BLACK LIQUOR RECOVERY BOILER
ADVISORY COMMITTEE

MINUTES OF MEETING
Virtual Teams Presentation
April 6 & 7, 2021

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:	**David von Oepen** WestRock Demopolis, AL	Tel: 334-341-7900 Cell: 904-753-4523 david.vonoepen@westrock.com
Vice-Chairman:	**Bentley Sherlock** Georgia-Pacific Atlanta, GA	Tel: 404-652-4608 Cell: 404-884-4872 bentley.sherlock@gapac.com
Secretary:	**Everett Hume** FM Global Norwood, MA	Tel: 781-255-4733 Cell: 413-265-9562 everett.hume@fmglobal.com
Treasurer:	**Len Olavessen** LENRO, Inc. 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

Companies 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.net
IRS Employer ID/Tax ID (IRS E.I.N.T./T.I.N.) ---- #13-366-5137

EXECUTIVE COMMITTEE

David von Oepen
BLRBAC Chairman
WestRock
Demopolis, AL
Tel: 334-341-7900
Cell: 904-753-4523
david.vonoepen@westrock.com

Bentley Sherlock
BLRBAC Vice Chairman
Georgia-Pacific
Atlanta, GA
Tel: 404-652-4608
Cell: 404-884-4872
bentley.sherlock@gapac.com

Everett Hume
BLRBAC Secretary
FM Global
Johnston, RI
Tel: 401-415-2272
Cell: 413-265-9562
everett.hume@fmglobal.com

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

John Phillips
Manufacturing Representative
Andritz
Alpharetta, GA
Tel: 770-640-2434
Cell: 678-427-6899
john.phillips@andritz.com

Jimmy Onstead
Insurance Representative
FM Global
Frisco, TX
Tel: 972-731-1656
Cell: 903-744-2734
jimmy.onstead@fmglobal.com

Operator Representative
International Paper
Frank Navojosky
6283 Tri-Ridge Blvd
Loveland OH 45140-7810
Cell: (513) 334-9999
frank.navojosky@ipaper.com

BLRBAC SUBCOMMITTEES

AUXILIARY FUEL **Bruce Knowlen, Chairman** International Paper Federal Way, WA Tel: (253) 924-4637 bruce.knowlen@ipaper.com	**BLACK LIQUOR, SAFE FIRING OF** **Vernon Blackard, Chairman** International Paper Roy, MT 59471 Cell: 251-284-3471 vernon.blackard@ipaper.com
EMERGENCY SHUTDOWN PROCEDURES **John Andrews, Chairman** Charleston, SC Tel: 843-509-4926 jandrews1975@comcast.net	**FIRE PROTECTION IN DIRECT CONTACT EVAPORATORS** **Stephen Cox - Chairman** International Paper Maumelle, AR Tel: 409-779-7104 stephen.cox@ipaper.com
INSTRUMENTATION **David Avery, Chairman** Domtar Paper Company Bennettsville, SC Tel: 843-454-8937 david.avery@domtar.com	**MATERIALS & WELDING** **Blair, Mike, Chairman** International Paper Loveland, OH Tel: 205-260-6359 Cell: 205-260-6359 michael.blair@ipaper.com
PERSONNEL SAFETY **John Fredrickson - Chairman** Sappi North America Cloquet, MN Tel: 218-878-4378 john.fredrickson@sappi.com	**PUBLICITY & NEWS RELEASE** **Matt Paine, Chairman** FM Global Norwood, MA Tel: 781-255-4733 matthew.paine@fmglobal.com
WASTE STREAMS **Paul Seefeld, Chairman** A.H. Lundberg Associates, Inc. Jacksonville, FL Tel: 904-614-6492 paul.seefeld@lundberg-us.com	**WATER TREATMENT** **Tom Przybylski, Chairman** Power Specialists Associates Somers, CT Tel: 860-763-3241 tom.@psaengineering.com

FUTURE BLRBAC MEETINGS

With the uncertainty of the Restrictions in travel, Virtual meetings may be necessary.

Spring	**April**	**4, 5 & 6 (format TBD)**	**2021**
Fall	**October**	**3,4 &5**	**2022**

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

Past Chairman Lon Schroeder

****

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

BLRBAC has established its own website at: www.blrbac.net

At this website 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 Will be available on the website with a link to register and pay on line.

SONESTA (formally Crown Plaza) 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 Bentley Sherlock. 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.

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

BLRBAC Guidelines & Recommended Practices

LEGAL NOTICE

Recommended Good Practice For Design, Operation, and Testing of the Emergency Shutdown System for Black Liquor Recovery Boilers
(Dated: October 2018)

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 2016)

Personnel Safety & Training
(Dated: April 2018)

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

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

Instrumentation Checklist and Classification Guide for Instruments and Control Systems Used in the Operation of Black 9Liquor Recovery Boilers (Dated: April 2014)

Thermal Oxidation of Waste Streams in Black Liquor Recovery Boilers
(Dated: April 2017)

If you have any questions, contact:

Secretary: **Everett Hume**
FM Global
270 Central Ave
Johnston, RI 02919
everett.hume@fmglobal.com
Tel: 401-415-2272
Cell: 413-265-9562

AUXILIARY FUEL SUBCOMMITTEE

-- VIRTUAL MEETING --

Bruce Knowlen – Chairman‡
International Paper
32901 Weyerhaeuser Way S., Ste101
Federal Way, WA 98001
Tel: (253) 924-4637
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	**Ivan Semyanko - Secretary**‡ GE Power 175 Addison Road, A1S7 Windsor, CT 06095-1580 Tel: (860) 285-3953 ivan.semyanko@ge.com	**Michael Acree**‡ CCA Combustion Systems 884 Main St. Monroe, CT 06468 Tel: (919) 269-0464 macree@peerlessmfg.com
Mike Bruce International Paper 104 Putnam Center road Putnam Station, N.Y. 12861 Tel: (518) 586-6954 mike.bruce@ipaper.com	**Rick Dooks** Fossil Power Systems Inc 10 Mosher Drive, Dartmouth Nova Scotia, Canada, B3B 1N5 Cell: 1-902-499-0546 dooksr@fossil.ca	**Brook M. Holland** George H. Bodman, Inc. 228 Wild Rose Lane Canton, NC 28716 Cell: (828) 421-0487 brookmholland@gmail.com
Greg Imig‡ Andritz 5405 Windward Pkwy, Suite 100W Alpharetta, GA 30004 Tel: (770) 640-2633 Cell: (404) 545-9076 greg.imig@andritz.com	**Bentley Sherlock**‡ Georgia Pacific 133 Peachtree St. Atlanta, GA Tel: (404) 652-4608 bentley.sherlock@GAPAC.com	**Andrew Young**‡ FM Global Property Insurance 34414 NE 101st Ave. La Center, WA 98629 Cell: (360) 904-6884 andrew.young@fmglobal.com
	Travis Flower*‡ (proposed to SFAF) Babcock & Wilcox Company address – tbd Tel: (330) 860-6042 taflower@babcock.com	

‡ = **Denotes attendance at last meeting, March 16, 2021**
* = **Denotes a new member**

EMERGENCY SHUTDOWN PROCEDURES SUBCOMMITTEE

John Andrews – Chairman‡
BSI
4123 Garden Lake Dr
Raleigh, NC 27612
Tel: 843-509-4926
E-mail: jandrews1975@comcast.net

Dean Clay, Secretary‡ Boiler Services & Inspection, LLC BSI Tel: (513) 497-9070 dclay@bsimail.com dclayesp@gmail.com	**Scott Crysel‡** FM Global One Cowboys Way, Suite 600 Frisco, TX 75034 Tel: (972) 731-1658 Fax: (972) 731-1820 scott.crysel@fmglobal.com	**James Franks‡** AXA XL Risk Consulting 855 Dogwood Road Somerville, TN 38068 Tel: (901) 465-0771 Fax: (888) 964-7348 james.franks@axaxl.com
Chris Jackson‡ Paragon Risk Engineering 1362 11th Court, Fox Island, WA 98333 Cell (503) 840-5775 chris.jackson44@comcast.net	**Joseph Fawcett** Mercer Peace River, ALB, CAN Postal Bag 4400 Pulp Mill Site Peace River, AB, Canada T85 IV7 Tel: 780-624-7241 joseph.fawcett@mercerint.com	**John A. Kulig‡** Babcock & Wilcox Company 1200 E. Market St, Suite 650 Akron, OH 44305 Tel: (330) 860-6438 Fax: (330) 860-9427 jakulig@babcock.com
Gregory Burns‡ Georgia-Pacific 133 Peachtree Street NE Atlanta, GA 30303 Tel: (470) 889-8452 Fax: (404) 654-4748 gregory.burns@gapac.com	**Scott Moyer‡** WestRock 1660 Prudential Drive, Ste. 202 Jacksonville, FL 32207 Cell: 904-437-7149 **scott.moyer@westrock.com**	**Frank Navojosky– Vice Chair‡** International Paper 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 Fax: (770) 640-2521 john.phillips@andritz.com	**John Harmon‡** GE Steam Power, Inc. 200 Great Pond Drive Office G3W2 PO Box 500 Windsor, CT 06095 T (860) 285 4436 M (860) 830 5211 john.harmon@ge.com	**Dave Gadai‡** Valmet Inc 3440 Torington Way Suite 300, Bldg 3 Charlotte, NC 28277 Tel: (704) 414-3501 Cell: (704) 560-3575 dave.gadai@valmet.com

‡ Denotes attendance in online meeting Spring 2021

PUBLICITY & NEWS RELEASE SUBCOMMITTEE

‡Matt Paine - Chairman
FM Global
Johnston, RI
Cell: 781-255-4733
matthew.paine@fmglobal.com

‡Denotes attendance at the meeting in April of 2021.

FIRE PROTECTION IN DIRECT CONTACT EVAPORATORS AND ASSOCIATED EQUIPMENT SUBCOMMITTEE

‡**Stephen Cox** - Chairman
International Paper
6318 Highway 139
Bastrop, La 71220
Tel: 409-779-7104
Stephen.cox@ipaper.com

‡**Kevin Huelsbeck - Vice Chair** FM Global Property Insurance Midwest-Chicago Ops N8955 Willow Lane Menasha, WI 54952 Tel: 920-205-5529 **kevin.huelsbeck@fmglobal.com**	‡**Andrew Young** FM Global S.W. Washington Resident Home Office Phone: 360-263-4418 andrew.young@fmglobal.com	‡**Robert Goddard** XL Group 129 Drive 1143 Tupelo, MS 38804 Tel: 662 844-5897 **robert.goddard@axaxl.com**
Christopher Skorton Australian Paper Tel: 61 0408-722-672 Chris.Skorton@AustralianPaper.com.au	**Rachakrit Withayaphan** Siam Cellulose Co. 19 Moo 19Saeng-Xuto Road Tambol Thapa Ban Pong, Ratchaburi 70110 Thailand Tel: +66 3221 1388-90 **rachakrw@scg.co.th**	**Joseph Lynch** Swiss Re America Holding Corporation 1150 Sanctuary Parkway, Suite 425 Alpharetta, GA 30009 Tel: 1770-569-8706 Joe_Lynch@swissre.com
‡**James Ham** FM Global 3460 Preston Ridge Road - Suite 400 | Alpharetta, GA 30005 T: (770) 777-3798 | james.ham@fmglobal.com	**Daniel Nesmith** WestRock P.O. Box 118005 Charleston, SC 29423-8003 Tel: **daniel.nesmith@westrock.com**	

‡Denotes attendance at the meeting in October of 2020

INSTRUMENTATION SUBCOMMITTEE

David Avery – Chairman
Domtar Paper Company
PO Box 678; Bennettsville, SC 29512
Tel: 843-454-8937 Fax: 843-479-9481
david.avery@domtar.com

John Browning, Jr **Vice-Chairman** Georgia Pacific 133 Peachtree St. NE (30303) Atlanta, GA 30348-5605 Tel: 251-593-6096 john.browning@gapac.com	**Kevin Huelsbeck‡** **Secretary** FM Gobal W4893 Cliff View Drive Sherwood, WI 54169 Cell: 920-205-5529 kevin.huelsbeck@fmglobal.com	**David T. Boudreau‡** SAPPI (S.D. Warren Company) 1329 Waterville Road Skowhegan, ME 04976 Tel: 207-238-7502 Fax: 207-238-7508 dave.boudreau@sappi.com
William Camp‡ International Paper Company 100 Jensen Rd Prattville, AL 36067 Tel: 334-361-5620 Fax : 334-361-5619 bill.camp@ipaper.com	**Joel Byrd‡** International Paper Company 12515 Choctan Rd Bogalusa, La 70427 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 Fax: 404-487-4154 chris.dailey@gapac.com
Marc Hunter Rockwell Automation 180 Harvester Drive Burr Ridge, IL. 60527 Cel:630-418-8432 mhunter@ra.rockwell.com	**Bruce Knowlen‡** International Paper Company IPGCFIC-1G39 Federal Way, WA 98001 Tel: 253-924-4637 Fax: 253-924-4941 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 TTS‡ 3026 Overhill Road Birmingham, AL 35223 Tel: 205-879-4382 Fax: 205-871-5264 eladiordm@aol.com	**Robert Putman** Kapstone Paper 5600 Virginia Ave. North Charleston, SC 29406 Tel: 843-745-3313	**Andy Smith‡** AIG 203 Dunleith Drive Woodstock, GA 30188 Tel: 770-671-2447 william.smith2@aig.com
Ben Bunner Andritz 5404 Windward Parkway Suit 100W Alpharetta, GA 30004 Tel: 770-640-2615 Cell: 678-907-7617 ben.bunner@andritz.com	**Jari Sopanen** Jari Consultoria de Automacao Ltda Rua Alipio Siqueira 770 Mafra SC Brazil 89300-220 Telephone +5547996722332 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	**Andy Clement‡** 10 Mosher Drive Dartmouth, Nova Scotia Canada B3B 1N5 Tel:902-468-2743 ext.245 clementa@fossil.ca	**John Cover‡** John E. Cover Engr., Inc. P.O. Box 36010 5425 Caldweld Mill Road Birmingham, AL 35236-6010 Tel: 205-991-7106 coverj@asme.org
Herb Betts‡ VAISALA 1031 Island Inlet Cove Greensboro, GA 30642 Tel:404-652-2838 Herb.betts@kpatents-usa.com		

‡Attended 9/16/2020 Virtual meeting

PERSONNEL SAFETY SUBCOMMITTEE

John Fredrickson - Chairman‡
Sappi North America
2201 Avenue B.
P.O. Box 511
Cloquet, MN 55720
Tel: (218) 878-4378
john.fredrickson@sappi.com

