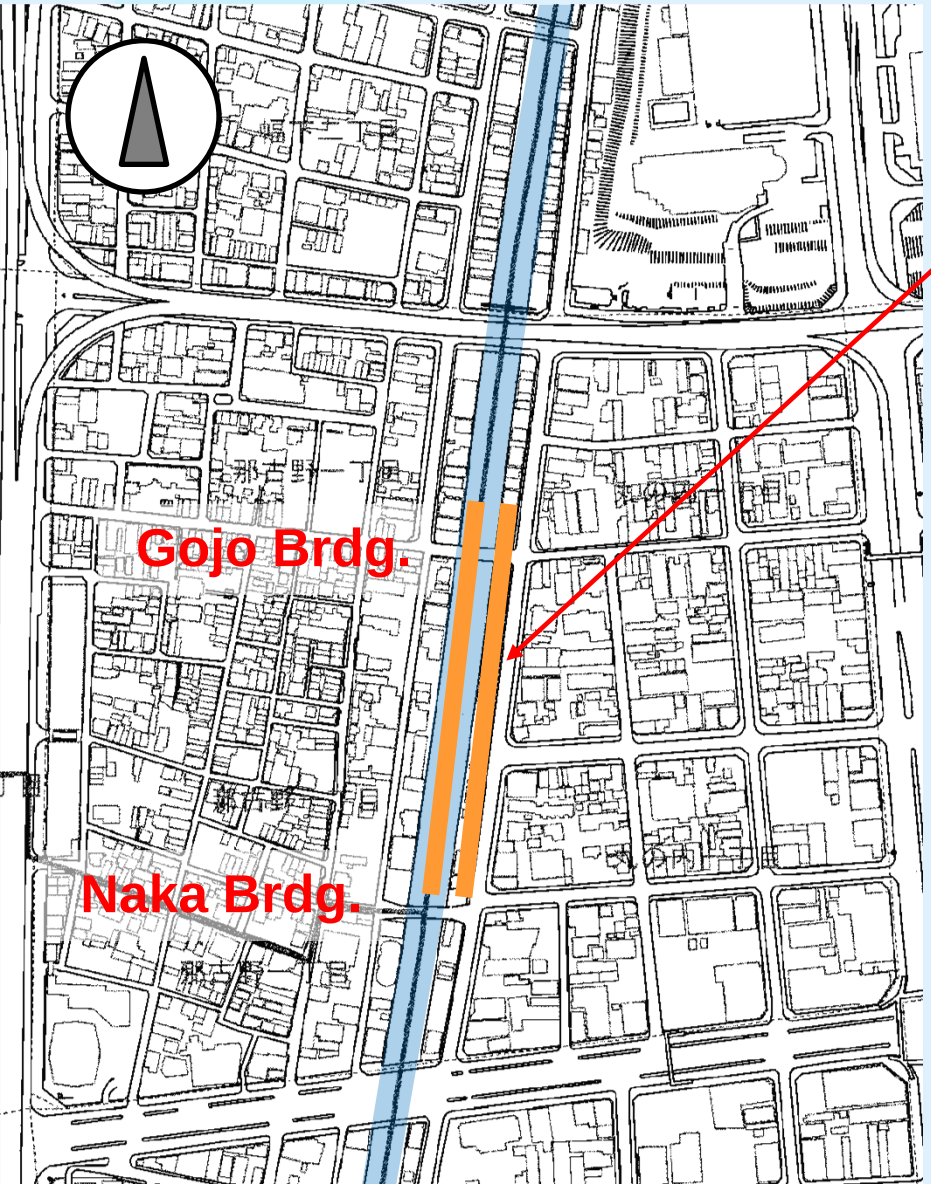
Outline of Clarification Experiments

- We implemented several clarification experiments focused on sludge appeared on ebb tide.

