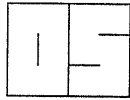


## Steam quality in Orkuver 5, Svartsengi

**Magnús Ólafsson**

**Greinargerð MÓ-2002-07**



Project: 8-630-229

---

## **STEAM QUALITY IN ORKUPER 5, SVARTSENGI**

In order to monitor the steam quality in ORKUPER 5 in Svartsengi, samples of steam and condensate have been collected and analysed for several elements. The following three locations were chosen for samples to be taken:

- Location 1: Steamline after separator but before mist-eliminator
- Location 2: Steamline at turbine inlet
- Location 3: Turbine condenser

During the years 2000, 2001 and 2002 samples have been collected on a relatively regular basis and at present the analysed components are as follows:

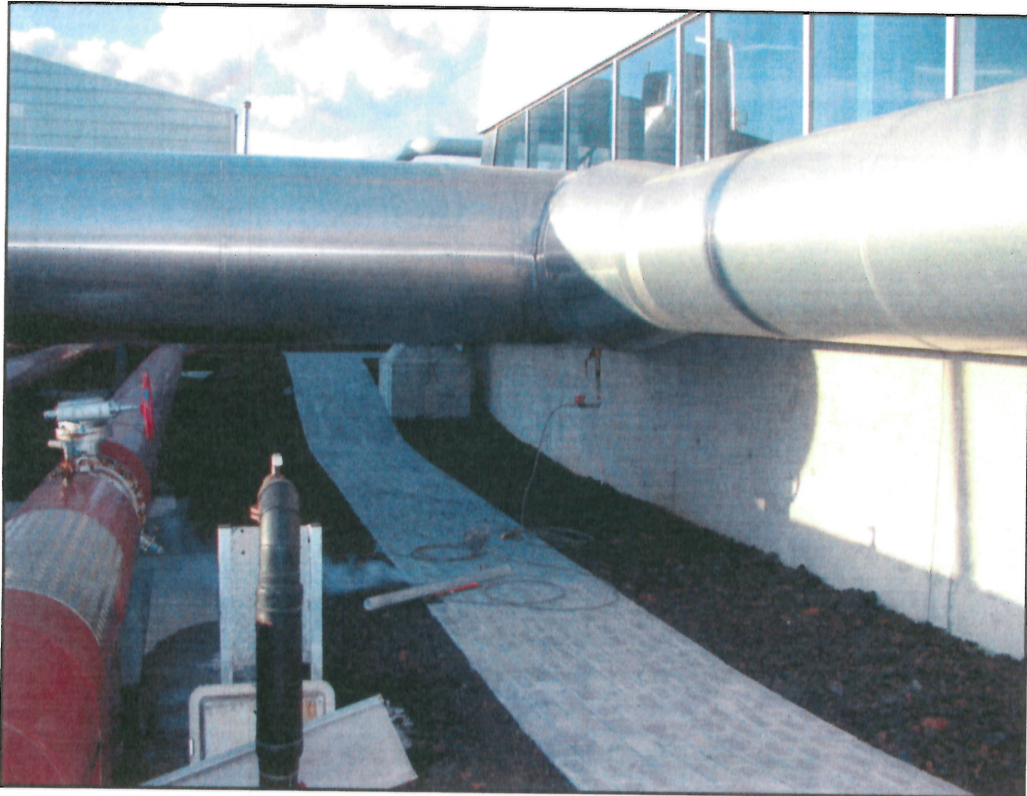
- Location 1: CO<sub>2</sub> and H<sub>2</sub>S in gas; sodium (Na), potassium (K), calcium (Ca), ammonia (NH<sub>4</sub>), silica (SiO<sub>2</sub>), iron (Fe) and conductivity in "condensate".
- Location 2: CO<sub>2</sub> and H<sub>2</sub>S in gas; sodium (Na), potassium (K), calcium (Ca), ammonia (NH<sub>4</sub>), silica (SiO<sub>2</sub>), iron (Fe) and conductivity in "condensate".
- Location 3: Sodium (Na), potassium (K), calcium (Ca), ammonia (NH<sub>4</sub>), silica (SiO<sub>2</sub>), iron (Fe) and conductivity.

CO<sub>2</sub> and H<sub>2</sub>S in gas are analysed by titration, Na, K, Ca and NH<sub>4</sub> with an ion chromatograph, SiO<sub>2</sub> with a spectrophotometer, Fe with atomic absorption and conductivity with a conductivity meter. The detection limit of Na and Ca is 0.05 mg/kg and 0.1 mg/kg for K and SiO<sub>2</sub>.

Sample locations are shown on figures 1, 2 and 3. A general layout of Orkuver 5 is shown in figure 4.

Analytical results are shown on figures 5 to 11 and in tables 2, 3 and 4.

