SIAPWS Annual Meeting 2016

NJV Laboratory – specialised in water-steam chemistry

Karsten Thomsen, COWI

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Background

- The laboratory at Nordjyllandsværket is specialised within two fields:
  - Oil and grease analysis
  - Water-steam circuit analysis
- The COWI chemists have worked with the lab for many years (Elsam and Vattenfall) and helped develop the expertise
- Cooperation continues, the lab is now owned by Aalborg Municipality
  - Agreement on task by COWI chemists
  - Analysis by the lab – on-site possibly by the chemist
  - Evaluation and comments by the chemists

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Water-steam analyses – on-site measurements

- Parameters measured on-site and/or in parallel with plant monitors
  - Conductivity
  - Acid conductivity
  - Degassed conductivity
  - Oxygen
  - Sodium

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Test of NJV3 condensate over a period

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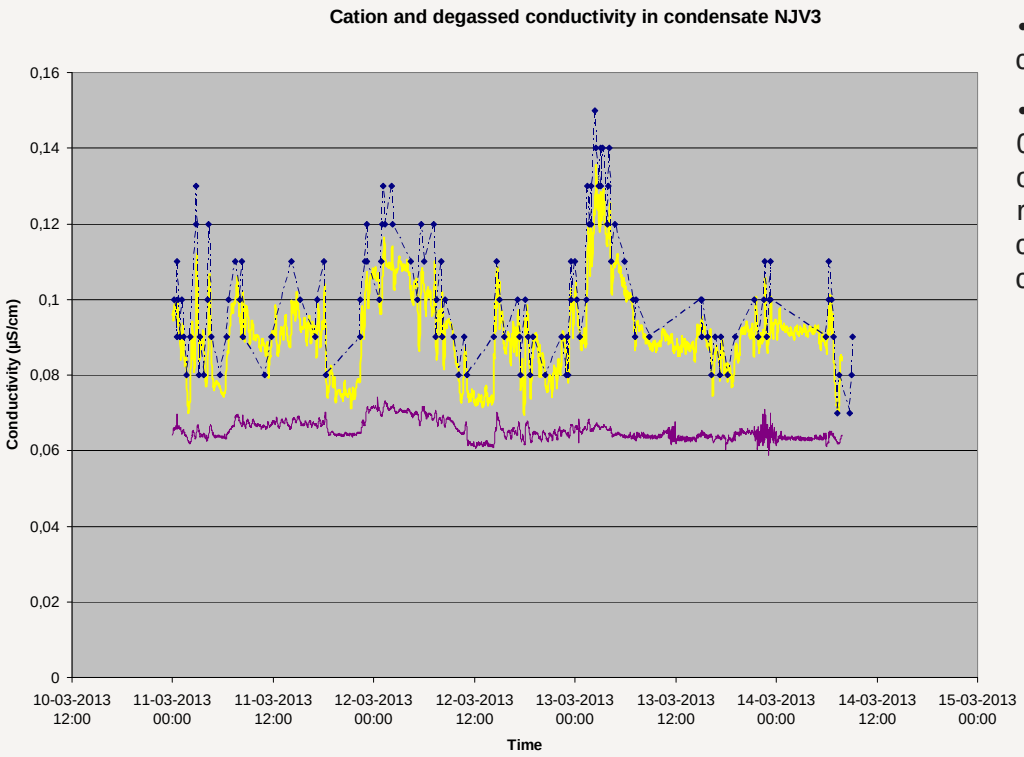
Source of AC in raw condensate?



