

## Investigation on the basic plan for the effective use of digestion gas in Nagaoka City

Whole term

1997. 8 ~ 1998.3

### (Purpose)

It was possible to treat stably the generated none-used digestion gas by incinerating with low cost digestion gas in the first wastewater treatment plant in Nagaoka City. But Nagaoka City which was appointed as the eco-city in July, 1995 could not proceed combustion treatment that is none eco-friendly. Therefore, the digestion gas generator was investigated upon seeking the effective usage of it. After that, the gravity condensing and mechanical condensing were adopted in the sludge condensing process in 1997, and the effective use of none-used digestion gas that has been increasing annually was the problem.

The objective of this research was to investigate the practical use of the wasted gas in order to utilize the digestion gas which is one of the sewage resources, effectively; and to establish and disseminate it as a usual technology.

### (Results)

A basic plan was established as a practically used method of none-used digestion gas, to describe the procedure from the method of gas purification to the facility and operation, including the prediction of quantity of the gas generation. Also a test for removing carbonic acid gas was conducted.

#### 1. Prediction of the quantity gas generation (in 2013)

Digestion gas emission: 5,033Nm<sup>3</sup>/day

Purified gas emission: 1,910 Nm<sup>3</sup>/day

#### 2. Targeted quality of the daily fluctuation of the supplying gas:

The quantity of supplying gas can be changed

The generated energy is over 9,000 kcal/m<sup>3</sup>.

Concentration of gas: less than 3%,

Hydrogen sulfide: less than 2 ppm

#### 3. Method of purification of the digestion gas

The method of liquid adsorption was adopted to remove the carbonic acid gas and the reasons were as follows:

(1) Because the existing desulfurizer in this plant was an adsorption system, it was easy to be maintained.

(2) The secondary effluent could be used as the absorption liquid, with no limit in the quantity.

(3) It was found that the carbonic acid gas in the digestion gas was adsorbed on to the liquid.

#### 4. The test for removing the carbonic acid gas

In case of the constant flow rate of gas, the increased quantity of the adsorbing liquid made the concentration of CO<sub>2</sub> in the effluent to be low. Also in case of the constant flow rate of the liquid, the increased flow rate of the gas made the concentration of CO<sub>2</sub> in the effluent low. The overall capacity coefficient (K<sub>La</sub>) was constant in case that the liquid flow rate was over 40m<sup>3</sup>/m<sup>2</sup>/h.

#### 5. Meaning of the practical use of the none-used digestion gas

- (1) Effective use of sewage sludge resources
- (2) Reduction of the maintenance cost
- (3) Contribution to cities of low loading
- (4) Advertising the maintenance of the sewage system among residents.

Collaborators: Nagaoka City

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Keywords

Effective use of digestion gas, Supply of City gas, Method for eliminating carbonic acid gas