BLACK LIQUOR RECOVERY BOILER ADVISORY COMMITTEE

MINUTES OF MEETING
Crowne Plaza Hotel/Atlanta Airport
Atlanta, Georgia
April 8, 9 & 10, 2002

OBJECTIVE

The objective of BLRBAC is to promote improved safety of chemical recovery boilers and their auxiliaries through the interchange of technical knowledge, experience, and data on past and any future recovery boiler incidents. ***Bylaws - 2.1***

OFFICERS

Chairman:	**Wayman Thompson** Rayonier P. O. Box 2070 Jesup, GA 31598-0207	Tel: (912) 427-5167 Fax: (912) 588-1417 **wayman.thompson** **@rayonier.com**
Vice-Chairman:	**Dean Clay** International Paper P. O. Box 7910 Loveland, OH 45140-7910	Tel: (513) 248-6564 Fax: (513) 248-6679 **dean.clay@ipapaer.com**
Secretary:	**Mike Polagye** (new) FM Global P. O. Box 9102 Norwood, MA 02062	Tel: (781) 255-4730 Fax: (781) 762-9375 **michael.polagye** **@fmglobal.com**
Treasurer:	**Tim McGee** Hartford Steam Blr. Insp. & Ins. 1465 White Columns Blvd., Canton, GA 30115	Tel: (770) 345-7375 Fax: (770) 345-0843 **tim_mcgee@hsb.com**

REGULAR MEMBERSHIP

Organizations operating, manufacturing, or insuring chemical recovery boilers are eligible.

ASSOCIATE MEMBERSHIP

Organizations having a direct interest or role in the safety of chemical recovery boilers are eligible.

CORRESPONDING MEMBERSHIP

A company residing outside of the United States which finds it impractical to attend meetings on a regular basis because of distance and expenses, but desires to be involved and informed of BLRBAC activities.

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BLRBAC INTERNET ADDRESS: ---- www.blrbac.org
IRS Employer ID/Tax ID (IRS E.I.N.T./T.I.N) ---- #13-366-5137

EXECUTIVE COMMITTEE

Wayman Thompson
BLRBAC Chairman
Rayonier
P. O. Box 2070
Jesup, GA 31598-0207
Tel: (912) 427-5167
Fax: (912) 588-1417
wayman.thompson@rayonier.com

Dean Clay
BLRBAC Vice Chairman
International Paper
P. O. Box 7910
Loveland, OH 45140-7910
Tel: (513) 248-6564
Fax: (513) 248-6679
dean.clay@ipaper.com

Mike Polagye (new)
BLRBAC Secretary
FM Global
P. O. Box 9102
Norwood, MA 02062
Tel: (781) 255-4730
Fax: (781) 762-9375
michael.polagye@fmglobal.com

Tim McGee
BLRBAC Treasurer
Htfd. Stm. Blr. Insp. & Ins.
1465 White Columns Boulevard
Canton, GA 30115
Tel: (770) 392-6245
Fax: (770) 345-0843
tim_mcgee@hsb.com

Karl Morency
Operator Representative
Georgia-Pacific
P.O. Box 105605
Atlanta, GA 30348-5605
Tel: (404) 652-4629
Fax: (404) 584-1466
ktmorenc@gapac.com

Joan Barna
Manufacturing Representative
Alstom Power
2000 Day Hill Road
Windsor, CT 06095
Tel: (860) 285-2217
Tel: (860) 285-5078
joan.barna @power.alstom.com

Jimmy Onstead (new)
Insurance Representative
FM Global
Granite Park One
5800 Granite Parkway, Ste. 600
Plano, TX 75024
Tel: (972) 731-1656
Fax: (972) 731-1820
jimmy.onstead@fmglobal.com

****

Secretarial Services: Barbara Holich
1005 59th Street
Lisle, IL 60532
Tel: (630) 512-0144 (new)
Fax: (630) 512-0155
E-Mail: **fhholich@aol.com**

****

BLRBAC SUBCOMMITTEES

EMERGENCY SHUTDOWN PROCEDURES **John Andrews* -- Chairman** MeadWestvaco Corp. P. O. Box 118005 Charleston, SC 29423-8005 Tel: (843) 745-3212 Fax: (843) 745-3229 **JDANDRE@westvaco.com**	**FIRE PROTECTION IN DIRECT CONTACT EVAPORATORS** **Jerry Vuoso -- Chairman** International Paper 6400 Poplar Avenue, Tower 1 Memphis, TN 38197 Tel: (901) 763-7541 Fax: (901) 763-6900 **jerry.vuoso@ipaper.com**
INSTRUMENTATION **Bill McQuillan -- Chairman** Sappi (S. D. Warren) RR#3, Box 1600 Skowhegan, ME 04976 Tel: (207) 238-3219 Fax: (207) 238-3490 **bill.mcquillan@sappi-na.com**	**MATERIALS & WELDING** Joan Barna, Chairman Alstom Power 2000 Day Hill Road Windsor, CT 06095 Tel: (860) 285-2217 Fax: (860) 285-5078 **joan.barna @power.alstom.com**
PERSONNEL SAFETY **Robert Zawistowski -- Chairman** Power Specialists Associates, Inc. 531 Main Street Somers, CT 06071 Tel: (860) 763-3241, Ext. 126 Fax: (860) 763-3608 **bob.zawistowski@psaengineering.com**	**PUBLICITY & NEWS RELEASE** **Craig Cooke -- Chairman** FM Global 815 Byron Drive Oconomowoc, WI 53066 Tel: (262) 567-7370 Fax: (847) 430-7699 **craig.cooke@fmglobal.com**
SAFE FIRING OF AUXILIARY FUEL **Dave Streit -- Chairman** Buckeye Technology of Florida One Buckeye Drive Perry, FL 32348 Tel: (850) 584-1402 Fax: (850) 584-1717 **dave_streit@bkitech.com**	**SAFE FIRING OF BLACK LIQUOR** **Len Erickson -- Chairman** Boise Cascade P. O. Box 50 Boise, ID 83728-0001 Tel: (208) 384-4933 Fax: (208) 384-7637 **len_erickson@bc.com**
WASTE STREAMS **John Rickard -- Chairman** Jacobs-Sirrine P. O. Box 5456 Greenville, SC 29606 Tel: (864) 676-6393 Fax: (864) 676-6005 **john.rickard@jacobs.com**	

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BLRBAC MEETING SCHEDULE

Fall	2002	--	October	7, 8 & 9
Spring	2003	--	April	7, 8 & 9
Fall	2003	--	October	6, 7 & 8
Spring	2004	--	April	5, 6 & 7

"Bring Operator(s). Give them a chance to hear first hand!"

■ Past Chairman Lon Schroeder

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BLRBAC has created its own WEB Site which is:

www.blrbac.org

At this WEB site you will find a copy of the next Meeting Notice. Therefore, each Representative and Associate Representative is asked to inform their people of this new WEB site and this is where they should obtain the following information for the BLRBAC meetings:

BLRBAC MEETING NOTICE

COVER LETTER	General Information
REGISTRATION FORM	Print and mail to Said & Done with appropriate fees
CROWNE PLAZA HOTEL	Blocked room dates, pricing, address, hotel phone number, alternate hotel information, etc.
SCHEDULE	List of Subcommittee activities on Monday & Tuesday
AGENDA	Reports given to Joint BLRBAC Meeting on Wednesday
DELTA AIRLINE	Reduced rates and contact phone number, including discounted Avis rates for BLRBAC attendees.
QUESTIONNAIRE	Mail/e-mail completed questionnaires back to Said & Done. These will be given to the Operating Problems Subcommittee Chairman. He will see that your concerns are brought up and discussed during the Operating Problems session at the next meeting.

Mrs. Barbara Holich
Said & Done
1005 59th Street
Lisle, IL 60532
fhholich@aol.com

BLRBAC Publications

The following is the current status of the BLRBAC publications. Most of these are available at the **BLRBAC INTERNET ADDRESS** :

www.blrbac.org

1. **Recommended Good Practice for Firing of Auxiliary Fuel in Black Liquor Recovery Boilers**, Published April 1967; revised November 1998

2. **Recommended Good Practice for Safe Firing Black Liquor in Black Liquor Recovery Boilers**, August 1982; revised March 2001

3. **Recommended Rules for Personnel Safety for Black Liquor Recovery Boilers**, approved March 1996; revised April 7, 1997

4. **Recommended Emergency Shutdown Procedure (ESP) and Procedure for Testing ESP System for Black Liquor Recovery Boilers**, revised October 4, 2000.

5. **Recommended Good Practice - Fire Protection in Direct Contact Evaporators and Associated Equipment**, October 1974 (out-of-print); presently being revised.

6. **Instrumentation Check List and Classification Guide for Instruments and Control Systems Used in Operation of Black Liquor Recovery Boilers**, loose leaf, revised October 1999.

7. **Thermal Oxidation of Waste Streams**, October 1999.

8. **Recommended Training Program Guidelines for Black Liquor Recovery Boilers and Associated Systems**, April 9, 1997.

Tim McGee
BLRBAC Treasurer (HSB)
1465 White Columns Boulevard
Canton, GA 30115

Bus. Phone No.: (770) 392-6245
BLRBAC Fax: (770) 345-0843

EMERGENCY SHUTDOWN PROCEDURES SUBCOMMITTEE

John Andrews* -- Chairman
MeadWestvaco Corp.
P. O. Box 118005
Charleston, SC 29423-8005
Tel: (843) 745-3212; Fax: (843) 745-3229
JDANDRE@meadwestvaco.com

Larry Carter* Weyerhaeuser Company P. O. Box 336 Pine Hill, AL 36784 Tel: (334) 963-2368 **larry.carter @weyerhaeuser.com**	Jack Clement* Clement Consulting, Inc. 563 Beaverbrook Drive Akron, OH 44333-2818 Tel: (330) 865-9779 Fax: (330) 865-6960 **clementcon@cs.com**	Jamie Contino* GE Global Asset Protection Service 1105 Sanctuary Parkway, Suite 200 Atlanta, GA 30004-4741 Tel: (770) 569-7124 Fax: (770) 569-7090 **jamie.contino@gegapservices.com**
Ralf Holm* Andritz Inc. 10745 Westside Parkway Alpharetta, GA 30004 Tel: (770) 640-2614 Fax: (770) 640-2569 **ralf.holm@andritz.com**	John Kulig* Babcock & Wilcox P. O. Box 351 Barberton, OH 44203-0351 Tel: (330) 860-6438 Fax: (330) 860-9427 **jakulig@babcock.com**	Mark LeBel* Alstom Power P. O. Box 500, 1011-2406 Windsor, CT 06095-0500 Tel: (860) 285-2238 Fax: (860) 285-5078 **mark.lebel@power.alstom.com**
Lloyd Moore* International Paper P. O. Box 7910 Loveland, OH 45140-7910 Tel: (513) 248-6761 Fax: (513) 248-6679 **lloyd.moore@ipaper.com**	Karl Morency* Georgia-Pacific P. O. Box 105605 Atlanta, GA 30348-5605 Tel: (404) 652-4629 Fax: (404) 584-1466 **ktmorenc@gapac.com**	Robert Norton* Norske Canada P. O. Box 2000 (Elk Falls) Campbell River, BC V9W 5C9 Canad Tel: (250) 287-5344 Fax: (250) 287-5588 **bob.norton@norskecanada.com**
Bo Oscarsson Fluor Daniel Forest Products 100 Fluor Daniel Dr., 106-B Greenville, SC 29607-2762 Tel: (864) 281-5010 Fax: (864) 676-7630 **bo.oscarsson@fluor.com**	David Parrish* FM Global P. O. Box 9102 Norwood, MA 02062 Tel: (781) 255-4734 Fax: (781) 762-9375 **david.parrish@fmglobal.com**	John Weikmann Kvaerner Pulping, Inc 8008 Corporate Center Drive Charlotte, NC 28226 Tel: (704) 414-3431 Fax: (704) 541-1128 **john.weikmann@kvaerner.com**

* = Attended 04/02 Meeting

FIRE PROTECTION IN DIRECT CONTACT EVAPORATORS AND ASSOCIATED EQUPMENT

Jerry Vuoso* -- Chairman
International Paper
6775 Lenox Center Court
Memphis, TN 38115
Tel: (901) 419-6128; Fax: (901) 419-6900
jerry.vuoso1@ipaper.com

Randy Baker* Buckeye Technologies One Buckeye Drive Perry, FL 32348 Tel: (850) 584-1380 Fax: (850) 584-1738 **randy_baker@bkitech.com**	Lou Chaddick* Chaddick Consulting, Inc. 673 Tuxbury Farm Road Wando, SC 29492 Tel: (843) 881-7783 Fax: (843) 971-1243 **louchad@bellsouth.net**	Craig Cooke* FM Global 815 Byron Drive Oconomowoc, WI 53066 Tel: (262) 567-7370 Fax: (847) 430-7699 **craig.cooke@fmglobal.com**
Bobby Crews Durango–Georgia Paper Company P. O. Box 878 1000 Osborne Street St. Marys, GA 31558 Tel: (912) 576-0823 Fax: (912-882-0126 **becrews@durangopaper.com**	Chris Jackson* Global Risk Consultants Corp. c/o 12848 SW Thunderhead Way Beaverton, OR 97008 Tel/Fax: (503) 671-9829 **chris.Jackson @globalriskconsultants.com**	Dan Krekeler Babcox & Wilcox 212 S. Tryon St., Suite 400 Charlotte, NC 28281-0001 Tel: (704) 334-4742 Fax: (704) 334-1438 **dgkrekeler@babcock.com**
John Lisenby International Paper North Roanoke Avenue P. O. Box 580 Roanoke Rapids, NC 27870 **john.lisenby@ipaper.com**	Joseph Lynch* GE Industrial Risk Insurers 191 Peachtree Street, N.E. Atlanta, GA 30303-1747 Tel: (404) 818-1700, Ext. 1749 Fax: (888) 964-7348 **joe.lynch@industrialrisk.com**	Charlie Macaulay Global Risk Consultants 1605 NW Sammamish Rd. Issaquah, WA 98027 Tel: (425) 557-4480 Fax: (425) 557-0528 **charles.macaulay @globalriskconsultants.com**
George Orme Royal Sunalliance 111 SW Columbia, Ste. 500 Portland, OR 97201-5897 Tel: (503) 657-8530 **gorgolit@aol.com**	David Stein Eurocan P. O. Box 1400 Kitimat, British Columbia Canada V8C 2H1 Tel: (250) 63-3530 Fax: (250) 639-3588 **dsei@epp.westfrasertimber.ca**	

* = Attended 04/02 Meeting

INSTRUMENTATION SUBCOMMITTEE

Bill McQuillan* -- Chairman
Sappi (S.D. Warren Company)
RR #3, Box 1600
Skowhegan, ME 04976
Tel: (207) 238-3219; Fax: (207) 238-3490
bill.mcquillan@na.sappi.com

Richard Pothier* - Sec. RiNan, Inc. 44 Glen Drive Peabody, MA 01960 Tel: (978) 535-2520 Fax: (978) 535-3502 **rinan44@aol.com**	David Avery* Willamette Industries P. O. Box 678 Bennettsville, SC 29512 Tel: (843) 479-0200, Ex.458 or 335 Fax: (843) 479-6603 **davery@wii.com**	J. C. Browning, Jr. Alabama River Pulp Co., Inc. P. O. Box 100 Perdue Hill, AL 36470 Tel: 334-743-8336 Fax: 334-743-8332 **johnb@ariver.com**
William Camp* International Paper Co. 100 Jensen Road Prattville, AL 36067 Tel: (334) 361-5620 Fax: (334) 361-5619 **bill.camp@ipaper.com**	Bryan Hanna GE GAP Services P. O. Box 166 Toronto, Ont., Canada M5V 3C7 Tel: 416-217-5543 Fax: 416-217-5531 **bryan.hanna@industrialrisk.com**	Gail Lance* Babcock & Wilcox P. O. Box 351 Barberton, OH 44203 Tel: (330) 860-2628 Fax: (330) 860-2220 **gjlance@babcock.com**
Rick Matarrese* FM Global 655 Engineering Dr, #300 Norcross, GA 30092 Tel: (770) 777-3684 Fax: (770) 777-0414 **rick.matarrese@fmglobal.com**	Dan Mott* Irving Pulp & Paper Ltd. P. O. Box 3007, Station B Saint John, NB, Canada E2M 3H1 Tel: (506) 632-4149 Fax: (506) 633-5598 **mott.dan@irvingpulp.com**	Jim Quandt Weyerhaeuser Company P. O. Box 275 Springfield, OR 97477 Tel: (541) 741-5428 Fax: (541) 741-5895 **jim.quandt@weyerhaeuser.com**
Roger Smith* Georgia-Pacific Corp. P. O. Box 105605 Atlanta, GA 30303 Tel: (404) 652-4264 Fax: (404) 584-1466 **RESmith@gapac.com**	Jari Sopanen Andritz-Ahlstrom KMB 10745 Westside Parkway Alpharetta, GA 39201 Tel: (770) 640-2528 Fax: (770) 640-2444 **jari.sopanen @andritz-ahlstrom.com**	

* = Attended 04/02 Meeting

MATERIALS & WELDING SUBCOMMITTEE

Joan Barna – Chairman*
Alstom Power
2000 Dayhill Road
Windsor, CT 06095
Tel: 860-285-2217; Fax: 860-285-5078
joan.barna@power.alstom.com

Dan Phillips – Vice Chairman* Industra 15055 SW Sequoia Pkwy, Ste.100 Portland, OR 97224 Tel: 503-624-9100 Fax: 503-620-0102 **dphillips@industra.com**	Mike Barry 2000 Dayhill Road Windsor, CT 06095 Tel: 860-285-3920 Fax: 860-285-5078 **mike.barry@power.alstom.com**	George Bodman* 12 Kingwood Villas Court Kingwood, TX 77339 **blrclgdr@aol.com**
Buddy Brown Alstom Power 1119 Riverfront Parkway Chattanooga, TN 37402 Tel: 423-752-2200 Fax: 423-752-2660 **richard.a.brown** **@power.alstom.com**	James G. Dixon* Weyerhaeuser Highway 10 E., P.O. Box 336 Pine Hill, AL 36769 Tel: 334-963-2481 Fax: 334-963-2761 **jim.dixon@weyerhaeuser.com**	James Duncan FM Global 111 Frontier Drive, Apt. 500G Staunton, VA 24401 Tel: 540-886-2743 Fax: N/A **james.duncan@fmglobal.com**
David K. Fuhrmann* International Paper 6285 TriRidge Blvd Loveland, OH 45140 Tel: 513-248-6954 Fax: 513-248-6679 **dave.fuhrmann@ipaper.com**	Michael Garfield Hartford Steam Boiler 191 Tannery Road Lowell, ME 04493 Tel: 207-732-5168 Fax: 207-732-5168 **michael_garfield@hsb.com**	Richard J. Godin SAPPI (S. D. Warren Company) P. O. Box 1600 Skowhegan, ME 04976-9512 Tel: 207-238-7685 Fax: 207-238-7530
Fabian Henriques* MeadWestvaco 232 8th Street Chillicothe, OH 45601 **fah1@meadwestvaco.com**	Dennis Hollenbach* Alstom Power 2000 Dayhill Road Windsor, CT 06095 Tel: 860-285-9214 Fax: 860-285-5078 **dennis.hollenbach** **@power.alstom.com**	Lasse Koivisto Andritz Relanderinkatu 2 78200 Varkaus, Finland Tel: 358-17-578-211 **lasse.koivisto@andrutz.com**

* = Attended 04/02 Meeting

MATERIAL & WELDING SUBCOMMITTEE (Cont.)

Dave Lang* FM Global 400 Interpace Pkwy Bldg. C Parsiphany, NJ 07054-1196 Tel: 973-541-6868 Fax: 973-402-1070 **david.lang@fmglobal.com**	Jim Martin* Andritz 10745 Westside Parkway Alpharetta, GA 30004 Tel: 770-640-2489 Fax: 770-640-2603 **james.martin@andritz.com**	Del McKamey Industra 1122 NE 185th Ave. Portland, OR 97224 **dmckamey@recorinc.com** **dmckamey@industrainc.com**
Stephen L. Meiley M&M Engineering 300A Lake Street Ramsey, NJ 07446 Tel: 201-785-9229 Fax: 201-785-9555 **steve_meiley@mmengineering.com**	Ron McCarty* P. O. Box 1559 Sandia Park, NM 87047-1559 Tel: 505-286-7888 Fax: 505-286-78887 **bobronmac@worldnet.att.net**	Max D. Moskal* Mechanical & Materials Engrng 11020 W. 72nd Street Indian Head Park, IL 60525 Tel: 708-784-3564 Fax: 708-784-3612 **max_moskal** **@MMEngineering.com**
Bob Patrick MeadWestvaco P. O. Box 757 Escanaba, MI 49825 Tel: 906-786-1660 Fax: 906-786-3558 **rap@meadwestvaco.com**	Pat Rank Pope & Talbot P. O. Box 400 Halsey, OR 97348 Tel: 541-369-1167 Fax: 541-369-1192 **pat_rank@poptal.com**	Mark Schwartz MeadWestvaco 3131 Newmack Drive Miamisburg, OH 45327 Tel: 937-495-5360 Fax: 937-495-333 **MES8@meadwestvaco.com**
Robert P. Sullivan* The National Board of Boiler & Pressure Vessel Inspectors 1055 Crupper Avenue Columbus, OH 43229 Tel: 614-888-8320 Fax: 624-847-1828 **rsullivan@nationalboard.org**	W. Kirk Thomas Packaging Corp. of America P. O. Box 1048 Valdosta, GA 31603-1048 Tel: 912-559-2301 Fax: 912-559-2338	John Vanden Hoek GE GAP Services 87 Charters Road Brampton, Ont., Canada L6V 2S8 john.vandenhoek @gegapservices.com
Tom Watkins Nova Resourcing Group 8559 Bellingrath Road Theodore, AL 36582 Tel: 334-653-9277 Fax: 334-653-7504 **twatkins@nrggroupinc.com**	Roy Williams Hartford Steam Boiler 12925 Chets Creek Road Jacksonville, FL 32824 Tel: 904-992-8430 Fax: 904-992-8430 **roy_williams@hsb.com**	Jim Young* CIMS Ltd. 5355 Parkwood Place Richmond, BC, Canada V6V 2N1 Tel: 604-274-9065 Fax: 604-274-9095 **jyoung@cimsltd.com**

* = Attended 04/02 Meeting

PERSONNEL SAFETY SUBCOMMITTEE

Robert E. Zawistowski* - Chairman
Power Specialists Associates, Inc.
531 Main Street
Somers, CT 06071
Tel: 860-763-3241, Ext. 126; Fax: 860-763-3608
bob.zawistowski@psaengineering.com

Ken Baker Smurfit-Stone Container Corporation P.O. Box 100544 Florence, SC 29501-0544 Tel: 843-662-0313, Ext. 279 Fax: 843-269-0167 **kbaker@smurfit.com**	Robert DeCarrera Georgia Pacific Corporation 133 Peachtree St. NE (30303) P.O. Box 105605 Atlanta, GA 30348-5605 Tel: 404-652-4686 Fax: 404-654-4746 **rdecarre@gapac.com**	Jim Dickinson* Babcock & Wilcox Company 20 S. Vanburen Avenue Barberton, OH 44203-0351 Tel: 330-860-1229 Fax: 330-860-9319 **jadickinson@babcock.com**
David Fuhrmann* International Paper Company 6285 Tri-Ridge Road Loveland, OH 45140-7910 Tel: 513-248-6954 Fax: 513-248-6679 **dave.fuhrmann@ipaper.com**	David Gadai* Alstom Power, Inc. 2000 Day Hill Road Windsor, CT 06095-0500 Tel: 860-285-4297 Fax: 860-285-5078 **dave.gadai @power.alstom.com**	Ronald Hess* HSB Forest Products Group 110 Cedar Cove Court Buckhead, GA 30625 Tel: 706-484-1723 Fax: 706-484-5267 **ronald_hess@hsb.com**
Kurt Kanouse* GE GAP Services 2800 S.E. Briarwood Drive Vancouver, WA 98683 Tel: 360-254-4972 Fax: 360-254-4061 **kurt.kanouse @gegapservices.com**	Marko Kvist Andritz Services, Inc. 10745 Westside Parkway Alpharetta, GA 30004 Tel: 770-640-2516 Fax: 770-640-2455 **marko.kvist @andritz.com**	Larry Lindsey* MeadWestvaco P.O. Box 940 Phenix City, AL 36868-0940 Tel: 334-855-5024 Fax: 334-855-5172 **GLL1@meadwestvaco.com**
Jamison Manion* MeadWestvaco 35 Hartford Street Rumford, ME 04276 Tel: 207-369-2479 Fax: 207-369-2813 **JJM11@meadwestvaco.com**	Preston Morgan* Kvaerner Pulping, Inc. 8008 Corporate Center Drive Charlotte, NC 28226 Tel: 704-414-3402 Fax: 704-541-3683 **preston.morgan@kvaerner.com**	Len Olavessen* Buckman Laboratories International 1256 North McLean Blvd. Memphis, TN 38108-1241 Tel: 800-282-5626 Fax: 901-272-6451 **lrolavessen@buckman.com**

* = Attended 04/02 Meeting

PERSONNEL SAFETY SUBCOMMITTEE (Cont.)

