BLACK LIQUOR RECOVERY BOILER
ADVISORY COMMITTEE

MINUTES OF MEETING
Crowne Plaza Hotel/Atlanta Airport
October 24, 25 & 26, 2016

OBJECTIVE

BLRBAC's objective 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:	**John Gray** Rayonier Advanced Materials 10 Gum Street Fernandina Beach, FL 32035	Tel: 912-277-1388 Cell: 912-321-7582 john.p.gray@rayonieram.com
Vice-Chairman:	**Dave Slagel** International Paper 1 Bonnybridge Road Port Wentworth, GA 31407	Tel: 912-966-4312 Cell: 912-247-6295 david.slagel@ipaper.com
Secretary:	**Everett Hume** FM Global 1151 Boston-Providence Turnpike Norwood, MA 02062	Tel: 781-255-4733 Cell: 413-323-6781 everett.hume@fmglobal.com
Treasurer:	**Len Olavessen** LENRO, Inc. 1851 N. Virginia Avenue Bartow, FL 33830	Cell: 901 573 8343 olavessen@aol.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. ***Bylaws - 3.1***

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

EXECUTIVE COMMITTEE

John Gray
BLRBAC Chairman
Rayonier Advanced Materials
10 Gum Street
Fernandina Beach, FL 32035
Tel: 904-277-1388
Cell: 912-321-7582
john.p.gray@rayonieram.com

Dave Slagel
BLRBAC Vice-Chairman
International Paper
1 Bonnybridge Road
Port Wentworth, GA 31407
Tel: 912-9664312
Cell: 912-247-6295
david.slagel@ipaper.com

Everett Hume
BLRBAC Secretary
FM Global
1151 Boston-Providence Turnpike
Norwood, MA 02062
Tel: 781-255-4733
Cell: 413.265.9562
everett.hume@fmglobal.com

Len Olavessen
BLRBAC Treasurer
LENRO, Inc.
1851 N. Virginia Avenue
Bartow, FL 33830
Cell: 901-573-8343
olavessen@aol.com

David von Oepen
Operator Representative
WestRock
28270 U.S. Highway 80 West
Demopolis, AL 36732-5152
Tel: 334-289-6315
dvonoepen@westrock.com

John Phillips
Manufacturing Representative
Andritz
1115 Northmeadow Parkway
Roswell, GA 30076-3857
Tel: 770-640-2434
Cell: 678-427-6899
john.phillips@andritz.com

Jimmy Onstead
Insurance Representative
FM Global
5700 Granite Parkway, Suite 700
Plano, TX 75024
Tel: 972-731-1656
jimmy.onstead@fmglobal.com

****

Secretarial Services
Barbara Holich
5500 Irish Spring Street
Las Vegas, NV 89149
Frank's Cell: (630) 269-1005
Barbara's Cell: (630) 640-1805
E-Mail: **fhholich@aol.com**

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BLRBAC SUBCOMMITTEES

AUXILIARY FUEL **Bruce Knowlen, Chairman** International Paper Mailstop: CH 3D29 PO Box 9777 Federal Way, WA 98063 Tel: 253-924-6434 **bruce.knowlen@ipaper.com**	**BLACK LIQUOR, SAFE FIRING OF** **Vernon Blackard, Chairman** International Paper 2895 79 Trail Rd. Roy MT 59471 Cell: 251-284-3471 **vernon.blackard@ipaper.com**
EMERGENCY SHUTDOWN PROCEDURES **John Andrews, Chairman** BSI 2347 MacLaura Hall Avenue Charleston, SC 29414 Tel: 843-509-4926 **jandrews1975@comcast.net**	**FIRE PROTECTION IN DIRECT CONTACT EVAPORATORS** **Craig Cooke, Chairman** FM Global 815 Byron Drive Oconomowoc, WI 53066 Tel: 262-567-7370 **craig.cooke@fmglobal.com**
INSTRUMENTATION **David Avery, Chairman** Domtar Paper Company P. O. Box 678 Bennettsville, SC 29512 Tel: 843-454-8937 **david.avery@domtar.com**	**MATERIALS & WELDING** **Blair, Mike, Chairman** International Paper 6285 TriRidge Blvd. Loveland, OH 45140 Tel: 205-260-6359 Cell: 205-260-6359 **michael.blair@ipaper.com**
PERSONNEL SAFETY **Robert Zawistowski, Chairman** Power Specialists Associates, Inc. 531 Main Street Somers, CT 06071 Tel: 860-763-3241, Ext. 135 **bob.zawistowski@psaengineering.com**	**PUBLICITY & NEWS RELEASE** **Matt Paine, Chairman** FM Global 1151 Boston-Providence Turnpike Norwood, MA 02062 Tel: 781-255-4733 **matthew.paine@fmglobal.com**
WASTE STREAMS **Paul Seefeld, Chairman** A.H. Lundberg Associates, Inc. 6174 Kissengen Springs Ct Jacksonville, FL 32258 Tel: 904-614-6492 **paul.seefeld@lundberg-us.com**	**WATER TREATMENT** **Tom Przybylski, Chairman** Power Specialists Associates 531 Main Street Somers, CT 06071 Tel: 860-763-3241 **tom.@psaengineering.com**

FUTURE BLRBAC MEETINGS

Spring	**April**	***10, 11 & 12 confirmed**	**--**	**2017**
Fall	**October**	**2, 3 & 4 confirmed**	**55th Anniversary** Reduced registration fee of $55 for all first time attendees and all operators.	**2017**
Spring	**April**	***9, 10 & 11 tentative**	**--**	**2018**
Fall	**October**	***22, 23 & 24 tentative**	**--**	**2018**
Spring	**April**	**8, 9 & 10 tentative**	**--**	**2019**

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

■ Past Chairman Lon Schroeder

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* **NOTE:** For varying reasons, the previously published meeting dates have been changed at the discretion of the Executive Committee.

BLRBAC has established its own WEB Site which is: www.blrbac.org

At this WEB site you will find a copy of past Meeting Minutes and the next Meeting Notice. Therefore, each Representative and Associate Representative is asked to inform their people of this WEB site. This is where they can obtain the following BLRBAC documents:

BLRBAC MEETING NOTICE

COVER LETTER — General Information

REGISTRATION FORM — Print and mail to Said & Done with appropriate fees before the posted cut-off date.

CROWNE PLAZA HOTEL — Blocked room dates, pricing, address, hotel phone numbers

SCHEDULE — List of subcommittee activities on Monday and Tuesday

AGENDA — Reports given to Joint BLRBAC Meeting on Wednesday

OPERATING PROBLEMS QUESTIONNAIRE — Mail/e-mail completed questionnaires to Barbara Holich. These will be given to the Vice Chairman and he will see that your concerns are brought up and discussed during the Operating Problems session at the next meeting.

Mrs. Barbara Holich
BLRBAC Secretarial Services
5500 Irish Spring Street
Las Vegas, NV 89149

Frank's Cell Phone: 630-269-1005
Barbara's Cell Phone: 630-640-1805
E-mail: fhholich@aol.com

These are available at the **BLRBAC INTERNET ADDRESS**: **www.blrbac.org**

BLRBAC Guidelines & Recommended Practices

LEGAL NOTICE

Emergency Shutdown Procedure (Dated: October 2012)

Safe Firing of Black Liquor in Black Liquor Recovery Boilers (Dated: April 2016)

Materials & Welding Guidelines (Dated: April 2013)

Safe Firing of Auxiliary Fuel in Black Liquor Recovery Boilers (Dated: February 2012)

Fire Protection in Direct Contact Evaporators and Associated Equipment (Dated: February 2012)

Personnel Safety & Training (Dated: February 2012)

Application of Rotork Actuators on Black Liquor Recovery Boilers (Dated: October 2005)

Post ESP Water Level (Dated: January 2005)

Post ESP Guidelines (Dated: October 2002)

Boiler Water Management Guidelines for Black Liquor Recovery Boilers (Dated: April 2016**)**

Instrumentation Checklist and Classification Guide for Instruments and Control Systems Used in the Operation of Black Liquor Recovery Boilers (Dated: April 2014)

Thermal Oxidation of Waste Streams in Black Liquor Recovery Boilers (Dated: April 2016)

If you have any questions, contact:

Secretary: **Everett Hume**
FM Global
1151 Boston-Providence Turnpike
Norwood, MA 02062

Tel: 781-255-4733
Cell: 413-323-6781
everett.hume@fmglobal.com

AUXILIARY FUEL SUBCOMMITTEE

‡**Bruce Knowlen – Chairman**
International Paper (formerly of Weyerhaeuser)
32901 Weyerhaeuser Way S.
Federal Way, WA 98001
Tel: (253) 924-4637
Cell: (253) 732-2285
bruce.knowlen@ipaper.com

‡**Tom DeBeer – Vice Chairman** AIG 5001 Willow Creek Drive Woodstock, GA 30188 Tel: (678) 494-6026 Cell: (404) 218-8613 thomas.debeer@aig.com	‡**Allen L. Ray – Secretary** Process Barron 105 19th Street South Birmingham, AL 35210 Tel: (205) 956-3441 aray@processbarron.com	**Chad Harrod** Georgia Pacific Brunswick Cellulose, Inc. PO Box 1438 Brunswick, GA 31520 Tel: (404) 652-5815 chad.harrod@gapac.com
‡**Brook M. Holland** George H. Bodman, Inc 228 Wild Rose Lane Canton, NC 28716 Tel: (828) 421-0487 (cell) brookmholland@gmail.com	‡**Kevin R. Huelsbeck** FM Global Property Insurance Midwest- Chicago Ops W4893 Cliff View Dr. Sherwood, WI 54169 Tel: (920) 205-5529 (cell) kevin.huelsbeck@fmglobal.com	‡**Greg Kornaker** Babcock & Wilcox Company P. O. Box 351 Barberton, OH 44203-0315 Tel: (330) 860-2009 gjkornaker@babcock.com
Dan Krekeler International Paper 6283 Tri-Ridge Blvd Loveland, OH 45140 Tel: (513) 802-7642 (cell) daniel.krekeler@ipaper.com	‡**Nick Merriman** Andritz Waagner-Biro-Platz 1 8074 Raaba/Graz, Austria Tel: +43-316-501-2810 Cell: +43-676-89-501-2810 nicholas.merriman@andritz.com	**Nathan Schindler** CCA Combustion Systems 884 Main St. Monroe, CT 06468 Tel: 203-268-3139 x 137 Cell: (203) 362-7520 NSchindler@peerlessmfg.com
Bentley Sherlock Georgia Pacific 133 Peachtree St. Atlanta, GA Tel: (404) 652-4608 bentley.sherlock@GAPAC.com		

‡Denotes attendance at the meeting in October of 2016.

EMERGENCY SHUTDOWN PROCEDURES SUBCOMMITTEE

John Andrews – Chairman
Boiler Services & Inspection (BSI)
2347 MacLaura Hall Avenue
Charleston, SC 29414
Tel: 843-509-4926
jandrews1975@comcast.net

‡**Dean Clay, Secretary** Boiler Services & Inspection (BSI) 935 Hidden Ridge Drive Milford, OH 45150-5588 Tel: (513) 576-0148 Cell: (513) 497-9070 dclay@fuse.net	‡**Scott Crysel** FM Global 5700 Granite Parkway, Suite 700 Plano, TX 75024 Tel: (972) 731-1658 scott.crysel@fmglobal.com	‡**James Franks** XL Catlin 855 Dogwood Road Somerville, TN 38068 Tel: (901) 465-0771 james.franks@xlcatlin.com
‡**John Harmon** GE Power Inc 200 Great Pond Drive Windsor, CT 06095 Tel: (860) 285-4436 john.harmon@ge.com	‡**Chris Jackson** Nautilus Loss Control 1362 11th Court, Fox Island, WA 98333 Tel (253) 303-0289 Cell (503) 840-5775 chris.jackson44@comcast.net	**Rinus Jellema** Nanaimo Forest Products' Harmac Pacific 1000 Wave Place Nanaimo, BC, Canada Tel (250) 701-1873 MJellema@harmacpacific.com
‡**John A. Kulig** Babcock & Wilcox Company P. O. Box 351, **BVSW2B** Barberton, OH 44203-0351 Tel: (330) 860-6438 jakulig@babcock.com	‡ **Karl Morency – Vice Chair** Georgia-Pacific 133 Peachtree Street NE Atlanta, GA 30303 Tel: (404) 652-4629 ktmorenc@gapac.com	‡**Scott Moyer** WestRock 1660 Prudential Drive, Ste. 202 Jacksonville, FL 32207 Cell: 904-437-7149 **scott.moyer@westrock.com**
‡**Frank Navojosky** International Paper Co 6283 Tri-Ridge Blvd Loveland OH 45140-7810 Cell: (513) 334-9999 frank.navojosky@ipaper.com	‡**John Phillips** Andritz Pulp & Paper 5405 Windward Parkway, Suite 100W Alpharetta, GA 30004 Tel: (770) 640-2434 john.phillips@andritz.com	‡**David Slagel** International Paper 1 Bonneybridge Road Port Wentworth, GA 31407 Tel: (912) 966-4312 david.slagel @ipaper.com
‡**John Weikmann** Valmet Inc 3430 Toringdon Way, Suite 201 Charlotte, NC 28277 Tel: (704) 414-3431 john.weikmann@valmet.com		

‡Denotes attendance at the October 2016 meeting.

FIRE PROTECTION IN DIRECT CONTACT EVAPORATORS AND ASSOCIATED EQUIPMENT SUBCOMMITTEE

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

Phil Ramsey - Vice-Chairman Kapstone Paper P. O. Box 118005 Charleston, SC 29423-8005 Tel: 843-745-3480 **phil.ramsey@kapstonepaper.com**	**Randy Baker** Buckeye Technologies One Buckeye Drive Perry, FL 32348 Tel: 850-584-1380 **randy_baker@bkitech.com**	**Robert Goddard** XL Group 129 Drive 1143 Tupelo, MS 38804 Tel: 662 844-5897 **robert.goddard@xlgroup.com**
Michael Hollern Verso 300 Pratt Street Luke, MD 21540 Tel: 301-359-3311, Ext. 3280	**Kevin Huelsbeck** FM Global Property Insurance Midwest-Chicago Ops N8955 Willow Lane Menasha, WI 54952 Tel: 920-205-5529 **kevin.huelsbeck@fmglobal.com**	**Nick Merriman** Austrian Energy & Environment Graz, Austria Tel: +43 316 501-2810 **nicholas.merriman@aee-austria.at**
Daniel Nesmith Kapstone P.O. Box 118005 Charleston, SC 29423-8003 Tel: **daniel.nesmith@kapstonepaper.com**	**Christopher Skorton** Australian Paper Tel: 61 0408-722-672 Chris.Skorton@AustralianPaper.com.au	**Alarick Tavares** Georgia-Pacific 133 Peachtree St. NE Atlanta, GA 30303 Tel 404-652-4606 **najtavare@gapac.com**
Jim Taylor Mondi Pine Bluff P. O. Box 20700 1701 Jefferson Parkway Pine Bluff, AR 71612 **jim.taylor@mondigroup.com**		

‡ Denotes attendance at the October 2016 meeting - no fall meeting.

.PUBLICITY & NEWS RELEASE SUBCOMMITTEE

‡Matt Paine - Chairman
FM Global
1151 Boston-Providence Turnpike
Norwood, MA 02062
Tel: 781-255-4733/ Cell: 781-255-4733
matthew.paine@fmglobal.com

‡ Denotes attendance at the October 2016 meeting

INSTRUMENTATION SUBCOMMITTEE

‡David Avery – Chairman
Domtar Paper Company
PO Box 678
Bennettsville, SC 29512
Tel: 843-454-8937
david.avery@domtar.com

‡Rick Matarrese – Sec FM Gobal 655 Engineering Dr. #300 Norcross, GA 30092 Tele: 770-777-3684 rick.matarrese@fmglobal.com	**David T. Boudreau** SAPPI (S.D. Warren Company) 1329 Waterville Road Skowhegan, ME 04976 Tel: 207-238-7502 dave.boudreau@sappi.com	**John Browning, Jr** Georgia Pacific Atlanta Ga Tel: 251-743-8336 john.browning@gapac.com
William Camp International Paper Company 100 Jensen Rd Prattville, AL 36067 Tel: 334-361-5620 bill.camp@ipaper.com	**‡Joel Byrd** International Paper Company Tel:985-516-1110 Joel.byrd@ipaper.com	**‡Chris Dailey** Georgia-Pacific 133 Peachtree St. NE (30303) Atlanta, GA 30348-5605 Tel: 404-652-2838 chris.dailey@gapac.com
Michael Kiper BSI Stapleton, Al 36578 Tel:251-422-4849 mkbasshunter@gmail.com	**‡Bruce Knowlen** International Paper WTC1B22 P. O. Box 9777 Federal Way, WA 98063 Tel: 253-924-6434 bruce.knowlen@ipaper.com	**‡Gregory J. Kornaker** Babcock & Wilcox Power Generation Group, Inc. 20 South Van Buren Avenue P.O. Box 351 Barbenton, OH 44203-0351 gjkornaker@babcock.com
‡Eladio Ruiz de Molina CORR System, Inc. 3026 Overhill Road Birmingham, AL 35223 Tel: 205-879-4382 eladiordm@aol.com	**Robert Putman** Kapstone Paper 5600 Virginia Ave. North Charleston, SC 29406 Tel: 843-745-3313	**Andy Smith** Global Risk Consultants 203 Dunleith Drive Woodstock, GA 30188 Tel: 770-928-3890 andy.smith@globalriskconsultants.com
‡Harri Soderlund Andritz 1115 Northmeadow Parkway Rosewell, GA 30076 Tel: 770-640-2409 Cell: 678-644-9882 **harri.soderlund@andritz.com**	**Jari Sopanen** Jari Consultoria de Automacao Ltda Rua Amilcare Bientinezi 315 cs 30 Capao Raso, Curitiba Brazil 81150-180 Tel: +554199991-3833 **jari@jariautomation.com**	**‡Gordon L. Vandenburg** Liquid Solids Control, Inc. P.O.Box 259, Farm St. Upton, MA 01568 Tel: 508-529-3377 **gordie@liquidsolidscontrol.com**
‡C.A. Vossberg Electron Machine Corp. P.O.Box 2349 Umatilla, FL 32784 Tel: 352-669-3101 **ca@electronmachine.com**	**John Cover** John E. Cover Engr., Inc. P.O. Box 35010 5425 Caldweld Mill Road Birmingham, AL 35236-6010 Tel: 205-991-7106 **coverj@asme.org**	

‡Denotes attendance at the meeting in October of 2016.

MATERIALS & WELDING SUBCOMMITTEE

‡**Michael Blair – Chairman**
International Paper
6285 TriRidge Blvd.
Loveland, OH 45140
Tel: 205-260-6359; Cell: 205-260-6359
michael.blair@ipaper.com

‡**Jesse Worsham - Co Chair** Domtar Paper Marlboro Mill P. O. Box 678 Bennettsville, SC 29512 Tel: 843-479-0200, Ext 8879 **jese.worsham@domtar.com**	**Lynn Barrett** Zampell Refractories 6801 Parke East Blvd. Tampa, FL 33610 Tel: **lbarrett@zampell.com** **John Heffernan** 262 Titus Ave. Warrington, PA 18976 Tel: 215 491 9300 **jheffernan@zampell.com**	**Jennings Bird** Metso Tel: 803 235 9091 Cell: **jennings.bird@metso.com**
‡**George Bodman** 13 Kingwood Villas Court Kingwood. TX 77339 Tel: 800 286 6069 or 281-359-4006 Cell: 713-557-2118 **blrclgdr@aol.com**	**Yurij Duda** Savcor Tel: **yurij.duda@savcorinc.com**	**Dave Fuhrmann** International Paper 6285 TriRidge Blvd. Loveland, OH 45140 Tel: 513-248-6954 **dave.fuhrmann@ipaper.com**
‡**Steve Harville** National Boiler Services Trenton, GA Cell: (251) 591-7850 **sharville @nationalboiler.com** ‡Alt: Mike Messamore*** National Boiler Services Tel: (706) 657-1584 **mmessamore @nationalboiler.com**	‡**Fabian Henriques** PSA Inc. 531 Main Street Somers, CT 06071 Tel: 614-440-4284 **fabian.henriques @psaengineering.com**	**Michael Hollern** New Page 300 Pratt St Luke, MD 21540 Tel: (301) 359 3311 X 3280 Cell: (301) 802) 2470 **mfh3@newpagecorp.com**
Dennis Hollenbach Alstom Power 2000 Day Hill Road Windsor, CT 06095 Tel: 860-285-9140 **dennis.hollenbach @power.alstom.com**	**Mark Hovinga** Babcock & Wilcox 20 S. VanBuren Avenue Barberton, OH 44203-0351 Tel: 330-860-6434 **mnhovinga@babcock.com**	**Billy Jones** Kapstone Tel: (843) 745-3507 Cell: (843) 297-2001 **william.jones_@kapstonepaper.com**

‡Denotes attendance at the meeting in October of 2016.

MATERIALS & WELDING (Cont.)

‡**Dave Lang** FM Global Box 1567 Little Elm, TX 75068 Tel: 972-731-1882 **david.lang@fmglobal.com**	**Mark LeBel** Andritz Pulp and Paper 1115 Northmeadow Parkway Roswell, GA 30076-3857 Tel (770) 640-2643 Cell (678) 577-8613 **mark.lebel@andritz.com** ‡**Alternate - Alec Shull**	**Michael Lykins** Packaging Corporation 1061 Woodcliff Drive South Elgin, IL 60177 Tel: 630-384-5272 Cell: 630.659.7115 **mlykins@packagingcorp.com**
Max D. Moskal M&M Engineering 11020 W. 72nd Street Indiana Head Park, IL 60525 Tel: 708-784-3564 **max_moskal @mmengineering.com** **Alternate - Ronald Lansing**	‡ **Preston Morgan** Chicago Tube & Iron a/k/a CTI Power PO Box 670 421 Browns Hill RD Locust, NC 28097 Tel: (704) 781-2067 Cell: (704) 533-4217 pmorgan@chicagotube.com	**Joe Nelson** Georgia Pacific Brunswick, GA Tel: 205-631-6457 Cell: 770-330-7924 jgnelson@gapac.com ‡Alt: **Terry Lane** Georgia Pacific Tel: 412 506 8168 **terry.lane@gapac.com**
Dan Phillips Wesco Welding Engineering Services Portland, Oregon 97062 Tel: 503-720 - 9270 phillipsdan@comcast.net	‡**Stacy Power** AZZ SMS 1615 118th Ave N. St. Petersburg FL 33716 Tel: 843-957-2111 **stacy.power@azz.com** **Alternate-Pedro Almador**	‡**Ron Reed** Valmet Tel: (704) 281-3073 Ron.reed@valmet.com Should be with Jennings Bird
‡**Bob Roy** RMR Mechanical PO Box 170 Cumming, GA 30028 Tel: 770-205-9646 **bob.roy@rmrmechanical.com** Dick Williams*** **dick.williams @rmrmechanical.com**	**Douglas Singbeil** FPInnovations – Paprican 3800 Wesbrook Mall Vancouver, BC V6S 2L9 Tel: 604 222 3254 Cell: 604 839 3254 **douglas.singbeil@fpinnovations.ca**	**Doug Keiley** KB Engineering and Inspection

‡Denotes attendance at the meeting in October of 2016.

