LIITE I

Tehtaiden EU-BATille toimittaman NOx-datan vertailua

Open your mind. LUT.
Lappeenranta University of Technology

IED NOx

Open your mind. LUT.
Lappeenranta University of Technology

Existing

Total rated thermal input (MW)		O_2 6 %	O_2 3 %
50-100	mg/Nm³	300	360
100-300	mg/Nm³	250	300
> 300	mg/Nm³	200	240

New

Total rated thermal input (MW)		O_2 6 %	O_2 3 %
50-100	mg/Nm³	250	300
100-300	mg/Nm³	200	240
> 300	mg/Nm³	150	180

Why should Recovery Boiler emisison levels be lower than IED?

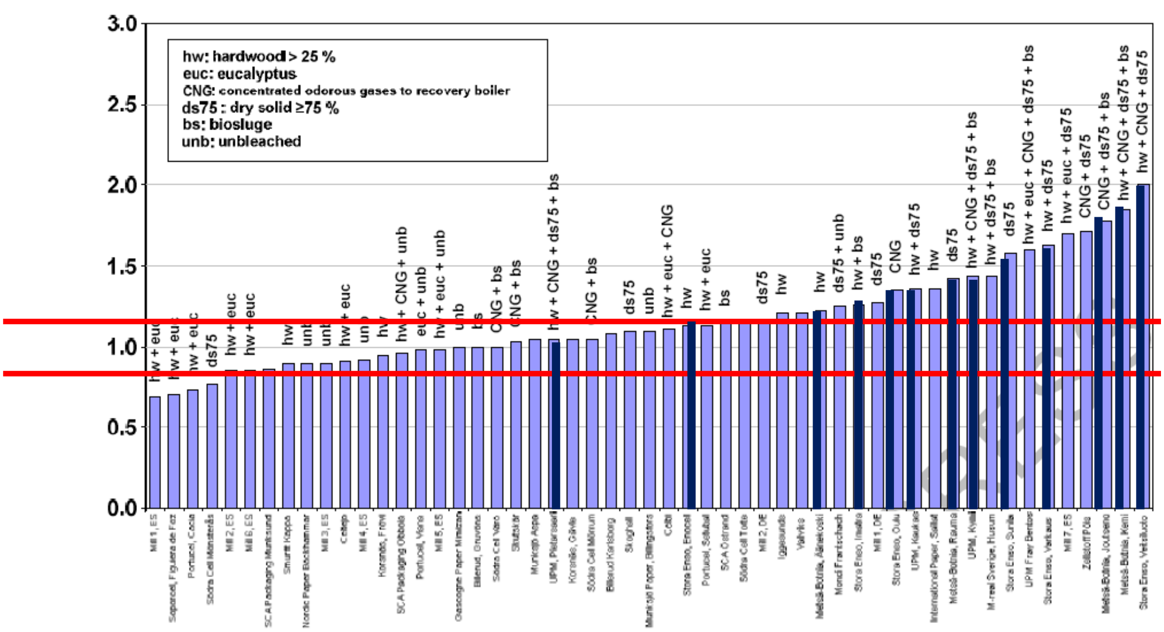
Open your mind. LUT.
Lappeenranta University of Technology

DRAFT BREF available

NOx emission from recovery boilers

Open your mind. LUT.
Lappeenranta University of Technology

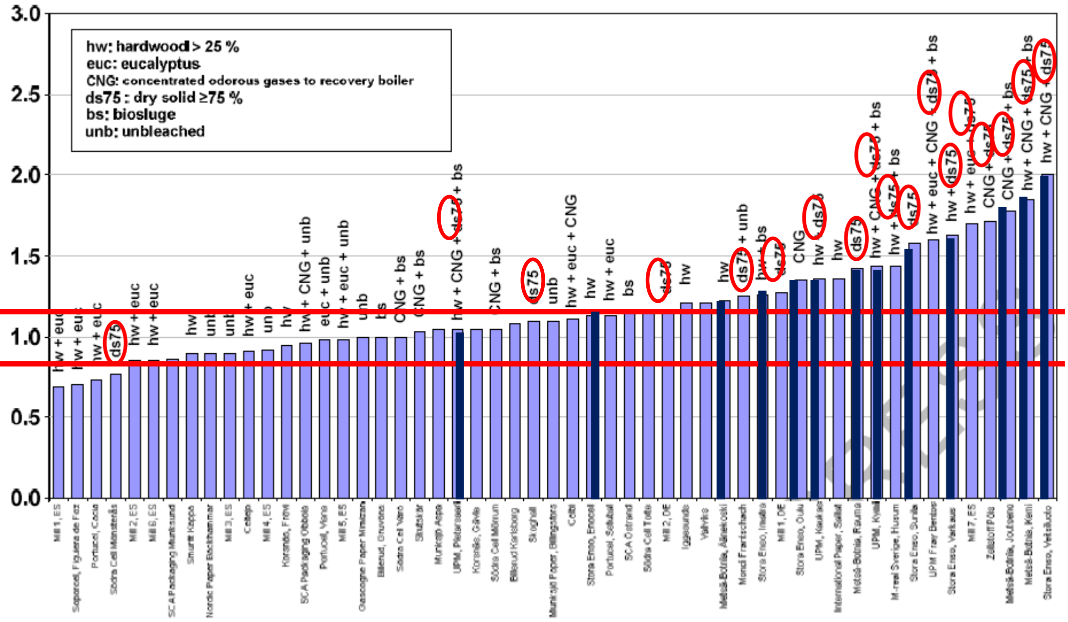
fired with different black liquors, dry solids and NCG, kg/ADt (EU IPPC, 2011)



NOx emission from recovery boilers

Open your mind. LUT.
Lappeenranta University of Technology

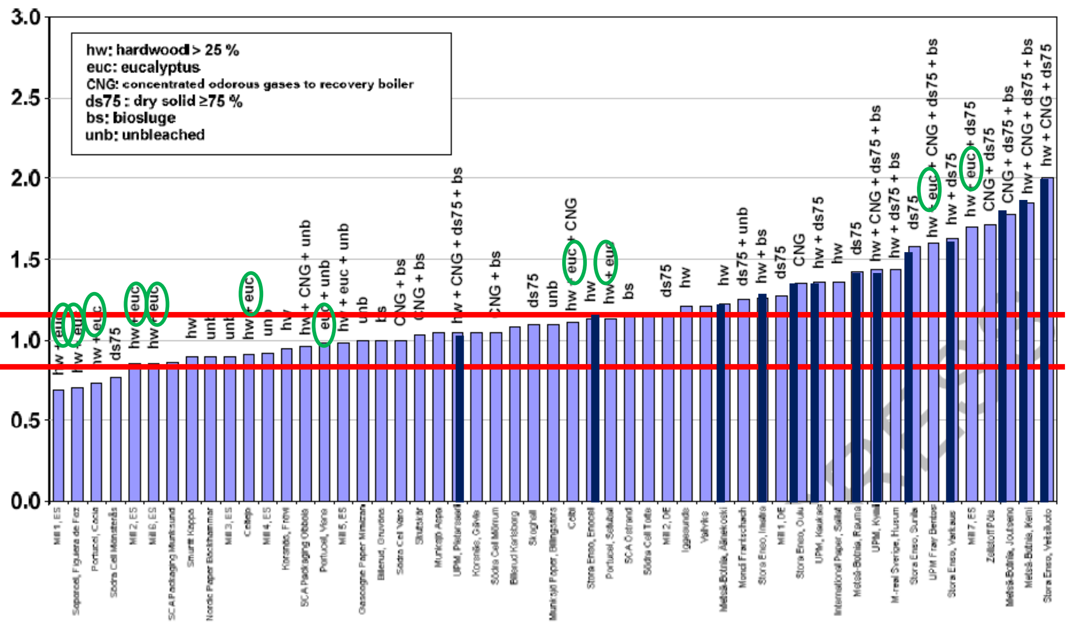
fired with different black liquors, dry solids and NCG, kg/ADt (EU IPPC, 2011)



NOx emission from recovery boilers

Open your mind. LUT.
Lappeenranta University of Technology

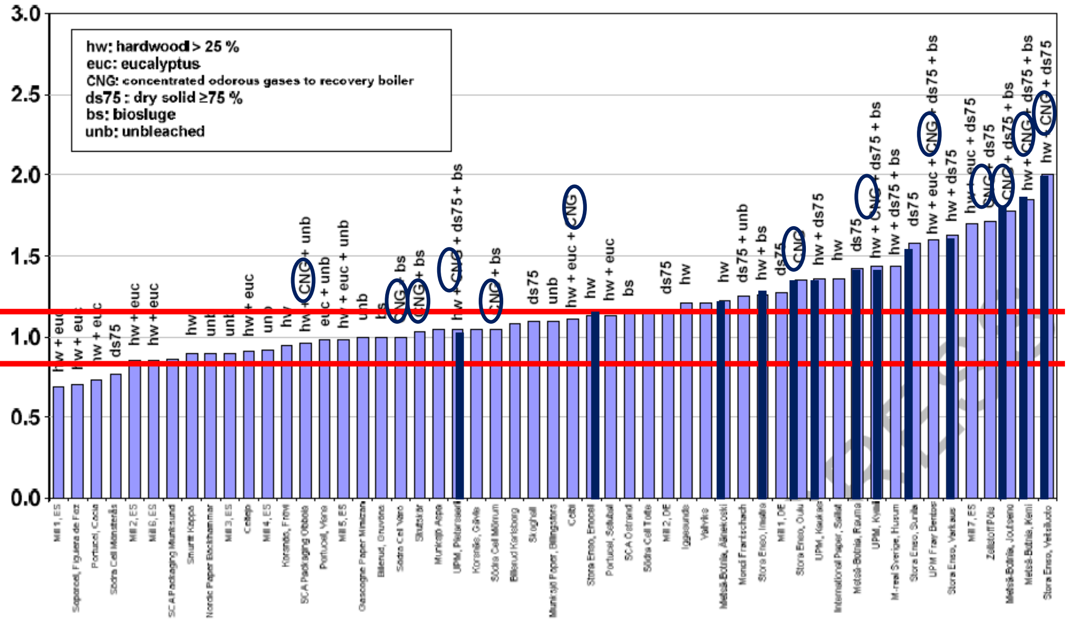
fired with different black liquors, dry solids and NCG, kg/ADt (EU IPPC, 2011)



NOx emission from recovery boilers

Open your mind. LUT.
Lappeenranta University of Technology

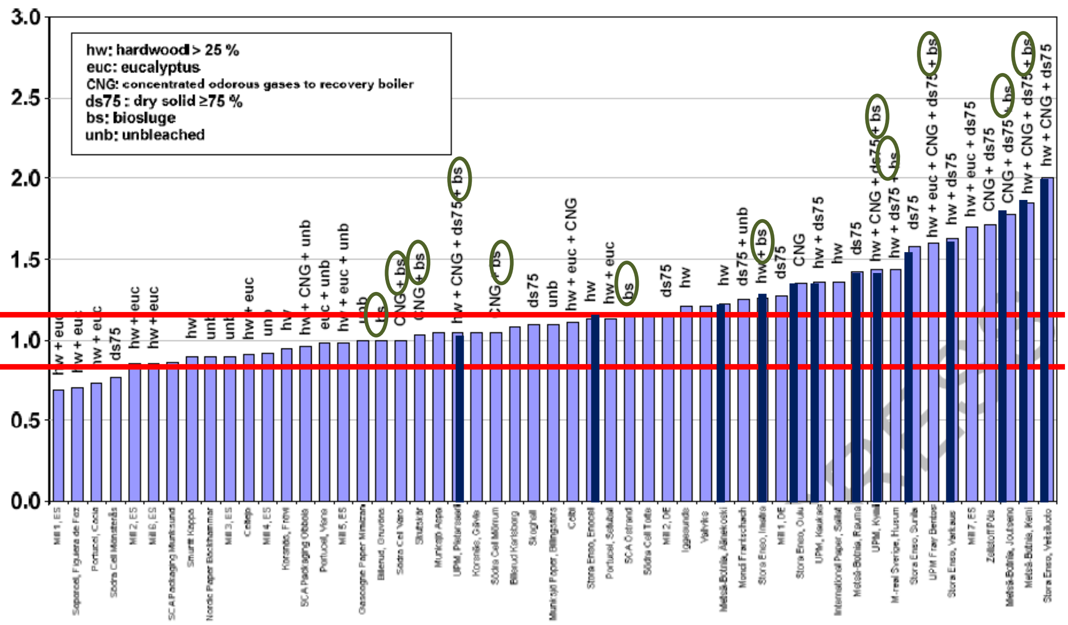
fired with different black liquors, dry solids and NCG, kg/ADt (EU IPPC, 2011)



