Study on Long-term Technology Development for Sewage System		
Whole term	1992.10 ～1997.3	

(Purpose)

The committee on Sewage Technology Development acknowledges the 'Sewage System for Global Environment Conservation' as one of the most important issues among the 'Long-term Technology Development Issues' to be dealt with in the future. The committee conducted investigation on the Green House Gases (GHGs) emission from sewage system. In this study, GHGs monitoring methods and countermeasures to reduce the GHGs emission from sewage system were explored.

In FY1992, extensive literature review was conducted concerning Global Warming problem. Simultaneously, the actual state and extent of the problem within Japan were also assessed. The studies revealed the lack of analysis for estimation of global warming potential induced by sewage systems and the fact that several unknown mechanisms play role in GHGs emission as well as in their diminution. This insufficient situation calls for clear understanding of the basic mechanisms governing GHGs emission from sewage systems. Also the necessity of compiling the related data along with the development of reliable measurement technology itself was also underscored.

Based on the above, in the winter period of FY1993, basic data were collected from five wastewater treatment plants.

The plants, which exhibited unexpected results during the investigations conducted in FY 1993, were subject to further monitoring in FY 1994 in order to ascertain the possible reasons for such result. During the summer, further monitoring was carried out in three wastewater treatment plants, two of which were the same plants involved during the first winter investigation and another one was newly selected. The newly selected plant went through the winter period monitoring.

The investigations were conducted in FY 1995 focusing on N_2O emission from aeration tank of wastewater treatment plants. Efficiencies of different operation systems in reducing emission were compared. Questionnaire survey was conducted at 46 wastewater treatment plants operated by municipalities at which the committee members worked. Three different types of plants, namely, (nitrite producing operation, nitrification-dinitrification operation, nitrate producing operation) were selected for comparison. The relation between the amount of N_2O emission and corresponding wastewater quality was explored. The N_2O removal in the deodorization system was also investigated. Based on these studies, it was concluded that N_2O gas emitted from the nitrite producing operation plants in much larger volumes than from the other two types of operations. The deodorization system exhibited negligible N_2O removal effect.

In the FY1996, the causes of N_2O emission were identified by referring to the results of the survey conducted in FY 1995, and countermeasures like operating parameter to reduce N_2O emission were contemplated.

(Results)

1. The total N_2O emission from all sewage systems (aeration tank) in Japan was estimated to be 1.34~3.98 kt.
2. The following two countermeasures were put forward for abatement of N_2O emission
   - Mid/long-term countermeasure: shifting to nitrification-denitrification operation.
   - Short-term countermeasure: preventing nitrite producing operation.

Collaborators: Sewage Technical Development Meeting

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