PERSONNEL SAFETY SUBCOMMITTEE

Robert E. Zawistowski - Chairman
Power Specialists Assoc., Inc.
531 Main Street
Somers, CT 06071
Tel: 860-763-3241, Ext. 135
bob.zawistowski@psaengineering.com

‡**Steve Bogart** Weyerhaeuser 3401 Industrial Way P. O. Box 188 Longview, WA 98632 Tel: (360) 414-3337 **steve.bogart@weyerhaeuser.com**	‡**Sam Dean – Vice Chairman** Rayonier Advanced Materials 4470 Savannah Highway Jesup, GA 31545 Tel: (912) 427-5103 **samuel.dean@rayonierAM.com**	**John Fredrickson** Sappi Fine Paper NA 2201 Avenue B P.O. Box 511 Cloquet, MN 55720 Tel: (218) 878-4378 **john.fredrickson@sappi.com**
‡**Sam Hendrix** International Paper sam.hendrix@ipaper.com	**Ron Hess** Global Risk Consultants 110 Cedar Cove Court Buckhead, GA 30625 Tel: (770) 490-4719 **ronald.hess** **@globalriskconsultants.com**	‡**Wes Hill** Georgia-Pacific 349 NW 7th Ave Camas, WA 98607 Tel: (360) 607-4189 **wes.hill@gapac.com**
‡**Daryl Hoffman** FM Global Granite Park Two, 5700 Granite Parkway, Suite 700 Plano, TX 75024 Tel: (972) 731-1978 **daryl.hoffman@fmglobal.com**	**Jennifer Johnston** Georgia-Pacific 133 Peachtree St., NE Atlanta, GA 30303 Tel: (404) 652-4632 **jennifer.johnston@gapac.com**	‡**Eric Schwartz** Babcock & Wilcox 20 S. Van Buren Avenue Barberton, OH 44203-0351 Tel: (330) 860-1335 **eschwartz@babcock.com**
John Stelling Packaging Corporation N. 9090 County Road E. Tomahawk, WI 54487 Tel: (715) 453-2131, ext. 309 **jstelling@packagingcorp.com**	‡**Brian Fiala - Alternate** Packaging Corporation N. 9090 County Road E. Tomahawk, WI 54487 Tel: (715) 453-2131, ext. 551 **bfiala@packagingcorp.com**	**Chris Suresh** Domtar Paper 100 Clinchfield Street Kingsport, TN 37660 Tel: (423) 247-7111 **chris.suresh@domtar.com**
David Von Oepen Rock-Tenn 28270 U.S. Highway 80 West Demopolis, AL 36732-5121 Tel: (334) 289-6315 **dvonoepen@rocktenn.com**		

‡Denotes attendance at the meeting in October of 2016.

SAFE FIRING OF BLACK LIQUOR SUBCOMMITTEE

‡**Vernon Blackard - Chairman**
International Paper
2895 79 Trail Rd.
Roy MT 59471
Cell: 251-284-3471
vernon.blackard@ipaper.com

Clif Barreca International Paper P. O. Box 1391 New Bern, NC 28563 Tel: 252-633-7696 clif.barreca@ipaper.com	‡Raymond BurelleValmet Tel. 613 618-9172 Raymond.burelle@valmet.com	**Joel Byrd** International Paper 12515 Church Street Bogalusa, LA 70427 Tel: 85-516-1110 Joel.byrd@ipaper.com
Raul Das Buckeye Technologies One Buckeye Drive Perry, FL 32348 Tel: 850-584-1514 Cell: 850-672-2326 raul_das@bkitech.com raul_das@comcast.net	‡**Mark Donahue** Fossil Power Systems, Inc. 10 Mosher Drive Dartmouth, NS B3B 1N5, Canada Tel: 902-468-2743, Ext. 238 Cell: 902-468-2323 donahuem@fossil.ca	**Len Erickson** Power Specialist Assoc. 7744 West Paloma St. Boise, ID 83704-0701 Tel: 208-841-4246 len.erickson@PSAengineering.com
Daniel Franco Smurfit Kappa Columbia Calle 15 #18-109 Yumbo, Valle, Colombia Cel: +57 3113001079 Tel: (57-2) 6914 000 Ext. 2016 daniel.franco@smurfitkappa.com.cm	**Tim Hicks** Babcock & Wilcox 20 South Van Buren Avenue PO Box 351 Barberton, Ohio, 44203-0351 Tel: 330-860-2820 Cell: 330-730-7216 tehicks@babcock.com	**Majed Ja'arah** International Paper Rome GA majed.jaarah@ipaper.com
‡**Guy Labonte** FM Global 600 de la Gauchetiere Ouest, 14th Floor Montreal, Que H3B 4L8 Canada Tel: 514-876-7412 Cell: 514-942-3651 guy.labonte@fmglobal.com	‡**Doug Murch** WestRock 501 South 5th Street Richmond VA 23219 Tel: 804-444-5245 Cell: 804-787-0781 douglas.murch@westrock.com	**Bob Phelps** Extra Hand, Plant Support Services 5440 Karma Road Chester, VA 23831 Ph. (804) 921-7374 Cell: 804-748-4391 robert.phelps1@verison.net
Mark Sargent George H. Bodman, Inc. 857 Tall Trees Drive Cincinnati, OH 45245 Tel: 514-543-0480 msarge1031@yahoo.com	‡**Alvaro Timotheo** Andritz Pulp & Paper 5405 Windward Parkway, Ste.100W Alpharetta, GA 30004 Tel: 770-640-2642 Cell: 770-630-4577 alvaro.timotheo@andritz.com	‡**Thomas Wranosky - Co-chair** International Paper 568 Shore Airport Road Ticonderoga, NY 12883-9699 Tel: 518-585-5305 tom.wranosky@ipaper.com

‡Denotes attendance at the meeting in October of 2016.

WASTE STREAMS SUBCOMMITTEE

‡**Paul Seefeld**
A.H. Lundberg Associates Inc.
6174 Kissengen Springs Ct.
Jacksonville, FL 32258
Tel: 904-614-6492
paul.seefeld@lundberg-us.com

Mark E. Cooper FM Global 550Birmard St., Ste. 1788 Bentall 5 Vancouver, BC V6C2B5 Tel: 604-694-8262 Cell: 425-877-9735 **mark.cooper@fmglobal.com**	**Wendy Coyle** International Paper 7600 Highway 10 West Pine Hill, AL 36769 Office: 334-963-2362 Cell: 541-285-1867 **wendy.coyle@ipaper.com** **Substitute: Richard Waters**	‡ **David Frazier** International Paper Technology 6285 Tri-Ridge Blvd Loveland, Ohio 45140 Cell: 706-305-5321 **david.frazier@ipaper.com**
Michael Glasheen Expera Specialty Solutions prev. d/b/a Thilmany Kaukauna, WI **michael.glasheen@experaspecialty.com**	Gary Thomas Weyerhaeuser Address: City/State Zip Tel: **thomas.gary@weyerhaeuser.com**	**Meville Hedges** Babcock & Wilcox 2302 Parklake Drive, NE, Suite 300 Atlanta, GA 30345 Tel: 770-621-3907 **mhedges@babcock.com**
‡**Olli Kujanpaa** Georgia Pacific Atlanta, GA **olli.kujanpaa@gapac.com**	‡**John Lewis** Fluor Daniel Forest Products 100 Fluor Daniel Drive Greenville, SC 29607-2762 Tel: 864-517-1683 **john.lewis@fluor.com**	‡**Pasi Miikkulainen** Andritz 5405 Windward Parkway Alpharetta, GA 30004 Tel:770-640-2414 Cell: 678-230-1525 pasi.miikkulainen@andritz.com
‡**Steven L. Osborne** Babcock & Wilcox 20 S. Van Buren Avenue Barberton, OH 44203 Tel: 330-860-1686 slosborne@babcock.com	**John Rickard** Jacobs Engineering P. O. Box 5456 Greenville, SC 29606 Tel: 864 676-6393 **john.richard@jacobs.com**	‡**Michael D. Sides** XL GAPS 1360 Olympia Park Circle Ocoee, FL 34761 Tel: 407-656-4275 Mobile: 407-462-4622 **michael.sides@xlgroup.com**
John Veltre Chartis Insurance 2565 Mohawk Trail Acworth, GA 30102 Tel: 678-347-5406 **john.veltre@chartis.com**	**Arie Verloop** Jansen Combustion and Boiler Technologies 12025 115th Avenue N.E., Ste 250 Kirkland, WA 98034-6935 Tel: 425-952-2825 **arie.verloop@jansenboiler.com**	‡ **Greg Wass** Lundberg LLC 13201 Bel-Red Road Bellevue, Wa 98005 Office: 425-283-5070 Cell: 425-503-2747 greg.wass@lundbergllc.com
Marla Weinberg International Paper 6283 Tri-Ridge Blvd. Loveland, OH 45244 Cell: 706-339-1631 **marla.weinberg@ipaper.com**		

‡Denotes attendance at the meeting in October of 2016.

WATER TREATMENT SUBCOMMITTEE

Tom Przybylski
Power Specialists Assoc., Inc.
531 Main Street, Somers, CT 06071
Tel: 860.763.3241
tom.przybylski@psaengineering.com

‡**Craig Aderman** Sappi Fine Paper NA 89 Cumberland Street P.O. Box 5000 Westbrook, ME 04098-1597 Tel: 207-856-3517 Cell: 207-831-2472 **craig.aderman@sappi.com**	**Robert Bartholomew, P.E.** Sheppard T. Powell Associates, LLC 1915 Aliceanna Street Baltimore, MD 21231 Voice: 410-327-3500 **rdb@stpa.com**	‡**Kelli Bastarache** Power Specialists Assoc., Inc. 531 Main Street Somers, CT 06071 Tel: 860-763-3241 **kelli.bastarache@psaengineering.com**
‡**Wayne Bucher** NORAM Engineering Birmingham, AL Tel: 205-408-1874 Cell: 205-368-9396 **wayne.bucher@gmail.com**	‡**Fred Call** Buckman North America 1256 North McLean Blvd. Memphis, TN 38108-1241 Tel: 207-214-8357 **fccall@buckman.com**	‡**Susan Childress** IP Technology Power Mfg. Solutions 5870 Anderson Road Grovetown, GA 30813 Tel: 706-339-1631 **susan.childress@ipaper.com**
‡**Frank DeStefano** The Purolite Company 500 Locust Grove Spartanburg, SC 29303 Cell: 864-617-0881 **fdestefano@puroliteusa.com**	‡**Buck Dunton** ChemTreat, Inc. 4301 Dominion Blvd. Glen Allen, VA 23060 Tel: 804-935-2000 **buckd@chemtreat.com**	‡**Don Flach** Georgia-Pacific Corporation 133 Peachtree Street Atlanta, GA 30303 Tel: 386-336-5584 **don.flach@gapac.com**
Claude Gauthier, P.E. The Purolite Company P.O. Box 308, Paris, Ontario Canada N3L 3G2 Tel: 800-461-1500 Tel: 519-448-4512 **cgauthier@puroliteUSA.com**	**John Gray** Rayonier Advanced Materials 10 Gum Street Fernandina Beach, FL 32034 Tel: 912-277-1388 Cell: 912-321-7582 **john.p.gray@rayonieram.com**	‡**Ken Hansen** Barberton, OH 44203 Tel: 330-256-5955 **kenhansen0728@gmail.com**
‡Jeff Fox Nalco Company 1601 W. Diehl Road Naperville, IL 60563-1198 **jfox@nalco.com**	‡**Norris Johnston** Water Wizard Consulting 37 Hough Road Lacey's Spring, AL 35754 Tel: 256-650-0049 Cell: 256-520-1011 **nnjohnston@ashland.com**	**Dave Kittel** Valmet, Inc. 3430 Toringdon Way, Ste. 201 Charlotte, NC 28277 Tel: 704-414-3434 Cell: 704-614-0492 **dave.kittel@valmet.com**

‡Denotes attendance at the meeting in October of 2016.

WATER TREATMENT SUBCOMMITTEE - (Cont.)

‡**Sam Lewis** Delta Training Partners, Inc. 4020 Oleander Drive Wilmington, NC 28403 Tel: 910-790-1988 **slewis@deltatraining.com**	**Michael Lykins** Packaging Corporation of America 1061 Woodcliff Drive South Elgin, IL 60177 Cell: 630-659-7115 **mlykins@packagingcorp.com**	**Tom Madersky** Power Specialists Assoc., Inc. 531 Main Street Somers, CT 06071 Tel: 860-763-3241 **tom.madersky@psaengineering.com**
Jason Miller Andritz Inc. 1115 Northmeadow Parkway Roswell, GA 30076-3857 Tel: 770-640-2528 Cell: 770-335-8529 **jason.miller@andritz.com**	**Rick Morgan** FM Global 5700 Granite Pkwy. Plano, TX 75024 Tel: 972-731-1869 **rick.morgan@fmglobal.com**	‡**Kurt Parks** Packaging Corporation of America 5495 Lake Park-Clyattville Road Valdosta, GA 31601 Tel: 229-559-2257 Cell: 229-415-8557 **kparks@packagingcorp.com**
Jim Robinson GE (Infra, Water) 4636 Somerton Rd. Trevose, PA 19053 Tel: 215-942-3381 **james.robinson@ge.com**	‡**Ray Cassel** RMIS 8571 Rosemary St # B, Commerce City, CO 80022 Tel: 303-789-9307 rlcassel@rmis.biz	‡**Ben Kupka** RMIS 6060 Saltsburg Rd Murrysville, PA 15668 Tel: (724) 387-2861

‡Denotes attendance at the meeting in October of 2016.

Registered for the meeting were:

3S Team
Fudge, Joey, Skiatook, OK
Pyszynski, George, Skiatook, OK

A.H. Lundberg
Seefeld, Paul, Jacksonville, FL
Wass, Greg, Bellevue, WA

Acuren
Smith, William, La Porte, TX
Strand, Jeff, Raleigh, NC

AIG Insurance
Benavides, Miguel, Vancouver, BC
DeBeer, Tom, Woodstock, GA
Doidge, Greg, New York, NY

AirTek Construction
Baines, Troy, Troy, AL
Kimberl, Rob, Baltimore, MD
Shanahan, Dennis, Summerfield, FL

American Forest & Paper Assn. (AF&PA)
Grilliot, Wayne, Springboro, OH

Andritz
Bunner, Ben, Alpharetta, GA
Carter, Tim, Alpharetta, GA
Freitas, Fabio, Curitiba - Brazil
Gazsi, Andrew, Alpharetta, GA
Gilmore, Dwayne, Alpharetta, GA
Herod, Chris, Alpharetta, GA
Latvakoski, Mika, Alpharetta, GA
Merriman, Nick, Graz, Austria
Miikkulainen, Pasi, Alpharetta, GA
Payne, Zack, Alpharetta, GA
Phillips, John, Alpharetta, GA
Pulkka, Antti, Varkaus, Finland
Pumeesuk, Somchay, Bangkok, Thailand
Ribeiro, Christian, Curitiba - Brazil
Schull, Alec, Alpharetta, GA
Soderlund, Harri, Alpharetta, GA
Suuronen, Teemu, Varkaus, Finland
Timotheo, Alvaro, Alpharetta, GA
Wolfe, Jeff, Alpharetta, GA

Applied Technical Services
Castle, Bill, Marietta, GA
Floyd, Kevin, Marietta, GA
Hills, Jim, Marietta, GA
Kapperman, Thomas, Marietta, GA
Luttrell, Robert, Marietta, GA
Rawls, Chris, Marietta, GA

AXA Matrix Risk
Hayes, Michael, Miamisburg, OH

AZZ (SMS)
Power, Stacy, St. Petersburg, FL

Babcock & Wilcox
Edwards, Tom, Charlotte, NC
Kornaker, Greg, Barberton, OH
Kulig, John, Barberton, OH
LeClair, Amber, Barberton, OH
Leibel, Greg, Charlette, NC
Osborne, Steve, Barberton, OH
Schwartz, Eric, Barberton, OH
Stonecipher, Greg, Chattanooga, TN
Troha, Janis, Charlette, NC
Youssef, Simon, Lancaster, OH

Beecher Carlson
Eaves, Dennis, Berkeley Lake, GA

Boiler Services and Inspection (BSI)
Clay, Dean, Simsboro, LA

Buckman Laboratories
Call, Fred, Newry, ME

ChemTreat
Graham, Jim, Collierville, TN

Chicago Tube and Iron (CTI Power)
Morgan, Preston, Locust, NC

Clearwater Paper Corporation
Bliss, Dave, McGehee, AR
Haines, Shana, McGehee, AR

Clyde Bergemann
Jameel, Ishaq, Atlanta, GA

CORR Systems
Ruiz de Molina, Eliadio, Birmingham, AL

Day & Zimmermann
Wasson, Eric, Charlote, NC

Delta Training Partners
Lewis, Sam, Wilmington, NC

Diamond Power Specialty
Bergstrom, Henrik, Lancaster, OH

Domtar
Avery, David, Bennettsville, SC
Worsham, Jesse, Bennettsville, SC

EER Systems
Breeding, Marve, Birmingham, AL

Registered for the meeting were:

Electron Machine
Osborne, Brad, Umatilla, FL
Vossberg, C. A., Umatilla, FL

Enertechnix
Smith, Shawn, Olympia, WA

Flotech
Johnson, Joanne, Suffolk, VA

Fluor Daniel Forest Products
Lewis, John, Greenville, SC

FM Global
Baro, Joachim, Hagen, Germany
Cooke, Craig, Plano, TX
Crysel, Scott, Plano, TX
Hoffman, Daryl, Plano, TX
Huelsbeck, Kevin, Sherwood, WI
Hume, Everett, Norwood, MA
Labonté, Guy, Montreal, Que
Lang, David, Plano, TX
Matarrese, Rick, Alpharetta, GA
Moberg, Eric, Plano, TX
Paine, Matthew, Norwood, MA

Fossil Power Systems (FPS)
Donahue, Mark, Dartmouth, NS

FPInnovations Paprican
Rezaei, Hooman, Vancouver, BC

Fuel Tech
Bohlen, Scott, Warrenville, IL
Chapman, Zack, Warrenville, IL

General Electric (GE)
Kistka, Gerry, Jacksonville, FL

George H. Bodman, Inc.
Bayse, Michael, Kingwood, TX
Bodman, George, Kingwood, TX
Holland, Brook, Kingwood, TX
Sargent, Mark, Kingwood, TX

Georgia-Pacific
Davis, Greg, Perdue Hill, AL
Davis, Matt, Perdue, Hill, AL
Flach, Don, Atlanta, GA
Gleaton, Stefanie, Atlanta, GA
Hill, Wes, Camas, WA
Kujanpaa, Olli, Atlanta, GA
Lane, Terry, Brunswick, GA
Lentz, Gregg, Brunswick, GA

Georgia-Pacific (Cont.)
Meadows John, Brunswick, GA
Miller, William, Brunswick, GA
Morency, Karl, Atlanta, GA
Pettis, Brett, Perdue, Hill, AL
Phillips, Ramsey, Cedar Springs, GA
Selner, Dale, Atlanta, GA
Sherlock, Bentley, Atlanta, GA

Glatfelter, P.H.
Forry, Jeffrey, Spring Grove, PA

Global Risk Consultants
Garfield, Michael, Lowell, ME
Macaulay, Charles, Snoqualmie, WA

GT Consulting Services
Thorslund, Gunnar, Stockholm, Sweden

Howe Sound Pulp & Paper
Jellema, Marinus, Port Mellon, BC

Integrated Test & Measurement (ITM)
Carlier, Tim, Milford, OH

International Paper
Adams, Wayne, Clinton, NC
Barnes, Brian, Selma, AL
Benning, Rick, Grande Prairie, Alberta
Blackard, Vernon, Loveland, OH
Blair, Michael, Loveland, OH
Bouchard, Henri, Grande Prairie, Alberta
Knowlen, Bruce, Federal Way, WA
Bruce, Mike, Loveland, OH
Byrd, Joel, Loveland, OH
Childress, Susan, Loveland, OH
Cox, Stephen, Loveland, OH
Frazier, David, Loveland, OH
Harp, Charles, Rome, GA
Hendrix, Sam, Loveland, OH
Holley, Steven, Columbus, MS
Lawrence, Jeff, Pine Hill, AL
Marlino, Mark, Rome, GA
Martin, Andrew, Franklin, VA
Navojosky, Frank, Loveland, OH
Perrett, Jack, Memphisl, TN
Ross, Jerron, Columbus, MS
Slagel, David, Port Wentworth, GA
Wranosky, Tom, Ticonderoga, NY

Irving Pulp & Paper
Glenn, Matthew, Saint John, NB

Registered for the meeting were:

Jansen Combustion
Henderson, Matt, Kirkland, WA
La Fond, John, Kirkland, WA

Kadant Black Clawson
Patel, Jean-Claude, Mason, OH
Smith, Jason, Mason, OH

Kapstone Paper
Burns, Gregory, N. Charleston, SC
Coyne, Joe, Charleston, SC
Sinsel, Brian, Longview, WA
Smith, Chandler, Longview, WA
Walker, Steve, Roanoke Rapids, NC
White, Ben, Roanoke Rapids, NC

K-Patents
Betts, Herb, Naperville, IL
Pyörälä, Keijo, Naperville, IL

Lewis B. Bringman
Bringman, Lewis, Baltimore, MD

Liquid Solids Control
Sweeney, Michael, Upton, MA
Vandenburg, Gordon, Upton, MA

Marsh & McLennan
Bisson, Guy, Vancouver, BC

MPW Industrial Services
Elam, Monty, Hebron, OH
Hall, Randy, Hebron, OH
Houck, Carey, Hebron, OH
Marchant, Rick, Hebron, OH
McGraw, Robert, Taft, TN

Nalco
Fox, Jeff, Springboro, OH
Moffett, Danny, Sheridan, AR
Olavessen, Len, Bartolo, FL
Smith, Bradley, Chesterfield, VA
Vittum, Michael, Naperville, IL

National Boiler Service
Harville, Steve, Trenton, GA
Mesamore, Mike, Trenton, GA

National Power Supply
Barnes, Greg, Thailand
Pechdee, Wichai, Thailand

Nautilus Loss Control
Jackson, Christopher, Fox Island, WA

NORAM Engineering and Constructors
Bucher, Wayne, Birmingham, AL

Packaging Corp. of America
Fiala, Brian, Tomahawk, WI
Overhaug, Derik, Tomahawk, WI
Parks, Kurt, Valdosta, GA
Webb, Trey, Valdosta, GA

Phoenix Pulp & Paper
Kusakulnirun, Teerapong, Thailand
Wongsap-In, Sarayut, Thailand

Power Specialists Associates
Bastarache, Kelli, Somers, CT
Henriques, Fabian, Somers, CT
Przybylski, Tom, Somers, CT

Process Engineering
Ray, Allen, Birmingham, AL

PSF Industries
Carpenter, Roger, Seattle, WA
Flynn, Kevin, Seattle, WA

Purolite
DeStefano, Frank, Bala Cynwyd, PA

RAE Engineering & Inspection
Santo, Shawn, Edmonton, Alberta

Rayonier Advanced Materials
Cox, Calvin, White Oak, GA
Dean, Sam, Jesup, GA
Elliott, Travis, Jesup, GA
Gray, John, Fernandina Beach, FL
Jones, Ronnie, Jesup, GA
Massey, Paul, Jesup, GA
Porter, Daniel, Fernandina Beach, FL
Thomas, Adam, Jesup, GA

Resolute Forest Products
Andrijeski, Greg, Coosa Pines, AL
Boisvert, André, Montreal, Que,
Corr, William, Catawba, SC
Dodd, Brandon, Calhoun, TN
Grimes, Travis, Coosa Pines, AL
Nesmith, Daniel, Coosa Pines, AL
Pease, Bruce, Calhoun, TN
Wilmoth, Brian, Coosa Pines, AL

Rick Spangler, Inc.
Spangler, Rick, St. Simons Island, GA

Registered for the meeting were:

RIMS (Rocky Mt Ind Services)
Cassel, Raymond , Denver, CO
Kupka, Benjamin, Denver, CO

RMR Mechanical,
Knowles, Don, Cumming, GA
Roy, Bob, Cumming, GA

Sandvik
Day, Katie, Houston, TX

Sappi Fine Paper
Aderman, Craig, Westbrook, ME
Fredrickson, John, Cloquet, MN
Hanninen, Nick, Cloquet, MN

Smurfit Kappa
Ledezma, Nelson, Yaracuy, Venezuela
Pifano, Alonza, Yaracuy, Venezuela
Rojas, Carlos, Cali, Colombia

Solenis
Meredeth, Jim, Gulf Breeze, FL

Sompo Risk Mgmt. & Health Care
Funaguchi, Akira, Shinjuku-ku,Tokyo, Japan

Southern Environmental
Lawton, Roger, Pensacola, FL

Swiss Re
Lynch, Joe, Alpharetta, GA

Thompson Construction Group
Halbig, John, North Charleston, SC

Thompson Industrial Services
Harry, Todd, Sumter, SC
Jackson, Dwayne, Sumter, SC
Rocco, Larry, Sumter, SC

Valmet Automation
Borduas, Pierre, Charlotte, NC
Burelle, Raymond, Charlotte, NC
Martin, James, Charlotte, NC
Morrison, Dan, Charlotte, NC
Nichols, Jody, Charlotte, NC
Reed, Ron, Charlotte, NC
Relangi, Ramana, Charlotte, NC
Smith, Dan, Charlotte, NC
Trivett, Michael, Charlotte, NC
Weikmann, John, Charlotte, NC
Yoder, Jeremiah, Charlotte, NC

Verso Paper
Amato, Joseph, Wisconsin Rapids, WI
Couture, Dean, Jay, ME
Durrell, Michael, Memphis, TN
Gagne, David, Jay, ME
Lewis, Jason, Bangor, ME
Mathers, Caleb, Jay, ME
Scenna, Anthony, Jay, ME
Walp, John, Jay, ME

Water Treatment R&D Consulting
Kelly, John, West Chicago, IL

Water Wizard Consulting
Johnston, Norris, Lacey's Spring, AL

WestRock
Madison, Brad, Panama City, FL
Moyer, Scott, Jacksonville, FL
Murch, Douglas, Richmond, VA
von Oepen, David, Meridian, MS
Weber, Douglas, Wisconsin Rapids, WI

Weyerhaeuser
Bogart, Steven, Longview, WA
Burnette, Richard, Oglethorpe, GA
Huckaby, Jacob, Oglethorpe, GA
Phillips, Leon, Oglethorp. GA

XL Catlin
Franks, James, Somerville, TN
Sides, Michael, Ocoee, FL

Zeeco
Langstine, Bob, Broken Arrow, OK

Zellstoff Poels AG
Duer, Werner, Poels-Oberkurzheim, Austria
Trummer, Harald, Poels-Oberkurzheim, Austria

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MAIN COMMITTEE MEETING

INTRODUCTION – John Gray - Chairman: Good morning! Welcome to the Fall 2016 BLRBAC Main Committee Meeting! Thank you all for being here and participating this week. The Main Committee Meeting is now open. This meeting, as are all of our BLRBAC meetings, is being held in strict compliance with BLRBAC's Anti-Trust Policy which states that any discussions involving pricing, pricing policy or any restraints on competition are not allowed. I trust all of you have heard it enough this week and will abide by this guideline.

