

6th EWA / JSWA / WEF Joint Conference
„The Resilience of the Water Sector“
15-18 May 2018, Munich, Germany



Building and Utilizing the Wastewater Treatment Plant Network in Kobe City

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Background

Kobe city

Population	1,500,000
Area, km ²	560
Sanitary sewer, km	4,100
Storm sewer, km	660
Total capacity of WWTPs, m ³ /day	700,000
Average WW flow, m ³ /day	500,000



Background

Great Hanshin-Awaji Earthquake (GHAE)

-Jan 17 1995

-Magnitude 7.2

Death	4,600
Missing	2
Injured	15,000
Destroyed houses	67,000
Evacuees, at peak	240,000



Background

WW Infrastructure Damage by GHAE

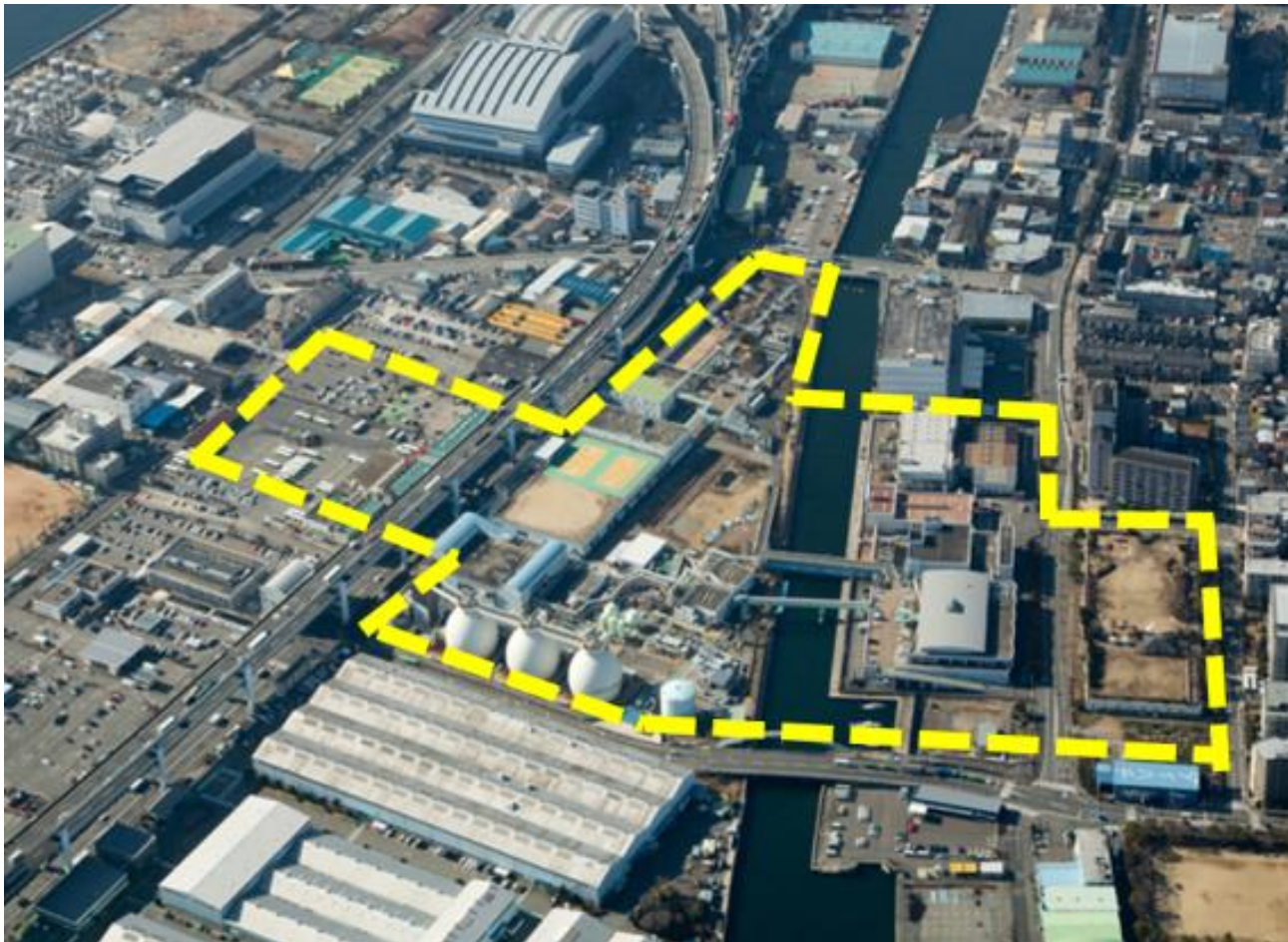
- Higashi-nada WWTP with 240,000m³/day capacity, the biggest, dysfunctional for 100days.
- Primary treatment only until recovery