NOx emission from recovery boilers

Open your mind. LUT.
Lappeenranta University of Technology

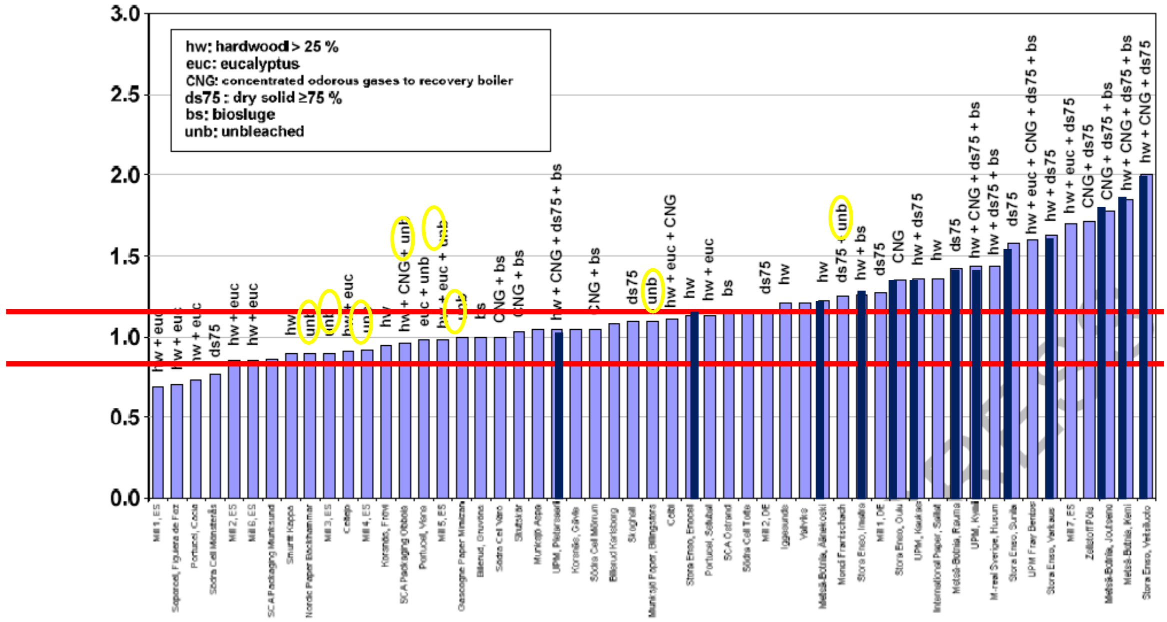
fired with different black liquors, dry solids and NCG, kg/ADt (EU IPPC, 2011)



NOx emission from recovery boilers

Open your mind. LUT.
Lappeenranta University of Technology

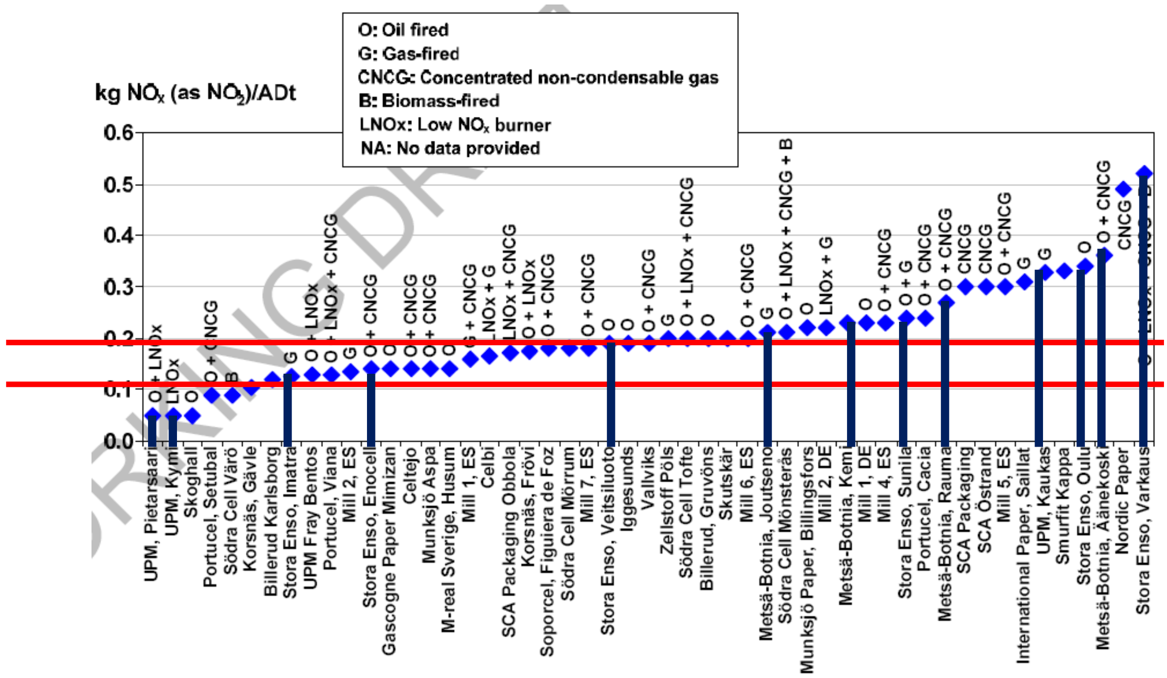
fired with different black liquors, dry solids and NCG, kg/ADt (EU IPPC, 2011)



NOx emission from lime kilns

Open your mind. LUT.
Lappeenranta University of Technology

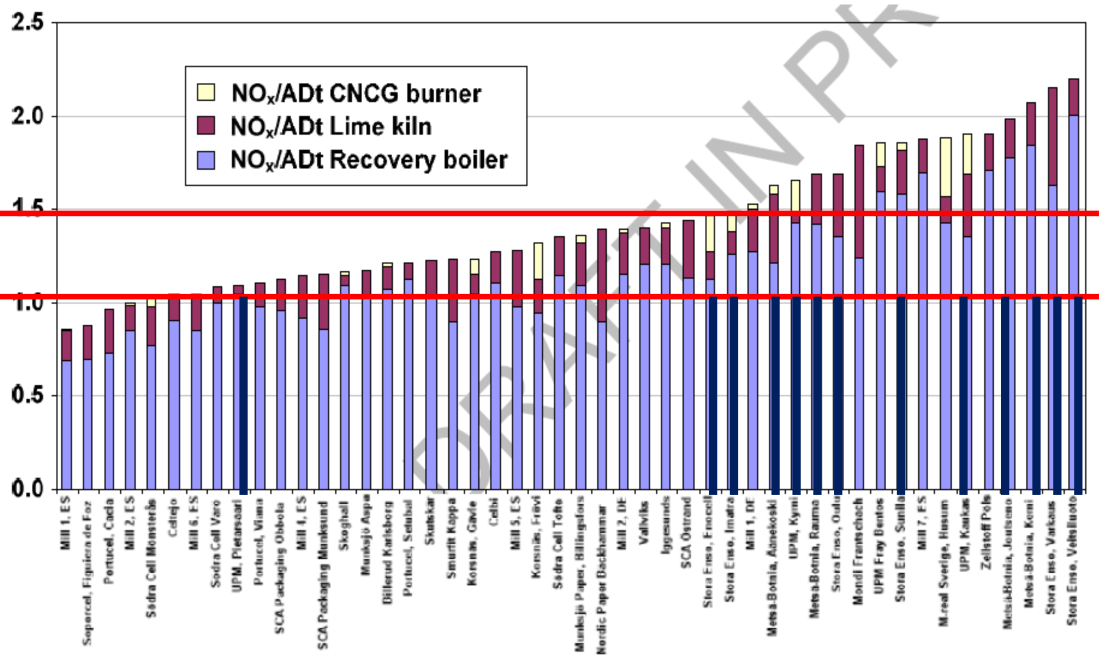
fired with different fuels, CNCG, kg/ADt (EU IPPC, 2011)



NOx emission from process

Open your mind. LUT.
Lappeenranta University of Technology

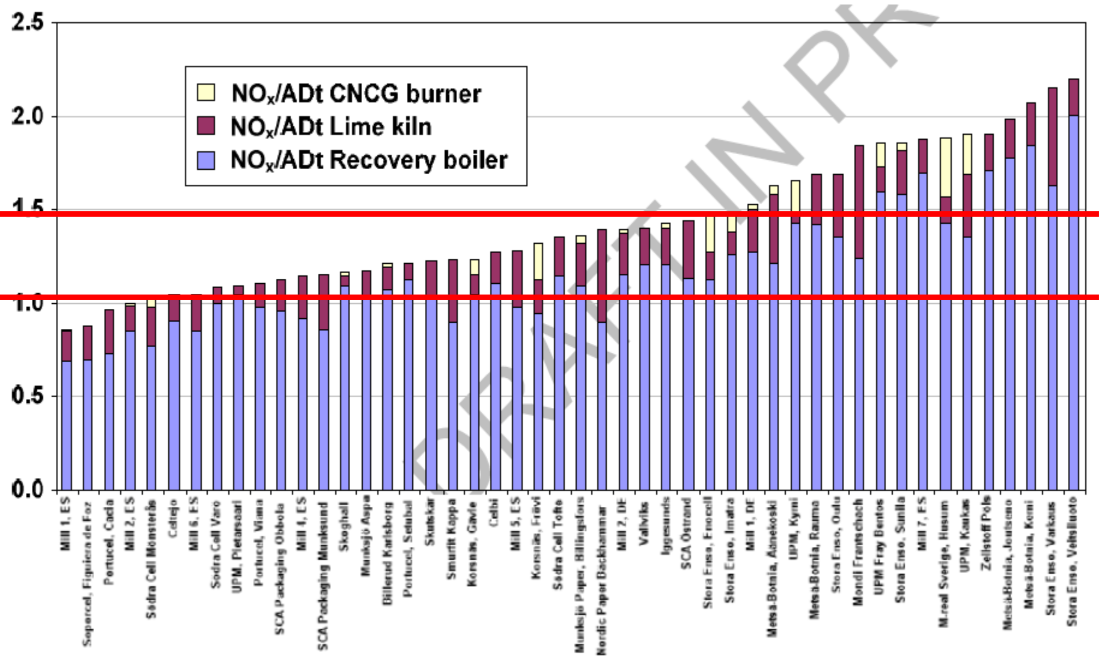
RB+LK+NCG, kg/ADt (EU IPPC, 2011)



NOx emission from process

Open your mind. LUT.
Lappeenranta University of Technology

RB+LK+NCG, kg/ADt (EU IPPC, 2011)



LIITE II

Savukaasumittaukset – uusi tekniikka haastaa vanhan –esitys

SICK Oy, 7.9.2011

SICK
Sensor Intelligence.