We will begin with some introductions this morning. We will introduce ourselves one-by-one:

John Gray - BLRBAC Chairman - Rayonier Advanced Materials
David VonOepen - Operating Company Representative - WestRock
Everett Hume - BLRBAC Secretary - FM Global
Len Olavessen - BLRBAC Treasurer - Nalco
John Phillips - Manufacturers' Representative - Andritz
Dave Slagel - BLRBAC Vice-Chair - International Paper

OLD BUSINESS

1. **ACCEPTANCE OF THE SPRING 2016 MEETING MINUTES** – John Gray

   Acceptance of Minutes from the Spring 2016 Session. Those Meeting Minutes have been posted on the BLRBAC web site for review now for several months prior to this meeting. Does anyone have any corrections to those minutes as they have been posted? If not, can I get a motion to accept those Minutes? (Accepted.) Can I get a second? (Seconded!) All in favor? All opposed? Thank you – The Spring 2016 Meeting Minutes have been unanimously approved.

   Is there any other old business that we need to discuss? Moving on then to ……

NEW BUSINESS

1. **NEW MEMBERS/REPRESENTTIVE CHANGES REPORT** – Everett Hume

NEW REGULAR MEMBERSHIP - None Reported

NEW ASSOCIATE MEMBERSHIPS

Gecko Robotics, Inc. - Pittsburgh, PA
Troy Demmer has been designated as the Associate Representative
Jake Loosararian has been designated as the Alternate Representative

Kadant Black Clawson, Inc. - Mason, OH
Jean-Claude Patel has been designated as the Associate Representative
Michael Reimer has been designated as the Alternate Representative

1. **NEW MEMBERS/REPRESENTTIVE CHANGES REPORT** – (Cont.)
NEW ASSOCIATE MEMBERSHIPS - (Cont.)

PSF Industries - Jesup, GA
Roger Carpenter has been designated as the Associate Representative
Kevin Flynn has been designated as the Alternate Representative

Water Wizard Consulting - Lacey's Spring, AL
Norris Johnston has been designated as the Associate4 Representative
No Alternate Associate Representative chosen.

NEW CORRESPONDING MEMBERSHIPS – None Reported

REGULAR REPRESENTATIVE CHANGES

FM Global
Jimmy Onstead replaced Rick Morgan as the designated Representative
Scott Crysel replaced Jimmy Onstead as the designated Alternate Representative

ASSOCIATE REPRESENTATIVE CHANGES

Applied Technical Services
Bill Castle replaced Brad Thomas as the designated Associate Representative
Kevin Floyd replaced Bill Castle as the designated Alternate Associate Representative

CORRESPONDING MEMBERSHIP CHANGES - None Reported

MEMBERSHIP COMPANY NAME CHANGES

International Paper
Various Weyerhaeuser locations purchased are Port Wentworth, New Bern, Flint River, Columbus and Grande Prairie

OJI Fiber Solutions
Previously known as Carter Holt Harvey

Sompo Japan Management & Health Care
Previously known as Sompo Japan Nipponkoa Risk Management

MEMBERSHIP COMPANY STATUS CHANGES - None Reported
*{**Secretary's Note**: The Company Membership List posted on the BLRBAC website may be out of date and not reflecting all the mergers, acquisitions, and name changes that have occurred. Anyone who sees something that needs changing should bring it to the attention of the BLRBAC Secretary via fhholich@aol.com}*

2. **EXECUTIVE COMMITTEE REPORT –** John Gray

The Executive Committee met Tuesday afternoon in closed session with six of seven members present. We discussed a host of administrative items. Some of the highlights:

- Future meeting dates: Confirmed the 2017 meeting dates as April 10, 11 & 12 and October 2, 3 & 4 as currently posted on the website. For 2018 the spring dates will be April 9, 10, & 11 as posted. But the Fall 2018 dates will be October 22, 23 & 24 – a shift of approximately three weeks.

  As most of you know, this current meeting has been held three weeks later than it has historically been held. The numbers show we've realized record overall attendance at this meeting, including an over 50% increase in the number of operators in attendance as compared to the normal average. We'd like to continue that trend. But our next opportunity to shift Fall meeting dates, due to hotel commitments, won't be until 2018.

  But the Fall 2017 meeting will be the BLRBAC 55 year anniversary meeting. For that meeting we'll be offering a reduced registration fee of $55 for all first time attendees and all operators. Details will be posted on the website and in the advance registration packets in mid-2017. For everyone else, we will not raise the rates. They will continue to be the same as they have been for the past several years -- $125 Advance Registration and $200 At Door Registration. Again this will be for the Fall 2017 meeting.

- EC has confirmed:
  - John Browning as Instrumentation Co-chair
  - Mark Cooper as Waste Streams Co-chair

- Lastly, this is an election year for BLRBAC officers. Per our BLRBAC bylaws, the nominating committee has recommended an additional two year term commencing after today's business meeting for all current BLRBAC officers. Those officers are:

  - Chairman – John Gray from Rayonier Advanced Materials

  - Vice Chairman – Dave Slagel from International Paper

  - Manufacturer's Representative – John Phillips from Andritz

  - Insurance Representative – Jimmy Onstead from FM Global

  - Operating Company Representative – David VonOepen from WestRock

Will the voting members, those with red ribbons, please rise. Unless there is an objection, we will vote this slate of officers as one vote. Any objections? All in favor of the recommended slate of officers? Opposed? The slate of officers has been unanimously approved by the voting members present.

3. **TREASURER'S REPORT** – Len Olavessen

Attendance at this meeting we had a total of 263 people. Two hundred and ten Advance Registrations and 53 At Door Registrations. If you were here Monday morning, we had a long line and thus we dealt with it.

There were 23 paper companies in attendance; six insurance companies; four were manufacturing companies; 25 Associate companies and six guests of member companies.

There were off-shore participants as follows: four persons from Colombia; three from Thailand; one from Japan; one from Austria; and two from Finland.

From a financial point of view cash on-hand as of yesterday, we had $88.227.77 in the BLRBAC checking account. I anticipate expenses of around $28,000 for remainder of year. Therefore, cash on-hand at the beginning of 2017 will be a little over $60,000.00. This makes us financially in good shape.

From a registration income point of view we used the same numbers as we have been using for several years which is 400 Advance Registrations and 80 At Door Registrations for the entire year. Hopefully we will continue with the improvements that we saw for this meeting which means that we will more than meet our budget.

Lastly we have been using credit card/debit card acceptance at At Door here at the meeting. We have set the gears in motion to accept credit card on-line registrations for Advance Registrations. I expect we will be able to announce that in time for the next meeting. We have to work with our bank and do some kind of coding and that kind of thing that is way above my head. So we will get all of that done and we will notify the membership when that happens; but we are going to make it happen. I just hope that it happens within the next three months.

4. **SECRETARY'S REPORT** – Everett Hume

As a reminder, when registering for upcoming meetings, please include your registration form with all payments. Without this there is no way to register the person. We have received a few company checks without names or registrations so it takes time to track these down. Also, if you complete the registration with payment and sent it to Barbara but do not receive a confirming email with your BLRBAC registration number, she did not receive it. So if you don't hear anything within two weeks, send her an email.

As general information, the TAPPI Report is given at the Spring Meetings only. There is no TAPPI meeting today. Report out by TAPPI at future meetings will be given by Energy Recaust Committee Chair or their designee.

4. **SECRETARY'S REPORT** – (Cont.)

SECRETARIAL SERVICES REPORT – Barbara Holich

It is required that each regular member company (boiler insurers, boiler operators and boiler manufacturers – voting members) keep me advised of names and e-mail addresses of their designated Representative and designated Alternate Representative. Preferably they will be someone who regularly attends BLRBAC. It is the member company's responsibility to keep me informed of any changes in representation by e-mailing me. **A "Representative Change Form" is posted on the BLRBAC website to make it easier for management to submit the changes in responsibility and/or any e-mail address changes.**

Anyone who wishes to be added or deleted from the BLRBAC e-mail list, please e-mail me (fhholich@aol.com) your intentions. Include your name, company and your e-mail address. Someone is needed to take the initiative (in the best case scenario, this should be the designated Representative or Associate Representative) to keep me advised of any member company name changes, mergers, etc., so that the BLRBAC database can be properly maintained.

Be sure that I have your current working e-mail address. BLRBAC's Meeting Notice and posting on-line of Meeting Minutes will only be sent via e-mail. If an e-mailed address notice is returned to me as "undeliverable," that e-mail address will be deleted from the BLRBAC database after a second attempt has been made.

If you are a designated Representative or Alternate Representative for your organization and something happens wherein you will no longer be functioning in this capacity, such as, retirement, occupational change, downsizing, etc., please let me know (fhholich@aol.com) and supply me with the name and e-mail address of whomever will fill your vacated position within BLRBAC.

Per BLRBAC's policy, BLRBAC's Secretarial Services will verify receipt of meeting registrations and checks via e-mail when appropriate e-mail addresses are given on the registration form. Sometimes e-mails pop back as "undeliverable." This may be due to the fact that the e-mail box is full, incorrectly typed due to not being able to decipher attendee handwriting, etc. I will do my best to see that all e-mails are properly received at the posted e-mail address. The BLRBAC database is always updated and corrected according to what is posted on the most recent Registration Form.

All Advance Registration attendees are recorded, given a registration number and sent a confirmation e-mail usually on the same day checks are received. This notification is sent to the e-mail address listed on the Registration Form. If you have not received a confirmation notification from me, you are not registered for BLRBAC! I am again requesting that all Meeting Registration Forms be completed in their entirety. This form is the only way I can confirm the accuracy of the BLRBAC database and e-mail address book.

4. **SECRETARY'S REPORT** – (Cont.)

Finally, if you know from past experience that your Accounting Department takes weeks to issue a requested check for registration purposes, just send me your completed Registration Form and a personal check before the posted cut-off date. Then you can get reimbursed from your company at a later date. This will guarantee you are registered at the Advance registration fee. Per BLRBAC policy, there are no exceptions when paying after the cut-off date given on the Registration Form. Your organization will be required to pay the higher At Door fee for all registrations posted after the cut-off date..

5. **SUBCOMMITTEE REPORTS**

5.1 **AUXILIARY FUEL REPORT –** Bruce Knowlen

The SFAF meeting was called to order with a reminder of the BLRBAC Anti-Trust Statement. Introductions were made of all attending. There were seven of 11 members and 12 guests present.

The minutes of the last meeting were read and approved. A call was made for any new business. None was brought forward, although, one topic was conveyed earlier by email.

New Business -
The topic of STABLE FIRING (SFBL 15.6) came in by email. The question was raised whether SFAF was going to add an explanation and direction similar to SFBL to our document? Discussion ensued with a review of the documents as they currently are. After serious consideration, the consensus was to not include it. SFBL has addressed this and the topic is primarily related to the conditions of black liquor firing.

Old Business -
The subject of super-heater clearing at start-up continued from the last meeting. Previous work was discussed and the present point was to decide on how the recommendation would be handled in SFAF figures. We referenced SFBL document as compared to ours. It was clear Figures 4, 10, 17 and 21 of the SFAF document seemed appropriate but there was a lack of logic steps in place to allow insertion into the sequence of actions.

The decision from the group was to make minor revisions in the figures of logic to recommend the normal steps of operation and provide a place for the caution regarding superheaters. Work on the figures will be handled by a couple members and presented at the next meeting.

Next, attention was placed on Table 12 of Chapter 5, Other Audible Alarms and Visual Indications. As we have discussed in the past, this table covers topics well outside the primary domain of the subcommittee's document. Although the list has existed historically, other BLRBAC subcommittees that have come into existence since the creation of this list have much clearer jurisdiction over many subjects listed.

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

5.1 **AUXILIARY FUEL REPORT -** (Cont.)

Our intention is to pass these entries to the appropriate subcommittee and allow them to manage them in their own documents.

A lengthy discussion occurred on this topic. It became apparent that we should not remove all external subjects. If there is something that is managed in the logic figures as a permissive, trip, or alarm, it should remain in the Table 12 with a possible reference to another subcommittee's document. Members volunteered to work through this before the next meeting.

Due to the need to conclude the work in progress from this meeting, we will have a Spring Meeting 2017.

The meeting was adjourned at 3:28 PM.

5.2 **SAFE FIRING OF BLACK LIQUOR REPORT** – Vernon Blackard and Tom Wranosky

SFBL Subcommittee Meetings – Monday 8:30 AM (CLOSED) and 1:00 PM (OPEN). Sub-Chair meeting on Monday 4 pm. Main meeting report out Wednesday 8 am.

Agenda:

- Open the meetings. Closed and Open.
- Reviewed BLRBAC Anti Trust statement. Both closed and open meeting.
- Introduced members and guests. 6 of 18 members present and 52 guests in open meeting.
- Reviewed and approved the Spring 2016 meeting minutes.
- Reviewed working draft document for next revisions. Items discussed below:

Chapter 5 page 35 – Figure 2 Add start DT agitators as black liquor fuel permissive in logic.
Chapter 9.1.6 Spout inspection interval (page 67).

Inspect the smelt spouts during every scheduled major outage. If a spout fails an inspection, replace it. All spouts should be replaced at least once every major maintenance outage with a new spout.

Replacement spouts should be field hydro tested to manufacturer's specifications prior to use. NEVER REBUILD, REPAIR OR MODIFY A SMELT SPOUT!

At each major outage, cut up at least one removed smelt spout. Thoroughly inspect the cooling water jacket internals, cooling water supply lines, valves and instrument devices, to ensure adequacy of the cooling water quality and the corrosion/deposition control program. Furthermore, a periodic inspection of sections of the cooling water piping should be made to ensure the absence of internal buildup or scale that could restrict cooling water flow. Sections of piping with scale or buildup should be replaced or cleaned.

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

5.2 **SAFE FIRING OF BLACK LIQUOR REPORT -** (Cont.)

Both smelt spout cooling water head tanks and collection tanks should be inspected and cleaned annually at each major outage.

A condition based decision should be used to determine the proper service run period for smelt spouts beyond the traditional one-year service run. The conditions to extend establish the service run period beyond the traditional one-year service run should include but not limited to; spout failures, operational upsets or. operational changes that can impact spout integrity, significant liquor cycle chemistry changes, past issues with spout cracking, no manufacturing defects, waterside deposits, loss of spout cooling water episodes, or material wastage.

Consider adding "Major Maintenance Outage" to our definition section. Doug Murch to work on.

Chapter 10.1 Plugged Spouts (pg. 70).

There have been documented cases on recovery boiler master fuel trip situations that sootblowers have continued to run for long periods of time. This practice can lead to removing large amounts of slag from superheater and generating bank tubes and depositing this slag into the lower furnace which can lead to plugged spouts and difficulty in opening spouts on subsequent start-up. For this reason it is recommended that the sootblower sequence be stopped and sootblowers be retracted on any boiler master fuel trip condition.

Revise figure 4. for MFT to add this logic. Vernon check with Everett to see how to revise figures and work on this one.

Chapter 10.2 Design Item 8. Explosion Relief.(pg 72)
The following should be considered when designing dissolving tank explosion relief:

- Dissolving tank vent scrubber bypass damper size and capacity.
- Dissolving tank explosion damper size and capacity.
- Dissolving tank overflow capacity as compared to green liquor pumps and tank water/weak wash make up flows.
- Dissolving tank overflow elevation as compared to tank roof elevation to allow proper explosion venting from tank during heavy smelt runs. Not enough "open area" above tank level will severely limit tank venting capacity and allow more damage and less ability to for spout shatter jets to reduce work properly.

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

5.2 **SAFE FIRING OF BLACK LIQUOR REPORT -** (Cont.)

- Advanced controls on dissolving tank density controls to mitigate possible damage from heavy smelt runs. Possible but not limited to using green liquor flow, weak wash make up flow, green liquor density, tank level, green liquor temperature, vent temperature. Usually provide a high ramp rate for pumping capacity increase and weak wash capacity increase during heavy smelt runs.

- Operation guidelines to assist with controlling heavy smelt run periods.

- Maintenance guidelines to assist with keeping the systems in good working condition. Check devices/explosion relief equipment for proper cleaning and operation at every major maintenance outage.

CHAPTER 14 AUDIBLE ALARM AND INDICATING SYSTEM (pg 86)

Updated alarm list for items 39 through 49.

- Open item discussion from members and guests. Reviewed Figure 5 as it relates to starting black liquor pumps after email question from Rudy Haraga of PSA. Mark Donahue explained how the logic is supposed to work and will revise the explanation part of our document to clarify how the logic is to work.

External BLRBAC Black Liquor Pump Start Permissives - Clarification.msg

- Reviewed two dissolving tank incident reports. GP Wauna Oregon, and GP Purdue Hill Alabama.

Both dissolving tank incidents were caused by smelt pools behind plugged spout causing heavy runoff when spout was opened. Corrective actions seem insufficient for both reports unless more details are provided. Would want to see hot restart procedure with sufficient details on how to deal with all spout plugs and decision process to allow shut down of unit if large inventory of smelt is observed in unit with all spouts plugged.

Continue review to document as related to AFPA documents on Dissolving Tank explosions.

Received document from Wayne of AFPA on Smelt water explosions for review.

Wayne Grilliot
Consultant, Recovery Boiler Program
American Forest & Paper Association
C/O: APEC, LLC
204 Hiawatha Trail
Springboro, Ohio 45066

Mobile: (937) 602-1892 (Preferred)
Fax: (937) 746-5569
Main Office: (937) 746-4600

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

5.2 **SAFE FIRING OF BLACK LIQUOR REPORT -** (Cont.)

- We continued discussion on items working at AFPA and our possible ways to assist with our document. Mark Sargent reported that University of Toronto has many items working and he needs their results to provide information for BLRBAC SFBL to work on.

5.3 **ESP SUBCOMMITTEE REPORT** – Karl Morency for John Andrews
(See ***Appendix A*** – Incident List)

The ESP Subcommittee met in closed session on Monday October 24, 2016 with 12 of 14 members represented. The Subcommittee met in open session on Tuesday morning October 25, 2016 with 12 members represented and about 220 guests.

During the open session, the Subcommittee reviewed 28 incident reports from North America and seven International Incidents. Of the 28 incidents, there were no Smelt Water Explosions reported and one Dissolving Tank Explosion. Ten (10) of the reported leaks were classified as critical incidents and 16 were non-critical incidents. There was one Smelt Spout Leak reported and one ESP with no leak. An ESP was performed in nine of the incidents including seven of the critical incidents representing 88% of the critical incidents that should have been ESP'd. This percentage is lower than we have seen historically.

The basic definitions of Explosions, Critical Incidents and Non-Critical Incidents were revised by the Executive Committee in September 1999. They are summarized as follows:

Explosions: Only if discernible damage has occurred. This does not include incidents where there is only evidence of puffs or blowback alone. With the new emphasis on damage, more 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 entered the recovery unit forward of isolating baffles (and therefore would be a similar criterion to the need to perform an ESP). This includes leaks of pressure parts of all sizes. Since small leaks often wash adjacent tubes to failure, this category is important to our learnings.

Non-Critical Incidents: Those cases that did not admit water to the boiler cavity defined above.

Appendix A contains a summary of the incidents reviewed during the meeting.

Incident Locations

The incident locations are summarized as follows:

- 12 – Economizer
- 1 – Boiler Bank
- 1 – Furnace Screen
- 2 - Superheater
- 6 – Upper Furnace
- 3 – Lower Furnace
- 1 - ESP No Leak
- 1 – Smelt Spout Leak
- 1 – Dissolving Tank Explosion

The general locations of the leaks for boilers in North America are shown in Figure 1, which displays a typical boiler, not representing any particular style or model. The yellow circles are the non-critical incidents and the red circles indicate the location of the critical incidents. The two green dots are for the Spout Leak

Incidents by Boiler Type

The incidents by the number of drums and the back end arrangement were reviewed. There were 7 incidents reported in a single drum unit and 21 incidents reported in two drum units.

Four (4) of the reported incidents were in boilers with Cascade Evaporators and 1 of the units had a Cyclone Evaporator. Twenty-three (23) of the incidents involved units with extended economizers.

Leak Cause

The determination of the cause of the leak is somewhat of a subjective determination by the Subcommittee based on information in the reports. The breakdown is listed below:

- 1 – Thermal Fatigue
- 2 - Mechanical Fatigue
- 5 - Weld Failure
- 5- Erosion or Corrosion Thinning
- 1 - Overheat
- 11 - Stress Assisted Corrosion or Stress Corrosion Cracking

How Discovered

Operator observations during boiler walkdowns continue to be the prevalent method of detecting leaks and accounted for identification of 21 of the leaks (75%) and shows that operators are continuing to be diligent in looking for leaks. Two leaks were identified by hydrostatic testing. Three (3) leaks were initially identified by Leak Detection Systems and one of the incidents reported that the leak detection system confirmed the presence of the leak during continued investigation

Leak detection systems were reported to be installed on units in 16 of the incidents (62%).

Incident Review

Figure 2 shows the critical incidents reported each year. There were 20 this year which is about the recent average. Figure 3 shows the history of Recovery Boiler Explosions showing the recent smelt water explosions in 2012 and 2014.

