



12th Asia-Pacific Eco-Business Forum in Kawasaki
第12回アジア・太平洋エコビジネスフォーラム

Session 2 Improvement of Environment and International Contribution by Companies in Kawasaki City
川崎発企業による環境改善に係る国際貢献について

Realizing Sustainable Water Treatment by Eco-Friendly Technology of Sand Filtration

持続可能な水処理技術を実現する最先端浄水技術

NIHON GENRYO
Water Treatment Technology

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日本原料株式会社



Established in 1939.

昭和14年創業

NIHON GENRYO was established in 1939. As of today, we have worked together with the development of Japanese Water Works for over 75 years. Our Filter Media is adopted by more than 80% of Water Purification Plants in Japan.

日本原料は1939年に創業したろ過材の専門メーカーです。日本唯一のろ過材メーカーとして戦後の復興から高度経済成長期の浄水場インフラ整備を、全国の水道事業体とともに歩んできました。全国浄水場の80%以上で当社のろ過材をご利用いただいています。



More than 80% of drinking water in Japan pass through our filter media.

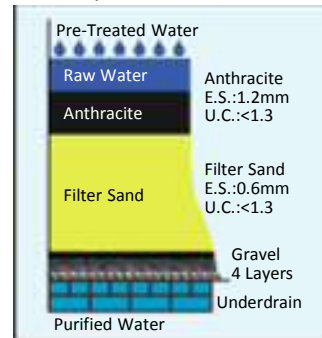


Outline of Sand Filtration

砂ろ過とは



Filter Layer



Typical Filter Layer

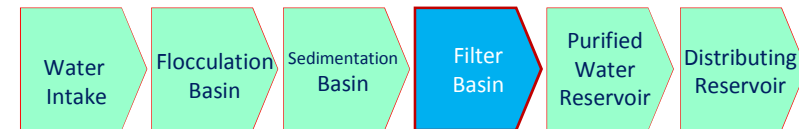
Common water purification methods!

Sand Filtration is the most common and traditional. Water goes through the filter media from the top to the bottom. The layer of filter consists of Anthracite, the sand and gravels. The sand filtration is the most important process in the flow at the water purification plant.

砂ろ過は最も一般的で昔からある信頼性の高い手法です。アンスラサイトと砂などから構成される「ろ過層」を水が垂直に(重力により)流れることによって水を浄化します。

浄水場のフローの中でも最も重要な工程です。

Water Treatment Flow in Water Purification Plant



Filter Media

ろ過材

We produce and supply several kinds of Filter Media in conformity with Japan Water Works Association(JWWA) regulation. We have developed new products, for example, the sand for manganese remove, color remove and so on. We propose suitable Filter Media depends on raw water quality. Certificated ISO 9000's.

日本原料では日本水道協会(JWWA)の規格に準拠した製品を製造・販売しています。

マンガン除去ろ過材や色度除去ろ過材など新しい製品の開発も行っており、創業以来の長年にわたる経験から原水の水質に見合った水処理を提案しています。



Filter Sand



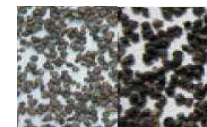
Filter Gravel



Anthracite(Hongay coal)



New Color Cutter Light



Special Manganese Media



Manganese Sand



Activated Carbon



Mesalite



Garnet



Biotite monzonite porphyry



Ion-exchange Resin

Every purification process needs exchange of filter!

すべてのろ過プロセスではフィルター交換が必要です。

Every kind of filter such as paper, cloth, granular media and membrane filter is getting dirty. Therefore, the filter needs to be exchanged after long time use. However, **this exchange work is required cost and time.**

砂ろ過、膜ろ過、布によるろ過など、すべてのろ過工程では、フィルターは徐々に汚れて目詰まりを起こし、交換しなければなりません。このフィルター交換作業がとても煩わしく、持続した浄水処理の妨げになっています。



After filtration, it is necessary for the cloth to be washed to reuse.



Membrane cartridge is exchanged for keeping its performance.



Filter exchange is required because the granular filter media is clogged and fixed by Suspended Solid.

How Raw (New) sand becomes dirty and clogged?