Capacity Loss by Quake

WWTPs	Capacity (m ³ /day)	Capacity loss
Higashi-nada	225,000	Down to 0%
Port island	20,000	None
Chubu	78,000	Down to 50%
Suzurandai	44,000	None
Seibu	162,000	Down to 20%
Tarumi	134,000	None
Tamatsu	75,000	None

Aerial view of the Higashi-nada WWTP



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Emergency primary sedimentation at sheet-piled canal

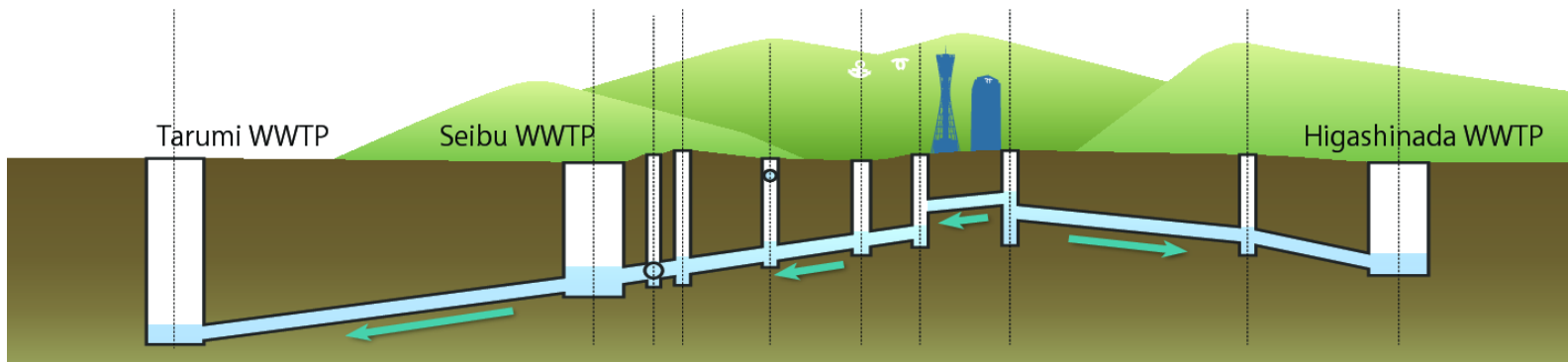
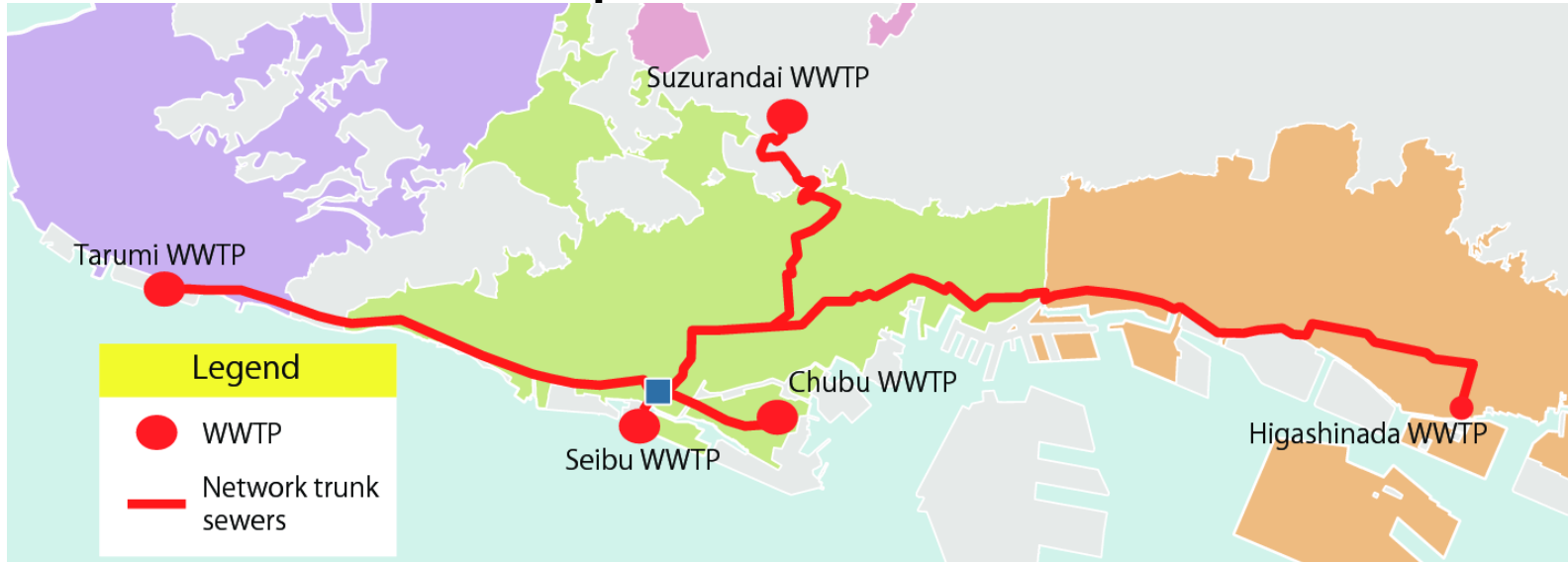