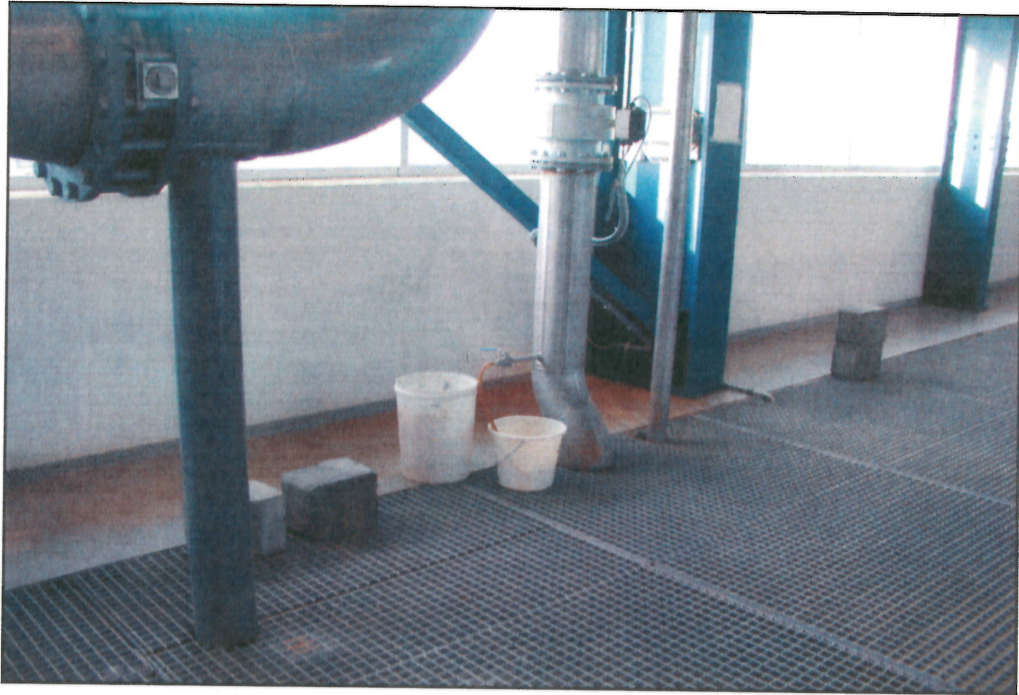
The composition of the brine in Svartsengi, calculated at 162°C (6.5 bar-a) is shown in table 1.



**Fig. 1: Steamline after separator but before mist-eliminator**



**Fig. 2: Steamline at turbine inlet**



**Fig. 3: Turbine condenser, condensate**

**Table 1. Brine in Svartsengi**

**Well SV-08 in Svartsengi**

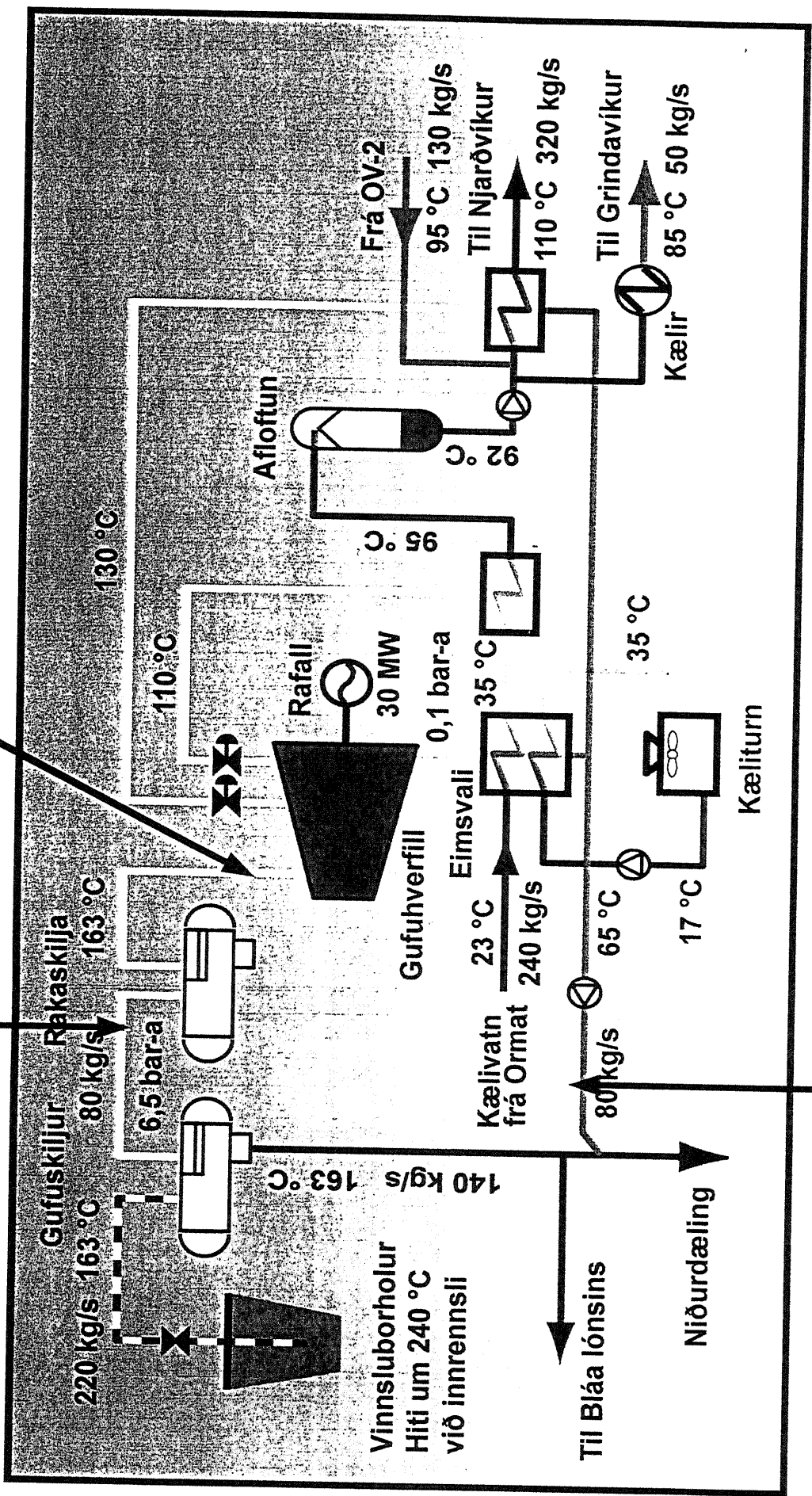
Sample 2000-0170 first calculated with the Watch program at 238°C, then boiled at 162°C ( 6,5 bar-a)