Jimmy W. Onstead* FM Global Granite Park One 5800 Granite Parkway, Suite 600 Plano, TX 75024 Tel: 972-731-1656 Fax: 972-731-1820 **jimmy.onstead@fmglobal.com**	Rick Spangler Rick Spangler, Inc. 310 John Shaw Road St. Simons Island, GA 31522 Tel: 912-638-1324 Fax: 912-634-9697 **spangler@thebest.net**	Robert P. Sullivan* The National Board 1055 Crupper Avenue Columbus, OH 43229-1183 Tel: 614-888-8320 Fax: 614-847-1828 **rsullivan@nationalboard.org**
Art Thompson* Weyerhaeuser Saskatchewan Prince Albert Pulp & Paper P.O. Box 3001 Prince Albert, SK Canada S6V 5T5 Tel: 306-953-7307 Fax: 306-953-0441 **art.thompson** **@weyerhaeuser.com**		

* = Attended 04/02 Meeting

PUBLICITY & NEW RELEASE SUBCOMMITTEE

Craig Cooke* - Chairman
FM Global
815 Byron Drive
Oconomowoc, WI 53066
Tel: (262) 567-7370; Fax: (262) 567-7370
craig.cooke@fmglobal.com

* = Attended 04/02 Meeting

SAFE FIRING OF AUXILIARY FUEL SUBCOMMITTEE – **

Dave Streit - Chairman
Buckeye Florida
One Buckeye Drive
Perry, FL 32348
Tel: (850) 584-1402; Fax: (850) 584-1717
dave_streit@bkitech.com

Allen L. Ray – Sec. Barron Industries, Inc. 105 19th Street South Birmingham, AL 35210 Tel: (205) 956-3441 Fax: (205) 956-2265 **allen_ray@barronind.com**	John Alesandrini Babcock & Wilcox Co. P. O. Box 351 Barberton, OH 44203-0315 Tel: (330) 860-6001 Fax: (330) 860-2220 **jmalesandrini@babcock.com**	Scott Crysel FM Global 5800 Granite Pkwy., Ste. 600 Plan, TX 75024 Tel: (972) 731-1658 **scott.crysel@fmglobal.com**
Tom DeBeer Industrial Risk Insurers 5001 Willow Creek Drive Woodstock, GA 30180 Tel: (770) 591-0760 Fax: (770) 926-4951 **thomas.debeer** **@industrialrisk.com**	Robert DeCarrera Georgia-Pacific Corp. 133 Peachtree St. N.E. Atlanta, GA 30303 Tel: (404) 652-4686 Fax: (404) 654-4746 **rdecarre@gapac.com**	Lino DiLeonardo GE Canadian Industrial Risk Insurers P. O. Box 166 Toronto, ON M5V 3C7 Tel: (416) 217-5530 Fax: (416) 217-5531 **lino.dileonardo** **@industrialrisk.com**
Lloyd Moore -- Co-Chair International Paper Co. Manufacturing Technology Ctr.. 6285 Tri-Ridge Blvd. Loveland, OH 45140 Tel: (513) 248-6761 Fax: (513) 248-6679 **lloyd.moore@ipaper.com**	Bob Norton Norske Skog Canada Ltd. P. O. Box 2000 Campbell River, BC V9W 5C9 Tel: (604) 287-5240 Fax: (604) 287-5478 **bob.norton** **@norskecanada.com**	Jim Quandt/Alt. Bruce Knowlen Weyerhaeuser Company P. O. Box 275 Springfield, OR 97477 Tel: (541) 741-5428 Fax: (541) 741-5895 **jim.quandt** **@weyerhaeuser.com**
Thomas Rutherford Rockwell Automation 1 Allen-Bradley Co., Inc. Mayfield Hts., OH 44124 Tel: (440) 646-4937 Fax: (440) 646-4843 **tjrutherford@ra.rockwell.com**		

** = No meeting held 04/02

SAFE FIRING OF BLACK LIQUOR SUBCOMMITTEE

Len Erickson* -- Chairman
Boise Cascade
P. O. Box 50
Boise, ID 83728-0001
Tel: (208) 384-4933; Fax: (208) 384-7637
lenerickson@boisepaper.com

Mark Sargent Co-Chair* International Paper 6285 Tri-Ridge Blvd. Loveland, OH 45140-7910 Tel: (513) 248-6086 Fax: (513) 248-6679 **mark.sargent@ipaper.com**	Richard Burnette Weyerhaeuser P. O. Box 238 Oglethorpe, GA 31068 Tel: (229) 472-5323 Fax: (229) 472-5292 **richard.burnette @weyerhaeuser.com**	Larry Hiner* Babcock & Wilcox P. O. Box 351 Barberton, OH 44203-0351 Tel: (330) 860-6525 Fax: (330) 860-9295 **lahiner@babcock.com**
Majed Ja'arah* Inland Paperboard & Packaging 1750 Inland Road Orange, Texas 77632 Tel: (409) 746-7315 Fax: (409) 746-7249 **MJaarah@iccnet.com**	Brian Lemay* FM Global 165 Commerce Valley Dr. West, Ste. 500 Thornhill, ON L3T 7V8 Tel: (905) 763-5683 Fax: (905) 763-5622 **brian.lemay@fmglobal.com**	Scott Moyer* Alabama River Pulp P. O. Box 100 Perdue Hill, AL 36470 Tel: (251) 743-8361 Fax: (251) 743-8529 **scottm@ariver.com**
Doug Murch * GE GAP Services 1818 Market Street Philadelphia, PA Tel: (215) 255-6835 Fax: (215) 255-6850 **douglas.murch @gegapservices.com**	Arie Verloop* Jansen Comb. & Blr. Tech. 12025 115th Avenue NE, Ste. 250 Kirkland, WA 98034-6935 Tel: (425) 825-0500 Fax: (425) 825-1131 **arie.verloop@jansenboiler.com**	Rick Young * Alstom Power 1119 Riverfront Parkway Chattanooga, TN 37402 Tel: (423) 752-2603 Fax: (423) 752-2660 **frederick.young @power.alstom.com**

* = Attended 04/02 Meeting

WASTE STREAMS SUBCOMMITTEE

John Rickard* -- Chairman
Jacobs Engineering
P. O. Box 5456
Greenville, SC 29456
Tel: (864) 676-6393; Fax: (864) 676-6005
john.rickard@jacobs.com

Craig J. Aderman* Sappi (S. D. Warren) Skowhegan, ME 04976-9512 Tel: (207) 238-3177 Fax: (207) 856-3675 **craig.aderman** **@sappi-na.com**	Joan Barna* Alstom Power 2000 Day Hill Road Windsor, CT 06095 Tel: (860) 285-2217 Fax: (860) 285-5078 **joan.barna** **@power.alstom.com**	Joe Barsin* Coen Company 5500 Five Knolls Drive Charlotte, NC 28226 Tel: (704) 236-8284 Fax: (704) 544-9117 **magalidusa** **@aol.com**
John Caine Southern Environmental 6690 West Nine Mile Road Pensacola, FL 32526 Tel: (850) 941-3001 Fax: (850) 944-8270 **apasales** **@sei-group.com**	E. Scott Crysel FM Global Granite Park One Plano, TX 75024 Tel: (972) 731-1658 Fax: (972) 731-1820 **scott.crysel** **@fmglobal.com**	Ned Dye Jansen Combustion & Boiler Technologies 12025 115th Ave. NE, Ste. 250 Kirkland, WA 98034-6935 Tel: (425) 825-0500, Ext. 125 Fax: (425) 825-1131 **ned.dye** **@jansenboiler.com**
James Franks* GE GAP Services 855 Dogwood Road Somerville, TN 38068 Tel: (901) 465-6645 Fax: (901) 465-0771 **james.franks** **@industrialrisk.com**	Dwight Husband* Inland Paperboard & Packaging P. O. Box 1551 Rome, GA 30162-1551 Tel: (706) 236-5306 Fax: (706) 236-5441 **dhusband** **@iccnet.com**	Arnie Iwanick* Harris Group, Inc. 1750 NW Naito Parkway Portland, OR 97209-2530 Tel: (503) 345-4510 Fax: (503) 228-0422 **arnie.iwanick** **@harrisgroup.com**
Olli Kujanpaa* Andritz-Ahlstrom 10745 Westside Parkway Alpharetta, GA 30004 Tel: (770) 640-2571 Fax: (770) 640-2455 **olli.kujanpaa** **@andritzahlstrom.com**	John Lewis* Fluor Daniel Forest Products 100 Fluor Daniel Drive Greenville, SC 29607-2762 Tel: (864) 281-8535 Fax: (864) 676-7630 **john.lewis** **@fluordaniel.com**	Wayne Macintire* International Paper P. O. Box 7910 Loveland, OH 45140-7910 Tel: (513) 248-6834 Fax: (513) 248-6679 **wayne.macintire** **@ipaper.com**

*= Attended 04/02 Meeting

WASTE STREAMS SUBCOMMITTEE (Cont.)

Bo Oscarsson Fluor Daniel Forest Products 100 Fluor Daniel Drive Greenville, SC 29607-2762 Tel: (864) 281-5010 Fax: (864) 676-7630 **bo.oscarsson** **@fluor.com**	Barry Seidel* BE&K Engineering P. O. Box 12607 Birmingham, AL 35202-2607 Tel: (205) 872-6438 Fax: (205) 972-6300 **seidelb** **@bek.com**	H. Bentley Sherlock* Babcock & Wilcox 2302 Parklake Dr.NE,Ste.300 Atlanta, GA 30345 Tel: (770) 621-3947 Fax: (770) 621-3922 **hbsherlock** **@babcock.com**

- = Attended 04/02 Meeting

MEETING REGISTRATION LIST

A.H. Lungberg Associates, Inc.
Paul Seefeld, Jacksonville, FL

Abitibi-Consolidated
Gustafson, Larry, Fort Frances, Ont.

AF-IPK
Flodqvist, Bert, Stockholm, Sweden

Alabama River Pulp
Browning, John, Perdue Hill, AL
Moyer, Scott, Perdue Hill, AL

Alert Systems, Inc.
Borsje, Henk, Duxbury, MA

Alstom Power
Barna, Joan, Windsor, CT
Barry, Mike, Windsor, CT
Farmer, Robert, Beverly, MA
Gadai, David, Windsor, CT
Grasso, Bob, Vancouver, WA
Hollenbach, Dennis, Windsor, CT
LeBel, Mark, Windsor, CT
Nordhausen, Chuck, St. Paul, MN
Seguin, Mike, Ottawa, Ont. Canada
Topping, Brian, Burnaby, BC
Young, Frederick, Chattanooga, TN

Andritz, Inc.
Holm, Ralf, Alpharetta, GA
Kujanpaa, Olli, Alpharetta, GA
Kvist, Marko, Alpharetta, GA
Martin, Jim, Alpharetta, GA
Phillips, John, Alpharetta, GA

Automation Applications, Inc.
McClain, Cliff, Exton, PA
Vigeant, Mark, Exton, PA

AXA Corporate Solutions
Abel, Frederic, France

Babcock & Wilcox
Barnhart, Phil, Barberton, OH
Dickinson, Jim, Barberton, OH
Hiner, Larry, Barberton, OH
Kulig, John, Barberton, OH
Osborne, Steve, Barberton, OH
Pifer, Greg, Barberton, OH
Sherlock, H. Bentley, Atlanta, GA
Yash, John, Atlanta, GA

Barron Industries
Justice, Jeff, Irondale, AL
Ray, Allen, Irondale, AL

Blue Ridge Paper Products
Green, Ray, Canton, NC
Hennessy, Kevin, Canton, NC
Holland, Brook, Canton, NC

Boise Cascade
Erickson, Leonard, Boise, ID
Lagers, Kris, Kennewick, WA
Stuart, Kenneth, Jackson, AL
Von Oepen, David, Jackson, AL
Zavadoski, Greg, St. Helens, OR
Zeigler, Adam, Wallula, WA

Bowater
Hornsby, John, Catawba, SC
Cambron, Tim, Coosa Pines, AL
Conley, Clark, Coosa Pines, AL
Griffitt, Frank, Coosa Pines, AL

Buckeye Technologies
Baker, Randy, Perry, FL

Buckman Laboratories
Olavessen, Len, Memphis, TN

CBC Industrias Pesadas
Takahashi, Nelson, Sao Paulo, Brazil

MEETING REGISTRATION LIST
(Continued)

Chaddick Consulting, Inc.
Chaddick, Louis, Wando, SC

CIMS Ltd
Young, Jim, Richmond, BC, Canada

Clement Consulting
Clement, Jack, Akron, OH

Clyde-Bergemann, Inc.
Jameel, M. Ishaq, Atlanta, GA

CMPC Celulosa
Barrios, Claudio, Balmaceda, Chile

Coen Company
Wadhwani, B.K., Burligname, CA

D&G Machine Products, Inc.
Tanguay, Eric, Westbrook, ME

Delta Training
Lewis, Sam, Diamond Power
Kamisnski, Bob, Lancaster, OH
Tavares, Alarick, Lancaster, OH

Domtar Papers
Zeran,William, Cornwall, Ont.

Eastern Paper
LaFlamme, Allen, Lincoln, ME
MacEachern, Pat, Lincoln, ME

Energy & Environmental Technologies
Jones, Russel, Augusta, GA

Enertech Corp.
Scurry,Bill, Atlanta, GA

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Environmental Elements
Elam, Stanley, Baltimore, MD
Bringman, Lewis, Baltimore, MD
Hardy, Kevin, Baltimore, MD
Holbrook, John, Baltimore, MD
Kercheval, Mark, Baltimore, MD
Shanahan, Dennis, Baltimore, MD

Fluor Daniel Forest Products
Lewis, John, Greenville, SC
Oscarsson, Bo, Greenville, SC

FM Global
Beaulieu, Andre, Montreal, Que. Canada
Cooke, Craig, Oconomowoc, WI
Fugleberg, Jonathan, Johnston, RI
Lamb, Ron, Parsippany, NJ
Lang, David, Bedminster, NJ
Lemay, Brian, Thornhill, Ont. Canada
Matarrese, Rick, Alpharetta, GA
Morgan, Rick, Plano, TX
Onstead, Jimmy, Plano, TX
Parrish, David, Norwood, MA
Polagye, Mike, Norwood, MA
Sephton, Jim, Thornhill, Ont. Canada
Smith, Shawn, Alpharetta, GA

Frantschach-Swiecie
Maciejak, Ryszard, Swiecie, Poland

Fuel Tech. Inc.
Nuttall, William, Charlotte, NC

G&M Consultadores, Ltda
Schreiber, Guido, Canoinhas, Brazil

GA Dept. of Labor
Everett, Earl, Atlanta, GA
Hancock, Gerry, Atlanta, GA

MEETING REGISTRATION LIST
(Continued)

Gaylord Container
Vinson, Robert, Bogalusa, LA

GE GAP Services
Coldwell, Donald, Hartford, CT
Contino, Jamie, Alpharetta, GA
Fincher, Daryl, Alpharetta, GA
Franks, James, Somerville, TN
Goddard, Sam, Charlotte, NC
Goodman, Brian, Bellevue, WA
Kanouse, Kurt, Vancouver, WA
Lynch, Joseph, Alpharetta, GA
Murch, Douglas, Philadelphia, PA
Rawals, Lynn, Alpharetta, GA
Sides, Michael, Alpharetta, GA
Wolters, Bodo, Alpharetta, GA

GeneralCologne Re
Freeman, Stuart Jr., Atlanta, GA

George H. Bodman, Inc.
Bayse, Michael, Kingwood, TX
Bodman, George, Kingwood, TX

Georgia-Pacific
Andrews, Jimmy, Pennington, AL
Drenth, Todd, Camas, WA
Morency, Karl, Atlanta, GA
Smith, Roger, Atlanta, GA
St. John, Adam

Global Risk Consultants
Cain, Morgan, Friendsville, TN
Jackson, Christopher, Iselin, NJ
Smith, Andy, Atlanta, GA

Gulf States Paper
Duckworth, Marty, Demepolis, AL

Harris Group
Iwanick, Arnie, LaCenter, WA

Hartford Steam Boiler
Garfield, Michael, Lowell, ME
Hess, Ron, Buckhead, GA
Ledlow, Larry, Loxley, AL
McGee, Tim, Canton, GA

Heberer Consulting Services
Heberer, Norman, Augusta, GA

Hercules, Inc.
Gaus, Jeff, Mandeville, LA
Robinson, James, Trevose, PA

Industra
McKamey, Del, Portland, OR
Phillips, Dan, Portland, OR

Inland Paperboard & Packaging
Ja'arah, Majed, Orange, TX

Inst. of Paper Science & Tech.
Schmidl, Wolfgang, Atlanta, GA

International Paper
Camp, Bill, Prattville, AL
Clay, Dean, Loveland, OH
Fuhrmann, Dave, Loveland, OH
Inman, Edward, Cantonment, FL
MacIntire, Wayne, Loveland, OH
McCarty, Ronald, Sandia Park, NM
Moore, Lloyd, Loveland, OH
Odom, Dennis, Roanoke Rapids, NC
Sargent, Mark, Loveland, OH
Vuoso, Jerry, Memphis, TN

International Technology Co.
Jonsson, Jan Erik, Portsmouth, NH
Teixeira, Joaohuis, Portsmouth, NH

Irving Pulp & Paper
Gallant, Cory, Saint John, NB, Canada
Mott, Dan, Saint John, NB, Canada

MEETING REGISTRATION LIST
(Continued)

Jaakko Poyry
Kankkonen, Sebastian, Vantaa, Finland

Jacobs Engineers, Inc.
Rickard, John , Greenville, SC

Jansen CBT
Drottar, Jerry, Kirkland, WA
Verloop, Arie, Kirkland, WA

John E. Cover Engineering, Inc.
Cover, John, Birmingham, AL

Kawasaki Heavy Industries
Sakaeyama, Osamu, New York, NY

Kellogg Brown & Root, Inc.
Adams, Wayne, Mobile, AL

K-Patents, Inc.
Haugen, Chris, Naperville, IL
Pyorala, Keijo, Naperville, IL

Kvaerner Pulping
Blackard, Vernon, Charlotte, NC
Geedey, Jim, Charlotte, NC
Hansson, Berth, Charlotte, NC
King, Dave, Charlotte, NC
Morgan, Preston, Charlotte, NC
Sherrod, Hank, Charlotte, NC
Wasson, Eric, Charlotte, NC
Weikmann, John, Charlotte, NC

Liquid Solids Control
Sweeney, Michael, Upton, MA

Longview Fibre
Berg, Greg, Longview, WA

Longview Inspection, Inc.
Cooper, Mike, Longview, TX

Marsh, Inc.
Durham, Rick, Atlanta, GA
Eaves, Dennis, Atlanta, GA

Matrix Risk Consultants
Hayes, Michael, Miamisburg, OH

MeadWestvaco
Gnegy, Richard, Charleston, SC
Henriques, Fabian, Chillicothe, OH
Lindsey, Larry, Phenix City, AL
Manion, Jamison, Rumford, ME
Sanders, Doug, Phenix City, AL
Suggs, Chris, Miamisburg, OH
Thompson, Craig, Escanaba, MI
Williams, Jimmy, Phenix City, AL
Wynn, Doug, Stevenson, AL

Mechanical & Materials Engrg.
Moskal, Max, LaGrange, IL

Metalspray North America
Calkins, Michael, Richmond, VA

National Board of BPVI
Sullivan, Robert, Columbus, OH

Norske Skog
Norton, Bob, Campbell River, BC

Ondeo-Nalco
Totura, George, Naperville, IL

Packaging Corp. of Amer.
Ferrell, Larry, Valdosta, GA
Pedron, Lester, Counce, TN
Rabalais, Cliff, Counce, TN

Potlatch
Bliss, Dave, McGehee, AR
Hartley, Chuck, Cloquet, MN

MEETING REGISTRATION LIST
(Continued)

Power Specialists Assoc. Inc.
Madersky, Tom, Somers, CT
Popielnicki, Ted, Somers, CT
Zawistowski, Bob, Somers, CT

Praxair Surface Technologies
Nalwasky, Ken, McMurray, PA

Rayonier
Davis, Gary, Jesup, GA
Stewart, Willie, Jesup, GA
Walthour, Peter, Jesup, GA
Thompson, Wayman, Jesup, GA

RiNan, Inc.
Pothier, Richard, Peabody, MA

Riverwood International
Hazard, Joel, Macon, GA

Sandguist, Inc.
Sandquist, Kent, Milwaukee, WI

sappi
Aderman, Craig, Skowhegan, ME
Godin, Richard, Skowhegan, ME
McQuillan, Bill, Skowhegan, ME
Merriman, Nick, Mandeni, KZN
Schroeder, Erwin, South Africa
Spindler, Guy, South Africa

Saucor Ltd.
Cousineau, Ray, Vancouver, BC

Smurfit Carton de Colombia
Cubillos, Jairo, Cali, Colombia
Franco, Daniel, Cali, Colombia

Smurfit-Stone Container
Cotnam, Jim, Portage-du-Forte, Que
Cotton, Rick, Pensacola, FL
Craig, David, Hodge, LA
Elder, Hollis, Jacksonville, FL
Fuster, Pedro, Panama City, FL
Hayes, Charles, Pensacola, FL
LaRue, Lance, Panama City, FL

Southern Environmental Elements
Cotton, Rick, Pensacola, FL
Hayes, Charlie, Pensacola, FL

St. Anne-Nackawic Pulp Co.
Lamey, Bernie, Nackawic, N.B., Canada

Stasuk Testing & Inspection Ltd.
Stasuk, David, Burnaby, BC

StoraEnso North America
Mertes, Mike, Wisconsin Rapids, WI
Paul, Irv, Wisconsin Rapids, WI

Tembec
Batson, Jim, St. Francisville, LA
Terrell, Carl, St. Francisville, LA

Weyerhaeuser
Avery, David, Bennettsville, SC
Basham, Richard, Hawesville, KY
Carter, Larry, Pine Hill, AL
Dixon, Jim, Pine Hill, AL
Hanna, Barry, Bennettsville, SC
Heustess, Jimmy, Bennettsville, SC
Knowlen, Bruce, Federal Way, WA
Rogers, Todd, Bennettsville, SC
Snyder, Orville, Hawesville, KY
Wilke, Jack, Hawesville, KY
Worsham, Jesse, Bennettsville, SC

INTRODUCTION

BLRBAC's Chairman, Wayman Thompson, called the meeting to order at 8:00 a.m. on Wednesday, April 10th.

CHAIRMAN: I'd like to welcome all of you to this meeting of BLRBAC. As you can see, the attendance is still somewhat down, but I think participation at the subcommittee level and the Operating Problems session yesterday was good. I'd like to thank all of you for that.

OLD BUSINESS

ACCEPTANCE OF MINUTES OF SPRING 2001 – Wayman Thompson
As most of you know the Minutes of the previous meeting were posted on the Web site. I know all of you have taken several hours reviewing those. If there are any additions or corrections, would someone so state or if not, can I get a motion to accept? Is there a second? All those in favor, signify with saying "aye." The fall Minutes are accepted as submitted. As we have said in the past, future Minutes will continue to be posted on the Web site. As Dean mentioned yesterday, we would still like to make sure that your current e-mail address is properly listed in the BLRBAC database. Keeping BLRBAC posted regarding any changes is just a matter of going on the Web site and sending Barbara Holich an e-mail. This will allow BLRBAC to notify you when the Minutes are posted and also when the Meeting Notice is posted.

NEW BUSINESS

1. **NEW MEMBERS/REPRESENTATIVE CHANGES REPORT** – Mike Polagye

   At the Executive Committee yesterday afternoon, accepted as new members were:

NEW REGULAR MEMBERSHIP

No new memberships requested at this time.

NEW ASSOCIATE MEMBERSHIP

Harris Group, Inc. – a design engineering construction company and international technology company; a supplier of ancillary equipment for recovery boilers.
Arnie Iwanick designated as Associate Representative
Bob Speck designated as Alternate Associate Representative

International Technology Co. (ITC) – dedicated to develop and supply the Industry with auxiliary equipment for Recovery Boilers
Jan Erik Jonsson designated as Associate Representative
Joao Luis Teixeira designated as Alternate Associate Representative

1. **NEW MEMBERS/REPRESENTATIVE CHANGES REPORT**
NEW ASSOCIATE MEMBERSHIP (Cont.)

Kamtech, Inc. – an industrial contracting company servicing recovery boilers.
Charles Laney designated as Associate Representative
Bob Roy designated as Alternate Associate Representative

CORRERSPONDING MEMBERSHIP

Frantschach Sweicie – a pulp and paper company operating a recovery boiler in Poland.
Ryszard Maciejak designated as Corresponding Representative
Maciej Kunda designated as Alternate Corresponding Representative.

PT. Indah Kiat Pulp & Paper Tbk – a pulp and paper company operating recovery boilers in Indonesia.
Lu Chi Nan designated as Corresponding Representative.
Richard Stonebridge designated as Alternate Corresponding Representative.

We welcome these new members to BLRBAC and we look forward to their participation in forwarding the safe operation of recovery boilers.

MEMBERSHIP COMPANY NAME CHANGES

GE Global Asset Protection Services (GE GAP)
Previously known as GE Industrial Risk Insurers

MeadWestvaco
Due to merger of Mead and Westvaco

NEW REGULAR REPRESENTATIVE CHANGES

Abitibi
Frederick Hnatuk replaces Peter Boon as Representative
Dany Laarochelle replaces Brad Bodnarchuk as Alternate Representative

Appleton Papers
Tom Lezzer replaces Jim Baird as Alternate Representative

Bowater, Inc.
Frank Griffitt replaces William Hagner as Representative
Clark Conley replaces William Litzenberg as Alternate Representative

Cariboo Pulp & Paper
David Hardman replaces Brian Morgan as Representative
Dan McRae replaces Cy Makeiff as Alternate Representative

1. **NEW REGULAR REPRESENTATIVE CHANGES** (Cont.)

NEW REGULAR REPRESENTATIVE CHANGES (Cont.)

CNA
Robert Norum designated as new Representative
Richard Schuch designated as new Alternate Representative

Eastern Paper
Pat MacEachern replaces Ed Pelkey as Representative

MeadWestvaco
George Lindsey replaces Chris Suggs/Mark Swartz as Representative
Jimmy Williams replaces John Andrews/Mark Ferguson as Alternate Representative

Mitsubishi Heavy Industries, Ltd.
Hitoji Yamada replaces Yoshihisa Arakawa as Representative

Tembec
Debra Tillman name change from Debra Little continues as Representative
Jim Batson replaces Tommy Blaylock as Alternate Representative

NEW ASSOCIATE REPRESENTATIVE CHANGES

A.H. Lundberg Associates, Inc.
Dan Bloom designated as new Associate Representative
Paul Seefeld designated as new Alternate Associate Representative

Environmental Elements
Lewis Bringman replaces Thomas Martinko as Associate Representative

Institute of Paper Science & Technology
Wolfgang Schmidel replaces Scott Sinquefield as Associate Representative
Scott Sinquefield replaces W.J.Frederick as Alternate Associate Representative

2. **SECRETARY'S REPORT** – Mike Polagye

You have heard this all before, but I will say it again. Dean mentioned it yesterday and Wayman this morning. In an effort to control costs, BLRBAC is using e-mail for all its communications. Therefore, it is important for you to keep your e-mail address up-to-date with Barbara Holich who provides secretarial services for BLRBAC. Barbara's contact information is contained in the Meeting Minutes and also within the Meeting Registration Package which is posted on the BLRBAC Web site. The Web site is www.blrbac.org.

