

Study on Effective CSO Control Technologies in Fukuyama City

Year of Research

2007

(Purpose)

In order to solve the combined sewer overflows (CSO) problem, “the Guideline and Interpretation of CSO control technologies – 2002” (hereafter, Guideline) was published in 2002, considering water pollution control, offensive odor prevention and public health improvement. In the Guideline, the following three targets were established:

- 1) reduction of pollution load (being lower than that of separated sewer system)
- 2) protection of public health (reducing the discharges of untreated sewage and storm-water by half)
- 3) reduction of trash (preventing outflow of trash extremely)

In addition, in Sewerage Law Enforcement Ordinance which has been enforced since April 1st, 2004, “Regulations concerning the technical standards for the water quality of the discharging wastewater from combined sewer system” was established. Within the regulations, the following target was added:

4) the water quality (total BOD pollution load divided by total sewage and storm-water quantity) of discharging water from outlets should be 40 mg/l or less when total amount of rainfall is 10mm~30mm. In addition, some countermeasures should be taken to prevent the discharges of sewage and storm-water released into public water bodies, when the influence of the storm-water is not large.

Moreover, by March, 2005, 24 technologies for CSO control have been evaluated successfully and proposed for use in practical applications in SPIRIT 21 (Sewage Project, Integrated and Revolutionary Technology for the 21st Century) which was started from March, 2002.

Based on the above background, the purposes of the study are to review the CSO control plan of Fukuyama City, and to evaluate and select the effective CSO control technologies taking account of combination process between “High Rate Primary Treatment” in SPIRIT 21 and “Storm-water Detention Reservoir” for meeting the discharging standards and reducing target pollution load.

(Results)

(1) Targets for CSO control

The targets for CSO control were four targets mentioned above based on the Guideline and Sewerage Law Enforcement Ordinance.

(2) Examination of alternative facilities for existing plan facilities

According to an existing plan, a storm-water detention reservoir with a capacity of 17,000 m³ will be constructed adjacent to the Shinhama storm-water pumping station. On the examination of the new technologies (such as technologies in SPIRIT 21), new CSO control technologies (including treatment process, capacity, removal rate, consistency with existing facility, construction costs etc.) were evaluated on the basic conditions of the treatment district (such as plant layout, size, surroundings, discharge condition and restriction conditions for the construction of the alternative facilities).

(3) Examination of inflow forms into the selected CSO control facilities

The improvement of the pollution load removal was expected by introducing new CSO control technologies (such as technologies in SPIRIT 21). In order to meet the targets, the combination of proper CSO control facilities (storm-water detention reservoir and primary treatment facility) was examined.

As regard inflow forms to storm-water detention reservoir and primary treatment facility, comparison examination of storm-water detention reservoir “Type II” and “Type III” was carried out. As the result of simulation, high efficiency of pollution load removal can be achieved by the inflow form that primary treatment facility is put into operation firstly before storm-water is discharged into storm-water detention reservoir, and then the storm-water detention reservoir “Type II” is put into operation when the capacity of the primary treatment facility is exceeded. Subsequently, the inflow form that primary treatment facility is operated continually was selected finally, considering the characteristics of “Setonaikai type climate” (i.e. the rainfall with small intensity and long duration).

(4) Determination of treatment process and capacity of facilities

For determination of the capacity of facilities, the facilities to meet “Target 1” (reduction of pollution load) were selected and the examination of each facility in terms of economical and restriction conditions was conducted for the selected facilities. The combination process between storm-water detention reservoir (8,000 m³) and primary treatment facility (1 Qsh) was selected. As a result, the capacity of storm-water detention reservoir was reduced by approximate 50% comparing with existing plan (17,000m³). Subsequently, the construction cost (expressed in single fiscal year base) and annual O&M (operation and maintenance) costs also were reduced by approximate 10%.

Based on the results of comprehensive examination, the selected facilities as final CSO control processes were determined by confirming the ability on selected facilities to meet other targets.

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Key words

CSO control, Improvement targets, Pumping station, Storm-water detention reservoir, High rate primary treatment