SICK
Sensor Intelligence.
SOLUTIONS TOUR

Savukaasumittaukset – Uusi tekniikka haastaa vanhan

Kari Karhula
Prosessiautomaatio
Soodakattilayhdistys / YTR, Vantaa 7.9.2011

Savukaasumittaukset
- Uusi tekniikka haastaa vanhan

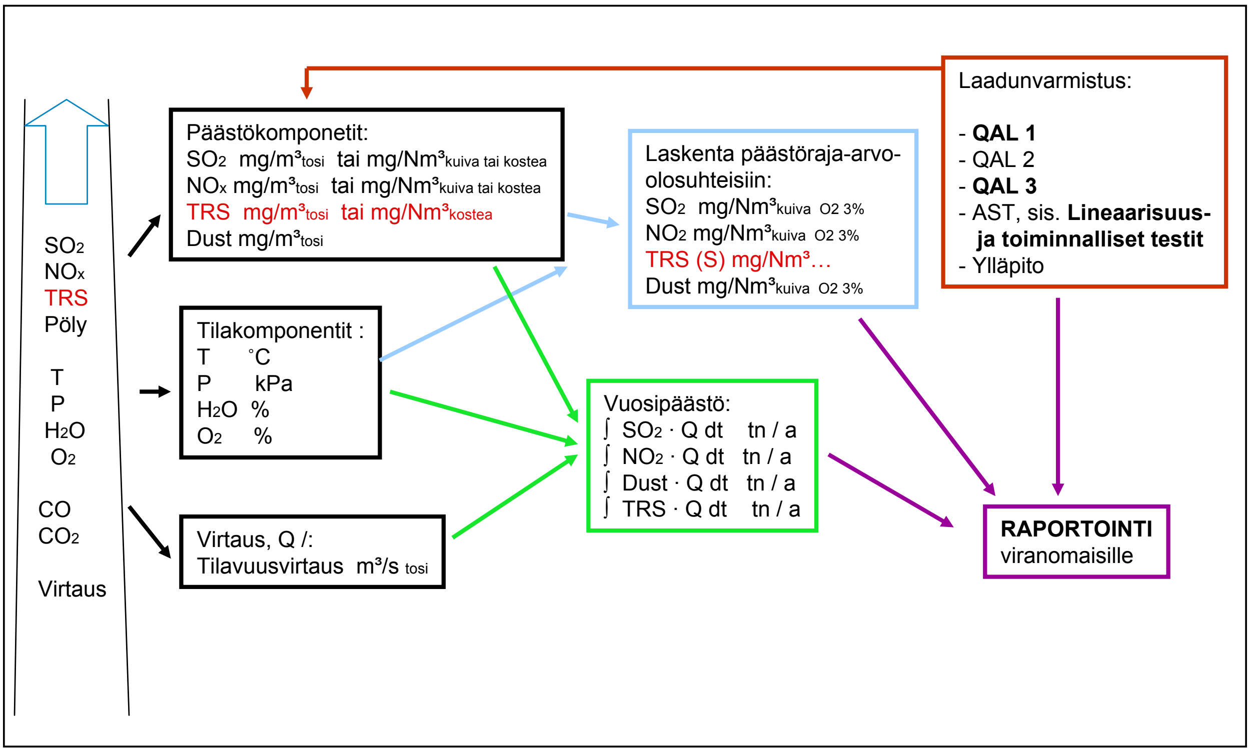
SICK
Sensor Intelligence.

Sisältöä

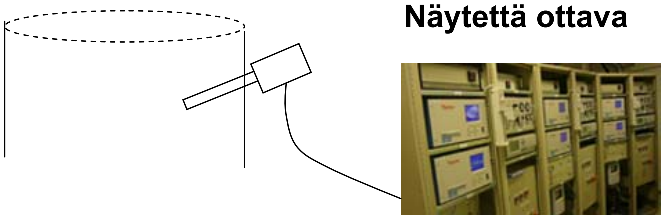
- Yleiskuvaus **päästömittausjärjestelmä**stä
- Vanhan ja uuden TRS-mittaustekniikan **ominaisuuksien vertailua**
- **Uuden** tekniikan esittely
- **Laadunvarmennus**
- Miten **muut** tarvittavat asiat voidaan mitata
- Mitä uuteen tekniikkaan siirtyminen **voi merkitä** tehtaalle

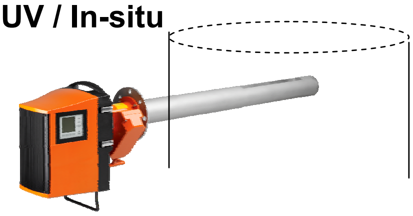
Tilaa **keskustelulle**

Päästömittausjärjestelmä
Soodakattila, meesauuni ja hajukaasukattila



TRS-mittaustekniikoista



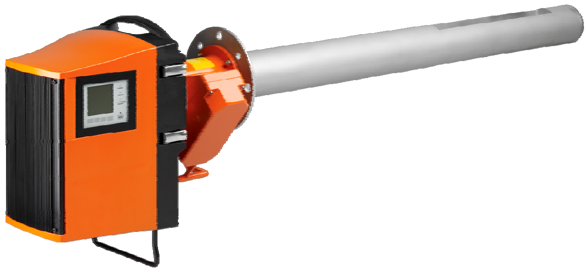


	Näytettä ottava	UV / In-situ
Suora mittaus		x
Jatkuvatoiminen mittaus	x	x
TRS, ei pelkkä H2S	x	x
TRS, yksilöllinen mittaus		x
SO2 ja NOx samassa laitteessa		x
Hävikkiä näytteenotossa	x	
Epätäydellisyyttä konversiossa	x	
Kaasuanalyysihuone	x	
Kemikaaleja	x	
Kalibrointikaasuja	x	
Vähäinen ylläpito		x

GM32 – Sovellusalueen laajennus

GM32 SO2, NO, NO2, NH3 –analysaattori julkistettiin 2010, edeltäjiä

- GM31 (1995-2010) SO2, NO, NO2, NH3
- GM30 (1982-1995) SO2, NO, pöly
- GM21 (1978–1993) SO2, pöly



Sovellusalueen laajennus 2009 - 2011

- TRS-komponentit H2S, CH3SH, DMS, DMDS
- Laboratoriotestit 2009
- Kenttätestit 2010 – 2011, kolme sellutehdasta, kaikissa testit soodakattilalla ja meesauunilla

In-situ

”**In situ**” on latinaa ja tarkoittaa ”**tilassa**”

In situ tekee mittausjärjestelmästä yksinkertaisen, mitataan **kosketuksettomasti** savukanavassa valon avulla.

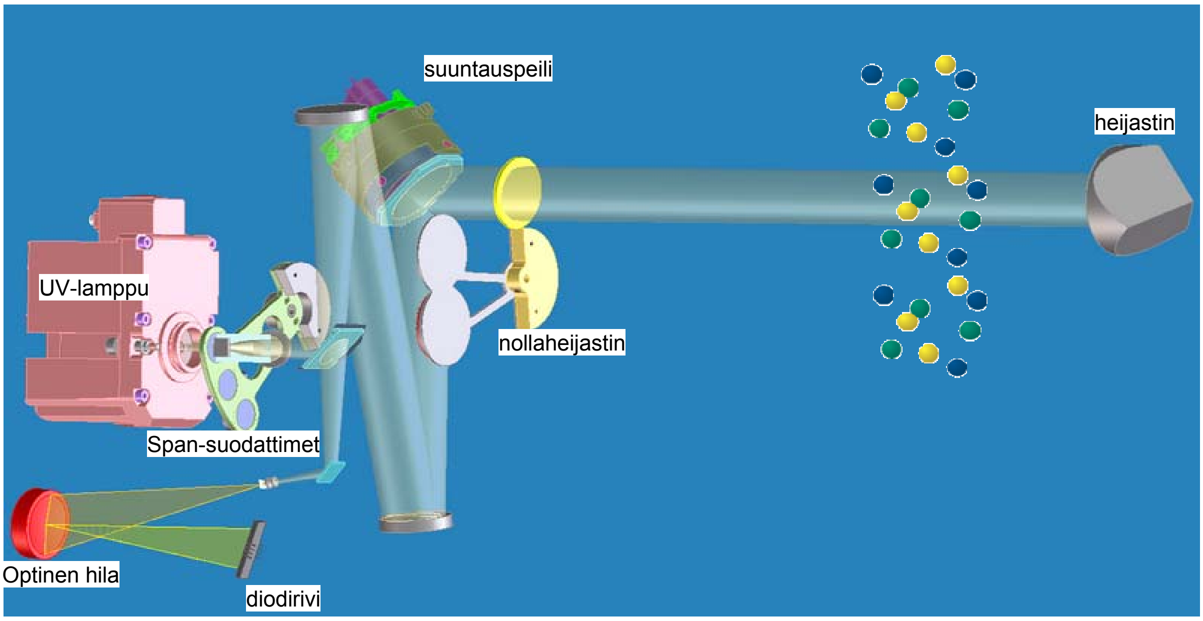
In situ helpottaa työpäivääsi:

- Kosketukseton mittaus
- Vain valolähde on kuluva
- QAL3 automaattisesti
- Yksinkertainen rakenne

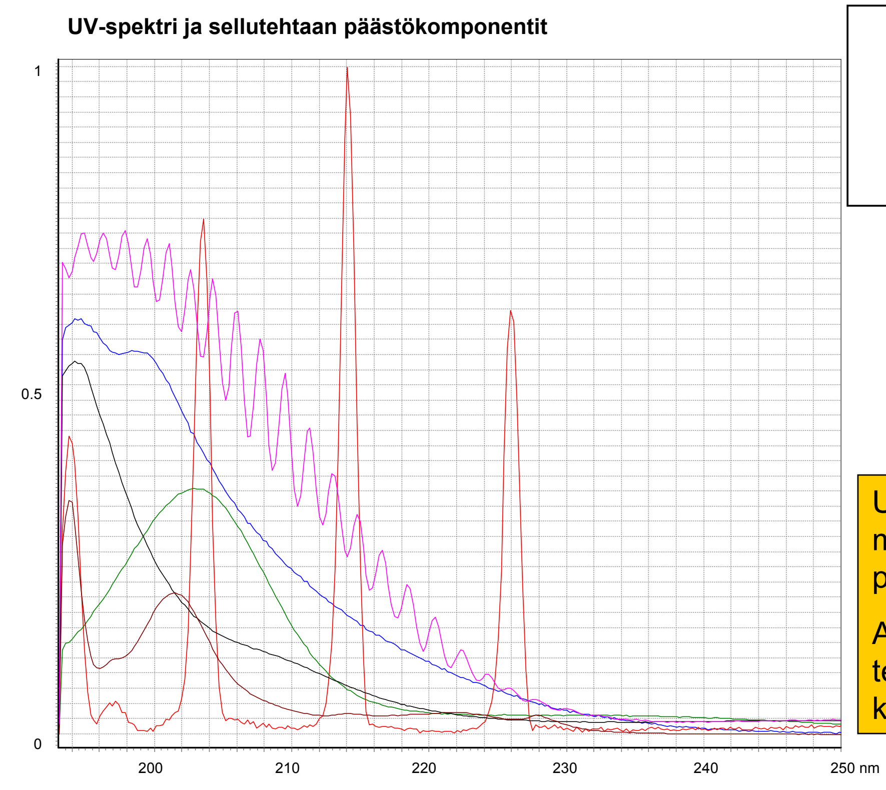
Ei näytteenoton ongelmia
Pumput, pesurit, laimentimet puuttuvat
Ei kalibrointikaasuja
Käyttäjälle lähes huoltovapaa.

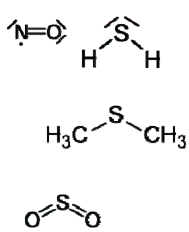
GM32 mittaustekniikka
- Optiikka

- UV-absorptio -spektroskopia
- Mittatie savukanavan sisällä
- Auto-collimaatioperiaate (optinen suuntaus) mahdollistaa tarkan mittauksen
- Span-suodattimet ja nollaheijastin mahdollistavat automaattisen kalibroinnin tarkistuksen.



TRS-komponenttien UV-Spektri





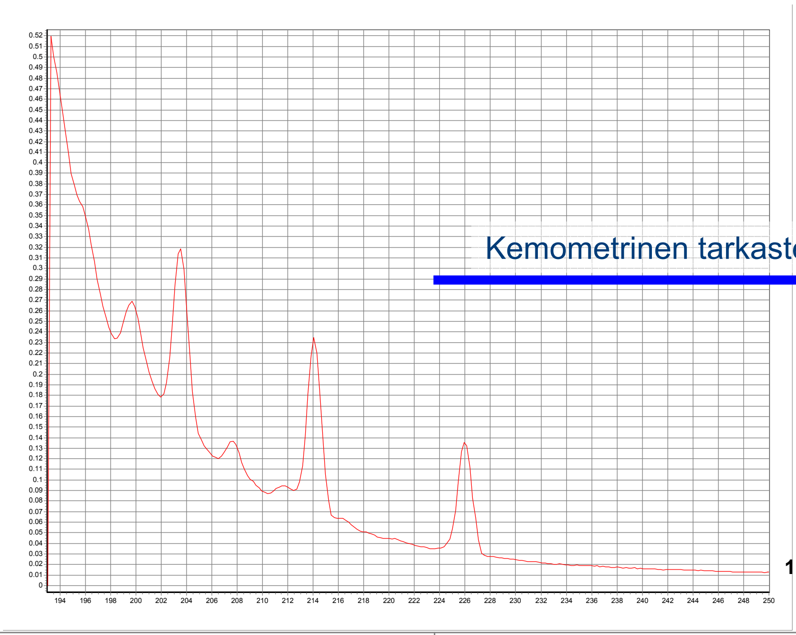
UV-Spektrin komponentit menevät lineaarisesti päällekäin.

Analysaattori saa tehtaalla elinikäisen kalibroinnin!