2. **SECRETARY'S REPORT** (Cont.)

Barbara also requests that when you send her an e-mail address change that you also include your old e-mail address. That way she knows that she is actually changing the correct person in her database. This will allow her to remove your old e-mail address from the database when entering your new address.

Also, I have a request to all the Presenters this morning. A tape is being made of this morning's meeting and the Meeting Minutes of your presentation will be a transcript of that tape unless you submit a written report. When you finish your presentation this morning, please indicate to me whether or not you are going to submit a written report. This way I can tell Barbara and that way she won't transcribe portions of the tapes that are not going to be used anyway.

SECRETARIAL SERVICES REPORT -- Barbara Holich

Designated Representative and Associate Representative changes appear in the minutes based on correspondence I receive between meetings. Changes are now made to the official BLRBAC database using US mailed letters or e-mail letters. Therefore many notes I received are not signed or on letterhead as previously required by BLRBAC. I am now accepting this format. All requests for change in representation should be sent by someone in management who has authority to grant permission to use company funds to attend BLRBAC. This letter must give the full name, BLRBAC position taken (Rep.; Alt. Rep.; Assoc.; Alt. Assoc.; or Corres. Rep.) and e-mail address of the designated person. It is imperative that the BLRBAC Secretarial Service receives written notification whenever a designated Rep. or Alt. Rep. retires, resigns, dies, or can no longer fulfill their responsibilities by attending BLRBAC regularly. This notification should be written in a timely fashion to Mrs. Barbara Holich, BLRBAC Secretarial Services, 1005 59th Street, Lisle, IL 60532 or e-mailed to fhholich@aol.com. The above also applies to Assoc. Reps., Alt. Assoc. Reps., and Corresponding Reps. A phone call is appreciated (630-512-0144) in this regard because it makes me aware of the change, but remember, **no changes are made to the database until written notification is received.** Your cooperation in this regard is greatly appreciated.

3. **EXECUTIVE COMMITTEE REPORT** – Wayman Thompson

Yesterday during the Executive Committee's rather lengthy session, we undertook several documents for review. First I'd like to make note that since the last meeting we have had some membership changes in the Executive Committee. Larry Chase submitted his resignation. In accordance with the rules and by-laws, the Executive Committee has appointed Mike Polagye to finish his un-expired term. Taking Mike's place on the Executive Committee as the Insurance Representative is Jimmy Onstead. This will be in effect until the fall meeting when new officers will be elected.

3. **EXECUTIVE COMMITTEE REPORT** (Cont.)

We now have an Operating List of Recovery Boilers. Joan Barna has updated that list. It is available if anyone wants that list. Do not assume that all the information on it is correct, but it is as up-to-date as we could get it with the information that was returned to Joan.

As I mentioned, we undertook several documents for review from the various subcommittees. I won't go into detail on that. Some we approved and the subcommittee chairs will be reporting on that during their Subcommittee Report. One thing the Executive Committee has agreed to do is documents that are under review and the procedure calls for the subcommittee to submit the documents to the Executive Committee, once the Executive Committee approves that document then it is made available to the membership for review and input back to the subcommittee prior to any vote on changing the rules and guidelines from the subcommittee. Starting with these documents being submitted to the membership for review, comments, input and approval, they will be posted on the Web site. There will be a separate page on the Web site so that any of these documents that you want to go into the Web site to get, they will now be available as a separate entity.

One of two other issues that we spent some time with were that the fall meeting is the 40th Anniversary of BLRBAC. We are planning more than an ordinary meeting at this point. We don't have the details worked out, but we hope to have some sort of celebration for the 40th Anniversary. That information will be made available as it develops. If any of you have any burning requests or desires, Joan Barna has graciously accepted to be the input organizing person on the Executive Committee for that.

The other issue that we discussed and we didn't take action on at the time is as you can see the attendance is down and it has been down. From a financial standpoint with the reduced attendance, we are not covering our expenses. So at some time, and it may be as early as the fall, we will have to initiate an increase in registration fees. The Executive Committee is taking that under advisement. Hopefully, when it does happen, it will be minimal. BLRBAC does not charge dues from member companies and registration fees are the only source of income.

Tim McGee could not be with us. As you all probably know, Tim and his wife are motorcycle enthusiasts. Unfortunately his wife fell off a motorcycle Saturday. She is doing fine and I was told that Tim's first comment was "…the bike could be repaired!" So in his absence, Ron Hess will give us a treasurer's report.

4. **TREASURER'S REPORT** -- Tim McGee (presented by Ron Hess)

For this meeting we had 230 registered attendees. The breakdown for that was about 180 people made Advance Registrations and 50 At-Door Registrations. From that breakdown we have 30 paper companies represented; six boiler manufacturers; and seven insurance companies. We have 43 Associate members now and three guests for this particular meeting. Some of the guests to recognize for this meeting are from Chile, Colombia, Brazil, Finland, France, Poland, South Africa, and Sweden. We would like to thank them all for attending.

On the financial side, we have two cash accounts that BLRBAC maintains.

Checking Account:	$13,100.00
Money Market Account	18,250.00
Total on hand receipts of:	**$31,350.00**

As Wayman pointed out, there has been a trend of decreased attendance at the past two meetings. Therefore, to cover our expenses with that decrease in number and decrease in participation, the Executive Committee is considering an increase in the registration fee. So, we will let you know what we think and we will get back to you with our final decision.

5. **SUBCOMMITTEE REPORTS**

5.1 **EMERGENCY SHUTDOWN PROCEDURES (ESP)** – John Andrews
*(See **Appendix A** – Incident List and **Appendix B** - Recommended Guidelines for Post-ESP Procedures for Black Liquor Recovery Boilers)*

The ESP Subcommittee met in Closed Session on Monday April 8, 2002 with 12 of 13 members present. During the Closed Session meeting, the Subcommittee accepted Lloyd Moore from International Paper as a member of the Subcommittee replacing Preston Morgan who resigned from the Subcommittee due to a change in employment.

The Subcommittee met in Open Session on Tuesday April 9, 2002 with 12 of 13 members present and about 220 guests. In Open Session, the Subcommittee reviewed the 29 North American and 9 International incident reports that had been received since the previous meeting. Of the 29 North American reports, there were no explosions reported during the last six months. Six of the incidents were rated as Critical Incidents and 23 were rated as Non-critical Incidents. The 9 international incidents were accepted for information but are not rated or included in the Subcommittee database. Nine of the leaks prompted an ESP by operators. An ESP was performed during five of the incidents listed as Critical Incidents and four of the incidents listed as Non-Critical.

5. **SUBCOMMITTEE REPORTS** (Cont.)

5.1 **ESP** (Cont.)

The Subcommittee has modified the definitions of incident classifications in order to better clarify the intent of the category of Critical Incidents. Because the category of Critical Incidents does not depend on the presence of molten smelt, there may be incidents listed as Critical that would not require an ESP such as leaks in the furnace cavity found during a hydrostatic test. The revised definitions are:

Explosions: Only if discernible damage has occurred. This does not include incidents where there is only evidence of puffs or blowback. With this emphasis on damage, attention will be given to the extent of damage and the amount of downtime for the damage repair (as opposed to total downtime that includes other activities).

Critical Incidents: All cases where water in any amount could enter the recovery furnace regardless of whether or not molten smelt is present.

Non-Critical Incidents: Those cases where water could not enter the recovery furnace.

Leak Locations

The leak locations that were reported are listed below and are also shown on a typical boiler cross section in Figure 1.

Critical Incidents

- 1 - Generating bank
- 1 - Screen Tubes
- 2- Wall Tubes
- 1 – Roof Tube
- 1 – Floor Tube

Non-Critical Incidents

- 4 - Superheater
- 13 – Economizer
- 1 – Inside Nose Cavity
- 4 – External to Furnace
- 1 Smelt Spout

5. **SUBCOMMITTEE REPORTS** (Cont.)
   5.1 **ESP** (Cont.)

Root Cause

The root causes of the leaks reported can be summarized as:

- Cracking
  - 7 - Fatigue
  - 11 - Corrosion Fatigue
  - 1 - Stress Assisted Corrosion
  - 1 - Unknown
- Pin Holes / Thinning
  - 5 - Corrosion
  - 1 - Erosion
  - 3 - Weld Quality

How Discovered

The breakdown of how the leaks were discovered once again shows the importance of routine operator walkdowns. The use of leak detection systems is increasingly being reported in the incident reports. However, experience has generally shown that they do not take the place of operator observations but serve as an added tool for detecting and/or confirming tube leaks.

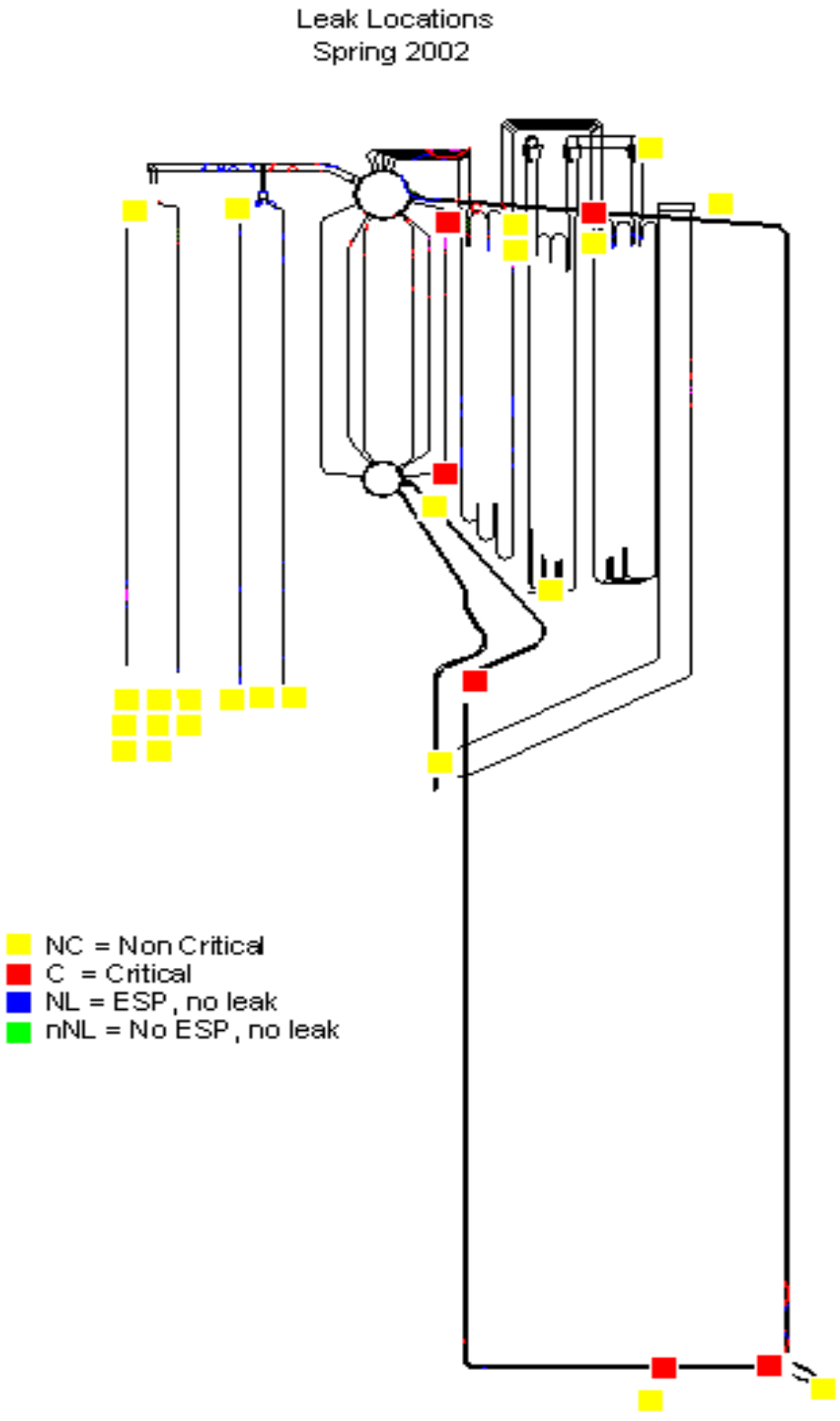
- 28 - Walkdown or Field Observation
- 1 - Control Room Instrumentation
- 1 - Leak Detection System
- 8 - Incidents with Leak Detection Installed
  - 1 - Identified Leak

Figure 2 shows the number of Critical Incidents reported to BLRBAC each year. The data for 2002 to date contains only the incidents reported at the spring meeting (six months). It is interesting to note that, when normalized for a full year (12 months) the number of Critical Incidents is running about the same over the years.

Figure 3 shows that the last smelt water explosion in the USA and Canada was reported in 1997. The explosions since then have been dissolving tank explosions. This positive trend is reflected in Figures 4 and 5 as well. We all hope that this indicates improvement in operations throughout the industry as well as the positive influence of BLRBAC.

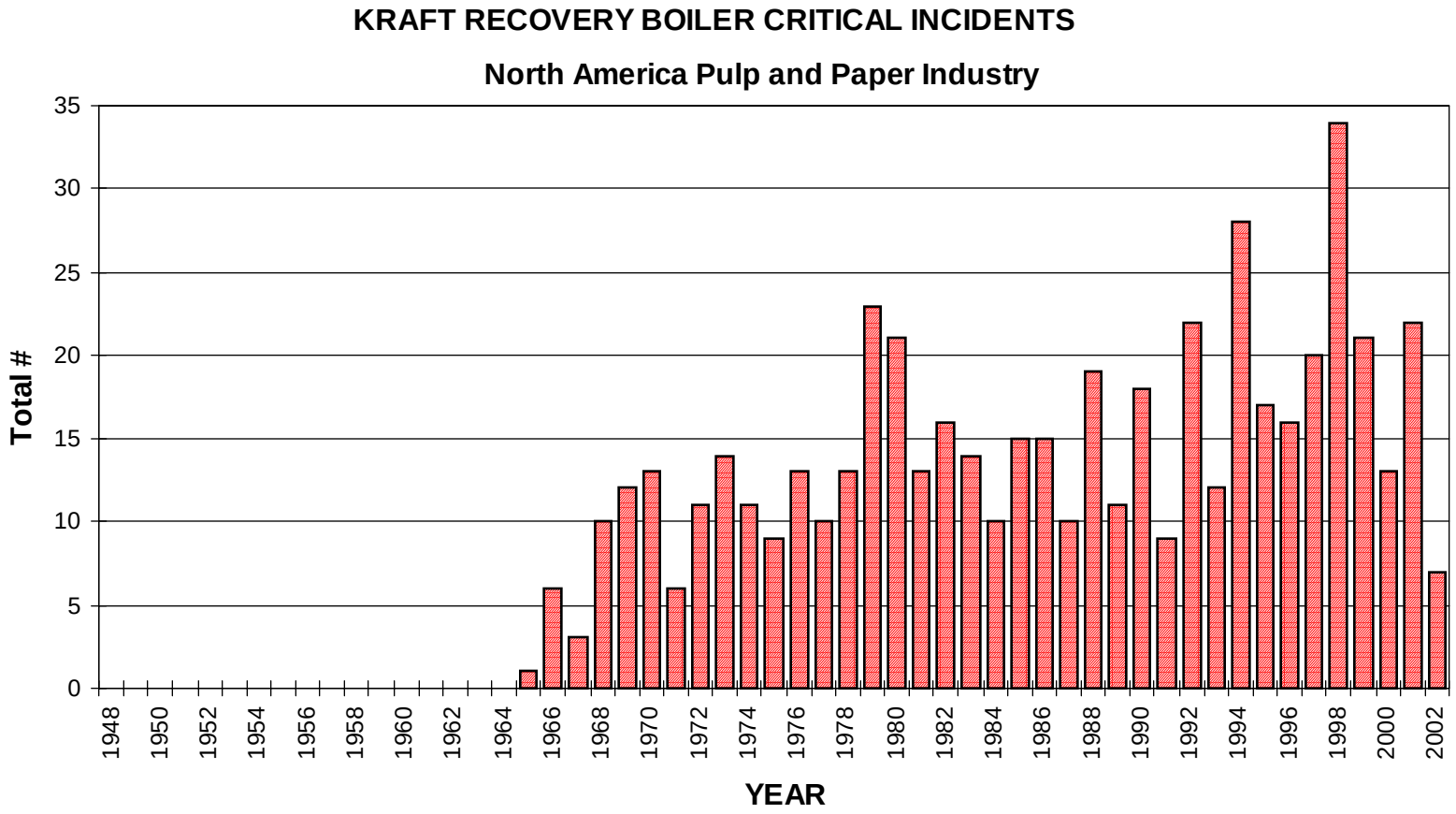
5. **SUBCOMMITTEE REPORTS** (Cont.)
   5.1 **ESP** (Cont.)

Figure 1



5. **SUBCOMMITTEE REPORTS** (Cont.)
   5.1 **ESP** (Cont.)

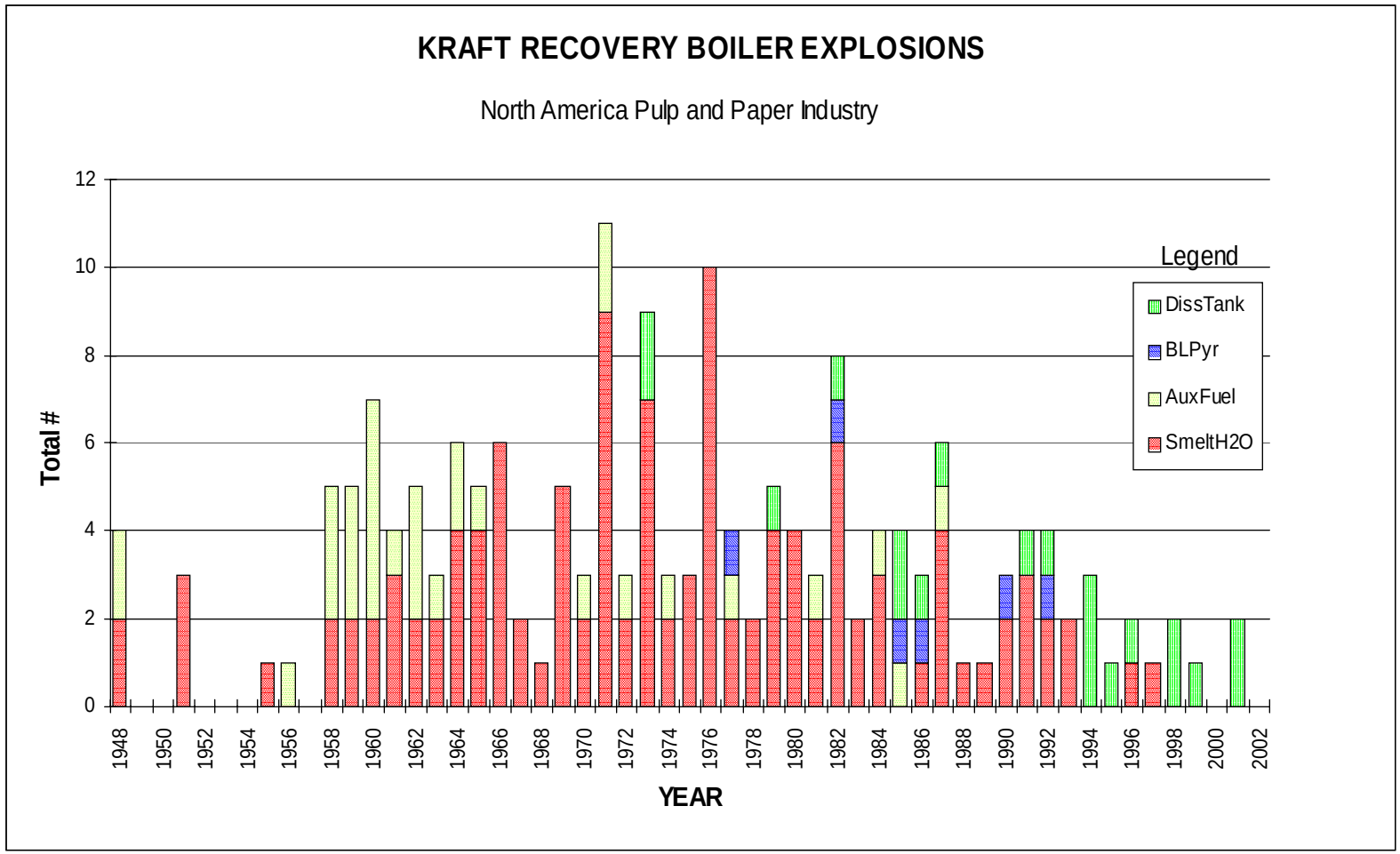
Figure 2



5. **SUBCOMMITTEE REPORTS** (Cont.)

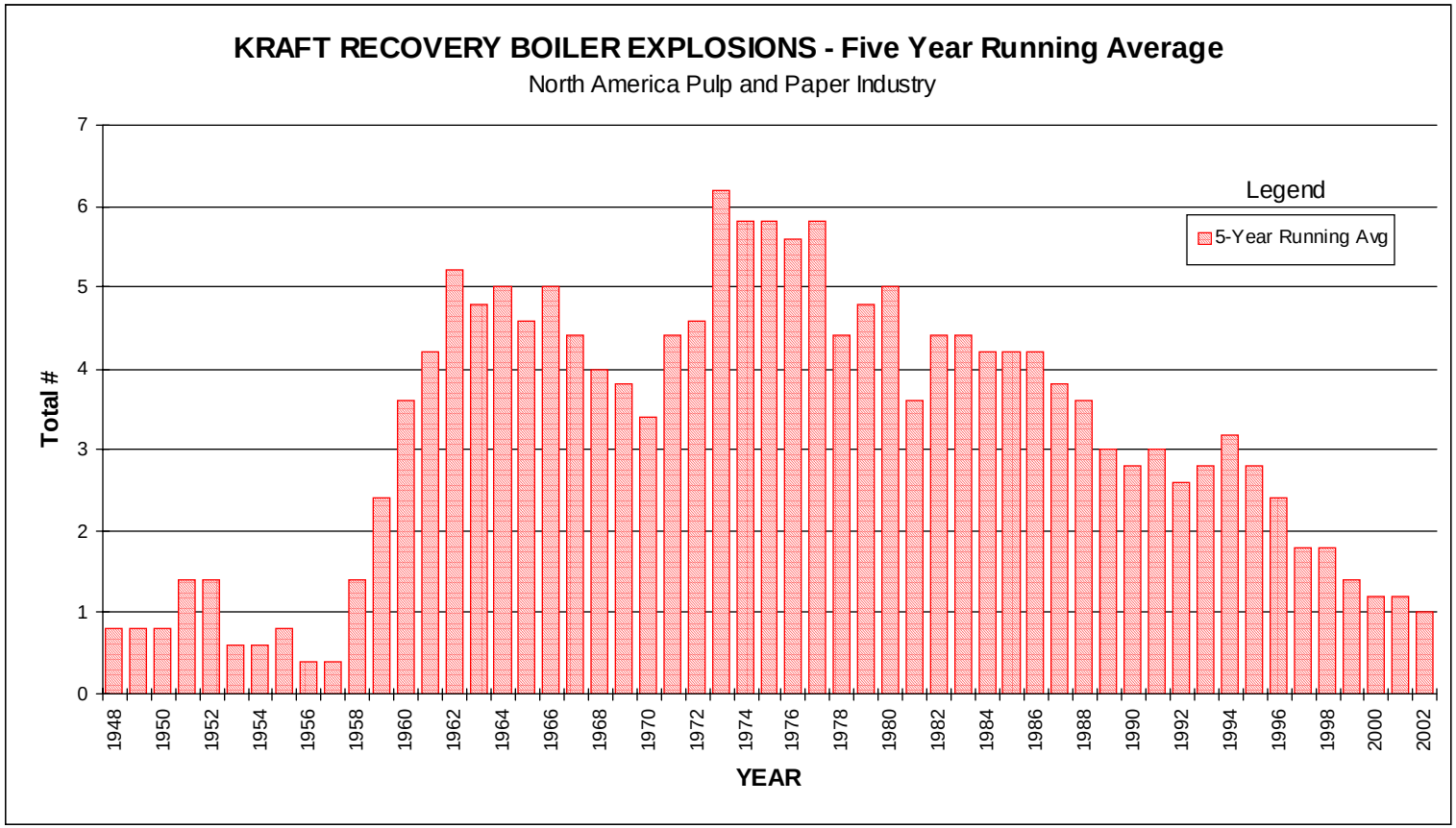
5.1 **ESP** (Cont.)

Figure 3



5. **SUBCOMMITTEE REPORTS** (Cont.)
   5.1 **ESP** (Cont.)