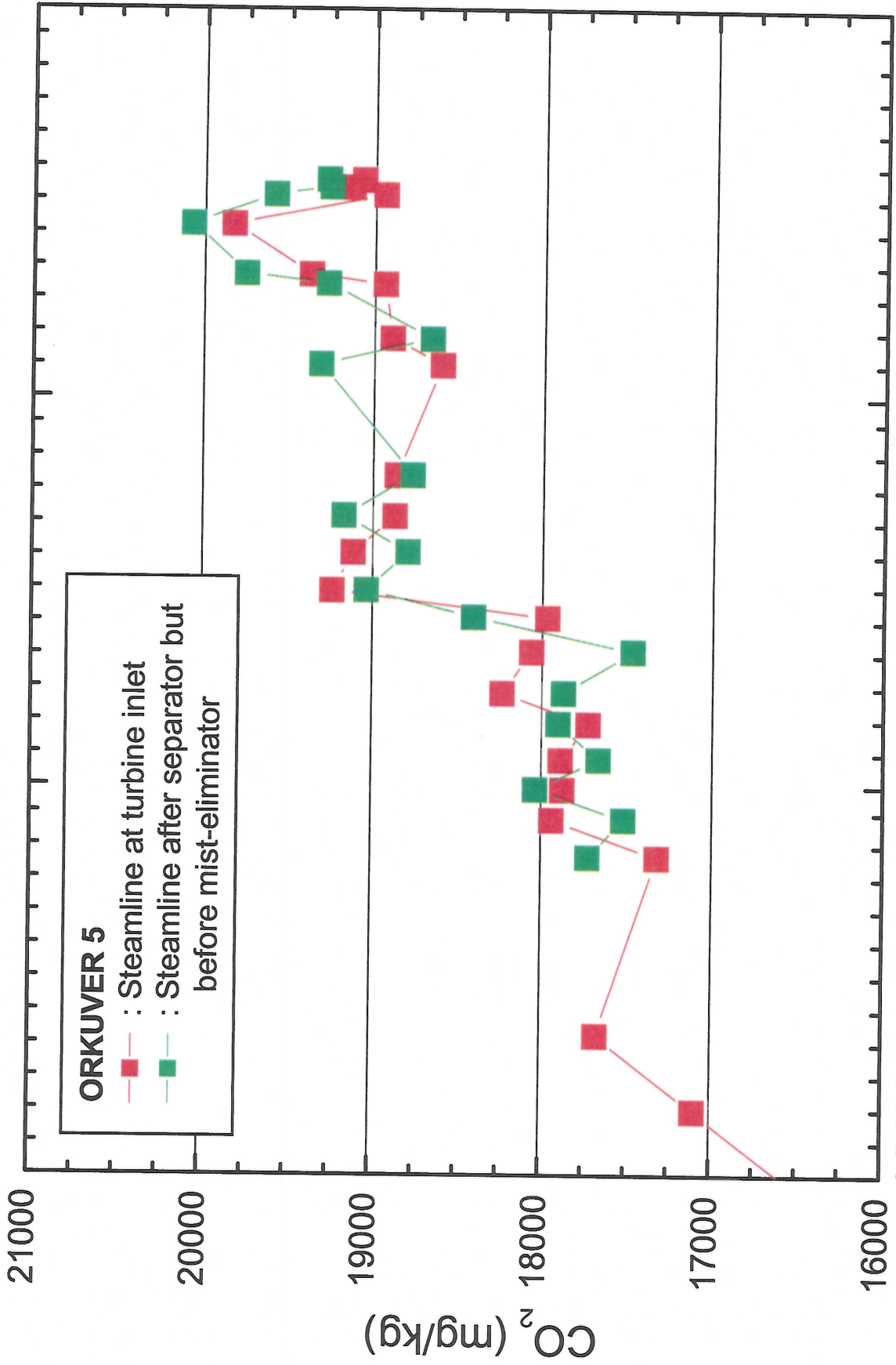
	Brine mg/kg		Efficiency 99,99% condensate (mg/kg)	Efficiency 99,999% condensate (mg/kg)
B	8,84		0	0
SiO <sub>2</sub>	563,77		0,06	0,01
Na	7356,92		0,74	0,07
K	1183,48		0,12	0,01
Mg	0,68		0	0
Ca	1267,4		0,13	0,01
F	0,18		0	0
Cl	14868,77		1,49	0,15
SO <sub>4</sub>	36,15		0	0
Al	0,1		0	0
Fe	0,04		0	0
TDS	25789,04		2,58	0,26