ろ過材が汚れる仕組み



Backwashing



Inside of filter basin



DAIRY MAINTENANCE WORK (日々のメンテナンス)

- ✓ Backwash (逆流洗浄)
- ✓ Surface wash (表面洗浄)
- ✓ Air wash (空気洗浄)

DAIRY MAINTENANCE can not remove the attached object perfectly because the sludge is accumulated on the filter media, little by little.

しかし、このメンテナンスでは洗浄が不十分で、洗浄しきれない濁質が徐々にろ過材を汚染する

The attached sludge harden firmly with changing them into "Hard Sludge" layer.

附着物層はやがて強固にろ過材の周りを凝着物層として覆い、その周りに附着物層が形成され、ろ過材の汚染と肥大化が進む

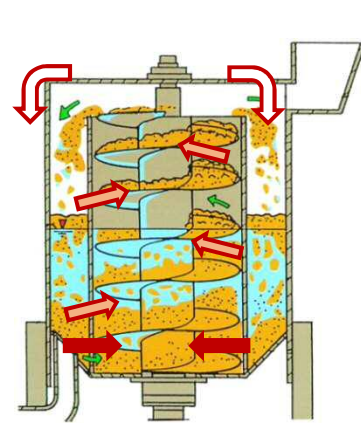
We developed Eco-friendly Sand Washing Technology to make Filter Media the best condition.

汚れたろ過材を再生させる洗浄技術

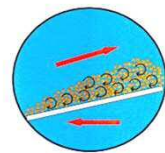
To satisfy the requirement for sustainable water supply, we developed new washing technology without using chemicals and cleaning agents to make it the same condition as new filter media. The new washing method is conducted by only water and physical actions. This is evolutionary technology.

持続可能な浄水処理のために、今まで廃棄していた汚れたろ過材を化学薬品や洗浄剤などを使用しないで、水と物理の力だけで新砂同様まで洗浄して再利用できる新しい洗浄技術を開発しました。

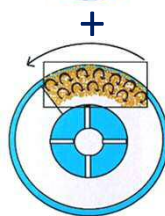
It is “SIPHON” washing technology



SIPHON washing machine



Vertical vortex is created in each sand grain by gravity and scooping up force. スパイラルによって掻き上げられる揚力と重力によってろ過材には縦の渦流が発生



Horizontal vortex is created in each sand grain by centrifugal and returning force after hitting the side of inner cylinder.

遠心力によってろ過材は外側に向かうが、内壁によって揺り戻され横の渦流が発生

3D Vortex
3次元の渦流

Twin vertical and horizontal vortexes make sand particles to knead each other in a three dimensional washing action

縦と横の渦流によってろ過材には複雑な3次元の渦流が発生し、お互いに揉み洗われる



This washing technology can wash used-dirty sand in a short time perfectly and the particle size does not be changed.

Acquired International Patents 33 countries

短時間でろ過材にこびりついた凝着物層まで剥離洗浄できる。ろ過材同士は同じ硬さ(硬度)であるため汚れだけを剥離して、粒の破碎はない。世界33か国で特許を取得した日本独自の技術。

SIPHON WASHING TECHNOLOGY

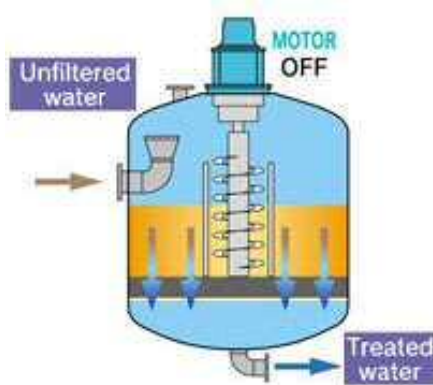
The Self-washing function built in the tank

シフォン洗浄技術を内蔵した浄水装置

Washing flow

1. Filtration

ろ過

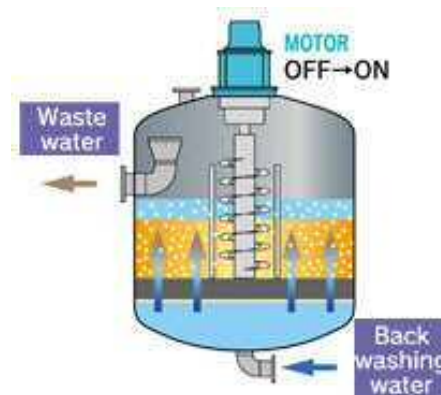


As with conventional filtration systems, filtration is conducted by down flow with pressure.

