

## Study on the existing situation and measure of micro-chemicals in the sewage system

Whole term

1997. 4 ~ 2003. 3

### (Purpose)

With the recent industrial development and the integration of the knowledge on chemicals, the existence of various chemical substances in the water environment has been identified, and thus has become an emerging issue in environmental point of view. For a sewage system, the end-of-pipe treatment plant and the whole sewage system linked to the plant are regulated under the law of prevention of contamination of the water, thus the management of the sewage system should involve the water quality management, because the responsibility of the sewage system is to prevent the environmental pollution.

In addition, the inflow of the hazardous substances into the sewerage system and its influence on the sewerage system should be investigated for the benefit of operation and maintenance of the sewerage system

As per the aforementioned facts, this research aimed at investigating the current situation and solutions for micro-chemicals in the sewerage system.

The investigation was focused on the micro-chemicals which are considered to have great influence on the environment, and was carried out from 1997~2002 in 3 steps as 1 step for 2 years.

### (Results)

In 1997 and 1998, two substances such as TOX (Total Organic Halogens), the aggregated index of disinfection byproducts and THMFP (Tri Halo Methane Formation Potential), which is regulated by Water Supply and Resources Law, were selected whereas in 1998, 13 treatment plants nationwide were investigated in spring and summer.

#### 1. Current situation of TOX and THMFP (spring and summer)

① The concentration of TOX had great variation with respect to the local characteristics, though there was no variation with respect to seasonal changes.

② There was no significant reduction of TOX at the treatment plant for the low inflow concentrations. The concentration increased at the chlorine disinfection process in many plants and the outflow concentration was greater than the inflow concentration at several plants.

③ The concentration of THMFP tended to be high in summer when water temperature was high. Also, the removal efficiency was lower in the biological reactor than in the preliminary settling tank, however the removal efficiency of THMFP was lower than that of the organic matters (COD<sub>Cr</sub>) in all the treatment plants.

#### 2. Investigation of the current situation

① The result of the current investigation of THMFP almost coincided with the existing results investigated by the Japan Sewerage Agency with respect to the distribution of concentration, correlation with organic matters and etc.

② The concentrations of THMFP were lower than 0.3 mg/L, the upper limit of the specified discharge standard in all treatment plants.

③ The THM generation rate tended to increase at the secondary treatment process, which leads to the conclusion that the organic matters become easier to produce THM in the organic treatment.

④ Through the investigations of whether the treated sludge return flow and excess sludge mixed with each other, the biological treatment method, the effect of chlorine treatment, and the extent of industrial wastewater in the influent; it was deduced that none of the factors significantly influenced the concentrations and removal efficiencies of TOX and THMFP.

⑤ In comparison between the two treatment plants performing the advanced treatment, filtration + sand filter + activated carbon treatment showed more stable reduction than that of the

sand filter only.

### 3. Treatment technology of TOX and THMFP

According to the literature review on the TOX and THMFP treatment technology, TOX has great volatility in the aeration tank, thus a solution for the volatile substances is needed. In addition, activated carbon adsorption is the most effective treatment among THMFP treatment technologies and it was suggested that either flocculation or ozone treatment being included prior to activated carbon treatment would enhance the efficiency.

### 4. Selection of a subject matter for the investigation in the following year (investigation on the existing situation 2)

For the selection of next subject matter for 1999 and 2000, the existing report and the summary were investigated focusing on substances having high concentrations or being frequently detected in wastewater treatment plants, substances considered frequently-detected, substances having large influence in public waters, substances having great impact on the water environment with respect to the regulations and endocrine disruptors, establishment of an investigation method and etc. As a result, the heavy metals such as antimony, nickel, boron, and molybdenum were selected because it was under investigation whether these substances should be included in the environmental regulations due to their large impact on the public water environment.

Collaborators: Liaison Conference for Sewerage Development

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Keywords

Micro-chemicals, TOX, THM formation potential, Investigation of the actual condition