Evaluation:

- AC-online and CC compares well
- DC remains below 0,07 µS/cm – traces of carbon dioxide responsible for the cation conductivity in condensate

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Water-steam analyses – lab methods

- Standard methods
  - Conductivity
  - pH
  - Alkalinity (p- & m- value)
  - Hardness
  - SiO_2 (molybdate blue method)
  - Fe (Ferrozine method)
  - Anions (ppm-range) (IC)
- Specialised methods
  - Cu (Anodic stripping voltammetry)
  - NVOC (UV-digestion, IR-detection)
  - Anions (ppb-range) (IC)
  - Cations (ppb-range) (IC)

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Ion chromatography at the low µg/kg level

Lab. facilities: Semi-clean room: Separate lab., air supply through filters, laminar flow bench for handling samples and standards

Equipment:	Dionex ICS-2000 (anions, gradient), Dionex ICS-1500 (cations, no gradient)
Eluent (generator)	Diluted KOH, 8-30 mM gradient, Diluted methanesulfonic acid, 20 mM
Columns:	IonPac AS15-5 um – 3x150 mm, IonPac AC12A-5 um – 3x150 mm
Injection vol:	1000 µL
Sampling:	Carefully rinsed sample bottles, pyrex glass for anions, HDPE for cations
Instructions:	Detailed instructions on sampling when samples are taken by others

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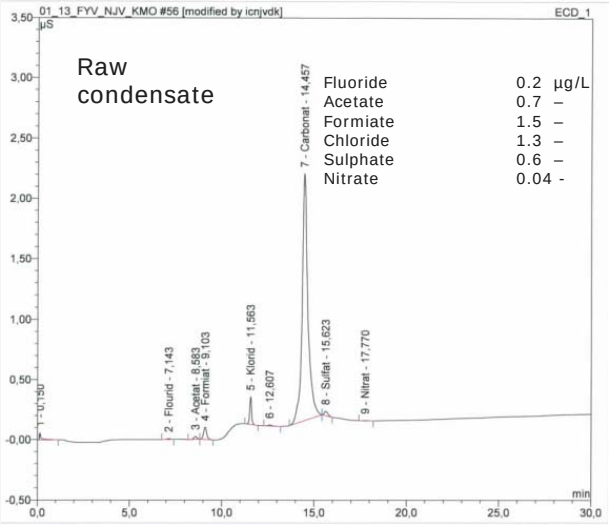
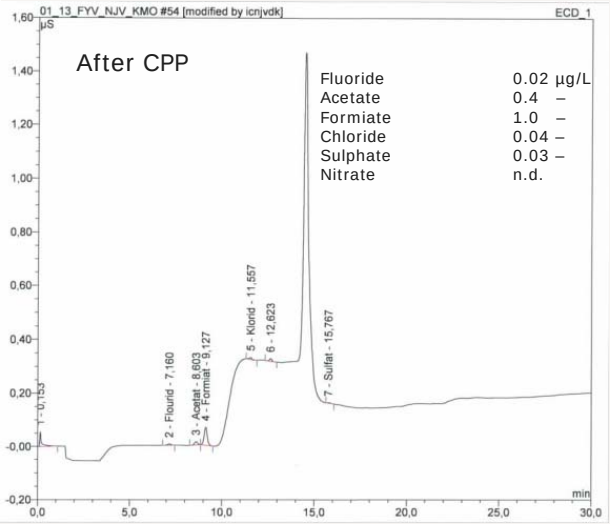
Anions at low level





Limit (µg/kg)	Fluoride	Acetate	Formiate	Chloride	Sulphate	Nitrate
DL	0.02	2.9	3.3	0.35	0.21	0.36
QL	1	5	5	1	1	1