Loc. 2

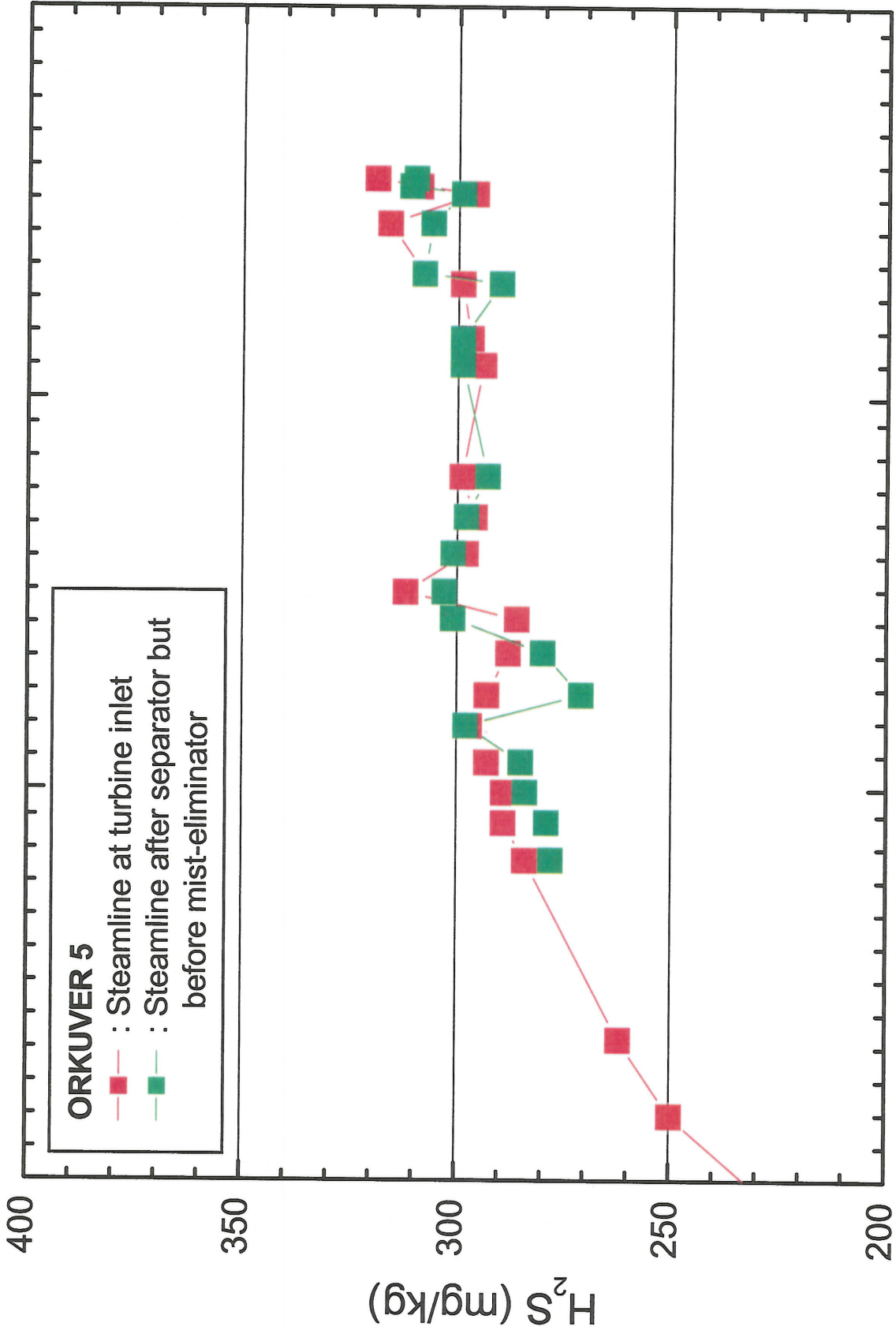
Loc. 1

Loc. 3

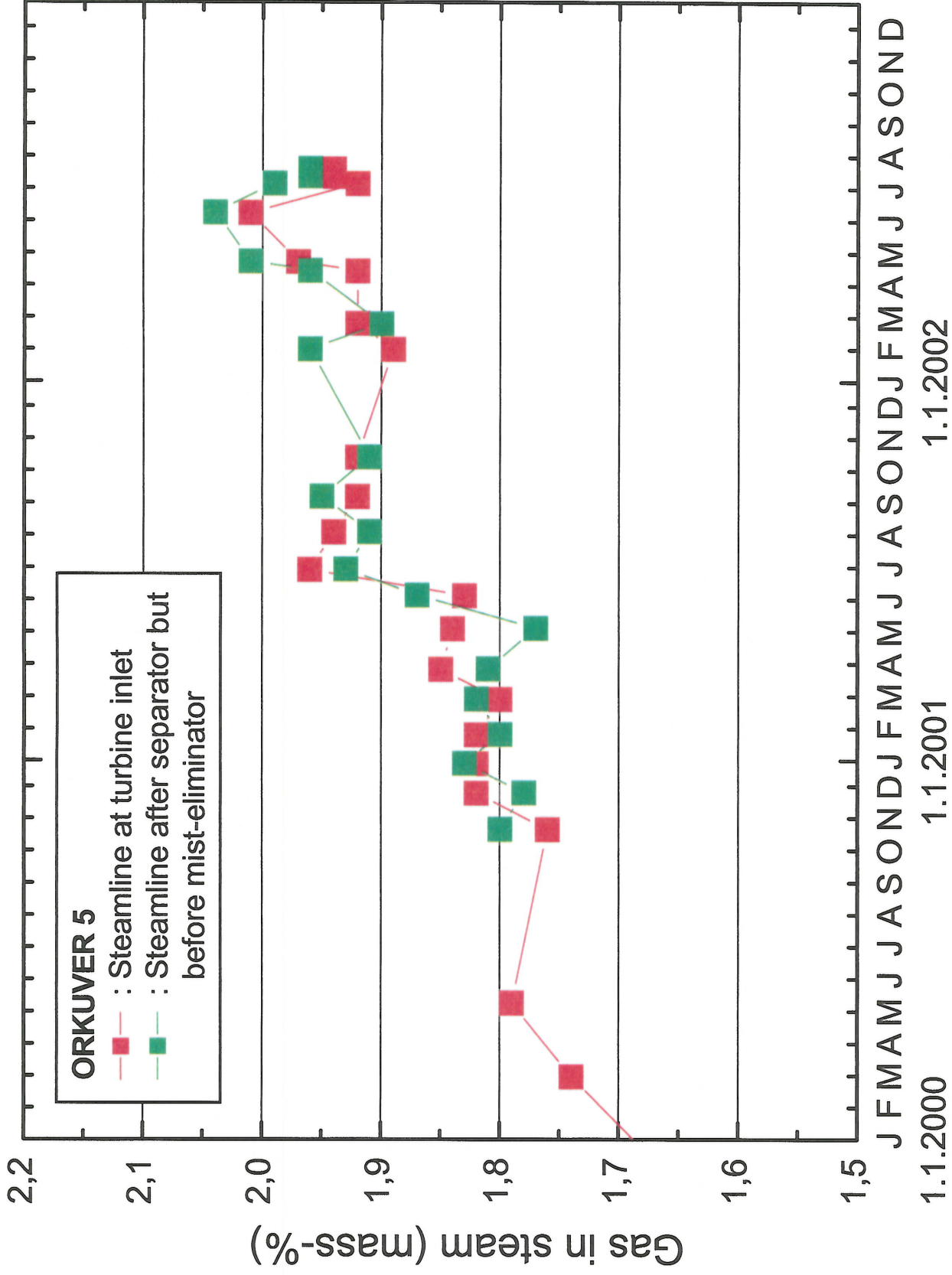




