EXPERIENCES FROM THE OPERATION OF A SEQUENCING BATCH REACTOR PLANT IN NOWY TARG

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BACKGROUND

Amongst Swedish project was the Waste Water Treatment Project for the town of Nowy Targ. The town is located in the southern part of Polnd on the feet of the Tatra Mountains, along tke sources of the Wistula river. Nowy Targ hosts about 35 000 inhabitants, and including surrounding villages about 45 000 inhabitants are connected to the sewer net. The town is discharging its sewage into the Dunajec, upstream the water supply dam for the city of Cracow. This situation is of course delicate, as more than 1 milion inhabitants are relying on this water source.

Nowy Targ is situated at about 600 to 650 m over the sea level, and the climate conditions are the typical for the mainland Europe, with cold and long Winters, and rather dry Summers with rather high temperature.

The town is an old market place, with history from the Middle ages, and is today a typical agricultural centre in southern Poland. The town hosts a number of typical industries linked to farming such as dairies and canning industries. The most delicate industrial establishment in Nowy Targ from water environmental viewpoints is represented by a large number of tanneries (about 300 legal). These are all based on chromium tanning and sized from an artisan level to larger industrial plants. They all represent a special environmental problem.

DESIGN AND TECHNICAL LAYOUT OF THE PLANT

The effluent demands are among the most strict in Poland for the time being, justified by the Nowy Targ location upstream the water supply dam in the Dunajec

river. This fact made it necessery to consider advanced treatment options for the new plant. The old one was o mechanical plant based on an Imhoff tank system. The SBR technology was chosen. The design data for the plant has been the following:

Waste water amounts	
Design flow	1 210 m^3/h
Daily flow, at design conditions	21 000 m^3/d
Peak flow into the plant	2 800 m^3/h
Maximum flow into the SBR - part	1 670 m^3/h
Maximum flow daily to be treated in the SBR - part	40 000 m^3/d

The plant has got the following configurations:

Pre - treatment facilities

1. The incoming water is pumped by means of two Archimedes pumps, each of 1 400 m^3/h.

2. The waste water is first screened by means of fine grade sieving screens, each of 1 500 m^3/h.

3. The refuse is handled by means of a refuse press, dewatering the coarse matters to about 30% dry solids content.

4. The waste water is treated in two parallel sand and grase traps, supplied with submersed aeration to keep the sludge in suspension but to separate the sand and grease.

5. The sand is dewatered by means of a sand classifier.

Biological treatment facilities

1. The pre-treated waste water is distributed by gravity from a split box with four automatically operated gates, that enables the distribution to the three SBR units downsteam. The fourth gate is the bypass gate to be used in emergancy cases.

2. The SBR plant is built up bythree identical reactors, each of 7 380 m^3 at maximum level inthe reactors. The reactor volume after decant is about 4 830 m^3.

3. From the SBR units is the water decanted by gravity to an equalisation basin and than to a Parshall flume.

The SBR units have been designed for the following conditions:

Cycle lenght at design conditions		6 h
	Filling, mixing	0.5 h
	Filling, aeration	1.5 h
	React	2.0 h
	Sediment	1.0 h
	Decant	1.0 h
SS concentration in the reactors at low level		5 200 gSS/m^3
SS amount in the reactors		73 300 kg SS
F/M ratio		0.08 (0.05) BOD_5 kg/kg SS
Elementary growth of sludge		0.6 (1.2) kg/kg BOD_5
Aeration capacity, make PURAC		735 kg O_2/h
Installed blowers, make Robuschi		6 x 6 000 m^3/h
Installed mixers, make Aqua Aerobic System		9 x 18.5 kW
Installed decanters, make Aqua Aerobic System		1 300 m^3

SRT 26 (14-30) days

Sludge treatment facilities

1.The waste activated sludge is pumped during the react phase by means of submersible pumps to two gravity thickeners, operated parallel.

2. Thethickened sludge is dewatered by means of two 8 m^3/h decanter centrifuges. The dewatered sludge has about 15-18 % of dry solids content.

The nowy Targ plant also contains a reception and treatment facility for tannery sludge, as follows:

- a reception volume
- a dosage station for lime slurry
- two reactors
- a sludge dewatering unit based on a chamber filter press.

OPERATION EXPERIENCES

The plant operation started in Spring 1995 and may be defined by five distinct phases:

1. The first operation phase may be addressed as „Start up period" covering the time from the commencement of plant operation until September 1995, when the plant had been running at stable performance levels for a number of months.

2. The second operation phase from Oktober 1995 until May 1996. This phasemay be addressed as a „two reactor operation phase".

3. The third phase that has been running since May 1996 until Autumn 1996, may be called „three reactor operation". This operation mode has been adopted as the preferred one.