GM32: SICKin ratkaisu TRS-analyysille

SICK Sensor Intelligence.

- SICK kehitti kemometrian (algoritmin) jolla voidaan laskea yksittäiset UV-alueen aktiiviset kaasukomponentit, joille laite on kalibroitu.



H_2S	= 28.9 ppm
MMK	= 0.4 ppm
DMS	= 0.5 ppm
DMDS	= 0,3 ppm
TRS[1)]	= 30.4 ppm
SO_2	= 1.9 ppm
NO	= 59.5 ppm
NH_3	= 0.7 ppm

[1)]TRS = H2S + MMK + DMS + 2*DMDS

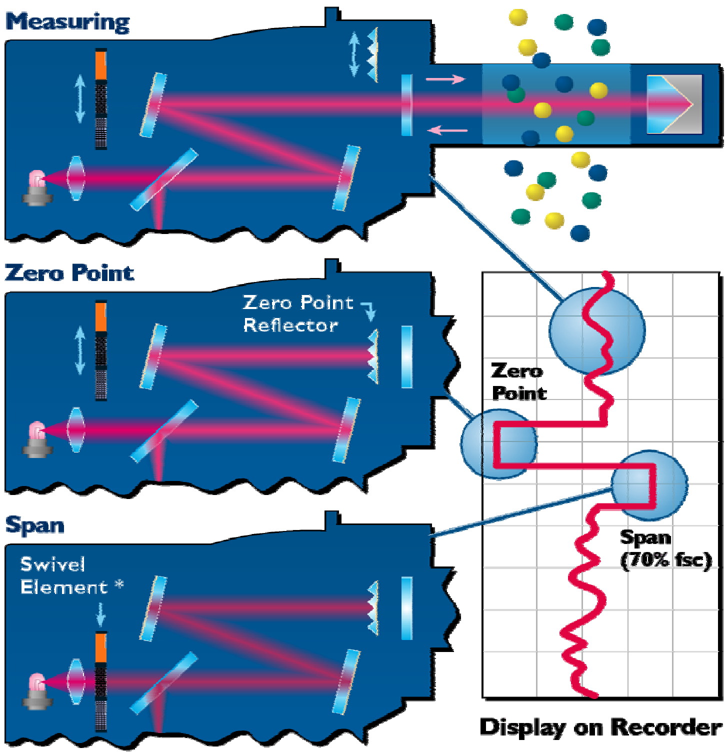
GM32 mittausperiaate
- QAL3 ilman testikaasuja – TÜV-hyväksytty

SICK Sensor Intelligence.

Tarkistussykli:
Säännöllinen liukumatarkastus (QAL3) tehdään automaattisesti ilman kalibrointikaasuja.

- Ei kuluja testikaasuista.
- Ei riskiä virheellisestä kalibroinnista.
- TÜV-testein todennettu pysyvyys.
- EN 15267-3 -hyväksytty.

Tarkistussyklin kesto ~3 minuuttia



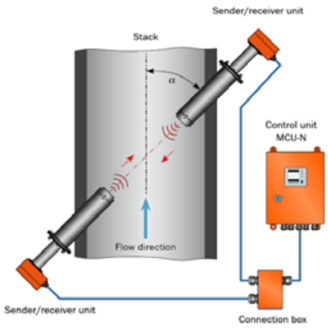
SICKin loistavat innovaatiot täydentyvät kokonaisuudeksi

SICK Sensor Intelligence.

Soodakattilan, meesauunin, hajukaasukattilan ja biokattilan päästömittaukset

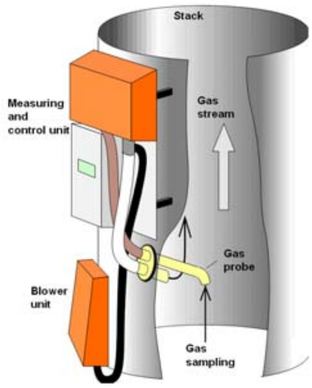
GM 32: SO2, NO, TRS

GM 35: CO2, CO, H2O



Flowsic 100: Virtaus

Enotec Oxitec: O2



Dusthunter SP100: Pöly

FWE 200: Pöly pesurin jälkeen

Tuottavuuden parantaminen on mahdollista

SICK Sensor Intelligence.

SICKin in situ –tekniikka on Ratkaisu päästömittauksiin

- √ Helppo asentaa
- √ Mittaus suoraan savukanavassa
- √ Lähes huoltovapaa
- √ Toimii ilman kalibrointikaasuja
- √ Automaattinen 0 / Span
- √ Kaikki komponentit mitataan yksilöllisesti

Kokonaisratkaisu SICKiltä:

Kaasuanalyysit Pöly Virtaus Lämpötila ja Paine

Kaikki in situna,
kaikkiin olosuhteisiin

Lisätietoja:

Kari Karhula kari.karhula@sick.fi 040 900 8024 www.sick.fi

SICK OY, Myllynkivenkuja 1, 01620 VANTAA

LIITE III

NH3 Formation and Recovery in a Kraft Pulp Mill – Project update

Åbo Academy, 23.3.2011

NH_3 Formation and Recovery in a Kraft Pulp Mill – Project Update

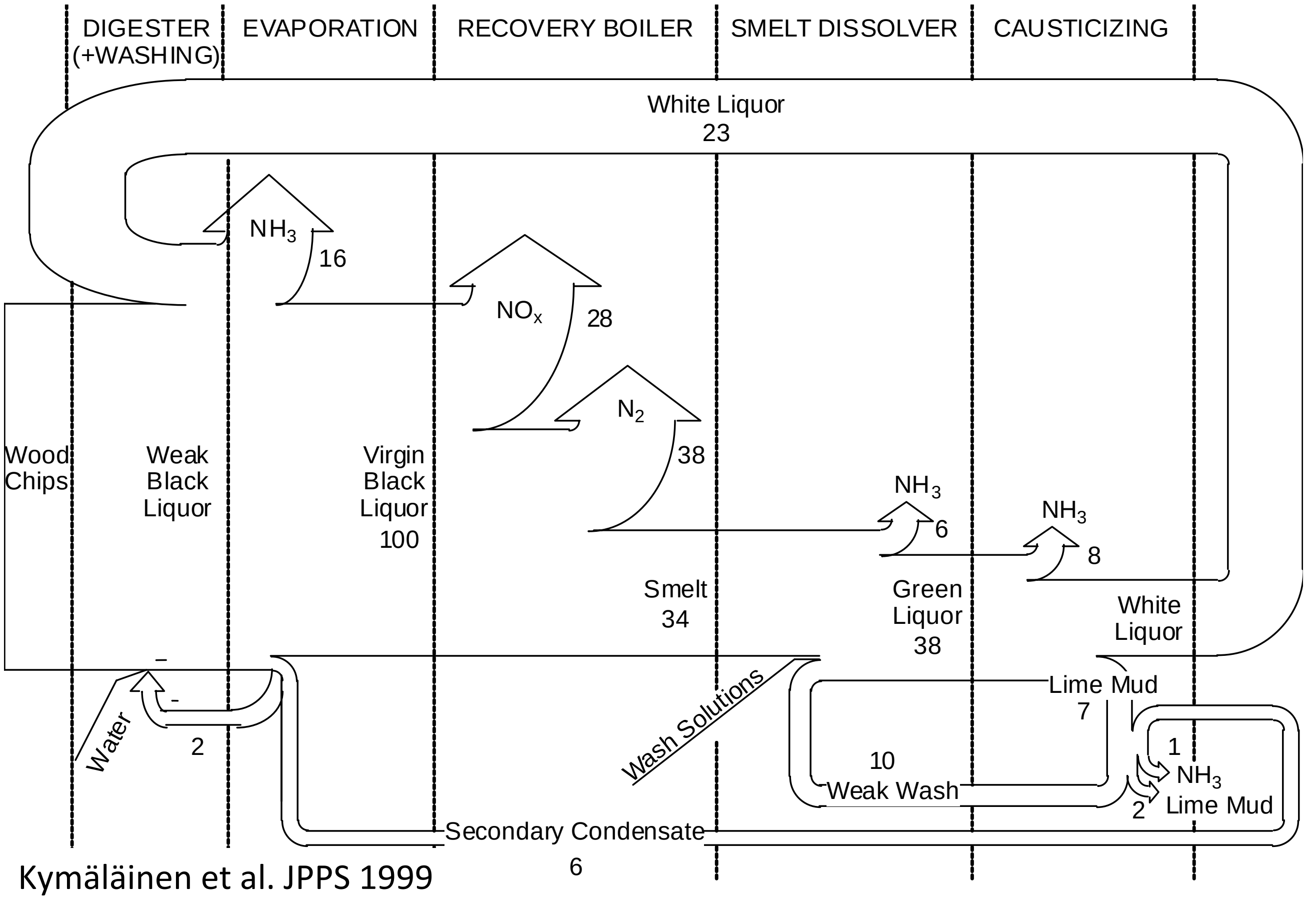
Nikolai DeMartini

23 March 2011

Project Components

- The flows of nitrogen and ammonia at one pulp mill
- Stripping of ammonia from white liquor
  - with N_2; with steam
  - 3 temperatures

