Pre-treatment (coagulant, algaecide) and filter resistance.



Filamentous diatom :Melosira

Short filter run : filamentous diatom :pioneer of succesion.



In long filter run,filamentous green algae are found. Cladophora, Spirogyra, Hydrodictyon,

Mollusk is also found.



Wakata plant., Takasaki city.



Dominant algae





Midge larvae is a grazing animal of Melosira.





Observed head loss and Normalized head loss (NHL)



Filter run in days Observed Head Loss gradually increases. It is due to increase of flow rate. Real resistance of NHL is almost same or it becomes slightly small resistance in warm period (August). These resistance change is influenced with the biological activity.

Sum of turbid matter (load of SS to filter bed) and NHL



Development of Algal Mat as Chl. a.



Health Index (%) of Algae: Chl.a/(Chl.a+Phe.a)



Algal development in summer. Filamentous diatom of Melosira grew rapidly and decreased after 10 days. It was caused by the grazing activity. This phenomena is clear in warm period.



Comparison of Load of SS and Filter Resistance, and Algal Development in Winter (FEB) and in Summer (AUG).



Filter resistance is related with temperature. This is due to biological activity.



Biomass and Run days

September, Takasaki, Gumma



:100cm~140cm :140cm~200cm :Less than 7 days

60 **Algal Biomass** 50 Biomass, mg/cm2 40 30 20 10 0 10 15 25 5 20 0 <u>_</u> 30 **Animal Biomass** () **;**20 5 10 15 20 25 30 0

Run Days

Biomass: Bio-volume as weight : Specific gravidity = 1.

Growth rate of algae was low in deeper filter. Algal biomass still grew even on 24 days and it did not reach the stationary 30 phase.

Population of small animals (ciliate, rotifer, midge etc.) grew with filter run.

Difference of biomass of algae and animals are 1000 times.



After 7 days of filter run, algal biomass is related with depth. Shallow: large biomass Deep: small biomass.



Active diatom is abundant in shallow filter

Dead and empty diatom is abundant in deep filter.

Algae and animals are abundant in shallow depth filter.



SSF is not mechanical filter. It is really ecological purification system. This system is similar with the ecosystem of soil in the natural forest. Microbial organisms and small animals are active in the forest soil.

生物の働きによる安全でおいしい飲み水 Safe and delicious drinking water by biological activity

Shallow depth for active algal growth. Small animals are necessary. Long filter run is better. Large size of sand particle. Faster filter rate gives better condition of aerobic condition for small animals. Less amount of removal of upper sand is necessary to keep heterotrophic organisms in the filter.





Acceptable risk is essential for practical life.



- 100 % safe is not good for practical life.
- This is natural ecological sense.

SSF(Ecological Purification System) is the suitable environment for filamentous algae.



Roughing filter experiment for SSF system and algal culture to reduce suspended matter from the surface water of a stream.

OFFSPRING

Filamentous algal growth experiment by use of natural stream water: the best food for animal