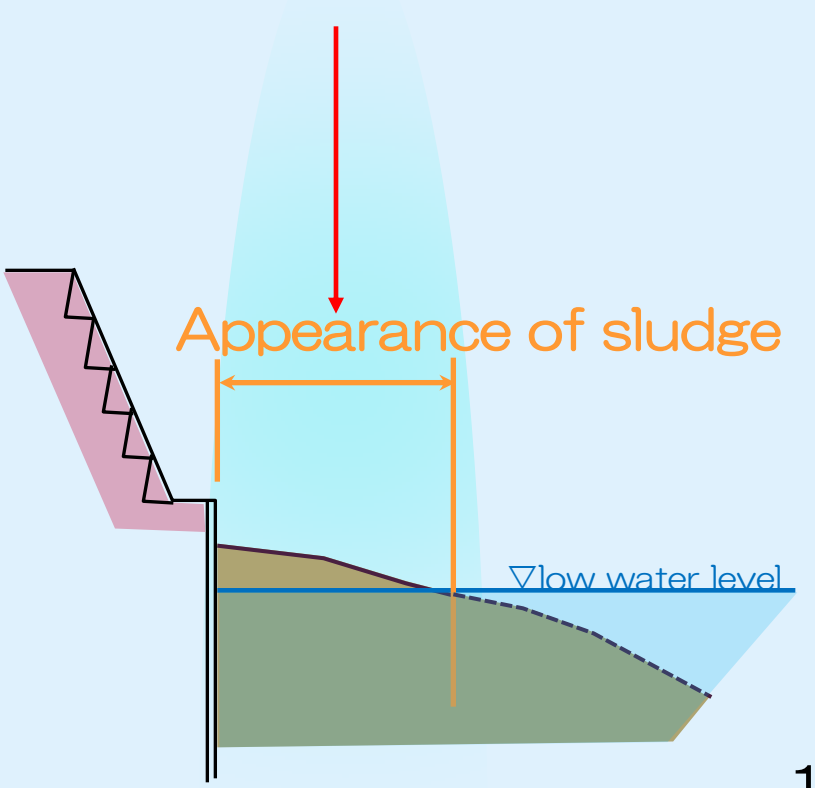


Outline of Clarification Experiments

■ Location of Experiments



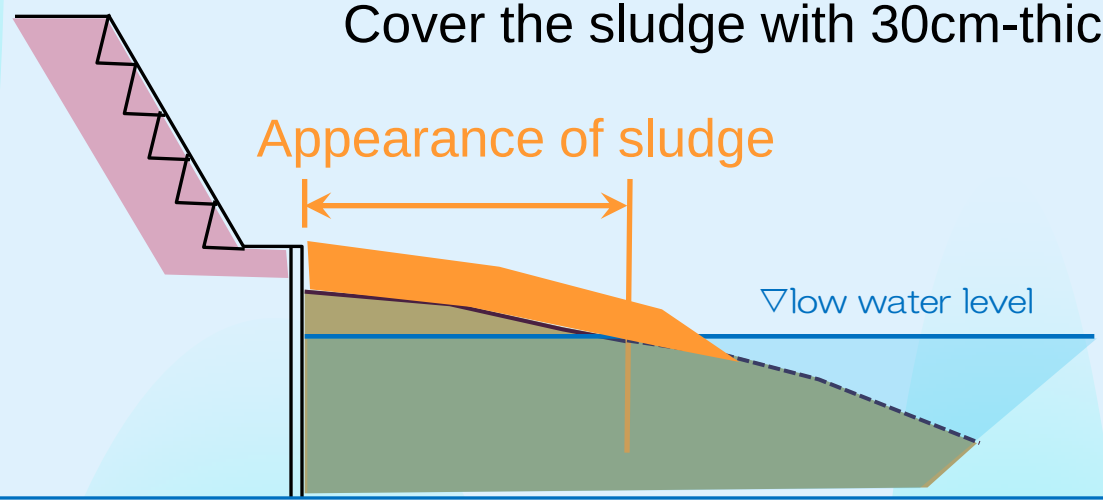
- about 300m long
- 3m width from each edge



Outline of Clarification Experiments

■ Experiment ① cover with sand bed

Cover the sludge with 30cm-thick sand bed



【Expected effects】

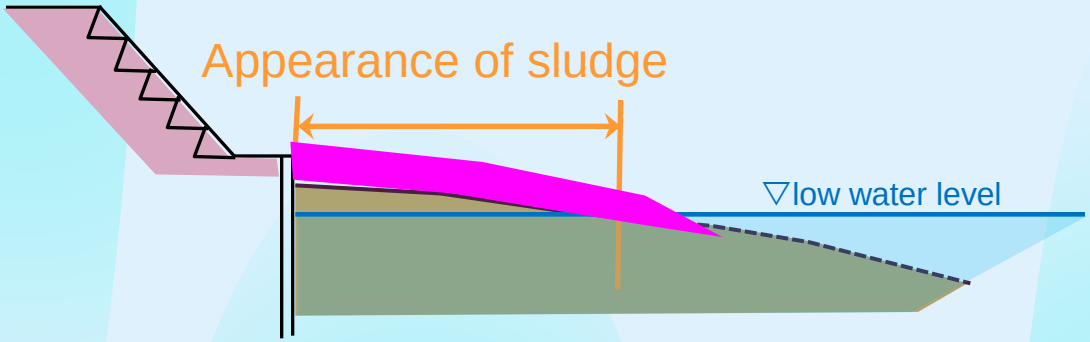
- inhibit elution of nutrient salt ⇒ prevent deterioration of water quality
- inhibit generation of H_2S ⇒ remove a bad odor
- as H_2S is inhibited, ecosystem is getting restored and water quality will be more improved.

