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Newsletter



*Innovative  
Approach for  
Integrated  
Wastewater &  
Stormwater  
Management*

The following researcher and company's project supervisors participated in the 7<sup>th</sup> project team meeting held in Kalmar in Nov 25<sup>th</sup>-26<sup>th</sup> 2009:

William Hogland, Marcia Marques, Fabio Kaczala, Sawanya Laohaprapanon, Henric Svensson, Henrik Hansson, Martin Sunden and M. Asim Ibrahim ([HIK](#)); Åke Erlandsson ([Kährs](#)); Malena Nilsson ([Kalmar Energi](#)); Anna Peterson ([Beckers](#)); Charlotta Persson and Caterina Camerani ([AkzoNobel](#)).



From January 1<sup>st</sup>, 2010 the University of Kalmar and Växjö University will merge to form the new LINNÆUS UNIVERSITY.



University of Kalmar (*Linnæus University from January 1<sup>st</sup>, 2010*)

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**Development of an  
Integrated Approach  
for  
Industrial Wastewater  
& Stormwater  
Management in the  
Wood-Industry Sector**

DECEMBER 2009

## SOME RECENT RESULTS:

### Leaching tests with different wood material to assess stormwater pollution transport from wood storage areas

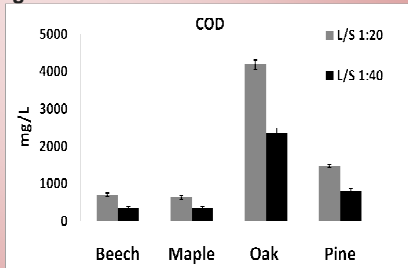


Fig. 1: Liquid: Solid ratios (L:S) tested were 1:20 and 1:40

There is a significant difference in the amount of substances that contribute to the Chemical Oxygen Demand (COD) leaching from different tree species. Oak offers the highest risk for stormwater pollution and pollution transport to receiving water bodies.

### Electrocoagulation tests with double plates (Al & Fe)



Fig 2: Electrocoagulation

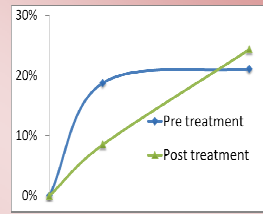


Fig 3: COD removal (%)

The focus has been to use it as a pre or post treatment step, to the activated carbon adsorption/filtration system. A semi-industrial size EC plant was offered as lend to be tested on-site that uses the same electrode system applied in lab scale

### Stormwater & wastewater aeration tests



Fig 4: Aeration test set up at Kährs

Aeration tests have been carried out to assess the appropriateness for reduction of COD compared to other methods tested in the project. Preliminary tests showed aerated stormwater with increased dissolved O<sub>2</sub> compared to not aerated stormwater. The effect on COD and specific pollutants removal will be reported in 2010.



Fig 5: Aerator unit

### Sorption/filtration tests in columns with activated coal carbon and wood carbon to treat wood floor washing wastewater



Fig. 6: Packed-columns of activated coal carbon and wood carbon

Fig. 7: Treated effluent from column test

- Activated coal carbon and wood carbon were found to be efficient media for the removal of COD from floor washing wastewater and can achieve higher % of removal than biological treatment; on the other hand, it does not remove formaldehyde;
- Spent activated coal carbon and wood carbon can be recovered using the thermal reactivation process at 400 °C;
- Relatively low cost of activated carbon when acquired in large quantity makes recovery of spent sorbent not cost effective;
- Incineration is proposed as the final destination of used activated carbon.

### Bio-treatability tests with wastewater generated after cleaning equipment used for application of glue

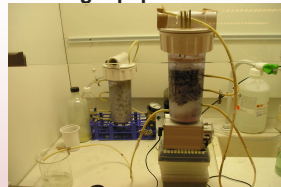


Fig 8: Lab-reactor in 2 phases

- The biological treatment system showed satisfactory performance in reducing COD and formaldehyde with overall reductions of 93% ± 4 and 65% ± 11 respectively;
- Inhibitory effects over nitrification process and nitrogen removal was observed and a better understanding on constraints faced during nitrification is necessary.

### Preliminary toxicity tests for stormwater with the freshwater microalgae *Scenedesmus subspicatus*

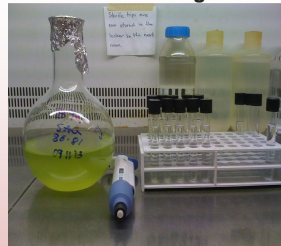


Fig. 9: Toxicity lab tests

- Whereas the growth of algae was significantly inhibited in the presence of oak wood leachate, no acute toxic effect was observed in the presence of leachate from pine.

- There is no "first flush toxic effect" and acute toxicity posed by stormwater runoff from Area 5 at Kährs.

The toxicity study suggests that several compounds leaching from different wood species are expected to have different impacts on the environment.

## 7 project team meetings & 2 steering group meetings



1<sup>st</sup> Project Team & 1<sup>st</sup> Steering Group Meeting, Becker Acroma AB, Stockholm, Feb 7<sup>th</sup>, 2008

2<sup>nd</sup> Project Team Meeting, Swedwood International AB, Ängelholm, Nov 3<sup>rd</sup>, 2008

3<sup>rd</sup> Project Team Meeting, Hotel Hulingen, Hultsfred, Jan 19<sup>th</sup> – 20<sup>th</sup>, 2009

4<sup>th</sup> Project Team Meeting (collaboration training), University of Kalmar, Kalmar, Feb 10<sup>th</sup> – 11<sup>th</sup>, 2009

5<sup>th</sup> Project Team Meeting, University of Kalmar, Kalmar, Apr 20<sup>th</sup> -21<sup>st</sup>, 2009 (collaboration training)

6<sup>th</sup> Project Team Meeting, University of Kalmar, Kalmar, Jun 23<sup>rd</sup> – 24<sup>th</sup>, 2009

2<sup>nd</sup> Steering Group Meeting for Project Evaluation, HiK Kalmar Jun 9<sup>th</sup> -10<sup>th</sup>, 2009

7<sup>th</sup> Project Team Meeting, University of Kalmar, Kalmar, Nov 25<sup>th</sup>-26<sup>th</sup>, 2009

### Communication and Scientific programs: Conclusions during the 7<sup>th</sup> project team meeting (Kalmar, Nov 25-26, 2009):

- ✓ Participants confirmed that all important information needed to follow up the project is found in the project homepage;
- ✓ The approach given to the project was considered unique and creative by company's members;
- ✓ Newsletter delivered every 6 months in English & Swedish;
- ✓ Activity plan original versus executed every 4<sup>th</sup> month;
- ✓ Final results of the project presented during Linnaeus Eco-Tech 2010, to be held in Kalmar, Nov 22-24, 2010, during a special session for the wood industry sector;
- ✓ A second joint co-production paper, having the project team group as co-authors to be published during 2010;
- ✓ Special meeting in 2010 with researchers and experts from the chemical industry AczoNobel and Becker Acroma to discuss chemical compounds released by the products/transformed in water medium;
- ✓ List of publications classified by subject, including Swedish and EU regulations uploaded during the coming trimester;
- ✓ The Best Management Practice Manual, starting the writing in Jan 2010 will include, among other topics, a step-by-step instruction for stormwater characterization & monitoring;
- ✓ Expand toxicity tests to other bio-indicators;
- ✓ Construction of a new testing plant for treatment of mixed wastewater streams with combined steps, according to the research results delivered in 2009.
- ✓ Possibilities of project continuation after 2010.

Happy 2010!