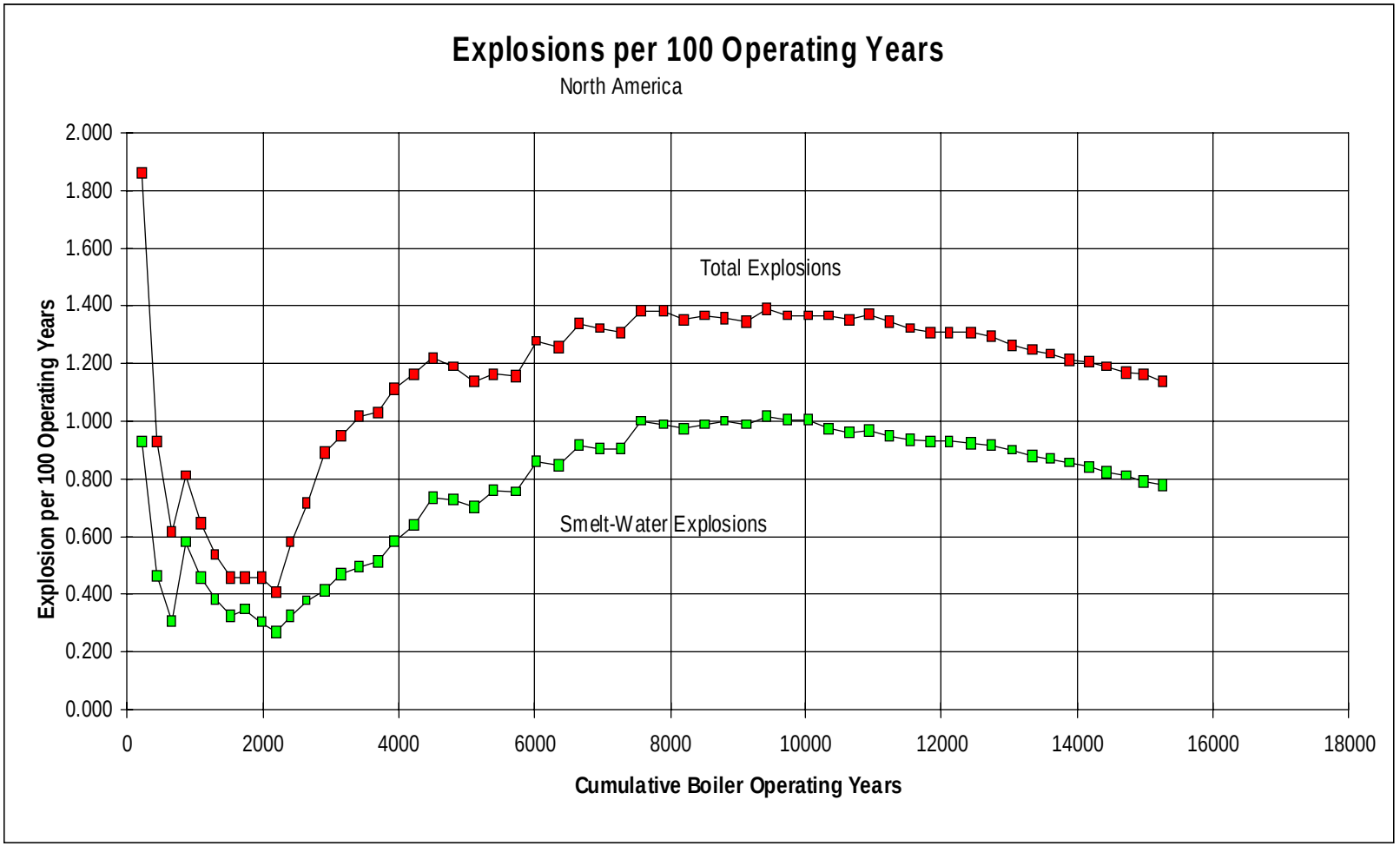
Figure 4



5. **SUBCOMMITTEE REPORTS** (Cont.)

5.1 **ESP** (Cont.)

Figure 5



5. **SUBCOMMITTEE REPORTS** (Cont.)
5.1 **ESP** (Cont.)

The Subcommittee greatly appreciates the effort that is put into filling out the Incident Questionnaires and would urge that the mills continue to support this valuable effort. It is especially valuable to include all pertinent information such as boiler diagrams showing leak locations and any reports of failure analysis to help the Subcommittee in their incident evaluation. The Subcommittee will continue to use diagrams and photos as visuals in presenting the incidents to the membership at the Open Session.

The most recent edition of the Incident Questionnaire is available on the Internet at the BLRBAC web site www.blrbac.org. Please send completed questionnaires at least one month prior to the BLRBAC meetings since it takes a few weeks to compile the working list and get it published so it can be included in the meeting handouts.

Send all Incident Questionnaires, including the boiler side view drawing or sketch with the leak well marked, to:

Jack Clement, Clement Consulting Inc.
563 Beaverbrook Drive
Akron, OH 44333-2818
Tel: (330) 865-9779; Fax: (330) 865-6960
clemetcon@cs.com

The Subcommittee is in the process of revising the Incident Questionnaire to simplify the form and make it easier and faster for the mills to fill in. We will be looking to make the format more interactive so that the person filling out the form will be directed to fill in only the appropriate sections of the Questionnaire, depending on the nature of the incident being reported. If anyone has suggestions or comments, they should contact Jack Clement at the address listed above.

Post-ESP Procedures: The Subcommittee has completed a Guideline for Post-ESP Procedures. Karl Morency of GP was largely responsible for that activity. The Executive Committee has approved the Guideline for membership review and it is attached as Appendix B. All members are asked to review the Guideline and send any comments to Jack Clement at the above address or to me, John Andrews, at jdandre@meadwestvaco.com or (843) 745-3212. Please forward comments as soon as possible so the Subcommittee can address them prior to the October meeting. Hopefully, the Guideline will be voted on during that meeting.

5. **SUBCOMMITTEE REPORTS** (Cont.)
   5.1 **ESP** (Cont.)

Eight-Foot Level: The Subcommittee has been continuing to work on evaluating the 8-ft. level for ESP valves. The objective is to minimize lower furnace damage to recovery units by ensuring that the 8-ft. level is adequate to provide proper tube cooling during and after an ESP. Lloyd Moore will be taking over this activity from Preston Morgan. The Subcommittee maintains the position that based on the current data available, there is no reason to change the 8-ft.level. The Incident Questionnaire attached to the minutes has been revised to include a request for data on water level and any trend data from floor tube thermocouples following an ESP. The Subcommittee will continue to review the data as it is received.

Recommended Changes to ESP Document: The Subcommittee submitted four items of revised language for the "Emergency Shutdown Procedure and Procedure for Testing ESP Systems for Black Liquor Recovery Boilers" to the Executive Committee for approval. The Executive Committee approved the revised language with minor changes.

Change the heading of the section titled **ADDITIONAL ITEMS TO CONSIDER** to **OPTIONAL ITEMS TO CONSIDER** on Page 4.

Insert the following two sections after the section titled **RAPID DRAIN VALVE LOCAL SELECTOR SWITCH** on Page 4:

RAPID DRAIN VALVE ALTERNATIVE ACTUATION. The following are acceptable means for complying with the requirement for an alternative means of actuating rapid drain valves:

- A switch or group of switches in the control room;
- A boiler control PLC (independent of the ESP system) providing an independent signal to each rapid drain control relay;
- Manual actuation of the individual rapid drain relays; or
- Manual actuation of the individual valve operator motor starters.

When individual switches are provided in the control room, they can serve the dual function of testing rapid drain valves as well as the alternate means of actuation. When manual actuation of the relays or motor starters is chosen , the relays or starters must be in a location that is designated safe and accessible during an ESP and the boiler operators must be trained to locate and actuate them**.**

RAPID DRAIN ALTERNATE POWER. Historically, power supply to rapid drain valve operators has been sufficiently reliable that an alternate power supply is not a recommendation. Care should be taken in selecting and protecting the reliability of the power source to these valve operators.

5. **SUBCOMMITTEE REPORTS** (Cont.)
   5.1 **ESP** (Cont.)

Replace the section titled **ATMOSPHERIC VENT** on Page 5 with the following:

ATMOSPHERIC VENT. Experience in North America has demonstrated flash tank systems permit draining of the boiler even if the ESP is initiated after boiler pressure has been significantly or completely lost. Provision of a flash tank rapid drain system is recommended for all new installations. Atmospheric vent (flash-to-the-sky) rapid drain systems may not drain the boiler as quickly as flash tank systems under reduced pressure conditions and may not permit any draining in some cases. Existing atmospheric vent systems should have some means to drain the boiler to the 8 ft. level under low or no pressure conditions (no specific drain time). This alternate drain does not have to be a part of the automated ESP system and may be an operator-initiated action.

These recommended changes should be reviewed by the membership and anyone who has questions or comments on the recommended revisions should contact John Andrews prior to the October meeting so that the Subcommittee will be able to consider the comments prior to that meeting. If all comments can be addressed, the changes should be available for acceptance by the full membership.

Precipitator Operation During ESP: The current ESP document, under the section **ADDITIONAL ITEMS TO CONSIDER,** contains a bullet item "Automatic shut-off of power to precipitator (as precaution against igniting possible combustible gas mixture)". Based on industry experience and data obtained from the University of Toronto Bed Cooling Trials, There appears to be no indication that a combustible gas mixture can accumulate after a successful ESP where the ID and FD fans operate according to the ESP logic. However, there is limited data concerning combustible gas accumulations following a trip of both the FD and ID fans. The Subcommittee is requesting mills to submit any available data on combustibles, CO or TRS following a trip of all fans to Jack Clement at the address above. This data will be used to evaluate the need for this particular recommendation.

CHAIRMAN: I think if you look at that data and statistics, it is very dramatic as far as what our results have been in the industry. There was some discussion and concern expressed yesterday in the Executive Committee that we, as owners and operators, are becoming complacent and complacency can lead to problems. Even though we haven't had an explosion in quite some time within the industry, that doesn't mean there is not the potential for them out there every day. Particularly with new supervisors and new operators, new operating philosophies trying to extend outage times, we need to continue to be very, very diligent and aware even though we haven't had an explosion that gets everyone's attention. Our results have been very good and we want to continue with no explosions. But, it really begins with the operator out there on the floor with the boiler every day. Just because we haven't had an explosion doesn't mean that he shouldn't appreciate the potential for one.

5. SUBCOMMITTEE REPORTS (Cont.)

5.2 FIRE PROTECTION IN DIRECT CONTACT EVAPORATORS AND ASSOCIATED EQUIPMENT – Jerry Vuoso

The subcommittee on Fire Protection in Direct Contact Evaporators & Associated Equipment met on Monday morning April 8, 2002, with 8 out of 12 subcommittee members (or alternates) present.

The minutes from the October 2002 meeting were accepted. The Fire Protection In Direct Contact Evaporator document was sent to the Executive Committee after the last meeting and feedback has been received from Mike Polagye, Dean Clay, and Joan Barna (her feedback had been misplaced and was not discussed during the Monday morning meeting). The feedback was positive in nature, with no major issues raised.

Mike Polagye had indicated the document is a "Good" overall document. There was discussion about the alarm and interlock temperature settings. It was agreed that alarms should be at 100 degrees F. above normal and interlocks, trips set at 200 degrees F. above normal. This should help avoid false alarms and trips. The subcommittee approved other minor editorial changes.

Dean Clay requested some minor wording changes. Some were approved and some were not. He also noted a mistake relating to the steam application rate. He had an older version of the document and the change he recommended had already been completed (2.5 lbs/100 ft3/ min rather than pph).

Jerry Vuoso addressed with the Executive Committee the changes made and the Executive Committee approved releasing the document to the general membership for review. *(Secretary's note: This document is not included with the minutes but will be posted on the BLRBAC Web site.)*

There was considerable discussion about who should receive the incident reports. It was generally agreed that the reports should be sent to the Executive Committee, or the secretarial service people. Having the information received by someone on the subcommittee places a lot of responsibility on that person and there is uncertainty about how or if the information will be distributed. Also how long or where the information will be retained are questions to be answered. The possibility of having the incidents received by the ESP subcommittee was also discussed.

The Subcommittee likely will stay active even after the document has been approved. There will be questions as the document is put into use, especially the first few years.

CHAIRMAN: There has been a lot of effort that has gone into that. It is really difficult to start almost over from scratch, take a document and completely redo it. Jerry and his group have really done a very good job.

5. SUBCOMMITTEE REPORTS (Cont.)

5.3 INSTRUMENTATION – Bill McQuillan

The Instrumentation Subcommittee met in open session Monday morning and afternoon. We had ten members and 22 guests present in the morning, and ten members with 11 guests in the afternoon.

The major subject of our meetings was how to accomplish functional system trip tests of interlocks and permissives for recovery boilers. We were very fortunate to have two recovery operations' managers at our meeting who helped us walk through each and every interlock and permissive and describe in detail how to test each one going into a major shutdown, or after one during start-up. In both cases it seems approximately eight hours is required to satisfactorily perform this testing. Because functional tests can't be performed after the boiler is locked out for maintenance, this period of testing has to be built into the major shutdown schedule to be successful.

We presented to the Executive Committee for their review an addition to our document calling for and describing functional testing of trips and interlocks on an annual basis to synchronize with other subcommittee requirements.

We discussed our desire to be able to allow shut-off valves on interlock devices, such as pressure and temperature switches. This allows us to maintain these devices should they fail and get them back in service quickly to ensure safety. We agree with the language coming from the Safe Firing of Black Liquor Subcommittee calling for these valves to be managed the same as a jumper or bypass.

Both our sessions were well attended with very good discussions and I'm sure everyone got something out of them to take home and make a contribution to keeping these recovery boilers safe for the future.

We had one senior operations member resign. Some of you might remember Eldon Gregoire, formerly Operations Manager of St. Anne-Nackawic Pulp Company. It seems that since he has retired he is so busy on shutdowns as a consultant he can't find the time to attend our meeting. We've noticed that this seems to happen to a lot of BLRBAC retirees.

Luckily for our Instrumentation Subcommittee, Eldon will be replaced by John Browning, a Power and Recovery Manager at Alabama River Company. John will help us keep a good balance in our subcommittee of insurers, manufacturers, and users of recovery boilers.

We plan to have an open meeting this fall and invite all members with an interest in instrumentation to our meetings.

5. SUBCOMMITTEE REPORTS (Cont.)

5.4 MATERIALS & WELDING -- Joan Barna

The Materials and Welding Subcommittee met in Open Session with 11 members and 13 guests. Dan Phillips volunteered to serve as Vice-Chairman, replacing Jerry Stephenson who has retired.

Reports were made on the status of the Task Groups formed during the October 2000 meeting. The Chairman emphasized that in order for this committee to be successful, greater participation on document preparation and review is needed.

- **Removal, Repair and Installation of Header Hand Hole Caps**

  Task Group Chairman Dan Phillips is now in receipt of all comments received for this draft document prior to the meeting. The following members and non-members signed up to serve as additional reviewers:

Del McKamey	Jim Young
Mike Garfield	Jim Dixon
Nick Merriman	Jesse Worsham
Rick Godin	

- **Installation of Carbon Steel I.D. Drum Plugs**

  Task Group Chairman Joan Barna received only one set of comments on the draft of this document. The following members and non-members signed up to serve as additional reviewers:

Del McKamey	Jim Young
Jim Dixon	Nick Merriman
Jesse Worsham	Lasse Koivisto

- **Installation of OD Blind Nipples and Tube Hole Plugs**

  Task Group Chairman Joan Barna received no comments on the draft of this document. The following members and non-members signed up to serve as additional reviewers:

Jim Young	Nick Merriman

5. **SUBCOMMITTEE REPORTS** (Cont.)
5.2 **MATERIALS & WELDING** (Cont.)

- **Pad Welding Carbon Steel Water Wall Tubes for Thickness Restoration**

Task Group Chairman Joan Barna received no comments on the draft of this document. The following members and non-members signed up to serve as additional reviewers:

Max Moskal
Dan Phillips
Jim Young
Mike Garfield
Rick Godin
Lasse Koivisto
David Fuhrmann
Del McKamey
Fabian Henriques
Jesse Worsham
Michael Hayes

- **Acceptable Size of Dents for Furnace Wall and Screen Tubes**

This Task Group has no members and no volunteers and will therefore be disbanded.

- **Proper Procedures for Weld Terminations**

This Task Group has no members and no volunteers and will therefore be disbanded. However, Jim Young has some standards for weld attachments drafted up that he and Max Moskal would work on as part of a future possible Task Group.

- **Materials Recommendations for Smelt Spouts**

Task Group Chairman Joan Barna received comments on the draft of this document. The following members and non-members signed up to serve as additional reviewers:

David Fuhrmann
Jesse Worsham
Nick Merriman
Lasse Koivisto

- **Materials Recommendations for Black Liquor Nozzles**

Task Group Chairman Joan Barna received no comments on the draft of this document. The following members and non-members signed up to serve as additional reviewers:

Jesse Worsham

5. **SUBCOMMITTEE REPORTS** (Cont.)
5.4 MATERIALS & WELDING (Cont.)

- **Materials Recommendations for Smelt Spout Shatter Jets**

  Task Group Chairman Joan Barna received no comments on the draft of this document. The following members and non-members signed up to serve as additional reviewers:

  Jesse Worsham

  The following new Task Groups have been formed. **One individual from each Task Group must volunteer to serve as the Task Group Chairman.**

- **Weld Repair of Cracks in Boiler Tubes Containing Water**

  Ron McCarty
  Dave Fuhrmann
  Fabian Henriques
  Nick Merriman
  Jesse Worsham
  Max Moskal
  Jim Young
  Mike Garfield
  Michael Hayes

- **Weld Repair of Small Holes in Superheater Tubes**

  Nick Merriman
  Jesse Worsham

- **Ultrasonic Test Procedure for Boiler Tube Weld Overlays**

  Max Moskal
  Jesse Worsham

- **Radiographic Test Procedure for Boiler Tube Weld Overlays**

  Joan Barna

- **Overlay Weld Procedure for Field Repairs of Boiler Tubes**

  Ron McCarty
  Dave Fuhrmann
  Fabian Henriques
  Nick Merriman
  Mike Hayes
  Max Moskal
  Jim Young
  Mike Garfield
  Jesse Worsham

5. **SUBCOMMITTEE REPORTS** (Cont.)
   5.4 **MATERIALS & WELDING** (Cont.)

- **Procedures for Parent Metal Build-Up (Pad Welding)**

Dave Fuhrmann	Dan Phillips
Del McKamey	Fabian Henriques
Mike Garfield	Nick Merriman
Jesse Gorsham	Mike Hayes

Dan Phillips proposed that the October 2002 meeting included a session to share ideas on goals and procedures for pad welding.

It was suggested at the close of the meeting that the Task Groups meet in closed session in the morning, followed by an open session in the afternoon during which informal presentations on various materials and welding issues could be made.

Max Moskal proposed that the format for the Task Group documents be as follows:

1.0 Methods, Reasons & Best Practices
2.0 Procedures
3.0 Specifications

The meeting was adjourned at approximately 3:00 p.m.

5.5 PERSONNEL SAFETY -- Robert Zawistowski

The personnel safety subcommittee met in an "open" session on Monday, April 8, 2002. There were 13 members and 14 guests in attendance during the morning meeting. Due to the amount of information that we were trying to cover, we added a second meeting on Monday afternoon. The afternoon meeting, attended mostly by committee members, continued editing the Personnel Safety document.

Representation at out meeting included original equipment manufacturers ALSTOM Power, Babcock & Wilcox and Kvaerner. Representation from insurance and insurance service companies included AXA Corporate Solutions, FM Global, GE Global Asset Protection Services, HSB Forest Products Group and Hartford Steam Boiler. Operating company representation included, Boise Cascade, Bowater, CMPC Celulosa S.A. (Chile), Domtar, Eastern Paper of Lincoln, Georgia Pacific, International Paper Company, Mead Coated Board, Mead Westvaco, Sappi, St. Anne Nackawic Pulp Co. Ltd., Stora Enso, Tembec and Weyerhaeuser. Water treatment company representation included Buckman Laboratories International, and Consultant representation included The National Board and Power Specialists Associates, Inc.

5. **SUBCOMMITTEE REPORTS** (Cont.)
   5.5 **PERSONNEL SAFETY** (Cont.)

We reviewed and discussed information contained in the AF&PA Phase II Study. We extracted points that we felt applied to personnel safety for incorporation into the Personnel Safety document. Language modifications and additions to the document will continue between now and the fall meeting.

We started a review of the training portion of the Personnel Safety document. Currently the training guidelines reside on the web site as an addendum to the Personnel Safety document. We are in the process of updating and incorporating this addendum into the main body of the document.

During the summer the subcommittee will continue to draft, edit and exchange information. During the October 2002 meeting we hope to complete the edit process and prepare the document for submittal to the Executive Committee for review.

We had two requests for information since the last meeting. Both of these topics were reviewed with the subcommittee.

The ESP subcommittee asked us to review a request for information on what is a safe distance from the recovery boiler for emergency personnel and equipment once an ESP has been activated. The committee felt that this boundary will vary on a mill-by-mill basis and that the alarms and lights that are activated by the ESP system should essentially establish that boundary. This information was relayed verbally back to the ESP subcommittee.

We were asked to review some language regarding attachment welds. An older version of the Personnel Safety document had a language change during a 1997 revision. After reviewing both versions of the language, we felt that the wording in the current version of the Personnel Safety document referencing attachment welds was sufficient. Following our meeting, information was passed on to the subcommittee chair specifically regarding tangent welds. Additional discussion on this topic will be brought up and reviewed during the fall meeting.

We were requested to review the use of the ESP alarm as it relates to evacuation. Currently, we are maintaining that the sole function of the ESP alarm is to signal all personnel evacuate the recovery boiler building when an ESP is activated. Additional information and explanation regarding evacuation was received on this topic following our meeting. As a result of this new information, this topic will be reviewed again during the fall meeting.

This subcommittee remains open to BLRBAC members who would like to participate.

5. **SUBCOMMITTEE REPORTS** (Cont.)

5.6 **PRESS RELEASE & PUBLICITY** – Craig Cooke

This is not a report. Rather it is an opportunity to answer some frequently asked questions. There seems to be some mystery about the position of Publicity & New Release chair and I intend to remove some of that mystery.

The most frequently asked questions are:

Q. How many people are on your Subcommittee?
A. One – me.
Q. How did you get your position?
A. I was the only one to volunteer for that position.
Q. Why did you want to become the Publicity & New Release chair?
A. Quite frankly, that was a good way to convince my boss that it was important for me to attend BLRBAC.
Q. Probably the most important question, what exactly do you do?
A. After each meeting, I send a news release to key magazines and publications and one Web site. These are:

Pulp & Paper International	***Pulp & Paper Canada***
Canadian Paper Maker	***TAPPI Engineering News Letter***
TAPPI Pulping News Letter	***Pulp & Paper Magazine***
TAPPI Journal	***Pulp & Paper Net***

Basically they receive a summary of the meeting and a list of the future meeting dates. The summary that I generate is an executive type summary and the intention was to have that included on the Web site. I sent that to Tim McGee last time and that was the first time it was going to be included on the BLRBAC Web site. It should be posted there in the future.

CHAIRMAN: Thanks for removing all that mystery.

5.7 **SAFE FIRING OF AUXILIARY FUEL** – Dave Streit

No meeting was held this session. A meeting is expected for October 2002.

CHAIRMAN: The Auxiliary Fuel Subcommittee is currently inactive so they didn't have a meeting yesterday. That has been left up to Dave Streit. If any of you see a need for him to reconvene and have meetings of that Subcommittee, please get in touch with him. For the time being they have no active on-going work. They will continue to remain inactive until such time as there is an additional need.

5. **SUBCOMMITTEE REPORTS** (Cont.)

5.8 **SAFE FIRING OF BLACK LIQUOR** – Len Erickson

The Safe Firing of Black Liquor Subcommittee met Monday morning in closed session with ten members present.

a) The proposed revisions to the Safe Firing document, including the additional changes requested by the Executive Committee, have been forwarded to the Executive Committee for review and approval. The committee is waiting for approval or comments from the Executive Committee.

b) Brian Lemay reviewed proposed changes to the safe firing document which would recommend the use of a keyed interlock switch when using the black liquor guns to wash the lower furnace during a boiler water-wash. The committee revised some of the wording:
   - Add a permissive in the header wash mode.
   - Require a written procedure for checking that the bed is sufficiently cool.
   - Add a step in Appendix 1, Page 2 to make sure that the wash position key switch is in the operate position and the key is in a secure location.

c) Len Erickson presented proposed changes to Chapter 6 of the SFBL document to allow a decrease in Black Liquor Solids testing frequency for those installations that operate at solids levels above 70%. Some redundant verbiage was eliminated and a bullet item added:
   - If the Black Liquor solids drop to 70% or below the two hour testing frequency shall be resumed.

d) Brian Lemay and Mark Sargent reviewed the proposed language addressing the use of isolating valves on SFBL permissive and trip logic instruments. Several small revisions were made to the proposed language.

e) Len Erickson presented a write up and schematic of a Fuel Tech™ chemical injecting system that injects an aqueous solution of a fouling inhibitor into the upper furnace of recovery boilers. It was agreed to send a notification to Fuel Tech™ that BLRBAC does not approve or condone the injection of water into a recovery boiler. In systems such as this, they should have sufficient interlocks, block & bleeds, etc. to ensure that the system will shut down in the event of a broken spray, stuck water purge valve etc.

5. **SUBCOMMITTEE REPORTS** (Cont.)
   5.8 **SAFE FIRING OF BLACK LIQUOR** (Cont.)

f) Jansen Combustion and Boiler Technologies and Alstom were invited to give technical presentations on their methods of enhancing recovery boiler operation by enriching the combustion air with Oxygen. Arie Verloop of Jansen and Kent Sandquist representing Alstom each made presentations lasting approximately 30 minutes. Following the technical sessions, the committee agreed to ask each company to submit their typical safety interlocking system.

It was agreed that language would be drafted and reviewed that acknowledges the use of oxygen, and recommending a minimum set of interlocks to the SFBL system. The language will be drafted for the Fall 2002 meeting.

The Safe Firing of Black Liquor Subcommittee met Monday afternoon in open session with ten members and about 50 guests in attendance.

a) The proposed changes to the safe firing document which would recommend the use of a keyed interlock switch when using the black liquor guns to wash the lower furnace during a boiler water-wash were reviewed. The guests in attendance were asked for comments. No comments were received. The committee voted to send the revision to the Executive Committee for approval.

b) Len Erickson presented proposed changes to Chapter 6 of the SFBL document to allow a decrease in Black Liquor Solids testing frequency for those installations that operate at solids levels above 70%. The guests in attendance were asked for comments. No comments were received. The committee voted to send the revision to the Executive Committee for approval.

c) The proposed language addressing the use of isolating valves on SFBL permissive and trip logic instruments were reviewed. The guests in attendance were asked for comments. No comments were received. The committee voted to send the revision to the Executive Committee for approval.

5. **SUBCOMMITTEE REPORTS** (Cont.)

5.8 **SAFE FIRING OF BLACK LIQUOR** (Cont.)

d) The committee reviewed the inquiries for clarification that were received since the October 2001 SFBL meeting. One of the questions asked why the temperature permissive could not be after the divert valve so the temperature of the liquor could be raised while purging the ring header. The committee agreed to review the logic, however it would require revising the SFBL document.

e) Members or guests brought no new business to the committee.

f) The meeting was adjourned at approximately 2:00 PM.

The meeting room was made available for Jansen Technologies and Alstom to present their Oxygen enrichment systems. ($PROMO_2OX$™ and Tomlox™, respectively).

Contacts:

- Len Erickson at 208/384-4933, e-mail lenerickson@boisepaper.com , or Fax 208/384-7637 or
- Mark Sargent at 513/248-6086, e-mail mark.sargent@ipaper.com , or Fax 513/248-6679 with questions or comments.