従来のろ過装置と同様に圧力式下向流でろ過を行います。中心部に内筒およびスクリーンが配置されていますが、この部分にもろ過材が充填される構造をとっており、ろ過装置全体でろ過がなされます。

2. Back washing

逆流洗浄



Backwashing is first conducted for a short period of time to fluidize filter media, and then Siphon Cleaning is conducted.

逆流洗浄を短時間行い、ろ過材を流動してから、シフォン洗浄を行います。

3. Siphon washing

シフォン洗浄



Filter media is washed by kneading with the upward force that pushes water and filter media up from the lower part to the upper part by the rotation of the screw and the downward force generated by gravity.

スクリーン回転により、水とろ過材を下部から上部に押し上げようとする力と重力による力を受け、ろ過材同士がもみ洗いをを行います。

4. Back washing

逆流洗浄



After Siphon Washing, backwashing is conducted to drain away washing water. Sludge is completely exfoliated from filter media to which Siphon Washing was applied, so sludge can be easily rinsed.

シフォン洗浄後、逆流洗浄を行い、洗浄水を排水します。シフォン洗浄が施されたるろ過材は汚泥分が完全に剥離されているため、すぐだけで艦隊に汚泥分を除去できます。

Value to Environment by “SIPHON” products

シフォン製品による環境へのメリット

Replacement of filter media is not necessary any more because of the Self-Washing Function (SIPHON WASHING) built in ろ過材交換不要な自己洗浄機能(シフォン洗浄機能)を内蔵

Permanent Type

 **SIPHON TANK**



“SIPHON TANK” can continuously produce the water with high quality **without replacing filter media**. SIPHON TANK is used for drinking water and water treatment in industrial area.

シフォンタンクは**ろ過材を交換することなく**、常に高品質な浄水ができます。ろ過された水は、飲料、工業的に使用できる。

Movable Type

Mobile
 **SIPHON TANK**



MOBILE SIPHON TANK is **compact** and **unified** each device together such as tank, piping, control panel, chemical dosing pumps and so on. It can be moved to the site where the water is needed and make clear (drinking) water there.

モバイルシフォンタンクは従来の設置型の『シフォンタンク』をコンパクトにしてユニット化し、充実した装備で車載も可能です。常に安定した水質が得られ、**ろ過材を交換が不要**です。移動が可能で設置後直ぐに給水が可能です。

✓ **Reducing industrial wastes**

Keeping filter media always clean. No need filter media exchange.

✓ **Reducing CO2 emissions in comparison with the conventional sand filtration devices**

✓ **Decrease the amount of backwashing water and electricity consumption for operation.**

■ 産業廃棄物の削減

■ CO2排出量を削減

■ 逆洗廃水量・電力量の減少

Case Studies in Japan and overseas Countries

国内外の導入事例



[Sony - Technology Center (in Sendai)]

Type – Siphon Tank/ST-2200
Tank size – 2200Φ X 2
Quantity of treated water - 40m³/hr
Pretreatment for pure water Process water



[Sumitomo Osaka Cement]

Type – Siphon Tank/ST-1500
Tank size – 1500Φ
Quantity of treated water - 25m³/hr
Wastewater treatment



[Yazaki Parts]

Type – Siphon Tank/ST-1500
Tank size –1500Φ
Quantity of treated water - 26m³/hr
Wastewater treatment



[Yame City]

Type – Mobile Siphon Tank/MST-1600
Tank size –1600Φ X 2
Quantity of treated water - 20m³/hr
Drinking water



[Miyaji purification plant(in Gero)]

Type – Siphon Tank/ST-900
Tank size – 900Φ
Quantity of treated water - 6.8m³/hr
Drinking water



[Private Company in Thailand]

