

## D4.1 Monitoring plan zero-measurement



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## Table of contents

TABLE OF CONTENTS.....	1
<b>INTRODUCTION</b> .....	<b>1</b>
1 AVERAGE RESULTS AND PERFORMANCE PARAMETERS .....	2
2 ADDITIONAL LABORATORY ANALYZES: .....	3
3 CONCLUSION:.....	4

## Introduction

Fine screens will be taken into operation at one of the two identical parallel waste water treatment lines of the WWTP Aarle-Rixtel, while the other treatment line will still be operated as a conventional system. In this way, the performance of the "fine screen line" can directly be compared with the performance of the conventional line. In order to properly evaluate the impact of the fine screens to the waste water treatment process, it is important that the performance of both purification lines are identical before the fine screens are put into operation. The report of the "zero-measurement" gives an overview of several parameters and the performances of both purification lines, and support the conclusion that both purification lines are identical before the fine screens are taken into operation.

## 1 Average results and performance parameters

After a testing period of approximately 2 weeks, the fine screens were taken into operation at waste water treatment line AT1 on October 13 2016 (date of official opening).

The period from 1 January to 1 October 2016 was used as a representative period for the zero-measurement to compare the performance of AT1 and AT2.

The average values of various parameters of the waste water treatment plant and the purification lines AT1 and AT2 are collected from the data management system Z-Info. These parameters include in-line measurements (flows and analyzers) and results of calculations. The average values are listed in Table 1.

### Biology:

		AT1	AT2	difference (%)	
SS	g/l	5,32	5,33	0	in line
SVI	mg/l	73,4	75,4	3	wwtp Lab
NH4-N	mg/l	2,56	2,64	3	in line
NO3-N	mg/l	1,49	2,17	37	in line
PO4-P	mg/l	0,77	0,78	2	in line
Sludge load	kgCOD/kgMLSS.d	0,15	0,15	0	calculated
Waste sludge flow	m3/d	819	799	2	in line
Waste sludge conc	g/l	8,76	8,69	1	in line
SRT	d	14,5	15,0	4	calculated
Elektricity consumption biology	kWh/d	4438	4266	4	in line and calculated

Table 1: Average parameters of WWTP lines AT1 en AT2 in period 1 jan to 1-oct 2016

The average parameters of line AT1 and AT2 are very good consistent with each other. That is in line with the expectation based on the practical experience with the wwtp operation, and is also in line with the reported data in the annual reports of the last years. The only significant difference is the average NO<sub>3</sub>-N concentration. Therefore, in the attached Figure 1, the in line NO<sub>3</sub>-N trends of both purification lines is presented. The figure shows that both trends follow the same pattern, but that AT1 (red) is always lower than AT2 (blue). This is most likely caused by a deviation in the NO<sub>3</sub> analyzer(s). In mid-September the analyzers were checked, and give similar results since then.

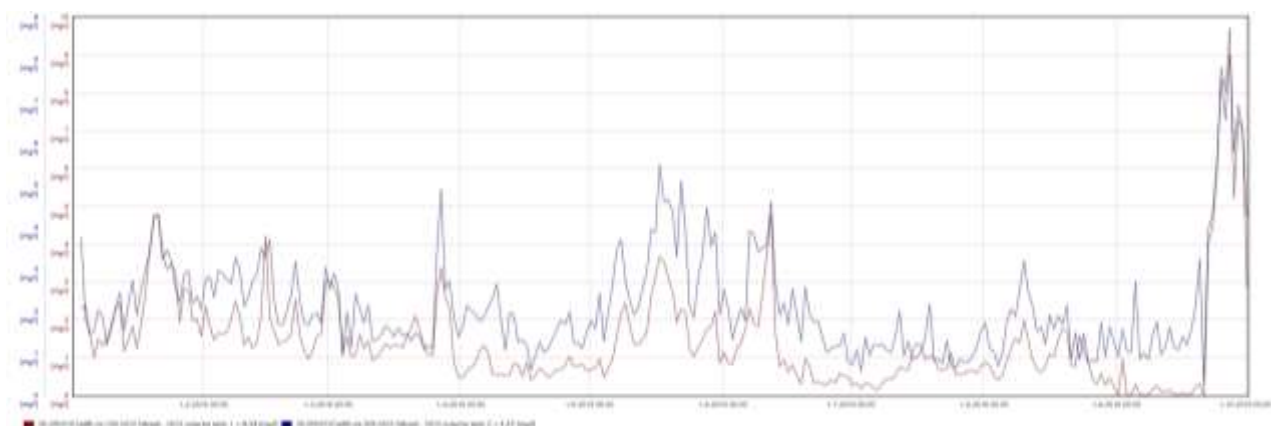


Figure 1: NO<sub>3</sub>-N concentration in AT1 (red) and AT2 (blue) in period 1-jan to 1-oct 2016

## 2 Additional laboratory analyzes:

On July 27 2016 grab samples were taken from the sludge from both aeration tanks AT1 and AT2. These samples were analyzed at the Aquon laboratory for various additional parameters, which will probably be affected by the operation of the fine screens. The results of the analyzes are presented in Table 2.

		AT1	AT2	difference (%)	
MLSS	mg/l	6000	6100	2	lab
Nkj	mg/l	333	337	1	lab
Oil + fat	mg/l	80	30	91	lab
<u>Activity:</u>					
Nitrification	mgN/g.h	2,8	2,2	24	lab
Denitrification	mgN/g.h	2,4	2,6	8	lab
P-release	mgP/g.h	10,6	10,9	3	lab
P-uptake	mgP/g.h	12,8	13,9	8	lab
<u>Fibres:</u>					
Total fibres = NDF	%	31,6	31,4	1	lab
Lignin = ADL	%	10,7	9,8	9	lab
cellulose	%	4,3	4,2	2	calculated
hemicellulose	%	16,6	17,4	5	calculated
<u>Microscopic:</u>					
Fibres	-/g	90	110	20	lab

Table 2: Analytical results (Aqon laboratory) of grab samples from sludge AT1 and AT2 from 27 July 2016

The results of AT1 and AT2 are generally in good agreement.

The main parameters in which differences are expected to occur due to the operation of the fine screens, are the content of "fibers" (cellulose, hemicellulose, lignin), and the activity of the sludge. In the zero measurement, these parameters match well in both ATs. The "total fiber" content has never been analysed in the sludge from WWTP Aarle-Rixtel, but the results are in line with the expectation based on the "cellulose balance" on the WWTP and the assumption that cellulose is barely degraded in the AT.

The most striking difference between AT1 and AT2 is the "oil and fat" content. The difference between AT1 and AT2 is much larger than the measurement uncertainty (20%) which Aquon specifies for this method. This parameter is not seen as an important and decisive parameter for the Screencap research. There is no reason why there should be a difference between the two ATs. Normally, the "oil and fat" content is not measured in the sludge from WWTP Aarle-Rixtel, so there are no reference data available. It is assumed that the difference is caused by an "inaccuracy" in sampling or analysis.

### **3 Conclusion:**

The performances of AT1 and AT2 are in good agreement with each other. When the fine screens are taken into operation on one of the two waste water treatment lines, it will be possible to determine the impact of the fine screens by comparing the performance of both treatment lines with each other.