Figure 4 shows the history of reported dissolving tank explosions with the two that were reported last year and one this year. Following the recommendations from Section 10 of the Safe Firing of Black Liquor document would prevent many of the reported dissolving tank incidents that have occurred in the past.

Figure 5 shows the effect of the smelt water explosions reported in the last couple of years on the five year rolling average which is up to 0.4. Hopefully in another few years we can get back down to zero but it does appear that we have reached a plateau of one to two boiler explosions in a five-year period.

Figure 6 is a plot of explosion history per 100-boiler operating years. This is a statistical summary of the experience across the industry. The smelt water explosion experience has dropped slightly to 0.481 explosions per 100 boiler operating years due to the explosions in the last couple of years, but the total explosions, which includes all boiler explosions and dissolving tank explosions, decreased slightly to .870 explosions per 100 boiler years. The factor is calculated by a summation of all reported explosions since 1948 divided by a summation of the number of boilers reported in service each year during the same period. We have accumulated over 18,285 total recovery boiler operating years in the BLRBAC database for North America and have recorded 88 smelt water explosions. We all need to continue to get those trends going down.

5. **SUBCOMMITTEE REPORTS -** (Cont.)
   5.3 **ESP SUBCOMMITTEE REPORT -** (Cont.)

List of Operating Boilers

The BLRBAC Boilers in Service Database currently has 190 active recovery boilers listed, 149 in the US and 41 in Canada. In the US, the average age is 38.8 years and the oldest is 63 years. The average age in Canada is 38.7 years and the oldest boiler is 69 years which is a 1947 Alstom unit at Three Rivers, PQ.

The list is available on the BLRBAC web site. We urge you to look over the list and if there are any changes or corrections, contact Dean Clay

Learnings

There are several learnings that come from review of the incident reports that may be of value for the industry. This is not a complete list but a few items that stood out during the incident review.

- When installing plugs in tube stubs, keep the stubs as short as possible to minimize the potential for accumulating deposits, forming steam pockets, etc.
- In the event of an inadvertent ESP, follow the post-ESP procedures to ensure no un-safe conditions are created.
- Check ESP systems to ensure all functions are energize to activate so that loss of power to the inputs or loose or broken wire from ESP buttons does not initiate an inadvertent ESP.
- Consider installing an ORP (oxidizing, reducing potential) meter to monitor feedwater quality – dissolved oxygen, pH, conductivity.
- Periodically shut off oxygen scavenger to check deaerator performance (<10 ppb)
- Consider chemically cleaning economizer w/ balance of the boiler to remove internal deposits, eliminate under-deposit corrosion, and passivate any O2 corrosion cells.
- Do not rely on IR gun to check bed temperature prior to water washing.
- Smelting out a bed should start at the spout wall to minimize potential for smelt pool forming behind a salt cake dam.
- Work with sootblower supplier to establish blowing pressures for each area of the boiler and check periodically. Follow management of change process before exceeding established pressures to minimize risk of fatigue failures

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

5.3 **ESP SUBCOMMITTEE REPORT -** (Cont.)

ESP Guideline Changes Under Consideration

The Subcommittee is working to combine the Post ESP Guidelines that covers the actions that should take place after the ESP has been initiated with the ESP Recommended Good Practice Document. We have maintained them as separate documents but have decided that it would be more useful as a single combined document. Chris Jackson has made a first draft of the combined document and the Subcommittee members will review and make further revisions before the next meeting.

Another proposed update will be to include the DCE Fire Suppression Medium as a specific exclusion to the "Stop All Water and Steam Supplies" in Section 3.8. We are also working on wording to clarify that all motor protection interlocks such as motor heater and overloads should be bypassed on the Rapid Drain Valves with the initiation of the ESP. Protection should be utilized in the close circuit to keep from burning up the motor unnecessarily. There is a guide on the BLRBAC web site for how Rotork Actuators should be set up for Rapid Drain Valves. We will also look at clarifying the intent of the provision for an "Alternate Means to Initiate ESP"

Incident Questionnaires

The Incident questionnaires are key to the operation of the ESP Subcommittee. We appreciate the good job that the mills have done in filling them out for their incidents. The current questionnaire has been updated with the contact information to send the file to Dean Clay at **dclay@fuse.net**. Anytime you have an incident that needs to be reported, I know it is very tempting to just go back in the file and pull out the report from a couple of years ago and just fill in the new information, but we really urge you to go and get the most recent version of that off the WEB site and use that for the report.
Again, a reminder that when you are adding pictures into the questionnaire document, it is best that you import the picture as .JPG files rather than cut and paste.

Dean will send out an e-mail confirmation to the mill any time he receives a questionnaire. If the mill does not receive that confirmation within a couple of weeks of submitting the form, please contact Dean to see if there is a problem. Any questions or comments?

CHRIS JACKSON - Nautilus Loss Control: The blank slide, Karl, I think was put there so we could see the time, the initiation of ESP. The time from the first indication to the time it was actually ESP'd. I think we can say, with a few exceptions, there were some pretty quick acting operators there even when they chose to go through a couple of steps and asked for help, they still pushed the button pretty quickly.

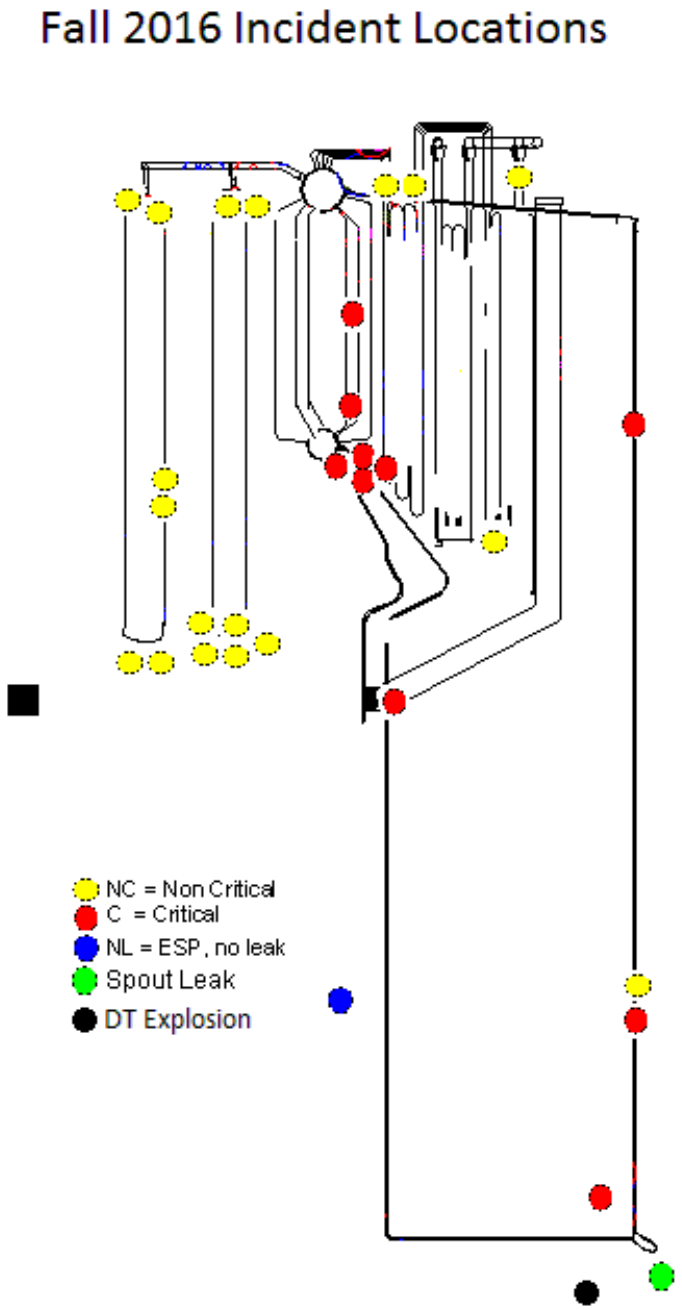
KARL MORENCY: I agree. This time we saw people were ESP'ing when they should have and they were doing it relatively quickly, making the decision and doing it.

JOHN WEIKMANN- Valmet: I know there was a lot of discussions on burners and when burners should be in and when you have no smelt flow or the spouts plug, and there was a lot of discussion on what happens with them and where. I was just wondering, I think normally that is not in our group and I don't know whose group it is in, and I'm wondering since it is quite an important topic, is there some review of that procedure necessary and who is doing it and should we decide that now rather than waiting two or three meetings before we decide that it should be done and then another two or three meetings before something gets done on it. It might be five years before something actually gets done.

KARL MORENCY: Yes, that is Safe Firing of Black Liquor which is Vernon Blackard's group. He does have copies of both of the recent incidents and I know that they are planning on reviewing those with respect to their write-up. -up. Personally I think the write-up does a pretty good job of addressing that. You know I have reviewed it several times and I'm not saying it can't be improved; but I do think it does a good job right now. I think it is more about the job that we do as operating companies on training the people on what to do more than not having that guidance there.

Anything else? Thank you.

Figure 1


Fall 2016 Incident Locations
NC = Non Critical
C = Critical
NL = ESP, no leak
Spout Leak
DT Explosion

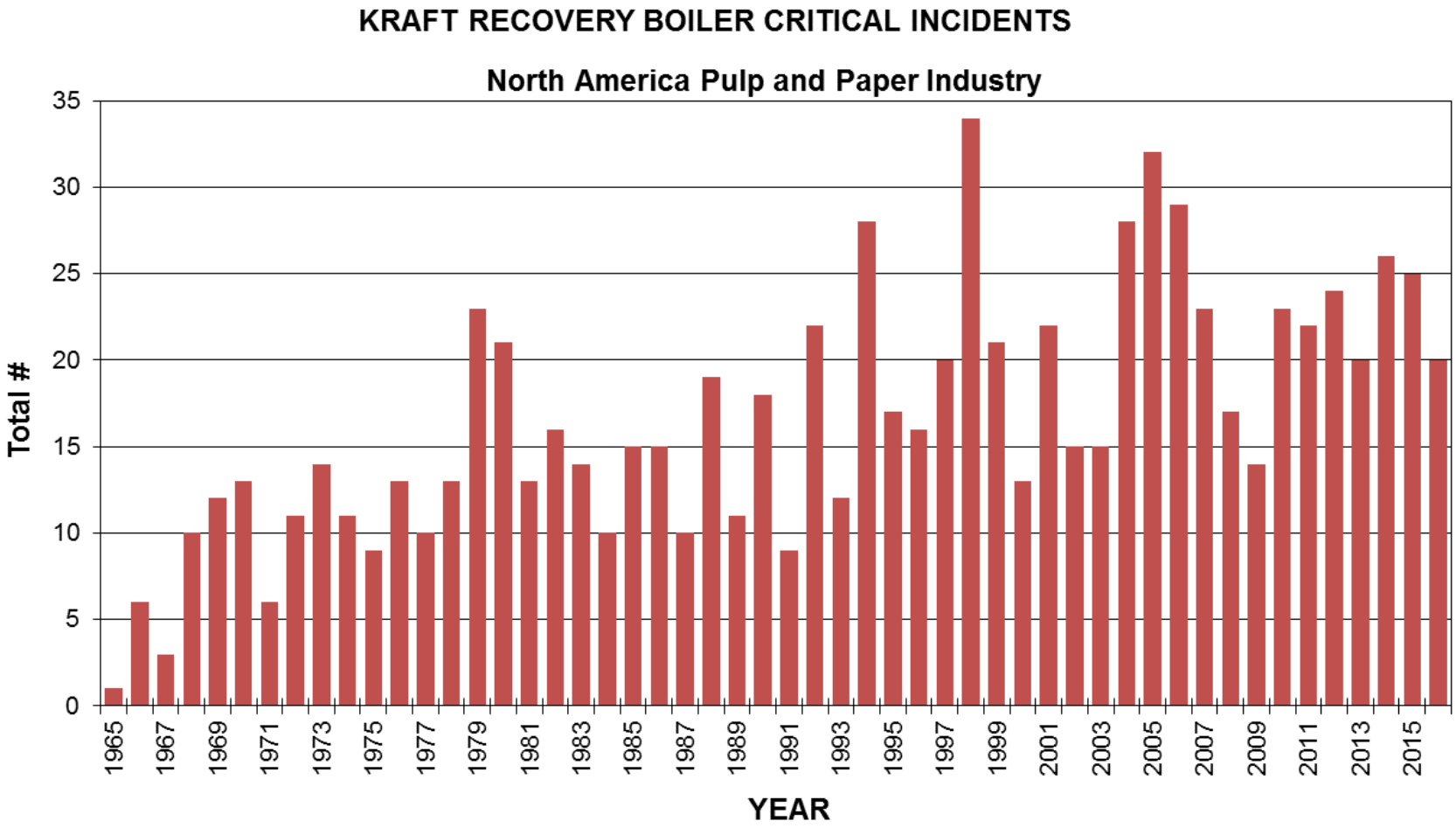
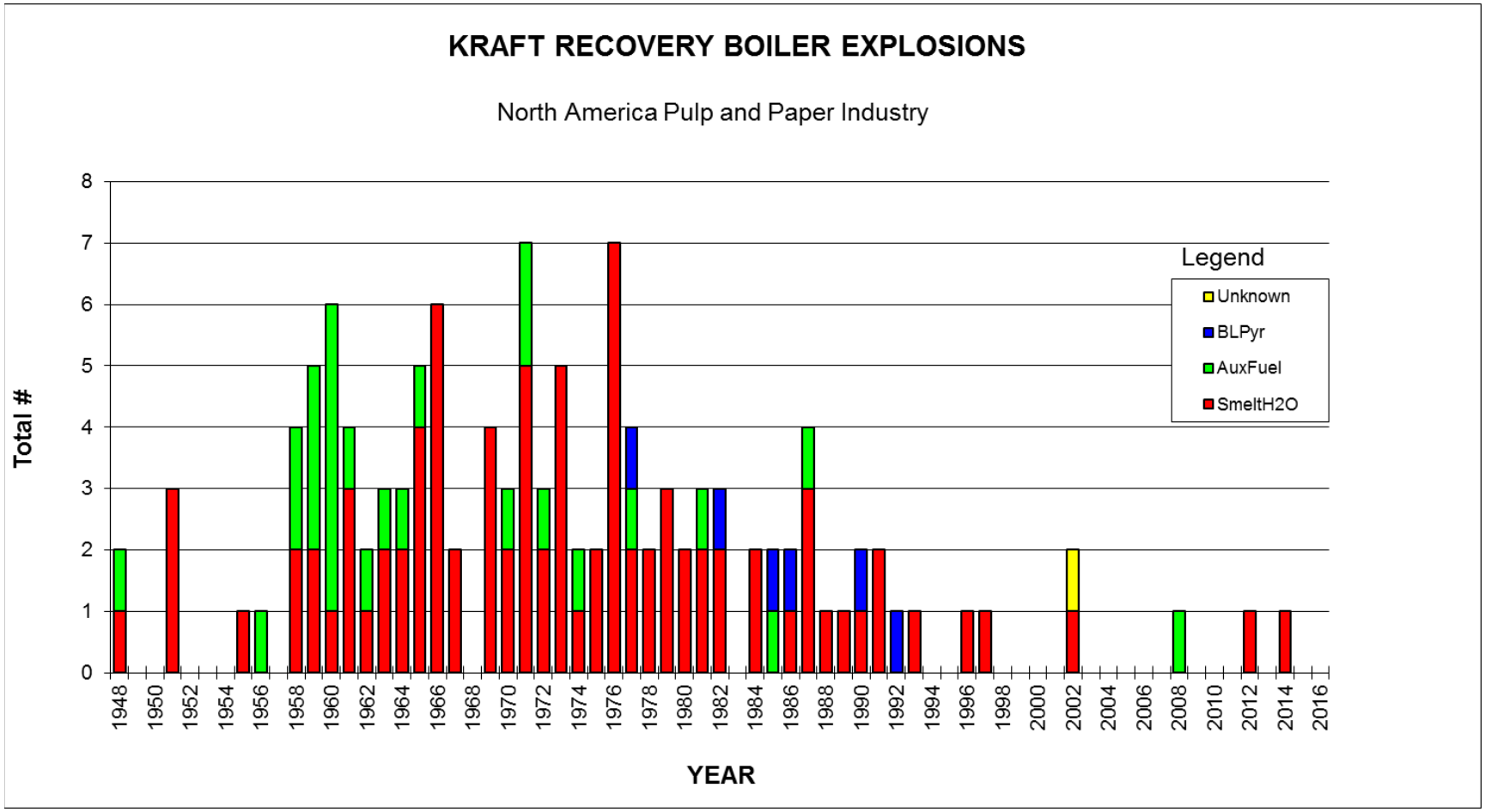


Figure 2
(Critical Exposure Classification Began in 1965, Changed to Critical Incident in 1999)


KRAFT RECOVERY BOILER EXPLOSIONS
North America Pulp and Paper Industry
Total #
YEAR
Legend
Unknown
BLPyr
AuxFuel
SmeltH2O
0
1
2
3
4
5
6
7
8
1948
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
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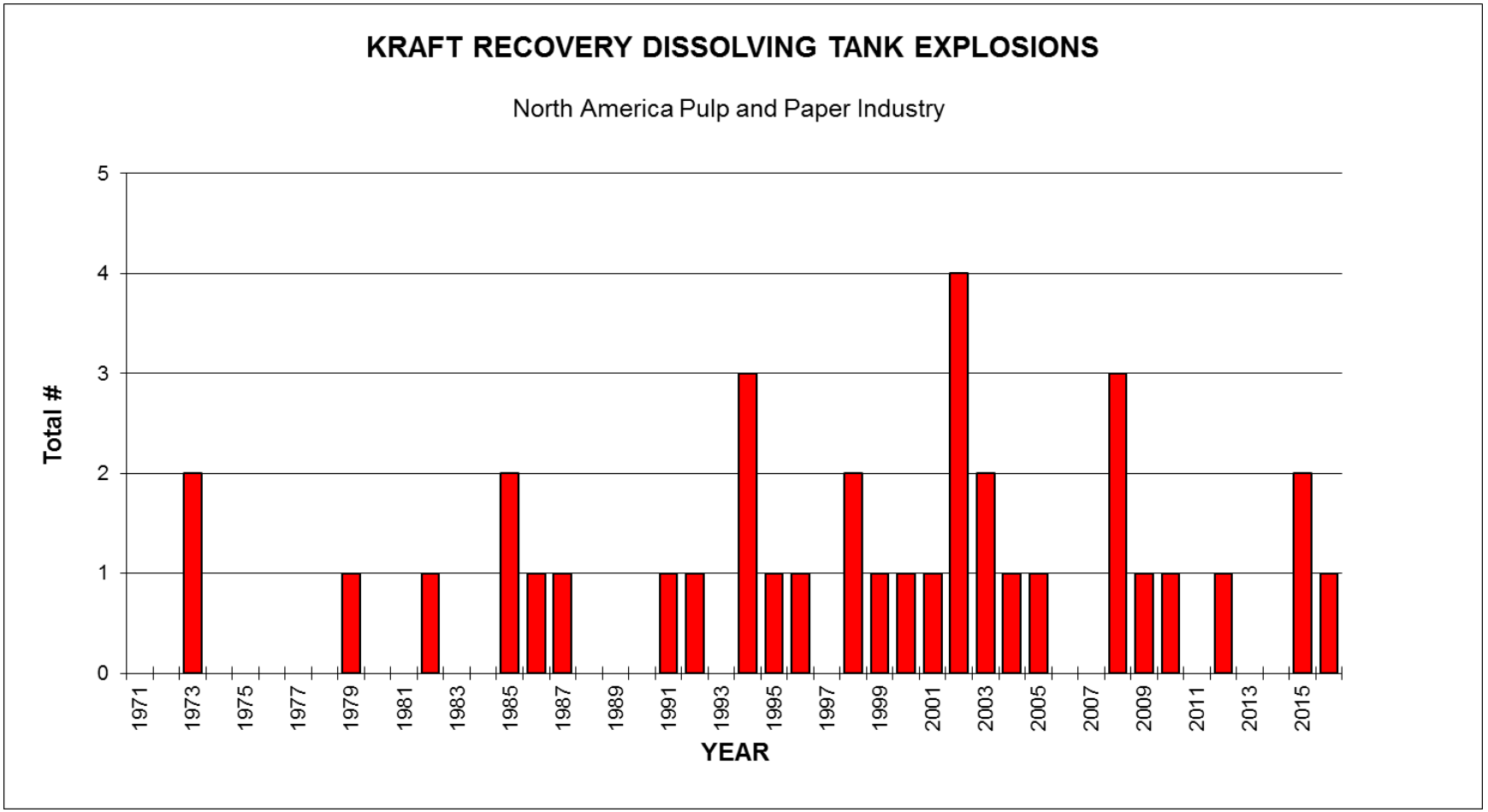
2014
2016

Figure 3


KRAFT RECOVERY DISSOLVING TANK EXPLOSIONS
North America Pulp and Paper Industry
Total #
0
1
2
3
4
5
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
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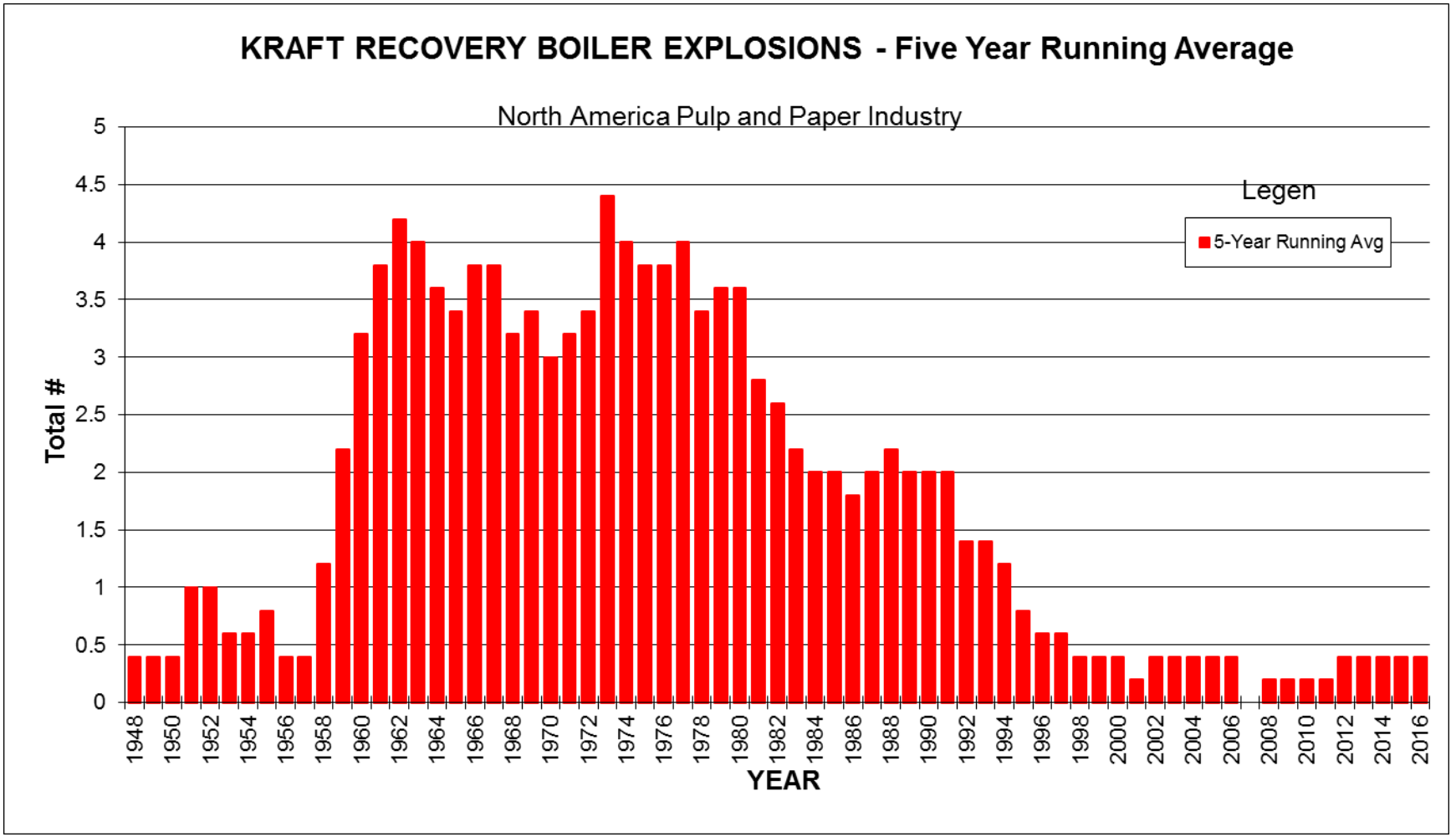
2009
2011
2013
2015
YEAR