Sam Dean Rayonier Advanced Materials 4470 Savannah Highway Jesup, GA 31545 Tel: (912) 427-5103 **samuel.dean@rayonierAM.com**	**Greg Zavadoski‡** PSA 531 Main Street Somers, CT 06071 Tel: (715) 432-2470 **greg.zavadoski@psaengineering.com**	**Brian Fiala** Packaging Corporation N. 9090 County Road E. Tomahawk, WI 54487 Tel: (715) 453-2131, ext. 551 **bfiala@packagingcorp.com**
Alarick Tavares‡ WestRock 319 Southgate Drive | Locust Grove, GA 30248 Tel: (678) 492-1107 **alarick.tavares@westrock.com**	**David Von Oepen‡** WestRock 28270 U.S. Highway 80 West Demopolis, AL 36732-5121 Tel: (334) 289-6315 **dvonoepen@rocktenn.com**	**Mathew Glenn** Irving Pulp & Paper, Limited Recovery Superintendent P.O. Box 3007 408 Mill Street Saint John, New Brunswick Tel: (506) 634-4234 **glenn.matthew@irvingpulp.com**
Sam Hendrix International Paper Power Manufacturing Solutions International Paper Co. 1163 Grand Pointe Dr. Gulf Breeze, Fl. 32563 Tel: (318) 658-4591 **sam.hendrix@ipaper.com**	**Alec Shull‡** Andritz 5405 Windward Parkway Suite 100W Alpharetta, GA 30004-3894 Tel: (706) 344-9006 **alec.shull@andritz.com**	**Francisco Britt‡** FM Global One Cowboys Way Suite 600 Frisco, TX 75034 Tel: (972) 731-2145 **Francisco.britt@fmglobal.com**
Brook Holland G.H. Bodman 228 Wild Rose Lane Canton, NC 28716 Tel: (828) 421-0487 **brookmholland@gmail.com**	**Eric Schwartz** Babcock & Wilcox 20 S. Van Buren Avenue Barberton, OH 44203-0351 Tel: (330) 860-1335 **eschwartz@babcock.com**	**Jennifer Johnston‡** Georgia-Pacific 133 Peachtree St., NE Atlanta, GA 30303 Tel: (404) 652-4632 **jennifer.johnston@gapac.com**

‡Denotes attendance at the March 2021 virtual meeting

MATERIALS & WELDING SUBCOMMITTEE

‡ **Michael Blair - Chairman**
International Paper
6285 TriRidge Blvd.
Loveland, OH 45140
Tel: 205-260-6359
Fax: 513-248-6679
michael.blair@ipaper.com
*Alternate - none

‡ this meeting

‡Jesse Worsham - Co Chair* Domtar Paper Marlboro Mill P. O. Box 678 Bennettsville, SC 29512 Tel: (843) 479-0200 Ext 8879 Fax: (843) 479-6603 **jesse.worsham @domtar.com**	Fabian Henriques PSA Inc. 531 Main Street Somers, CT 06071 Tel: 614-440-4284 Fax: 860-760-3608 **Fabian.henriques@ psaengineering.com** *Alt: Andrew Myton Andrew.myton@psaengineering.com	‡Mark LeBel Andritz Pulp and Paper 5405 Windward Parkway, Suite 100W Alpharetta, GA 30004 Tel (770) 640-2643 Cell (678) 577-8613 Fax(770) 640-2496 **mark.lebel@andritz.com** *Alternate - Alec Shull
‡Pedro Amador AZZ 1615 118th Ave N. St. Petersburg FL 33716 843-957-2111 **stacy.power@AZZ.com**	*Max D. Moskal (-) M&M Engineering 11020 W. 72nd Street Indiana Head Park, IL 60525 Tel: (512) 407-3755 Cell:(708) 288-8430 **max_moskal@mmengineering.com** *Alternate- ‡Dave Fuhrman david_fuhrmann@mmengineering.com	

*Eric Moberg FM Global Tel: (815) 385-3946 Fax: **Eric.moberg@fmglobal.com** *Dave Lang Tel: 972-731-1882 Fax: 972-731-1820 david.lang@fmglobal.com	*George Bodman 13 Kingwood Villas Court Kingwood. TX 77339 Tel: 800 286 6069 or 281-359-4006 Fax: 281-359-4225 Cell: 713-557-2118 **blrclgdr@aol.com**	‡Laura Nicol Babcock & Wilcox 20 S. VanBuren Avenue Barberton, OH 44203-0351 Tel: 330-860-2160 **lsnicol@babcock.com**
‡Chad Harrod Georgia-Pacific LLC 133 Peachtree St NE Atlanta, GA 30303 404-395-3064 **Chad.Harrod@gapac.com**	‡Jennings Bird Valmet Tel: 803 235 8091 Cell: FAX: N/A **Jennings.bird@valmet.com** *Alt: Ron Reed Tel: (704) 281-3073 Ron.reed@valmet.com	*Steve Harville Cell: (251) 591-7850 **Sharville@NationalBoiler.com** *Alt: Mike Messamore National Boiler Services Tel: (706) 657-1584 mmessamore@NationalBoiler.com
‡Bob Roy RMR Mechanical PO Box 170 Cumming, GA 30028 Tel: 770-205-9646 Fax: 770 205 9580 **bob.roy@rmrmechanical.com**	*Jeffery Forry Pixelle Specialty Solutions Tel: (717) 225-4711 Fax: 717-225-7372 Cell: 717-578-2084 **Jeffrey.forry@pixelle.com**	William Smith Acuren Tel: 281-716-7012 **whsmith@acuren.com** 2017 S 2017 Jeff Strand 330-663-8651 jstrand@acuren.com
Chris Rawls Applied Technical Services Tel: 757-218-8465 **crawls@atslab.com** Alt: Thomas Kapperman Tel: (678)231-8025 tkapperman@atslab.com	Roger Carpenter PSF Industries Tel: (206) 571-3144 roger@psfindustries.com 2017 S yes 2017 F yes Alt: Kevin Flynn Tel: (206) 641-4983 Kevin@psfindustries.com Matthew Tunnicliffe ? attended 2019 said wants to be a member	

‡April 2021 Attendees

.

SAFE FIRING OF BLACK LIQUOR SUBCOMMITTEE

‡Vernon Blackard - Chairman
International Paper
Cell: 251-284-3471
vernon.blackard@ipaper.com

‡ Clif Barreca International Paper Tel: 252-633-7696 clif.barreca@ipaper.com	**‡ Piere Borduas** Valmet Tel. 704-541-1453 Piere.borduas@valmet.com	**Joel Byrd** International Paper Tel: 85-516-1110 Joel.byrd@ipaper.com
‡ Sarah Henke Valmet Tel: 704-620-0084 Sarah.henke@valmet.com	**‡ Peter Donahue** Fossil Power Systems, Inc. Tel: 902-468-2743, Ext. 251 Cell: 902-877-9312 donahuep@fossil.ca	**‡Len Erickson** Power Specialist Assoc. Tel: 208-841-4246 len.erickson@PSAengineering.com
‡Daniel Franco Smurfit Kappa Colombia Cel: +57 3113001079 Tel: (57-2) 6914 000 Ext. 2016 daniel.franco@smurfitkappa.com.co	**‡ Wes Hill** Georgia Pacific Tel 360-607-4189 Wes.hill@gapac.com	**‡ Majed Ja'arah** International Paper Cell: 706-728-8085 majed.jaarah@ipaper.com
Guy Labonte FM Global Tel: 514-876-7412 Cell: 514-942-3651 guy.labonte@fmglobal.com	**‡Doug Murch** WestRock Tel: 804-444-5245 Cell: 804-787-0781 douglas.murch@westrock.com	**‡Alarick Tavares** **Westrock** **Tel -** alarick.tavares@westrock.com
Mark Sargent George H. Bodman, Inc. Tel: 514-543-0480 msarge1031@yahoo.com	**‡Zach Payne** Andritz Pulp & Paper p: +1 770 640 2420⁄f: +1 770 640 2681 m: +1 706 344 8610Tel: 770-640-2642 Cell: 770-630-4577 zack.payne@andritz.com	**‡Thomas Wranosky - Co-chair** International Paper Tel: 518-585-5305 tom.wranosky@ipaper.com
‡Hooman Rezaei FPInnovations Tel: 604-803-1753 Hooman.rezaei@fpinnovations.ca	**Eric Jin** B&W Tel: 519-620-4870 ejin@babcock.com	**‡Olli Kujanpaa –** Georgia Pacific Tel: 404-432-8281 Olli.kujanpaa@gapac.com
‡ Ryan P Henry - Green Bay Packaging Inc. Tel: 508-208-7454 rhenry@gbp.com	**Keijo Pyorala –** Vaisala keijo.pyorala@vaisala.com	

‡Denotes attendance at the meeting in Spring of 2021.

WASTE STREAMS SUBCOMMITTEE

***Paul Seefeld – Chairman**
LDX Solutions
9246 Audubon Park Ln S
Jacksonville, FL 32257
Cell: 904-614-6492
PSeefeld@LDXSolutions.com

Wayne Bucher Noram Wayne.bucher@noram-eng.com	**Neil Chaudhuri** FM Global 100 New Park Place, Suite 200 Vaughan ON Canada L4K OH9 Tel: 647-894-5680 Neil.chaudhuri@fmglobal.com	***David Frazier** International Paper Technology 6285 Tri-Ridge Blvd Loveland, Ohio 45140 Cell: 706-305-5321 **David.frazier@ipaper.com**
Cobb Golson Westrock Jacksonville, FL Tel: 904-826-7430 Cobb.golson@westrock.com	***John Lewis** Fluor 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**	**Michael D. Sides** XL Catlin 1360 Olympia Park Circle Ocoee, FL 34761 Tel: 203-964-5333 Mobile: 407-462-4622 **michael.sides@xlcatlin.com**	***Greg Wass** LDX Solutions 8271 154th Ave NE Redmond, WA 98052 Office: 425-283-5070 Cell: 425-503-2747 gwass@LDXSolutions.com
***Kevin Sapp – Vice Chairman** Georgia Pacific Atlanta, GA Tel: 387-227-1038 Kevin.sapp@gapac.com	**Jacob Huckaby** International Paper Oglethorpe, GA Tel: 478-472-5240 Jacob.huckaby@ipaper.com	
		.

*Denotes attendance April 2021

WATER TREATMENT SUBCOMMITTEE

‡Tom Przybylski
Power Specialists Assoc. Inc.
tom.przybylski@psaengineering.com

Kelli Bastarache Power Specialists Assoc., Inc. **E-mail Address** kelli.bastarache@psaengineering.com	**Michael Bayse** George H. Bodman, Inc. **E-mail Address** bbayse@aol.com	***‡Rick Baxter** Valmet. **E-mail Address** richard.baxter@valmet.com
Fred Call Buckman **E-mail Address** fccall@buckman.com	**Ray Cassel** Rocky Mountain Industrial Services **E-mail Address** rlcassel@rmis.biz	**‡ Susan Childress** International Paper **E-mail Address** susan.childress@ipaper.com
***‡Don Downey** Purolite **E-mail Address** don.downey@purolite.com	**‡Buck Dunton** ChemTreat **E-mail Address** BuckD@chemtreat.com	**‡Don Flach** Georgia Pacific **E-mail Address** don.flach@gpac.com
‡ Jim Gannon Nalco **E-mail Address** jgannon@ecolab.com	**‡Ken Hansen** Consultant **E-mail Address** Kenhansen0728@gmail.com	**Scott Holloway** Solenis **E-mail Address** sholloway@solenis.com
Norris Johnston Water Wizard Consulting/Solenis **E-mail Address** h2odocnnj@gmail.com	**Tom Meehan** FM Global **E-mail Address** thomas.meehan@fmglobal.com	**John McGraw** Shepard T. Powell **E-mail Address** jwm@stpa.com
‡Steve Morrison Georgia Pacific **E-mail Address** steve.morrison@gapac.com	**Trevor Murray** Irving Pulp and Paper **E-mail Address** murray.trevor@irvingpulp.com	

‡ Denotes attendance at meeting in October of 2020. (No update for April 2021)

Registration List*

Ken	Taylor	Acuren
Brian	Wilson	Acuren Inspection
Wayne	Grilliot	AF&PA
Tom	DeBeer	AIG
Andy	Smith	AIG
Jason	Miller	Andritz
Elisa	Ahonen	Andritz Inc.
Chris	Herod	Andritz Inc.
Greg	Imig	Andritz Inc.
Mark	LeBel	Andritz Inc.
Pasi	Miikkulainen	Andritz Inc.
Preston	Morgan	Andritz Inc.
Zachary	Payne	Andritz Inc.
John	Phillips	Andritz Inc.
Aaron	Rose	Andritz Inc.
Alec	Shull	Andritz Inc.
James	Franks	AXA XL Risk Consulting
Michael	Sides	AXA XL Risk Consulting
Pedro	Amador	AZZ Specialty Welding
John	DeFusco	Babcock & Wilcox
Travis	Flower	Babcock & Wilcox
John	Kulig	Babcock & Wilcox
Laura	Nicol	Babcock & Wilcox
Steven	Osborne	Babcock & Wilcox
Simon	Youssef	Babcock & Wilcox
John	Andrews	BSI
Dean	Clay	BSI
Fred	Call	Buckman North America
Marco	Franca	CBC Industrias Pesadas S.A
Eduardo	Ohnishi	CBC Industrias Pesadas S.A
Michael	Acree	CCA Combustion Systems
Brent	Bourassa	Clearwater Paper
Shana	Kelly	Clearwater Paper
James	Biggs	Crenshaw Machine Systems
Brandon	Peed	Crenshaw Machine Systems
JC	Reyes	Crenshaw Machine Systems
Johan	Engvall	Diamond Power Sweden
David	Avery	Domtar Paper Company
Jesse	Worsham	Domtar Paper Company, LLC
Greg	Barnes	DoubleA 1991
Matt	Jones	E and E Tech
Mark	Coffin	EES, Inc.
Thanh	Trung	FITNIR Analyzers Inc.

John	Lewis	Fluor
Rasmus	Andersson	FM Global
Andrew	Bahnsen	FM Global
Andre	Beaulieu	FM Global
Michael	Both	FM Global
Francisco	Britt	FM Global
Neil	Chaudhuri	FM Global
Scott	Crysel	FM Global
Jasbir	Dodnona	FM Global
Brandon	Dominguez	FM Global
Arturo	Garcia	FM Global
Peter	Goddyn	FM Global
James	Ham	FM Global
Kevin	Huelsbeck	FM Global
Everett	Hume	FM Global
John	King	FM Global
Guy	Labonte	FM Global
Jyri	Lindström	FM Global
Homero	Maldonado	FM Global
Xavier	Menard	FM Global
Jimmy	Onstead	FM Global
Matthew	Paine	FM Global
Dave	Pearson	FM Global
Christian	Ribeiro	FM Global
Benjamin	Roberge	FM Global
Tomi	Sankola	FM Global
Francois	Sauve	FM Global
Kimmeng	Seang	FM Global
Steven	Seibel	FM Global
Maxime	Simard	FM Global
Graham	Spencer	FM Global
Rodrigo	Teixeira	FM Global
Tyler	Wood	FM Global
Andrew	Young	FM Global
Andy	Clement	Fossil Power Systems Inc.
Peter	Donahue	Fossil Power Systems Inc.
Wenli	Duo	FPInnovations
Hooman	Rezaei	FPInnovations
Jonh	Harmon	GE Steam Power
Daryl	Philo	General Electric
Michael	Rushing	General Electric
Ivan	Semyanko	General Electric Company
Michael D.	Bayse	George
George	Bodman	George H. Bodman, Inc.
John	Browning	Georgia Pacific
Gregory	Burns	Georgia Pacific
Eric	Collins	Georgia Pacific

