BACKGROUND

The site was reserved by decision of the City Council on 20th February 1948. Stage one of the construction was put into operation in 1963, stage two in 1970 and stage three is now being planned.

SITE

The purification plant is situated on the mouth of the river Segeån. The site, which has an area of 100 000 sq m, was obtained by constructing embankments in the sea and filling with refuse and structural filling material to a height of 2.5 to 3.0 m above sea level. The plant, except two activated sludge tanks, is constructed on concrete pillars.

COST

The total investment costs for the first two stages including outlet pipes, built during the years 1948 — 1970, are amounting to approximately 62 million kronor.

Operational costs for 1973, incl interests and depreciations, amount to about 30 kronor per person. With industries included, they will amount to 20 kronor per pe.

QUANTITATIVE DATA

After the completion of stage two, the plant is now constructed for a quantity of domestic and industrial sewage equivalent to a population of 550 000 and an average rate of dryweather flow of 2 400 l/s, predicted to be attained in 1980. These figures apply to an effect of treatment of 50 to 70 % calculated of the biochemical oxygen demand. The maximum flow during rainy periods is estimated to 9 000 l/s and is assumed not to increase during the period, as a result of the transition from combined to separate sewers.

The plant is intended for the main part of Malmö and a region north of the town. The remaining part of Malmö is served by the sewage treatment plant at Klagshamn, taken into operation in the beginning of 1974.

METHOD OF PURIFICATION

The plant receives combined sewage, a mixture of rainwater and wastewater, which is subjected to biological treatment in an activated sludge plant with a short aeration period. The sewage passes the plant in approximately 5 hours at average flow. Methods to obtain a higher degree of purification by a combined chemical and biological treatment are under consideration.

THE COURSE OF PURIFICATION

The sewage is pumped into the plant by pumping stations. The three largest, Rosendal, Spillepengen and Turbinen, are equipped with comminutors.

1 Mechanical treatment. The entire normal inflow.

Inlet Chambers

The inflowing water is received in two parallel inlet chambers, where it passes mechanically cleaned racks. Adjoining the inlet chambers is an overflow arranged, which, at exceptional inflow, makes part of the sewage by-pass the plant.

Primary Aeration Plant

From the inlet chambers the sewage is led into the primary aeration plant, which is divided into two sections with parallel operation and with a total volume of 2 600 cu m. First it has to pass a combined aeration tank and sand trap. Along the tank runs scrapers, which collect the sand in pockets, from which it is pumped away. After this, the water passes an aeration tank with facilities for separating grease and other floating sludge by means of traverse decanting ducts. This floating sludge is led off to a pumping station adjoining the plant. The sewage is aerated by air bubbles blown through it from a system of perforated boxes. The blowers are located in a building adjoining the tanks.

Primary Sedimentation Plant

The primary sedimentation plant is divided into two sections, each with four round tanks, , arallelly operated, with a total effective surface area of 5 500 sq m. At the predicted average rate of flow in 1980 the load will be 1.5 m/h. The sewage inlet is located in the centre of the tank, thus creating a radial flow towards the periphery. Each tank has a rotation sludge scraper, which collects the digested sludge from the bottom of the tank and brings it into sludge pockets in the centre. From these pockets the sludge is carried off under its own pressure to the above mentioned sludge pumping station. The scraper also collects the floating sludge, which may have passed the primary aeration plant and leads it off to the sludge pumping station. The mixture of raw and floating sludge is then pumped to a sludge densifier for further transportation to the digestion chamber.

Main Measuring Duct

The mechanical purification process is then completed, and the primary treated water passes a main measuring duct, which measures the total flow to the plant and also regulates the quantity of water received in the activated sludge plant. The main measuring duct consists of seven parallel Venturi flumes, four large and three small ones. The three smaller flumes permit a maximum of 2 400 l/s of sewage to flow to the activated sludge plant. The other flumes divert the remainder of the sewage past the activated sludge plant. Later, this water is mixed in a mixing conduit with the biologically treated sewage. The amount of water entering the conduits is controlled by automatically regulated sluice valves at the inlets of the conduits.

