

Study on Countermeasures for Hydrogen Sulfide in Sewer Force Mains

Whole term

2005.7 ~ 2007.3

(Purpose)

Hydrogen sulfide generation in sewer force mains induce serious maintenance problems. Under anaerobic conditions in force mains, hydrogen sulfide generation is caused by microbial reduction of sulfate by sulfate-reducing bacteria. Hydrogen sulfide is easy to release in the air, so that the odor problem will occur. Furthermore, the sulfuric acid oxidized from hydrogen sulfide by sulfur-oxidation bacteria at concrete surface in aerobic conditions causes corrosion of concrete structures such as manholes, gravity sewers and receiving tanks.

In such situation, several countermeasures for control of hydrogen sulfide generation in force mains had been developed and now in practical use. Although the situation of those countermeasures are as described below.

- It has not been established as the level to evaluate and rearrange with new knowledge in actual service facilities.
- There are some differences in effect between those countermeasures due to sewer quality and quantity such as pump operation (continuous or intermittent), sewer residence time in force mains and pipeline profile, etc.
- Examination in actual situation and clarification of the reflection way to the facility design are required.

This study selects the air injection method, oxygen injection method and chemical adding method (nitrate adding and polyferric sulfate adding) as the present practical countermeasures for control of hydrogen sulfide generation in force mains. The purpose of this study is to arrange the technical matter, confirm the problems about design and maintenance and propose the design procedure of each method.

(Details of research)

Contents in this collaboration study are as follows.

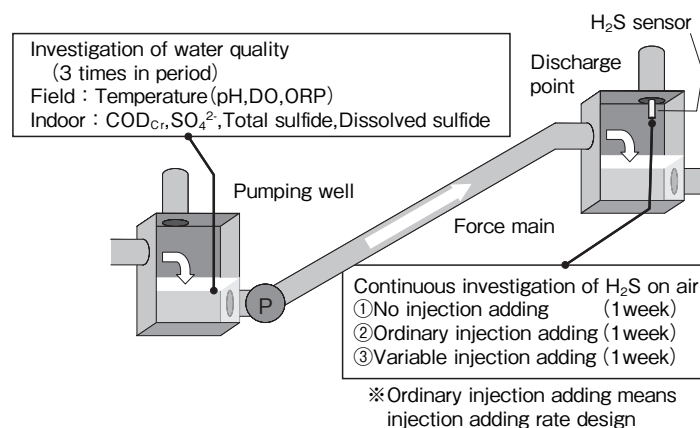
1. Extraction and rearranging of problem

Extraction and rearranging the view and problem for design and maintenance will be carried out by questionnaire survey to the local governments those were already introduced generation control measures for hydrogen sulfide.

2. Field investigation

Field investigation of the hydrogen sulfide concentration for 3 to 4 weeks continuously with changing injection / adding rate by continuous measuring instruments will be done in the 8 pumping stations those were already equipped the control measures for hydrogen sulfide generation (each 2 pumping stations of air injection / oxygen injection / nitrate adding / polyferric sulfate adding).

Investigation will be carried out three times (summer of 2005, winter and summer of 2006) to clarify the recommended applicable situation and to determine the injection / adding rate of each method based on the results.



Figure— 1 Contents of Field Investigation

3. Evaluation of design and maintenance procedure

Standard design procedure of each method will be proposed by rearranging the manufacturers' design and maintenance manual. Proposed standard design procedure shall be not only the calculation way of the injection/adding rate, but also involved attentions for design and maintenance by questionnaire survey.

4. Preparation of technical manual

Technical manual for control measures of hydrogen sulfide generation in force mains shall be prepared based on this study.

(Study schedule)

- Clarifying the characteristics and determination of recommended applicable situation of each method by field investigation in 8 pumping stations in Japan.
- Collecting the attentions about maintenance of each method by questionnaire and interview survey.

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key words

Force main, Hydrogen sulfide, Air injection, Oxygen injection, Nitrate adding,
Polyferric sulfate adding