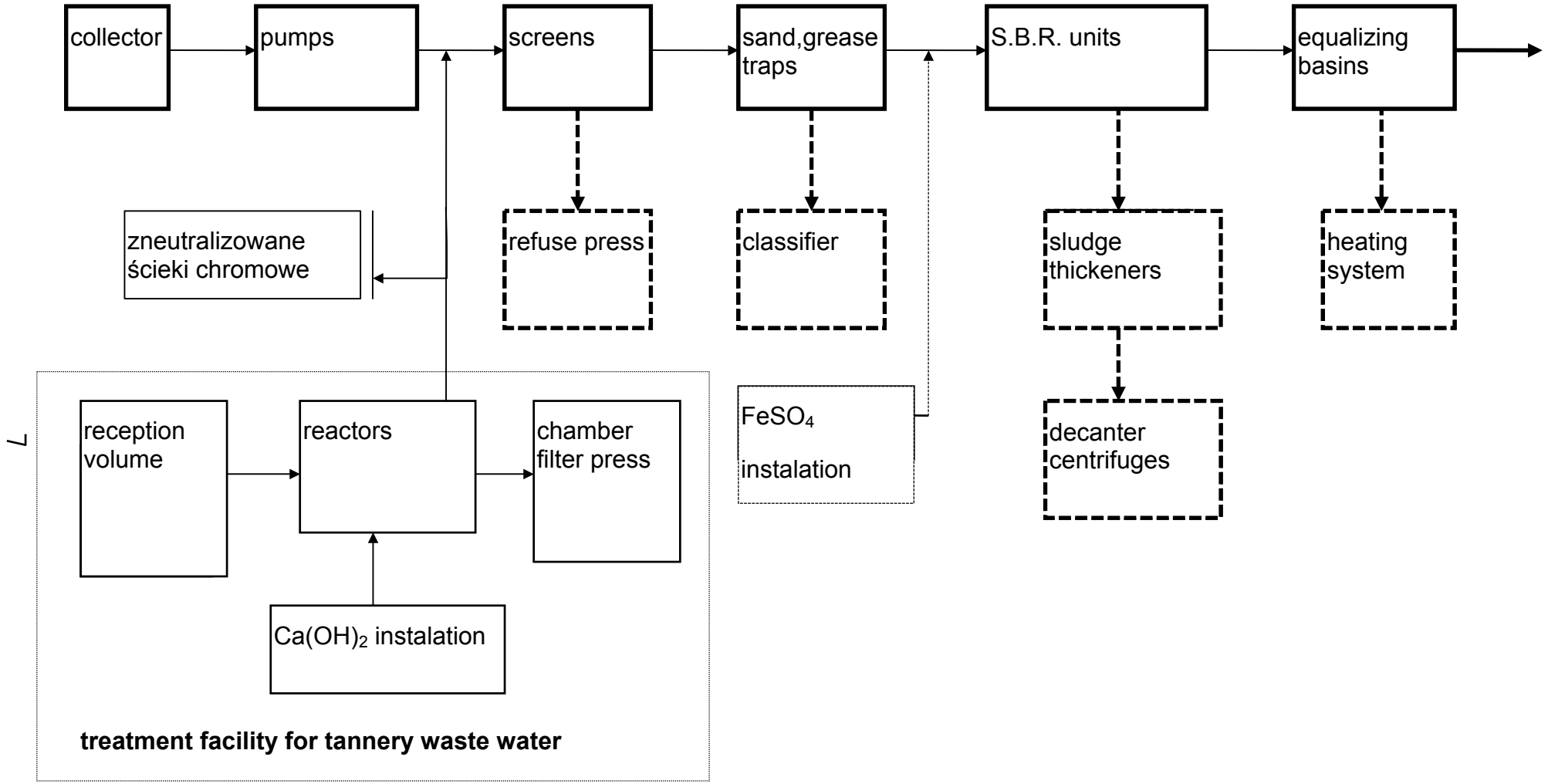
4. The fourth operation phase has been starting since November 1997 until April 1997.

5. The fifth operation cycle has been running from May 1997. This phase may be called „8 hours cycle”.

The situation during these phases may be summarised as follows:

DISCHARGE LEVES FROM THE SBR PLANT IN NOWY TARG.

PHASES	BOD_5 mg/l			COD mg/l			SS mg/l			N - total mg/l			P - total mg/l			Cr mg/l		
	inlet	outlet	% red.	inlet	outlet	% red.	inlet	outlet	% red.	inlet	outlet	% red.	inlet	outlet	% red.	inlet	outlet	% red.
IV-IX 95	190.0	11.9	93.7	495.7	98.1	80.2	212.3	14.1	93.4	43.5	25.1	42.4	5.7	1.93	66.1	0.68	0.16	76.5
X95-V96	261.0	8.5	96.7	726.1	66.3	90.9	411.5	20.6	95.0	53.8	14.0	74.0	7.85	0.58	92.6	2.5	0.41	83.6
VI96-X96	235.9	5.0	97.9	669.1	38.5	94.3	432.7	11.2	97.4	44.8	5.15	88.5	6.9	0.44	93.6	1.83	0.24	86.9
Xi96-IV97	275.0	9.45	96.6	764.0	53.9	93.0	455.0	21.9	95.2	48.0	16.2	66.3	6.0	0.58	90.3	4.56	0.46	89.9
V97-																		
projekt	332	15	95.5	526	40	92.4	106	20	81.1	25.9	10	61.4	12.4	1.0	92.0	0.5	0.05	90.0



NOWY TARG - FLOW SHEET