CHAIRMAN: The interlock system and Chapter 9-10 are approved by the Executive Committee for membership review. *(Secretary's note: This document is not included with the minutes but will be posted on the BLRBAC Web site.)*

5.9 **WASTE STREAMS** – John Rickard

The Waste Streams Subcommittee met in closed session at 8:00 AM on April 8, 2002 with 9 members present.

We approved the minutes. There had been one question since the spring meeting. The question asked about an igniter operating continuously when there was a scanned flame present. The present guidelines require a continuously operating igniter but the wording may be better if it were "a scanned source of ignition energy". There may be a change to the guidelines in the future.

The rest of the morning meeting was spent working on the guidelines for waste streams blended with black liquor. Since the fall meeting the individual rough drafts for each waste stream had been combined into a single document but it was still in "draft" condition. Methanol blending was reviewed first and, as the first waste stream, consumed much of the morning. The efforts on methanol set precedents for the other waste streams:

5. **SUBCOMMITTEE REPORTS** (Cont.)
   5.9 **WASTE STREAMS** (Cont.)

- Require two shut off valves to ensure isolation.
- Require two hour off line testing of black liquor.
- Describe effect that the waste stream has on the refractometers.
- Measure the waste stream flow rate.
- Control room indication that a waste stream is being added to black liquor.

At the end of the morning, we had not made significant progress reviewing the document. We would continue the review process in the afternoon meeting, but our slow pace required that we make plans for continuing our work after this BLRBAC meeting. Each previously assigned work group will complete revisions and typing for their waste stream section. The revised sections will be compiled into a single document. At the completion of that work we will have a call-in teleconference to continue our review process. The teleconference will be limited to two hours. We will review the most controversial waste stream first. If more time is needed, another teleconference will be scheduled.

Two points reinforced or made during the morning were:

- Each waste stream write up must be a stand alone document, so the user is not required to reference several sections of a chapter to understand the requirements for a particular waste stream
- Each waste stream write up should have a description adequate to allow a flow sheet to be drawn by the user.

The subcommittee's schedule is to have a document to the Executive Committee by October, 2002.

The afternoon session convened at 1 PM in an open meeting. There were seven subcommittee members present and eight visitors. After reviewing the morning meeting progress for the benefit of the visitors, Mr. B. K. Wadhwani made a presentation on Coen burners, especially as applied to firing NCGs. It was informative to learn about the available burner designs.

The subcommittee wants to thank Mr. Clark Conley of Bowater, Coosa Pines, for his willingness to discuss his experience in designing and operating a methanol blending system. Hearing direct experience helped us greatly by eliminating unknowns and replacing guessing with facts.

The subcommittee members returned to reviewing the draft document. They completed the review of all waste streams except tall oil and turpentine. These two areas will be revised in the same manner as those that were reviewed. Arnie Iwanick will update the turpentine guidelines.

5. **SUBCOMMITTEE REPORTS** (Cont.)
   5.9 **WASTE STREAMS** (Cont.)

The meeting was adjourned just shy of 4 PM. The Waste Streams Subcommittee had made excellent progress in their two Monday meetings.

CHAIRMAN: I'd like to thank you and your committee for doing a lot of work in a relatively short period of time. The time is upon us because we are being forced more and more to accept and incinerate these streams, gaseous and liquid, in process recovery boilers.

6. **AMERICAN FOREST & PAPER ASSOCIATION REPORT** – Karl Morency for Tom Grant

The AF&PA Recovery Boiler Program continues actively to produce greater awareness of safe practices and to improve the operation, maintenance, safety and efficiency of recovery boilers. Each of the subcommittees is working for the Program's mission.

At the latest count after mergers, buy-outs, etc., we have 27 companies in the Program including three non-AF&PA member companies. The Program and AF&PA agreed a few years ago to allow non-AF&PA member companies to participate in the Program in the common cause of safe operation of recovery boilers. In this way all companies with recovery boilers may gain the benefits of the Program. There are seven companies that operate recovery boilers in the U. S. that are not in the Program. We continue in our efforts to encourage them to join with the current members to cooperate in the common cause of the safe operation and research to improve the safety of the recovery boilers. AF&PA decided in the past year to open membership to Canadian companies as well.

The Operation and Maintenance Subcommittee continues to sponsor Operational Safety Seminars in its efforts to further improve operations and maintenance. The seminars are sponsored in an effort to further minimize the risks of explosions and incidents. Over the years, they have proven to be most helpful and informative by providing both formal and informal open forums for the discussion of problems and situations in the safe and reliable operation of recovery boilers. We can see the results of the seminars in the substantial reduction in the number of explosions over this past decade. Three seminars were scheduled to be held; one in Portland OR in March and two others to be held in April and May here in Atlanta. Either due to travel restrictions, economical conditions, or complacency in operating the boilers, we had 30 attendees at the Portland seminar and are a little ahead of this count for both the April and May seminars. We hope this will pick up as we get closer to those dates. If we find that there is not sufficient interest in conducting these seminars, we will be forced to cancel them. With the number of new people working in the recovery boiler area, we felt there would be increased participation in these seminars. We ask that you let us know whether your company feels that we should continue these training sessions. The Committee will review this again at the end of the year.

6. **AMERICAN FOREST & PAPER ASSOCIATION REPORT** (Cont.)

Mr. Jack Clement is continuing in his role as the AF&PA explosion monitor. He is also working with the BLRBAC ESP Subcommittee in collecting and reporting on recovery boiler incidents. The report that he and Dr. Grace recently completed, sponsored by AF&PA, to investigate the relationship between recovery boiler furnace design and explosion damage was distributed to the Program members. It was also given to the ESP Subcommittee of BLRBAC for its review and use in its work. The report does not make specific recommendations. It only comments on the level of risk associated with the damage potential of given designs. Copies of the report are available through AF&PA.

The highly rated AF&PA Recovery Boiler Training Program continues to be of interest in many mills and many companies (members and non-members) who are using this extensive information to their best advantage. Many in the industry feel that it is the best training program available for operating recovery boilers. There are only a handful of mills that do not have the Program.

Phase II of the Recovery Boiler Char Bed Cooling following an ESP project, sponsored by the AF&PA, was completed late last year. A full-scale test of the use of liquid CO2 and sodium bicarbonate to cool a char bed during a simulated ESP at the Willamette Industries' Albany OR mill proved very successful. The results of the test are detailed in the report. The next phase of the project is nearing completion at the end of this month. It involves insights into how these coolants interact with bed material and help determine if either coolant has an advantage in penetrating a hard, crusted-over char bed, and help develop improved strategies for using coolants on char beds after an ESP. This report will summarize the research on char bed thermal properties. An instructional video, with a narrative, covering the Willamette trial is scheduled for completion in May. The draft of the final report will be distributed to the Subcommittee by the end of September and the final report is scheduled for completion and distribution to AF&PA Program members by the end of October.

The Research & Development Subcommittee is sponsoring a project with the Pressure Vessel Research Council (PVRC) of the Welding Research Council (WRC) to create a document on damage mechanisms. This project is proceeding in full for the refining and fossil power industries. Coverage of the pulp and paper industry will receive the same extent for its portion of the project. Mechanical & Materials Engineering (M&ME) is preparing the portion of the document relating to the pulp and paper industry under contract for PVRC's current sponsors, API and NBIC. Drs. Dave Bennett and Max Moskal are the principal investigators. The project will identify damage mechanisms in the pulp and paper industry in conjunction with development of the American Petroleum Institute document "API-571 Damage Mechanisms in the Refining Industry." API-571 is being developed for use with "API-579 - Recommended Practice for Fitness-for-Service." The ultimate objective is to be able to determine whether damaged equipment is fit-for-service. Once the damage mechanism has been identified using API-571, it will be possible to determine whether a piece of equipment is suitable for service based on criteria established in API-579. The intent is that identification of the pulp and paper mechanisms will allow the same procedures to be used in the pulp and paper industry. A task force from AF&PA will review the draft before it is published at the end of the year.

6. **AMERICAN FOREST & PAPER ASSOCIATION REPORT** (Cont.)

The R & D Subcommittee is working with ABB, B&W, Alstom and Andritz-Ahlstrom in a project to investigate experience with overheat floor tube failures in chemical recovery boilers. AF&PA is sponsoring the project in which the first phase will be to compile the industry's experience with floor tube failures in order to get a better understanding of the issues involved as well as the magnitude of the problem. Dr. Grace and Mr. Clement are collecting, and studying, information from operating companies and boiler manufacturers. The project is scheduled to be completed by November and a copy of the report will be distributed to AF&PA Program members.

An Energy Performance Task Group for Agenda 2020 is continuing to work to develop projects with a vision for the future. There are a number of projects currently underway in both the Sensors and Controls and Energy Performance Task Groups, including gasification, that are funded by DOE and which are related to recovery boilers. Two projects involved in the Sensors and Controls Task Group of much interest are:

- Guided Acoustic Wave Monitoring of Corrosion and Erosion in recovery boiler tubing;
- Laser Sensors for On-Line Monitoring of Carryover.

Another project that was completed at the end of last year by Combustion Specialists was "Deposition on Pendant Tubes of Kraft Chemical Boilers."

Others are being reviewed for possible future funding from DOE with cooperative research at universities, research institutions and at the corporate level. Proposals continue to be reviewed in the selection process by the Task Group.

The R&D Subcommittee is considering a study to identify potential non-destructive technologies for detecting waterside deposit in recovery boiler furnace wall tubes. The objective is to eliminate overheat failures due to waterside deposits and optimize the chemical cleaning interval. RFPs were sent to prospective researchers in March.

The AF&PA's Recovery Boiler Program held its annual Conference in February. The presentations included reports on the projects underway relating to the Program as well as a status report on the research projects in the Agenda 2020 program funding by DOE and subcommittee reports on their accomplishments. The object of the Conference is to keep not only AF&PA Recovery Boiler Program members informed of the status of current projects, but also boiler manufacturers, vendors, insurers, as well as the remainder of the recovery boiler community. We hope that many of you will plan to attend next year's Conference to be held in Atlanta in February.

7. **TAPPI RECOVERY BOILER REPORT** - Karl Morency

I'm covering the proceedings of the Recovery Boiler Subcommittee that is part of the Steam & Power Committee of TAPPI. The last meeting was held on March 4th here in Atlanta.

7. **TAPPI RECOVERY BOILER REPORT** (Cont.)

Currently we are developing a number of technical information papers that will be published through TAPPI. I'm will give you a brief status of those.

Recommended Test Procedures for Black Liquor Evaporators: Those test procedures have been completed. They were sent out to the evaporator manufacturers for comments. We have received comments back from two of the manufacturers. Those are in the process of being incorporated back into the document and then we will review it one final time at the committee level. It will then be submitted to TAPPI for publication.

Establishment of Tube Rolling Procedures and Quality Guidelines: This is for replacement of generating bank tubes in two drum boilers, including recovery boilers. That document has been in development for a number of years now and it is finally complete, thanks in a large part to Joan Barna. That document was approved by the Steam & Power Committee and has been submitted to TAPPI for publication. I don't yet have a schedule on the publication date. It is an excellent document if you are looking at replacing a generating bank in a two-drum unit in a recovery boiler or non-recovery boiler. If anybody is interested in getting a copy of that ahead of time, just contact me and I can e-mail it to you.

Stripping of Kraft Pulping Process Condensates – Regulations, Design and Operation: That document is now complete and has been approved by the committee. It has also been submitted to TAPPI for publication.

NCG Systems Operation: Again, that document is complete and has been submitted to TAPPI for publication.

Analysis of Soda & Sulfate Black Liquor Chemical Properties: This was an existing TAPPI document. It went out-of-date. It was actually the responsibility of the Chemical Properties Committee to update the document, but they let it expire. So Wolfgang Schmidl from IPSC, who was a member of this recovery boiler subcommittee, has taken it upon himself to join their committee and push it through. We are hoping that by this fall we will have an updated version to submit to TAPPI. Hopefully we can get it republished and back on the list of test procedures.

Effect of the Composition on First Melting Temperature, Fireside Deposits in Recovery Boilers: This was originally a paper that was presented at the TAPPI Engineering Conference by Dr. Hongi Tran from the University of Toronto. We asked him to convert it into a technical information paper. He has completed a draft of that and we are currently reviewing it at the committee level. Hopefully we will have that reviewed and completed by this fall and ready to submit to TAPPI.

There is a technical information paper that is being written on ***Composite Floor Tube Inspection Guidelines*** and sponsored by the Corrosion & Materials Committee. I believe that is complete and has been submitted to TAPPI for publication. Again I don't have any schedule on the projected publication date.

7. **TAPPI RECOVERY BOILER REPORT** (Cont.)

That completes the review of the ongoing projects we have been working on. The next meeting of the Recovery Boiler Subcommittee will be on September 9th in San Diego in conjunction with the TAPPI Engineering Conference.

8. **NATIONAL BOARD OF BOILER & PRESSURE VESSEL INSPECTORS' REPORT** – Bob Sullivan

The NBIC 2001 Addenda was issued December 31, 2001. The effective date is July 1, 2002 or as specified by the agency having authority for repairs of boilers and pressure vessels in the jurisdiction in which the item is located.

The NBIC committee appointed an NBIC task group for Yankee Dryer inspection, repairs, and alterations. This committee was assigned to develop a non-mandatory appendix as a guide for inspection repairs and alterations of Yankee Dryers.

Seven interpretations to the NBIC have been issued. These are listed on the National Board web site (www.nationalboard.org) under NBIC/Interpretations. Interpretations of particular interest to BLRBAC members are:

01-15 Pressure Testing Repairs and Alterations by Isolating the Repaired Portion of a Pressure Retaining Item, 2001 Edition

Question 1: When performing a pressure test of a repair, is it permissible to isolate and pressure test the repaired area of a pressure retaining item such that the remaining parts of the pressure retaining item are not subjected to the pressure test? *Reply 1*: Yes

Question 2: When performing a pressure test of an alteration where there has not been an increase in temperature or maximum allowable working pressure, is it permissible to isolate and pressure test the altered area of a pressure-retaining item such that the remaining parts of the pressure-retaining item are not subjected to the pressure test? *Reply 2:* Yes

01-17 RC-3021 Calculations, 2001 Edition

Question 1: Do published standard values for the pressure rating of pipe along with the design pressure satisfy the calculation requirements of RC-3021? *Reply 1:* No

Question 2: Do published standard values for the pressure temperature ratings of fittings along with the design pressure satisfy the calculation requirements of RC-3021? *Reply 2:* Yes, when permitted by the original code of construction.

9. **WESTERN CANADA BLRBAC** -- Bob Norton
No report.

CHAIRMAN: We would like anyone who wishes to present an offshore report to notify us ahead of time, if possible, so that we can reserve a spot on the Agenda for it.

10. **ACTIVITIES OUTSIDE NORTH AMERICA REPORTS**

10.1 **REPORT FROM BRAZIL** -- Guido Schreiber

Activities of the Brazilian Recovery Boiler Safety Committee during 2001/2002.

1-Distribution of the translated pamphlets to Portuguese of the following BLRBAC recommendations during the 34rd Annual Congress of the Brazilian Technical Pulp and Paper Association last October:

a) "Recommended Good Practice for the Thermal Oxidation of Waste Streams in a Black Liquor Recovery Boiler" as being "Práticas Recomendadas para Oxidação Térmica de Gases Não-Condensáveis em Caldeiras de Recuperação".

b) "Instrumentation Checklist and Classification Guide for Instruments and Control Systems Used in Operation of Black Liquor Recovery Boilers" as being "Lista de Checagem de Instrumentação e Guia de Classificação para Instrumentos e Sistemas de Controle Usados na Operação de Caldeiras de Recuperação".

(P.S.: Translations were authorized by Chairman Wayman Thompson thru letter to ABTCP Chairman Celso Foelkel.)

2- Distribution of the "Guide for Inspection of Recovery Boilers", in Portuguese, during the 34th Annual Congress. A second guide is being written that covers criteria for minimum thickness for tubes in recovery boilers.

3- The translated BLRBAC questionnaire to Portuguese, and the Clement Short Form were used to report the six incidents in Brazil that were brought for this April Meeting.

4- 2nd Recovery Boiler Operator Meeting was held at Aracruz Pulp Plant last September with expected audience.

5- New elections were held last October and President F. Paoliello and Vice-President G. Schreiber were accepted to work for one more year. For the Permanent Recovery and Energy Committee, E. Galdino was elected Coordinator for two years.

6- There are 35 Recovery Boilers in Brazil; 27 in operation; 4 out-of-service and 4 being erected. Six incidents were reported, 2 in the boiler bank, 3 in the superheater, and 1 in the economizer. There was also 1 dissolving tank explosion.

10. **ACTIVITIES OUTSIDE NORTH AMERICA REPORTS** (Cont.)
10.1**REPORT FROM BRAZIL** (Cont.)

Future Planned Activities:

Full participation during the 11th Recovery and Utility Seminar next May 8 and 9 in São Paulo City.

Participation in the TAPPI Kraft Recovery Short Course next Jul 29-Aug 2, in São Paulo.

Participation during the 35th Annual Congress of the Brazilian Technical Pulp and Paper Association next October 14 in São Paulo City.

Organization of the 3rd Recovery Boiler Operator Meeting scheduled for next December in São Paulo State.

15th Latin American Recovery Boiler Congress planned to happen in Argentina in 2003.

CHAIRMAN: Thank you Guido. We do appreciate the reports from off-shore. There is always something of interest to us.

10.2 **REPORT FROM SWEDEN & NORWAY** -- Bert Flodqvist,

Bert Flodqvist is Chairman of the Swedish-Norwegian Recovery Boiler Incident Subcommittee E-mail: bert.flodqvist@af.se. This report is based on the report given by the committee secretary Mette Jansson, at the February 2002, AF&PA meeting.

This is a report on the incidents reported to the Swedish-Norwegian Incident Subcommittee during the last year. In this report you will find information on the incidents, new recommendations, and our survey on boiler water level after an ESP.

Incidents

During the year, 2001, a total of 18 incidents were reported, which is slightly lower than normal. However, with a total number of boilers around 34, fluctuations is normal. As you can see in the trend, for the last seven years it is slightly declining. One quarter into this year we have got a total of four minor incidents on our table. The reporting follows a pattern, basically those dedicated to the idea of sharing information, or those not in the middle of some project, are reporting also minor incidents. Therefore you might find an over representation of some mills, while others are rarely seen and then only in connection with major failures. All of the incidents in 2001 are listed in Table 1 and Figure 2, and a few of them are discussed below.

10. **ACTIVITIES OUTSIDE NORTH AMERICA REPORTS** (Cont.)
10.2 REPORT FROM SWEDEN & NORWAY (Cont.)

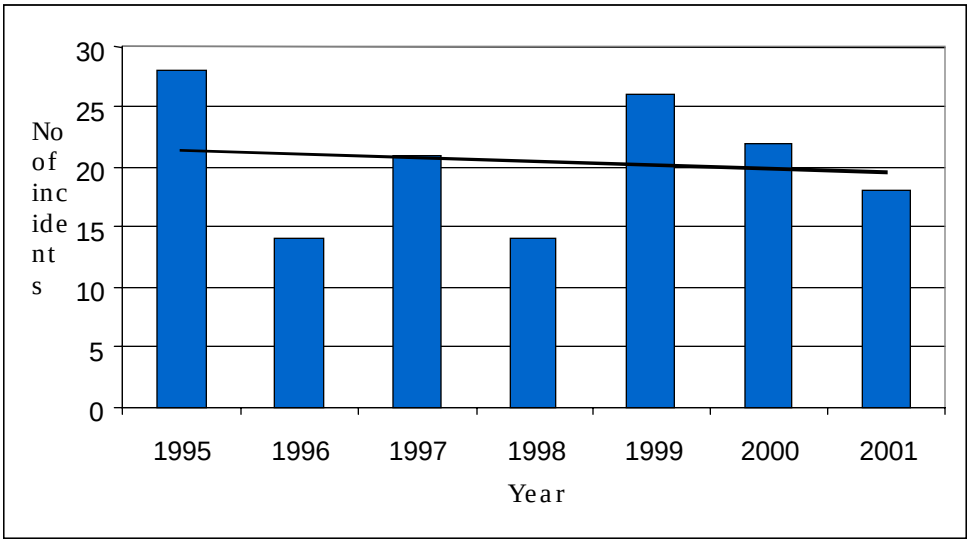


Figure 1. Number of incidents during the last seven years.

Table 1. Incidents during the last year**.**

No	Incident headline	Stand time	Classification
01-01	Dissolving tank explosion, Peterson A.S. Moss	**24 hrs**	**B3-P2**
01-02	Smelt leakage, Stora Enso Pulp Norrsundet (SP65)	-	E-P2
01-03	Smelt leakage, Stora Enso Pulp Norrsundet (SP65)	2.9 days	E-P2
01-04	Economizer leak, Korsnäs	26 hrs	D
01-05	Superheater leak, M-real Husum	24 hrs	D
01-06	Grid leak + ESP, M-real Husum	2.4 days	D
01-07	Superheater leak + ESP, SCA Packaging Munksund	2.4 days	D
01-08	Superheater leak, Iggesund Paperboard	2.2 days	D
01-09	Smelt leakage, Aspa	3.3 days	E-P2
01-10	Superheater leak during test, Aspa	Hydro	E
01-11	Tall oil in the feed water, Kappa Kraftliner	1.5 days	E
01-12	Economizer leak, Kappa Kraftliner	23 hrs	D
01-13	Waterside corrosion, Mörrum	-	E
01-14	Superheater corrosion, Mörrum	-	E
01-15	Crack in wall tube, Kappa Kraftliner	-	E
01-16	Ruptured gable in hp steam distr. manifold, Värö	158hrs	E-P2
01-17	Economizer leak, Korsnäs	38,5hrs	D
01-18	Economizer leak, Korsnäs	1.8 days	D

10. **ACTIVITIES OUTSIDE NORTH AMERICA REPORTS** (Cont.)

10.2 **REPORT FROM SWEDEN & NORWAY** (Cont.)

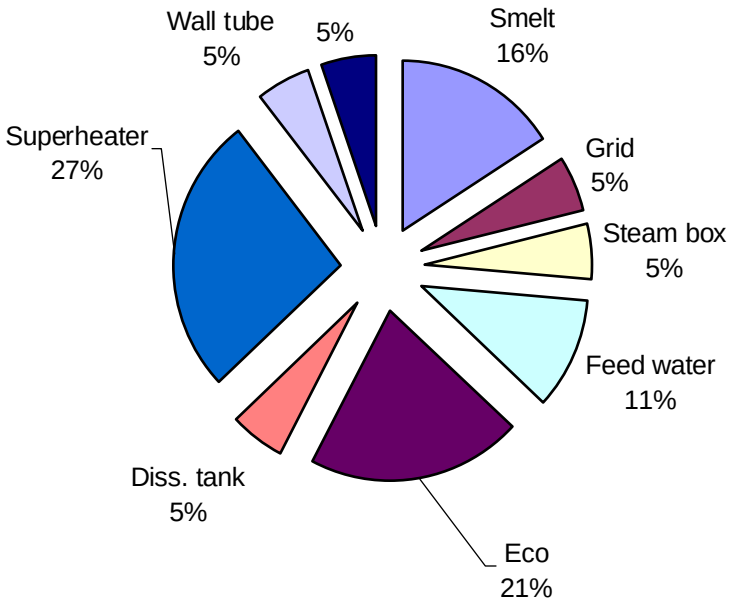


Fig 2. Incidents during 2001.

First a few words about an older incident. In the Tofte recovery boiler, in Norway, they had a smelt leakage followed by an explosion. It has been reported before but as more information is available now, it is of interest for you who have composite tube furnaces.

The explosion caused black colored composite tubes in contrast to the metallic appearance the tubes had preserved during the preceding decades. The color change had evidently been caused by sulphidation of the oxide on the tubes, evidently the temperature had been raised well above normal operating temperatures.

The explosion moved the right sidewall outwards about one inch creating an opening between the sidewall and the floor tubes.

10. **ACTIVITIES OUTSIDE NORTH AMERICA REPORTS** (Cont.)
10.2**REPORT FROM SWEDEN & NORWAY** (Cont.)

The leak was in a composite tube in the right sidewall, next to a primary air port. The hole had the size of a pinhead and was next to a blister in the tube, as can be seen in Figure 3.

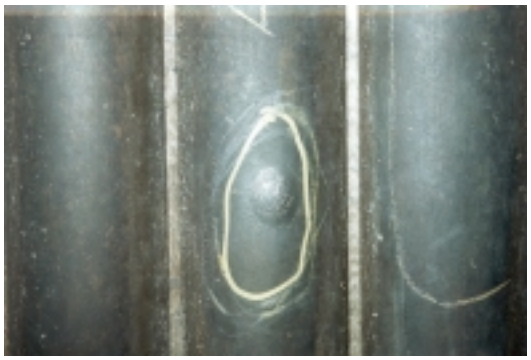


Fig 3. Blister in a composite tube.

There were also smaller blisters on parts of the tubes between primary and secondary air port levels. The composite layer was also completely corroded away at some of the primary air ports. Both the blisters and the black tints were results of high temperature excursions

Even though the composite layer was intact at most tubes, some tubes were thinned from the waterside. (See Figure 4.)

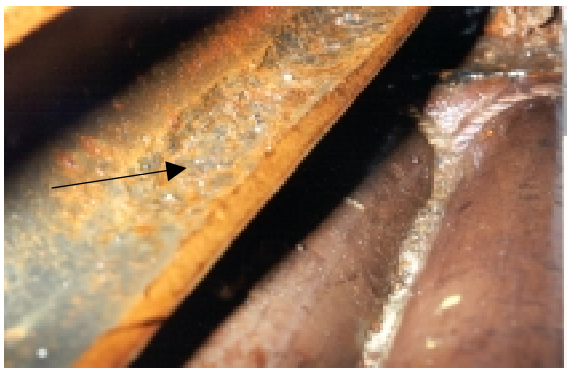


Fig 4. Corrosion grooving on the waterside.

10. **ACTIVITIES OUTSIDE NORTH AMERICA REPORTS** (Cont.)
10.2 **REPORT FROM SWEDEN & NORWAY** (Cont.)

The tubes were initially examined with endoscope optics on the waterside, and finally with an eddy current device on the boiler side, see Figure 5. The damage turned out to be most severe on the straight tubes located next to the air port tubes.

Fig 5. The eddy current measuring device.

