



TOTAL EFFLUENT FREE MILL

CHANGING TECHNOLOGY ?

OR

END-OF-PIPE MEASURES ?

OR

BOTH ?

TOTAL EFFLUENT FREE MILL

QUINTENARY TREATMENT

THE CLEAN-RIO PROCESS

PRIMARY STAGE:	SETTLING
SECONDARY STAGE:	ACTIVATED SLUDGE
TERTIARY STAGE:	FLOCCULATION / SETTLING
QUATERNARY STAGE:	SAND-BED FILTRATION
QUINTENARY STAGE:	REVERSE OSMOSIS

TOTAL EFFLUENT FREE MILL

THE CLEAN-RIO PROCESS

INVESTMENT COSTS:	160 US\$ / admt/year
OPERATIONAL COSTS:	10 US\$ / admt
HANDLING COSTS FOR SOLID RESIDUES:	4 US\$ / admt

TOTAL EFFLUENT FREE MILL

QUINTENARY TREATMENT

STAGE	kg / admt				
	Cl ⁻	AOX	COD	BOD	COLOR
RAW EFFLUENT	25	0.50	55	15	120
SETTLING	22	0.35	26	8	100
ACTIVATED SLUDGE FLOCCULATION / SETTLING	22	0.28	15	0.9	180
FILTRATION	18	0.12	4	0.3	20
REVERSE OSMOSIS	18	0.10	2.3	0.25	13
TOTAL EFFICIENCY, %	1.5	0.002	0.25	0.1	0
	94	99.6	99.5	99.3	100

TABLE OF CONTENTS

Session 1: Current and Future Regulations on the Global Scene

1-1 EPA Post Proposal Incentive for the Pulp & Paper Effluent Guidelines

Donald F. Anderson, EPA, USA

1-2 Swedish EPA and the Environment

Staffan Lagergren, Swedish EPA, Sweden

1-3 Australian Environmental Regulations for New Bleached Eucalyptus Kraft Pulp Mills

Dr. Peter J. Nelson, CSIRO, Australia

1-4 Environmental Regulations in Latin American Pulp & Paper

Dr. Celso Foelkel, Riocell SA, Brazil

Session 2: Advances in ECF Bleaching

2-1 ECF Bleaching with Very Low ClO_2 Charges

Barbara van Lierop, N. Liebergott and M. Faubert, PAPRICAN, Canada

2-2 Optimization of ECF/TCF Bleaching to Meet Environmental Regulations

Nils C. Johannsson and D.E. Fletcher, Eka Nobel, Inc., USA

2-3 Low Kappa Factor Bleaching—A Low Capital Strategy to Achieve EPA Guidelines

Ronald J. Klein, William G. Strunk, Alex M. Vegega, FMC Corp., USA

2-4 Mill Experiences: Weyerhaeuser Grande Prairie, Canada and Procter & Gamble, USA

Douglas C. Pryke, Consultant; Grant Bouree, Weyerhaeuser Canada; Pam Kloepper-Sams and Willie Owens, Procter & Gamble, USA; Stella Swanson, EMA/Golder, Canada

Session 3: Modern Delignification Technologies for TCF Pulp

3-1 Effects on Pulp and Paper Properties from ISO-Thermal Cooking (ITC) and Black Liquor Impregnation in a Continuous Digester

Anders Hjort, Kamyr AB, Sweden

3-2 Enerbatch Extended Delignification for TCF Pulp

Dr. Johannes Kappel, V. Kubelka, Wolfgang Wizani and G. Lemoch, VAI and Andritz Cos., Austria

3-3 Prehydrolysis Kraft Displacement Cooking (Visbatch) for TCF Dissolving Pulp

Dr. Michael Sinner, Wolfgang Wizani and K. Lackner, VAI, Austria

3-4 Low Kappa ASAM Pulp for TCF Bleaching

Dr. Hans-Ludwig Schubert, KAH, Germany; Dieter Teubner, VAI Austria; W.D. Hunter, Weyerhaeuser, USA