Type – Siphon Tank/ST-1000
Tank size – 1000Φ
Quantity of treated water - 7.8m³/hr
Wastewater (Carbon) treatment

Contributing to Environment by Wastewater Treatment

廃水処理による環境への貢献

～ Case of Food Factory ～ 食品工場の場合

We installed “SIPHON TANK” for the wastewater treatment at Food factory



wastewater treatment plant



filtration machine of sand and activated carbon

The water treatment plant of this factory is operating for 3 years. The filter media needs to be exchanged. In case of the exchange of filter media, it costs a lot of money for purchasing new filter media, exchange work, disposal and so on. Furthermore, the factory is suspend for operation in case of work for filter media exchange.

食品工場は3年前に建設され運転が開始されましたが、すべてのろ過材交換がすでに必要な状況となっていました。ろ過材交換工事には、新しいろ過材の購入・運搬・搬入費用、使用済みろ過材の搬出・産廃処理費用が必要となります。さらに、工事のために工場の操業の一時停止などの処置も生じてきます。

Main of Cause is Scum include oil and fat



The wastewater include scum flow out from Sedimentation basin



The Scum

The scum is normally settled at the sedimentation basin. The scum sometimes leaks into the filter basin and it creates a bad effect to the filter media. This scum includes oil and fat negatively affect to the filter media.

通常スカムは沈殿池で沈殿しますが、溢れ出たスカムはろ過材に悪影響を及ぼしています。特にこのスカムに含まれる油脂がろ過材にとって問題です。

Result after installation of “SIPHON TANK”

■シフォン洗浄を導入した環境に対する結果

If the wastewater contains oil and fat flow tank, SIPHON TANK can always operate and keep the filter media clean.

■油脂を含んだ廃水を流してもシフォンならろ過材を洗浄可能

Before
3 years



After
No Need To Exchange

- | | |
|--|--------------------------|
| ✓ Reduction of Industrial waste | ■ 産業廃棄物の削減 |
| ✓ Reduction of CO ₂ emissions | ■ CO ₂ 排出量の削減 |
| ✓ Usage of wastewater treatment | ■ 廃水処理として利用 |

Case studies of Disaster recovery in overseas and domestic 災害復旧事例（国内外）



[Huge Typhoon]

Typhoon flooded Miyazaki, 2005.
30,000 households were suspended water supply.
We dispatched 3 MST and recovered WTP.



[Earthquake]

2008, magnitude 7.2 earthquake occurred in Iwate and Miyagi. Then we went there and Supplied drinking water with MST.



[Earthquake]

July, 2008, Magnitude 6.8 earthquake occurred in Northern part of Aomori. We went there and helped with MST.



[Heavy Raining]

Heavy rain hit Fukuoka in 2012.
MST and facilities were immediately installed
and the drinkable water smoothly provided.



[Huge Typhoon], Philippines

Huge typhoon hit Philippines in November, 2013.
We dispatched 7 people to disaster area and
installed water purification equipment MST.
We started drinking water supply for 20,000 people
there from December 28, 2013.



Recovery [Heavy Raining], Laos, R.D.P.

Heavy raining hit SARANAHN province, of Lao
People's Democratic Republic, September, 2013.
The truck-mounted MST-700 was dispatched to
the disaster site and provided drinking water
with 67,579 people by themselves.