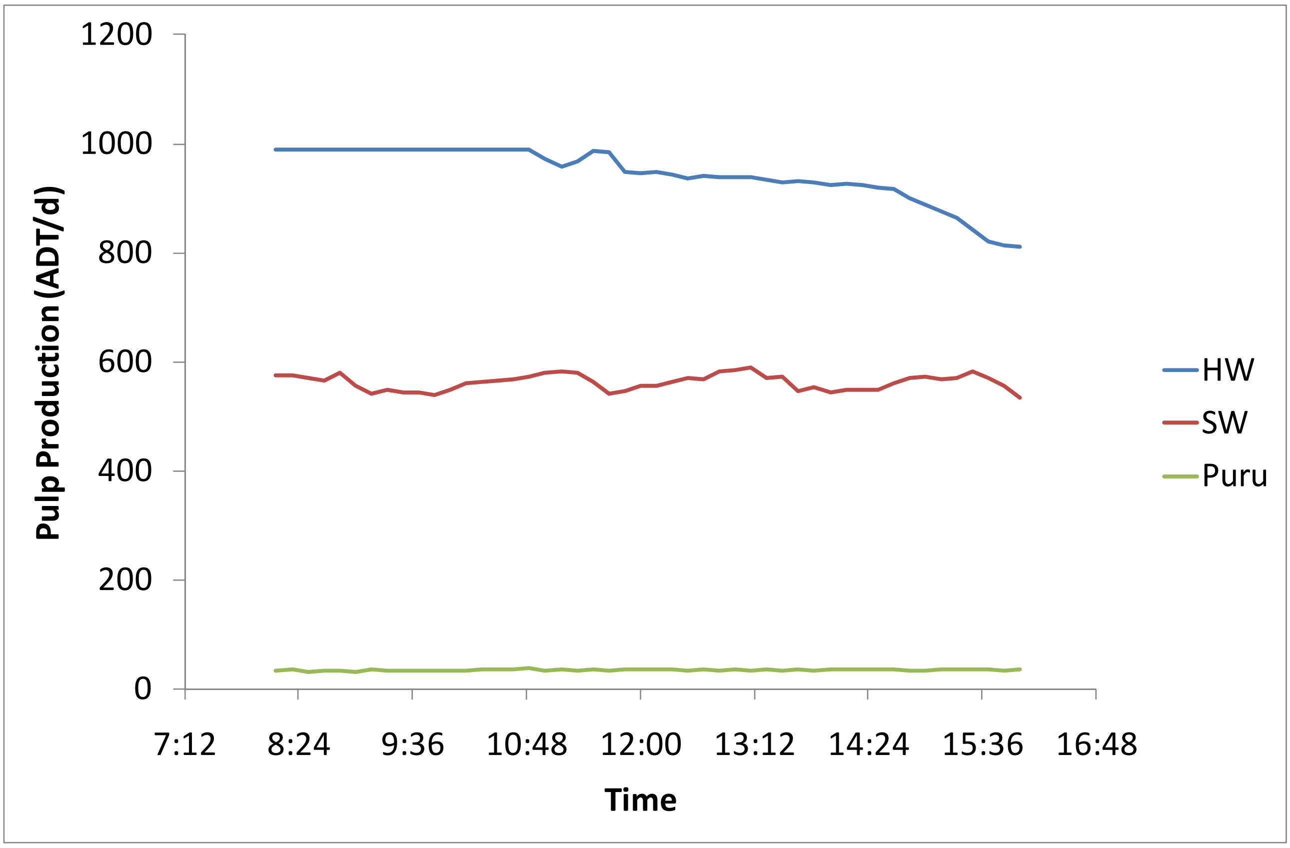
N in the Chemical Recovery Cycle

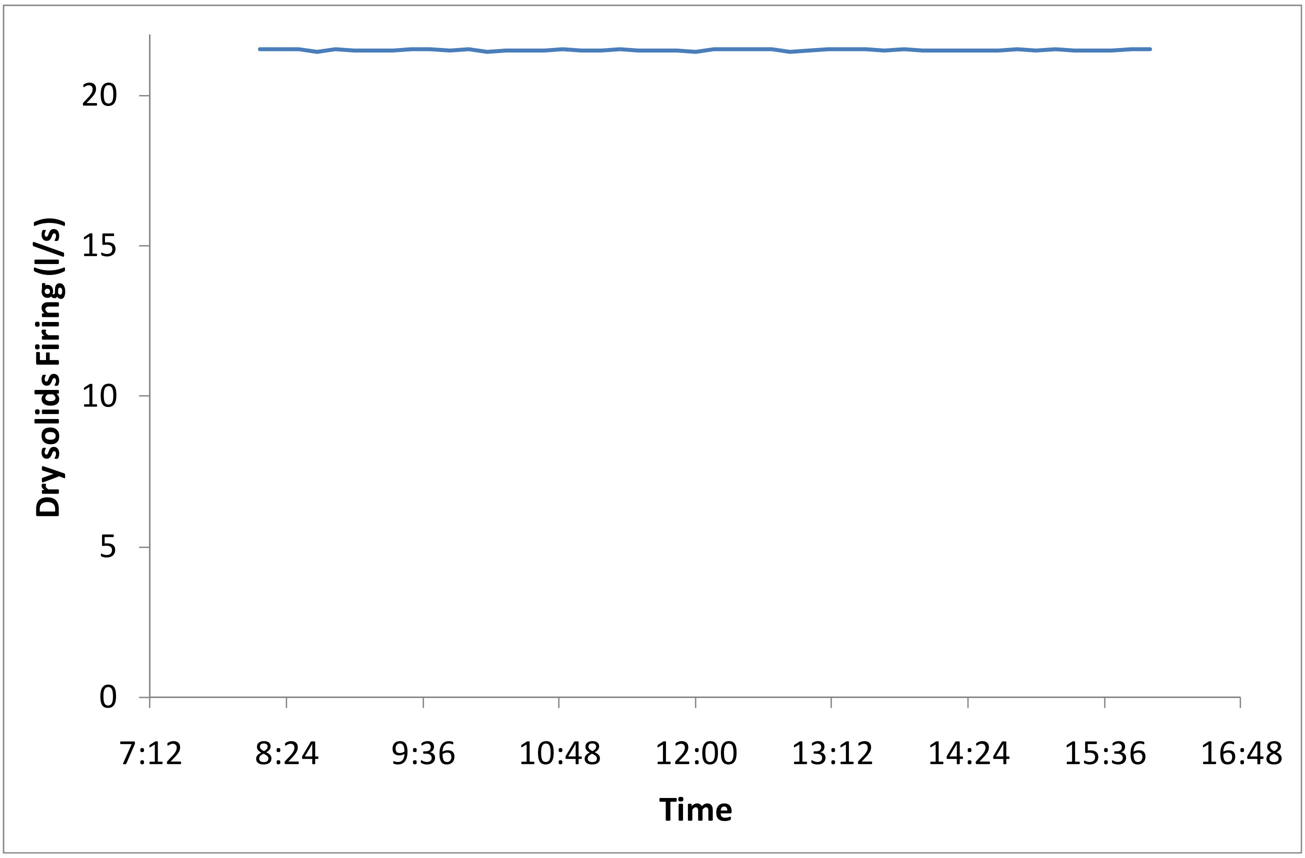


Kymäläinen et al. JPPS 1999

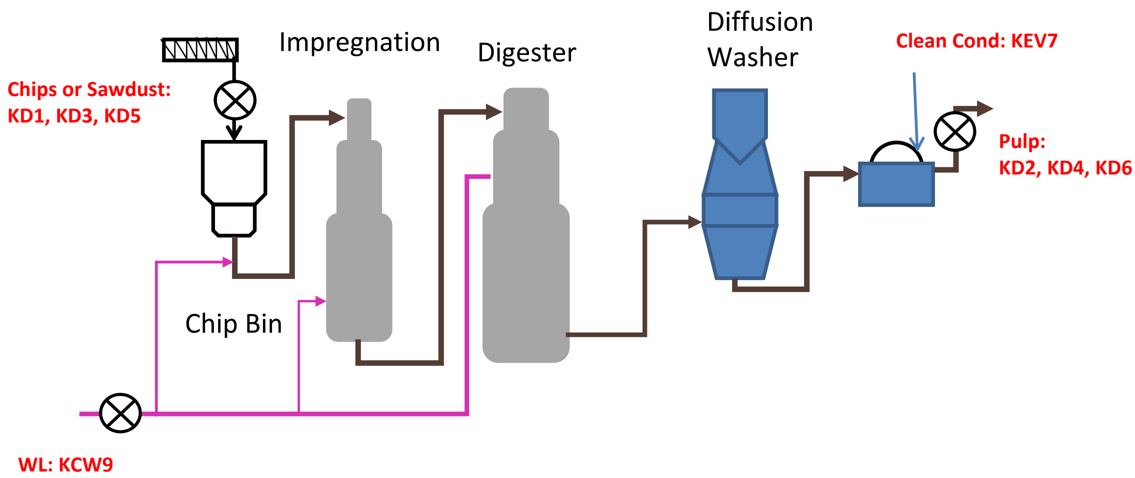
Mill Balance

- Sampling was to take place wk 45, but had to reschedule due to problems in pulping
- Sampling campaing took place 1 Dec 2010 (wk 48)
- WL Ox was running
- Biosludge was not added to BL at that time
  - Scheduled to be added back to BL in June, 2011
- 39 solid and liquid samples (not all analyzed)
- 1 gas sample


Pulp Production (ADT/d)
1200
1000
800
600
400
200
0
7:12
8:24
9:36
10:48
12:00
13:12
14:24
15:36
16:48
Time
HW
SW
Puru

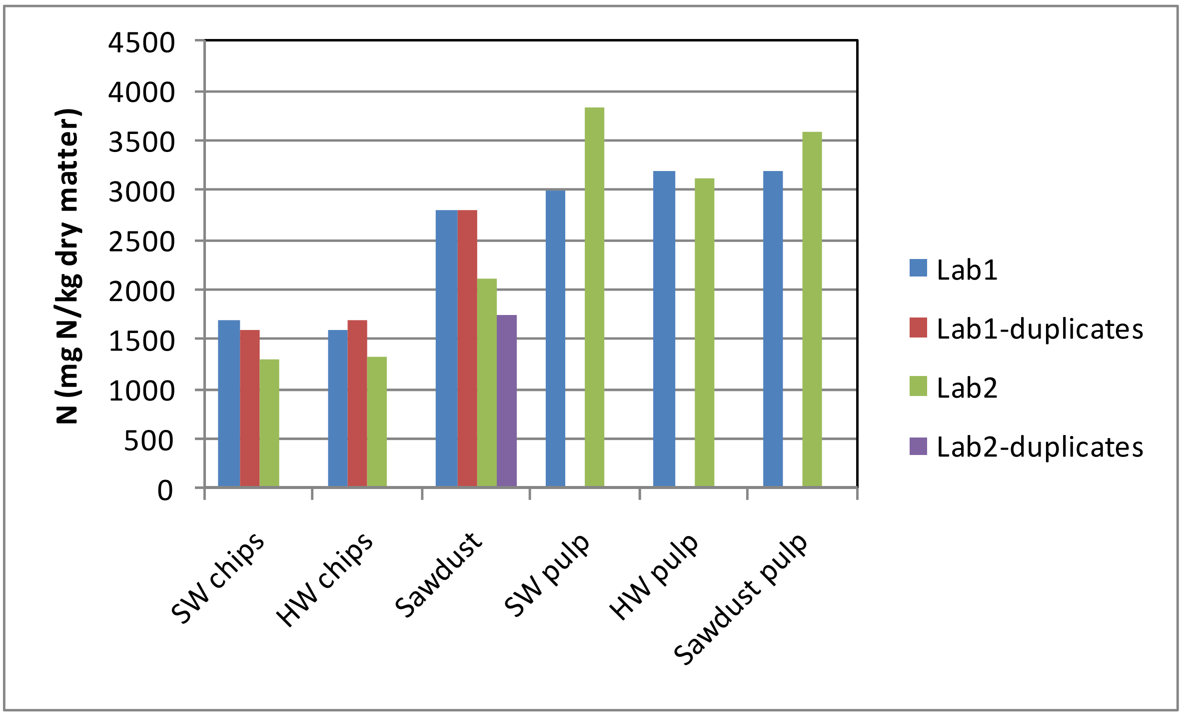

Dry solids Firing (l/s)
20
15
10
5
0
7:12
8:24
9:36
10:48
12:00
13:12
14:24
15:36
16:48
Time

Pulping General



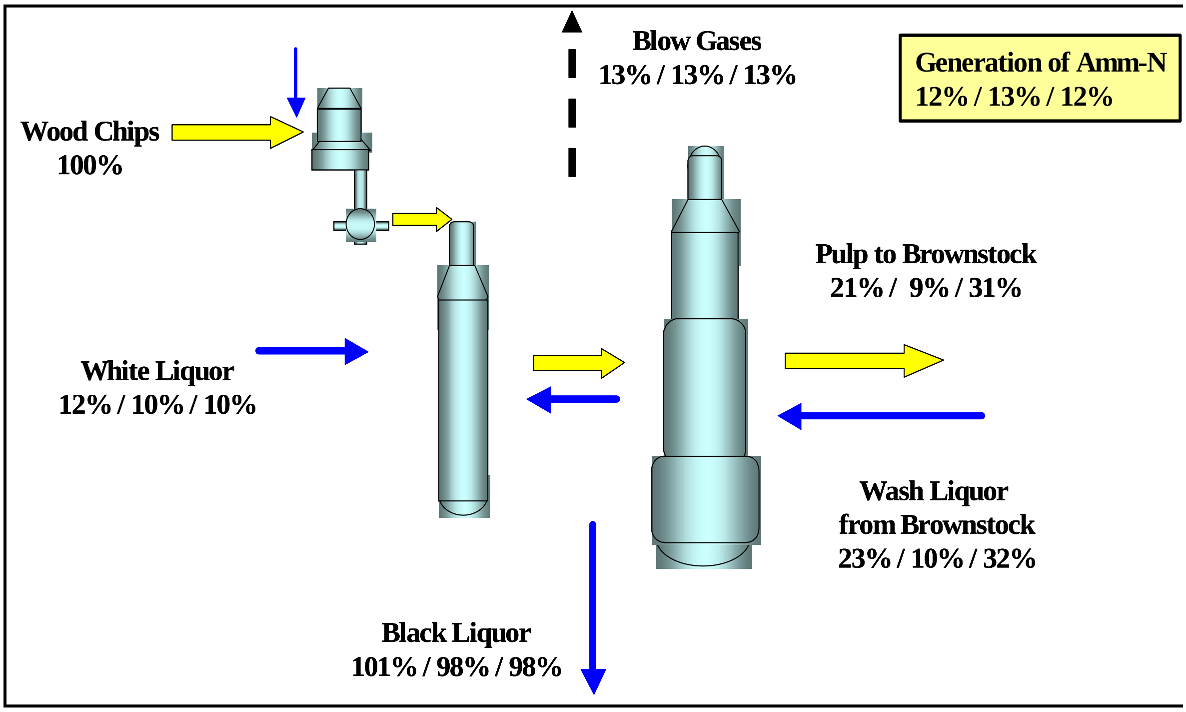
Three Line: Hardwood, Softwood and Sawdust