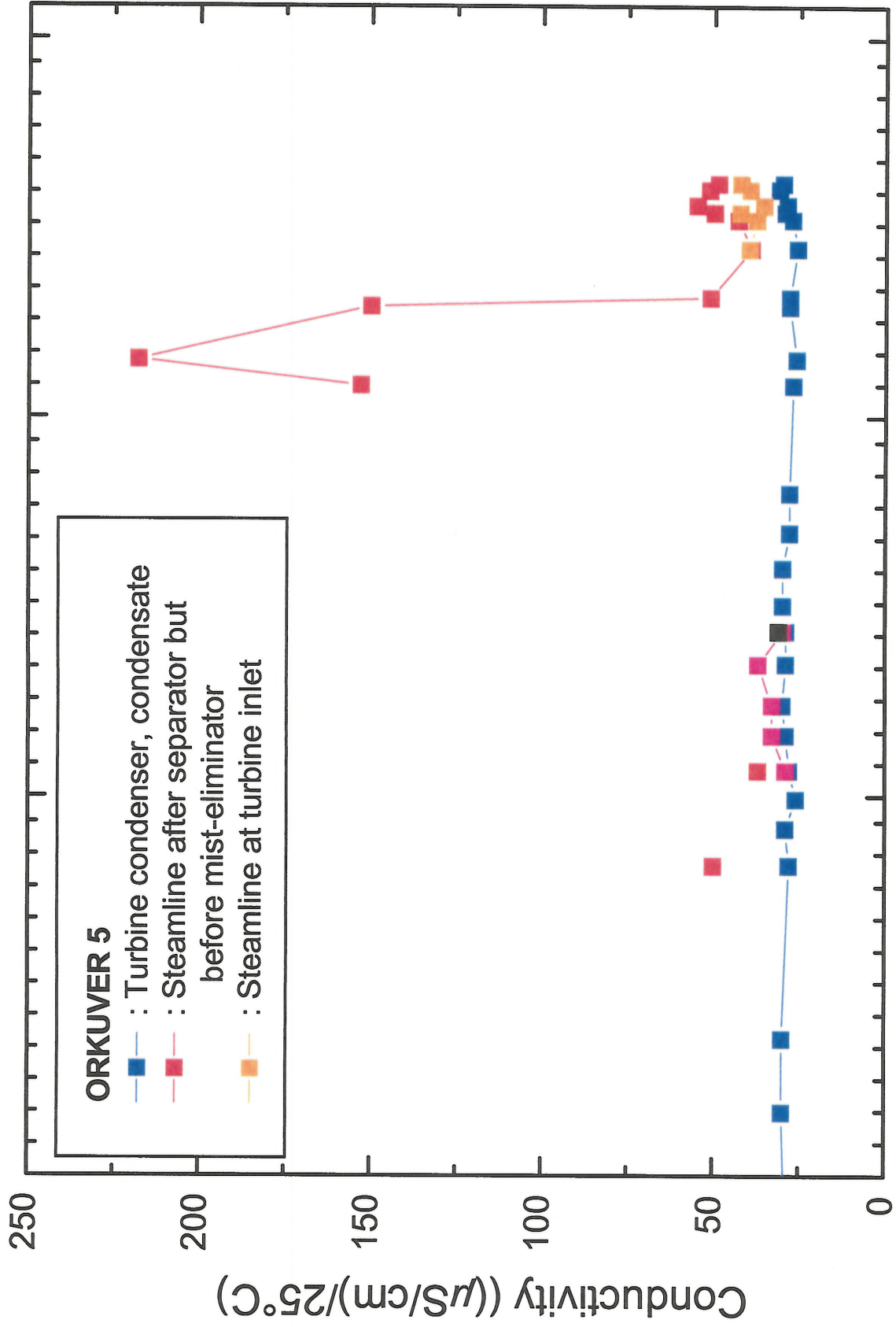
J F M A M J J A S O N D J J A S O N D J F M A M J J A S O N D  
 1.1.2000 1.1.2001 1.1.2002