Prepare for Natural Disasters

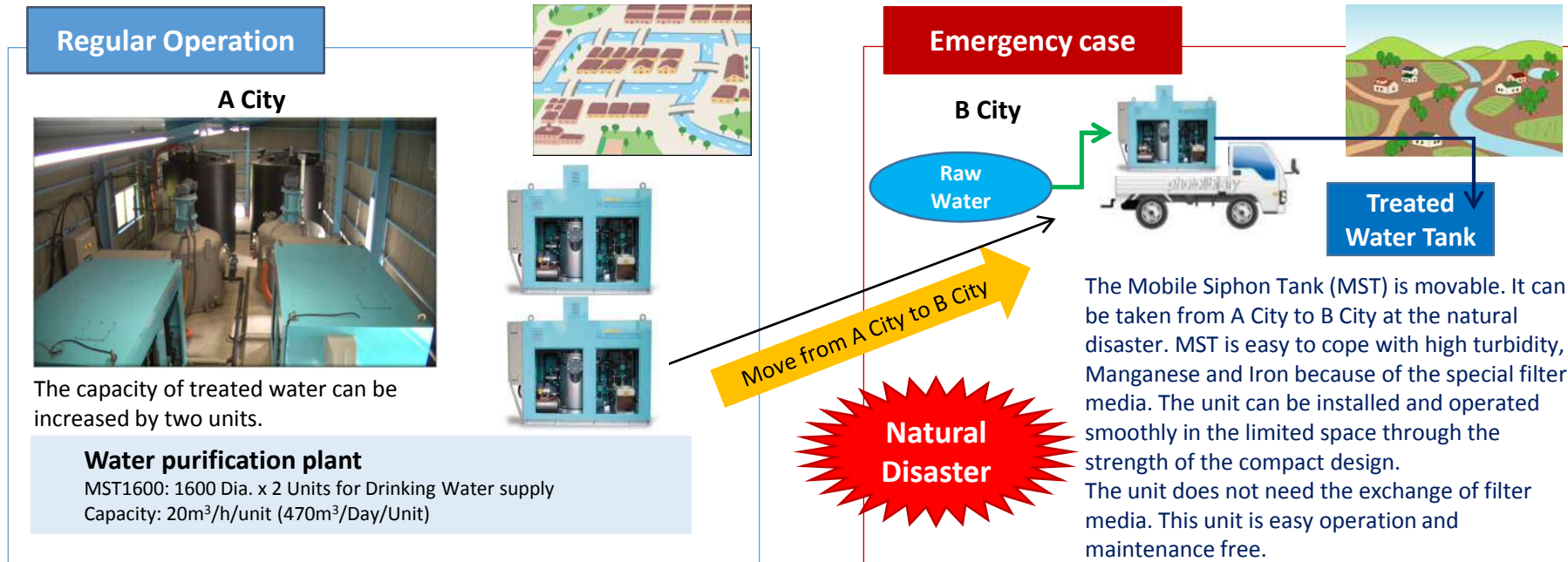
自然災害に備えて

Safe drinking water supply at the Natural Disasters by Climate Change

気候変動による自然災害でも安全な水を供給する

Mobile Siphon Tank is easily installed in short period and can cope with the several kinds of raw water with high turbidity, Manganese and Iron. This units is maintenance free and no need replace filter media.

MSTは、簡単に設置できさまざまな原水に対応します。例えば、高濁度原水や鉄、マンガンを含んだ原水にも対応します。しかもろ過材交換は不要ですから維持管理も簡単です。



New Idea for filter media from “Disposal” to “Recycle”

意識を“捨てる”から“リサイクルする”へ

New washing technology “SIPHON WASHING” is realized not only for sustainable safe water supply, but also Saving the limited natural resources (natural mineral) and reducing industrial waste.

最先端の洗浄方法、シフォン洗浄技術は持続可能な浄水処理だけでなく、天然鉱物資源であるろ過材を保全し、廃棄物を削減することも実現します。



[Workshop]

Q & A session and discussion after introducing our technology and products.

不明点がないよう質疑応答および、ディスカッションを行います。

[Workshop]

We are explaining the water treatment technology for sand filtration and “SIPHON WASHING”

ろ過砂による水処理技術やシフォン洗浄について説明しています。



[“SIPHON” Product]

We are introducing and explaining the “SIPHON WASHING TECHNOLOGY” by MST Unit to the Clients.

シフォン製品も製品を見てもらいながら、ろ過材洗浄の有用性について理解してもらうように努めています。

[Recycle Work]

We are introducing “KOUSEI KOJI(Recycling)” works .

リサイクル(更生)工事について見てもらいながら説明し、理解してもらいます。



“SIPHON WASHING TECHNOLOGY” creates new idea that we save the limited natural resources rather than the cost of recycling !

未だリサイクルの方が高価であるという意識が働いています。日本原料では「限りある資源を大切に使う」ことをシフォン洗浄技術とともに伝えています。

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Thank You
For
Your Kind Attention.