Outline of Clarification Experiments

■ Experiment ② cover with clarification materials

Cover the sludge with 30cm-thick clarification materials*

*made from solid clinker ash
(by-product of coal thermal power station)
Work as H_2S absorber for its porousness



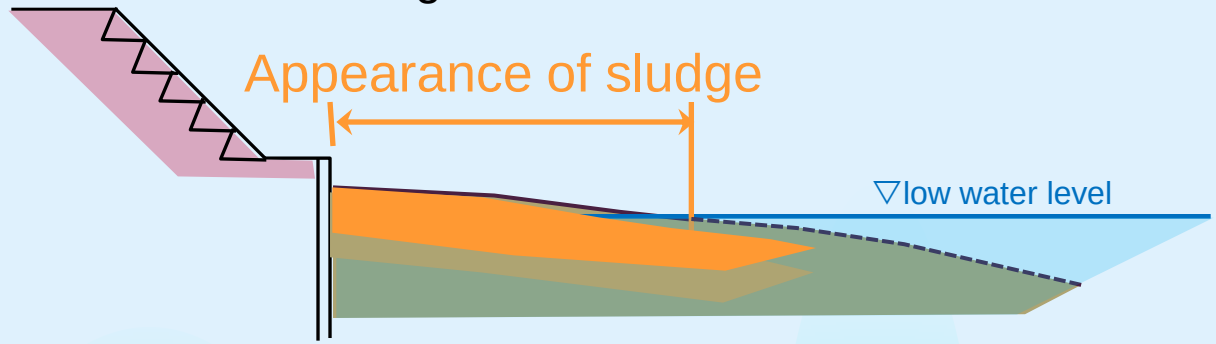
【Expected effects】

- perform like sand bed
- with feature of clarification material, might be able to leads better result than sand bed cover

Outline of Clarification Experiments

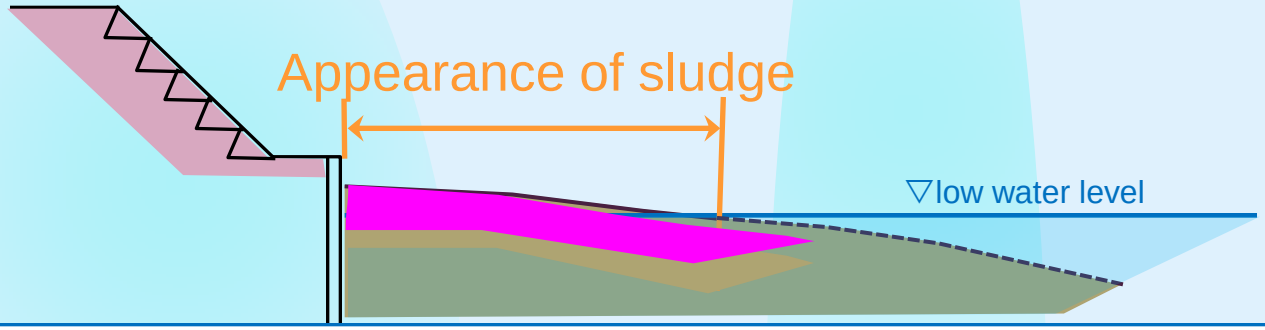
■ Experiment ③ cover with sand bed（after removing sludge）

remove 30cm-thick sludge, and cover with same-thick sand bed



④ cover with clarification materials（after removing sludge）

remove 30cm-thick sludge, and cover with same-thick materials

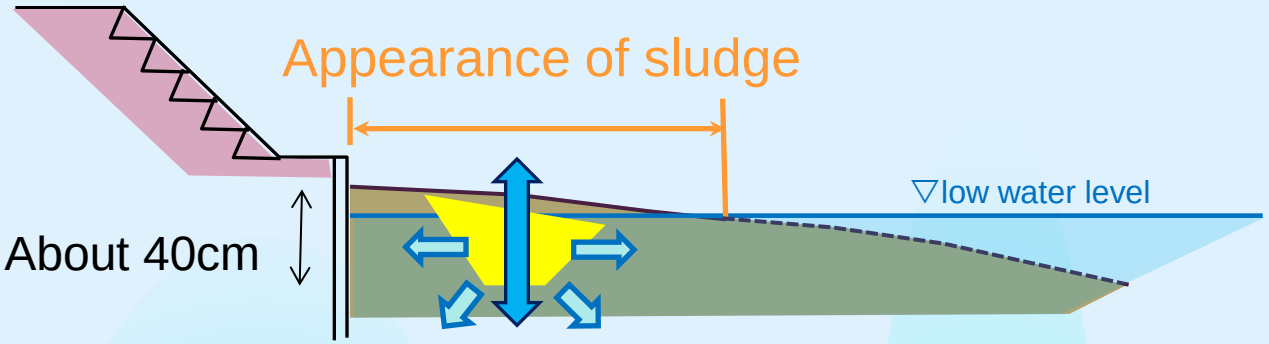


We focused on difference between the case of covering and the case of covering after removing sludge.

Outline of Clarification Experiments

■Experiment ⑤ settle infiltrator

settle corn-shaped infiltrators made with solid clinker ash every 1m through sludge bed



【mechanism of infiltrator】

- stream was generated inside the facilities by ebb and flow
- supply bottom layer with oxygen ⇒ improve the bottom layer around facilities

【Expected effects】

- improve sludge layer by supplying it with oxygen
- the ecosystem getting restored and the water quality will be improved more

Outline of Clarification Experiments

- Images after the experiments

Present condition

Experiment image

- Plan of monitoring survey

We verify effect of experiments for several years.

Survey items…bottom layer, odor, benthic organism