3-5 Extending Oxygen Delignification

Richard Reeves, Sunds Defibrator, Inc., USA

Session 4: Mill Experience with Ozone Bleaching Machinery and Pulp Reactor

4-1 Ahlstrom Machinery Systems

Kari Henriksen, A. Ahlstrom Corp., Finland

4-2 MC Ozone Bleaching—An Established Technology in Mill Scale

Hakan Dahllöf, Kamyr AB, Sweden

4-3 High Consistency Ozone Delignification—Mill Experience

Frank Steffes, Sunds Defibrator, Inc., USA

4-4 Ozone in the Pulp Mill: Alternatives and Costs

Dr. Thomas R. Covers, Air Liquide, France

Session 5: Panel on Mill Experience with Ozone Bleaching Worldwide

No papers were required of Session 5 panelists.

Session 6: On-Site Generation of Oxygen, Ozone, and Peroxide Bleaching Chemicals

6-1 Mill Experience with Ozonia System

(four mills: one each in USA, Sweden, Canada and Finland)

Michael A. Dimitriou, Ozonia North America, USA

6-2 High Concentration Ozone Generators Installed in Swedish and Finnish Pulp Mills

Greg R. Leist, Emery-Trailgaz Ozone Co., USA

6-3 High Concentration Ozone Systems for Pulp and Paper Applications—Design and Mill Experiences

Shaun S. Pierson, Capital Controls Co., USA; Dr. A. Shadiaky, Schmidding-Werke, Germany

6-4 Integrated Oxygen and Ozone Supply for Pulp Mills

M.J. Campbell, W.I. Johnson and Stewart K. Mehlman, Praxair, Inc., USA

6-5 On-Site Manufacturing of Hydrogen Peroxide at a Kraft Pulp Mill

Torolf Laxen, Rintekno Oy; Kaj Henricson, A. Ahlstrom Corp., Finland

Session 7: TCF Bleaching—Part I: Advances in Science & Technology

7-1 A New Process for TCF Bleaching of Kraft Pulps

Dr. Jorge L. Colodette, Federal University of Vicosa, Brazil; A.K. Ghosh, U.P. Singh, Dr. B. Dhasmana and Dr. R.P. Singh, Coll. of Forestry, N.C. State Univ., USA

7-2 Whats and Hows in TCF Bleaching

Dr. Celso Foelkel, Riocell SA, Brazil

7-3 Practical Implications of Metal Management in TCF Pulp Production

Dr. Madhu D. Jayawant, DuPont Co., USA

7-4 TCF Bleaching Using Z and Eop Stages

Kaj Henricson and O. Pikka, A. Ahlstrom Corp., Finland

Session 8: TCF Bleaching—Part II: Mill Experience with Different Pulp Types

8-1 Mill Scale Multistage Oxygen Delignification

Dr. Peder J. Kleppe, M. Peterson & Son AS, Norway

8-2 Mill Experience of Black Clawson's "No Moving Parts" Oxygen Delignification

Steven T. Haywood and Michael A. Sieron, Black Clawson Co., USA; Rameu A. Zanchin, Riocell Brazil; Pedro Pita, Air Products, Brazil

8-3 Leykam's Road to Becoming the World's Largest Integrated TCF Pulp and Paper Producers

Klaus D. Merzeder, KNP-Leykam, Austria; E. Barghede, Maschinenfabrik, Austria; H. Stockinger, Voest-Alpine, Linz, Austria

8-4 Towards Effluent-Free TCF Bleaching of Eucalyptus Prehydrolysis Kraft Pulp

Dr. Herbert Sixta, A.W. Krottscheck and W. Ruckl, Leuzing AG, Austria

8-5 Mill Experiences with Development of a TCF Sequence on Low Yield Sulfite Pulp (By title only)

Fritz Stahl, Bowater/Great Northern Paper; Graziella Teodorescu, Morton International; Alex Vegega, FMC Corp., Canada

Session 9: TCF Bleaching—Part III: Paper Users, A Global Perspective

No papers were required of Session 9 speakers and panelists.