J F M A M J J A S O N D J J A S O N D J F M A M J J A S O N D  
 1.1.2000 1.1.2001 1.1.2002

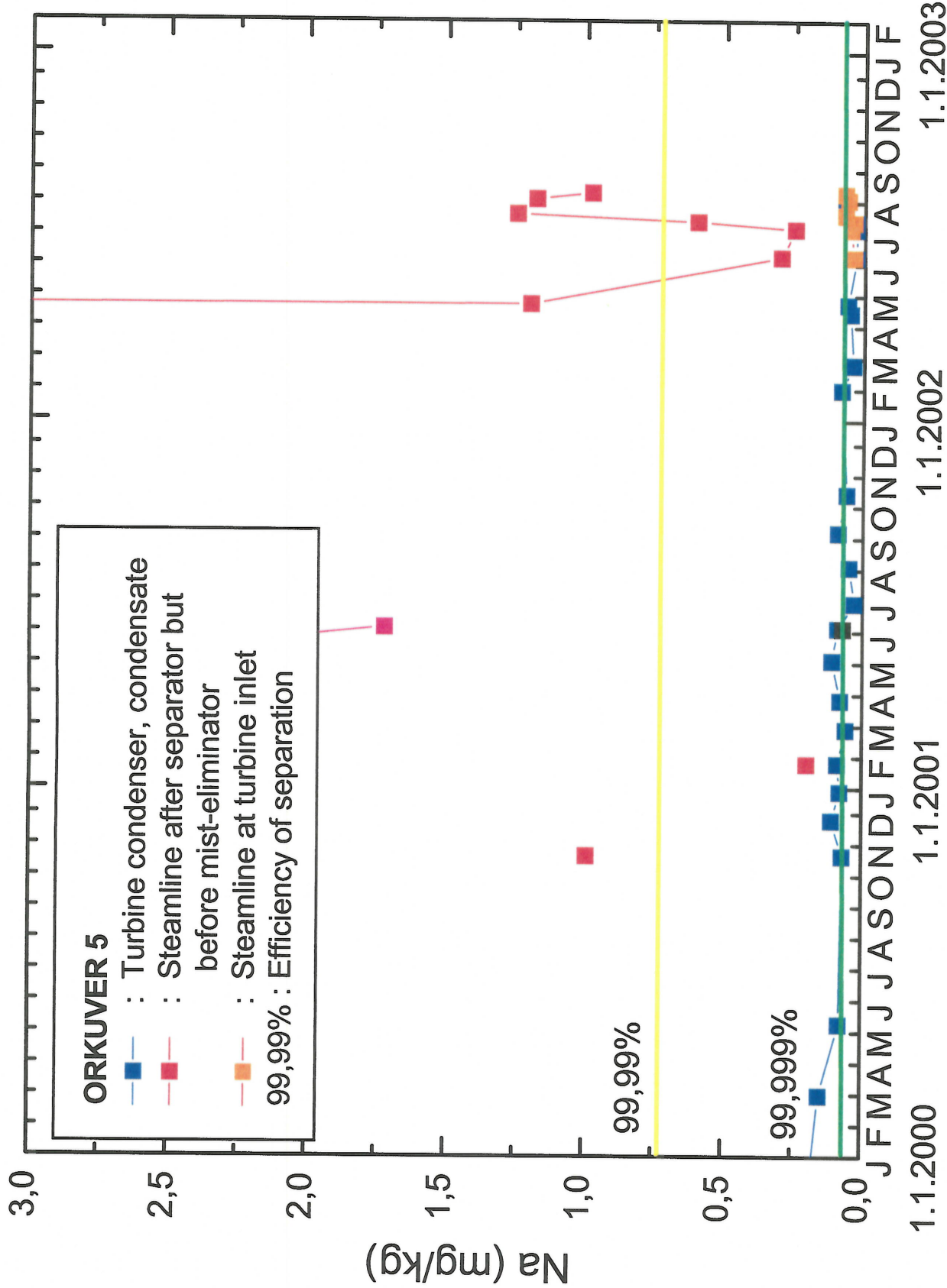