Wes	Hill	Georgia Pacific
Yahya	Khan	Georgia Pacific
Olli	Kujanpaa	Georgia Pacific
Bentley	Sherlock	Georgia Pacific
Peter	Fogg	Georgia-Pacific
Chuck	Griffith	Georgia-Pacific
Chad	Harrod	Georgia-Pacific
Jennifer	Johnston	Georgia-Pacific
Steve	Morrison	Georgia-Pacific
Kevin	Sapp	Georgia-Pacific
Nick	Wildey	Georgia-Pacific
Ryan	Henry	Green Bay
Johan	Holmer	Heat Management
Vernon	Blackard	International Paper
Susan	Childress	International Paper
Clif	Barreca	International Paper
Joel	Byrd	International Paper
Stephen	Cox	International Paper
David	Frazier	International Paper
Majed	Ja'arah	International Paper
Bruce	Knowlen	International Paper
Tom	Wranosky	International Paper
Frank	Navojosky	International Paper company
James	Cantrell	Jacobs Engineering
Douglas	Giarde	Jansen Combustion & Boiler Tech.
Steve	Campbell	Jansen Combustion & Boiler Tech.
John	Cover	John E. Cover Engineering
Brian	Dickman	Kennametal
Leonard	Olavessen	Lenro. Inc.
Gordon	Vandenburg	Liquid Solids Control, Inc
Paul	Seefeld	Lundberg
David	Fuhrmann	M&M Engineering/Acuren
Joe	Fawcett	Mercer Peace River
Jim	Gannon	Nalco Water
Michael	Lykins	Packaging Corp of America
Christopher	Jackson	Paragon Risk Engineering
Thomas	Przybylski	Power Specialists Assoc., Inc
Greg	Zavadoski	Power Specialists Assoc., Inc
Robert	Zawistowski	Power Specialists Assoc., Inc
Leonard	Erickson	Power Specialists Associates Inc.
Blair	Rydberg	PSA
Donald	Downey	Purolite Corp
Bob	Roy	RMR Mechanical Inc
Luiza	Esteves	Sandvik Materials Technology
Johnnie	Nguyen	Sandvik Materials Technology
David	Boudreau	Sappi Fine Paper
Christopher	Edgcumbe	SAPPI Fine Paper

Donovan	Moroney	SAPPI Fine Paper
Lance	Bolduc	Sappi NA
John	Fredrickson	Sappi NA
Daniel	Franco	Smurfit Kappa
Rudolf	Bito	Smurfit Kappa PPT
Scott	Holloway	Solenis
Bernard	Abramczyk	Southern Environmental, Inc.
Keith	Yalowega	SUEZ Water Technologies
Joe	Lynch	Swiss Re
Eladio	Ruiz de Molins	TTS, LLC
Herb	Betts	Vaisala formerly K-Patents
Arto	Hamalainen	Vaisala formerly K-Patents
Keijo	Pyörälä	Vaisala Oyj
Edward	Harris	Valmet
Sarah	Henke	Valmet
Michael	Trivett	Valmet
JEREMIAH	YODER	Valmet
Ronald	Reed	Valmet Inc.
Jennings	Bird	Valmet, Inc.
David	Gadai	Valmet, Inc.
Brandon	Mosley	WestRock
Scott	Moyer	WestRock
Alarick	Tavares	WestRock
David	von Oepen	WestRock
Tim	Myers	WestRock Co.
Donn	Tarpley	WestRock Company
Douglas	Murch	WestRock Company
William	Hammill	Whertec, inc

MAIN COMMITTEE MEETING

1.0 INTRODUCTION – (David von Oepen – Chairman)

First let me thank all those who have participated over the past couple of weeks in the virtual subcommittee meetings. Good participation and preparation by our Sub Committee Chairman

Please remember that all BLRBAC subcommittee meetings including this session are held in strict compliance with BLRBAC Anti-Trust Policy. Discussion involving prices, pricing policy and a restraint on competition are not allowed. Traditional for us to read that policy. The second order of business is to go over the ground rules for the meeting. This is a virtual

meeting allowed attendees must refrain from taking pictures, photos, and screenshots. Material deemed appropriate for sharing will be published in the meeting minutes.

Please keep your microphones muted. Scott will let you unmute if needing to speak. Chat message to the moderator with Scott Moyer, who did a good job yesterday as the ESP subcommittee moderator, will then allow you to on the cell and then you can ask questions or make comments. When speaking as always, state your name, and who you affiliated with. You can unmute yourself by using the *6 key. I am asking that everyone who is not a member of the Executive Committee to keep their camera's off. You can raise your hand with the hand icon and chat with Scott and Scott will pick up on that and then relay your message.

At the bottom of the screen, here you can see the icons that are available for Microsoft teams participant icon can see who is in the meeting, dialog box there, that is how you chat as one just right of that one, you got your hand that's it's just raise your hands and I've got something I want to say, Scott will see that, and may stop and ask you to unmute.

Got that out of the way so will move into the meeting agenda for today but here is schedule for three hours. Introductions of the executive committee this morning will introduce ourselves one by one. Again, my name is David von Oepen, I work for Westrock. and the chairman of the executive committee. Bentley Sherlock with Georgia-Pacific is the vice chairman on the executive committee. Everett Hume is the Executive Secretary and works for FM Global. Jimmy Onstead works for FM Global and is the Insurance Representative. John Phillips works for Andritz and is the Manufacturer Representative. Frank Navojosky with International Paper Co. and is the Operating Company Representative. Len Olavessen with LENRO and is the treasurer and is not with us today as he is having surgery today.

Okay, that's the Executive Committee. In looking at the participant list of this meeting and looks like we have a quorum of the member companies, so I'm declaring that we do have a quorum.

2.0 Old Business

ACCEPTANCE OF THE FALL 2020 MEETING MINUTES – David von Oepen

The meeting minutes for the Fall 2020 BLRBAC Session have been posted on the Website. I am sure that everybody has taken a look at it. Does anyone have any comments regarding the Fall 2020 Meeting minutes? Can I get a motion to accept the minutes? We have a motion. Do I have a second? Anybody opposed? Alright, the Fall 2020 Meeting minutes have been approved and accepted as posted. Thank you very much.

Is there any other Old Business to bring to life? If not, we will move on to New Business where we well get an update on new members and representative changes.

3.0 New Business Report (Everett Hume)

New Members and Representative Changes. Your Executive Committee met at least a couple of times since the virtual Fall Meeting. Okay we had two companies apply for associate memberships in our organization. The first was from ATC, a heat treat, encoding, and corrosion resistance company. The full name is Applied Thermal Coating and they are located in Chattanooga, TN. We voted to accept them into the organization. The second request came for Curtiss Wright who is a pop a plug boiler tube plugging repair company. They seal leaks in HEX and condensers. They are the ESP group for the valves division.. We voted to accept them as an Associate member as well.

That's all I have.

4.0 Executive Committee Report (David VonOepen)

The Executive Committee met last week in closed virtual session to discuss the budget and the budget going forward.

There have been some significant changes in how we operate that We want to talk about. First, Barbara and Frank Holich have retired and are no longer providing meeting and Secretarial Services for BLRBAC. We had some question on their role in registration for this meeting. It taks a lot of work for registration that they been doing for some of the years, typing of the minutes and getting all the materials gathered for our meetings.

Whichever way you want to take a look at the Executive Committee has searched for and selected a new meeting planning company or service company called 'Metro Connections'. They will take credit cards. Registration both early and door, for in person meetings. Also, they will help with reading materials, badges and involved in the registration at in person meetings. We used them to register everybody for the Spring Virtual Meeting, which was a smaller role than what we will use them for. Will hopefully have a plan to have a Face-To-Face meeting in the Spring if all goes well.

Looking forward to planning for the Fall meeting at the same location in Atlanta Georgia. However, the Crowne Plaza has changed names and I think this is largely due to struggles with the pandemic and try to stay in business. They were bought out by Sonesta Hotel will be the same hotel, just a different name to book. That information will posted for the Fall Meeting. The days for the Fall meeting are October 4,5,6, 2021. Of course there is always a chance we will go back to a virtual, but we will keep you posted on that!

We have been notified by Len Olavessen that he is planning to retire his position on the

Executive Committee sometime over the next year. Lens ahs done a fantastic job over the past 12-13 years and will be a great loss for us as an organization.

As for the Executive Committee, we did have a new member Frank Navojosky from International Paper Co. is accepted, Representative on the Executive Committee. He regularly brought his expressed expertise and experience in many of the other BLRBAC Meetings past and now he will participate on the Executive Committee. So, everybody welcome Frank and congratulate him on his big role in BLRBAC. Went on to Discuss, we have been notified by Len that he is planning to retire from his position as the Treasurer on the Executive Committee sometime next year. Len volunteered to be our Treasurer the last 12 years and done a great job on the Executive Committee. Len will be a great loss for us at BLRBAC. We have leaned heavily on him for his knowledge and experience.

The Executive Committee is looking for someone who is interested in becoming the Treasurer for the Executive Committee. Please let me know if you are a person that wants to volunteer, or if you know of anybody that would fit that role, contact me by email or anybody on the Executive Committee. Contact information is on the Website www.BLRBAC.net , but basically the treasurer is responsible for receiving all the funds for the meetings not necessarily personally, but through our organization. Currently the Metro Connections are depositing that money into the bank. They are responsible for paying any obligation that BLRBAC has. They prepare a report and budget for the receipts and expenses of BLRBAC in the also prepare a Budget or Each Fiscal Year. This is reported out on each BLRBAC Meeting the Fall and Spring. Treas. Will coordinate with a new accounting firm to prepare our tax returns from BLRBAC every year. So that is the duties of the Treasurer and again we ae looking for some volunteers.

We are looking to getting an accounting firm to provide the Tax Preparation Services for BLRBAC, so that treasurer would just interact with the accounting firm to be sure that the tax returns are filled out and completed.

Everett mentioned the new website and did a great job getting this transition done. If any of you has gone through the trials and tribulation of putting together a new website. We are all good boiler people, but websites are not our specialty and we had to get some help. If you get a chance go to the website at www.blrbac.net and look at it. It very professional done and it is really really good. We are glad to have it up and running.

Also, in the closed meeting we discussed updating our current list of members across all categories. This is a work in progress. There have been many mergers and acquisitions over the past few years.

As a reminder, with all these changes and new expenses there will be an increase in the BLRBAC meeting registration fees, at least temporarily, and several unknowns we have to work through, still working out the details. Most of those are being worked out with the meeting planning services, Metro Connections. We are looking at getting a new

accounting service to help us with our tax returns every year and the expenses of new website development and expenses related to that. We are proposing that the new registration costs goes to $300 for early registration and $350 at the door.

The Executive Committee also discussed upcoming meeting dates. We discussed the future stage of committee reports we have since the beginning and how these will be stored going forward.

Does anyone have any questions? If not we will move int the sub-committee reports.

5.0 Treasurer's Report (Everett Hume for Len Olavessen)

In Len's absence this is the abbreviated version.

1. Checking Balance as of 3/302021: $15,495.70

2. Receivables are $13,658.00 (net proceeds for Spring Meeting)

3. Total assets $29,153.70

4. Pending Expenses are $3,500

5. Meeting Statistics:
   167 Total Registrations

6. 28 Off Shore Attendees
   Thailand- 1 Finland- 4 , Sweden-3, Brazil-4, Canada-11, Germany-3, Columbia-1, France-1

7. As a reminder. no one has volunteered to take over the position of Treasurer. As a result, BLRBAC will establish an accounting firm to handle the financial matters of this organization, as well as our tax returns. That is why we have included accounting services expenses in the 2021 budget.

6.0 Secretary's Report (Everett Hume)

As you all have figured out we do have a new website, www.blrbac.net . The old site BLRBAC.ORG has been shut down, so remember to update any saved sites to WWW.BLRBAC.NET for current information. All information will be place on this new website going forward.

Bentley Sherlock commented that this was a tremendous job by Everett. Putting all this together was a large effort and successful transition and thank you.

Hopefully you all will get a chance to work you way around the site and please provide comment, both positive and negative.

Several member now have access to update the site. In particular Dean Clay will be able to place the current list of Boilers as well as the updated Questionnaire on the site and will maintain both.

Unfortunately, we continue not to have a paid professional secretarial service so there will be some impact on the speed at which documents are completed and uploaded. So for now I am learning a new trade maybe I can put to use when I retire.

That is all I have.

Question from Chris Jackson about the old website being still active and when will that be shut down. Yes, the site is still active but not being updated. I have posted a note on the home page referring anyone to the new site. I am working to get it taken down. There are some technical obstacles I need to overcome to make that happen, but this will be done before the next meeting. Since our new site is NEW, the way search engines work is they will point to the old site until there are a sufficient number of requests for the new site. Thanks for bringing that up.

MEMBER COMPANY ACQUISITION

MEMBERSHIP COMPANY STATUS CHANGES – None at this time.

*{**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 Chairman*

7.0 SUBCOMMITTEE REPORTS

7.1 AUXILIARY FUEL REPORT – Bruce Knowlen

Minutes of the Meeting of the Safe Firing of Auxiliary Fuels Subcommittee, March 16, 2021

The meeting began at 01:05 PM CDT with virtual meeting instructions and the BLRBAC's antitrust statement.
We took subcommittee attendance and introduced the members. There were 6 of the 11 members participating with about 50 guests. One existing member, Greg Kornaker, was leaving and will be replaced by Travis Flower.

The minutes of the last Meeting, held on September 15, 2020, were read and accepted.

Under **old business**, the subject of torches for spout clearing was raised. A discussion occurred on their function and safe operation. We emphasized the need to have these shut off on a boiler trip. These are not an auxiliary fuel burner but provide a source of ignition. These must be managed relative to purge credit status. An example was given of torches which are in service almost continuously on a soda boiler with non-water-cooled (solid) spouts. The torches are used to keep the smelt flowing. Additional information was emailed following the meeting and this subject will be carried into the Fall 2021 meeting.

Under **new business**, a question was asked by a guest on the burning CNCGs. The discussion involved burners and interlocks. The guest was referred to the waste stream subcommittee for further direction.

Other **new business** related to questions on Igniter position limit switches and Igniter fuel train high gas pressure. The question regarded an alternative to the traditional auxiliary fuel igniter limit switches for proof of position for retractable igniters (reference SFAF

3.5 “Retractable igniter position should be interlocked” and 6.1.4). An igniter interlock is specified but not defined. Two types of limit switches were discussed: mechanical and proximity. It was recommended that the user contact the igniter or burner vendor regarding the supply of the limit switch for the retractable igniter.

The question was raised on the absence of high pressure interlock on an igniter fuel train -- there is a low pressure interlock shown in diagrams (See SFAF Figures 6 and 9). Discussion was not conclusive on this and it was decided this should be a topic for our next meeting.

A guest also raised a question regarding the use of starting burner gas igniters to supplement black liquor heat input to achieve desired steam flow. The proposal was to fire all seven gas igniters, but only one starting burner oil gun. It was concluded to be okay but that this operation would require a change to the control system sequence, since now the firing of the igniters would not be followed by the firing of the associated oil guns.

Next Meeting - The next meeting of the SFAF subcommittee is scheduled for the fall of 2021 with the hope that it will be in person.

The meeting adjourned at 03:40 PM CDT.

7.2 ESP SUBCOMMITTEE REPORT – John Andrews

ESP SUBCOMMITTEE REPORT – John Andrews
(See ***Appendix I*** – Incident List)

The ESP Subcommittee met in closed virtual session on April 6th 2021 with 12 members represented. The Subcommittee met in open virtual session on Monday morning April 12th, 2021 with 12 members represented and about 101 guests.

During the open session, the Subcommittee reviewed 20 incident reports from North America and 1 International Incident that had been submitted since the Fall 2020 meeting Of the 20 incidents, there were no Smelt Water Explosions and no Dissolving Tank Explosions reported during this session. Seven (7) of the reported leaks were classified as critical incidents and 9 were non-critical incidents. One incident report covered a Smelt Leak in the lower furnace and one was for a Dissolving Tank upset with no explosion. An ESP was performed in 9 of the incidents including 5 of the 6 critical incidents that should have been ESP’d. One of the critical leaks were identified during an outage while performing a hydrostatic pressure test.

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 (or could have entered) 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 I contains a summary of the incidents reviewed during the meeting.