2. Biological treatment. Maximum 2 400 l/s.

The biological treatment takes place in an activated sludge plant with a short treatment period. The activated sludge plant consists of three parallel sections with aeration tanks and secondary sedimentation tanks, each section with a building containing the necessary blowers.

Aeration (Activating) Tanks

The aeration tanks have a total volume of 10 000 cu m. By 2 400 l/s the retention period is 1.5 h. The water to the activating tanks is supplied from a number of different points: this is known as the stage-feeding method. The first section of the tank can be used only for aerating return-sludge. A biological decomposition process by micro-organisms is activated in the tanks in much the same way as occurs everywhere in nature. The impurities, not removable in the primary sedimentation, are taken up by freefloating sludge flocs, so-called activated sludge. The sludge is to a large extent converted into protoplasm or decomposed into inorganic matter. To maintain the biological process, sludge from the secondary sedimentation tanks is used for inoculation.

Secondary Sedimentation Tanks

The activated sludge undergoes sedimentation in rectangular tanks with a total surface area of 5 500 sq m. By 2 400 l/s the surface load is 1.6 m/h. There are four tanks with parallel operation, each with a chaindrawn sludge scraper, which collects the sludge deposited at the bottom of the tank into a sludge pocket. From here the main part of the sludge is pumped as return-sludge to the aeration tanks, whilst the remainder is pumped as excess sludge to the sludge re-aeration plant.

Outlet Pipe

The biologically treated water is then led off to the mixing conduit, from which it passes into Lomma Bay through two outlet pipes 2 m in diameter and about 3 km long. In the case of higher rate of flow or high water level in the receiver, the water must be pumped through the outlet pipes by six vane-type pumps, each with a capacity af about 1 850 l/s. The pumps are located in a pump station adjoining the main building.

Sludge Re-aeration Plant

Excess activated sludge from the activated sludge plant is aerated (stabilized) in a separate aeration tank and then added to the sewage in the primary aeration plant beyond the sand trap stage.

SLUDGE TREATMENT

Sludge Densifier

The sludge, separated in the primary sedimentation plant, is pumped into two sludge densifiers where part of the water is separated from the sludge and returned to primary aeration. The sludge densifiers, which are approximately 4 m deep, contain combined sludge scrapers and agitators, which make the dehydration of the sludge easier. Adjoining the densifiers is a pump station, which transfers the densified sludge to the digestion chambers.

Digestion Chambers

The digestion plant consists of two parallel sections, each with two chambers coupled in series with a total volume of 11 300 cu m. In each section a sludge pumping station is housed in a building between the two chambers. These buildings also contain gas compressors and the necessary pipes for sludge, gas etc. The retention period in the chambers for the sludge is 20 days.

Sludge Disposal

The digested sludge is pumped into a sludge container with a volume of 5 000 cu m from where it is transported by tank trucks to be utilized in agriculture as a fertilizer. According to a decision by the City Council the sludge will later be treated together with ground refuse or dried in the adjacent treating plant.

USE OF DIGESTER GAS

The digester gas formed during sludge digestion is used to heat the plant. It is collected in two gas tanks, each with an effective volume of 800 cu m.

OTHER BUILDINGS

Stand-by Power Station

The power station has three gas-diesel generators, two of 500 kW and one of 365 kW, which produce stand-by power for the plant and the pumping station at Rosendal.

Chlorination Station

Before transfer to the receiver, the treated water can be disinfected in the chlorination plant. Both primary and secondary chlorination can be carried out.

Main Building

This building houses the central control room with control panel, staff premises, workshop and stores, physical, chemical and bacteriological laboratory etc. The laboratory provides the Water and Sewage Works with analyses, checks industrial sewage and samples taken in the receiver etc.

Pilot Plant

In the pilot plant the Division of Hydraulics of the University of Lund is researching into the problems of sewage treatment techniques.

MALMÖ

SEWAGE TREATMENT PLANT AT SJÖLUNDA

PUBLISHED BY
WATER AND SEWAGE WORKS
OF MALMÖ
1974