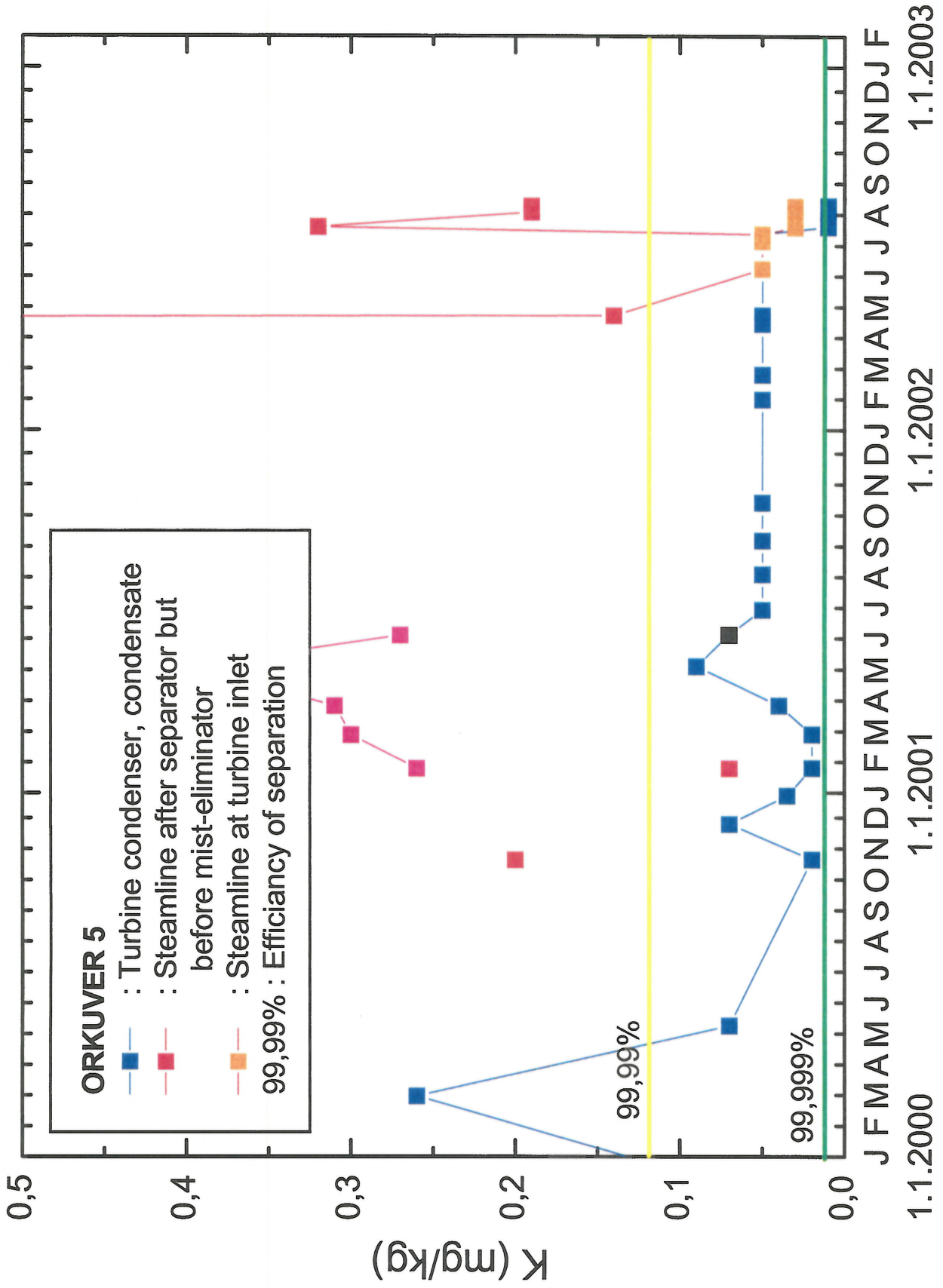




J F M A M J J A S O N D J J A S O N D J F M A M J J A S O N D J F

1.1.2000 1.1.2001 1.1.2002 1.1.2003