The blisters have raised the question about hydrogen damage. The corrosion on the waterside is assumed to evolve nascent hydrogen. The hydrogen atoms could combine to common gaseous hydrogen in the steam, but a small share is also assumed to diffuse into the steel.

The corrosion model assumed the ingress of sea water into the condensate. The seawater settles hardness deposits, more and thicker where the heat transfer is highest. The boiler water will concentrate under the deposits and in this case an acid corrosion caused by the hydrolysis of the magnesium chloride was the most probable explanation for the corrosion.

The main suspicion at present is that there has been leakage in the condenser of the turbine. This leakage has been small enough so that the conductivity of the returned condensate did not exceed the given maximum value for the boiler. The whole picture of the feed water chemistry is thus under consideration.

Of the incidents last year, one I would like to tell you more about is the waterside corrosion discovered at the Mörrum Mill. The attacked tubes were composite tubes in the lower part of the furnace. The tubes were scanned during a scheduled outage and the corroded parts on the waterside were found mostly at the secondary air port elevation. (See Figure 6.)

10. **ACTIVITIES OUTSIDE NORTH AMERICA REPORTS** (Cont.)
10.3 **REPORT FROM SWEDEN & NORWAY** (Cont.)

For checking the area under between primary and secondary air port levels, an ultrasonic based equipment was used to check three spots on each tube at every inch of height. The result gave a picture of over a number of tubes.

Fig 6. Pictures of the corroded tubes, Mörrum Mill.

The measurements at Mörrum Mill were done because Mörrum had the same feed water conditioner as Tofte until 1995; they both used polyamines. Besides Tofte, parallels can also be seen in the Kotka incident in Finland.

As in Tofte, parts of the composite layer were black colored. It was however not nearly as large areas as in Tofte. Neither blisters nor thinned composite layers could be found. It has not been possible to find any relation between the black parts and the corrosion on the waterside.

The last incident I will tell you about is also a waterside incident. At the Kappa Kraftliner Mill they got tall oil in the boiler water. The pH of the feed water dropped suddenly and simultaneously the Sodium in the condensate increased. The polluted condensate had not been dumped to the effluent automatically, since that function was connected to the conductivity. The conductivity didn't increase since the tall oil wasn't dissociated.

The furnace load was decreased and they started to purge out the polluted water.

10. **ACTIVITIES OUTSIDE NORTH AMERICA REPORTS** (Cont.)
10.2**REPORT FROM SWEDEN & NORWAY** (Cont.)

It took a while before they understood that it was tall oil they were dealing with. But when they did, they dumped all the reflux condensate, and stopped the turbine. Liquor firing was immediately terminated, but the boiler was contiued in operation with auxiliary fuel oil.

The reason to the leakage of tall oil into the feed water was a plug in the tall oil pipe, forcing the tall oil backwards into the water through a purging line.

New Recommendations

Since the beginning in 1965 the main mission of our committee has been safety questions. This year alone we will spend 600 000 SEK (60 000 US$), almost one third of the total budget, on developing new recommendations.

The recommendations are divided into six areas:

Technical Terms and Concepts
Construction and equipment
Operation and operational interruptions
Inspection and maintenance
Education
Security conditions

Last year only one new recommendation was published:

- *C11 – Leakage of gases and liquids*

The purpose of this recommendation is to give guidance regarding measures that could be necessary to make in case of leakage of hot, corroding, and poisonous liquids into the boiler house.

In process of being revised are among others:

- *B2 – Construction of recovery boiler buildings (at the printer house)*
- *B19 – Equipment for liquor firing (at the printer house)*
- *C3 – Firing of liquor and auxiliary fuels*
- *B14 – Arrangements of alarms in operator rooms*
- *D3 – Thickness of tube materials*
- *C9 – Firing for destruction*
- *D6 – Waterside inspection and acid cleaning of feed water equipment (paused)*

Survey

Earlier this year we did a survey among our members investigating the boiler water level after an ESP. The reason for the study was the ongoing BLRBAC project on the same subject.

10. **ACTIVITIES OUTSIDE NORTH AMERICA REPORTS** (Cont.)
10.2**REPORT FROM SWEDEN & NORWAY** (Cont.)

In our recommendation B8 we recommend a final water level of at least 3 meters in the boiler tubes after an ESP. BLRBAC recommends 8 feet (2.44 m). Our survey showed that most of the boilers in Sweden and Norway have followed the recommendation. Another conclusion is that you seem to ESP your boilers more frequently in North America than we do in Scandinavia.

Growing Committee

Last year we had the pleasure of welcoming a new member into our committee. The Norwegian calcium-sulfite mill Borregaard has ordered a small recovery boiler and wants to take advantage of the committee already during the project phase. Besides Borregaard, we have two member mills in Norway: Tofte and Moss.

CHAIRMAN: The question was asked: "Is there an English translation of the Swedish Guidelines?" The answer was: "No."

10.3**REPORT FROM FINLAND** – Sebastian Kankkonen

See ***Appendix C*** for a slide report submitted from Finland.

11. **OPERATING PROBLEMS SESSION REPORT** – Dean Clay

We had a very good Operating Problems Session yesterday afternoon. I want to give special thanks to all of those who actively participated or submitted written questions.

We did have a good mix of subjects. I will just hit a few highlights on some notes I had taken. We talked about:

The use of generating bank vibration bars related to rubbing and grooving of tubes and what people were doing about it. I guess what I heard back was that a lot of people, when possible, are going to a handcuff, leg iron type, clamping vibration restraint and some people are actually physically moving the vibration bars to change the wear-point. I think it was also mentioned of going to an altered design on the bar to have less of an opportunity to wear.

We talked about corrosion of roof tubes in the superheater area. There had been an incident discussed in the ESP Subcommittee of a leak in that area due to corrosion and some potential ways to inspect tubes in that area.

We talked about corrosion in the furnace wall area just above the composite or chromized tube zone being seen in a number of boilers. We had some discussion as to just how high you had to carry your corrosion protection, with no real conclusion. We also talked about some people extending the corrosion protection zone either with new composite tubing, new chromized tubing, or potentially a thermal spray coating to provide protection.

11. **OPERATING PROBLEMS SESSION REPORT** (Cont.)

We talked about handhole cap leaks and we are anxiously looking to our subcommittee to give us the definitive answer on how to stop those. I think the feedback was that for whatever reason they seem to come in multiples. You know, if you have a problem, you have lots of problems. If you don't have a problem, you wonder what the issue is. So, we discussed the material of handhole caps, procedures, including the maximum weld size to seal weld the handhole cap to the header. There are limits within the code. Some have found it beneficial to make sure they are right up to the limit to maximize the size, but stay within the code. Also references to treat the welding of handhole caps as a very critical part of your outage and don't neglect it. Put your best welders on that area.

We talked about green liquor density control and went through various options. There are a number of different schemes being used out there, but the feedback I received was that there were a variety of ways to make sure you have working green liquor density control instrumentation.

We talked about plugging of recovery boilers and water wash frequency. There was a lot of emphasis placed on knowing the chloride level in your liquor and controlling it. Reference was made of monitoring ash pH as an indicator of potential for plugging.

We talked about smelt spouts and experience with dry smelt spouts.

We talked about black liquor density measurement with a reference to some use, at least in Europe, of a Coriollis mass flow meter instead of a refractometer for measuring and, as we understood it, using it as part of the safety logic for black liquor diversion on solids.

We also discussed what people are doing as far as deciding how to, or if to, inspect inside the recovery boiler furnace after an ESP.

Again, thank you for your participation and I look forward to another good session in the fall.

CHAIRMAN: Just would like to remind you that following the break, we do have two technical presentations that will start, as follows:

"From 'Time in Grade' to Making the Grade:
How to Build Your Next Generation of Operators"
presented by Sam Lewis of Delta Training

"Improve Boiler Awareness with Online Viewing"
presented by M. Ishaq Jameel Ph.D of Clyde Bergemann, Inc.

TIME & PLACE OF NEXT MEETING: The next meeting will be held on October 7, 8 & 9, 2002, at the Crowne Plaza Hotel/Atlanta Airport, in Atlanta, Georgia.

ADJOURNMENT: Are there any other questions or comments, which need to be addressed? If not, this meeting is adjourned. Everyone have a safe trip home!

SUMMARY OF RECOVERY BOILER INCIDENTS
SPRING 2002 BLRBAC MEETING

2002 April – 1	
Location:	**Weyerhaeuser Co., Kamloops, British Columbia**
Unit:	No. 1 Recovery Boiler. CE Contract. Startup 1965
Size:	1.2 million ppd solids. Operating at 600 psig & __ F. Design at 800 psig. 2 drum/large economizer
Incident Date:	June 21, 2001
Leak/Incident Loc:	**Economizer** – Pinhole leak ~ 6 in. above the weld to lower header No. 7 in tube 10, Row C. In vicinity of 13 previously removed tubes. Over the years, there have been a number of leaks.
Downtime hrs due to leak/total:	Total downtime – 46 hours
ESP?	No ESP
Classification:	**Non-critical Incident**
How discovered:	On routine walkdown, Recovery Engineer discovered water coming from the south economizer header
Leak detection:	A Triple Five Acoustic Leak Detection System had been taken out of service prior to the incident
Sequence of events:	Upon observing the water, Engineer called Asst Shift Engineer and they opened the hopper door; the Shift Engineer was called. Liquor guns were removed from the furnace 30 minutes after water observed.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Tube removed and plugs installed in the headers
Root cause:	Stress assisted corrosion. Tube had a heavy iron oxide deposit. Problem believed to originate from oxygen pitting resulting from shutdown practices years ago.
Future prevention:	Chemical cleaning of economizer in 2002. Present practices being reviewed. Investigative inspection at next annual outage.
Last full inspection:	Last inspection March 2001. Last chemical cleaning pre-80's.

2002 April – 2	
Location:	**Willamette Industries, Johnsonburg Mill, PA**
Unit:	Tampella Contract No. 90132. Startup 1993.
Size:	2.2 million ppd solids. Operating at1250 psig & 900F. Design at 1600 psig. Single drum/large economizer
Incident Date:	September 7, 2001
Leak/Incident Loc:	**Economizer** – Pin hole leak <u>in</u> a lower header at radius in base of header extrusion for tube 5 in Platen 43 at 6 o'clock position (12 is plant north). Header is at feedwater inlet to economizer
Downtime hrs due to leak/total:	Total downtime – 38.25 hours
ESP?	No ESP
Classification:	**Non-critical Incident**
How discovered:	During a routine walkdown, operator noticed moisture in the ash hopper
Leak detection:	None installed
Sequence of events:	Operator noticing the water suspected an economizer leak as there had been several leaks over the past 2 years. Liquor was pulled for visual inspection and wet area determined to be in the hopper. Orderly shutdown taken
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Leak ground out and welded. Additional porosity found at 5 and 7 o'clock positions.
Root cause:	Corrosion fatigue cracking initiating from the inside surface.
Future prevention:	In the 15 months prior to 11/2001, tube to tube welds in the feedwater inlet bank were overlaid to correct poor shop welds. All of welds at lower headers and some at upper were overlaid. No tube to tube weld leaks have occurred since.
Last full inspection:	Last ndt inspection May 2001. Acid cleaned in 1993.

SUMMARY OF RECOVERY BOILER INCIDENTS
SPRING 2002 BLRBAC MEETING

2002 April – 3	
Location:	**Willamette Industries, Johnsonburg Mill, PA**
Unit:	Tampella Contract No. 90132. Startup 1993.
Size:	2.2 million ppd solids. Operating at1250 psig & 900F. Design at 1600 psig. Single drum/large economizer
Incident Date:	September 21, 2001
Leak/Incident Loc:	**Economizer** – Pin hole leak in a lower header at radius in base of header extrusion for tube 3 in Platen 44 at 6 o'clock position (12 is plant north). Header is at feedwater inlet to economizer
Downtime hrs due to leak/total:	Downtime due to leak – 27.5 hours/ Total downtime – 69 hours
ESP?	No ESP
Classification:	**Non-critical Incident**
How discovered:	Economizer inspected when the boiler was off liquor due to a digester outage
Leak detection:	None installed
Sequence of events:	Leak discovered during inspection
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Leak ground out and welded. .
Root cause:	Corrosion fatigue cracking initiating from the inside surface.
Future prevention:	In the 15 months prior to 11/2001, tube to tube welds in the feedwater inlet bank were overlaid to correct poor shop welds. All of welds at lower headers and some at upper were overlaid. No tube to tube weld leaks have occurred since.
Last full inspection:	Last NDT inspection May 2001. Acid cleaned in 1993.

2002 April – 4	
Location:	**Westvaco, North Charleston, SC**
Unit:	No. 1 Recovery Boiler. B&W Contract PR-206. Startup 1984. Kvaerner revamp with new economizer 1996.
Size:	4.5 million ppd solids. Operating at 1450 psig & 880F. Design at 1725 psig. 2 drum/large economizer
Incident Date:	November 23, 2001
Leak/Incident Loc:	**Economizer** – small longitudinal crack in tube originating out of butt weld at upper bottle tube to header weld. Crack at right angle to axis of header in 20th row in from right hand sidewall, 3rd row to rear and in sootblower path.
Downtime hrs due to leak/total:	Total downtime – 28.75 hours
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	Operator discovered water in economizer hopper during walkdown.
Leak detection:	Acoustic leak detection system in operation did not detect the leak
Sequence of events:	After noticing water in the hopper, liquor guns were removed from furnace, bed burned out. When gas became clean, water could be observed flowing from lower header
Bed cooling:	No
Wash adjacent tube:	One adjacent tube washed
Repair procedure:	Crack welded and adjacent washed tube overlaid
Root cause:	Unknown Under investigation. Tube to header weld in economizer installed 1996 not stress relieved
Future prevention:	This is 6th leak at the tube to header weld since July 2000, all perpendicular to the RHSW. First 5 at lower bottle headers. All bottom headers have been tied together for vibration restraint. Welds have been stress relieved.
Last full inspection:	

SUMMARY OF RECOVERY BOILER INCIDENTS
SPRING 2002 BLRBAC MEETING

2002 April – 5	
Location:	**Westvaco, North Charleston, SC**
Unit:	No. 1 Recovery Boiler. B&W Contract PR-206. Startup 1984. Kvaerner revamp 1996 included new economizer.
Size:	4.5 million ppd solids. Operating at 1450 psig & 880F. Design at 1725 psig. 2 drum/large economizer
Incident Date:	December 12, 2001
Leak/Incident Loc:	**Economizer** – longitudinal crack on 11th bottle header from RHSW at 3 o'clock position (12 o'clock in direction of front of economizer). .
Downtime hrs due to leak/total:	Total downtime – 28.75 hours
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	During a routine walkdown, operator discovered wet salt cake on the ash conveyor
Leak detection:	Acoustic leak detection system in operation did not detect the leak
Sequence of events:	The wet salt cake was confirmed to be due to a leak and liquor was pulled. Economizer doors were opened at lower header elevation and leak determined to be in rear economizer module . Boiler was shutdown.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	11th section in rear module cut off at inlet and outlet connections, which were plugged. The 6th section in front bank also cut off at feeders and plugged.
Root cause:	Crack had some appearance of corrosion but appeared to be caused primarily by fatigue that propagated on the internal surface of the tube. B&W Service Bulletin identifies a similar crack they attribute to feedwater temperature cycling. Ongoing investigation is evaluating possibility manufacturer did not follow specified weld detail and this caused the crack formation in the header
Future prevention:	Evaluation program of investigation, shutting off some sootblowers, bypassing rear economizer section, thermocouples on front bank, monitoring and heat treating headers
Last full inspection:	May 11, 2001. Unit chemically cleaned with chelant in 1989.

2002 April – 6	
Location:	**TEMBEC USA LLC, St. Francisville, LA**
Unit:	B&W Contract PR-85. Startup 1965. B&W revamp Contract No. 4873 in2001.
Size:	3.0 million ppd solids. Operating at 500psig and 500F. Design at 600 psig. 2 drum/large economizer.
Incident Date:	February 23, 2002
Leak/Incident Loc:	**Economizer** – ½ inch crack in handhole cap weld. Cap in lower header of original crossflow economizer module at boiler outlet
Downtime hrs due to leak/total:	Total downtime – 32.5 hours
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	Operator noticed water in ash hopper while making rounds
Leak detection:	None installed
Sequence of events:	Water in left side common ash hopper for economizer/generating bank. Location of leak assessed and boiler shutdown in an orderly manner. Liquor was diverted and the bed burned out.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Weld gouged out, surface prep and rewelded using Code procedures.
Root cause:	Weld failure caused by slag inclusion in the shop weld of original economizer
Future prevention:	
Last full inspection:	Inspection in May 2001. Chemically cleaned March 2001 using HCl/thiourea

SUMMARY OF RECOVERY BOILER INCIDENTS
SPRING 2002 BLRBAC MEETING

2002 April – 7	
Location:	**Mead Containerboard, Stevenson, AL**
Unit:	Ahlstrom recovery boiler started up 1998
Size:	1.36 million ppd NSSC liquor solids. Operating at 600 psig and 750F. Design at 785 psig. Single drum/large economizer
Incident Date:	October 7, 2001
Leak/Incident Loc:	**Economizer** – 1 inch ID crack in tube propagated to OD as a pinhole. 1st tube, about 1.5 inches above hot header. First economizer bank is bypassed
Downtime hrs due to leak/total:	Total downtime, due to ESP – 69 hours
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	Recovery operator and trainee changing liquor guns noticed water dripping from above.
Leak detection:	None installed
Sequence of events:	Operator noticing water immediately went upstairs and operation. Liquor guns were pulled, which caused an auxiliary fuel trip. Leak then identified over 3 hour found water coming out of hopper on hot economizer. An auxiliary gas burner was placed in period. Aux burners refired to burn out bed.
Bed cooling:	No
Wash adjacent tube:	Yes. Leaking steam cut surface of header
Repair procedure:	3 foot long bent dutchman installed at point of failure. Header showed no cracks when dye-penetrant and ultrasonic thickness tested. Steam cut ground to a groove and weld overlaid. Retested with dye penetrant..
Root cause:	Corrosion fatigue
Future prevention:	Testing for cracking in remaining tubes during 2002 annual outage. Maintain dissolved oxygen between 0 and 7 ppb. Consider a design change in the supply tubes from feedwater header to economizer section bottle headers to reduce high stress levels. Also review design of external feedwater piping since the No. 1 economizer is bypassed.
Last full inspection:	Inspection March 2001. Chemically cleaned with citric acid at same time

2002 April – 8	
Location:	**TEMBEC, Skookumchuck, British Columbia**
Unit:	ABB Contract No. CA91105. Startup 1993.
Size:	4.3 million ppd solids. Operating at 630 psig and 750F. Design at 900 psig. Single drum/large economizer
Incident Date:	June 14, 2001
Leak/Incident Loc:	**Economizer** – 2 inch crack in tube to header weld of tube No. 6 from right sidewall in bank No. 1. Lower header of secondary (hot bank) of economizer.
Downtime hrs due to leak/total:	Total downtime – 23.5 hours
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	Operator walkdown
Leak detection:	None installed
Sequence of events:	
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Repaired according to PP105.
Root cause:	Suspect vibration in long flow tubes
Future prevention:	Stabilizer bars installed during June 2001 shutdown
Last full inspection:	Inspected during 2001.

SUMMARY OF RECOVERY BOILER INCIDENTS
SPRING 2002 BLRBAC MEETING

2002 April – 9	
Location:	**Pope & Talbot- Harmac Operations, Nanaimo. British Columbia**
Unit:	No. 5 Recovery Boiler. CE Contract No. CA51126. Startup 1952. B&W Revamp Contract 829-0052 in 1994 included economizer replacement.
Size:	1.4 million ppd solids. Operating at 600 psig & 750F. Design at 650 psig. 3 drum/large economizer
Incident Date:	March 6, 2002
Leak/Incident Loc:	**Economizer** – hand hole cap weld failure in lower header of rear module on end of left sie bundle (module)
Downtime hrs due to leak/total:	Total downtime-20 hours
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	Operator making rounds
Leak detection:	None installed
Sequence of events:	Routine leak check during rounds discovered the leak The boiler was shutdown in a routine manner.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Handhole removed, seat cleaned and NDE inspected New cap installed and weld dye penetrant inspected. Economizer hydroed and boiler returned to service
Root cause:	Crack in the weld of header handhole cap, most likely caused by an improper installation procedure
Future prevention:	All handhole caps in the economizer will be removed and replaced in the next outage
Last full inspection:	May 15, 2001

2002 April – 10	
Location:	**Longview Fibre Co., Longview, Washington**
Unit:	No. 15 Recovery boiler. ABB-CE Contract No. 1956. Startup 1957. CE Revamp Contract No. 72796 in 1997.
Size:	2.0 million ppd solids. Operating at 850 psig & 750F. Design at 895 psig. 2 drum/DCE
Incident Date:	January 28, 2002
Leak/Incident Loc:	**Economizer** – 3/8 in. long oval hole within ‘3/4 in. of lower economizer header on cold side of a tube in the row supporting the rear wall casing of a cavity to the rear of the economizer bank
Downtime hrs due to leak/total:	Total downtime – 29 days, 8 hours. After repair of the leak, a hydrostatic test revealed another leak in the same row. Removal of 2 additional tubes on either side of the first 2 showed similar cracking. Sections at both headers of all 76 tubes in the row were removed and holes plugged during a resulting early start to the 2002 annual outage. Casing continued to be supported by remaining tubes and their hanger rods.
ESP?	Yes.
Classification:	**Non-critical Incident**
How discovered:	Operator observed water dripping from economizer casing at both ends
Leak detection:	None installed
Sequence of events:	Liquor firing stopped when water observed at the lower header and source unknown. Door opened and ESP performed after water seen at the bottom of the economizer with a small washed area as water could enter the cascade evaporator
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Section of tube extending 4 in. above header removed & bisected revealing internal circumferential cracking. A new 4 in. long tube section was plugged & welded into the lower and upper headers. Hydro revealed the 2nd near duplicate leak in a tube 12 tubes away. The further actions are above.
Root cause:	Corrosion fatigue caused failure
Future prevention:	Economizer is due for replacement
Last full inspection:	6 months before incident. Acid cleaned 1998 as part of revamp

SUMMARY OF RECOVERY BOILER INCIDENTS
SPRING 2002 BLRBAC MEETING

2002 April – 11	
Location:	**Norske Canada, Crofton, British Columbia**
Unit:	No. 4 Recovery Boiler. CE/ABB Contract CA-88105. Startup 1991
Size:	4.0 million ppd solids. Operating at 600 psig & 750F. Design at 800 psig. Single drum/large economizer
Incident Date:	March 9,2002
Leak/Incident Loc:	**Economizer** – 3.5.in. circumferential crack adjacent to upper toe of weld of tube into header (lower inlet header, rear bank)
Downtime hrs due to leak/total:	Total downtime – 30 hours
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	Water observed in economizer ash hopper.
Leak detection:	Nalco RBLI system in operation detected the leak
Sequence of events:	Boiler on line ~ 21% load firing auxiliary oil. Annual maintenance outage & inspection during outage. Liquor firing had been delayed 3 hours to repair the liquor flow meter.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	A 22 in. length of failed tube was cut from the header and replaced
Root cause:	Believed to be stress crack propagated by startup and shutdown stresses. Inlet of tube showed evidence of thinning on the ID
Future prevention:	Length and ring of failed tube to be metallurgically examined
Last full inspection:	Inspected March 2002. Acid cleaned 1996

Comment from ESP Subcommittee member –"Flow accelerated corrosion can show up at economizer inlet under some conditions and remove the protective oxide layer

2002 April – 12	
Location:	**Smurfit-Stone Container Corp, Brewton, AL**
Unit:	Recovery Unit No. 2. B&W Contract PR-79. Startup 1963.
Size:	1.1 million ppd solids. Operating at 860 psig and 830F. Design at 975 psig. 2 drum/DCE
Incident Date:	July 26, 2001
Leak/Incident Loc:	**Superheater** – crack in lower loop of Secondary SH bank at top part of offset bend (abbreviated hockey stick) at an old C & D lug attachment weld on No. 20 platen from right sidewall. The lug is attached to the Secondary SH tube forward of the tube with crack. Crack initiated at weld and ran around the tube and upward to a point just above the weld
Downtime hrs due to leak/total:	Hours due to leak – 51 / Hours total downtime – 56
ESP?	ESP was performed. Irrevocable policy is to stay out of recovery area 8 hours
Classification:	**Non-critical Incident**
How discovered:	Operator crew heard a noise while working on No. 20 sootblower
Leak detection:	None installed
Sequence of events:	There was normal drum level, steam flow and water flow at the time noise was heard. Sootblowers on all 3 boilers were stopped; noise did not stop and boiler was ESP'd.
Bed cooling:	No enhancement used
Wash adjacent tube:	No
Repair procedure:	Loop and about 8 ft. of tube each side replaced and weld x-rayed.
Root cause:	Crack may have caused when the forward loop to which lug attached failed earlier
Future prevention:	
Last full inspection:	Inspected March 11, 2001. Chemically cleaned 15 years ago.

Reference Incident Summaries Nos. 13, 14 and 15 In Minutes of Meeting,,October 8, 9 and 10, 2001

SUMMARY OF RECOVERY BOILER INCIDENTS

SPRING 2002 BLRBAC MEETING

2002 April – 13	
Location:	**Smurfit-Stone Container Corp, Brewton, AL**
Unit:	Recovery Unit No. 2. B&W Contract PR-79. Startup 1963.
Size:	1.1 million ppd solids. Operating at 860 psig and 830F. Design at 975 psig. 2 drum/DCE
Incident Date:	December 14, 2001
Leak/Incident Loc:	**Superheater –** circumferential crack about 75% of way around tube at line of roof tubes. In 9th platen of secondary superheater from left sidewall. Tube bridges sootblower cavity with large bend that extends above the roof tubes. Crack at rear leg of bend
Downtime hrs due to leak/total:	Downtime – boiler off line 31 hr-18 min and off liquor for 34 hr- 43 min
ESP?	ESP was performed
Classification:	**Non-critical Incident**
How discovered:	During walkdown of boiler by helper
Leak detection:	None installed
Sequence of events:	Helper making first round of shift heard a noise and requested sootblowers on all three boilers be shut down. Noise still heard and boiler was ESP'd. No noise on last round of preceding shift. The steam flow was 110,000 pph with a feedwater flow of 135,000 pph. Difference masked by a digital steam flow reading higher than the chart flow.
Bed cooling:	No enhancement
Wash adjacent tube:	No
Repair procedure:	The 9th platen tube could not be repaired and the secondary SH element was plugged at the headers. Hydro revealed a leak in 20th Secondary SH element from right sidewall where a roof shingle had worn a small hole. Spot was repaired after shingle plate removal for access.
Root cause:	Stress fatigue due to cyclic movement imparted to tube by IK blowers in area
Future prevention:	
Last full inspection:	Inspected March 2001.