Figure 4


KRAFT RECOVERY BOILER EXPLOSIONS - Five Year Running Average
North America Pulp and Paper Industry
Legen
5-Year Running Avg
Total #
YEAR
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
1948
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
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1976
1978
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2012
2014
2016

Figure 5

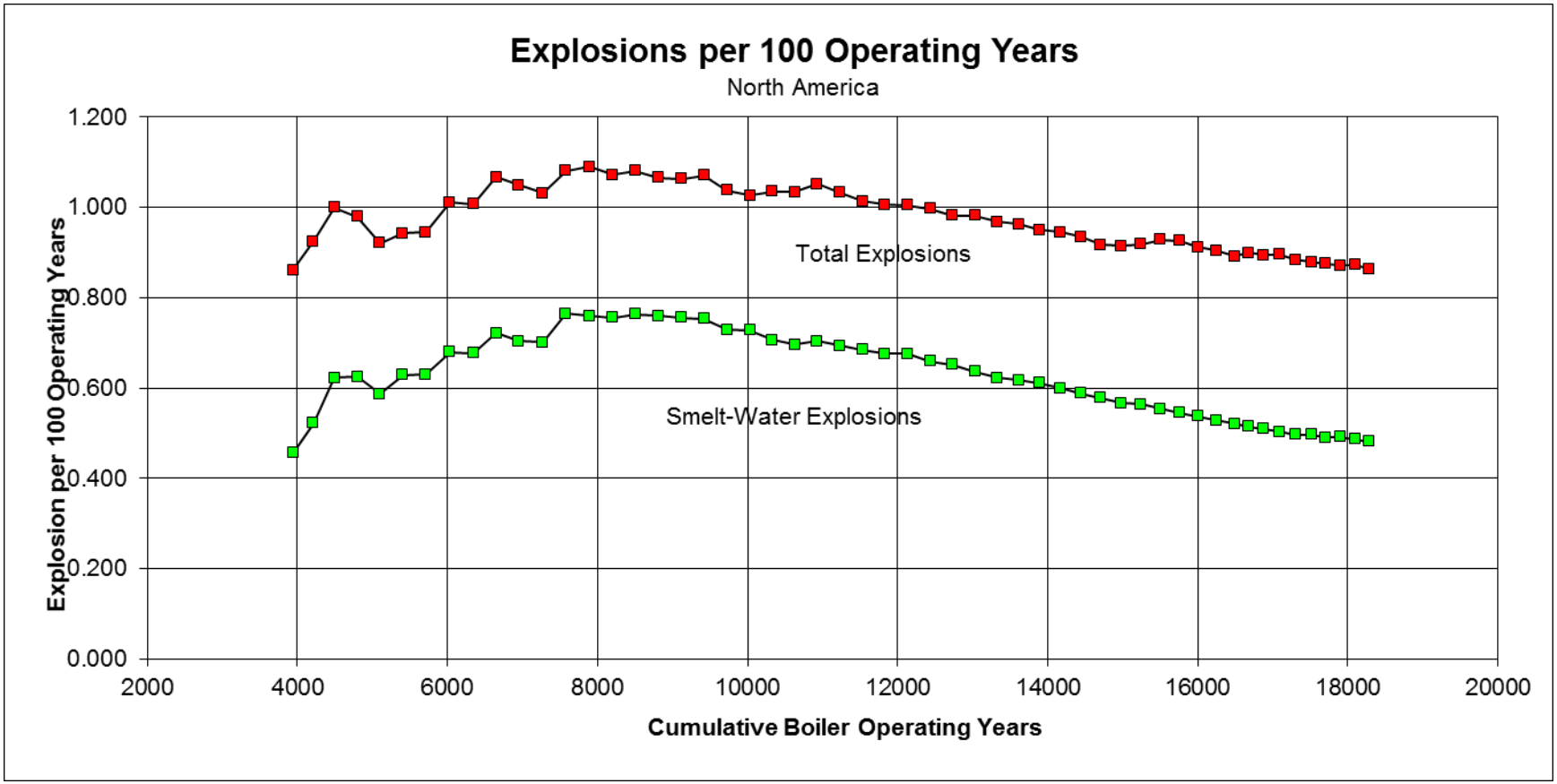
Explosions per 100 Operating Years
North America
Explosion per 100 Operating Years
1.200
1.000
0.800
0.600
0.400
0.200
0.000
Total Explosions
Smelt-Water Explosions
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
Cumulative Boiler Operating Years

Figure 6

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

5.4 **FIRE PROTECTION IN DIRECT CONTACT EVAPORATORS REPORT** – Craig Cooke

No meeting; therefore, no report.

5.5 **INSTRUMENTATION REPORT -** Dave Avery

The instrumentation subcommittee met in open session on Monday morning with 8 members and 14 guests. Our session began with reading the antitrust statement continuing with introductions of members and guest.

We reviewed minutes from our April meeting and approved them as presented.

New Business:

- The ever changing group attendance dynamic from meeting to meeting leaves us rehashing previous completed work based on new questions and ideas generated at the current meeting. We need a tracking document that defines the project (original question, background, who submitted it, what the scope is and potential completion date). We did develop an issues/projects tool to help the sub-committee to track items under development.

- We acknowledge there has been a problem with the Instrumentation Checklist posted on line – the original file has always been hosted by FM Global, the working copies the subcommittees used were copies. If the original copy became corrupted then the subcommittee had to have a backup. In our case we have not had a central location for files until now. We now have cloud site hosted by a member company providing the storage and working space to provide a level of documentation reliability. We are working with Everett to correct this issue for **"Recommended Good Practice – Instrumentation Checklist for Black Liquor Recovery Boilers."**

- We completed our work on defining what a Qualified E&I technician is: The list of requirements that constitute a qualified E&I technician as originally developed during the fall 2015 meeting was reviewed and updated to produce a final document. The list will be incorporated into the front end document **"Recommended Good Practice Instrumentation Guide for Instruments and Control Systems Used in The Operation of Black Liquor Recovery Boilers".** The incorporated product will be submitted to the executive committee for consideration.

- We have been tasked by the executive committee to "Develop a road map to address any issues or conflicts between NFPA 85 and BLRBAC guidelines (safety vs environmental compliance). "Bruce Knowlen and I are currently assigned to the item for development.

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

5.5 **INSTRUMENTATION REPORT -** (Cont.)

Under Old Business:

- We continued project development for Drum Level measurement and Protection: Discussion was initiated at the request of the auxiliary fuel subcommittee and was centered around the need for standardization of requirements for drum level measurement for both control and safety interlock applications. Specifically, equipment installation and calibration accounting for sub cooling and water density considerations. The project will include a better definition of what constitutes "two low drum level trip" and if this wording is still relevant. David Avery, Bruce Knowlen and Eladio Ruiz de Molina have agreed to take on this issue and present findings at the next meeting.

- Checklist progress – Eladio presented an updated version of Checklist C "Flue gas Emissions" which was discussed and approved we will be submitting to the executive committee along with section "G" "Black Liquor and Green Liquor Systems" for their consideration.

The afternoon session had six members and three guests in attendance.

We continued refining the checklist work along with setting up our cloud based "Sharefile" for our subcommittee members

Final thought, our future depends on how well we transfer knowledge to our successors. Instrumentation Subcommittee meetings are open -- help us ensure we are transferring the best information we can.

5.6 **MATERIAL & WELDING REPORT -** Mike Blair

MORNING SESSION:

The Materials and Welding Subcommittee met in Open Session on Monday morning, October 24, 2016.

The meeting was opened with a review of the BLRBAC Anti-Trust Statement.

Attendance

11 members and 22 guest attended the morning session.

Old Business

The meeting minutes from the Spring 2016 Subcommittee meeting were reviewed and accepted. No Old Business other than to continue work on Tube Plugging Bulletin and Document which was addressed following New Business.

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

5.6 **MATERIAL & WELDING REPORT** - (Cont.)

New Business

Started building a list of topics for future research, bulletins or documents:

- Copper contamination and cracking in welds and in tube metals
- Standard recommendations for near drum corrosion inspection and interpretation
- Phased array inspection of butt welds vs. radiography

Members

Membership requests were received from Acuren and RAE Engineering. These were voted upon and accepted by those committee members present.

Interest in becoming members was expressed by ATS, PSF Industries, and Glatfelter.

Presentations

No technical presentations were made during this session. Discussions were held on possible topics for future presentations. Possible topics:

- Package boiler drum overheat and replacement
- Cap pass penetration
- Back filling Superheaters during acid cleaning
- Cracking at PA port openings (refresher for folks new to Recovery Boilers)
- Radiography digital versus hot source
- Phased array vs. shear wave vs. radiography (possibly ATS)

Document Development

Reviewed the comments from the Executive Committee on the Bulletin; 1.6 *Plugging Tubes in Drums and Headers*

The subcommittee worked on the development of Section 2.5 Plugging Tubes in Drums and Headers. Made final mark-ups for correction. Hope to be complete for final review by subcommittee during the next meeting to then be forwarded to Executive Committee.

AFTERNOON SESSION:

No meeting was held during the afternoon.

Document Development

Next Meeting Agenda

Section 2.5 Plugging Tubes in Drums and Headers. Hope to be complete for final review by sub-committee during the next meeting to then be forwarded to Executive Committee.

MORNING SESSION:

The Materials and Welding Subcommittee met in Open Session on Monday morning, October 24, 2016.

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

5.6 **MATERIAL & WELDING REPORT** - (Cont.)

The meeting was opened with a review of the BLRBAC Anti-Trust Statement.

Attendance

11 members and 22 guest attended the morning session.

Old Business

The meeting minutes from the Spring 2016 Subcommittee meeting were reviewed and accepted. No Old Business other than to continue work on Tube Plugging Bulletin and Document which was addressed following New Business.

New Business

Started building a list of topics for future research, bulletins or documents:

- Copper contamination and cracking in welds and in tube metals
- Standard recommendations for near drum corrosion inspection and interpretation
- Phased array inspection of butt welds vs radiography

Members

Membership requests were received from Acuren and RAE Engineering. These were voted upon and accepted by those committee members present.

Interest in becoming members was expressed by ATS, PSF Industries, and Glatfelter.

Presentations

No technical presentations were made during this session. Discussions were held on possible topics for future presentations. Possible topics:

- Package boiler drum overheat and replacement
- Cap pass penetration
- Back filling Superheaters during acid cleaning
- Cracking at PA port openings (refresher for folks new to Recovery Boilers)
- Radiography digital versus hot source
- Phased array vs. shear wave vs. radiography (possibly ATS)

Document Development

Reviewed the comments from the Executive Committee on the Bulletin; 1.6 *Plugging Tubes in Drums and Headers*

The subcommittee worked on the development of Section 2.5 Plugging Tubes in Drums and Headers. Made final mark-ups for correction. Hope to be complete for final review by sub-committee during the next meeting to then be forwarded to Executive Committee.

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

5.6 **MATERIAL & WELDING REPORT** - (Cont.)

AFTERNOON SESSION:

No meeting was held during the afternoon.

Document Development
Next Meeting Agenda

Section 2.5 Plugging Tubes in Drums and Headers. Hope to be complete for final review by sub-committee during the next meeting to then be forwarded to Executive Committee.

5.7 **PERSONNEL SAFETY REPORT** – Samuel Dean for Robert Zawistowski

The Personnel Safety Sub-committee met in an "open" session on Monday, October 24, 2016. There were 7 members (out of 14) plus 35 guests in attendance during the meeting.

Representation at our meeting by regular members and guests included original equipment manufacturer Babcock & Wilcox. Representation from insurance and insurance service companies included FM-Global. Operating company representation was present at this meeting with representatives from Clearwater Paper, Georgia-Pacific, SKCV, SAPPI, International Paper, Packaging Corporation of America, Smurfit-Kappa, Rayonier Advanced Materials, Kapstone, Verso and Weyerhaeuser. Consultant representation included George H. Bodman, Andritz, 3S Team and RSI.

The BLRBAC anti-trust statement was read.

The minutes of the last meeting were reviewed and approved.

The "Common Practices" document was discussed briefly. This document will be presented to the Executive Committee during the 2017 spring meeting.

The committee has been working on language to deal with plugged hoppers. We reviewed this document today, and a few minor changes were made, based on input from the group. We will continue to review this document between now and the spring meeting, with hopes to have something to present to the Executive committee at that time.

A presentation, on hopper pluggage, was given by Tim Carlier of ITM. Tim has offered this up anyone that would like to have a copy.

There were several discussions around PPE: the different types of PPE being used and when to use certain PPE. Sam Dean shared finding and photos of smelt pour testing done on different Carbon-X swatches and 19oz Aluminized Kevlar swatches. There were conversations around engineering out hazards vs. relying on PPE; an example, of operator and management engineered Baume pots, was displayed for the group.

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

5.7 **PERSONNEL SAFETY REPORT** - (Cont.)

There were discussions around Dissolving Tank safety….operating without mechanical means of agitation (loss of 1 agitator or loss of both agitators); the question was asked "if any mills had experience operating this way". There were discussions involving the preheating of dissolving tank dilution, prior to introducing liquor to the furnace; not much response.

There were detailed conversations around length of time between liquor spray hose change outs, and this lead into conversations around changing all hoses in the mill on some frequency…no general consensus.

Sam Dean reviewed a set of 9 ESP decision trees that are currently being used at his facility, and offered to share those with the group.

In closing, we are always welcome to new committee members who can participate in any capacity even if you can only attend meeting intermittently. Simply let me know via e-mail at the address below you are interested and provide me with your contact information.

5.8 **PUBLICITY & NEWS REPORT** – Matt Paine

Not a lot to report from the Subcommittee of one! BLRBAC continues to advertise its meetings on four industry WEB sites -- TAPPI, Pulp & Paper of Canada, Paper Age and Paper Industry. BLRBAC and TAPPI continue with the cross promotion program where events are advertised on the others WEB site in prominent locations, for example, a banner on top of the WEB site. Any questions?

CHRIS JACKSON - Nautilus Loss Control: I see the ICRC (International Chemical Recovery Conference) is coming up. Are we doing anything to raise our presence in PAPTAC (Pulp and Paper Technical Association of Canada) or TAPPI's advertisement of ICRC? I think that that is something we ought to consider. It happens every three years and it focuses on recovery boilers. I think we ought to note that.

5.9 **WASTE STREAMS REPORT** – Paul Seefeld

On October 24, 2016 the Waste Streams Subcommittee met in a closed session at 9:00 AM. There were 7 of 9 members present. In the afternoon session, there were 8 members and 11 guests present. At the start of both the morning and afternoon sessions the BLRBAC antitrust statement was reviewed. The October 2015 meeting's minutes were reviewed and unanimously accepted.

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

5.9 **WASTE STREAMS REPORT** - (Cont.)

Morning (Closed) Session:

The subcommittee completed the Dissolving tank vent gas (DTVG) subsection. The remaining discussion was whether to modify or keep the 30% MCR permissive or move to a 15% MCR permissive. As the DTVG guidelines fall in the overall DNCG chapter, we decided to keep the 30% MCR interlock level in order to be consistent for both named waste streams. However, we are going to add a phrase to Table 3 in Chapter 4 under the 30% permissive. It will read "This may be determined on a case-by-case basis." In this manner, a mill with a new boiler with an integrated dissolving tank vent can begin to oxidize the vent gas at a lower MCR. This is subject to review by the boiler manufacturer and the insurance provider. We are going to generate a new Table 3 as the current version is a copy of a copy that was converted to PDF.

There have been questions from operators of liquid methanol waste streams regarding the 1% solution to liquor feed limit. The current guidance in chapter 6 does not account for high or low concentrations of methanol in the solution, nor does it address the possibility of simultaneously routing two or more liquid waste streams to the boiler. The subcommittee decided to review our document and address these issues in the April 2017 session.

We reviewed the latest Finnish waste streams document and compared the DNCG and CNCG sections. We found no significant differences in the process guidelines. The BLRBAC document tends to reach farther outside of the boiler wall with guidance and this appears be attributed to addressing operational incidents.

Afternoon (Open) Session:

In the afternoon, we reviewed DTVG section and Chapter 4 with the guests. We talked to representatives from two companies with new boilers with integrated dissolving tank vents. PCA, in Valdosta, would like to run the DTVG vent at the lower 15% MCR but GP Brewton plans to keep the 30% MCR as their environmental permit is tied to the 30% interlock. Neither of the two foresaw any safety or process reason to prevent operating properly at the 15% MCR.

The issue of testing the NCG interlocks during a simulated ESP was brought up, again, in the afternoon meeting. We had no simple resolution in that discussion, but we did receive Bruce Knowlen's document later in the day. We are going to review this and update our document as needed.

The afternoon subcommittee meeting adjourned at 1:48 PM.

Miscellaneous:

The subcommittee is down to nine (9) members. We would like to get two more members, preferably from companies operating waste stream systems.

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

5.10 **WATER TREATMENT REPORT** – Tom Przybylski

The water treatment subcommittee met Monday morning and Monday afternoon in open sessions.

Twelve (12) subcommittee members and approximately fifteen (15) guests attended the morning session. Thirteen (13) subcommittee members and six (6) guests attended the afternoon session. The subcommittee membership profile for those in attendance was as follows:

- Two (2) OEM
- One (1) Insurance representative
- Two (2) mill representatives
- Eight (8) BLRBAC Associate Members (four of the eight in attendance represented water treatment companies).

The spring meeting activities were as follows:

- In the morning session, the BLRBAC Antitrust Policy was reviewed, the membership lists updated, and the spring meeting minutes accepted.

- Two new subcommittee members for water treatment suppliers replaced three outgoing water treatment representatives.

- The morning was dedicated to revisions on the condensate system. Two illustrations of conductivity instrumentation arrangements for liquor-bearing condensate streams were revised and inserted into the document.

- The group had length discussions about verification of flow in a condensate conductivity instruments sample line. This proves to be particularly difficult for insertion style instruments in recirculating loops.

- Flow measurement is a preferred solution in every case, but the subcommittee did create procedural methods for ensuring flow is maintained in these sample lines.

- There was discussion about the definition of a critical condensate streams, which this subcommittee decided was a loop with a potential to force the shut down a recovery boiler.

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

5.10 **WATER TREATMENT REPORT** – Tom Przybylski

- The group discussed automatic dump valves and their placement in systems that contain critical condensate streams, and agreed that automatic divert valves could be anywhere between the potential contaminant and the recovery feedwater system.
- Condensate will be further revised during the October meeting.
- The afternoon started with the BLRBAC antitrust statement and followed by a discussion about drawings inserted into our draft deaerator document. Final work on this document was deferred until October.
- The rest of the afternoon was spent developing a chemical cleaning document.
- A set of terms for a glossary was agreed upon.
- An initial set of tools that can be used to trigger consideration of a chemical clean was developed.
- We adjourned at 3:25 p.m.

6. **AMERICAN FOREST & PAPER ASOCIATION RECOVERY BOILER REPORT** – Wayne Grilliot **(NEW)** (Tom Grant - Recently Retired)

The AF&PA Recovery Boiler Program was established in 1974 to develop programs and assist companies operating recovery boilers to improve the safety, integrity and reliability of the recovery boiler operations. We continue in these efforts to produce greater awareness of safe practices and to help drive improvements in operation, maintenance, safety, and the efficiency of recovery boilers.

Membership

Currently, we have 23 member companies in the AF&PA Recovery Boiler Program. We continue to encourage the 3 non-member companies that operate recovery boilers to join the Program. We would very much enjoy having these companies in our group and participating in the shared learning promoted by the Program.

Operational Safety Seminars

The Operation & Maintenance Subcommittee sponsored two (2) Operational Safety Seminars in 2016. There was a total of 36 attendees at the April seminar and 64 at the May seminar. Operators, supervisors, superintendents, and process engineers from 12 companies and 24 mills attended. Over 3,500 people have attended the seminars since they were started in 1985. We continue to receive excellent comments and ratings from the attendees. The attendees receive valuable information and insight from the dialogue among the attendees and monitors of the seminars. The table top exercises help operators and supervisors make decisions when to ESP a recovery boiler.

6. **AMERICAN FOREST & PAPER ASOCIATION RECOVERY BOILER REPORT** - (Cont.)

As more senior operators and supervisors retire, training will continue to increase in importance. Companies are finding these seminars to be an important part of their training program. We recommend that all companies and mills seriously consider sending people to these valuable seminars. The 2017 Operational Safety Seminars are scheduled for April 25-26 and May 16-17 in Atlanta.

Annual Meetings and Conference

The 2016 AF&PA Annual Recovery Boiler Meetings and Conference were held in Atlanta on February 2-3. We had 70 attendees. The Meetings and Conference were very successful. The presentations included reports on the projects currently sponsored by the AF&PA Recovery Boiler Program, Subcommittee reports on their accomplishments, reports from Sweden, Norway and Finland on their recovery boiler committees' activities, as well as other recovery boiler related research being done outside of the AF&PA.

The 2017 Annual Recovery Boiler Meetings and Conference are scheduled to be held in Atlanta on February 7-8. As usual, the Conference is open to all operating companies, insurers, vendors, and manufacturers. The object of the Conference is to keep the members and the recovery boiler community advised of new developments and best practices. We hope that many of you will plan to attend the 2017 Conference.

Study on Smelt Dissolving Tank Explosions

Both the Operation & Maintenance Subcommittee and the Research & Development Subcommittee are working to develop best practices around dissolving tank related issues. The Research & Development Subcommittee has recently sponsored some very exciting new research projects with the University of Toronto. The 4 new projects focus on Dissolving Tank key operating conditions and advanced monitoring techniques in order to further improve safety and reduce operational risks. The 2.5-year program will build on past studies sponsored by the AF&PA Recovery Boiler Program and related research underway at the University, currently funded by a consortium of 22 companies. We are very pleased to have Dr. Markus Bussmann of the University of Toronto leading these studies.

Work on Developing a Best Practice for Functional Testing of Interlocks and Trips on Recovery Boilers

The Operation & Maintenance Subcommittee is continuing its work on developing guidelines for functional testing of interlocks and trip procedures on recovery boilers. The Committee will also work on identifying best practices for clearing and preventing plugged and bridged ash hoppers, as well as external line maintenance, inspection, and testing. However, the Committee agreed to finish work on developing guidelines for functional trip testing procedures before considering additional projects.

6. **AMERICAN FOREST & PAPER ASOCIATION RECOVERY BOILER REPORT** - (Cont.)

Updating "Kraft Recovery Boilers" Blue Book

We are very pleased to have Dr. Honghi Tran of the University of Toronto leading the project to update the "Kraft Recovery Boilers" Blue Book. Dr. Tran and other well-known recovery boiler researchers are currently updating the 16 chapters for the book and expect to complete it in early 2017. We are very excited about this new textbook and feel it will advance the knowledge and understanding of recovery boilers and will be a great help to the industry.

Research of Protective Clothing and Equipment

The Research & Development Subcommittee continues work on an industry survey on recommended clothing that is both resistant to heat and chemical attack, while providing mobility and comfort for safe use around recovery boilers.