Incident Locations

The incident locations are summarized as follows:

- 4 – Economizer
- 3 – Superheater
- 5 – Boiler Bank
- 0 – Screen
- 1 – Upper Furnace
- 2 – Lower Furnace
- 1 – Lower Vestibule
- 2 – ESP with No Leak
- 1 – Smelt Leak in Lower Furnace
- 1 – Dissolving Tank Upset

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 number of Economizer Leaks was far less than normally reported. The two blue dots represent the ESP with No Leak and indicate the general location of where the indication of the suspected leak was first noticed.

The Figures 2 shows the number of leaks reported by boiler location over the past 17 years along with the average per year. It also notes that four Smelt Water Explosions occurred during the period: one from a Boiler Bank Leak, two from Screen Tube Leaks and one from a Floor Tube Leak.

Incidents by Boiler Type

The incidents by the number of drums and the backend arrangement were reviewed. There were 9 incidents reported in single drum units and 11 incidents reported in two drum units.

Eighteen (18) of the incidents were from low odor units with extended economizers. Two (2) of the reported incidents were in boilers with Cyclone Evaporators and none of the units had a Cascade Evaporator.

Leak Cause

The cause of the leak is a determination by the Subcommittee based on information in the reports and should not be considered the root cause of the incident. The breakdown is listed below:

- 5 – Mechanical Fatigue
- 3 – Thermal Fatigue
- 1 - Weld Failure
- 3 - Erosion or Corrosion Thinning
- 3 - Stress Assisted Corrosion
- 1 – Overheat
- 1 – Unknown

How Discovered

Boiler Walkdown continues to be the major way leaks are discovered showing that operators maintain their diligence for leak detection. Fifteen (15) of the leaks (75%) were initially indicated by operators during walkdowns. Three (3) leaks were detected by Control Room Instrumentation observations, one was initially indicated by the leak detection system and one leak was discovered during Hydrostatic Testing.

Leak detection systems were reported to be installed on units in 16 of the incidents (80%). One of the incidents reported that the leak detection system provided the initial indication of the leak and four of the incidents reported that the system confirmed the leak after subsequent evaluation.

Time to Initiate the ESP

The time to initiate the ESP system after the initial indication of the leak ranged from about 15 min to 2:39 hours. The median time from the incident reports that provided information on the timing was 30 min which is similar to recent years.

Incident Review

Figure 5 shows the Critical Incidents reported each year. There were 7 reported this meeting which represents on half of 2021. Figure 6 shows the history of Recovery Boiler Explosions showing the smelt water explosion reported at March of 2020 with the prior reported explosion in 2017.

Figure 7 shows the history of reported dissolving tank explosions with the last one reported in 2017. 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 and maybe there has been some improvement in smelt spout and dissolving tank operation as a result of these efforts.

Figure 8 the five-year rolling average which is back up to 0.4 indicating there have been two explosions in the last 5 years. It appears that the trend has

leveled out with one to two explosions occurring in a five year period. We need to continue efforts to bring that even lower.

Figure 9 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 increased slightly to 0.47 explosions per 100 boiler operating years due to the explosion reported this year, but the total explosions, which includes all boiler explosions and dissolving tank explosions, decreased slightly to .85 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 19,010 total recovery boiler operating years in the BLRBAC database for North America and have recorded 90 smelt water explosions with resulting damage to the boiler. We all need to continue to keep those trends going down.

List of Operating Boilers

The BLRBAC Boilers in Service Database currently has 173 active recovery boilers listed, 133 in the US and 40 in Canada with a decrease of seven boilers in the US. In the US, the average age is 42.6 years and the oldest is 69 years. The average age in Canada is 43.2 years and the oldest boiler is 74 years which is a 1947 CE unit at Three Rivers, PQ.

The list is available on the BLRBAC web site. We urge all mills to look over the list and if there are any changes or corrections, contact Dean Clay at **dclayesp@gmail.com**.

Learnings

There are several learnings and suggestions 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.

- Mills should develop standard operating procedures for loss of DCS display to include when and how to put boiler is a safe state.
- Mills should consider increasing sootblowing frequency rather than increasing sootblower pressure when dealing with boiler pluggage to limit potential for tube damage. Sometimes the steam you save may not be worth the pain.
- Mills should review the Dissolving Tank level and density instrumentation to make sure low dissolving tank level does not interfere with the density measurement. Consider redundant level measurements.
- Weak wash from smelt hoods can cause rapid corrosion of boiler pressure parts. Inspect skirts during outages and test with water hoses during outages to assure there are no leaks.

- Non-Destructive Examination contractors should be instructed to report unusual findings or observations. If they are inspecting a weld and see a Linear Indication (crack) in the film but not at the weld, it should be reported.
- It is important to inspect and repair damaged and missing ties in the superheater to prevent tube failures from swinging pendants or platens.
- Welding over cracks and pin holes may not eliminate all the internal cracking. It is best to remove the tube section but if not, consider x-ray or shear wave inspection to determine the extent of internal cracking before welding.
- Large slag falls (Volkswagens) can cause floor tube damage including crimping tubes at floor beams. Be mindful of any negative slopes that may trap steam bubbles.

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.

Dean has updated the questionnaire in the past to be more interactive and should be easier to complete. The most up to date form is available on the BLRBAC Website at www.blrbac.net. Note that BLRBAC has changed the domain name from .org to .net When you have completed the report, send the file to Dean Clay at **dclayesp@gmail.com** .

Please remember 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 to minimize the resulting file size.

Figure 1

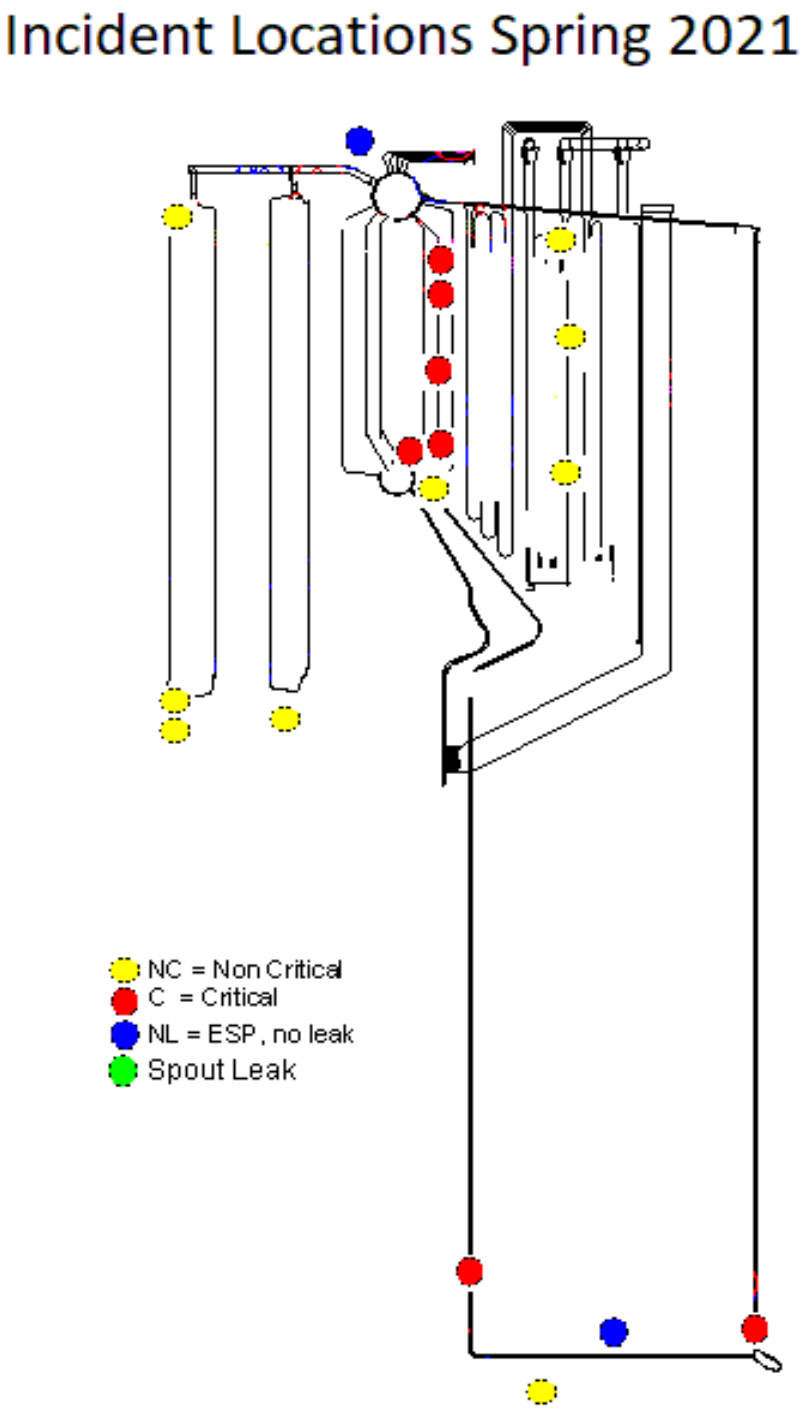

Incident Locations Spring 2021
NC = Non Critical
C = Critical
NL = ESP, no leak
Spout Leak

Figure 2

BLRBAC Reported Leaks (US + Canada)
2004 thru Spring 2021

Location	17.5 Year Total	Average/Year
Economizer	416	23.8
Upper Furnace	127	7.3
Superheater	134	7.7
Lower Furnace*	97	5.5
Boiler Bank*	100	5.7
Screen*	39	2.2
Smelt Spout	29	1.7

*Four Smelt-Water Explosions Recorded 2004 thru 2020,
One from Boiler Bank Leak, Two Screen Tube Leaks, One Floor Leak

Figure 3

Leak Cause

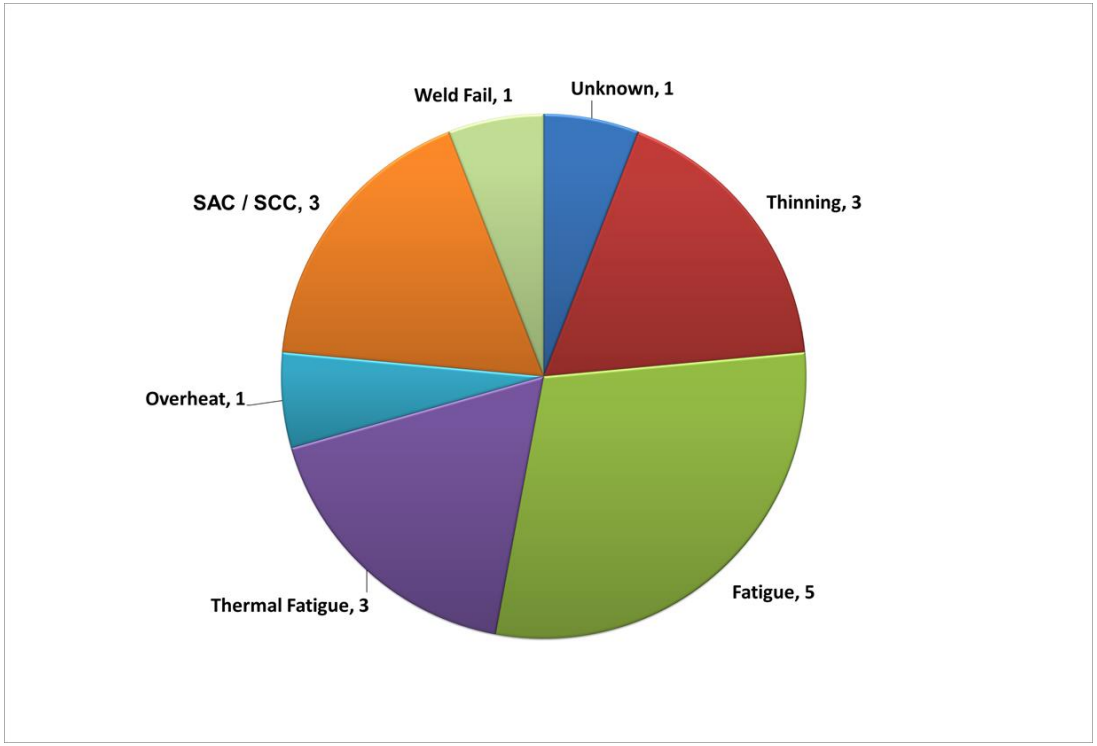


Figure 4

How Discovered

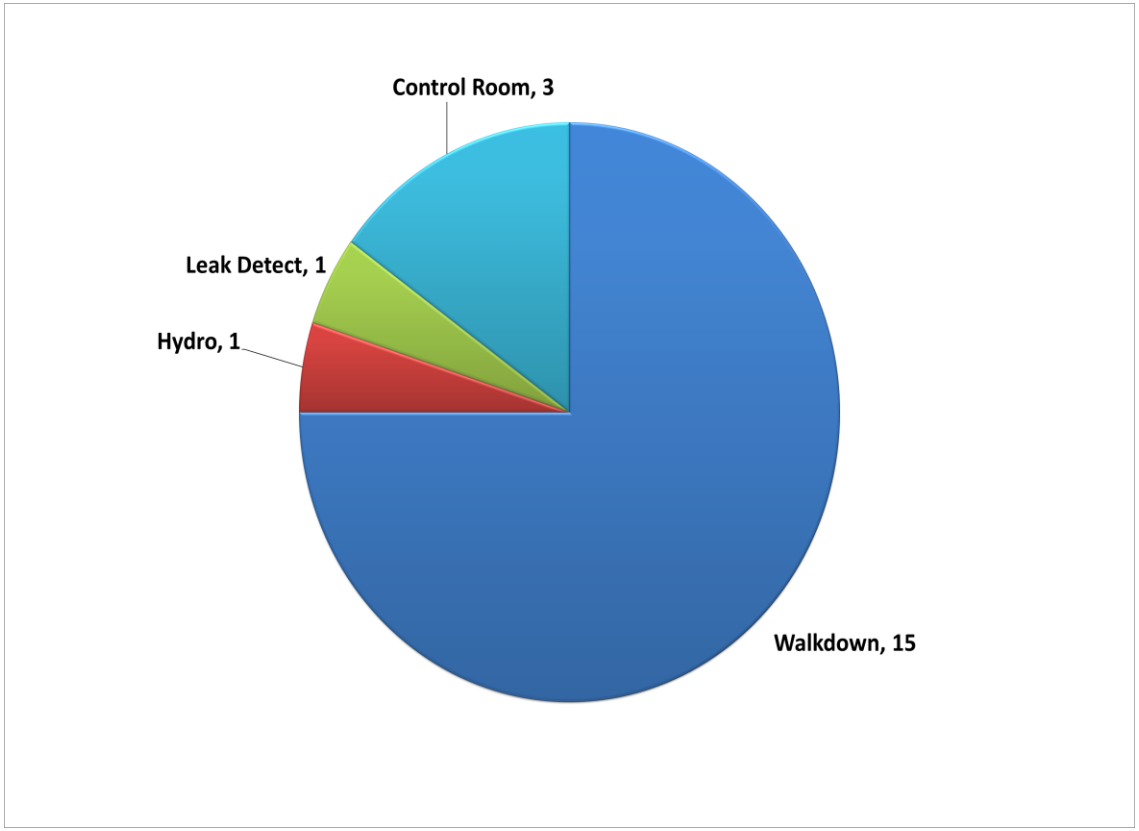


Figure 5
(Critical Exposure Classification Began in 1965, Changed to Critical Incident in 1999)