0,5

0,4

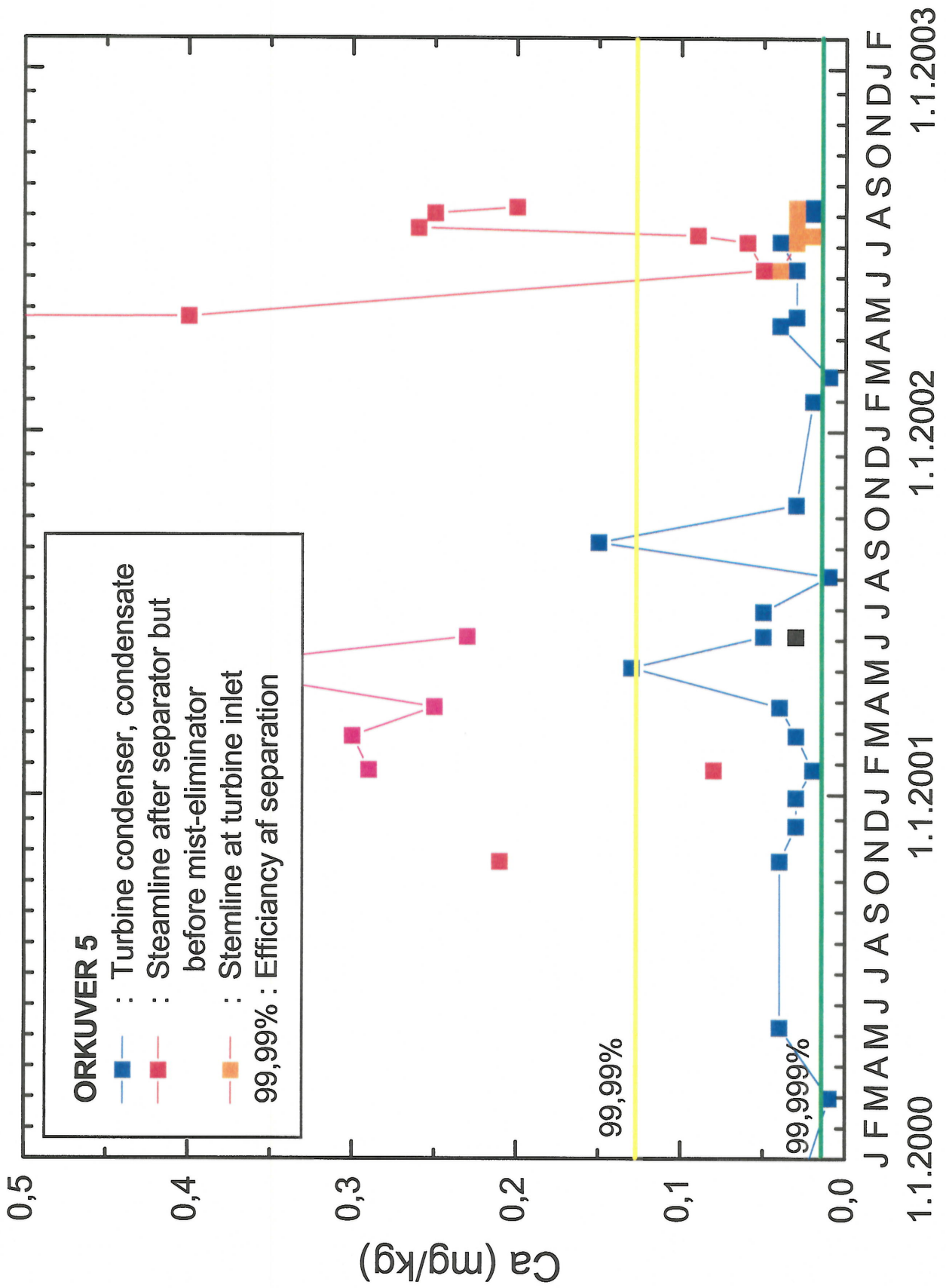
0,3

0,2

0,1

0,0

K (mg/kg)



Ca (mg/kg)

0,5  
0,4  
0,3  
0,2  
0,1  
0,0