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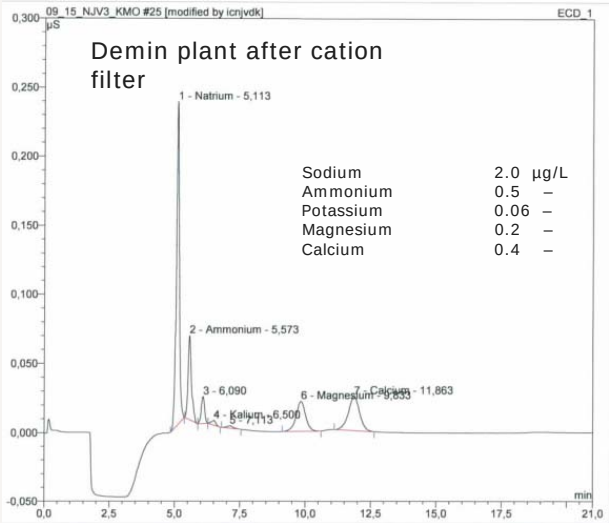
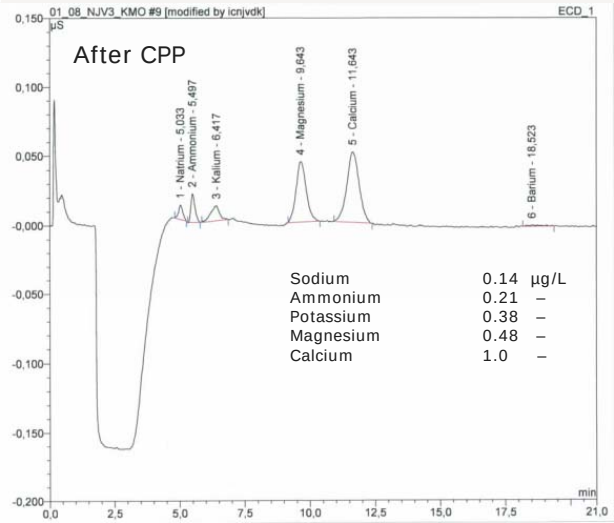
Cations at low level





Limit (µg/kg)	Sodium	Ammonium	Potassium	Magnesium	Calcium
DL	0.2	0.5	0.2	0.2	0.2
QL	1	2	1	2 (blind value ~1)	2 (blind value ~1)

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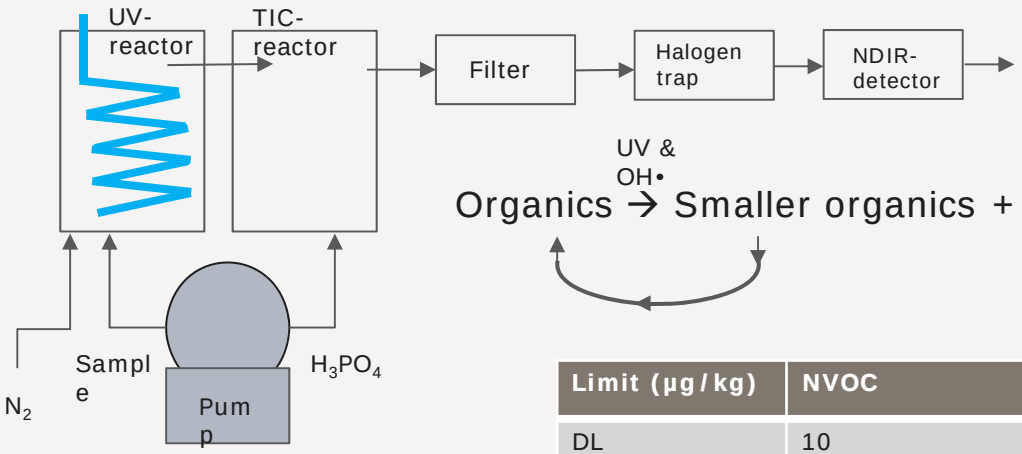
TOC/NVOC at µg/kg level



UV & OH•

Organics → Smaller organics + CO_2 + H_2O

Limit (µg/kg)	NVOC
DL	10
QL	40 (20 on 4 repetitions)

Lab. facilities:	Water lab, air supply through filters
Instrument:	Analytic Jena, Multi N/C UV HS TOC-analyser
Destruction mode:	UV light alone, no oxidant added
Sampling:	Carefully rinsed sample bottles, pyrex glass
Instructions:	Detailed instructions on sampling when samples are taken by others

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