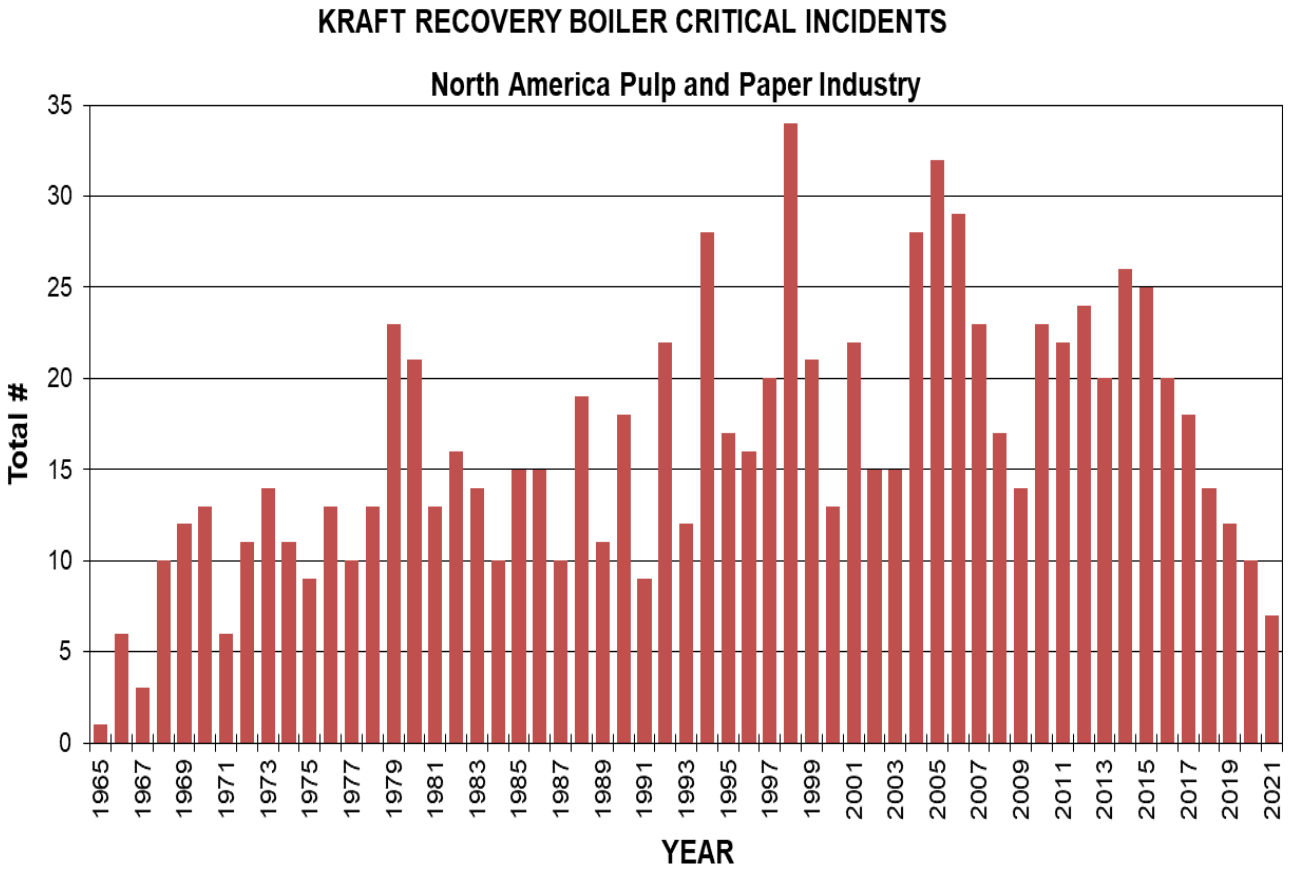


Figure 6

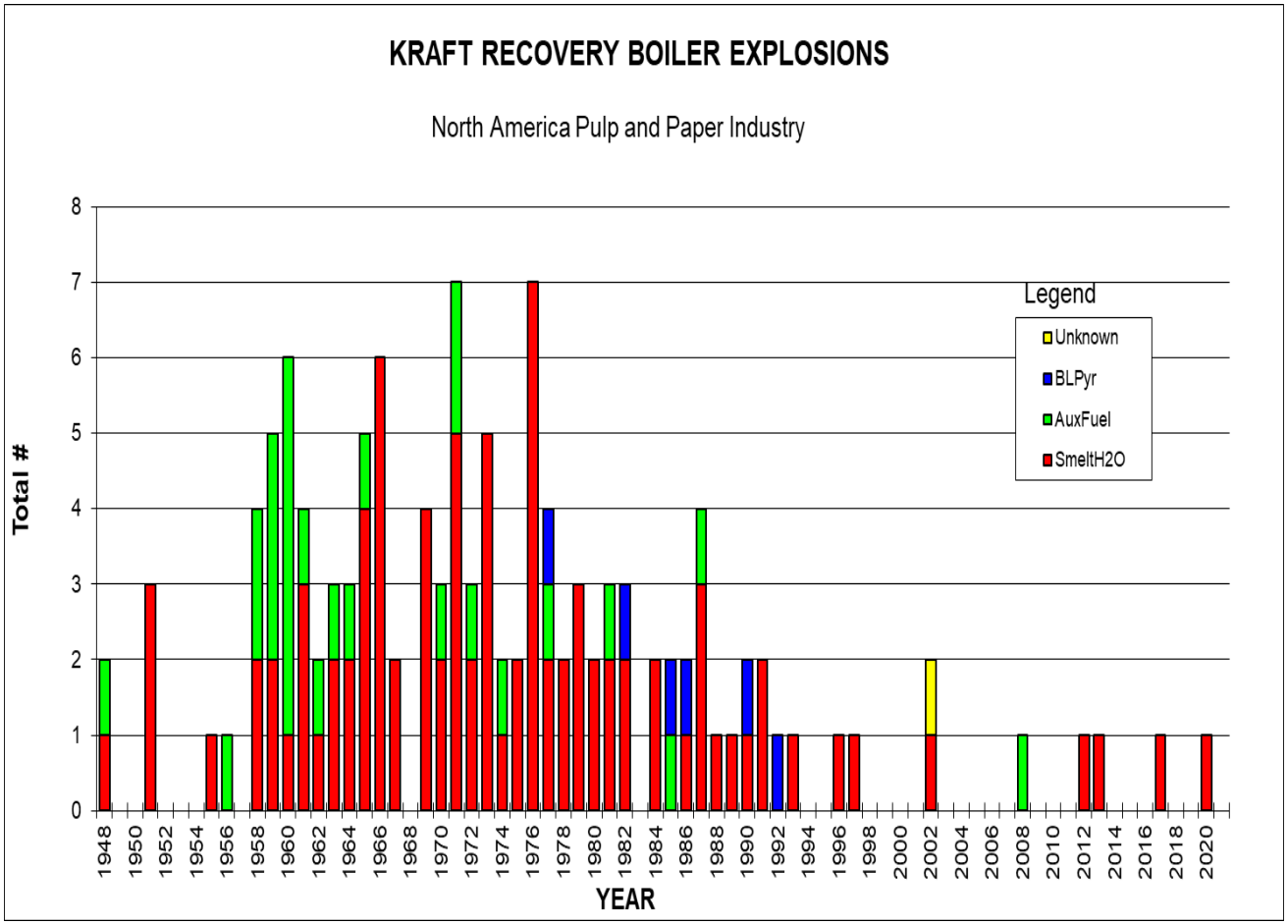

KRAFT RECOVERY BOILER EXPLOSIONS
North America Pulp and Paper Industry
Total #
YEAR
Legend
Unknown
BLPyr
AuxFuel
SmeltH2O

Figure 7

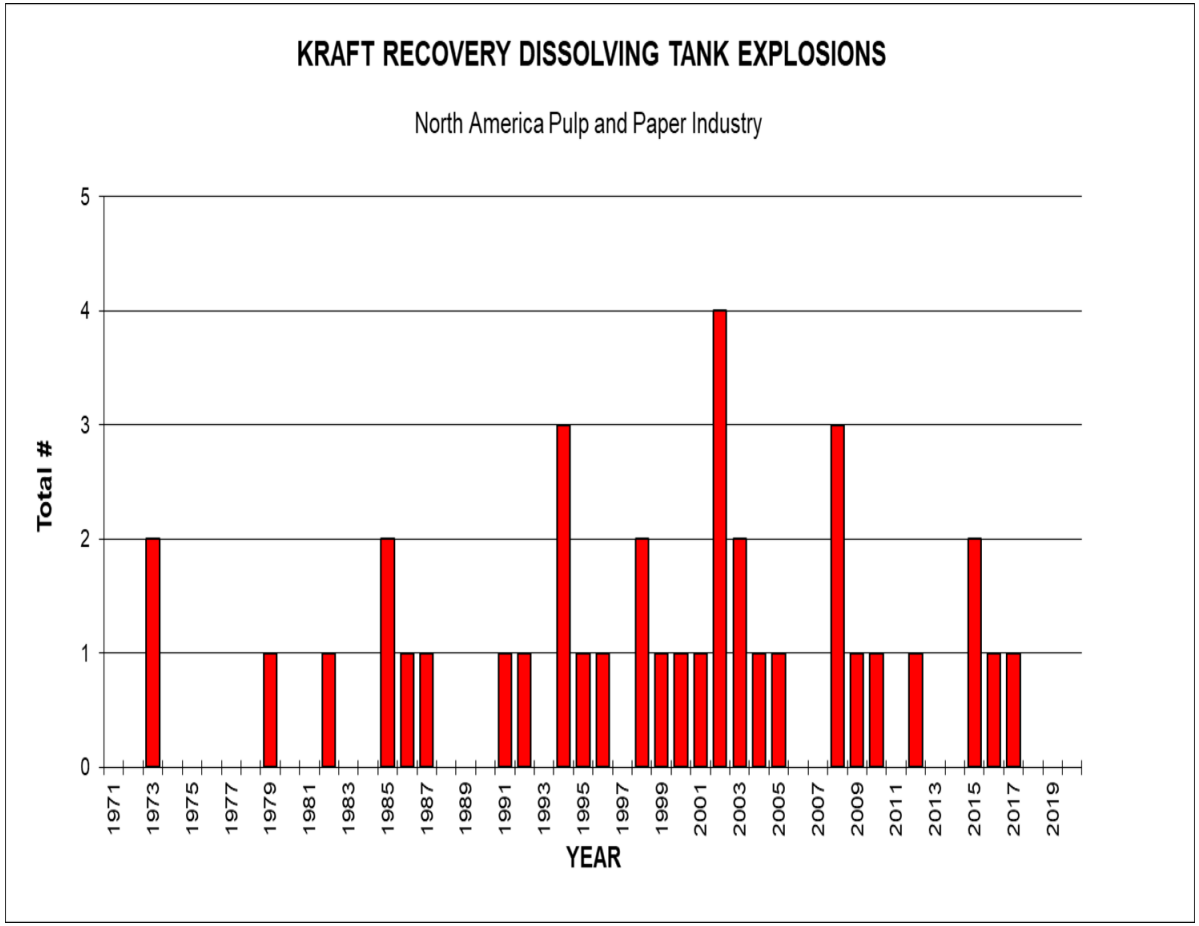

KRAFT RECOVERY DISSOLVING TANK EXPLOSIONS
North America Pulp and Paper Industry
Total #
0
1
2
3
4
5
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019
YEAR

Figure 8

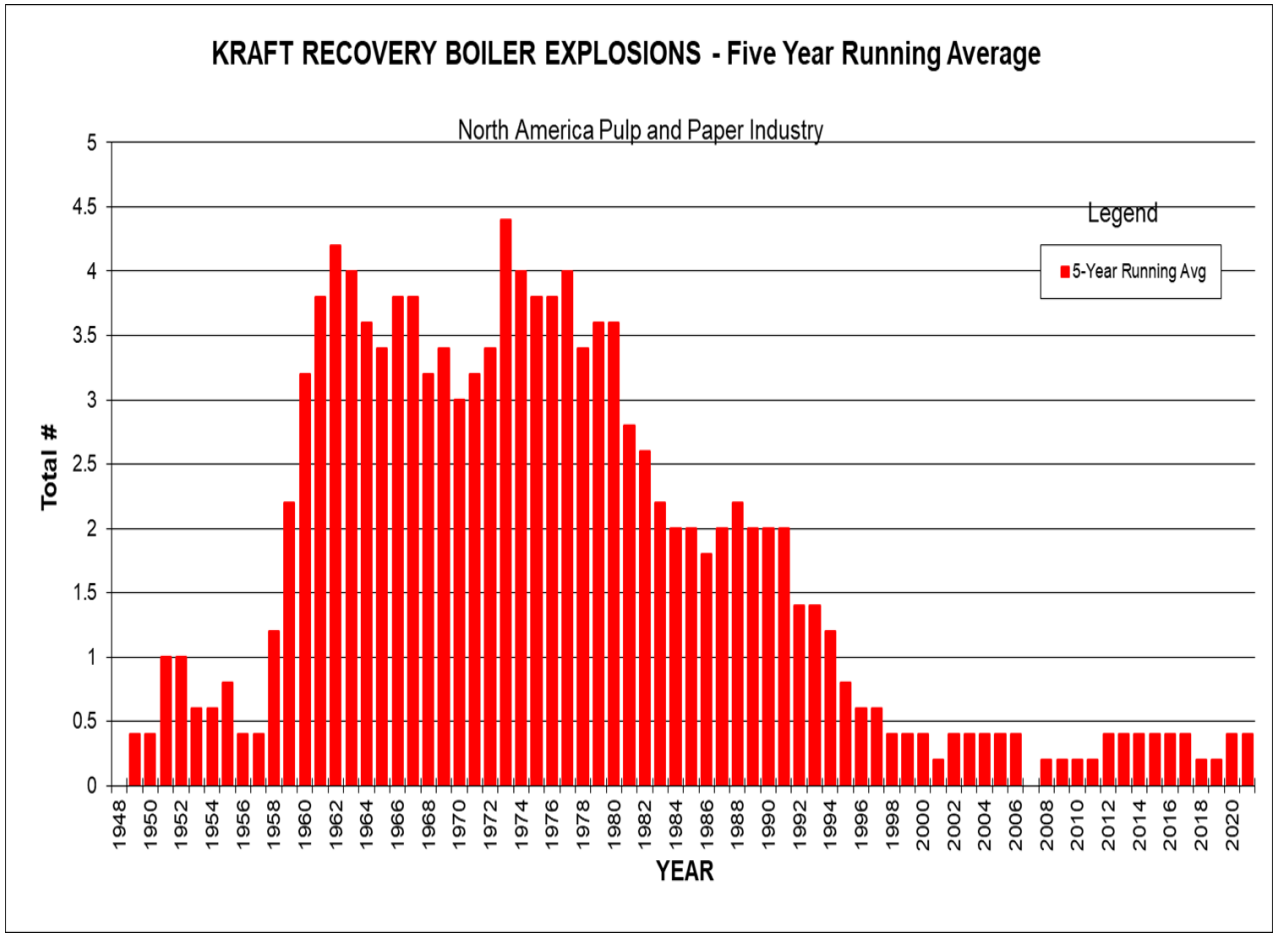
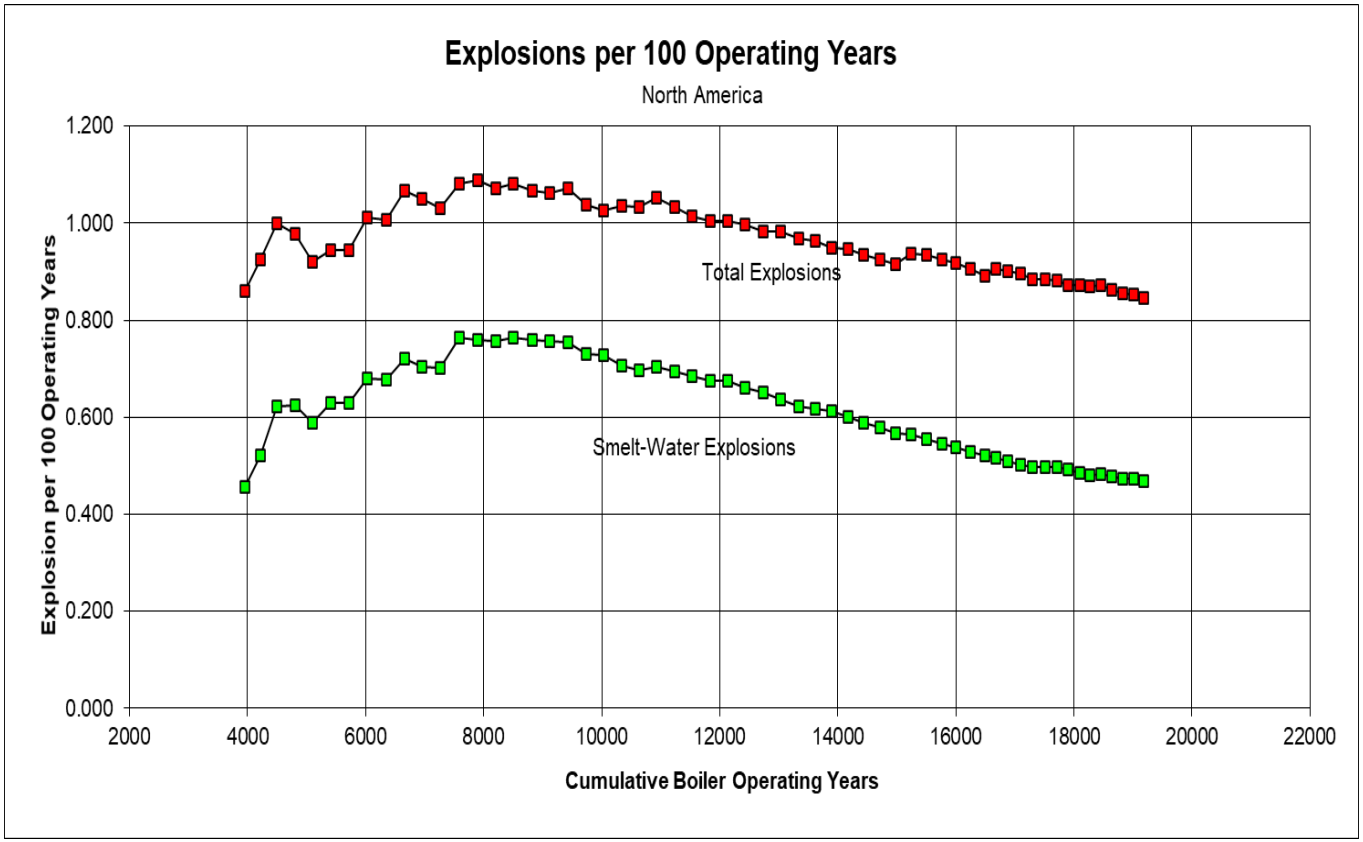