Nitrogen in Wood & Pulp



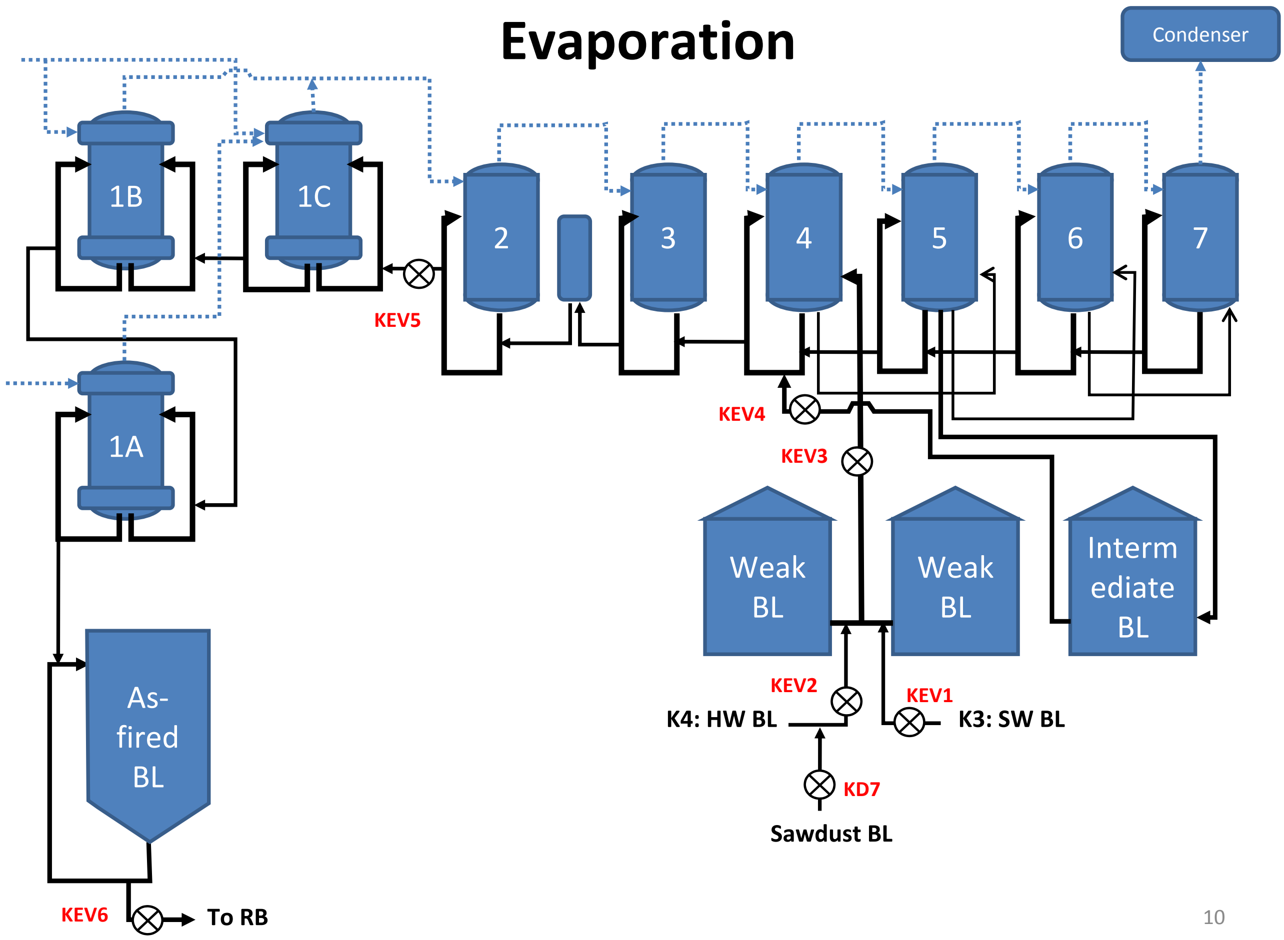
*Pulp values unexpectedly high (not consistent with earlier studies), need to resolve this; pulp analysis at lab 2 with pulp washed in laboratory

