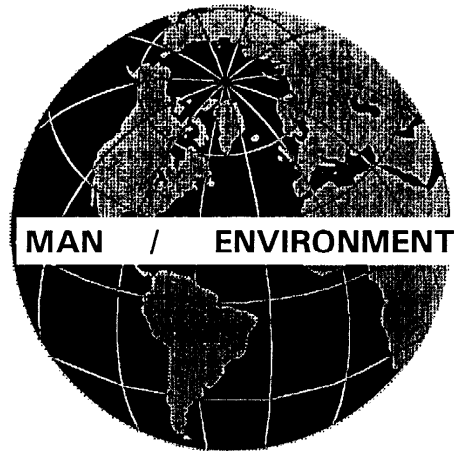


***NON - CHLORINE BLEACHING
MILL OPERATIONS UPDATE***

CELSO FOELKEL

**Director of Technology and Environment
Riocell S. A.
Brazil**

ENVIRONMENT



**MAN IS AN IMPORTANT PART OF ENVIRONMENT
ENVIRONMENT IS NOT JUST ANIMALS AND PLANTS
SOCIAL PROBLEMS ARE ENVIRONMENTAL PROBLEMS**

ENVIRONMENTAL ISSUES

- 1 - WASTEWATERS
- 2 - AIR EMISSIONS
- 3 - SOLID RESIDUES
- 4 - PEOPLE'S QUALITY OF LIFE
- 5 - INTEGRATION

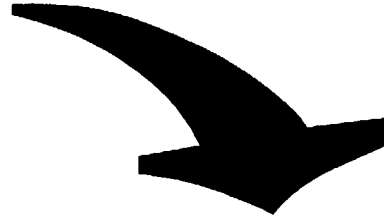
EFFLUENTS AND EMISSIONS

	WATER (kg / ton of pulp)					AIR (ppm)
REGULATION	BOD	COD	TSS	AOX	COLOR	TRS
CANADA	5.5 - 30	NOT RESTRICTED	9.5 - 11.5	1.5	NOT RESTRICTED	8 - 106
USA	5.5 - 8	NOT RESTRICTED	9.5 - 16.4	NOT RESTRICTED	NOT RESTRICTED	8 - 38
SWEDEM	7.5 - 17	39 - 107	0.3 - 5.8	1.5 - 2	NOT RESTRICTED	10 - 50
FRANCE	3.3 - 13.5	48 - 65	6.5 - 10	1.5 - 2	NOT RESTRICTED	8 - 23
BRAZIL (*)	1.2	5	1.5	NOT RESTRICTED	33.5	7.5
ATUAL EFFLUENTS AND EMISSIONS.						
RIOCELL	0.25	3	1	< 0.2	6.7	1.5 - 4.5
(*) STATE OF RIO GRANDE DO SUL.						

RIOCELL

THE PRESENT

- EXTENDED COOKING
- OXYGEN DELIGNIFICATION
- D_c E D E D BLEACHING
- SUBSTITUTION RATE: 80%
- TOTAL ACTIVE CHLORINE : 47 kg/t
- TOTAL EFFLUENT: 35 m³ /t
- WASTEWATER TREATMENT TO TERCIARY LEVEL
- INTENSIVE RECYCLING



THE FUTURE

- LOWER KAPPA
- OXYGEN / OZONE / CAUSTIC SODA /
HYDROGEN PEROXIDE / CHLORINE DIOXIDE
- NEW TECHNOLOGIES
- TWO BLEACHING LINES
- HIGHLY EFFICIENT WASTEWATER TREATMENT

PANEL: MILL OPERATIONS UPDATE

Gene Boatwright, Technical Director, Alabama River Pulp Co.

Dr. Walter Peter, Lenzing AG, Austria


Dr. Celso Foelkel, Technology & Environment Director, Riocell, Brazil

Fred Munro, Process Engineer, E.B. Eddy Forest Products, Canada

Bruce Burns, Technical Manager, Crestbrook

Cathy Ali, Chemical Engineer, Procter & Gamble

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Matthew B. Van Hook, Senior Environmental Counsel, American Paper Institute

Dr. Walter Peter, Production Manager, Lenzing AG, Austria

Dr. Peter Sligh, Environmental Manager, Tasman Pulp & Paper Co., New Zealand

Dr. Raimo Malinen, Vice President, The Finnish Pulp & Paper Research Ins., Finland

Doug Pryke, Environmental Consultant, Canada

Tutorial: Critical Examination of Bleach Plant Operations

Dr. Rudra P. Singh, President, Emerging Technology Transfer, Inc.

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Dr. Richard B. Phillips, Vice President/Director, International Paper

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Dr. Michael Sinner, Vice President, Voist-Alpine, Austria

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Vincent Magnotta, Technical Manager, Air Products and Chemicals, Inc.

Lewis Shackford, Products & Technology Manager, Ingersoll-Rand, IMPCO Division

Robert H. Collins, Director of Marketing, Kamy, Inc.

Mike Dimitriou, Manager of Sales & Marketing, Ozonia

Jeffrey E. Angulo, Technical Service Engineer, Du Pont

Nils Johansson, Director, Technical Marketing, Eka Nobel, Sweden

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Calvin Hastings, Senior Process Engineer, H.A. Simons Ltd. and Kristina Idner,
AF-IPK, Sweden

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Gene Boatwright, Technical Director, Alabama River Pulp Co.

Dr. Walter Peter, Lenzing AG, Austria

Dr. Celso Foelkel, Technology & Environment Director, Riocell, Brazil

Fred Munro, Process Engineer, E.B. Eddy Forest Products, Canada

Bruce Burns, Technical Manager, Crestbrook

Cathy Ali, Chemical Engineer, Procter & Gamble

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Ozone Bleaching Technology '92

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CANADA: Fred Munro, E.B. Eddy Forest Products; Norman Liebergott, Paprican;

FRANCE: Dr. Dominique Lachenal, Prof., Grenoble Univ.;

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NORTH AMERICA: Doug Pryke, Canada;

SOUTH AMERICA: Dr. Celso Foelkel, Riocell, Brazil;

PACIFIC RIM: Dr. Robert W. Allison, Group Leader, Chemical Engineering, PAPRO, New Zealand

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Dr. Ronald J. Slinn, Vice President, American Paper Institute;

Dr. Rudra P. Singh, Emerging Technology Transfer, Inc.;

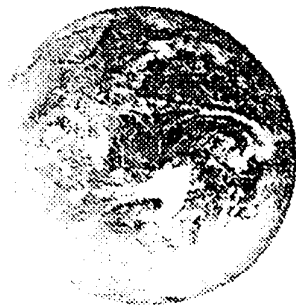
Dr. Dominique Lachenal, Center Technique Du Papier, France;

Dr. Raimo Malinen, The Finnish Pulp & Paper Research Institute

Dr. Steve Moldenius, Technical Director, Sodra Cell, Sweden

Dr. Hans U. Suess, Degussa AG, Germany

NON-CHLORINE BLEACHING



**Emerging
Technologies
Today and in
the Future**

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PROCEEDINGS

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