KRAFT RECOVERY BOILER EXPLOSIONS - Five Year Running Average
North America Pulp and Paper Industry
Legend
5-Year Running Avg
Total #
YEAR
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
1948
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020

Figure 9


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
22000
Cumulative Boiler Operating Years

7. SUBCOMMITTEE REPORTS – (Cont.)

7.3 FIRE PROTECTION IN DIRECT CONTACT EVAPORATORS REPORT

Stephen Cox
March 18, 2021

Meeting started at 13:00 Central Time

Attendees (as best determined):
25 attendees

Reviewed anti-trust document

Introduction:
-Review of Agenda

Role Call of Members: with 5 of 6 present

Review of Minutes:
Minutes from Fall 2020 session were read
-Motion to accept (Kevin Huelsbeck). Second (Andrew Young). Carried: Minutes Approved.

Recent Events:
-None submitted prior to meeting
-None submitted during meeting.

Agenda topics for discussion were held
6.a. Suggested wording changes regarding routine testing of the system components

It was discussed during the session to review and vote on suggested language presented during fall 2020 session to test not only the primary but also back up fire protection and also any manual activation means during the required functional testing every 12 months (major outages).
The new verbiage for testing back up and manual fire protection was offered to the committee and no issues noted. No Objections. This was put out for subcommittee members to vote on. All members voted "Yea". No Opposition. Unanimous to push forward to executive committee.

6.b. Item to be discussed regarding protective caps over nozzles
During the 2020 session a language change was recommended for a suggested practice of adding loose fitting caps over fire protection nozzles. This falls in section 4.2.1 Water

The language change to Loose fitting caps tethered to prevent entering the liquor system
was offered to the committee and no issues noted. No Objections. This was put out for subcommittee members to vote on. All members voted "Yea". No Opposition. Unanimous to push forward to executive committee.

6.c. Valve failure states for fire protection valves
During the 2020 session it was brought up regarding what should the fire protection valve failure mode be upon loss of air or power. It was suggested as a topic for the spring 2021 session
BLRBAC recommended practice does have verbiage in 4.1 for manual activation, and safe access during a fire situation. Suggested wording was presented for discussion. The wording was to add "from a safe location" to section 4.1 General under system design types.
Questions were asked to assure that automatic protection is still needed.
A: Yes. The verbiage still supports automatic protection with the provision of manual.

Q: Is this verbiage in alternate to providing guidance on fail safe state conditions of fire protection valves?
A: Yes. Fail safe conditions will not be prescribed with manual back-up provisions.

The new verbiage was offered to the committee and no issues noted. No Objections. This was put out for subcommittee members to vote on. All members voted “Yea”. No Opposition. Unanimous to push forward to executive committee.

6.d. Follow up regarding instrumentation subcommittee to ask if adding the water flow alarm to the recommended instrumentation

In the Fall 2020 session it was noted that flow alarms are required for water based fire suppression systems in the recommended practices for Fire Protection in DCE, but the BLRBAC instrumentation recommended practice list does not have this listed. It was suggested to present this to the instrumentation sub-committee to add to their document.
It was communicated during the current session that this has been sent to the Instrumentation subcommittee for discussion in the Spring 2021 session on whether to add to the recommended instrumentation list or not.
Discussion on this topic led to additional items being added to the recommended list for alarms
The new verbiage for adding the water flow alarms was offered to the committee and no issues noted. No Objections.

Q: How will you alarm this if it is “Smothering Media” for steam protection?
A: Will be discussed in later document.

Q: Should we have two line items on the table, one for water alarm and one for steam alarm?
A: Steam could be for steam valve position indication. We will discuss later.

A: We came back to this issue and discussed whether we should have 2 lines

1. Valve Position for Steam Flow “Open and Not Closed”
2. Flow Alarm “Steam Smothering Valve”

The following verbiage was presented to the group:

1. High High Temperature Admit Fire Protection Media (class 1 alarm)
2. Alarm for Fire Protection Media In-Service Status

a. Water flow alarms (class 2 alarm)
b. Steam valve position (class 2 alarm)

This verbiage was offered to the committee and no issues noted. No Objections. This was put out for subcommittee members to vote on. All members voted “Yea”. No Opposition. Unanimous to push forward to executive committee. Some “massaging” of the verbiage is expected.

D. FIRE PROTECTION SYSTEM					
Instrument or Control System	Major Function	Operating Modes or Techniques	I	II	Comments
Direct contact evaporator temperature	Warns of high temperature and activates fire protection	High Temperature Alarm	X		Refer to BLRBAC “Recommend Good Practice Fire Protection in Direct Contact Evaporators and Associated Equipment.”
		High High Temperature Alarm	X		
		High High Temperature Alarm Master Fuel Trip	X		
		High High Temperature Admit Fire	X		

		Protection media			
		Alarm for Protection Media In-Service Status			
		A. Water Flow Alarm		X	
		B. Steam Smothering Valve Position		X	
Precipitator Inlet Temperature	Warns of high temperature and activates fire protection	High Temperature Alarm	X		Refer to BLRBAC "Recommend Good Practice Fire Protection in Direct Contact Evaporators and Associated Equipment" and "Recommended Good Practice for Safe Firing of Auxiliary
		High High Temperature Alarm	X		
		High High Temperature Alarm Master Fuel Trip	X		
		High High Temperature Admit Fire Protection		X	

		media			Fuel"
		Alarm for Protection Media In-Service Status			
		A. Water Flow Alarm		X	
		B. Steam Smothering Valve Position		X	

6.e. Discuss if steam smothering systems should have a flow alarm or some other indication of presence of steam.

New topic of discussion – Steam systems don't have suggested guidance to have flow indications but there is recommended practice on valve positions feedback to the operator and in section 4.3 it recommends testing monthly valve position checks. .

Discussion should center around if the language should stay as is without recommending additional instrumentation.

Section 4.2.2. "Steam" does not have any verbiage of alarms.

Q: Quarterly for water flow alarm testing acceptable based on FM and NFPA requirements:

A: That is correct. This can be changed. (Andrew Young)

Q: Should we have functional tests for steam smothering systems.

A: Yes. We believe our verbiage covers that.

Q: Should we have regular valve checks to assure steam valve is not stuck, and full steam flow to the DCE.
A: Kevin Huelsbeck offered some history of discussions of test procedures of stroking the steam supply valves, functional testing of the steam smothering systems with IR thermal imaging cameras.

4.2.2 Steam

- Steam Smothering valves should alarm back to a manned control room indicating the steam valve is open.

The above verbiage was offered to the committee and no issues noted. No Objections. This was put out for subcommittee members to vote on. All members voted "Yea". No Opposition. Unanimous to push forward to executive committee.

4.3 Inspection/Testing

A program of alarm testing should be implemented that assures all relevant alarms are tested periodically. It is recommended that valve position checks be performed at least monthly, and water flow alarm tests be performed at least quarterly.

The above verbiage was offered to the committee and no issues noted. No Objections. This was put out for subcommittee members to vote on. All members voted "Yea". No Opposition. Unanimous to push forward to executive committee.

Kevin Huelsbeck provided comment that to be less prescriptive the words "frequently" or "regularly based on condition", but will support the verbiage with a "yea" vote. Stephen Cox supported and second the comment. All members vote Yea.

New Issues:

Any new issues opened up to the group. No new issues noted.
No new topics for Spring 2022 discussion.

Questions and Comments:
Q: Do we have adequate verbiage to address dilution water (non-operating) with the DCE document. This was discussed to assure consistency with the ESP document.
A: We direct to the SFBL for dilution sources.
A: Frank Navojosky confirmed that the ESP Subcommittee document excludes shutting off dilution water for DCE during an ESP. This supports the DCE committee documents.
Q: Does anyone have a good practice for level indication on DCE. Best Practice?
A: This could be provided to the operating session as a question. No answers were provided by the group.
Plan for next meeting:
The next meeting will cover any issues between now and the fall session. The planned meeting will be Spring 2022.
Adjournment:
Motion to Adjourn: Seconded, unanimous, carried.
Adjourned 14:20 Central Time.

7.4 INSTRUMENTATION REPORT –Dave Avery

The instrumentation subcommittee met via WebEx virtual meeting on March 23 at 1:00pm Central time. The meeting began with a welcome screen and participant protocols.

An updating agenda was included to track topics as they are presented to keep the assembly current on where we were in the proceedings. The next item was a presentation of BLRBAC's Anti-trust statement which was covered with the attendees.

Shared information about our new " www.blrbac.net" website and reminded everyone that the original site " www.BLRBAC.org" is inactive and no longer up to date.

A Membership Roll Call and guest attendance procedure was followed recording 9 members and 42 guest participants for this event. A reading of the fall 2020 minutes occurred with a vote by committee members to accept them as recorded in the fall 2020 BLBRAC minutes. The minutes were accepted as published.

The Proposed E&I Qualifications Statement with the objective to establish minimum guidelines (Definition) for an E&I technician servicing a recovery boiler was developed over last several meetings is ready for submission. We will submit definition to the executive committee for posting with Follow up and possible voting in the Fall 2021.

Update since our last meeting for the Rapid Drain Valve vendor issues with Rotork's IQ3 actuator. Rotork has developed solutions to address the IQ3 issues. The following summary details Rotork's solutions and actions:

- Rotork will update the BLRBAC document for the std IQ3 and the IQ3 SIL (BLRBAC) build.
- A firmware fix for the selector is going to be ready.
- This SIL fix cover many other bases.
- Note: As part of the setup, it records the time for a full stroke in case the position encoder fails. It will drive the actuator based on stroke time when it doesn't know where it is.

- It will also ESD with a failed torque sensor.
- If our 24VDC internal supply were to fail, that alone would not initiate an actuator ESD.

Hopefully 2021 will bring closure to this problem.
Submitting to the executive committee our revised section **4.3 Recovery Boiler Safety Systems Applied to Burner Management** - "***For RBSS Burner Management System requirements, users and designers should consult the appropriate standards, codes, and guidelines such as BLRBAC, NFPA, FM, UL, etc***." This addresses and clarifies our previous BLRBAC vs NFPA-85 discussion.

A request was received from Stephen Cox DCE subcommittee chair to include "Water flow alarms should be provided with an annunciator in the recovery control room" to the instrumentation checklist section D. "Fire Protection System". In the review of this request, it is apparent that the update for the DCE section conducted in 10/06/2008 is not what is posted on the website. The 2008 version is being sent to executive committee to update the current section D. of the Instrumentation checklist. This will give the DCE subcommittee the proper checklist to review for their document. We then can update the checklist as needed with information from the DCE subcommittee.
Drum Level chapter development guidance document has made respectable progress. The document is to promote discussion about areas for potential mistakes in the employment and operation of drum level installations. The discussion of installation practices should help provide a reliable drum level measurement. A WebEx team meeting will be scheduled in July to keep the development of this Guideline on track. The October meeting wrap up should allow us to send this to the executive committee for posting.
The meeting was opened for questions from the attendees. Several were received and addressed. Potential future subjects of discussion are:
-Bed cameras: Difficulty of keeping in service.
-Liquor gun door proximity switches wiring reliability.
-Spool Piece: Not Fail Safe.
-Protections of RBSS from a Cyber Security perspective.
-BMS Life Cycle.
-DCE Committee- Same items that were up before.

-SFAF has a combustion analyzer in their instrumentation list, but our committee does not?
-O2 meters. New technologies could be ignition source if covers do not have proper flame covers.

The meeting was adjourned 3:44pm Eastern time.
Final thought, our subcommittee has been and is ready to continue BLRBAC's ongoing mission, we are here for you, thanks for your patience and looking forward to when we can see everyone in person.

7.5 MATERIAL & WELDING REPORT – Mike Blair

WEBEX SESSION:

The Materials and Welding (M&W) Subcommittee met in Open WEBEX Session on Wednesday afternoon, 24 March 2021.

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

Attendance

9 members attended the webex session. Did not count guests.
We had quorum and the meeting was called to order.

Old Business

Reviewed and accepted minutes from Fall 2020.

New Business

Presentation by Michael Blair regarding recent experience with ID initiated copper induced cracking of a carbon steel boiler tube near a through wall weld repair. Copper from tube ID deposits present in the tube near the weld repair.
The above presentation sparked discussion about possible revision to the copper induced cracking advisory M&W Guidelines 1.6, accepted Fall 2019. Chad Herrod suggested that due to recent incidents that they have had at GP, that we publish 1.6 advisory soon, and catch up with revision concerning the recent discovery of copper contamination due to ID deposits near a through wall weld repair.

Members
9/16 in attendance

Document Development
Reviewed proposed revisions put forward by Jesse Worsham to move M&W issues from Personnel Safety Section to M&W Section. Several questions came up for clarification. Tabled until fall 2021.