Proposal for Recovery Boiler Generating Bank and Screen Tube Studies

The Research & Development Subcommittee has reviewed a proposal for studies of generating bank and screen tubes. These studies would build on the work from several other studies sponsored by the AF&PA Recovery Boiler Program. The Research & Development Subcommittee is very interested in these proposed projects, but will focus current efforts on the new textbook project and the University of Toronto research studies. These new projects will be reconsidered at the Research & Development Subcommittee meeting on February 7, 2017.

Other Research Projects Under Review

The Research & Development Subcommittee is also discussing other possible new research projects related to recovery boiler safety. These include: shatter jet design improvements; burning CNCGs; ash hopper best practices; develop procedures for safe inspection of boiler leaks; boiler inspection protocols; and combustible meters.

I would like to thank our member companies for their continued support of the Program. I would also like to thank all the Committee & Subcommittee members and the company Representatives for their dedication and hard work.

For comments or questions contact Wayne Grilliot or go to our Website listed below:

Wayne Grilliot
Email: grilliot.wj@apec.com
Mobile: (937) 602-1892
http://www.afandpa.org/our-industry/recovery-boiler-program

7. **TAPPI STEAM & POWER/ENERGY MANAGEMENT REPORT** - Bentley Sherlock

No report was given at this meeting.

8. **WESTERN CANADA BLRBAC REPORT** – Rinus Jellema

No report was given at this meeting.

9. **ACTIVITIES OUTSIDE NORTH AMERICA REPORTS**

No report was given at this meeting.

10. **OPERATING PROBLEMS SESSION REPORT** – David Slagel

The operating problem session was held the afternoon of October 25th. There was good membership attendance at this session.

Twelve submitted questionnaires were reviewed during the session. A wide variety of topics were covered with good audience participation. Safe operation for dissolving tanks was a focus topic with specific interest in management of plugged spouts. I will be coordinating with AF&PA to slate in a presentation of their recent study on dissolving tanks for the Spring 2017 meeting.

This concludes the Operating Problem Session report.

I would like to remind everyone before we close the main committee meeting that we have two Technical presentations immediately following this meeting. The first is a presentation by Frank DeStefano of Purolite entitled "Organic Fouling of IX Resins" followed by a presentation by Dennis Shanahan of AirTek entitled "How Recovery Boiler Changes Affect Precipitator Performance".

CHAIRMAN: That concludes our Main Committee Meeting this morning. Thank you all for your attendance and your time away from home. Just a reminder as Dave mentioned, we do have two Technical Presentations which will immediately follow the close of this meeting. Our next meeting will be April 10, 11 & 12, 2017. I'll now entertain a motion to close the Main Committee business meeting. Second? All in favor? The Main Committee Meeting is now closed. Safe travel everyone!

NEXT MEETING – April 10, 11 & 12, 2017, Crowne Plaza Hotel, Atlanta, GA.

Appendix A
INCIDENT LIST

NO LEAK

FALL 2016 – 01	
Classification:	**Noncritical**
Location:	**Georgia Pacific, Camas, WA**
Unit:	RB4, 1975, CE, 22673, 2 drum, large economizer, decant floor.
Unit Size:	2.5 MM lb ds/day; 400,000 lb/hr steam at 650 psig, 750°F, 733 psig design
Incident Date:	January 6, 2016
Downtime hrs, leak/total:	53.2 hrs
ESP?	**Yes**
Leak/Incident Loc:	N/A, ESP system activated due to DCS design and Comm card failure
How discovered:	N/A
Wash adjacent tube:	No
Root cause:	DCS system designed with deenergize to activate components
Leak detection:	Nalco Trasar – RBLI system
Bed cooling enhanc	NA
Last full inspection:	Sept 2015
Sequence of events:	At 10:15 pm Wednesday January 6th, #4 Recovery Furnace experienced a partial Emergency Shutdown Procedure (ESP) initiated by the DCS system that caused the rapid drain valves to open and drain the boiler. Other ESP and Master Fuel Trip devices functioned properly to shut the boiler fuels and trip the boiler offline. The boiler was on natural gas following a maintenance outage and had not yet fired liquor, nor was it smelting at the time. Post-ESP procedures were followed to ensure personnel and equipment safety. Further investigation revealed that a faulty digital RBC communication card initiated the sequence of events leading to the boiler rapid drain. The card failure on DCS rack 2 cascaded to racks 3 through 7. Communication was lost to all six slave racks. Upon loss of communication the DCS received signals from racks 2, 3 and 6 which initiated a stage 1 and stage 2 ESP simultaneously. This caused the rapid drain valves to open and primary air damper to close, which then caused a Master Fuel Trip. **Root and Contributing Causes:** • Primary Cause: Communication Card failure on DCS Rack 2 • Contributing Cause: DCS was programmed as “de-energize to activate” an ESP. BLRBAC and GP ESP Design/Construct Guidelines require an “Energize to Trip” system for the ESP system. This was true except for the status signals sent to both the BMS and DCS systems.
Repair procedure:	N/A
Future prevention:	**Corrective Actions:** • Conducted Incident Investigation • Completed Post-ESP checks per Standard Procedure including wait periods, drum internal inspections and boiler hydrostatic test. • Design of “Energize-to-Activate” ESP activation logic and associated wiring changes. Logic changes will be made to reverse the input/output status due to the change in the ESP Initiate switches. Design in accordance with BLRBAC

	Recommended Good Engineering Practice. • Functional Trip Testing of ESP program changes was completed • Recommend all facilities investigate this on all recovery boilers to make sure the ESP systems are indeed “Energize to Trip” systems and there are no “De-Energize to Trip” systems in operation.

ECONOMIZER

FALL 2016 – 02	
Classification:	**Noncritical**
Location:	**Verso Paper, Androscoggin Mill, Jay, ME**
Unit:	RB1, 1965, CE2564, 2-drum, sloped floor (Gotaverken rebuild), large econ (CE addition)
Unit Size:	2.35 MM lb ds/day, 296,000 lb/hr steam at 900 psig 810°F, 1000 psig design
Incident Date:	March 28, 2016
Downtime hrs, leak/total:	33 hr 40min
ESP?	**No**
Leak/Incident Loc:	"New" Economizer, One 1/8" pin hole leak in an existing tube plug weld, two pin hole leaks in tube 65 row 7 one approximately 1" from lower header and one approximately 1' from lower header under a stainless tube shield
How discovered:	Operator walk down
Wash adjacent tube:	No
Root cause:	Suspected O2 pitting, bad weld in plug installed on 1/25/15..
Leak detection:	Yes
Bed cooling enhanc	N/A
Last full inspection:	November 2015
Sequence of events:	1800hrs 3-28-2016- Operator found water coming in the new economizer hopper. Began to burn the Bed out. 2045hrs 3-28-2016- Fire out Bring boiler down on curve and begin cooling the boiler for repairs. 1400hrs 3-29-2016- Repairs complete. 1600hrs 3-29-2016- hydro complete. Began unlocking boiler 2128hrs 3-29-2016- Fire in 0300hrs 3-30-16 – Online 0417hrs 3-30-16- liquor in
Repair procedure:	Tube was cut and plugged at top and bottom headers. The welds were dye penetrant tested and the boiler was hydrostatic tested before returning to service.
Future prevention:	Improve DO control

ECONOMIZER

FALL 2016 – 03	
Classification:	**Noncritical**
Location:	**Catalyst Paper, Crofton, BC, Canada**
Unit:	RB3, 1971, BWC70810, 2-drum, sloped, large econ
Unit Size:	2.8 MM lb ds/day; 410,000 lb/hr steam at 625 psig, 699°F, 800 psig design
Incident Date:	October 26, 2015
Downtime hrs, leak/total:	58
ESP?	**No**

Leak/Incident Loc:	Economizer, pinhole in tube 2” above header, in swage, tube 68, row 1.
How discovered:	Operator walkdown, water in gen bank hopper
Wash adjacent tube:	No
Root cause:	O2 in feedwater due to DA problem.
Leak detection:	Yes
Bed cooling enhanc	No
Last full inspection:	September 2015
Sequence of events:	Leak noticed, monitored, boiler brought down, proceed to orderly shutdown
Repair procedure:	Excavate and weld up leak.
Future prevention:	Replace lower headers.

ECONOMIZER

FALL 2016 – 04	
Classification:	**Noncritical**
Location:	**ALPAC, Boyle, AB, Canada**
Unit:	1992, B&W7634, 1992, Single drum, sloped floor, large econ
Unit Size:	7.3 MM lb ds/day; 1,029,268 lb/hr steam at 900 psig, 850°F, 1150 psig design (MAWP)
Incident Date:	March 9, 2016
Downtime hrs, leak/total:	33
ESP?	**No**
Leak/Incident Loc:	Economizer crack about 1" above lower header, top of fillet weld. 108 ft above the floor.
How discovered:	Operator noticed water at center door of economizer conveyer during walkdown
Wash adjacent tube:	Nothing found
Root cause:	This defect may be caused by SAC (Stress Assisted Corrosion)
Leak detection:	Yes
Bed cooling enhanc	No
Last full inspection:	September 2015
Sequence of events:	03/09/16: • 00:45, Operator noticed water at center door of economizer conveyer during walkdown. • Relief Steam Chief and Operation's specialist notified and confirmed the leak. • 02:30-05:15, Removed liquor from the furnace. Went on gas. • 10:45, Boiler off-line. • 14:45-00:00, Boiler water washed, locked out and scaffolding built. 03/10/16 • 00:00-05:30, Leak repair and inspected. • 05:30-12:00, Boiler filled and hydro-tested to 900psi. • 12:00-13:30, Delocked and fired. • 19:20, Boiler online. 21:30, Liquor in.
Repair procedure:	Grind defective area leaving at least 0.30 at the bottom of the defect to prevent burn through. Re-inspect the ground out area with magnetic particle inspection to ensure all of the crack has been exposed. Pre-heat the area of repair to 250 degrees "F" . Weld the defective area with E 7018 electrode ensure that there is NO burn through. When welding is complete inspect with the magnetic particle inspection, if no surface defects are noted inspect with Radiography.
Future prevention:	During the Annual outage we will work with our inspection contractor to determine an ultrasonic inspection process that may help in identifying further defects in this area.

ECONOMIZER

FALL 2016 – 05	
Classification:	**Noncritical**
Location:	**Paper Excellence, Skookumchuck, BC, Canada**
Unit:	1993, ABB, CA91105, 1 drum, decant, large econ
Unit Size:	3.4 MM lb ds/day; 463,000 lb/hr steam at 630 psig, 750°F, 900 psig design (MAWP)
Incident Date:	November 6, 2015
Downtime hrs, leak/total:	42.5HRS total
ESP?	**No**
Leak/Incident Loc:	Pinhole 20ft up from the bottom of the 1st economizer.
How discovered:	While doing a walk down of the Recovery
Wash adjacent tube:	No
Root cause:	Internal O2 pitting
Leak detection:	No, found on walk down
Bed cooling enhanc	No
Last full inspection:	June 2015
Sequence of events:	While doing a walk down of the Recovery Boiler on Nov 6/15 the operator noticed water coming from the bottom of the 1st economizer. Manager was notified and the boiler was taken off liquor to see where the leak was coming from. Was hard to see exactly where the leak was as there were two indications of hard saltcake build up. Decision was made to do an organized/ planned outage on Nov 10/15, therefore boiler was put back on liquor and limited to MCR steam flow.
Repair procedure:	Nov 9 at 8:00pm the RB was taken off liquor in a planned manner and shut down and allowed to cool. At this time the leak could be seen and was coming from around the 49th tube in from the left had side but could not tell exactly until the boiler was cooled enough to go inside to locate the exact location. Nov 10 at 11:00am boiler on CSE and entering boiler to locate leak. The leak was found to be coming from the 49th tube in from the left hand side (in the middle of the economizer) about 20ft up from the bottom of the economizer on the 2nd tube counting from the front of the boiler. To get to the leak staging was required which was set up on the bottom baffle plate. It was found to be very difficult to reach the leak as the tube spacing is too small so we made the decision to cut the tube at the headers top and bottom and install tube plugs. At 4:00pm started installing bottom tube plug, complete at 8:00pm. Then went to top and plugged top tube and completed at 12:45am. At 1:20am started filling the boiler for hydro test. At 3:15am hydro test complete, found to be tight. Nov 11 at 7:00am fire in the RB At 1:00pm RB on line At 2:30pm RB on liquor.
Future prevention:	Looking at the cost of replacing the 1st economizer.

ECONOMIZER

FALL 2016 – 06	
Classification:	**Noncritical**
Location:	**Paper Excellence, Skookumchuck, BC, Canada**
Unit:	1993, ABB, CA91105, 1 drum, decant, large econ
Unit Size:	3.4 MM lb ds/day; 463K lb/hr steam at 630 psig, 750°F, 900 psig design (MAWP)
Incident Date:	February 9, 2016
Downtime hrs, leak/total:	40 HRS total
ESP?	**No**
Leak/Incident Loc:	20ft up from the bottom of the 1st economizer.
How discovered:	During walk down of the boiler
Wash adjacent tube:	No
Root cause:	Internal pitting
Leak detection:	No found on walk down
Bed cooling enhanc	No
Last full inspection:	June 2015
Sequence of events:	On Feb 7/16 at 9:30pm it was reported that water was coming from the Recovery Boiler 1st economizer hopper. Plan was developed to take the mill down and do planned maintenance while making the Recovery Boiler tube leak repair on Feb 11/16. However on Feb 9/16 at 8:30pm the Digester went down. Plan was then changed to start the Recovery Boiler repair at this time. - Feb 9/16 at 11:58pm Recovery Boiler off liquor and burning the bed out. - Feb 10/16 at 1:45am gas out of Recovery Boiler and boiler now cooling. - Feb 10 at 2:00pm boiler entered to locate the leak. Leak was found to be about 20ft up from the bottom of the economizer and was on the 41st tube counting from the west on row 2 of the rear bank of tubes. Note: Was very close to the leak that we had on Nov 6/15. Due to the difficulty of reaching the leak it was decided that we would just plug this tube off. - Feb 10 at 4:00pm repairs started to plug off the tube. - 10:30 pm repairs complete - 11:30pm filling the boiler - Feb 11 at 12:05am boiler full. - 12:25am started the hydro test. - 1:00am boiler to 600psig inspecting tube plug welds. - 1:25am hydro complete. Removing CSE and gas blinds. - 4:30am fire in RB following start up curve. - 9:00am boiler up to pressure and on line. - 3:55pm Recovery Boiler on liquor. Note: this took longer as the evaporators had very low inlet solids which took time to circulate the liquor to get the solids up and then get the evaporators to go to the strong black tank. To strong black at 3:00pm
Repair procedure:	Tube plugged.
Future prevention:	Looking at the cost of replacing the 1st economizer.

ECONOMIZER

FALL 2016 – 07	
Classification:	**Noncritical**
Location:	**WestRock Mahrt, Cottonton, AL**
Unit:	RB2, 1990, Tampella, Contr #337, single drum, large econ, decant
Unit Size:	3.75 MM lb ds/day; 561,800 lb/hr steam at 890 psig, 825°F, 1,100 psig design (MAWP)
Incident Date:	May 1, 2016
Downtime hrs, leak/total	77.5 hours
ESP?	**No**
Leak/Incident Loc:	Economizer, 2 leaks, leak on tube # 81 A, was a crack located at the top of the fin that is attached to the tube; leak on tube # 82 B was a crack located at the weld attachment to the lower header;
How discovered:	Operator rounds / Water in ash conveyor
Wash adjacent tube:	n/a
Root cause:	The leak on tube #81A was due to a stress associated with the attachment of the fin on the tube. The leak on tube #82B was due to the stress associated with the attachment of the tube to the header. SAC
Leak detection:	Mass balance
Bed cooling enhance:	No
Last full inspection:	February 2015
Sequence of events:	Operator discovered water in salt conveyor on a routine boiler walk down. At this salt conveyor it is possible for leak to be coming from economizer or generating bank sections. Tube leak mass balance calculation did not indicate a substantial leak. Decision was made to pull liquor, open doors, and inspect for leaks. A leak was identified in East economizer 9th floor below #48 IK. Controlled shut down of boiler. After first leak repair, boiler was hydro'd and a second leak was found in East economizer on 5th floor.
Repair procedure:	81A - The leak on tube # 81 A, was a crack located at the top of the fin that is attached to the tube. This repair was accessible by installing scaffold, therefore a weld repair of the crack was performed. The weld repair was tested with a dye penetrant test to ensure that the repair made to the tube did not contain any weld defects. The leak on tube # 82 B was a crack located at the weld attachment to the lower header. This area was not accessible for a weld repair. Therefore, a window was cut into the upper and lower header and a plug was welded inside the tube. The plug weld was tested using a dye penetrant test along with the window weld of the header after it was re-installed.
Future prevention:	Increase PT frequency around Economizer tubes

ECONOMIZER

FALL 2016 – 08	
Classification:	**Noncritical**
Location:	**WestRock Mahrt, Cottonton, AL**
Unit:	RB2, 1990, Tampella, Contr #337, single drum, large econ, decant
Unit Size:	3.75 MM lb ds/day; 561,800 lb/hr steam at 890 psig, 825°F, 1,100 psig design (MAWP)
Incident Date:	May 16, 2016

Downtime hrs, leak/total	30 hours
ESP?	**No**
Leak/Incident Loc:	Economizer at top header 1” crack in previous repair window access weld.
How discovered:	Boiler walk down after liquor pulled for controlled shutdown
Wash adjacent tube:	No
Root cause:	Defect in previous weld
Leak detection:	No
Bed cooling enhance:	No
Last full inspection:	February 2015
Sequence of events:	Smelt leak. Controlled shutdown. Boiler walked down. Economizer leak identified. Fixed while down to repair smelt leak.
Repair procedure:	Ground out crack and multiple weld passes over it
Future prevention:	N/A

ECONOMIZER

FALL 2016 – 09	
Classification:	**Noncritical**
Location:	**WestRock Mahrt, Cottonton, AL**
Unit:	RB2, 1990, Tampella, Contr #337, single drum, large econ, decant
Unit Size:	3.75 MM lb ds/day; 561,800 lb/hr steam at 890 psig, 825°F, 1,100 psig design (MAWP)
Incident Date:	June 10, 2016
Downtime hrs, leak/total	37 hours
ESP?	**No**
Leak/Incident Loc:	Economizer Lower Header, Leak was located at a previously plugged tube cap weld
How discovered:	Operator rounds
Wash adjacent tube:	No
Root cause:	Erosion, flue gas
Leak detection:	No
Bed cooling enhance:	No
Last full inspection:	February 2015
Sequence of events:	Operator found water in economizer salt conveyor. Controlled shutdown to repair leak.
Repair procedure:	Crack was welded and another weld was installed around the entire tube plug. Tube was plugged in 1996 and repaired in 2006.
Future prevention:	Add weld layer to tube plugs on next scheduled outage

ECONOMIZER

FALL 2016 – 10	
Classification:	**Noncritical**
Location:	**Georgia Pacific, Palatka, FL**
Unit:	RB4, 1977, CE, Contract #22974, 2 drum, 2007 Andritz long flow economizer, decant
Unit Size:	5.04 MM lb ds/day; 850,000 lb/hr steam at 1200 psig, 900°F, 1500 psig design (MAWP)
Incident Date:	August 2, 2016
Downtime hrs, leak/total	36 hours
ESP?	**No**
Leak/Incident Loc:	Economizer, 1/16" Pinhole leak in repair plug. Pinhole leak in weld for a repair plug for tube 62-3 in the first economizer section. Plug is located inside the top header and part of Andritz repair procedure for economizer tube.
How discovered:	Operator – normal round
Wash adjacent tube:	No
Root cause:	Weld Porosity – repaired weld
Leak detection:	Yes
Bed cooling enhance:	No
Last full inspection:	June 2016
Sequence of events:	The operator saw a wet area in the rear economizer ash hopper. The boiler was taken down in an orderly manner. One leak was found in the lower rear economizer.
Repair procedure:	The plug weld was ground down and re-welded.
Future prevention:	The mill is developing a plan for economizer replacement

ECONOMIZER Inspection Nozzle

FALL 2016 – 11	
Classification:	**Noncritical**
Location:	**International Paper, Mansfield, LA**
Unit:	RB2,1981, Babcock and Wilcox, PR-200, 2 Drums, Large Economizer, sloped to rear floor
Unit Size:	3.4 MM lb ds/day; 484K lb/hr steam at 1250 psig, 900°F, 1475 psig design (MAWP)
Incident Date:	March 24, 2016
Downtime hrs, leak/total	24 hrs 47 mins
ESP?	**NO**
Leak/Incident Loc:	Lower Economizer Header
How discovered:	Operator making first walkdown on shift
Wash adjacent tube:	No
Root cause:	Weld Procedure, Design
Leak detection:	Yes
Bed cooling enhance:	No
Last full inspection:	Annual Outage 2015
Sequence of events:	Operator was walking down boiler at the beginning of the 6 pm shift and observed water in the economizer hopper. Liquor was removed from the boiler and inspection doors were open to identify a leak. Once the doors were open, the leak could be seen spraying out. No water had been noticed prior to the operator round. Started backing liquor out at 6:13 pm, fuel out 10:31 pm.
Repair procedure:	Ground out the weld and rewelded, followed IP weld procedure
Future prevention:	Follow IP weld procedure

ECONOMIZER

FALL 2016 – 12	
Classification:	**Noncritical**
Location:	**International Paper, Rome, Ga**
Unit:	RB5, 1989, Tampella, 254-583, 1 drum, large economizer, decant
Unit Size:	5.44 MM lb ds/day; 655,000 lb/hr steam at 850 psig, 780°F, 1160 psig design (MAWP)
Incident Date:	March 18, 2016
Downtime hrs, leak/total	60hrs
ESP?	**No**
Leak/Incident Loc:	Corrosion leak 51 tubes from left hand wall cold economizer. Located at the bottom row of tubes to mini header & tube side (weld heat affected zone). No indications in the header.
How discovered:	Operator walk down
Wash adjacent tube:	No
Root cause:	Possible internal oxygen pitting, SAC.
Leak detection:	No
Bed cooling enhance:	No
Last full inspection:	Jan 2016
Sequence of events:	Operator noticed wet saltcake in the rear economizer ash hopper. A controlled shutdown was executed by burning the bed out and then shutting down.
Repair procedure:	Tube section installed.
Future prevention:	Planned shutdown and engineered repair to make it to 2017 and replace both economizers.