2002 April – 14	
Location:	**Smurfit-Stone Container Corp, Brewton, AL**
Unit:	Recovery Unit No. 2. B&W Contract PR-79. Startup 1963.
Size:	1.1 million ppd solids. Operating at 860 psig and 830F. Design at 975 psig. 2 drum/DCE
Incident Date:	January 1, 2002
Leak/Incident Loc:	**Superheater –** horizontal, circumferential crack in 20th secondary superheater element from right sidewall about ¾ inch long just above the roof shingle plate and about ¾ in. above a previous pad welded repair. Hydro revealed additional circumferential crack in 10th platen of primary superheater from left sidewall. Crack in 60 degree bend of the large tube bend that bridges sootblower cavity with large bend that extends above the roof tubes. Crack at front leg of bend about 1 foot below the roof and extended 270 degrees around the tube.
Downtime hrs due to leak/total:	Downtime – boiler off line 43 hr-35 min and off liquor for 51 hr- 45 min. Liquor firing delayed by difficulty pulling spout rods from smelt spouts
ESP?	ESP was performed
Classification:	**Non-critical Incident**
How discovered:	During walkdown of boiler
Leak detection:	None installed
Sequence of events:	During walkdown of boiler by shift Recovery Operator, blowing noise heard. Sootblowers were shutdown. Noise still present; boiler ESP'd
Bed cooling:	No enhancement
Wash adjacent tube:	No
Repair procedure:	20th element removed and tubes plugged at headers. The 10th element was also removed and plugged at headers.
Root cause:	Stress fatigue due to cyclic movement imparted to tube by IK blowers in area
Future prevention:	Vibration restraints added to stabilize remaining superheater elements. Upper primary and secondary superheater loops to be replaced during February 2002 outage.
Last full inspection:	Inspected March 2001.

SUMMARY OF RECOVERY BOILER INCIDENTS
SPRING 2002 BLRBAC MEETING

2002 April – 15	
Location:	**Smurfit-Stone Container Corp, Brewton, AL**
Unit:	Recovery Unit No. 2. B&W Contract PR-79. Startup 1963.
Size:	1.1 million ppd solids. Operating at 860 psig and 830F. Design at 975 psig. 2 drum/DCE
Incident Date:	February 5, 2002
Leak/Incident Loc:	**Superheater –**21st secondary superheater element from right sidewall broke off just below the roof line in the large tube bend that bridges the sootblower cavity; the large bend extends above the roof tubes to be supported. Failures had occurred in the same location in the two sootblower cavities 6 times in the past.
Downtime hrs due to leak/total:	Downtime – boiler off line 36 hr and off liquor for 39 hr- 30 min.
ESP?	ESP was performed. Irrevocable policy is to stay out of area a minimum of 8 hours
Classification:	**Non-critical Incident**
How discovered:	Loud noise heard in control room and boiler back pressured
Leak detection:	None installed
Sequence of events:	Boiler ESP'd when a loud noise was followed by a furnace back pressure. No prior indication of anything wrong. Steam flow at 126,000 lb/hr and feedwater 130,000 lb/hr just prior to ESP. Differential 6-8,000 lb/hr at time of ESP.
Bed cooling:	No enhancement
Wash adjacent tube:	No
Repair procedure:	21st element removed and tubes plugged at headers.
Root cause:	Stress fatigue due to cyclic movement imparted to tube by IK blowers in area
Future prevention:	Vibration bars added to stabilize some remaining superheater elements. Boilermakers removed the remaining secondary superheater tubes from the boiler.
Last full inspection:	Inspected March 2001.

2002 April – 16	**Critical Incident No. 552**
Location:	**Alberta-Pacific Forest Ind., Boyle, Alberta**
Unit:	Recovery Boiler No. 1. B&W Contract No. 134-7634. Startup 1993.
Size:	6.7 million ppd solids. Operating at 900 psig and 850F. Design at 1150 psig. Single drum/large economizer
Incident Date:	December 1, 2001
Leak/Incident Loc:	**Generating Bank –** pinhole leaks in 5 end caps of upper mini-headers (bottle headers) of long flow economizer
Downtime hrs due to leak/total:	Total downtime – 172 hours
ESP?	No Boiler was not burning liquor. Operating on gas at 400,000 lb/hr steam with no bed and no smelt flow
Classification:	**Critical Incident**
How discovered:	Walkdown during period boiler off liquor
Leak detection:	None installed
Sequence of events:	Boiler off liquor due to mill problems. Later in the day, generating bank ash conveyor gearbox failed and was replaced. Operations noticed large lumps of saltcake in the hopper and on inspection, heard a noise on 10th floor and noted a clean spot on nose arch where water was dripping
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	End caps removed and replaced with same material. 56 of 81 end caps removed and replaced
Root cause:	Failure due to internal erosion from steam velocity in dead space at end of mini-header.
Future prevention:	Plan for repair to remove dead spot at end of headers
Last full inspection:	Inspected May 2001. Acid cleaned in 1993.

Comment from ESP Subcommittee member-"Loss of metal of this nature has more frequently been attributed to corrosion

SUMMARY OF RECOVERY BOILER INCIDENTS
SPRING 2002 BLRBAC MEETING

2002 April – 17	
Location:	**Westvaco PRG, Charleston, South Carolina**
Unit:	Unit No. 9, CE contract No. 564. Startup 1966.
Size:	3.0 million ppd solids. Operating at 570 psig & 715F. Design at 700 psig. 2 drum/DCE
Incident Date:	December 12, 2001
Leak/Incident Loc:	**Furnace Screen** – 1/8 in. pinhole leak in the screen tube 2"' to 3"' from front wall header external to the furnace enclosure. Design has shot skin casing at wall penetration by screenFirst screen header from sidewall. Water spray directed away from furnace.
Downtime hrs due to leak/total:	Total downtime – 10.5 hours
ESP?	No. Leak external to furnace
Classification:	**Non-critical Incident**
How discovered:	Leak discovered by Foreman during routine walkdown of the boiler
Leak detection:	Acoustic leak detection (EARS) system was in operation. System not intended to detect leak external to boiler
Sequence of events:	Water was observed leaking from casing at the screen tube header. Insulation and lagging were removed to expose leak location to be the header. Liquor firing discontinued and oil used to burn down bed. Boiler drained to just below the header to be repaired
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Welded the pinhole. No hydro test as leak external.. Tubing at the header noted to be thinner.
Root cause:	Not determined
Future prevention:	NDT inspection of screen tubes at the area of the leak
Last full inspection:	Inspected December 3, 2001. Chemically cleaned with Chelant December 2000

2002 April – 18	
Location:	**International Paper, Natchez, Mississippi**
Unit:	No. 6 Recovery Boiler. B&W Contract PR-82. Startup 1964. B&W Revamp Contract SC-0435 in 1978
Size:	2.67 million ppd solids. Operating at 600 psig & 700F. Design at 1425 psig. 2 drum/DCE
Incident Date:	December 21, 2001
Leak/Incident Loc:	**Upper Furnace** – 1/8 in.pinhole in weld of membrane to tube at top end of arch. Located inside the arch (cold side) 2.5 in. down from membrane termination in tubes 10 and 11
Downtime hrs due to leak/total:	Total downtime – 60 hours
ESP?	ESP performed
Classification:	**Non-critical Incident**
How discovered:	Leak heard by boiler operator performing a routine walkdown
Leak detection:	None installed
Sequence of events:	The leak was suspected to be in the nose arch dead air space. As this was an area where water might reach the bed, the boiler was ESP'd.
Bed cooling:	No
Wash adjacent tube:	Yes. Pinhole in the membrane weld of tube No. 11 washed tube No.10 to cause the leak that was audible
Repair procedure:	Membrane removed to facilitate repair. Tubes UT inspected to ensure thickness loss confined to area of failure. Tubes cleaned and a 1" x1" pad weld laid over the area
Root cause:	Membrane weld failure
Future prevention:	
Last full inspection:	Inspected April 2000. Acid cleaned also with 6.5% HCl, 0.5% ABF, 0.2% Rodine 213

SUMMARY OF RECOVERY BOILER INCIDENTS
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2002 April – 19	**Critical Incident No. 553**
Location:	**Smurfit-Stone Container Corp, Brewton, AL**
Unit:	Recovery Unit No. 1. B&W Contract PR-32. Startup 1957.
Size:	1.1 million ppd solids. Operating at 860 psig and 830F. Design at 975 psig. 2 drum/DCE
Incident Date:	February 3, 2002
Leak/Incident Loc:	**Upper Furnace** – pinhole leak on 24th tube in the rear wall (counting from the right sidewall) just below the bend to form the nose arch on the outside of the tube and flat stud rear wall and just above a buckstay attachment. 2nd leak an ~ ¾" hole in tube 23 apparently washed by the leak from the pinhole. After repair, hydro testing revealed two ~1/2" long, horizontal cracks in the 22nd tube, one on the outside and one on the inside of the furnace. Both were at a scalloped bar welded to the wall to support the buckstay.
Downtime hrs due to leak/total:	Downtime – boiler off line 40 hr-30 min and off liquor for 42 hr- 40 min.
ESP?	ESP was performed. Irrevocable policy is to stay out of area a minimum of 8 hours
Classification:	**Critical Incident**
How discovered:	During walkdown of boiler by operator
Leak detection:	None installed
Sequence of events:	During walkdown of boiler by shift Recovery Operator, noticed water dripping from the rear wall buckstay. Source could not be determined and on-call superintendent was called in. Source still not determined & buckstay cover removed revealing water running down behind the casing. Boiler ESP'd 2 hr-15 min. after dripping was noticed
Bed cooling:	No enhancement
Wash adjacent tube:	Yes
Repair procedure:	Holes heliarced and pad welded.
Root cause:	Pinhole leak was adjacent to buckstay attachment weld.
Future prevention:	
Last full inspection:	Inspected September 2000

Comment by ESP Subcommittee member – "Tube cracks at buxkstay attachments may be stress assisted corrosion. Operators should always check this to determine the repair procedure

SUMMARY OF RECOVERY BOILER INCIDENTS
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2002 April – 20	**Critical Incident No. 554**
Location:	**International Paper, Roanoke Rapids, North Carolina**
Unit:	No. 7 Recovery Boiler. B&W Contract PR-168. Startup 1975. Ahlstrom Revamp Contract No. 400038 in 1998
Size:	2.6 million ppd solids. Operating at 850 psig & 825F. Design at 1000 psig. 2drum/large economizer
Incident Date:	November 7, 2001
Leak/Incident Loc:	**Upper Furnace** - < 1/8 in. pinhole at edge of weld penetration 2 ft. above the swage of 3" OD nose arch tube to 2.5" OD generating bank inlet screen tube, ~~9~~ 14th tube from right sidewall.
Downtime hrs due to leak/total:	Downtime due to leak – 19.5 hours/total downtime – 31.5 hours
ESP?	No. There was smelt in the furnace. Drum pressure was nearly down.
Classification:	**Critical Incident**
How discovered:	Operator walkdown while boiler was down for a cleanability inspection
Leak detection:	An "in-house" Mass Balance System was in operation, but leak to small to detect, ie, deviation to small to detect. Detects greater than 6000 lb/hr
Sequence of events:	Boiler down while mill made evaporator MACT tie-ins. Operator during walkdown heard a hissing sound and observed a mist of vapor from the pinhole. Drum pressure had decayed to 440 psig. Neither Mass Balance system nor chemistry indicated a leak. Decision to monitor leak and take boiler down in normal manner. Sequence followed of opening vents to reduce pressure, drain to 8 ft. level, lock out boiler and repair leak, cool bed with bicarbonate, and hydro
Bed cooling:	Bed cooled with sodium bicarbonate using nitrogen transport. Used 2500 lbs. Credited time saved – 12 hours. Very successful.
Wash adjacent tube:	No
Repair procedure:	Leak area ground out and pad welded
Root cause:	Faulty weld suspected. Tube to be removed for analysis during the May 2002 outage.
Future prevention:	Entire area of leak will be tested across full boiler width during May 2002 outage.
Last full inspection:	Inspected May 2001. Acid cleaned November 1998.

2002 April – 21	
Location:	**Canadian Forest Products Ltd, Northwood Pulp Mill, Prince George, British Columbia**
Unit:	ABB Contract. Startup 1983
Size:	3.35 million ppd Solids. Operating at 650 psig & 400F. Design at 750 psig. 2 drum/large economizer
Incident Date:	October 17, 2001
Leak/Incident Loc:	**Upper Furnace** – leak in weld on upstream end connection of a 1 in. weld end vent valve on the sidewall upper header
Downtime hrs due to leak/total:	Total downtime – 24 hours
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	Operator doing unit walkdown noticed steam leak external to boiler
Leak detection:	RBLI leak detection system in operation did not detect leak as it was discovered when minor and boiler was shutdown.
Sequence of events:	Asst Shift Engineer during walkdown noticed wet steam spitting intermittently from the weld. Leak progressively increased to a few gallons per minute when decision was made to shutdown in a controlled fashion and repair the leak
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Pipe was cut 1 in. below valve and a reducer end cap welded on the line. Valve has not been used since 1983 startup.
Root cause:	Porosity in original construction field weld
Future prevention:	100% x-ray of repair weld and x-ray of other vent line welds
Last full inspection:	Inspected September 2001

SUMMARY OF RECOVERY BOILER INCIDENTS
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2002 April – 22	**Critical Incident No. 555**
Location:	**Weyerhaeuser Company, Longview, Washington**
Unit:	B&W Contract PR-165. Startup 1974. B&W Revamp 1994
Size:	4.5 million ppd solids. Operating at 700 psig & 730F. Design at 800 psig. 2 drum/ large economizer
Incident Date:	March 4, 2000
Leak/Incident Loc:	**Furnace Floor –** two 1/8 in., water side initiated cracks in 6th tube from right sidewall, midway between front and rear wall, in the area of a large depression in the floor. Cracks in crown of tube adjacent to a pin stud. A number of cracks in a 3 ft. section of tube.
Downtime hrs due to leak/total:	None
ESP?	No
Classification:	**Critical Incident**
How discovered:	Observed after completion of bed burn out for annual outage
Leak detection:	Triple V leak detection system in operation did not detect leak. Leak started after start of bed burn out and noise was masked
Sequence of events:	The leak was observed after the bed had been burned out
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Thirteen tubes in area of depression were removed and replaced
Root cause:	Cracks due to thermal cycling of tube metal likely due to circulation problems and steam blanketing related to floor depression
Future prevention:	Floor depression removed during annual outage
Last full inspection:	Inspected May 1999

2002 April – 23	**Critical Incident No. 556**
Location:	**Georgia-Pacific, New Augusta, Mississippi**
Unit:	Unit ID 62-001-001. Gotaverken Contract No. 551-992. Startup 1984. Gotaverken revamp in 1992 replacing front wall with composite tubes all the way to the header.
Size:	6.342 million ppd solids. Operating at 1225 psig & 900F. Design at 1250 psig. Single drum/large economizer
Incident Date:	January 7, 2002
Leak/Incident Loc:	**Lower Furnace** – multiple cracks to for 180 degree of circumference located at toe of the weld of rear (spout) wall tubes into the common header for floor and rear wall.
Downtime hrs due to leak/total:	No information
ESP?	ESP initiated
Classification:	Critical Incident
How discovered:	Observation of boiler chemistry
Leak detection:	The Recovery Boiler Advisor and In-house Mass Balance systems installed.. RBA down & small leak below detection level for In-house system
Sequence of events:	First indication of leak was drop in boiler PO_4 level, which was stabilized with increased feed. All other indications normal at 10 PM. Next morning, spouts sporadic and operator used rod to check primary ports in spout area and felt something moving the rod. ESP initiated at 10:55 AM. During draining, spewing smelt/vapor observed on bed camera screens that could not be seen when liquor was being fired.
Bed cooling:	Yes. Sodium bicarbonate applied by Southland Fire & Safety
Wash adjacent tube:	No
Repair procedure:	72 of 154 tubes had “notch” indication. 50 tubes were sectioned and welded with a different weld design. The other tubes were reinforced, and some repaired and reinforced.
Root cause:	The weld design created a “notch” where the peel back of the Inconel 825 outer surface was terminated. The exposed carbon steel end of the composite tube was welded into the header. The notch at termination was a stress point and the cause of fatigue cracking.
Future prevention:	Wall to header connections to be inspected at annual outage February 2003
Last full inspection:	January 2002

SUMMARY OF RECOVERY BOILER INCIDENTS
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2002 April – 24	
Location:	**Norske Canada, Crofton, British Columbia**
Unit:	No. 3 Recovery boiler. B&W Contract No. C-7081. Startup 1973. B&W Revamp Contract 691-7646 in 1991.
Size:	2.8 million ppd solids Operating at600 psig & 750F. Design at 750 psig. 2 drum/large economizer
Incident Date:	October 22, 2001
Leak/Incident Loc:	**Lower Furnace** – ~ 5 ft. below the lowest point of the floor. A 1 in. crack in the head of the 18 in. NPS distribution header from which supply tubes feed the lower furnace headers. Header ends protrude from lower vestibule and are encased in casing boxes. Crack in a 5 in. diameter circular groove worn in left head
Downtime hrs due to leak/total:	Not applicable
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	During annual inspection hydrostatic test.
Leak detection:	None installed
Sequence of events:	Crack in leak observed during outage and repaired
Bed cooling:	Not applicable
Wash adjacent tube:	No
Repair procedure:	New head installed (Schd 80, SA-234 WPB Pipe Cap)
Root cause:	Suspect vortex formation in the head. Groove at thinnest area had plastic deformation. Similar, less severe groove in right head
Future prevention:	Right head to be installed during March 2002 outage. This has been completed
Last full inspection:	Inspected October 2001.

2002 April – 25	
Location:	**Gulf States Paper Corp., Demopolis, Alabama**
Unit:	B&W Contract PR-218. Startup 1992
Size:	3.3 million ppd solids. Operating at 600 psig & 750F. Design at 875 psig. Single drum/large economizer
Incident Date:	September 28, 2001
Leak/Incident Loc:	**Smelt Spout** – crack in spout below the weld at ~ 7 o'clock position of discharge
Downtime hrs due to leak/total:	Total downtime- 24 hours
ESP?	No.
Classification:	**Non-critical Incident**
How discovered:	
Leak detection:	
Sequence of events:	While spout was plugged to repair shatter spray, a leak was observed at the spout discharge.
Bed cooling:	
Wash adjacent tube:	
Repair procedure:	Replaced spout. Welds on other three spouts overlaid with Inconel 625. These three will be changed out during mill outage October 2001
Root cause:	Corrosion due to fuming at spout discharge end creating external crack
Future prevention:	Continue to monitor and maintain normal dissolving tank level and spout cooling water temperature
Last full inspection:	Inspected October 2000

SUMMARY OF RECOVERY BOILER INCIDENTS
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2002 April – 26	
Location:	**Norske Canada, Elk Falls Division, Campbell River, British Columbia**
Unit:	No. 1 Recovery. B&W Contract No. 5682. Startup 1967
Size:	1.25 million ppd solids. Operating at 625 psig & 675F. Design at 650 psig. 2 drum/DCE
Incident Date:	January 31, 2002
Leak/Incident Loc:	**Superheater** – leak at seating surface of handhole on superheater outlet header. Header is inside penthouse. Leak near center of header, on backside
Downtime hrs due to leak/total:	Total downtime- 27.6 hours
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	By the fireman during boiler walkdown
Leak detection:	None installed
Sequence of events:	**Boiler was running at a reduced rating and sootblowers were off for the walkdown. The fireman opened the penthouse door-vapor and noise immediately evident. Liquor was pulled and the boiler cooled**
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Handhole seating surface in bad shape. Decision to seal weld the handhole
Root cause:	Gasket failure
Future prevention:	
Last full inspection:	May and October 2001

2002 April – 27	
Location:	**Norske Canada, Elk Falls Division, Campbell River, British Columbia**
Unit:	No. 1 Recovery. B&W Contract No. 5682. Startup 1964
Size:	1.25 million ppd solids. Operating at 625 psig & 675F. Design at 650 psig. 2 drum/DCE
Incident Date:	March 12, 2002
Leak/Incident Loc:	**Economizer** – 3/8 inch crack in a tube . Crack located at ”1/2 inch from tube to upper header weld.
Downtime hrs due to leak/total:	Total downtime- 17.5 hours
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	By the fireman during boiler walkdown
Leak detection:	None installed
Sequence of events:	Fireman during walkdown opened economizer door and noticed water running from above. Sootblowers were off for the walkdown. The water was directly under a sootblower, so it was run in 18 inch and isolated the steam. Observing no change in water flow, an orderly shutdown was started
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Leak weld repaired and radiographed
Root cause:	Not reported
Future prevention:	
Last full inspection:	May and Octoober 2001

SUMMARY OF RECOVERY BOILER INCIDENTS
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2002 April – 28	**Critical Incident No. 557**
Location:	**Norske Canada, Elk Falls Division, Campbell River, British Columbia**
Unit:	No. 2 Recovery. B&W Contract No. 5350. Startup 1963
Size:	2.4 million ppd solids. (Actual 3.3 million ppd) Operating at 625 psig & 675F. Design at 750 psig. 2 drum/DCE
Incident Date:	March 20, 2002
Leak/Incident Loc:	**Upper furnace** – pinhole leak in roof tube where the steam cooled spacer tube penetrates the roof
Downtime hrs due to leak/total:	Total downtime- 84.15 hours
ESP?	ESP initiated
Classification:	**Critical Incident**
How discovered:	By the fireman during boiler walkdown
Leak detection:	None installed
Sequence of events:	Fireman heard noise coming from left side of boiler on the 10th floor. Sootblower steam isolated and a furnace door opened. Joined by the shift engineer and Asst. Chief at the location, the evidence of small amounts of water and the hissing sound. Boiler was ESPd.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Weld repair using Procedure 60113 to repair hole and buildup wall of thinned tubes
Root cause:	Tube became thin (area size of a dime) and pinhole leak occurred. Two adjacent tube were also thinned
Future prevention:	
Last full inspection:	March 2002

2002 April – 29	
Location:	**Inland Paperboard and Packaging, Rome, Georgia**
Unit:	Rome Mill unit No. 5. Tampella contract No. 325. Startup 1988.
Size:	4.0 million ppd solids. Operating at 900 psig & 825F. Design at 1160 psig
Incident Date:	February 13,, 2002
Leak/Incident Loc:	**Economizer** – '3/4 inch circumferential crack at bottom 1st tube in panel #7 from the right sidewall. Crack about 1 ft. above header at termination of square cut fin
Downtime hrs due to leak/total:	Total downtime (liquor to liquor) – 60 ¼ hours
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	Operator making rounds found water in the economizer No. 1 ash hopper drag conveyor. (No. 1 is feedwater inlet, gas outlet bank)
Leak detection:	Nalco Trasar and Mass Balance systems in operation but leak to small for detection
Sequence of events:	Operator making rounds found water in the economizer No. 1 ash hopper drag conveyor. Boiler was shutdown in a normal manner
Bed cooling:	None
Wash adjacent tube:	No
Repair procedure:	Small crack ground out and weld repaired
Root cause:	Thermal stress
Future prevention:	
Last full inspection:	

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2002 April–INTL 1	**INTERNATIONAL**
Location:	**Australian Paper, Maryvale, Australia**
Unit:	Unit No. 6. B&W Contract C-7461. Startup 1984
Size:	__ million ppd solids. Operating at 6.3 MPa (900 psig) & 450C (842F). 2 drum/large economizer
Incident Date:	April 13, 2001
Leak/Incident Loc:	**Economizer –** crack in weld of casing support attachment to front row left side corner tube at generating bank outlet. Crack propagated through economizer wall. A stainless steel inner casing is supported by generating bank sidewall tubes and front row of economizer tubes. Casing bolted for support to stainless steel 'tabs' welded to tubes
Downtime hrs due to leak/total:	
ESP?	No
Classification:	
How discovered:	Operator during walkdown noticed water dripping from the economizer hoppers
Leak detection:	None installed
Sequence of events:	
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Stainless steel 'tab' removed, crack burred out and pad welded
Root cause:	Possible cause is differential expansion of stainless steel 'tab' welded to CS tube to support the stainless steel inner casing liner.
Future prevention:	Position of 'tabs' makes impossible NDT of welds. Plan is to progressively remove all these SS tabs and replace with chrome molly tabs welded to tube sleeves
Last full inspection:	Inspection every 12 months

2002 April–INTL 2	**INTERNATIONAL**
Location:	**Australian Paper, Maryvale, Australia**
Unit:	Unit No. 6. B&W Contract C-7461. Startup 1984
Size:	__ million ppd solids. Operating at 6.3 MPa (900 psig) & 450C (842F). 2 drum/large economizer
Incident Date:	May 22, 2001
Leak/Incident Loc:	**Upper Furnace** – pinhole at weld of scalloped tiebar to left hand sidewall at upper end of inside of nose arch.
Downtime hrs due to leak/total:	Total downtime – 30.7 hours
ESP?	No
Classification:	
How discovered:	Operator during walkdown noticed abnormal noise near the mud drum
Leak detection:	None installed
Sequence of events:	Operator determined noise still present when sootblowers turned off. No water found in hoppers. Called Shift Coordinator and Recovery Superintendent. Tradesmen removed lagging from area where leak noticed; water detected running on outside of tubes. Black liquor spraying was stopped and doors opened; no evidence of water entering furnace. Boiler taken off-line, cooled and leak located for repair. Water spraying away from furnace through gap in casing to outside.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Pinhole in tube burred out and filled with tube metal. Weld of poor quality with severe undercut.
Root cause:	Possible cause stress assisted corrosion at toe of weld
Future prevention:	Inspect tie bar welds to wall tubes at each outage.
Last full inspection:	Inspected every 12 months