Nitrogen in Pulping (3 mills) – EU Rempulp

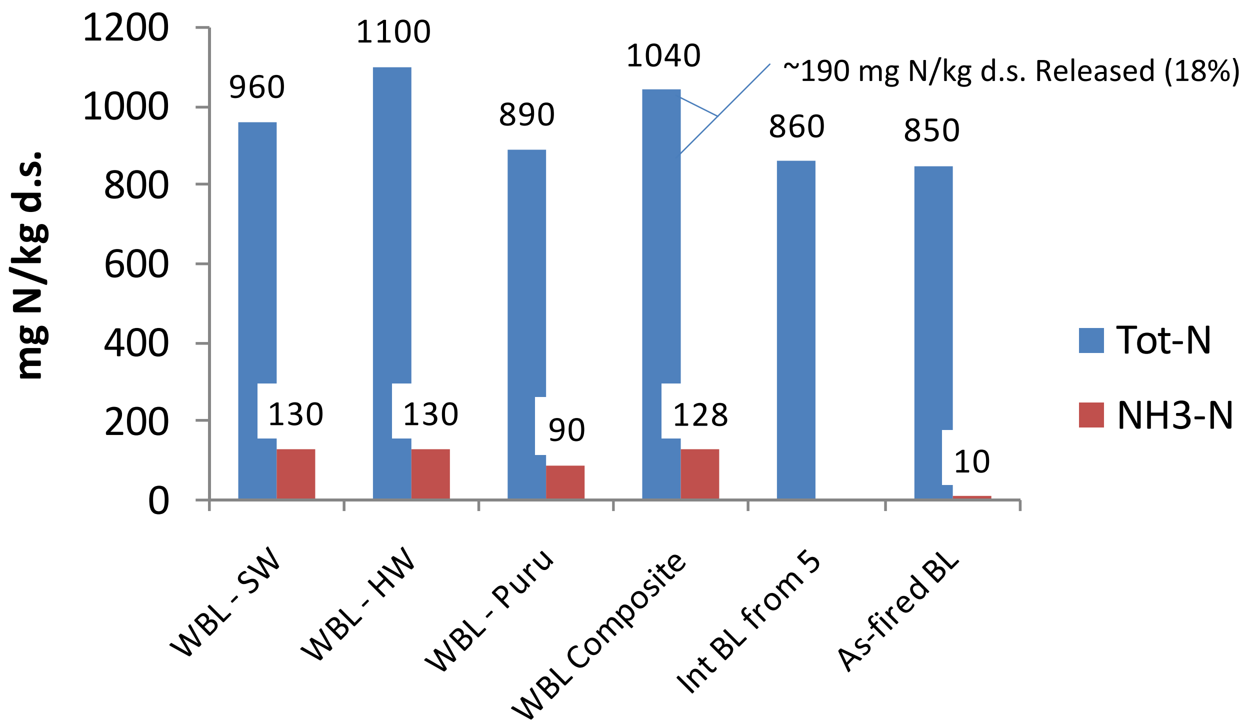


DeMartini et al. ICRC 2004

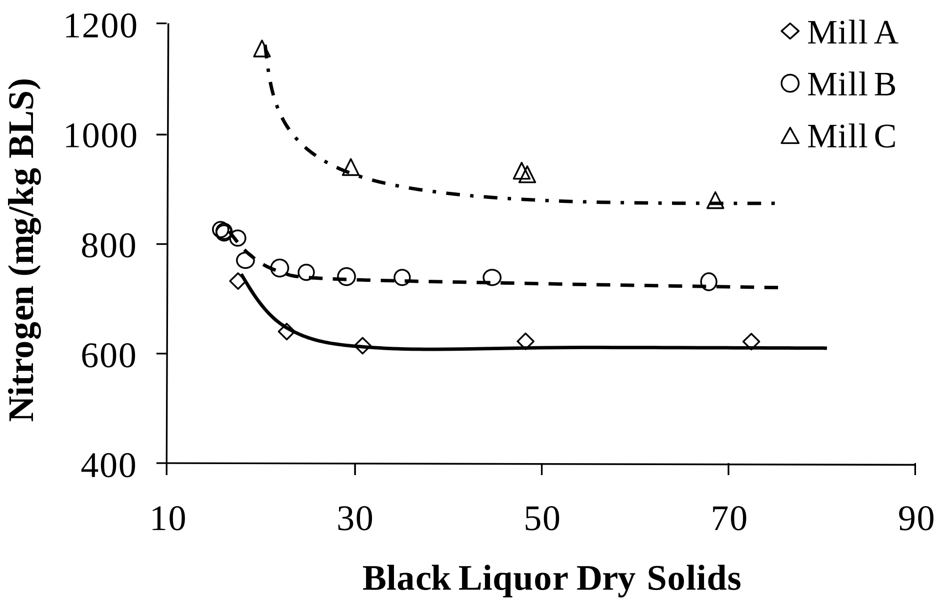
Evaporation

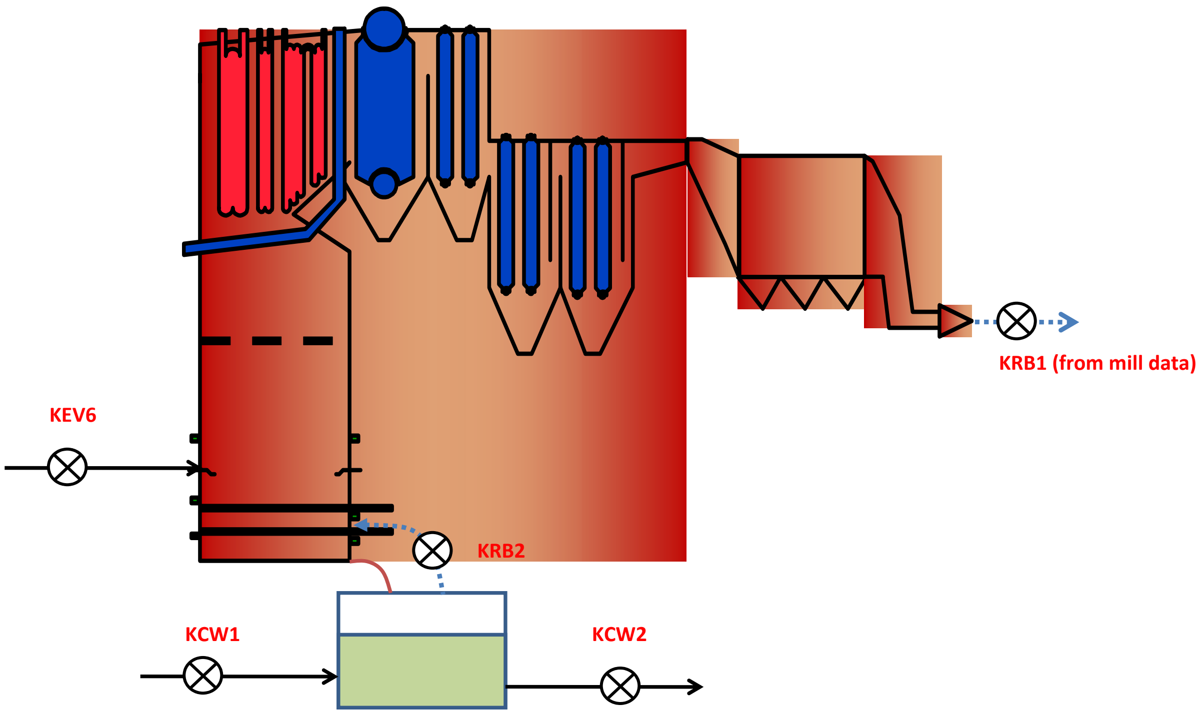


Concentration of N in BL

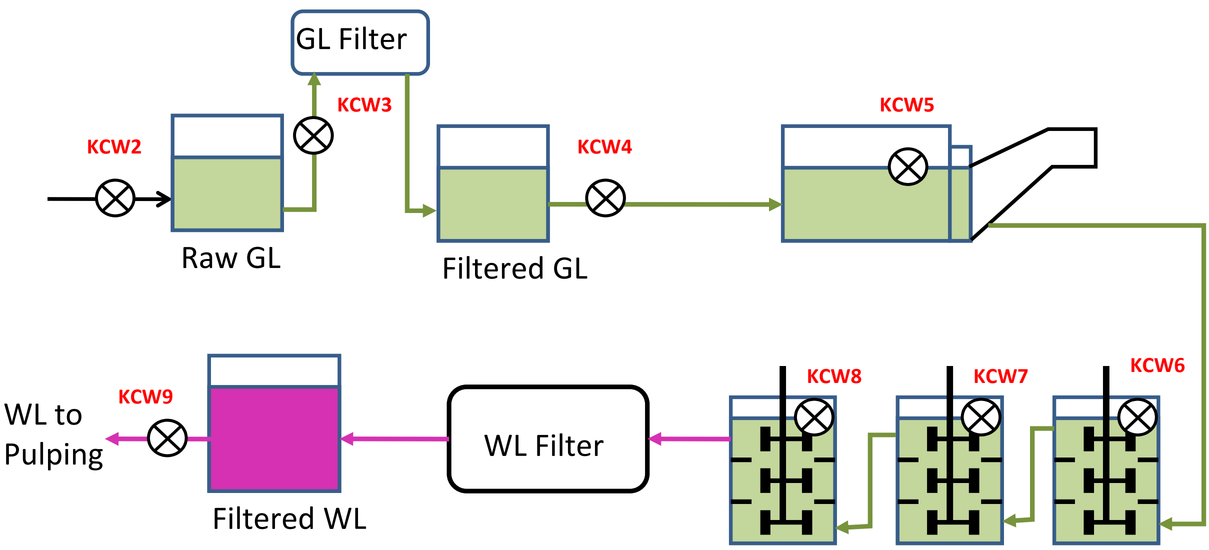


Nitrogen in Evaporation (3 mills) – EU Rempulp

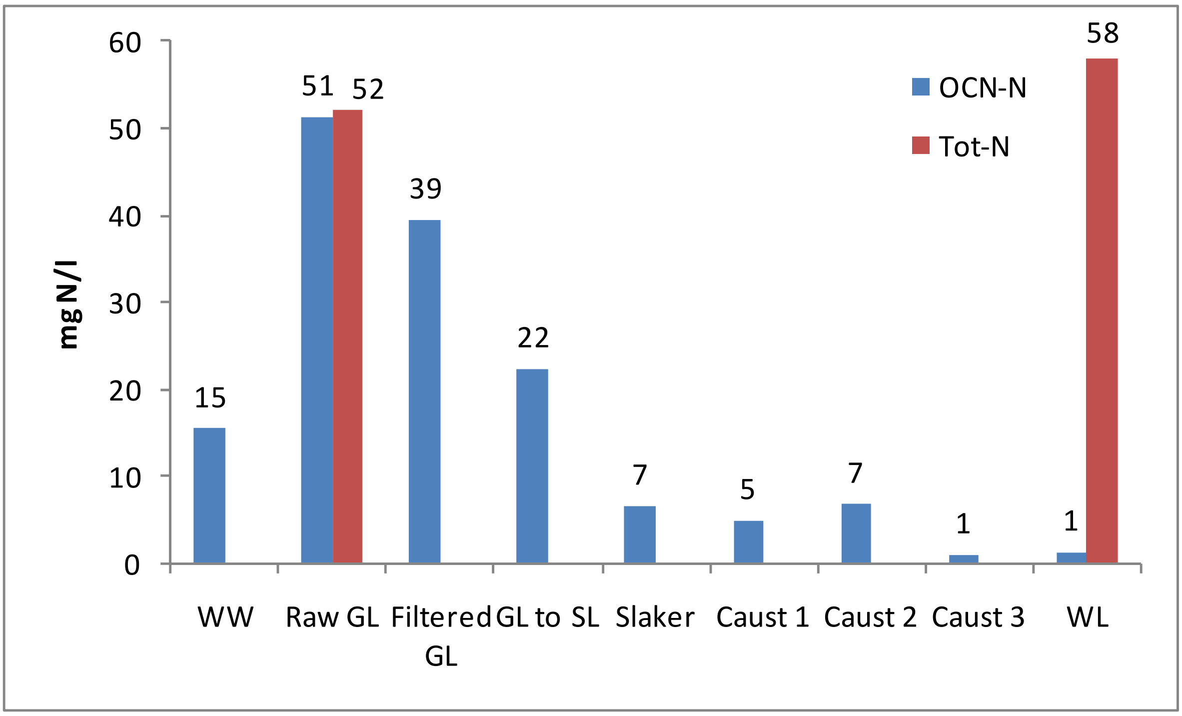




Recausticizing



Cyanate in GL & WL



Sample List – Pulping & Evaporation

Pulping and White Liquor Oxidation		Analysis	
Name	**Position**	NH3-N	Total - N
UPM-KD1	Chips to K3		X
UPM-KD2	Washed Pulp from K3		X
UPM-KD3	Chips to K4		X
UPM-KD4	Washed Pulp from K4		X
UPM-KD5	Sawdust to Sawdust digester		X
UPM-KD6	Pulp from washer		X
UPM-KD7	Black liquor from washer	X	X
UPM-KD8	Oxidized WL	X	
Evaporation and Stripper			
Name	**Position**	NH3-N	Total - N
UPM-KEV1	Weak Black Liquor from K3	X	X
UPM-KEV2	Weak Black Liquor from K4	X	X
UPM-KEV3	Weak Black Liquor to Evaporators		
UPM-KEV4	Intermediate black liquor	X	X
UPM-KEV5	Black Liquor from 2nd Effect		
UPM-KEV6	As-fired black liquor		X
UPM-KEV7	Secondary Condensate 1	X	
UPM-KEV8	Secondary Condensate 2	X	
UPM-KEV9	Secondary Condensate 3	X	
UPM-KEV10	Condensate from 1C	X	
UPM-KEV11	Dirty Condensate from evaporators	X	
UPM-KEV12	Dirty condensate to stripper	X	X
UPM-KEV13	Stripped Condensate	X	
UPM-KEV14	MeOH		

Sample List – Recovery Boiler and Recausticization

Recovery Boiler			
Name	**Position**	NH3-N	Total - N
UPM-KRB1	NOx stack gases		
UPM-KRB2	Gas from Dissolving Tank	X	
UPM-KRB3	Mechanically cleaned hot water from RB	X	
Recausticizing			
Name	**Position**	NH3-N	Total - N
UPM-KCW1	Weak Wash to disolving tank	X	
UPM-KCW2	GL from Dissolving tank	X	X
UPM-KCW3	GL from Equilizing tank to x-filter	X	
UPM-KCW4	GL to Slaker	X	
UPM-KCW5	WL from slaker	X	
UPM-KCW6	WL from cuasticizer 1	X	
UPM-KCW7	WL from cuasticizer 2	X	
UPM-KCW8	WL from cuasticizer 3	X	
UPM-KCW9	WL to digester & WL oxidation	X	X
UPM-KCW10	Lime Mud from CD filter	X	
UPM-KCW11	Lime Mud from disc filter	X	
UPM-KCW12	Filtrate from lime mud washer	X	
UPM-KCW13	Dregs to Dregs Washer	X	
UPM-KCW14	Dregs from dregs washer	X	
UPM-KCW15	Filtrate from dregs washer	X	
UPM-KCW16	Mechanically Cleaned Hot Water from lime kiln	X	

Summary

- Sampling campaign went very smoothly
- Strong odorous gas sample not pulled
- N analysis to date
  - Wood: Total N
  - Black Liquor: Total N, NH_3-N, Na
  - Green Liquor & White Liquor: OCN-N, Na, Total N (WL)
  - MeOH: Not yet analyzed
  - Condensates: Analyzed but NH_3 results appear incorrect

Path Forward

- Establish analytical capabilities at ÅAU for NH_3
- Perform stripping experiments
- Complete mass balance with current information/samples
  - Use N flow with wood, WL, pulp, BL to establish N release to blow gases
  - Use N, NH_3 in BL to determine N release in evaporation
  - Use OCN, NH_3 in Recaust to determine N release in recaust
  - Still have MeOH sample
- Intermediate report
- Take additional condensate samples if needed
- Final report

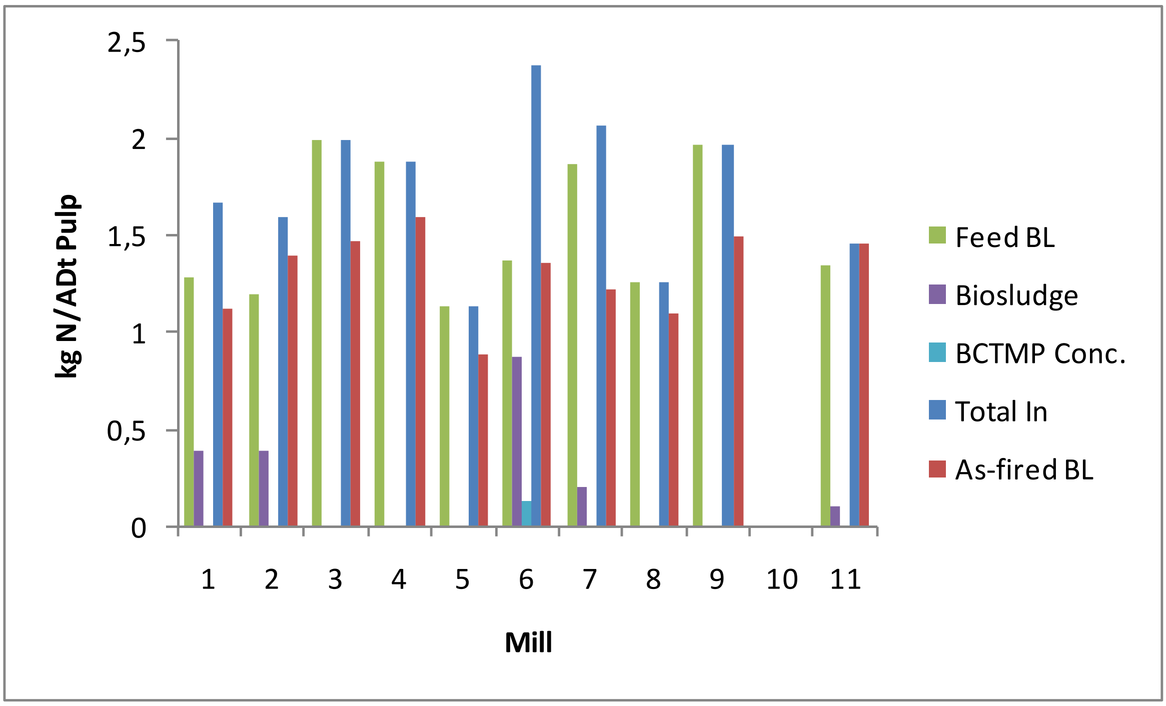
Biosludge Addition (1/3)

- Biosludge addition a significant N source
- Reported to not result in a significant increase in NO
- One study showed no increase in N in as-fired BL after biosludge addition, but condensate sample not available

Biosludge Addition (2/3)

- Biosludge at Kymi: tot-N 47 g/kg d.s.; NH3-N 3.8 g/kg d.s.
- Assuming addition of 0.5 wt% on d.s. Basis this results in 7 gN/s and 0.7 gNH_3-N/s compared to flows of ~30 gN/s and 4 gNH_3-N/s in the weak black liquor to evaporators

Biosludge Addition (3/3)



LIITE IV

Biosludge sampling plan

Åbo Academy, 12.5.2011

Draft Plan for Sampling at UPM-Kymi Before and After Biosludge Measurements

12 May 2011

The fate of biosludge nitrogen in evaporation and combustion is not well understood. Mill experience consistently shows that biosludge does not result in increased NO, but earlier nitrogen balances around the evaporators have been inconclusive. It is important to understand the fate of biosludge nitrogen. Biosludge can represent a significant nitrogen flow and should be better understood. It is relevant to recovery boiler emissions. Also, if biosludge nitrogen is released during evaporation, the condensates from the concentrators may be a good source of ammonia for use elsewhere in the mill.

We would like to pull samples, Table I below, in the evaporation plant and around the recovery boiler to establish the nitrogen behavior before and after biosludge nitrogen. The intent is to pull the samples twice per day, two days in a row both before and after biosludge addition. Given a planned tie-in day of May 23, we are planning on sampling 19-20.5.2011 to get samples before biosludge addition. Since it will take several days for some equilibration after biosludge addition occurs, we will sample several days to a week after the tie in. Possible dates are the weekend (28-29.5) or Monday-Tuesday (30-31.5). Other commitments prevent coming before 28.5. For one day after the biosludge addition, we would like to pull samples throughout the mill for the SKY-NH3 project. This is because we had problems with sample analysis for the earlier campaign. This will also give us an opportunity to get samples when the mill is running with biosludge. For this we will need some mill support as with the earlier sample campaign. Thus, 30-31 may be better from the mills perspective. The plan for 4 days of sampling rather than 5 represents the fact that sampling will not be realistic during the day of tie in and the fact that prior commitments minimize the opportunities to get in on short notice. A fifth/intermediate date of sampling (26.5) is possible and should be considered.

