URBAN WATER POLLUTION

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Keywords: Sanitary sewage, Storm drainage, Runoff, Combined sewage system, Separated sewage system

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Summary

Urban sewages consist of mainly domestic sewage and underground water. Qualities of urban sewages depend on the customs of the inhabitants and the character of the city. Sanitary sewage mainly arises from cooking, bath, laundry and feces. In areas where sewer for sanitary sewage is not serviced yet, unprocessed drainings are led into nearest marshes, lakes and rivers. Sewage hydrographs may be influenced radically by inflows of rainwater. Rainfall may cause serious hydraulic overloading of sewers and treatment facilities. Flow in a combined sewerage system during a storm often exceeds the capacities of sewers and treatment plants and discharged directly. Urban water pollution may be derived from non-point-sources which associated with general land runoff, road runoff including highway, construction and industrial runoffs, and hydraulic overloading of sewers and treatment facilities. Those pollutions from non-point-sources are more difficult to manage.

1. Urban Sewage

Qualities of sewages are quite different by their source and, consequently, treatment methods of them are also different. Because urban sewages consist of mainly domestic sewage and little of industrial wastewater and underground water, qualities of sewages depend on the customs of the inhabitants and the character of the city. Urban sewages contain 1,000~2,000ppm of solids and 70~80% of soluble substances. Organic matters in sewages are proteins, fats, carbohydrates, and their catabolite, which came from feces and sanitary sewages.

2. Sanitary Sewage

To prevent water contamination, mainly industrial wastewater has been treated, and application of strict regulations has improved quality of natural environment water. On the other hand, treatments of sanitary sewage have been limited to sewer service and sanitary sewages are not treated in areas where sewer is not serviced. Then, portion of pollution from sanitary sewage has increased yearly. Sanitary sewage occurs mainly from cooking, bath and laundry. Quantities and qualities of sanitary sewages depend on the habits of family, family constitution, season etc. About a half of biological oxygen demand (BOD) and suspended solids (SS) of sanitary sewage occur from cooking, while nitrogen and phosphorus from feces. In areas where sewer for sanitary sewage is not serviced yet, unprocessed drainings are led into the nearest sewer in service to reduce pollution in marshes lakes and rivers.

3. Effects of Rainfall on Sewer

Sewage hydrographs may be influenced radically by inflows of rainwater to the system. Connections of downspouts from roofs to sanitary sewers usually are forbidden by regulations; nevertheless, they are encountered often. Large numbers of those connections can produce sharp flow peaks during each rainfall and may contribute to serious hydraulic overloading of sewers and treatment facilities.

Recent practice has been based mostly on installing two “separate” sewerage systems in communities, one to carry sanitary wastes to the treatment plant, and the other to transport storm flow directly to discharge points, usually without treatment. However, many older communities still have “combined sewers,” designed to carry both sanitary wastewaters and storm runoff in the same pipeline. Flow in a combined sewerage system during a storm may be many times that during dry weather, often exceeding the capacities of sewers and treatment plants and requiring the direct discharge of some mixed sanitary sewage and storm runoff to streams. The overflows are highly undesirable but continue to exist because of the great expense of converting “combined” systems into “separate” ones or building sewers and treatment plants large enough to handle the peak flows during storms.

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Biographical Sketches

Katsuhiko Nakamuro is Professor of Pharmaceutical Sciences at Setsunan University, where he has been at the present post since 1994. He graduated from Gifu Pharmaceutical University and received the Bachelor Degree and the Master Degree in Pharmaceutical Sciences in 1967 and in 1969, respectively. After graduation, he worked for Division of Environmental Chemistry, National Institute of Health Sciences, the Ministry of Health and Welfare of Japan from 1969 to 1984, participating in fundamental research for deciding standard of water quality and establishing measurement method for water quality. In the meantime, he also obtained the Ph.D. in Pharmaceuticals from Gifu Pharmaceutical University in 1977 on studies of environmental toxicology of sodium selenate. He worked for Office of National Environment Board in Thailand as a technical expert and transferred the water quality technology from 1983 to 1984.

Since 1984, he is with the Department of Environmental Health where his research topics cover development of risk-assessment for pollutants in water and evaluating toxicities of environmental chemicals including mutagens in river, disinfection byproducts by chlorination and ozonation, endocrine disrupting chemicals.

He has written many books on health risk of water contaminants. He has been the author or co-author of more than 150 research articles. He was awarded from Japan Water Works Association on his research of formation mechanism of trihalomethane during aqueous chlorination in 1983, and awarded from Japan Society on Water Environment on his research of effect of coexisting metals for trihalomethane formation during water chlorination in 1989. He has served as the official in Japan Society of Water Environment, the Pharmaceutical Society of Japan, Japan Society for Biomedical Research on Trace Elements, Japan Ozone Association, and Japan Research Association for the Medical & Hygienic Use of Ozone.

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