Presentations
Michael Blair (IP Technology) made a presentation *Copper Contamination Cracking on Tube ID near heavy, copper containing tube ID deposits*

No other issues being raised, meeting was closed at approximately 16:00 eastern time.

7.6 PERSONNEL SAFETY REPORT – John Fredrickson
Meeting opened at 2PM EST

The BLRBAC anti-trust statement was read.

The minutes of the last meeting were read and approved by the Committee.

The Personnel Safety Sub-committee met in a "virtual" session on Thursday, March 25, 2021. There were 7 members (out of 12) plus 30 guests in the virtual Teams session.

Representation at our meeting is captured by the digital tracking at the end of these notes.

1. Agenda review and review of meeting protocol for virtual meeting

2. Committee Members in attendance - Information review/updated
    a. Alarick Tavares
    b. David von Oepen
    c. Alec Shull
    d. Jennifer Johnston
    e. John Fredrickson
    f. Francisco Britt (joined late)
    g. Greg Zavadoski (joined late)
3. Review and acceptance of 2020 October meeting minutes
4. Subcommittee topic - develop list of RB tasks with SIF potential
    a. Reviewed AF&PA SIF definition
    b. Suggested - create new Appendix D - High Risk Tasks
    c. Support from GP, WestRock
    d. Utilize others outside subcommittee to help develop, such as mill trainers (WestRock offer) – Alarick Tavares and David Von Oepen are contacts.
    e. Additional suggested high risk tasks - BL and GL sampling should be included (Daniel Franco)
    f. Group alignment to proceed
    g. Greg Z to coordinate next steps to develop Appendix D with subcommittee team members and Daniel Franco (Smurfit Kappa - Columbia) Report out to subcommittee at Fall 2021 meeting.
5. Open forum Topics:
    a. Topic 1 - how handling RB audits during pandemic restricted travel time? What worked, what learned?
        i. SAPPI - remote document review. Easier because auditors know each other's mills, but POV that audit isn't complete until responses verified on site. Vigorous approach to mill prep for audit.

ii. WestRock - 1-2 ATL auditors, 1 FM Global, 1 FW treatment vendor, 3 auditors w/in driving distance, couple remote over teams - limit meeting times to maintain focus. Selectively reduced number of audits this year based on past performance, to extend audit timeframe for strong performers

iii. GP - hybrid audit - not complete until onsite review. Document review remote. Remote audit doing document review - about 5 days (compared to 3 days if on site) due to other priorities. 2 days for 1-2 SME onsite validation. Estimate about 85% efficient compared to in-person. Estimate 12-14 hours virtual meetings - scope includes RB, TG, air compressors, electrical

iv. Smurfit Kappa - all virtual - 3 hour sessions, 3 sessions - total 9 hours

b. Topic 2 - has pandemic spurred new uses of technology to overcome travel restrictions?

i. How have suppliers applied technology?

1. Alec Shull - Andritz – Pandemic situation is still viewed as temporary - use of pictures, videos, data, cloud storage/sharing for troubleshooting support

2. Sarah Henke - Valmet - biggest struggle is getting into Canada - may send someone local with tablet / VR goggles with data sent to tech in US for review

ii. Anyone using live-feed furnace cameras for remote troubleshooting / technical assistance?

c. Topic 3 - what biggest impact to RB personnel safety due to pandemic? What have you done to overcome or take advantage?

i. GP - struggle to have floor conversations with employees

1. Idea - use of tour microphone / head set or radio communications such as fire fighters

ii. SAPPI - using both before and after shift crew debriefs

d. Topic 4 - during ESP, is elevator programmed to go to bottom floor and stay out of service (like smoke / fire detection), or procedural only?

i. WestRock Demopolis - procedural only. Last person to use leaves door open

ii. Lance Bolduc - need to consider if bottom floor could be more hazardous than another floor

e. Topic 5 - experience with spout cleaning robots, experience, barriers

i. Andritz - don't know of any installed in north America. 1 in Europe since 2019, 1 in 2020. anther starting fall 2021, 1 into south America in 2022. reliability - units in Europe - >95%. Issues when high smelt flow and splatter - upgraded protected covering on equipment. When robot not cleaning, it moves to the side to stay away from spout opening. No known operating issues - cleaning effectively. Couple instances smelt was too hard for robot to clean - due to upset chemistry in boiler. Operator acceptance - really like technology and being able to be away from smelt deck. Frequency for manual cleaning - not a typical need - only when had very hard smelt. Barriers: price - working with Finland to improve this position

ii. Diamond Power - not a robot, more like an auto port rodder - 1 in US, 1 in Brazil, 3 in Europe. Not intended to be 100%, 50-90% of time reduction for spout cleaning. Can fit easier in tight spaces due to equipment configuration

iii. Valmet - over 10 robots installed - south America, china, Scandinavia. One issue seen - operators increased torque on robot arm which damaged the spout. This wasn't intended to be a parameter to be set by the operator and has since been restricted. Barrier - price - safety is the justification

iv. GP - port rodder design on small RB (1 spout). Had growing pains but now well received by operators. Kept operators involved in design / placement of guarding. Had been manual cleaning every 2 hours, now about 1/day. Cost is more than the capital cost - also need to consider electricians needing to learn to service the equipment, for example (whole new type of controls technology). Was a good test for a mill that was having issues, but also to test small scale. Also available to have sites considering technology be able to see it in action. Estimated to reduce exposure by about 5 hours per day operator time on smelt deck. There is a pin to move rodder out of the way when need to manual clean or perform work.

v. Andritz - fence around smelt deck and operating area to keep accidental entry. There is a maintenance mode on robot to go to a idle location when folks need to be in area. cameras of robot displayed in control room
vi. Valmet - goes to idle position when people in area. Area is blocked off
vii. Diamond - working on methods for alternate retract mechanisms depending on spout deck arrangement, but will have to remove manually
viii. Gulf Coast Automation - partnered with ABB robotics - have a brake release to be able to remove a robot, also options for quick release heads
ix. Do suppliers provide safety risk assessment for systems? Would be helpful to sites trying to move project forward
1. Andritz - yes, developed for each project and part of startup training material
2. Gulf Coast - each project is individual, but each has a safety plan
3. Valmet, Diamond - each project different based on unique physical considerations
x. Reminder to incorporate management of change as evaluate / move projects forward

6. Meeting ended at 3:25 PM EST

7.7 PUBLICITY & NEWS REPORT – Matt Paine

BLRBAC posted meeting notices on North American industry, such as TAPPI and Pulp and Paper Canada. Committee continues with virtual meeting format.

Look to broaden the meeting notice to reach Europe and South American Mills

That's all I have, any questions?

7.8 SAFE FIRING OF BLACK LIQUOR REPORT – Vernon Blackard

Wednesday March 17th (A.M.)

8:30 am --Noon Safe Firing of Black Liquor Subcommittee – (CLOSED)

Wednesday March 17th(P.M.)

1:00 pm --4:00 pm Safe Firing of Black Liquor Subcommittee - (OPEN)

Agenda:

1. Open the meetings. Closed and Open.

2. Reviewed BLRBAC Anti Trust statement. Both closed and open meeting.

3. Introduce members and guests. 18 members and 64 members/guest in open meeting.

4. Reviewed and approve the Fall 2020 minutes.

5. Review any open items brought up to the subcommittee before the Spring 2021 Meeting.

Items brought up since last meeting.

- Continue discussions from Fall 2020 meeting (Refer to minutes).
- Review revisions to large tube leak logic discussion. Wes, Cliff, Tom, Len
- Vernon check personnel safety to high furnace pressure settings?
- Review DT Explosion vent revisions Len, Sarah, Zach, Wes, Pierre
- Review spout leak comments revisions. Daniel and Len
- REVIEW EC COMMENTS ON DRAFT DOCUMENT SUBMITTED FALL 2020.

- Figure 1 move sootblower box and spout arrow markup. Add note to use spout torches only after boiler purge is complete. Tom
- Vernon check with Aux fuel on changes to figure 1.
- Figure 2 Missing box on subs. Tom
- Figure 3 Peter to clean up with discussion for reasons for this logic on liquor wash
- Revise Chapter 15 to capture reasons behind recent changes…Len

- Add agenda items as they come in before meeting.

- Discussion on low DT tank level and agitation. Trip or no trips; permissives only? Daniel, Pierre

- Discussion on how to control DT level best practice. Some still run to high pump suctions on DT. Daniel, Ryan, Len, Pierre

Worked on large tube leak logic revision after regular call. Wes, Cliff, Daniel, Len, Tom.

6. Open item discussion from members and guests.
    - Any new items will be discussed. Discussed putting in language around drum level recovery time in large tube leak logic section for watch out if taking too long for drum level to recovery after a low drum level trip.
7. Explosion videos…Smelt water in boilers, dissolving tanks, others to share. Show the hazard we face and try to mitigate. Members to send information to Vernon and he will share with all on team. Go over next face to face meeting.
    - Please submit some if you can.
8. Close meeting.

7.10 WATER TREATMENT REPORT – Tom Przybylski

- The water treatment subcommittee met in open session for a single 3-hour on-line session. There were 7 of 16 subcommittee members in attendance for the morning session along with 29 guests.
- There were Kelli Bastarche and Ken Hansen are no longer on the subcommittee
- The session started with a review of the BLRBAC antitrust statement.
- Meeting minutes from last spring were approved.
- We discussed edits that various subcommittee members suggested for the chemical cleaning document in the time since the last subcommittee meeting. Various edits were either accepted, edited, or rejected.
- Among the edits suggested, an in-depth discussion about the extent of detail that coverage that we should give to cleaning of superheaters resulted in us simply stating that it is not in the scope of this document.
- An ESOP section was added.
- Definitions of phosphate hideout were refined.
- We revised the cleaning chemistry versus deposit table.
- Significant effort was spent on cleaning up the text and certain definitions. A vote on whether to submit the chemical

cleaning document to the executive committee was postponed due to the lack of a quorum. The document will be emailed to all subcommittee members prior to the fall meeting for one last edit.

- The sampling and instrumentation document was deferred due to the lack of time.

- We concluded the session at 3:40PM

8.0 AMERICAN FOREST & PAPER ASOCIATION RECOVERY BOILER REPORT – Wayne Grilliot (See ***Appendix III*** – Slide Presentation)

The American Forest & Paper Association (AF&PA) Recovery Boiler Program was established in 1974 to help identify the root cause of recovery boiler critical incidents and explosions. The AF&PA Recovery Boiler Program assists companies in improving the safety, integrity, and reliability of recovery boiler operations. Recovery Boiler Program membership is open to all companies that operate recovery boilers. Program activities are funded by member company dues.

The Recovery Boiler Program is under the direction of a Steering Committee which includes Karl Morency (Georgia-Pacific), Frank Navojosky (International Paper), Jeff Wagoner (International Paper), and Wes Hill (Georgia-Pacific). The Steering Committee sets Program priorities based on Member Company Input, BLRBAC Incidents, and Industry Needs

The Recovery Boiler Program provides a forum for companies to develop information to help evaluate Safe Operating Procedures, Organization and Training, Maintenance Programs, Specifications and Construction, and Research & Development Programs. Documents developed by the Program include Reference Manuals, Audit Guidelines, Best Practices, Training Aids, Checklists, Textbooks, and Studies. The Program sponsors R&D projects for Safety Improvements and Process Improvements. This helps drive improvements in Safety, Operations, Maintenance, and Recovery Boiler Integrity.

The AF&PA Recovery Boiler Program has two (2) Standing Subcommittees. The Operation & Maintenance (O&M) Subcommittee is Co-Chaired by Frank Navojosky (International Paper) and Wes Hill (Georgia-Pacific). The Research & Development (R&D) Subcommittee is Co-Chaired by Karl Morency (Georgia-Pacific) and Jeff Wagoner (International Paper). Subcommittee Membership is made up of Representatives from the Member Companies.

In 2018, the AF&PA Recovery Boiler Program was opened to all Canadian Mills that operate Recovery Boilers. We currently have 22 member companies in the AF&PA Recovery Boiler Program. Our membership currently represents 94% of USA and 30% of Canadian Chemical and Semi-chemical pulp production.

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 is sponsoring some very exciting research projects at the University of Toronto. The 4 projects focus on Dissolving Tank key operating conditions and advanced monitoring techniques to further improve safety and reduce operational risks. The program is building on past studies sponsored by the AF&PA Recovery Boiler Program and related research underway at the University, which is currently funded by a consortium of 26 companies. We are very pleased to have Dr. Markus Bussmann of the University of Toronto leading these studies.

Available documents on the AF&PA Recovery Boiler Website include Publications, Studies, Training Aids, Standards, and General Program Information.

AF&PA Recovery Boiler Program Website:
http://www.afandpa.org/our-industry/recovery-boiler-program

9.0 TAPPI STEAM & POWER/ENERGY MANAGEMENT REPORT - Energy Recaust Committee Chair

No report was given at this meeting.

10.0 WESTERN CANADA BLRBAC REPORT

Meeting Minutes	BLRBAC	April 14, 2021

No report was given at this meeting.

11.0 ACTIVITIES OUTSIDE NORTH AMERICA REPORTS

No report was given at this meeting.

12.0 OPERATING PROBLEMS SESSION REPORT – Bentley Sherlock

The Operating Problems Session started at 2pm Eastern Time.
The BLRBAC Antitrust Statement was read at the beginning of the meeting by Bentley Sherlock, who drove the display of questions and monitored for comments from the audience.
Frank Navojosky read the questions and solicited responses or provided his own.
Dean Clay, Jeremiah Yoder, John Kulig, John Phillips, Scott Moyer and Wes Hill were on hand to form an answer panel.
Many others from the audience provided answers.
Fourteen questions were sent in before the meeting and one during the meeting, for a total of fifteen questions.
There were multiple comments and responses to most questions, and there was good participation in the discussion.
The questions covered topics in:

- Instrumentation and Control
- Mechanical Integrity
- Operation
- Automation
- Inspection
- Auditing

The meeting was adjourned at 4:15pm Eastern Time.

CLOSING COMMENTS:

CHAIRMAN: David von Oepen: That concludes the Main Committee meeting.
Just a reminder that the next meeting of BLRBAC is going to be October 4,5,6 2021. Our spring meeting will be either virtual or in person. If in person, the meeting will be at the Crowne Plaza Hotel (now the Sonesta Hotel) Atlanta GA.

I'll now entertain a motion to adjourn the meeting! Do I have a second? All in favor? Anybody opposed? The Main Committee Meeting is officially closed. Thank you for coming and we will see you in the spring. Have a safe week.