The samples for the mill balance are the same as before with the addition of biosludge (given in Table II). Additionally, we would like to have full mill data for the tags used in the previous mill trial for all days of sampling and for the days between the tie-in of biosludge and subsequent sampling. The same tags as used in the previous campaign are applicable, but we need to add biosludge data.

Additionally, we need to clarify if we can get good condensate samples from the concentrators individually to better clarify if nitrogen is lost from the biosludge in the concentrators. We would also like to have black liquor samples from each concentrator if possible for dry solids. The current list in Table I assumes black liquor and condensate samples from each concentrator is not possible.

Åbo Akademi Process Chemistry Centre, Inorganic Chemistry
FI - 20500 Turku / Åbo · Finland · Tel: +358 2 215 31 · Fax: +358 2 215 4962

Table I. Proposed sampling for biosludge campaign.

	Day				
Sample	19.5 (no biosludge)	20.5 (no biosludge)	26.5 (?) (w/ biosludge)	28 or 30.5 (w/ biosludge)	29 or 31.5 (w/ biosludge)
BL from Evap 2 to IC	Twice/day (Kjehdahl-N, d.s.)	Twice/day (Kjehdahl-N, d.s.)	Twice/day (Kjehdahl-N, d.s.)	Twice/day (Kjehdahl-N, d.s.)	Twice/day (Kjehdahl-N, d.s.)
Condensate from Evap 2	Twice/day (total N, NH3)	Twice/day (total N, NH3)	Twice/day (total N, NH3)	Twice/day (total N, NH3)	Twice/day (total N, NH3)
Condensate from IC	Twice/day (total N, NH3)	Twice/day (total N, NH3)	Twice/day (total N, NH3)	Twice/day (total N, NH3)	Twice/day (total N, NH3)
Biosludge	-	-	Twice/day (total N, NH3, d.s.)	Twice/day (total N, NH3, d.s.)	Twice/day (total N, NH3, d.s.)
Virgin BL to mix tank	Twice/day (Kjehdahl-N, d.s.)	Twice/day (Kjehdahl-N, d.s.)	Twice/day (Kjehdahl-N, d.s.)	Twice/day (Kjehdahl-N, d.s.)	Twice/day (Kjehdahl-N, d.s.)
As-fired BL	Twice/day (d.s.)	Twice/day (d.s.)	Twice/day (d.s.)	Twice/day (d.s.)	Twice/day (d.s.)
NO from stack gas on-line analysers	Daily Avg.	Daily Avg.	Daily Avg.	Daily Avg.	Daily Avg.
Weak Wash to Dissolving Tank	Twice/day (total N, NH3)	Twice/day (total N, NH3)	Twice/day (total N, NH3)	Twice/day (total N, NH3)	Twice/day (total N, NH3)
Green liquor from dissolving tank	Twice/day (total N, NH3, OCN)	Twice/day (total N, NH3, OCN)	Twice/day (total N, NH3, OCN)	Twice/day (total N, NH3, OCN)	Twice/day (total N, NH3, OCN)
Vent gases from dissolving tank	Once/day, multiple spouts (NH3)	Once/day, multiple spouts (NH3)	Once/day, multiple spouts (NH3)	Once/day, multiple spouts (NH3)	Once/day, multiple spouts (NH3)
Additional Sampling					All samples for full mill balance (Table II)

Table II. Samples for mill campaign.

Pulping and White Liquor Oxidation

Name	Position	Sampler
UPM-KD1	Chips to K3	ÅAU with help from mill
UPM-KD2	Washed Pulp from K3	ÅAU with help from mill
UPM-KD3	Chips to K4	ÅAU with help from mill
UPM-KD4	Washed Pulp from K4	ÅAU with help from mill
UPM-KD5	Sawdust to Sawdust digester	ÅAU with help from mill
UPM-KD6	Pulp from washer	ÅAU with help from mill
UPM-KD7	Black liquor from washer	ÅAU
UPM-KD8	Oxidized WL	ÅAU

Evaporation and Stripper

Name	Position	Sampler
UPM-KEV1	Weak Black Liquor from K3	ÅAU
UPM-KEV2	Weak Black Liquor from K4	ÅAU
UPM-KEV3	Weak Black Liquor to Evaporators	ÅAU
UPM-KEV4	Intermediate black liquor	ÅAU
UPM-KEV5	Black Liquor from 2nd Effect	ÅAU
UPM-KEV6	As-fired black liquor	ÅAU
UPM-KEV7	Secondary Condensate 1	ÅAU
UPM-KEV8	Secondary Condensate 2	ÅAU
UPM-KEV9	Secondary Condensate 3	ÅAU
UPM-KEV10	Condensate from 1C	ÅAU
UPM-KEV11	Dirty Condensate from evaporators	Mill
UPM-KEV12	Dirty condensate to stripper	Mill
UPM-KEV13	Stripped Condensate	Mill
UPM-KEV14	MeOH	Mill

Recovery Boiler

Name	Position	Sampler
UPM-KRB1	NOx stack gases	
UPM-KRB2	Gas from Dissolving Tank	ÅAU
UPM-KRB3	Mechanically cleaned hot water from RB	ÅAU

Recausticizing

Name	Position	Sampler
UPM-KCW1	Weak Wash to disolving tank	ÅAU
UPM-KCW2	GL from Dissolving tank	ÅAU
UPM-KCW3	GL from Equilizing tank to x-filter	ÅAU
UPM-KCW4	GL to Slaker	ÅAU
UPM-KCW5	WL from slaker	ÅAU
UPM-KCW6	WL from cuasticizer 1	ÅAU
UPM-KCW7	WL from cuasticizer 2	ÅAU
UPM-KCW8	WL from cuasticizer 3	ÅAU
UPM-KCW9	WL to digester & WL oxidation	ÅAU
UPM-KCW10	Lime Mud from CD filter	ÅAU
UPM-KCW11	Lime Mud from disc filter	ÅAU
UPM-KCW12	Filtrate from lime mud washer	ÅAU
UPM-KCW13	Dregs to dregs washer	ÅAU
UPM-KCW14	Dregs from dregs washer	ÅAU
UPM-KCW15	Filtrate from dregs washer	ÅAU
UPM-KCW16	Mechanically Cleaned Hot Water from lime kiln	ÅAU

Prepared by:

Nikolai DeMartini Senior Researcher

LIITE V

Muiden työryhmien kuulumiset sekä SKYREC

OTR kuulumiset

Tapahtumat

Soodakattilapäivä 19.10.2011

SKYREC-seminaari 20.10.2011

– Sokos hotel Presidentti

50-vuotisjuhla ja ICRC 2014

– Tampere-talosta varattu ma 9.6.2014 - to 12.6.2014
– Ke 11.6 SKY 50v-juhla.
– Pe 13.6 jää mahdollisuus järjestää excursioita

ATR kuulumiset

ATR projektit

Määräaikaistestausprojektin jatko, Pöyry/BMS

- Parhaat käytännöt/menetelmät testausvälin pidentämiseksi
- Seisokin aikaisen testauskuorman vähentäminen
- Kommentoitavana työryhmällä

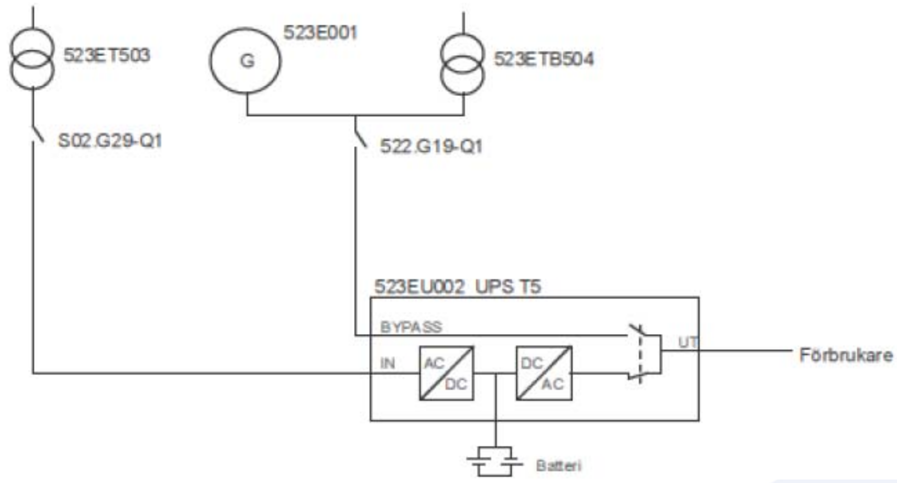
Turva-automaatiosuosituksen päivitys

- Käännös saatu FMGlobalilta
- Kommentoitavana työryhmällä

Selvitys: UPS-kytkennät tehtailla

- Gruvön tehtaalla Ruotsissa sattunut UPS-vika (staattinen vaihtokytkin hajosi) -> 30 min blackout
- Tehdään yhdistyksen suositus UPS-kytkennästä
- Oma työryhmä perustettu tekemään vikapuu-analyysi neljästä eri UPS-kytkentävaihtoehdosta. Ensimmäinen kokous 9.9
- Henri Tonder (UPM), Markku Toots (Metso), Juha Honkamaa (Pöyry), Pekka Tarvainen (Inspecta)

Gruvön UPS-kytkentä



LTR / SKYREC kuulumiset

LTR/SKYREC projektit

Pulp mill optimal steam pressure levels, LUT

- Selvitetään mahdollisuudet ja keinot soodakattiloiden rakennusasteen nostamiseen sellutehtaan modernisoinnin yhteydessä
- Loppuraportti kommentoitavana

Dew point measurements, ÅA

- Selvittää matalin taloudellinen savukaasu loppulämpötila
- Mittaukset tehty keväällä Heinolassa ja Raumalla tulossa vko 37

Mustalipeän viskositeetti, VTT

- 90-luvulla tehty laaja selvitys mustalipeistä (LIEKKI 2-ohjelmassa) ja nyt tehdään viskositeettikäyrät ja selvittää, onko tilanne jotenkin muuttunut 15 vuodessa.
- Kaikilta tehtailta ei saatu näytettä pyynnöistä huolimatta, joten laitetoimittajille on annettu mahdollisuus lähettää omia näytteitään mittattavaksi

PÖYRY

PÖYRY

KTR / SKYREC kuulumiset

KTR / SKYREC

<u>Field tests of furnace materials, Boildec Oy</u>

- Neljä onnistunutta koetta tehty
- Viides koe menossa (1000h), päättyy syyskuun puolessa välissä

<u>Analysis of the furnace test materials, VTT</u>

- Neljännen kokeen tuloksia odotetaan, paksuusmittaukset tehty, SEM-tutkimukset menossa
- Testikappaleiden paksuudet mitattiin kokeita ennen ja jälkeen. 304L ja Super625 ohentuivat selvästi eniten (25 – 50 µm/1000 h)
- Tähänastisten tulosten perusteella lupaavimmilta materiaaleilta vaikuttavat 4C54 (3XRE28), San28 ja San38

<u>Corrosion tests in reducing conditions, PART II</u>

- Tests with BL-chars
- Earlier tests were done in a gas containing CO and N2 and additionally active carbon were placed on the synthetic salts.
- Kokeet menossa

PÖYRY

Tulipesäsondi, Boildec Oy

Thermoelement number 1 is installed inside the topmost test material (3R12). In the left side of the picture you can see part of the aluminium casing which contains electric heating resistors.

PÖYRY

KTR / SKYREC

Materiaalisuositus

- Vuoden 1997 suojaussuosituksen päivitys

Aktiivihiilisuodatuksen ja UV-käsittelyn soveltaminen suolanpoistolaitokseen lisäveden TOC-tason alentamisessa, JP-analysis/Cewic

- Pilot-mittakaavan aktiivihiiletkokeet jatkuvat, nyt olleet ajossa yli puoli vuotta, TOC reduktio edelleen ~40%.
- Teollisuus-mittakaavan aktiivihiilikokeet alkoivat toukokuun alussa, yllättävänä huomiona oli silikaattipitoisuuden nousi suolanpoistosarjassa.
- UV-kokeita tehty Hanovian laitteistolla, pienellä virtauksella (1,5 m3/h) TOC reduktion oli noin ~40%, suuremmalla virtauksella (6 m3/h) reduktio oli ~20%. Seuraavaksi on tarkoitus kokeilla vetyperoksidin syöttämistä ja tämän jälkeen UV ja aktiivihiiltä kokeillaan sarjassa.

Vesisuositus, Teollisuuden Vesi Oy

- Suositus valmis, kommentoitavana

PÖYRY