ECONOMIZER HH Cap

FALL 2016 – 13	
Classification:	**Noncritical**
Location:	**International Paper, Texarkana Mill, Domino Texas**
Unit:	RB1, 1972, Babcock & Wilcox, PR-144, 2 drum, large econ, no DCE
Unit Size:	2.6 MM lb ds/day; 408,000 lbs/hr steam at 650 psig, 750°F, 775 psig design (MAWP)
Incident Date:	June 23, 2016
Downtime hrs, leak/total	29.75 hours off line; 34.92 hours off liquor
ESP?	**No**
Leak/Incident Loc:	Lower economizer section, upper header hand hole cap weld leak
How discovered:	Operator walkdown
Wash adjacent tube:	NA
Root cause:	Root cause appears to be inadequate weld size
Leak detection:	Yes
Bed cooling enhance:	No
Last full inspection:	September 2015
Sequence of events:	The boiler assistant operator saw water dripping down the outside of a manway door at the top of the lower economizer section during one of his rounds. He then found the external leak on the hand hole cap on the top of the economizer.
Repair procedure:	Removed cap, MT tested seat & header, pre-heated, replaced cap, MT tested root & final passes
Future prevention:	NA

SUPERHEATER

FALL 2016 – 14	
Classification:	**Noncritical**
Location:	**Weyerhaeuser, Port Wentworth, GA**
Unit:	B&W, 1979, PR-190, Large Econ, 2 drum, sloped to rear floor
Unit Size:	4.7 MM lb ds/day; 699,000 lb/hr steam at 600 psig, 750°F, 1700 psig design (MAWP)
Incident Date:	January 24, 2016
Downtime hrs, leak/total	18 / 60 hours
ESP?	**Yes**
Leak/Incident Loc:	Primary Superheater tube loop, 3.5” rupture in bott loop ; Platen 19, Row 2, Tube 19
How discovered:	Operator heard noise/Steam feedwater differential
Wash adjacent tube:	No
Root cause:	Short term overheating (circulation loss still under investigation)
Leak detection:	No
Bed cooling enhance:	No
Last full inspection:	10/2014
Sequence of events:	Boiler had been down for a five day scheduled outage. The warm up curve was completed at 8:30 am on the 23rd. Superheaters were cleared and the boiler was put in the header at 2:50 PM. Liquor was in the boiler at 7:45 PM. At 3:45 AM on the 24th the boiler was at 71% of normal liquor burn. At 4:00 AM the field operator was called to investigate an issue with the attemperator. During his walk down he began to hear steam blowing in the boiler. He found #15 IK stuck in the boiler so he closed the valve to that IK. He still heard steam blowing so he closed the valve on the steam to all of the IK’s. Steam could still be heard so the operator, along with another person, then opened an inspection door on the 10th floor and verified that he was hearing a leak in the superheater section. They proceeded to the control room and ESP’d the boiler at

	5:07 AM.
Repair procedure:	Replace superheater loop and 8’ on each side with SA-213T22 material using Welding Proc. Spec. No 5A60 rev1; Weld replacement for base metals QW-403
Future prevention:	Investigating a possible superheater steam circulation issue; plan to measure tube swell on all superheater loops, pull/inspect all drum internals, perform internal inspection of superheater headers, and perform expanded superheater UT work during the next Annual Outage

SUPERHEATER

FALL 2016 – 15	
Classification:	**Noncritical**
Location:	**Weyerhaeuser, Flint River Mill, Oglethorpe Georgia**
Unit:	RB1, 1980, B&W, PR-198, 2 drum, 2 long flow economizers, low odor. Boiler upgrade with new Andritz superheater and decanting hearth – 2015.
Unit Size:	5.4 MM lb ds/day; 778,000 lb/hr steam at 900 psig, 900°F, 1175 psig design (MAWP)
Incident Date:	March 22, 2016
Downtime hrs, leak/total	236 hrs 30 min
ESP?	**No**
Leak/Incident Loc:	Superheater 1 inlet tube weld to crown seal box. Leaks occurred on one or more of the three tubes welded to the crown seal box
How discovered:	During hydro of the repair to the rear wall tube to membrane weld crack
Wash adjacent tube:	No
Root cause:	Movement of SH1 platens causing fatigue stresses at crown seal box to tube weld which cracked through tube wall.
Leak detection:	Yes
Bed cooling enhance:	No
Last full inspection:	May 2015
Sequence of events:	**See Fall 2016 Incident #20 sequence of events for the rear wall tube leak.**
Repair procedure:	Final count was 14 tubes were sectioned out that leaked and 11 tubes found cracked were repaired. All SH1 inlet and outlet tubes for all 36 platens were x-rayed and shear wave tested to determine repair scope. 20% of all SH2 and SH3 tubes were x-rayed and shear wave tested with no indications found. Tested and tightened all loose hanger rods. Reduced sootblower pressures.
Future prevention:	Extensive failure analysis is being performed. Follow-up inspections are planned for Spring 2017 shutdown to inspect crown seal box to tube welds. Install restraints between SH1 platen tubes and generating bank screen tubes. Continue videoing of SH1 platen movement and salt cake accumulations.

BOILER BANK and RISER

FALL 2016 – 16	
Classification:	**Critical #864**
Location:	**Verso Corporation, Wisconsin Rapids, WI**
Unit:	RB1, 1967, CE, 1166, 2 drum, decant, DCE – Cascade
Unit Size:	1.60 MM lb ds/day; 230,000 lb/hr steam at 1275 psig, 900°F, 1450 psig design
Incident Date:	January 3, 2016
Downtime hrs, leak/total	81.00 hours total
ESP?	**Yes**
Leak/Incident Loc:	2 Leaks – 1 on Left Sidewall Tube, 1 in Penthouse sidewall riser to Steam Drum
How discovered:	Operator walk down
Wash adjacent tube:	No
Root cause:	Too long Sootblower Lance in Generating Bank Section, mechanical impact to tube
Leak detection:	No
Bed cooling enhance:	Yes
Last full inspection:	July, 2015
Sequence of events:	At 5:30pm a leak was detected on the R-1 boiler. Water was seen dripping from conduit exiting the penthouse on the south side. When a door was opened a floor below at the front of generating bank on the south side, steam/water could be heard blowing in the boiler and tubes that should have been white were black. **At this time an ESP was initiated.** After ESP wait period was over, and Southland mobilized & conducted the chemical bed cooling, a hydostatic test was conducted & Leak #1 was found on south side wall between 5.1 & 5.2 Elevation, directly opposite to the #2 IK. To access it required a localized water wash in the generating bank & scaffolding to be installed at that elevation. Repairs required Dutchman on leaking tube and neighboring tube due to damage from the #2 Sootblower that had an oversized lance tube that struck the wall, causing the leak. The lance tube was replaced on the #2 sootblower to prevent possibility of re-damaging tube(s) after start-up. After making repairs to the initial leak, a hydro was conducted & water was found dripping above the steam drum coming from the Penthouse. When Penthouse man doors were opened, leak #2 was discovered on the riser to the steam drum from the waterwall header on the north side of the steam drum on the 6th floor. Leak was a 2" crack that was grinded down & filled in. PT (dye penetrant testing) was conducted to ensure all compromised material & defects were repaired.
Repair procedure:	Sidewall Tube – Dutchman w/ X-Ray | Penthouse Leak – Dye Penetrant Testing on compromised portions, Weld Overlay
Future prevention:	Work with Diamond Power to standardize sootblower length to a standard length mill wide

UPPER FURNACE

FALL 2016 – 17	
Classification:	**Critical #865**
Location:	**Verso Corp. Androscoggin, Jay, Maine**
Unit:	1976, B&W. PR-182, 2 Drum, sloped floor, long flow economizer
Unit Size:	3.0 MM lb ds/day; 365,000 lb/hr steam at 900 psig, 810°F, 1050 psig design (MAWP)
Incident Date:	January 17, 2016
Downtime hrs, leak/total	100 hrs
ESP?	**Yes**
Leak/Incident Loc:	Rear wall at top of nose arch
How discovered:	Leak detection system/chemistry & operator
Wash adjacent tube:	No
Root cause:	SAC
Leak detection:	Buckman Recovery Boiler Advisor
Bed cooling enhance:	Injection of Liquid CO2 into remaining bed
Last full inspection:	June 2015
Sequence of events:	The #2 Recovery Boiler was operating normally with a steaming rate of 370Klb/hr on liquor (169gpm/200Klb/hr) and Natural Gas (230DTh/170Klb/hr). This was 60% of full liquor load due to low liquor inventory. Liquor solids were normal at 65%. Early in the day shift (0600) on Sunday, January 17, the Recovery Boiler Advisor system registered a small water imbalance alarm. Sootblowers were removed and the boiler was inspected top to bottom. One of the ESP valves was found leaking so the operator took up on the packing and stopped the leak. The operator also found the color glass drain was leaking by slightly and took up on the valve and it stopped. There were no other detections of a leak during this inspection. The steam/feedwater differential had not changed. There were no changes in ID fan speed, steam temperature or furnace draft. At 0853, the bark boiler experienced a superheater tube failure. The plant went through several main header pressure swings to settle the header out. Early in the afternoon, the RBA imbalance increased to a level of 3. The Boiler chemistry was checked and rechecked with results of decreasing ph, phosphate & alkalinity. Liquor was immediately removed from the boiler with Natural Gas in the boiler. Supervisors/operators started the boiler walk down. Noise was detected at the mud drum level. Looking in from the man door on the right side wall at the nose arch level, water was observed at the top of the nose arch , spraying toward the generator bank. Leak was in center of boiler on top of nose arch. Boiler was immediately ESP'd. The ESP checklist was completed, personnel headcount completed, and the boiler was isolated for 4 hour minimum wait period per policy. Floor Thermocouples were monitored and all registered decreasing and were below 225 degrees within 90 minutes. After the four hour period, the boiler was inspected top to bottom. A small washed area was confirmed at top of nose arch at mud drum hopper attachment area. Very little bed remained in furnace, and it was between 0-2' wide and 0-2' high in front of each spout area. The remaining floor area was bare. Bed geometry was mapped and temperatures readings were recorded. Liquid CO2 was used to inject each area on map. All bed areas were below 800 degrees after 8 hours. CO2 was continued to be injected in all areas of remaining bed and all temperatures were below 500 degrees after 16 hours. The Boiler was filled to identify leak 22 hours after initiating the shutdown.

	Leak was Rear wall (nose arch) tube #48 from the Right wall at gusset attachment weld at point where the tube bends to follow rear of secondary superheater platen. This is also where the mud drum hopper attaches at the top.
Repair procedure:	4' Dutchman. Weld procedure Gas Tungsten Arc Weld (GTAW) and Shielded Metal Arc Weld (SMAW)
Future prevention:	Replacement of all 24 tubes that have this attachment weld in May 2016 annual outage.

UPPER FURNACE

FALL 2016 – 18	
Classification:	**Critical #866**
Location:	**Verso Corp. Androscoggin, Jay, Maine**
Unit:	1976, B&W. PR-182, 2 Drum, sloped floor, long flow economizer
Unit Size:	3.0 MM lb ds/day; 365,000 lb/hr steam at 900 psig, 810°F, 1050 psig design (MAWP)
Incident Date:	March 23, 2016
Downtime hrs, leak/total	85 hrs
ESP?	**Yes**
Leak/Incident Loc:	Rear wall at top of nose arch
How discovered:	Leak detection system/chemistry & operator

Wash adjacent tube:	No
Root cause:	SAC
Leak detection:	Buckman Recovery Boiler Advisor
Bed cooling enhance:	Injection of Liquid CO2 into remaining bed
Last full inspection:	June 2015
Sequence of events:	The #2 Recovery Boiler was operating normally with a steaming rate of 308Klb/hr on liquor (125gpm/124Klb/hr) and Natural Gas (211DTh/184Klb/hr). This was 60% of full liquor load due to low liquor inventory. Liquor solids were normal at 68%. Early in the day shift (0800) on Wednesday, March 23, 2016, the boiler water operator noted a slight decrease in phosphate, PH and alkalinity in the Recovery Boiler. The Buckman Recovery Boiler Advisor system registered a small water imbalance – level 4. At 1300, the Sootblowers were removed and the boiler was inspected top to bottom to listen for a leak in the east boiler hopper area, after the boiler operator noted a noise of something blowing. Liquor was pulled at 1323 for a more thorough inspection. The nose arch was inspected first from the front wall mandoor. There was no water noticed on the nose arch. Looking in from the man door on the right side (west) wall at the nose arch level, water was observed at the top of the nose arch, spraying toward the generator bank. Leak was in center of boiler on top of nose arch. Boiler was immediately ESP'd at 1408. The ESP checklist was completed, personnel headcount completed, and the boiler was isolated for 4 hour minimum wait period per policy. Floor Thermocouples were monitored and all registered decreasing. After the four hour period, the boiler was inspected top to bottom. A small washed area was confirmed at top of nose arch at mud drum hopper attachment area. Very little bed remained in furnace. It was between 0-3' wide and 0-2' high in front of each spout area and a small pile in the Northwest corner of the front wall. The remaining floor area had bare tube. Bed geometry was mapped and temperatures readings were recorded. Liquid CO2 was used to inject each area on map. All bed areas were below 800 degrees after 7 hours. CO2 was continued to be injected in all areas of remaining bed for an additional 5 hours and all temperatures were below 500 degrees before entry Leak was Rear wall (nose arch) tube #45 from the Right wall at scallop weld attachment at a point where the tube bends to follow rear of secondary superheater platen. It appeared to be a stress crack at the toe of the heat affected zone.
Repair procedure:	4' Dutchman. Weld procedure Gas Tungsten Arc Weld (GTAW) and Shielded Metal Arc Weld (SMAW)
Future prevention:	Inspect all hopper scallop bar welds in May 2016 annual outage.

UPPER FURNACE

FALL 2016 – 19	
Classification:	**Critical #867**
Location:	**Verso Corporation, Wisconsin Rapids, WI**
Unit:	RB1, 1967, CE, 1166, 2 drum, decant, DCE - Cascade
Unit Size:	1.60 MM lb ds/day; 230,000 lb/hr steam at 1275 psig, 900°F, 1450 psig design
Incident Date:	December 13, 2015
Downtime hrs, leak/total	56.75 hours total
ESP?	**Yes**
Leak/Incident Loc:	5 Leaks in Upper Furnace Front Wall
How discovered:	Operator walk down
Wash adjacent tube:	No
Root cause:	Possibly due to having only 3 of 4 gas guns functional during initial warm-up of boiler.
Leak detection:	No
Bed cooling enhance:	No
Last full inspection:	July, 2015

Sequence of events:	• 12/13/2015 – Repairs complete on Cascade Evaporator After 10-Day Shutdown, Fire in boiler 9 AM
	• 12/13/2015 – 1:00 PM walk down R1 wet insulation was discovered
	  o Insulation was cold; a heavy rain was in progress and entered building through roof drain leaks, open doors, and windows.
	• 12/13/2015 – On liquor at 5:00 PM
	• 12/13/2015 – 5:15 PM during walk-down of boiler leak was detected
	  o Shut-down of boiler was initiated; No ESP at time due to external leak only
	• 12/13/2015 5:30 PM bed burnout complete; Off-Liquor
	• 12/13/2015 8:40 PM
	  o Team member observed water entering R-1 boiler during inspection round & initiated ESP

Repair procedure:	UT Testing to ID compromised portions, Pad Welds
Future prevention:	Ensure all 4 start burners are functional prior to cold start-up of Recovery Boiler

UPPER FURNACE

FALL 2016 – 20	
Classification:	**Critical #868**
Location:	**Weyerhaeuser, Flint River Mill, Oglethorpe Georgia**
Unit:	RB1, 1980, B&W, PR-198, 2 drum, 2 long flow economizers, low odor. Boiler upgrade with new Andritz superheater and decanting hearth – 2015.
Unit Size:	5.4 MM lb ds/day; 778,000 lb/hr steam at 900 psig, 900°F, 1175 psig design (MAWP)
Incident Date:	March 22, 2016

Downtime hrs, leak/total	236 hrs 30 min
ESP?	**No**
Leak/Incident Loc:	#1 rear wall tube from the left just above the nose arch seal weld elevation
How discovered:	Feedwater operator test showed a decrease in chemical residual along with a separation in steam/feedwater flow
Wash adjacent tube:	No
Root cause:	Stress assisted corrosion and fatigue
Leak detection:	Yes
Bed cooling enhance:	No
Last full inspection:	May 2015
Sequence of events:	This boiler had undergone a replacement of the superheater, generating bank and lower furnace from above the primary airports to the downcomer header in April 2015. Steam/feedwater differential ran normal until after a planned maintenance outage on 10-21-15 where the boiler was taken down. From the 10-21-15 outage until around 12-23-15 when an unplanned plant event occurred and the boiler was forced down the steam/feedwater differential increased slightly. After restarting the boiler on 12-23-15 a slightly higher increase in steam/feedwater differential was indicated. Boiler walk downs were increased and leak checks on valving and lines attached to the boiler were performed. No changes in chemical residuals were noted. This increased stayed consistent to the 1-26-16 planned maintenance outage. The boiler ran from 1-26-16 to a plant upset on 2-15-16 when the steam/feedwater differential increased slightly. Walkdowns and monitoring of chemical residuals showed no water side leaks. From 2-15-16 to an unplanned plant event on 3-10-16 the steam/feedwater differential increased again. There was no change in chemical residuals test results. On 3-21-16 the steam/feedwater differential increased in a short time duration. Operators performed walkdowns and performed checks on valves and lines connected to the waterside of the boiler. No leaks were found. On 3-22-16 a boiler water chemical residual change was noted and troubleshooting steps taken to determine the cause of the differential. Chemical addition rates were unchanged and no leaking valves were found that are connected to the boiler. At 18:00 hours the decision was made to take the boiler off liquor. At 20:20 hours the boiler was off liquor and on fuel oil. Fire side walkdowns began with no water evident in the lower furnace, upper furnace, nose arch, generating bank and generating bank hoppers. The economizer was also checked. While looking into the sootblower pass between generating tube section and Superheater 1 a steam blowing noise could be heard. Fire was removed from the boiler at 01:14 on 3-23-16 due to the bed being completely burned out and a very thin smelt pool. Continuous rounds were made on the fireside of the boiler during boiler cool down with no leaks found. Plans were developed to perform a hydro to find leak location. Around 0900 on 3-23-16 during another walkdown of the boiler a small amount of water was seen at the top of the nose arch running into the generating bank hopper and a smaller amount wetting the top of the nose arch tubes on the furnace side as seen from the front wall, 8th floor upper furnace scaffold door. No water was running down and off of the furnace side of the nose arch. 3-23-16 11:55 operators draining water from boiler to start repairs. 3-24-16 0130 repairs complete. 3-24-16 03:50 the boiler waterside unlocked, fill for hydro began. 3-24-16 05:15 the hydro revealed several superheater leaks in the upper penthouse of

	the boiler. 3-31-16 2130 boiler hydro for rear wall tube repair and superheater tube repair 4-1-16 1800 liquor firing in boiler
Repair procedure:	Crack in tube was ground out, PT checked, welded then NDT checked
Future prevention:	The same tube on the right side of the boiler was inspected, surface cracks were found and repaired. No other rear wall tube at the top of the nose arch has the split membrane from the boiler rebuild with new tube installation.

UPPER FURNACE

FALL 2016 – 21	
Classification:	**Critical #869**
Location:	**International Paper, Orange Mill, Orange , TX**
Unit:	RB2, 1967, B&W, PR-108B, 2 drum, 1974 small econ, direct contact cyclone evaporator, sloped to front floor
Unit Size:	2.7 MM lb ds/day; 254,000 lb/hr steam at 850 psig, 835°F, 975 psig design (MAWP)
Incident Date:	August 3, 2016
Downtime hrs, leak/total	56.5
ESP?	**Yes**
Leak/Incident Loc:	Rear wall screen tube near the right sidewall
How discovered:	boiler walk down
Wash adjacent tube:	No
Root cause:	Casing crack in the hopper seal appears to have initiated at the right sidewall then propagated down the filler plate weld and eventually into the tube
Leak detection:	Yes, TRASAR detected the leak, but did not give first indication
Bed cooling enhance:	No
Last full inspection:	April 2016
Sequence of events:	At approx 7:45 am the boiler was firing 194 gpm and steaming 225,000 #/hr. During #2 Recovery boiler normal operations walk down of the boiler, water was noted coming from the generator bank hopper. After further inspection, it was suspected that a generator bank tube was leaking and ESP of the boiler was performed at 8:18am. There were no observable ID fan increases, drum level issues, increase in feed water usage or drop in steam production. The TRASAR system did detect the loss in boiler water but the alarm counter did not advance due to the operational issue (boiler trip) experienced 24 hrs previously.
Repair procedure:	Burred out the indication keeping the opening as small as possible, root weld and final weld the crack.
Future prevention:	Inspection and scheduled repairs, replace the tube next annual outage

UPPER FURNACE

FALL 2016 –22	
Classification:	**Critical #870**
Location:	**International Paper, Riverdale Mill, Selma, AL**
Unit:	RB2, 1981, Combustion Engineering, 28679, 2 Drum, Large econ, decant floor
Unit Size:	2.70 MM lb ds/day; 425,000 lb/hr steam at 1440 psig, 860°F, 1720 psig design (MAWP)
Incident Date:	July 26, 2015
Downtime hrs, leak/total	60.8 steam/ 61.8 liquor
ESP?	**Yes**
Leak/Incident Loc:	Right hand extended side wall below IK 54
How discovered:	Operator round
Wash adjacent tube:	No
Root cause:	Corrosion fatigue, SAC
Leak detection:	Yes
Bed cooling enhance:	Yes
Last full inspection:	Nov 2015
Sequence of events:	First helper was making rounds on RB2 at beginning of evening shift on Tuesday, July 26. At 15:15, helper observed steam and condensate coming from around a manway on 10th floor, right hand side. Helper called another helper to scene to evaluate. Another call was made to power operator and I/Ks were removed from boiler. No separation was noted in steam production against feed water usage. Boiler drafts remained normal at time of event. ESP RB2 at 15:45 on Tuesday, July 26 due to an apparent tube leak. Insulation was removed around a wallbox on right hand extended side wall on 10th floor below #54 IK. No evidence of leak was found after incident. Southland was mobilized to site and arrived Wednesday morning to cool bed. Bed was cooled by 13:00. Started filling and hydro of boiler. Leak was localized to lower corner of wall box on 10th floor on outside of boiler. Turner and BSI looked at leak. Elected to cut the corner of wallbox and demo refractory to confirm that leak was at bottom. Leak was confirmed to be present at lower corner weld of wall box to tube attachment. Completed hydro to look for any other leaks at 23:30 on Wednesday. Mill, BSI, and IP Technology discussed leak. Elected to do an overlay repair in lieu of installing a Dutchman for the affected location on next major outage. Repair started at 2:30 and was complete by 4:30, Thursday morning. Completed replacement of steam drum vent valve that would not close during hydro. Locks off water side at 6:00. Filled boiler and performed hydro. Dry hydro of unit called at 12:45 on Thursday. Bricking of 3rd floor manway completed at 13:15, which released all locks from boiler. Fire in boiler at 17:15. Boiler on line at 3:30 Friday morning. Boiler on liquor at 5:30. 61.75 hours liquor to liquor for event.
Repair procedure:	A portion of wall box and associated refractory was removed to view the leak. Crack was burred out and PT used to verify the end of the crack. Weld overlay was used for repair.
Future prevention:	Perform more SAC inspections on next major outage on extended side wall. Review possible methods to alleviate stress on corners of existing, similar wall boxes.