WWTPs network system

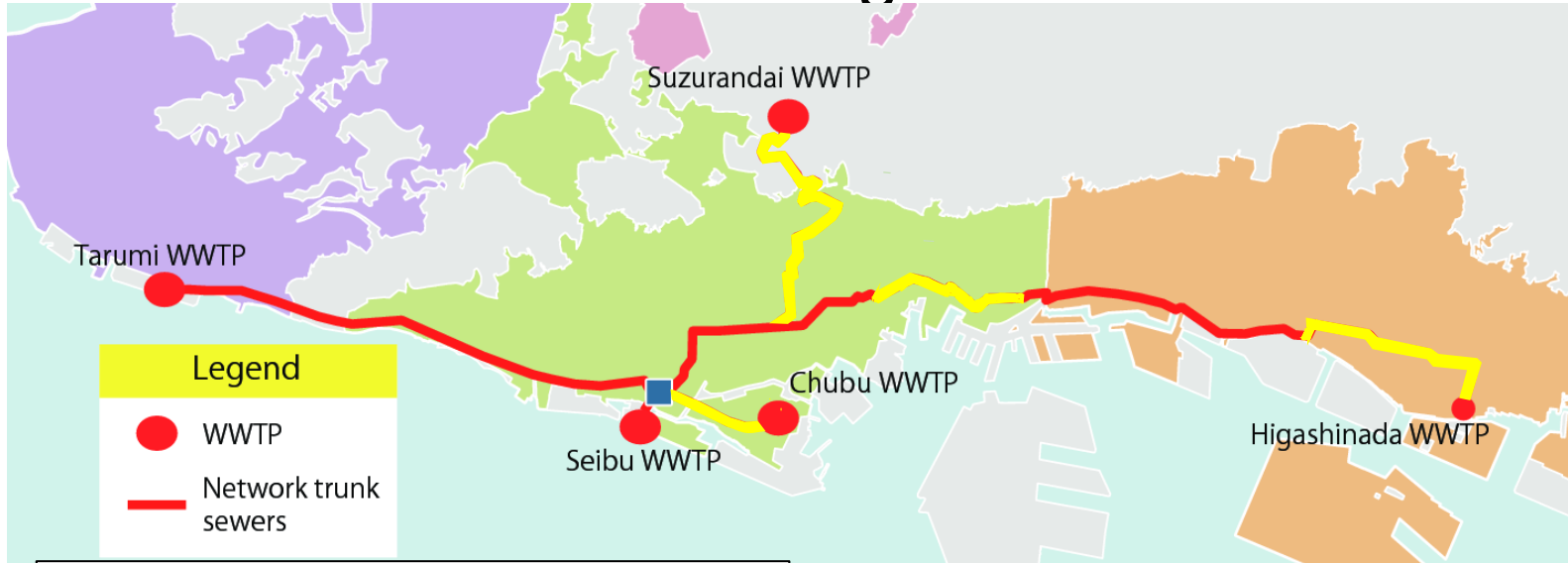
- Connecting several WWTPs with trunk sewers.
- Transport WW from Not-operational WWTP to operational WWTPs in Emergency.
→ Strengthen resilience
- Use of existing infrastructure to reduce construction cost.
- Routine use of network to seek additional benefit.