Session 10: TCF Bleaching—Part IV: Delignification and Bleaching with Peroxides, Peracetic Acids and Other Chlorine-Free Bleaching Chemicals

10-1 Pathway to High Brightness TCF Kraft Pulps

Drs. N.A. Troughton, F. Desprez and J. Devenyns, Solvay Interlox Co., USA

10-2 Pressurized Hydrogen Peroxide Bleaching

Dr. Ryszard S. Szopinski, Kamyr, Inc., USA

10-3 The Effect of TCF Bleaching of ASAM and Kraft Pulps on Recovery and Effluent Treatments

Dr. Hans-Ludwig Schubert, Karl Fuch and Ulrich Kaiser, KAH, Germany; Dieter Teubner, VAI, Austria

10-4 Commercial TCF Bleach Plant Design and Effects of Solids and Thermal Balance on Operations

Lewis D. Shackford, Ingersoll-Rand/IMPCO, USA; Dr. Celso Foelkel, Riocell SA, Brazil

Session 11: TCF Bleaching—Part V: Mill Experiences

11-1 Worldwide Survey: State-of-the-Art TCF Bleaching

Dr. Richard J. Albert, Parsons Main, Inc., USA

11-2 Biological Effects of Kraft Mill Effluents—A Comparison Between ECF and TCF Pulp Production

Roland Lövblad, Sodra Cell, Sweden

11-3 Alternatives for Achieving High Brightness TCF Pulps

Lillemor Holtinger, Jiri Basta, and P. Lundgren, Eka Nobel AB; H. Fasten and R. Fredriksson, Munksjö AB, ASPA Mill, Sweden

11-4 Mill Experience with the Use of Caro's Acid to Produce High Brightness TCF Pulps

Dr. Rod Seccombe and R. Hill, Solvay Interlox SA, Belgium; H. Martens, Finnish Peroxides AB; A. Haakana, Sunila Oy Pulp Mill

Session 12: "Closing The Loop" – Moving Toward the Closed Effluent Cycle

12-1 Applying Proven TEF Technology to ECF Kraft Mill Closure

Donald R. Manolescu, Zerotech Technologies, Inc.; Tim Evans, Millar Western Pulp, Ltd., USA; Bill Sweet, NLK Consultants, USA

12-2 Monitoring and Control of Transition Metals in Kraft Mill Fiber Line

Dr. Patrick S. Bryant, Bryant Consulting, USA; Lewis I. Edwards, University of Idaho, USA

12-3 Comparison of ECF and TCF Based Solutions for Minimum Impact Mill (MIM)

Tuomo Nykanen, Kamyr Inc., USA

12-4 Chloride Removal from Precipitator Salt Cake Studies Aimed at Developing a New Process

Dr. Brij M. Moudgil, Univ. of Florida, USA

Session 13: Panel on Worldwide Emerging Trends in Chlorine-Free Bleaching in the 21st Century

No papers were required of Session 13 speakers and panelists.

DR

INTERNATIONAL NON-CHLORINE BLEACHING™ CONFERENCE, 1994. PROCEEDINGS

DL0



Notice: A book of conference proceedings containing all papers received prior to press time will be distributed to each delegate at the conference. Additional copies may be purchased after the conference for \$400 from the Miller Freeman Inc. Distribution Center, 6600 Silacci Way, Gilroy, Calif. 95020, (800) 848-5594. All papers received after the proceedings go to press will be sent to each delegate within 60 days after the conference.

Copyright 1994 by Miller Freeman, Inc. All rights reserved. No part of this book covered by the copyright hereon may be reproduced or copied in any manner whatsoever without written permission except in the case of brief quotations embodied in news articles and or reviews. For information contact the publishers: Miller Freeman, Inc. 600 Harrison St., San Francisco, CA 94107. 415-398-2993.

3096 0221 4324
Iolip
2 21113 12 14 15 16 17
18 19 20 21 22 23 24
25 26 27 28 29 30 31
32 33 34 35 36 37 38
39 40 41 42 43 44 45
46 47 48 49 50 51 52
53 54 55 56 57 58 59
60 61 62 63 64 65 66
67 68 69 70 71 72 73
74 75 76 77 78 79 80
81 82 83 84 85 86 87
88 89 90 91 92 93 94
95 96 97 98 99 100

SPONSORED BY

PULP & PAPER

**EMERGING
TECHNOLOGY
TRANSFER, INC.**

RIGOLD S.A.
Central office: ...
...