SUMMARY OF RECOVERY BOILER INCIDENTS
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2002 April–INTL 3	**INTERNATIONAL**
Location:	**Australian Paper, Maryvale, Australia**
Unit:	Unit No. 6. B&W Contract C-7461. Startup 1984
Size:	__ million ppd solids. Operating at 6.3 MPa (900 psig) & 450C (842F). 2 drum/large economizer
Incident Date:	May 15, 2001
Leak/Incident Loc:	**Lower Furnace** – below floor crack at membrane bar termination weld between center and rear shop assembled right sidewall panels. Termination weld crack propagated into the wall tube just above center header.
Downtime hrs due to leak/total:	Total downtime – 28.3 hours
ESP?	No
Classification:	
How discovered:	Operator during walkdown noticed water dripping from lower plenum bottom access door
Leak detection:	None installed
Sequence of events:	Operator contacted Shift Coordinator, who called in daywork staff (Superintendent, Power/Recovery Engineer & Power/Recovery Operations Manager). Black liquor spraying was stopped and access door opened. Leak confirmed but not located (boiler had history of header handhole cap leaks). Boiler taken off-line, cooled and drained.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Membrane adjacent to failed area was cut away and not replaced. Crack weld prepped by grinding to a "V" and filled with weld metal.
Root cause:	Possible cause is poor weld quality combined with panel joint induced fatigue stress to the weld. Original weld deposited across end of membrane in transverse direction to tube. (Note by subcommittee secretary-probably a field construction weld)
Future prevention:	Dye penetrant inspection of all panel joints in lower plenum
Last full inspection:	Inspected every 12 months

2002 April – INTL 4	**International - Brazil**
Location:	**Aracruz Celulose S/A - Aracruz - Espírito Santo - Brazil**
Unit:	Unit "B " ; Gotaverken; start-up 1991
Size:	7.05 million ppd solids. Operation@ 910 psig & 842 F
Incident Date:	October 5th , 2001
Leak/Incident Loc:	**Superheater** - One sootblower external lance had a failure in the fitting body and was launched inside SH. It didn´t fall into the furnace and there was no damage in pressure parts.
Downtime hrs due to leak/total:	24 hours
ESP?	No
Classification:	Critical (Classification assigned by Brazilian Safety Committee)
How discovered:	Operator routine inspection
Leak detection:	No
Sequence of events:	The field operator found the damaged sootblower without lance, concluding it was launched into the boiler.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	The lance was removed by hand using a man door and the SH was inspected visually.
Root cause:	Mechanical fatigue in the fitting body accelerated by machining grooves left in the piece during fabrication. The lance had been installed in March 2001 (7 months in operation)
Future prevention:	Inspected all sootblowers in 3 recovery boilers using PT and X-Ray. The supplier was contacted to solve the fabrication problem.
Last full inspection:	January 22, 2001

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2002 April –INTL 5	**International - Brazil**
Location:	**International Paper, Mogi-Guaçu, São Paulo State, Brazil**
Unit:	No.4 Recovery Boiler. B&W . Start-up 1985 Revamp in 2000 by B&W
Size:	0.693 million ppd solids. Operating @ 427 psig & 680F
Incident Date:	October 9, 2001
Leak/Incident Loc:	**Dissolving Tank**
Downtime hrs due to leak/total:	Total downtime - 76hr-24 min
ESP?	No
Classification:	**Dissolving Tank Explosion (Classification assigned by Brazilian Safety Committee)**
How discovered:	Smelt spout plugged (Unit is equipped with a single spout)
Leak detection:	No
Sequence of events:	Problem with the black liquor flow indicator drove to an excessive liquor feed to the furnace and plugged a spout. Four oil burner were put on and manual lancing was used. When spout was unplugged heavy smelt run was not controlled causing the steam nozzle misalignment and damage to the reinforcing beam of the tank and the spout.
Bed cooling:	Not applicable
Wash adjacent tube:	Not applicable
Repair procedure:	Substitution of smelt spout and repair of the reinforcing beam of the dissolving tank.
Root cause:	Procedure says to light one burner when plugging occurs, not 4 burners.
Future prevention:	Reinforce training of operators, existing procedures, and use of the plugging lance
Last full inspection:	May, 2001

2002 April –INTL 6	**International - Brazil**
Location:	**Aracruz Celulose S/A - Aracruz - Espírito Santo - Brazil**
Unit:	Unit "A " ; Gotaverken ; start-up 1978
Size:	3.96 million ppd solids. Operation@ 910 psig & 842 F
Incident Date:	August 11, 2001
Leak/Incident Loc:	**Boiler Bank -** Seventh riser tube, before leaving the gas outlet got cut due to loss of material by abrasive means between the damaged tube and a broken support**.**
Downtime hrs due to leak/total:	Desconsidered. The annual shutdown was anticipated 2 days.
ESP?	No
Classification:	Critical
How discovered:	Increase of the draft and immediate visual inspection by operators.
Leak detection:	No
Sequence of events:	The operator noted a rapid increase of the draft and pressurization of the furnace, relating this to a possible plugging of the boiler bank.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	No repair was made because the boiler was programmed to go thru a retrofit two days later.
Root cause:	Mechanical erosion of the tube with the leak by rubbing against the broken support
Future prevention:	Recycling of operators, because they took too long to check the water-vapor curve, that was jeopardized by a plugging problem.
Last full inspection:	August 9, 2000

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2002 April –INTL 7	**International - Brazil**
Location:	**Celulose Nipo-Brasileira AS- CENIBRA, Belo Oriente, Minas Gerais State, Brazil**
Unit:	No. Recov. Boiler. CBC contract start-up 1976. CBC (Mitsubishi) Revamp in 1995.
Size:	3.0 million ppd solids. Operation @ 924 psig & 842F
Incident Date:	Jan23, 2002
Leak/Incident Loc:	**Superheater-** Circumferential cracks that originated at the welds of primary SH spacers.
Downtime hrs due to leak/total:	139 hr- 45 min
ESP?	No
Classification:	**Not classified**
How discovered:	Water-steam differential and strange noises
Leak detection:	No
Sequence of events:	Operator noticed his trend of water-steam in the control room and field operators confirmed noises by opening the upper inspection doors of the boiler
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	22 tubes of 50 mm were replaced and crack was repaired
Root cause:	Fatigue stress on welds
Future prevention:	Next August shutdown primary, secondary and tertiary SH and respective headers will be replaced.
Last full inspection:	October, 2001

2002 April –INTL 8	**International - Brazil**
Location:	**Rigesa Celulose Papel e Embalagens Ltda- Tres Barras, Santa Catarina, Brazil**
Unit:	No.3 Recovery Boiler. Ahlstrom contract No. 4000031. Start up July7,1999
Size:	1.32 million ppd solids. Operating @ 597 psig & 860F
Incident Date:	Oct 19, 2001
Leak/Incident Loc:	**Primary Superheater -** Small crack of 12 mm wide at tube No.34, at the 6th loop weld sealing box in the penthouse. (2 months earlier, the adjacent tube had the same problem)
Downtime hrs due to leak/total:	80hr- 31 min
ESP?	No
Classification:	**Not classified**
How discovered:	Sensors of the Acoustic Leak Detection System alarmed.
Leak detection:	Yes.
Sequence of events:	Sensor No.2 of the Acoustic Leak Detection System at primary SH alarmed periodically on Oct 10, and on continuous basis on Oct 15. This could mean a leak or plugging noise. Boiler was shutdown, nothing noted, put back on line. But on Oct 18 vacuum increased, unit was shutdown, cleaned and cooled. After this work, sensors No.1 and No.5, around No.2, also alarmed, showing that it was not only a pluggage. On the 20th liquor was resumed, unit cooled for 24 hr, washed, inspected and water was noted running down on the 2nd loop of primary SH (it had been filled with water and chemicals). Leak was finally seen after removing refractory in the penthouse and SH sealing box where water was trapped. Hydro OK after repair.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Crack was welded
Root cause:	Stress/Failure of welded tube in the SH sealing box in penthouse
Future prevention:	Apparently, better construction
Last inspection:	April 1, 2001

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2002 April –INTL 9	**International - Brazil**
Location:	**Votorantim Celulose e Papel - Luiz Antonio, São Paulo State, Brazil**
Unit:	No.1 Rec Boiler. CBC start-up 1991.
Size:	2.2 million ppd solids. Operation @ 967 psig & 852F
Incident Date:	Dec 19, 2001
Leak/Incident Loc:	**Boiler Bank.** Tube No.36, side wall, 1st row of gas entrance.
Downtime hrs due to leak/total:	Not informed
ESP?	No
Classification:	**Non-critical (Classification assigned by Brazilian Safety Committee)**
How discovered:	Leak was detected during visual inspection after hydrostatic test
Leak detection:	No
Sequence of events:	Boiler was down for normal shutdown. Leak was detected after water wash.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Damaged tube was replaced
Root cause:	Not informed
Future prevention:	Not informed
Last full inspection:	Not informed

Recommended Guidelines for
Post-ESP Procedures for Black Liquor Recovery Boilers

The activities that take place following initiation of an Emergency Shutdown Procedure (ESP) on a black liquor recovery boiler can have a significant impact on personnel safety, equipment protection and down time. The following guidelines are intended to identify the essential elements of a Post-ESP Procedure. It is the responsibility of each operating company to use these guidelines to develop a comprehensive set of site-specific procedures covering post-ESP activities. These guidelines are intended to cover situations when there has not been an explosion. In the event that an explosion occurs prior to, during, or following an ESP, the post-ESP procedures may have to be altered to deal with emergency situations.

This guideline reflects nomenclature and functions of current system installation and industry practice. This document should not be used to interpret BLRBAC system design recommendations. For detailed ESP system recommendations refer to BLRBAC document "Emergency Shutdown Procedure (ESP) and Procedure for Testing ESP System for Black Liquor Recovery Boilers".

1.0 Verification of ESP Functions

Immediately following initiation of an ESP, the control room operator should use a customized checklist to verify that all ESP functions took place. This checklist should contain information regarding the desired status of equipment following the ESP. The checklist should include the following equipment/functions, where applicable:

- Warning lights went on
- Siren sounded
- Black liquor pump(s) shut down
- Black liquor diverted
- Auxiliary fuel tripped
- Feed water stop valve closed
- Rapid drain valves opened
- Drum level dropped indicating unit is draining
- Desuperheater stop valve closed (pumped systems)
- Desuperheater control valve(s) closed (sweetwater condenser systems)
- Chemical feed pumps shut down
- Chemical feed flush water system isolated
- Air heater steam supply shut off
- Fuel supply to direct fired air heaters shut off
- Water supply to water coil air heaters shut off
- Soot blower steam supply shut off
- Steam supply to direct and indirect liquor heaters shut off
- Auxiliary fuel atomizing steam supply shut off
- NCG gases diverted

- Waste stream supply valves closed, pumps shut off
- Primary air damper closed
- I.D. Fan maintaining balanced draft
- F.D. Fans and secondary/tertiary air dampers followed ESP logic
- Superheater vent valve opened after appropriate time interval
- Furnace floor thermocouple recording device activated

The above list is not intended to be all-inclusive and each mill should review their system to insure that the checklist covers all ESP functions. A mill may elect to add additional items to this list that are considered to be good operating procedures but are not necessarily covered under the ESP Guidelines. Examples are functions such as: "saltcake feeder screw shut off", and "precipitator drag conveyors shut off".

2.0 Operating Procedures

There should be site-specific operating procedures covering the following:

2.1 **Evacuation.** There should be procedures covering evacuation of the area and a method for accounting for personnel

2.2 **Failure of ESP Functions.** Site-specific operating procedures should be developed to cover failure of each of the ESP functions included on the checklist. The procedures should incorporate information from the BLRBAC ESP guidelines regarding the desired status of the equipment following an ESP. The procedures should also incorporate the instructions from the ESP Guidelines that prohibit restarting any fan, including the I.D. fan, that trips immediately prior to or during an ESP.

2.3 **Control of Access.** Procedures should be established to control access to the area until re-entry is permitted.

2.4 **Closing Remote Isolation Valves.** There should be a checklist of remote isolation valves to be closed following an ESP. Operating procedures should designate responsibility for closing the valves. Valves to be closed should include:

- Natural gas supply valve
- Fuel oil supply valve
- Combustible waste streams

Closing these isolation valves will protect against fuel line rupture hazards in the event of an explosion. In addition to isolating fuel lines, consideration should also be given to isolating the feedwater header and all steam headers (with the exception of the header providing steam to the smelt shatter jets) if it can be done safely from remote locations.

2.5 **Notification.** There should be a list of management personnel, insurance company representatives and local authorities to be notified in the event of an ESP. The procedures should state who is responsible for making the notifications. If local fire or medical emergency services are summoned, they should be met at the mill gate by knowledgeable personnel who can direct their activities and keep them away from the area of explosion danger.

2.6 **Adjacent Equipment.** There should be procedures for operating and/or shutting down adjacent equipment.

2.7 **Lower Furnace Water Level.** The water level remaining in the lower furnace following an ESP should be measured to help determine the potential for overheat damage to floor and lower sidewall tubes. There should be site-specific procedures for collecting this information. Some boilers are equipped with permanent systems for measuring the water level over the full height of the furnace and it will only be necessary to assure that the information is recorded. On units that are not equipped with a permanent system, it will be necessary to install temporary clear tubing on a lower furnace drain connection after it is safe to re-enter the area following the ESP. There are instructions for doing this posted on the BLRBAC Web site. The water level data should be included as part of the BLRBAC incident report.

2.8 **Operating Data Collection.** Operating parameters before and after an ESP are often used to evaluate an incident. Each site should include a methodology to capture and document the operating parameters. Depending on the type control and monitoring equipment installed this may be either hard copy (charts) or soft copies of data that pertains to the boiler. It may include items such as:

- Combustion air system flows, temperatures and pressures
- Flue gas temperatures and drafts
- Floor tube temperatures
- Feedwater, blowdown and steam flows
- Drum level
- Drum pressure
- Feedwater, boiler water and blowdown analytical data (conductivity, pH, etc)
- Oil, gas and black liquor flows and pressures
- Superheater temperatures
- Sequence of event print outs
- First out print outs

3.0 Operator Interviews

All operators on duty at the time of the ESP should be interviewed before leaving the mill to assure all information relating to the ESP is available for making subsequent decisions. The interview should include:

- Events and/or conditions that led to the decision to ESP
- Any problems encountered during or following the ESP

4.0 ESP System Reset

The ESP system should not be reset until re-entry into the area is permitted. The ESP system reset logic/procedures may result in automatic movement of controls to undesired positions. Proper caution should be taken to position controls where intended. Examples of valves that may need isolation or manual positioning prior to reset include the feedwater to the economizer and the steam to the steam coil air heater(s).

The audible ESP alarm should be silenced after sounding for a minimum of 15 minutes if it is a distraction to operating personnel and impedes communications. Procedures to control access to the area should be in effect prior to silencing the alarm. Silencing the alarm should be completely independent of the ESP system reset. Visual alarms are to remain in effect until the ESP system is reset.

5.0 ESP Re-Entry Waiting Period

Post-ESP procedures should include rules covering the length of the waiting period for re-entry into the recovery boiler area following an ESP (no explosion). BLRBAC has not set a minimum waiting period and has left this decision to the operating companies. At the fall 1993 BLRBAC Meeting, a paper (copy attached) was presented summarizing BLRBAC recovery boiler explosion history including data on the time interval from water entry into the furnace till explosion. This information can be used as the basis for establishing a safe waiting period.

The industry currently utilizes two types of rules – fixed time periods and condition based.

5.1 **Fixed time period** – a number of companies set a fixed time period that personnel must remain outside the building following an ESP.

5.2 **Condition based rules** – with condition-based rules, the information available to operating personnel is used to determine the minimum-waiting period that personnel must remain outside the area following an ESP. The following conditions should be considered when determining the waiting period:

- **Location of leak** (Water could / could not enter the furnace.)
- **Size of leak** (Large / Small)
- **Was the boiler successfully ESP'ed?** (Yes / No)
- **Evidence of floor tube damage resulting from the ESP** (Yes / No)

Use of condition-based rules will require establishing a minimum waiting period for each of the possible combinations of conditions listed above. Procedures should designate who is responsible for making the decision regarding the waiting period.

Example 1: After the boiler was ESP'ed, it was determined that there was a small leak in the economizer (no possibility of water entering the furnace), the boiler was successfully ESP'ed and there was no evidence of floor tube damage from the ESP. These conditions would require minimal waiting time before re-entering the building.

Example 2: After the boiler was ESP'ed, it was determined that there was a large leak in the lower furnace, the boiler did not drain**,** and there was no evidence of damage to the floor due to the ESP. These conditions would require maximum waiting time before re-entering the area.

Inadequate Information. If any of the information required to make a decision is not available or the accuracy is questionable, the worst conditions should be assumed and the maximum waiting period should be used.

6.0 Re-Entry into Recovery Boiler Area

Once the waiting period has expired, one or two qualified personnel should enter the recovery building to determine if there are any conditions that require extending the waiting period. If there are not, then required operating and maintenance personnel can be allowed back into the area.

If there is any evidence of accumulation of water on the bed, operating and maintenance personnel should be kept out of the area until all indications of any hot spots in the bed are gone. The surface of the bed fractures as it cools and the potential exists for accumulated water to enter one of these fractures and cause a smelt water explosion.

7.0 Condition Assessment

After re-entry into the area, it will be necessary to assess the condition of the boiler to determine what steps are required to make repairs and get the boiler ready to return to operation. This assessment should include the following:

- Assessment of the condition of the char bed and determination of whether

supplemental bed cooling will be used
- Determination of whether it will be necessary to water wash
- Determination of whether a hydrostatic test will be required to locate the leak
- Identification of the location of the leak and extent of damage
- Evaluation of floor thermocouple data and any information regarding lower furnace water level to determine if the floor boiled dry and the potential for floor tube damage

The normal sequence of events following condition assessment will be:

- Char bed cool-down
- Probing bed to check for hot spots
- Water washing
- Hydrostatic test for determination of leak location
- Leak repair
- Floor cleaning and inspection
- Final hydrostatic test

8.0 Char Bed Cool-Down

Before the furnace can be water-washed or hydrostatically tested, it is necessary to determine that the char bed / smelt pool has cooled sufficiently to ensure that there is no longer the possibility that molten smelt is present. A char bed is highly insulating and pockets of molten smelt can exist in a large bed for several days after an ESP. Before the furnace can be water-washed, the bed should be probed with thermocouples to make certain that no hot spots remain that could contain molten smelt. A hard crust will normally form on the surface of the bed and some hand lancing will usually be necessary to break up the crust to allow checking subsurface material for hot spots. Under no circumstances should water washing begin if there are any visible, glowing hot spots present in the char bed.

The char bed can be allowed to cool on its own or it can be broken up and cooled down using hand lances to inject a cooling medium such as nitrogen propelled sodium bicarbonate, liquid carbon dioxide, or low pressure dry steam. The use of hand lances with cooling medium facilitates break-up of the bed crust - disrupting the bed and exposing hot material to the cooling medium. In addition to significantly reducing the cool down time, breaking up the bed makes it much easier to probe the bed with thermocouples and determine that all hot spots have been eliminated. Under no circumstances should water - including “fog” nozzles - be used for bed cooling.

Each mill should have a written char bed cool-down procedure that includes the following:

- Procedures for use of bed cooling mediums such as sodium bicarbonate, liquid carbon dioxide or low-pressure steam (if they are to be used). If low-pressure steam is to be

used, the procedures need to include provisions to prevent any condensate from entering the furnace.
- Type of thermocouple equipment and procedures to be used for probing the bed to check for hot spots.
- Maximum bed temperature allowable to start water washing in the furnace. For units with hearth designs that retain a residual pool of smelt, the procedures may also include a minimum time interval before water washing can commence.

The melting temperature for smelt is normally around 1400° F but it can be as low as 1000° F depending on the chemistry. The maximum bed temperature allowable to start water washing should provide enough safety-margin to take into account potential variations in smelt chemistry, the potential for localized hot spots, and the inability to probe 100% of the bed. The maximum bed temperature used by the majority of companies that provided input for these guidelines is 800° F.

9.0 Water Washing

Following completion of cool down of the bed including any minimum time interval requirements, water washing of the furnace can begin using the mill's normal water wash procedures. These procedures should include the following:

- The differential between wash water temperature and pressure part metal temperatures does not exceed manufacturer's recommendations
- An adequate number of smelt spouts are open to drain wash water
- Procedures to protect personnel from burn hazard due to exposure to hot water
- Procedures to prevent flooding and collapse of flues, ducts, hoppers, etc. due to plugged drain lines or openings

As an additional precaution, consideration should be given to having all but essential personnel leave the area for a pre-established period of time starting prior to the introduction of wash water into the furnace.

10.0 Floor Inspection

The floor thermocouple data and any information regarding lower furnace water level should be evaluated to determine if the floor boiled dry and the potential for floor tube damage. If there is evidence of potential damage, then the floor should be cleaned and inspected prior to starting back up.

11.0 Check of Drum Internals

There have been several reports of loose drum internals found after an ESP. Drum internals should be checked prior to putting the boiler back in service.

12.0 Hydrostatic Tests

A final hydrostatic test should be conducted following completion of repairs and inspection of the unit. The ESP procedure subjects the boiler to significant thermal stresses so the boiler should be thoroughly inspected for any resultant damage. In a number of cases, leaking generating bank tube seats were found in two-drum recovery boilers following an ESP, so the generating bank should be carefully inspected for leaks.

SUOMEN SOODAKATTILAYHDISTYS
FINNISH RECOVERY BOILER COMMITTEE

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ACTIVITIES 2001

Sebastian Kankkonen
Secretary

BLRBAC spring meeting April 8.-10. 1

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FINNISH RECOVERY BOILER COMMITTEE

Recovery Boiler Operation Data

- 22 Boilers in operation at 18 mills
- Total BL firing capacity 38 000 tds/day
  84 MM lb ds/day
- Average boiler size: 1730 tds/day
  3.7 MM lb ds/day

  Average boiler age: 21.5 yrs

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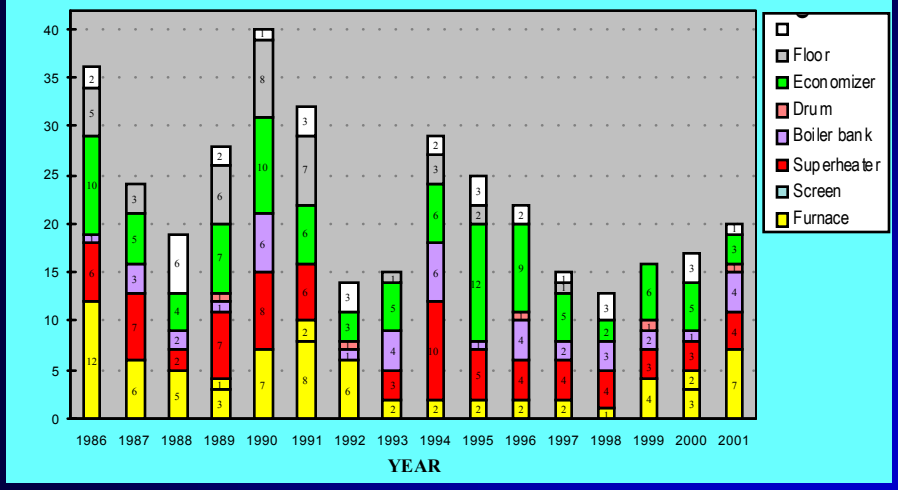

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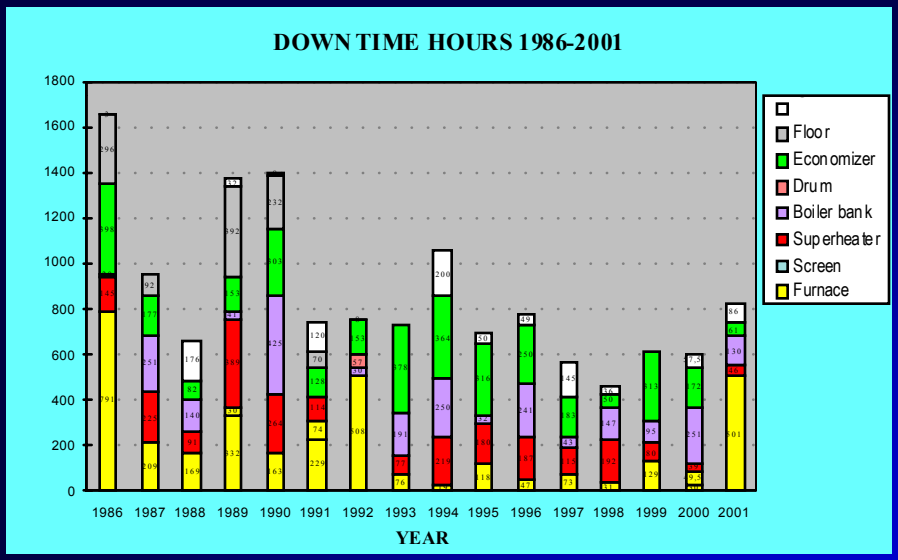

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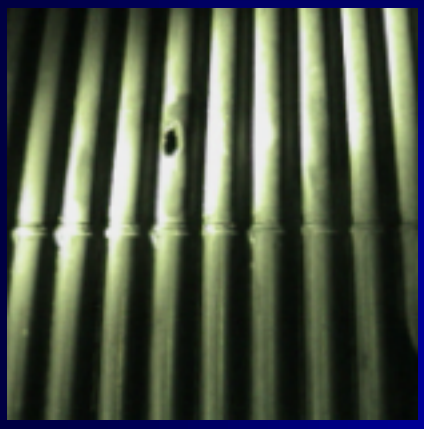
Hydrogen corrosion damage



- CE boiler from 1959
- Pressure reduced from 80 ⇒ 60 bar (1150 ⇒ 850 psig) before incident
- Wall tubes changed during 3 service stoppages
- Poor water quality

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Salt cake damage

- Salt cake caused 96 hrs of further down time
- Dent in floor was 6 inches deep

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Recent research topics

- Wall tube hydrogen corrosion
- New materials for the recovery boiler
- Odorous gas firing (HVLC and LVHC)
- Release of sulphur compounds at the evaporation plant

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Future research

- Recommendations for Safety Logic design
- Future Recovery Boiler design – ways to increase the power to heat –ratio

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FINNISH RECOVERY BOILER COMMITTEE
Recovery Boiler Day 2002
Oct. 10
in Helsinki,
Finland
BLRBAC spring meeting April 8.-10.
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