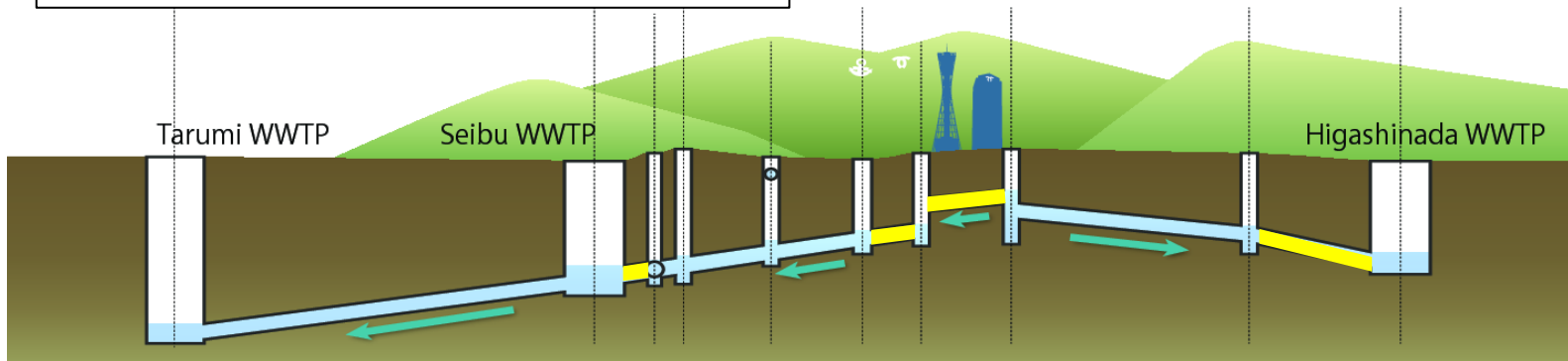
Route map and vertical section



Use of existing trunks



 **Yellow: Trunk, already existed**



Routine Use of Network, example

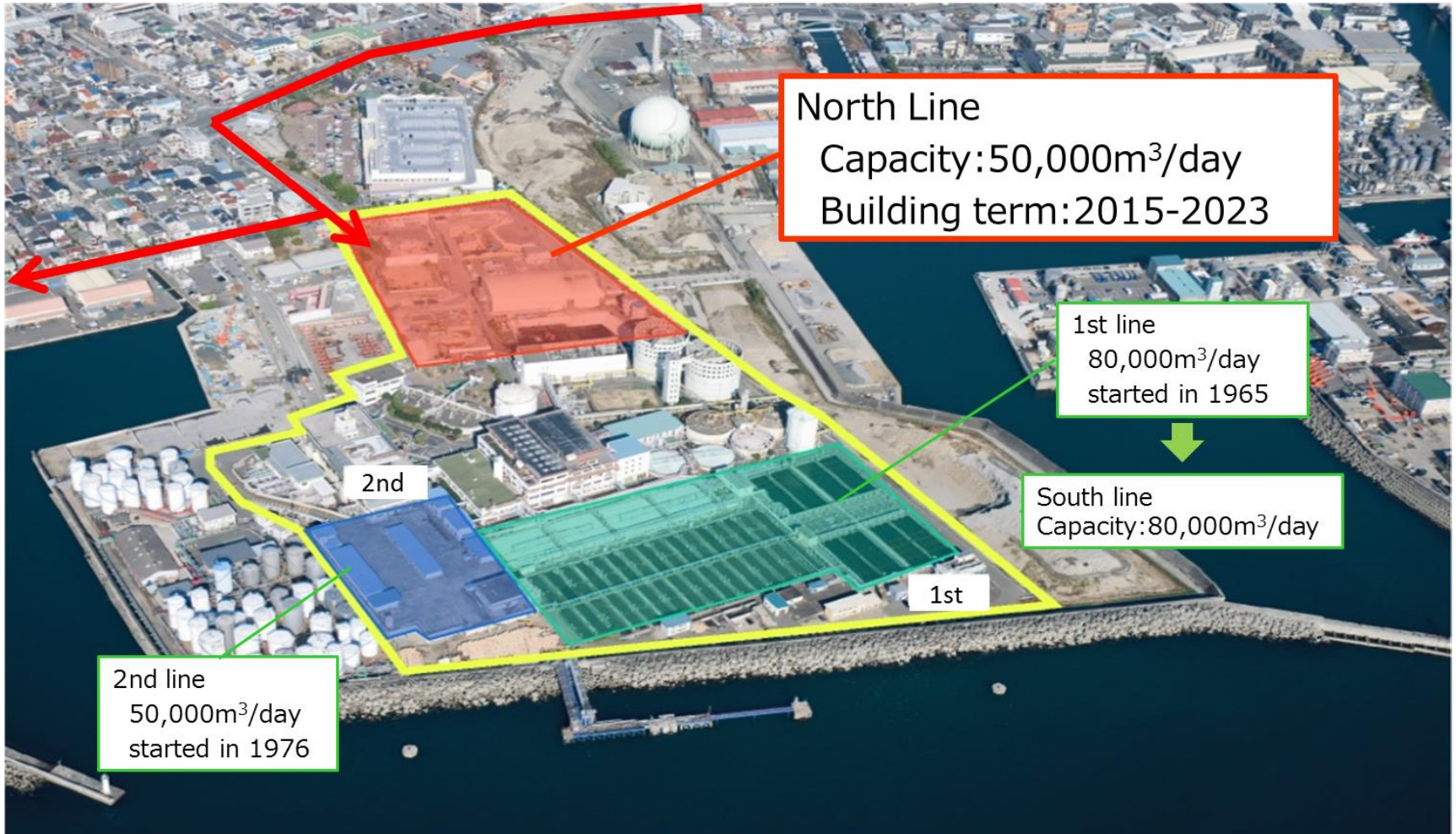
Rehab of Seibu WWTP, with a cap of 130,000m³/day

- Bypassing WW to the other WWTPs.
- Treatment at Tarumi WWTPs.

→ Rehab with no WW inflow ease and reduce cost of works.



