

## Research on the utilization of the belt type filtration and the system of condensation

Whole term

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### (Purpose)

Gravity condensation has been mainly used in the sewage sludge condensation. However, the quality of gravity-condensed sludge deteriorates because of the increase of the organic portion in sludge and the decomposition of sludge due to being transported for long distance to the integrated treatment plant. Thus, the returning load increases because of the decrease in the solid withdrawal rate and decrease of the efficiency of digestion and dewatering as a result of the decrease in condensed sludge concentration.

In the case of the water treatment center in Arao City, digestion deteriorated in 1980 and 1981, and it was clear that the quality of the water separated from the gravity condenser had deteriorated and normal sludge treatment was impossible. Arao City reduced the quantity of the input to the digester, enforced the direct dewatering, developed the independent belt type filtration and the condenser, and applied to the basic investigation and examined the operation.

Based on the results of the aforementioned activities, a project on utilization was launched in 1988, by the project to innovate the functions of facilities, in order to establish a high speed condensation technology which would not be much affected by sludge characteristics.

This study investigated the primary sludge and excess sludge with the concentration of 0.4~2.0% using an actual tester equipped with a filter condenser and a supplemental equipment, with a target to treat sludge at a supply rate over 15m<sup>3</sup>/m/h, condensed sludge concentration over 4% and retrieving rate of SS over 95%. In addition, to confirm the effect on the treatment efficiency and operational and maintenance characteristics, the effect on the digestion and dewatering processes following the condensation were verified; and by establishing the design standards, it was persuaded to utilize the technology of condensation by means of the belt type filtration.

### (Results)

The results of the co-research in 1988 and 1989 are as follows;

- 1) Condensed characteristics of primary sludge, excess sludge and mixed sludge during the four seasons using belt type-filtering-condenser were not related to the usual characteristics and had the concentration of about 5 % and a recovery rate of solid 98 %. Also, the continuous operation of the excess sludge showed a concentration of 4.8 %, the performance was confirmed to have been stable during all the seasons.
- 2) It was investigated whether noise, vibration and odor caused surrounding environmental impacts. Though installing a deodorizing cover and preparation for a deodorizing facility might be required, it satisfied all the regulations. The belt type-filtering-condenser makes small impact on the surrounding environment.
- 3) Impact on the other facilities due to the installation of the filtering- condensation-system
  - The gravity condenser was transferred to the filtering-condenser. Thus the condensed sludge concentration changed from 2.0 % to 5.0 %, and the recovery rate of the solid changed from 60 % to 98 %. As a result, the digestion rate became 55 % which was 30 % previously, because the input sludge concentration was increased.
  - If the inflow solid quantity was 100, a quantity of 66 would return the treatment system as a reverse flow and it means that the sludge circulates in the system. After the induction of the facility, the reverse flow loading rate from the condensation and dewatering was 4.5, which was less than 1/15 of that in the previous system.
  - There was no effect on the dewatering system in the existing belt press dehydrator, and after the induction, the water content of the dewatering cake became 82 %.
  - As an evaluation for scaling up the facility, the method of coagulation and washing was

investigated and the ability to inject coagulated sludge for uniform dispersiveness was verified, thus utilization would be possible.

(Future task)

Based on the research carried out from 1990 to 1991 on utilization, a research to evaluate the performance will be conducted to confirm that the new sewage technology would be practical in case of the actual facility.

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Keywords

Mesh belt, Filtering condensation, Excess sludge, Digester