SCREEN

FALL 2016 – 23	
Classification:	**Critical #871**
Location:	**WestRock, La Tuque, Quebec, Canada**
Unit:	RB5, 1975, CE, CA73114, 2 drum, large econ, direct contact cascade evaporator, decant
Unit Size:	4.0 MM lb ds/day; 604,000 lb/hr steam at 400 psig, 500°F, 1170 psig design (MAWP)
Incident Date:	May 23, 2016
Downtime hrs, leak/total	34
ESP?	**No**
Leak/Incident Loc:	Screen tube small leaks inside refractory on outside of rear wall, 3 tubes had leaks
How discovered:	On outage hydro.
Wash adjacent tube:	No
Root cause:	External corrosion and O2 pitting.
Leak detection:	No
Bed cooling enhance:	No
Last full inspection:	2015
Sequence of events:	Leak discovered during hydro test following annual outage and acid wash. Test pressure 800 psi. During hydro test following annual outage and acid wash, water was seen on the rear wall under platens #3 and #30. Opened seal box located leaks on tube #10 in platen #3 and tube #5 in platen #30. Tube 3 was small pinhole repair was done by replacing a section of tube. Tube #5 was repaired with over lay weld being outside of sealbox. Second hydro revealed a leak in tube #12 of platen #3 (leak was probably hidden during first test being just below leaking tube) this tube was also overlay weld repair. Cause is cold side corrosion and oxygen pitting.
Repair procedure:	Replaced one section of tube and overlay welding on tubes on cold side of sealbox.
Future prevention:	

LOWER FURNACE

FALL 2016 – 24	
Classification:	**Critical #872**
Location:	**Canfor-Northwood Pulp, Prince George, British Columbia, Canada**
Unit:	RB1, 1966, CE, CA-64127, 2 Drums, Long Flow, Large Economizer, decant
Unit Size:	4.00 MM lb ds/day; 658,000 lb/hr steam at 656 psig, 752°F, 750 psig design (MAWP)
Incident Date:	May 29, 2016
Downtime hrs, leak/total	Total time off liquor after knowledge of the leak was 148 hours
ESP?	**Yes.**
Leak/Incident Loc:	Right wall tubes 13 and 14 at bottom of primary air port opening
How discovered:	Operator walkdown, Visual find
Wash adjacent tube:	No
Root cause:	Thermal fatigue
Leak detection:	Did not detect
Bed cooling enhance:	No
Last full inspection:	February 2, 2016
Sequence of events:	• "A" side power failure May 26th 15:22hrs; RB1 not restarted until May 28th 0530 hours (contributing event). • May 29th, Recovery Field 4th Class (spoutman) noticed steam coming from south east corner of boiler RB#1 (right wall near front wall) primary port damper handle during his round 07:55hrs. • Assistant Shift engineer and Shift Engineer were contacted. Both SE, ASE, and RE3rd (Recovery Operator) observed the steam coming from the damper adjuster handle, boiler cladding and fire side of the primary port (right front of boiler 3rd port from corner). • Weak black liquid was also observed fire side primary port. A bar inserted and removed from the port was damp with a watery black liquid. • At this point all non-essential personnel were evacuated to control room. Fiberline Supervisor and Security were notified to clear area of contractors. • The steam coil air heater was then isolated, nozzle conditions checked, tell-tale checked and observed to be clear (by SE). 10 minutes later no change in primary port condition. • SE initiated ESP 08:11hrs. All non-essential personal evacuated to muster station.
Repair procedure:	The leak on right wall tube #13 and 14 were found to have initiated at the lower primary airport crotch plate attachment. Tube #13 and 14 were observed to have a crack-like indication. The indication was not excavated as it was very similar to the February 2016 ESP event. Tubes #13 and #14 were replaced.
Future prevention:	Retrofit the primary airports with cast nozzles that do not require attachment welds as was implemented on the rear wall in fall 2015.

LOWER FURNACE and Superheater

FALL 2016 – 25	
Classification:	**Critical #873**
Location:	**Tolko Manitoba Kraft, The Pas, Manitoba, Canada**
Unit:	1969, CE, CA69108, 2 drum, cascade, decant
Unit Size:	1.95 MM lb ds/day, 219,000 lb/hr, 750 psig, 825F, design 800 psig
Incident Date:	March 31, 2016
Downtime hrs, leak/total	114 hrs
ESP?	**No**
Leak/Incident Loc:	Front wall tube 129 was found to have cracked on buckstay weld and pulled away from buckstay. SECONDARY SUPER HEATER HANGER TUBE 28 PLATEN 4, ¼" rupture due to corrosion.
How discovered:	Operator walkdown
Wash adjacent tube:	No
Root cause:	SAC; external corrosion
Leak detection:	No
Bed cooling enhance:	No
Last full inspection:	June 2015
Sequence of events:	The unit was firing only auxiliary fuel and the unit had not been firing liquor since 13:00 hours March 30th .The fire had been pulled on the unit March 30th @18:30 to inspect the ID fan and DCE outlet duct. Unit was @ 500 psig offline in warming curve when Shift Engineer noticed water on the 7th floor buckstay @ 07:30 am March 31st 2016 front wall and right wall while on walkdown round that had not been there 2 hours previously. Shift engineer notified the day shift supervisor. Day shift supervisor notified superintendent and Chief Engineer and inspected water on Buck stays. Auxiliary fuel was pulled from unit (no ESP) bed temperature was below 600°F. Cladding and Insulation removed from suspected area of leak at buckstay on front wall. No leak found. Penthouse inspection door opened and water was visual in penthouse. Unit pressurized to 300 psig and leak detected on SECONDARY SUPER HEATER HANGER TUBE 28 PLATEN 4. Unit depressurized, and readied for water wash. Pup repair completed, April 3, 2016 00:00 hrs. Boiler hydro at for 20 minutes no leaks. Depressurized unit and de-lock, <u>Second associated leak</u> Shift engineer noticed water on buckstay at the 2nd floor elevation, front wall, looking in cold boiler could see water running down the wall tubes from approximately the liquor gun level front wall left corner. Cladding removed and tube 129 front wall was found to have cracked on buckstay weld and pulled away from buckstay. Cause of leak fatigue cracking of the weld between the buckstay and the tube Repad and weld repair completed April 4th 12:00, Hydro completed @ 18:30 Boiler de-locked and fire in unit @ 01:15 April 5th 2016
Repair procedure:	Weld repair on wall tube; new section on SH tube.
Future prevention:	Investigate complete super heater replacement

UPPER FURNACE and Superheater

FALL 2016 – 26	
Classification:	**Noncritical**
Location:	**WestRock, Tacoma, WA**
Unit:	RB4, 1972, CE, 21971, 2 drum, large econ, decant
Unit Size:	3.7 MM lb ds/day, 554,000 lb/hr, 950 psig, 825F, design 1000 psig
Incident Date:	March 9, 2016
Downtime hrs, leak/total	75 hrs
ESP?	**No**
Leak/Incident Loc:	Left front corner tube, SH outlet tube
How discovered:	Operator walkdown
Wash adjacent tube:	No
Root cause:	Weld failure or corrosion
Leak detection:	No
Bed cooling enhance:	No
Last full inspection:	2016
Sequence of events:	On the helpers walk down he noticed a wisp of steam coming from under the insulation of the expansion joint at the 4th floor front left corner, Operator performed a thorough leak detection with the IK's on hold, it was determined that an ESP was not necessary (the furnace tubes are membrane welded; lower furnace leak appeared as a small wisp of steam coming from behind the buckstay, with very little water showing). The boiler was taken down in an orderly fashion, while doing a hydro to locate the leak, we found a new leak in superheater section 1A.
Repair procedure:	Performed weld repair on the 4th floor south west corner wall tube (external) at a corner attachment. The 4th floor (lower leak) is located on the front left location at the blast corner, liquor guns are located on the 3rd floor, the tertiary air ports are located on the 3 ½ floor (we have a 3rd floor, 3 ½ floor and a 3 ¾ floor, the fourth floor is approximately 40 ft above the liquor guns. Performed weld repair on the 9th superheater pendant, outlet leg, 3rd in from the crown seal attachment. Pad welded (2) weld defects 1A superheater pendent.
Future prevention:	

SMELT SPOUT

FALL 2016 - 27	
Classification:	**Spout Leak**
Location:	**Fortress Specialty Cellulose, Thurso, Quebec, Canada**
Unit:	RB #3, 1989, 2 drums B&W, BWC7621,
Unit Size:	1.3 MM lb ds/day; 158,700 lb/hr steam at 510 psig, 710°F, 600 psig design (MAWP)
Incident Date:	Sept 20, 2016
Downtime hrs, leak/total:	11.5 hours
ESP?	**No**
Leak/Incident Loc:	Smelt spout cracked in bottom trough close to discharge end, and small amount of water was sprayed intermittently.
How discovered:	Routine spout cleaning. Smelt was flowing differently in EAST spout
Wash adjacent tube:	N/A
Root cause:	Ca/Mg deposit combined with low flow area in spout cooling channels
Leak detection:	N/A
Bed cooling enhance:	N/A
Last full inspection:	2015

Sequence of events:	The boiler had been firing black liquor continuously since August 25th, after a 1 hour unscheduled maintenance outage. Sept 19th, spout began light splashing on west spout Sept 20th 08:30 - Spout man noted splashing was heavier and reported Sept 20th 12:50 – Sept 21th 00:30 unscheduled stop to replace spout Sept 21th Damaged spout was inspected, found 3/4in crack at 4in from discharge edge Analysis revealed that the opposite spout (East) had the same failure in June 2016, at the exact same location in the spout. Spout was left in location, and cooling water kept flowing during bed burnout and cooldown time
Repair procedure:	Replaced spout
Future prevention:	To be determined with manufacturer and water treatment consultant

DISSOLVING TANK EXPLOSION

FALL 2016 - 28	
Classification:	**Dissolving Tank Explosion #37**
Location:(Mill, city, ST)	**Georgia Pacific, Wauna Mill, Clatskanie, OR**
Unit:	1967 B&W, PR-93, 2 drum, large economizer, sloped floor to front
Unit Size:	3.6 MM lb ds/day, 515,000 lb/hr, 600 psig, 750F, design 700 psig
Incident Date:	April 22, 2016
Downtime hrs, leak/total:	
ESP?	**No**
Leak/Incident Loc:	Sheared header drain line due to dissolving tank explosion
How discovered:	
Wash adjacent tube:	No
Root cause:	The boiler initially tripped while at load burning black liquor, thus no burn down of the bed occurred. The boiler remained down (approx. 48hrs) and again for (approx. 25.5hrs) cooling allowing the upper furnace to shed adding more material to accumulate in the bed. This combined with prolonged auxiliary fuel firing during start-up without smelt flow due to plugged spouts and internal damming resulted in smelt pooling. This led to a rush of smelt that filled the entire spout opening overwhelming the shatter jet system causing a smelt water reaction in the dissolving tank. • Sulfate rich slag affecting sulfidity, viscosity, and melting point • Overreliance on heat release within the furnace to help open spouts. While internal heating with auxiliary fuel can help melt frozen smelt and make it easier to open plugged spouts, it will add to the molten smelt pool in the unit and contribute to the magnitude of the rush once the spouts are opened. • Heat input was auxiliary fuel (50% load) • Visual observation from outside the furnace did not prove to be a reliable method for estimating the magnitude of smelt pool present. • Smelt run off quick and inadequate time to make changes • Explosions intensified
Leak detection:	Yes
Bed cooling enhance:	No
Last full inspection:	May 2015

Sequence of events:	After two unexpected shutdowns within a week, the recovery boiler had been brought back online and employees were attempting to get liquor firing again. When doing this they ran into plugged smelt spouts and used a torch to successfully clear the spout. Liquor was put back on for only seconds before a series of explosions occurred in increasing power. During the series of explosions liquor was immediately pulled off again and the employees in the area clearing the spouts ran from the area. No employees were injured but the dissolving tank was torn at the top and much of the associated equipment in the area was damaged. • Sunday 11PM – Power outage and recover boiler shut down unexpectedly with full bed. • Tuesday 11PM – Natural gas back on to the boiler. Steaming rate 80-100Mlb/hr on auxiliary fuel only and smelt spouts at least partially open. • Wednesday 7PM – Natural gas pulled off boiler for a fast controlled shutdown due to effluent treatment issues. • Thursday 8:30PM – Natural gas back on the boiler at a rate to burn NCGs 225Mlb/hr (approx. 50% load). • Friday 2:50PM – Smelt spouts were at least partially open and decision was made to fire liquor. • Friday 3:09PM – Smelt spouts observed plugged and liquor guns pulled. – Employees start to unplug smelt spouts • Friday ~4:20PM – By using torches on East and West spouts the East spout cleared and had a trickle of flow. – Employee was sent to put liquor in the boiler • Friday ~4:30PM: – Employee on 3rd floor added liquor for 5-10 seconds prior to isolating due to event – Employees on smelt deck observed east spout become full flow and the dissolving tank became quiet – Loud dissolving tank sounds 1-5 with most employees recalling 3 with the 3rd being the most significant – Relief vent dampers did show opening – Last tank explosion sound activated the master fuel trip on high gas supply pressure
Repair procedure:	Repairs to the tank and associated equipment were completed using like kind materials and repair methods.
Future prevention:	Boiler start-up procedures were modified to require cooling and water washing of the bed if the boiler is down for more than 6-hours with a bed in the lower furnace. Note- if burn down occurred during shutdown, this would not be required.

INTERNATIONAL INCIDENTS

SUPERHEATER

FALL 2016 - 1148	
Classification:	
Location:	**International Paper Rajahmundry, AP, India**
Unit:	RB4, 2006, Enmas Andritz, GB-055, Single Drum, large Economizer, decant
Unit Size:	1500 Tds/day,, 210 TPH steam flow, steam pressure 65 Bar, Steam Temp 460°C
Incident Date:	February 15, 2016
Downtime hrs, leak/total:	29 Hrs

ESP?	**No**
Leak/Incident Loc:	Secondary superheater coil leakage, one tube got rupture and second pinhole.
How discovered:	In B shift shift-in-change reported less steam production, then we suspect leakage and made round by C shift in-charge and operator they hear heavy sound near superheater zone and boiler was immediately stop for finding out the exact location and repair.
Wash adjacent tube:	No
Root cause:	During AO 2015 superheater tube thickness was below norm and decide to replace in AO 2016. The root cause of failure may be improper selection of material, corrosion due to high Cl, K and temperature variation of steam.
Leak detection:	No
Bed cooling enhance:	No
Last full inspection:	July 2015
Sequence of events:	• At B Shift end on 5/15/16 observed reduction in steam flow. C shift operator walk around the boiler he found abnormal sound coming from superheater area. • Liquor firing stopped at 11:55 p.m. due to superheater coils tube leak. Oil firing stopped at 12.15 a.m. and boiler taken off range at 12:30 a.m. • After maintenance works RB4 hydraulic done up to 64kg/cm2 on 2/16/16, C shift 11:50 p.m. RB4 boiler lighted up on 2/16/16 C shift at 4:20 a.m. and kept in range on 2/17/16 A shift at 11:00 a.m.
Repair procedure:	Tubes were cut inlet and outlet header and dummied.
Future prevention:	Change secondary superheater outlet tube with better T22 material, reduce Cl and K.

SUPERHEATER and Economizer

FALL 2016 - 1149	
Classification:	
Location:	**International Paper Rajahmundry, AP, India**
Unit:	RB4, 2006, Enmas Andritz, GB-055, Single Drum, large Economizer, decant
Unit Size:	1500 Tds/day,, 210 TPH steam flow, steam pressure 65 Bar, Steam Temp 460°C
Incident Date:	April 26, 2016
Downtime hrs, leak/total:	42 Hours
ESP?	**No**
Leak/Incident Loc:	Economizer-1 panel bottom header connecting tube crack at 11 (row B, 6) tube from boiler RHS side (CF-6 boiler side) leakage found. Superheater - Got pinhole in 2 tubes due to corrosion
How discovered:	Economizer - The operator observed the hoppers and found the following: water in economizer-1 hopper the economizer boiler door at hopper was opened and leak was observed from the door. SH - found during hydro test of the boiler for identify the leakage in ECO-1.
Wash adjacent tube:	No
Root cause:	Cyclic Stress
Leak detection:	No
Bed cooling enhance:	No
Last full inspection:	April 2013
Sequence of events:	At 1:15 PM shift in charge went to field to further investigate. He found that leakage in economizer -1 and he informed to Power boiler manger. At 2.20PM power boiler manger went to field. It was determine that there is leakage at Eco-1 At 2.30 PM one meeting was held for stopping of recovery boiler. A plan was developed for stopping of recovery boiler and related to other plant. Boiler was shut down at 8 PM on 26/04/16 when bed was burned out. After leak repairs boiler was hydrostatic tested and economizer leak was found to be repaired successfully. 2 leaks were found in SH Oil firing started at 3 AM on 28/04/16 , Liquor firing at 9AM, Boiler went online at 10AM 28/04/1
Repair procedure:	Econ - Leaking tube panel was dummied as there is no approach for repair. SH - Damage tubes replacement is very difficult. Tubes were dummied at both inlet and outlet header of super heater
Future prevention:	Econ - Install all bottom header U clamp , SH - We will replace secondary outlet tube in AO 2016. We started the ESP ASH purging for reduce the cl and K in BL. Tuning the de-superheater control valve to reduce the steam temp variation.

SUPERHEATER

FALL 2016 - 1150	
Classification:	
Location:	**International Paper Rajahmundry, AP, India**
Unit:	RB4, 2006, Enmas Andritz, GB-055, Single Drum, large Economizer, decant
Unit Size:	1500 Tds/day,, 210 TPH steam flow, steam pressure 65 Bar, Steam Temp 460°C
Incident Date:	May 20, 2016
Downtime hrs, leak/total:	29 Hrs
ESP?	**No**
Leak/Incident Loc:	Secondary superheater coil leakage, one tube got rupture and second pinhole.
How discovered:	At C shift at 1:30 a.m. on 5/20/16 observed reduction in steam flow, C shift operator walk around the boiler he found abnormal sound coming from superheater area. They check conductivity and phosphate in boiler water and found no difference in reading.
Wash adjacent tube:	No
Root cause:	During the AO 2015 superheater tube thickness was below norm and decide to replace in AO 2016. The root cause of failure may be improper material, corrosion due to High Cl, K, and steam temp temperature variation.
Leak detection:	No
Bed cooling enhance:	No
Last full inspection:	July 2015
Sequence of events:	At C shift at 1:30 a.m. on 5/20/16 observed reduction in steam flow. C Shift operator walk around the boiler he found abnormal sound coming from superheater area. They check conductivity and phosphate in boiler water and found no difference in reading. Boiler taken into off range on 5/20/16 C Shift at 2:30 a.m. After maintenance works RB4 hydraulic done up to 64 kg/cm2 on 5/21/16 C shift 10:45 pm and hydraulic failed found leakage in other tube. After dummy of tubes RB4 hydraulic done up to 64kg/cm2 on 5/21/16 C shift 4:15 a.m. And RB4 boiler lighted up on 5/22/16 A shift at 11:30 a.m. RB4 kept in range on 5/22/16 A shift 6:45 p.m.
Repair procedure:	Tubes were cut inlet and outlet header and dummied.
Future prevention:	Change secondary superheater outlet tube with better T22 material, Reduce Cl and K.

ECONOMIZER

FALL 2016 - 1151	
Classification:	
Location:	**International Paper Rajahmundry, AP, India**
Unit:	RB4, 2006, Enmas Andritz, GB-055, Single Drum, large Economizer, decant
Unit Size:	1500 Tds/day,, 210 TPH steam flow, steam pressure 65 Bar, Steam Temp 460°C
Incident Date:	May 27, 2016
Downtime hrs, leak/total:	28
ESP?	**No**
Leak/Incident Loc:	Crack develop near weld joint between bottom header connecting Tube 19 of lower panel RHS side (CF-6 Boiler side).
How discovered:	Operator investigation of hoppers and boiler openings
Wash adjacent tube:	No
Root cause:	The economizer leak can be seen on the attached drawing and pictures. The linear indication can also be seen. The general thought is that cyclic stress on the bottom header resulted in this failure. It is not known whether or not the hangers were adjusted properly and may have contributed, but there are no lateral supports on the mini-headers which may be allowing additional stresses with draft on boiler. The mechanical slip joint is in place on the main header and is not suspected to be part of the stress related issue. A careful metallurgy study will also be conducted for other possible issues.
Leak detection:	No
Bed cooling enhance:	No
Last full inspection:	July 2015
Sequence of events:	On 27 /05/16 Night shift operator observe water in Eco-1 hopper. Rb4 ECO-1 TUBE leak identified and boiler taken into off range on 28/5/2016 A shift at 11:45am after maintenance works rb4 hydraulic done up to 64kg/cm2 on 29/5/2016 A shift 7:30Am Boiler lighted up on 29/5/16 A shift at 8:45am and kept in range on 29/5/2016 B shift 3Pm
Repair procedure:	Crack portion tube cut and renew with new tube.
Future prevention:	Extensive NDT of bottom header. We have check all supports. Install bottom header all missing U clamp

SUPERHEATER

FALL 2016 - 1152	
Classification:	
Location:	**International Paper, Svetogorsk, Russia**
Unit:	RB3, 1977, Tampella, SH by Andritz 1996, 2 drum, large econ, decant
Unit Size:	1.4 MM lb ds/day; 264,000 lb/hr steam at 550 psig, 824°F, 711 psig design (MAWP)
Incident Date:	August 14, 2015
Downtime hrs, leak/total:	41 Hours
ESP?	**Yes**
Leak/Incident Loc:	Leak in SH 1, pinhole
How discovered:	Operator Walkdown
Wash adjacent tube:	No
Root cause:	Corrosion
Leak detection:	Yes
Bed cooling enhance:	Yes, dry ice
Last full inspection:	2014
Sequence of events:	14.08.15 at 15.25 the operator had heard a noise between the generating bank and the SH I. Also the DCS parameters showed that something was wrong. At 15:40 we decided to stop the boiler by the pushing the button of emergency stop. Then we informed BFB and contractors left the location. In 4 hours – at 20:00 we checked the boiler, visual inspection showed that the boiler was not damaged. From 21:50 – 22:30 the thermocouples were mounted into the furnace floor and we monitored the temperature every 2 hours. To cool down the boiler asap we ordered the dry ice 15.08.15 at 5:40 the ice was received, at 23:47 the second batch of the ice had been received and used. 16.08.15 at 08.30 the floor temperature was 415°C and the heating surfaced were washed from 9:00 till 17:00. The HYD test was performed, it showed the pinhole in the I stage of the SH.
Repair procedure:	Replace the loops and tubing sections.
Future prevention:	Using new loops with weld overlay.

SUPERHEATER

FALL 2016 - 1153	
Classification:	
Location:	**International Paper, Svetogorsk, Russia**
Unit:	RB1, 1974, Tampella TA133, SH by Andritz 1996, 2 drum, large econ, decant
Unit Size:	1.4 MM lb ds/day; 264,000 lb/hr steam at 550 psig, 824°F, 711 psig design (MAWP)
Incident Date:	January 14, 2016
Downtime hrs, leak/total:	41 Hours
ESP?	**No**
Leak/Incident Loc:	Leak in SH III, pinhole
How discovered:	Operator Walkdown
Wash adjacent tube:	No
Root cause:	Corrosion
Leak detection:	Yes
Bed cooling enhance:	Yes

Last full inspection:	June 2015
Sequence of events:	During the boiler startup at 7.00 14.01.16 after the repair of precipitator the boiler furnace overpressure interlock (safety pressure system) was actuated. The oil burners were stopped. During the furnace visual inspection, the holes were found in the 3rd (stage) superheater. The preparation of the boiler for repair was started: cooling down, cleanout, hydraulic, mount of deck floor. By 19.00 it was found out that three loops of 3rd stage superheater are damaged.
Repair procedure:	Replace the loops and tubing sections.
Future prevention:	Using new loops with weld overlay.

SUPERHEATER

FALL 2016 - 1154	
Classification:	
Location:	**International Paper, Svetogorsk, Russia**
Unit:	RB3, 1977, Tampella, SH by Andritz 1996, 2 drum, large econ, decant
Unit Size:	1.3 MM lb ds/day; 242,000 lb/hr steam at 550 psig, 824°F, 711 psig design (MAWP)
Incident Date:	October 15, 2015
Downtime hrs, leak/total:	41 Hours
ESP?	**No**
Leak/Incident Loc:	Leak in SH III and II
How discovered:	Operator Walkdown
Wash adjacent tube:	No
Root cause:	Loops overheating during the startup. Corrosion
Leak detection:	Operator Walkdown
Bed cooling enhance:	Yes
Last full inspection:	2014
Sequence of events:	15.10.2015 at 14:27 the RB3 operator informed that there is a strange noise on the III SH right side in the boiler furnace while the sootblower was turned off. Due to the procedure, the boiler was switched to the oil for burning the bed. The following actions: - burning the bed – 6 hrs; - shutdown and cooling down the boiler – 5 hrs, the temperature was controlled with the portable thermocouples; - washing the heating surfaces – 5 hrs
Repair procedure:	The replacement of SH loops: 1st stage SH • 3rd platen, 4th loop + 2nd loop (the replacement of 2 straight tubing sections). • 8th platen, 4th loop (the replacement of 1 straight tubing section). • 11th platen, 4th loop + the replacement of 1 straight tubing section. 2nd Stage of the SH • 2nd platen, 2nd loop (the replacement of 2 straight tubing sections). • 4th platen, 1st loop (the replacement of 2 straight tubing sections). • 13th platen, 3rd loop (the replacement of 2 straight tubing sections). 14th platen, 3rd loop (black, curved) + 1 straight section.
Future prevention:	Using the loops with overlay.