Large-scale rehab of Seibu WWTP

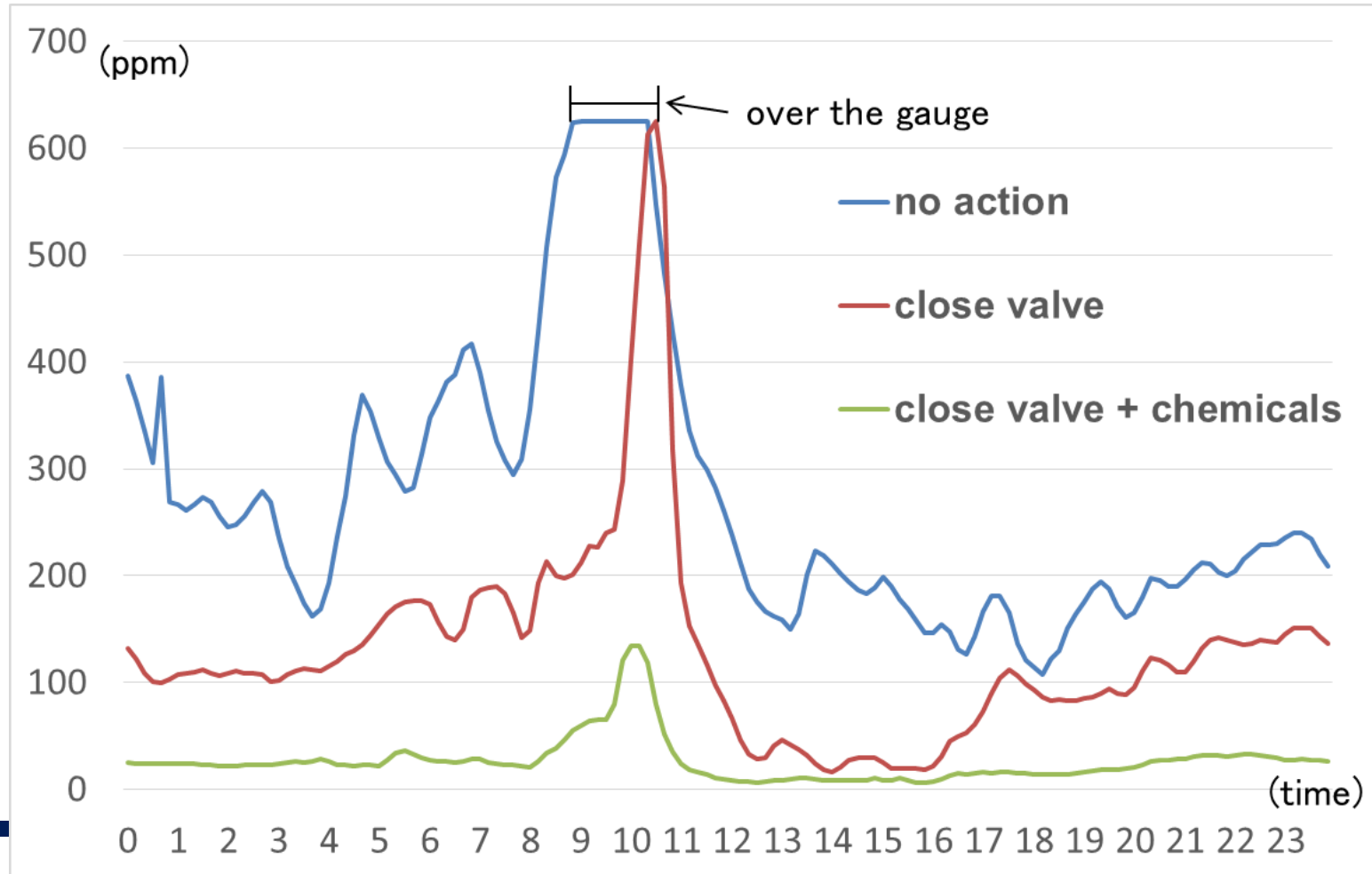


Challenges during the operation

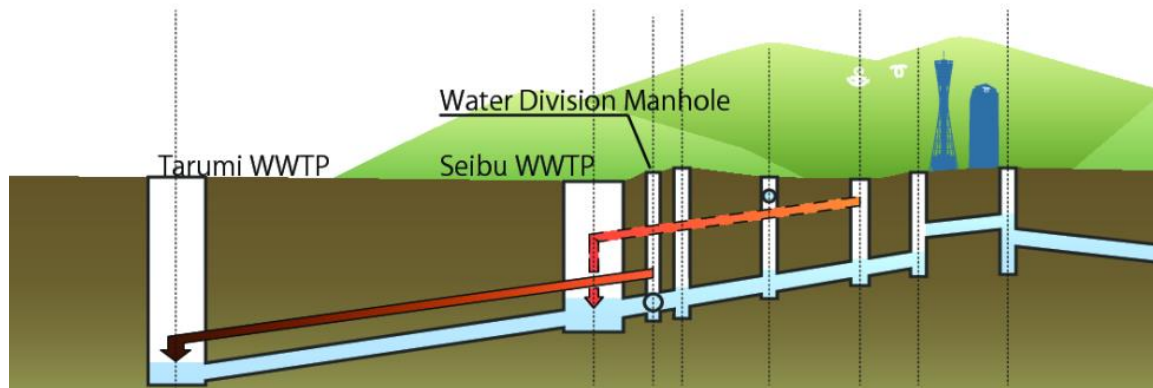
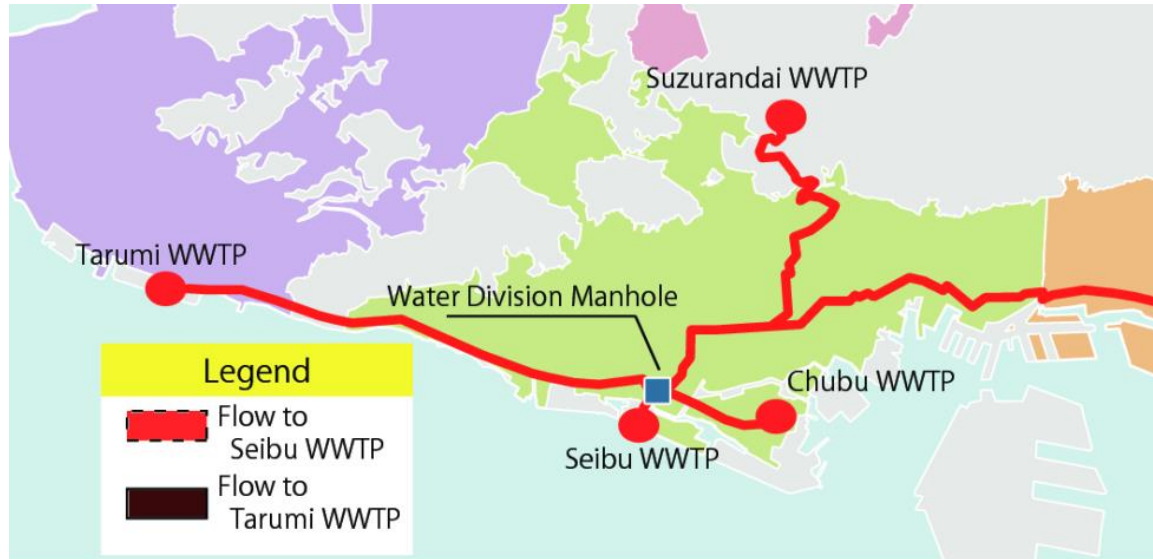
1. Generation of H₂S
 - Rusting devices (main pump, screen)
 - Reducing life of the activated carbon in deodorization
2. Rapid water level elevation in the trunk sewer
 - Increased Risk of Wet Weather SSO



H₂S at Pump Well of Tarumi WWTP



Cause of H₂S generation



Summary

- Kobe built WWTPs network system to increase resilience.
 - Existing trunks used to reduce construction cost.
 - Planned routine use to seek further benefit.
 - Has used NW routinely as planned for rehab of WWTPs.
 - Will use NW for rehab of trunk sewers.
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Thank you very much for your listening!