APPENDIX I
INCIDENT LIST

NO LEAK

NO LEAK

SPRING 2021-01	
Classification:	No Leak
Co, Mill, Location:	Westrock Mill Evadale, Texas
Unit Data:	RB#3 1995 Andritz, 400009, Drums - single drum, DCE - No., Floor - Decanting Floor
Unit Size:	2.81 MMlb DS/day, 420,000 lb/hr steam, 600 PSIG,753^{o}F, 800 PSIG Design
Incident Date/Time:	9/3/2020 3:14 AM., Earliest Indication: 2:30 AM at Gun Ports
Downtime hrs, leak/total:	188 hrs went ahead and had our major outage with the ESP
ESP?	**Yes**
Leak/Incident Loc:	No Leak, thought to be in Floor tube, after hydro, no leak found.
How discovered:	Operator round
Wash adjacent tube:	NO
Root cause:	Small smelt pool in the bed on gas
Leak detection:	Yes
Bed cooling enhanc	Southland
Last full inspection:	4/13/2020
Sequence of events:	We had taken liquor out of #3 recovery boiler, and it had been out for a couple of hours. The bed was hard and the spouts had quit running. The second helper called the fireman and told him he saw something in the bed of #3 recovery that didn't look right. The fireman then called the top operator and told him what the helper had seen. After looking at the bed from the gun port on the third floor, the bed was dry all over except for one spot that had smelt bubbling up from it. By the operators experience it showed all signs of a floor tube leak. He called the foreman and asked for a second opinion. The foreman observed and said he felt it was a leak as well. They both agreed

	it could be a leak and the decision was made to ESP the boiler. The fireman was notified and the buttons were pushed to ESP the #3 recovery boiler. At this time the roads were barricaded, and everyone was notified. We stayed out of the area for the 8-hour time period, when the 8 hours was over, we opened the 3rd floor doors and inspected the bed. At this point we called Southland to cool the bed to make sure there were no hot spots. After southland was complete and the floor tube temps were below 200F, we water washed and then Hydro'd the boiler and no leak was found.
Repair procedure:	No leak
Future prevention:	No leak

NO LEAK

SPRING 2021-02	
Classification:	No Leak
Co, Mill, Location:	Sappi North America, Cloquet Pulp Mill, Cloquet Minnesota
Unit Data:	RB#10, 1998, Tampella, 18258, Drums - Single Steam Drum, DCE - None, Floor - Decanting (Tampella Design)
Unit Size:	6.1 MMlb DS/day, 925,000 lb/hr steam, 1300 PSIG, 900°F, 1300 PSIG Design
Incident Date/Time:	11/11/2020, Earliest Indication:11/11/2020 at 12:57PM
Downtime hrs, leak/total:	56 Hours
ESP?	**Yes**
Leak/Incident Loc:	No leak, Loss of DCS Control
How discovered:	NA
Wash adjacent tube:	NA
Root cause:	
Leak detection:	Nalco
Bed cooling enhanc	NA
Last full inspection:	4/27/2020 - 5/18/2020
Sequence of events:	At roughly 12:15PM the Recovery Boiler Fischer DCS system data screen went pink on all data points. Prior to losing control, Control Room Operator was adjusting the production rate controller to slow firing rate. When Control Room Operator noticed he had no controls, he attempted to switch screens and only found the scrubber screen available for changes. Control Room Operator then attempted to call the Controls Technician on the phone with no answer followed by

a call to the Recovery Superintendent with no answer. A page was sent to the Controls Technician which triggered an immediate response to the control room. The Controls Technician asked the operator to logon using the evaporator screen. The Control Room Operator was able to access RB10 but still showed pink data. As the Controls Technician left to continue troubleshooting, the Control Room Operator contacted the Recovery Field Operator #1 and explained the situation. The Recovery Field Operator #1 then took a field tour starting with taking a Baume to check dissolving tank density which looked normal.
The Recovery Superintendent then calls back and gets the details of the situation. The Maintenance Superintendent is then advised what was happening and joined the effort for repairs.
12:35PM (est.) Control Room Operator and the Recovery Field Operator #2 were in the control room monitoring the cameras (building and bed) and watching the drum level indication at the desk. During this time period Recovery Field Operator #1 was requested to look at the feedwater and dissolver again. Baume was still in range and feedwater pumps were still running.
12:52PM (est.) Control Room Operator and the Recovery Field Operator #2 decided to vary the feedwater storage level through the sight glass on el. 159. As the Recovery Field Operator #1 walked out of the stairwell at that elevation, all he could see was smoke and flames. He escaped back in the stairwell and reported over the radio what he was seeing. The Control Room Operator and the Recovery Field Operator #2 were witnessing the same event from the control room on the building camera (el. 139). Unsure of what to do at this point, the Control Room Operator and the Recovery Field Operator #2 continued to watch the cameras.
12:57PM- As the Control Room Operator and the Recovery Field Operator #2 are watching the events, the camera shows the lights on the drum level losing level. With the furnace pressure blowing flames out the ports and believing they were losing drum level they thought they might have a pressure part leak. The Control Room Operator didn't know for sure what decision to make and the Recovery Field Operator #2 was telling him to ESP. At that point the Control Room Operator pushed the buttons and started the ESP sequence.

Both Control Room Operator and the Recovery Field Operator #2 said they saw the drum level on the camera descending but the Merli stayed level. This should be a learning opportunity for the operators that the Merli on the console is hard-wired and should be the most reliable.

The conclusion of the controls team was operators did not have view of the boiler processes, but the process was still controlling during the time from 12:10PM to 12:57PM. During the manual fail

	over to the backup system, the north ID fan lost its run permissive causing the positive pressure in the boiler. Operators began watching the drum level indicators and the camera system was showing the lights on the drum level losing level. With the furnace pressure blowing flames out the ports and operators believing they were losing drum level, they believed they might have a pressure part leak and proceeded to press the ESP buttons.
Repair procedure:	No repairs required
Future prevention:	Replace DCS system during next outage

SMELT LEAK

OTHER

SPRING 2021-03	
Classification:	No Leak
Co, Mill, Location:	Domtar Kamloops Mill, BC
Unit Data:	RB#No2,1972, B&W, 8810, Drums - 2, DCE - NO, Floor - Sloped to Front
Unit Size:	5.5 Running at 5.0 MMlb DS/day, 760,000 lb/hr steam, 600 PSIG, 721^{o}F, 771 PSIG Design
Incident Date/Time:	September 1, 2020, Earliest Indication: 9/1/2020 at 21:00
Downtime hrs, leak/total:	205 hrs until back online
ESP?	**NO**
Leak/Incident Loc:	Other, Smelt Leak, no tube leak
How discovered:	Walkdown, observed smelt coming out of the vestibule
Wash adjacent tube:	NO
Root cause:	Ash Fall, Systemic issue with buildup causing deflection in floor.
Leak detection:	NO
Bed cooling enhanc	NO
Last full inspection:	Oct-19
Sequence of events:	-09/02/2020 21:00 on Sept 2 smelt was found leaking on the ground floor and the Recovery building. -An orderly shutdown of the Recovery took place, bed was burned out by 00:51 that nightshift (4hrs in) -09/04/2020 3:30 Start Water Wash of Recovery (31hrs in) -09/04/2020 15:15 Water Wash Complete (42hrs in) -09/04/2020 19:00 Initial inspection under the floor (46hrs in) discovered split on West side of floor, tube 95-105 region. -09/05/2020 7:00 CIMS inside starting repair (58hrs in), floor clean up on Recovery, Scaffolding construction. -09/06/2020 7:00 Tubes cut out . -09/07/2020 1:00 CIMS TIG welding in new tubes (100hrs in) -09/08/2020 2:00 CIMS TIG welding complete prepping for Hydro (125hrs in) -09/08/2020 8:25 Hydro Complete (131hrs in) , discovery of damage to floor beams 3 & 4 assessing structural repair.

	-09/08/2020 19:00 Structural repair plan established, cutting hole in vestibule floor for structural scaffolding (142hrs in). Concurrent repair work taking place on beam 4. -09/09/2020 17:30 Structural Scaffolding in place, beam lifted up. Shimming and Securing as per repair plan (165hrs in) -09/09/2020 22:48 Structural repairs complete, hydro test competed. (170hrs in) -09/10/2020 11:30 Scaffolding removed vestibule floor replaced, delocking and deblanking starting. -09/11/2020 10:10 Trip Checks and warm up curve complete (205hrs)
Repair procedure:	Temporary Repair, cut out 2 tubes and bent to match deflection
Future prevention:	Gain understanding of the nature of deposition. We are working with a 3rd party expert to tune the operating parameters to minimize deposition. In the short term we are committing to 6-month Water Washes until the nature of the deposition is fully understood.

DISSOLVING TANK

SPRING 2021-04	
Classification:	No Leak
Co, Mill, Location:	**International Paper, Vicksburg Mill, Redwood MS**

Unit Data:	RB# B&W, PR105, 1967, Click here to enter text., Drums - 2, DCE - Cyclone, Floor - Sloped to Front
Unit Size:	3.4 MMlb DS/day, 560,000 lb/hr steam, 1000 PSIG, 825^{o}F, 1200 PSIG Design
Incident Date/Time:	June 12, 2020, Earliest Indication: 6/12/2020 at 8:00 AM
Downtime hrs, leak/total:	N/A
ESP?	**NO**
Leak/Incident Loc:	Dissolving Tank,
How discovered:	Control Room Operator noted unusual indications on control room instrumentation for the dissolving tank
Wash adjacent tube:	NA
Root cause:	Other, Dissolving tank level instrumentation false high signal.
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Mar-20
Sequence of events:	On June 12th, 2020 the Recovery Boiler was operating under steady state conditions. Approximately 8 am that morning the dissolving tank level instrument plugged which then indicated a false high 100% dissolving tank level. The false level indication caused the dissolving tank pump out valve to open 100% lowering level in tank. Once the tank reached a level below the external density dual standpipe column upper sample tap, the upper tap stand pipe column drained empty. The loss of level in the standpipe caused the density indication to indicate a false low density. The density controls then closed all dilution valves to the dissolving tank to try to reach setpoint. The control room operator began to receive alarms that were ambiguous and could not be interpreted by the operator as impending potential dissolving tank emergency condition and the boiler continued to operate at steady firing rate. Once the alarms were determined to be indicating dissolving tank issues, the tank was observed for live smelt and dilution was added to the tank. The level instrumentation and density reading were returned to service. The event duration was 71 minutes without dilution at a low tank level. No violence or damage occurred as a result of this incident. Level instrumentation at the time of the incident was a bubble tube in a stilling chamber and is susceptible to plugging. The external density dual stand pipe was installed with the upper tap above the pump suction allowing the potential for the pump to pump the level below the standpipe tap and allow the upper tap column to drain empty which will yield a false low density reading.
Repair procedure:	N/A

Future prevention:	Improved alarming, training and control improvement

ECONOMIZER

ECONOMIZER

SPRING 2021-05	
Classification:	Noncritical
Co, Mill, Location:	**WestRock, Mahrt, AL**
Unit Data:	RB#2,1989, Tampella, 337, Drums - 1, DCE - NO, Floor - Decanting
Unit Size:	3.75 MMlb DS/day, 561,800 lb/hr steam, 890 PSIG, 825^{o}F, 1100 PSIG Design
Incident Date/Time:	January 17, 2020, Earliest Indication: 1/16/2020 at 10:50pm
Downtime hrs, leak/total:	31.3 hours
ESP?	**NO**
Leak/Incident Loc:	Economizer, The leak was on the tube to bottom header weld connection. Element 57, tube J.
How discovered:	Walkdown, Operator discovered wet saltcake under the #1 ECON (cold) conveyor.
Wash adjacent tube:	NO
Root cause:	Weld Failure, weld porosity
Leak detection:	YES
Bed cooling enhanc	NO

Last full inspection:	Mar-19
Sequence of events:	At 8:30pm on Thursday, February 13th, an operator found water under the #1 ECON (cold) conveyor. Due to the location of the leak and all other boiler conveyors being dry, the boiler was brought down in an orderly shutdown. Liquor out at 11:20pm on 2/13/20. Fire out at 12:01am, bed was completely burned out. Boiler cooldown curve was followed and boiler waterwash started at 9:00am on 2/14/20. IKs were used only in the #1 and #2 ECON sections. Wash completed, boiler LOTO and leak identified, weld repaired, PT'd and boiler hydro tested. Boiler lit off at 10:50pm on 2/14/20 and boiler on liquor at 6:40am Saturday, February 15th.
Repair procedure:	Weld was ground out and weld repaired. Weld PT completed and boiler hydro tested
Future prevention:	Additional inspection and mag particle testing in this area during Mar 2020 shutdown. The additional testing was performed in March, and repairs completed as needed. Additional testing will be performed in future outages.

ECONOMIZER

SPRING 2021-06	
Classification:	Noncritical
Co, Mill, Location:	**International Paper, Port Wentworth, GA**
Unit Data:	RB#3,1979, B&W, PR-190, 2017 Andritz rebuild, Drum - 1, DCE - NO, Floor - Decanting
Unit Size:	5.1 MMlb DS/day, 742,000 lb/hr steam, 1250 PSIG, 950^{o}F, 1566 PSIG Design
Incident Date/Time:	September 13, 2020, Earliest Indication: 9/13/2020 at 4:00 PM
Downtime hrs, leak/total:	38 hrs, 21 min
ESP?	**NO**
Leak/Incident Loc:	Economizer, Feed Water Header. Cracked at connection between #4 module left supply tube and feed water header.
How discovered:	Walkdown, Water was identified in the Economizer Conveyor during an operator walk down.
Wash adjacent tube:	NO
Root cause:	Fatigue, Combination of thermal and mechanical fatigue. Thermal fatigue caused by changes in feed water temperatures from start-ups/shutdowns over the years. Mechanical fatigue caused by header moving as it travels into the boiler (excessive mechanical cycling).
Leak detection:	NO
Bed cooling enhanc	NO
Last full inspection:	Aug-20
Sequence of events:	9/13/20 16:00- Operator noticed water in Econ Salt conveyor and called CCR and Site Coordinator.

	16:05- Determined leak to be in lower water supply header for Economizer. Call was made to start pulling liquor. 16:23- All Liquor out of boiler. Boiler offline. Secondary Fan burned up inboard bearing so boiler was taken offline. 9/15/20- 8AM-12:30PM Hydro Post repair. No leaks. Still waiting on secondary air fan rotor change to restart boiler. 9/17/20- 11:30pm Liquor back in boiler.
Repair procedure:	Leaking tube was ground out at the weld and rewelded over to repair leak. Tube successfully passed PT test and hydro.
Future prevention:	Working with Andritz to reduce mechanical fatigue on this section.

ECONOMIZER

SPRING 2021-07	
Classification:	Noncritical
Co, Mill, Location:	**International Paper, Valliant, Oklahoma, USA**
Unit Data:	RB#2,2006, Andritz, 400084, Drums - 1, DCE - NO, Floor - Decanting
Unit Size:	6.3 MMlb DS/day, 943,000 lb/hr steam, 1500 PSIG, 925^{o}F, 1800 PSIG Design
Incident Date/Time:	July 18, 2020, Earliest Indication: 7/16/2020 at 4:15PM
Downtime hrs, leak/total:	79.4 total hours downtime
ESP?	**NO**
Leak/Incident Loc:	Economizer, No. 1 Economizer; Heat affected zone of tube to economizer header weld (34th tube counted from the north)
How discovered:	Walkdown, Recovery operator found water in economizer one hopper during rounds
Wash adjacent tube:	NO
Root cause:	Fatigue, Mechanical fatigue due to failed bottle header restraints.
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Sep-19
Sequence of events:	No ESP. Leak detected on 7/16/20 Liquor was taken out on 7/18/20 at 05:36 The bed was burned out. There was no water wash. Fire in the boiler on 7/20/20 at 13:00

	Liquor in boiler on 7/21/20 at 12:58
Repair procedure:	The leak was repaired by grinding out the indication and pad welding (SMAW)
Future prevention:	Continue to wet mag at tube-to- header welds during annual outages; improve vibration restraint design; Andritz has changed the arrangement of vibration restraints since our boiler was built. They have added an additional set of restraints and spaced them on the bottle headers.

ECONOMIZER

SPRING 2021-08	
Classification:	Noncritical
Co, Mill, Location:	**International Paper, Mansfield Mill, Mansfield, LA**
Unit Data:	RB#1,1981, B&W, PR-199, Drums - 2, DCE - NO, Floor - Sloped to rear
Unit Size:	3.74 MMlb DS/day, 486k lb/hr steam, 1250 PSIG, 915^{o}F, 1475 PSIG Design
Incident Date/Time:	December 26, 2018, Earliest Indication: 12/26/2018 at 2:00 PM
Downtime hrs, leak/total:	54hrs
ESP?	**NO**
Leak/Incident Loc:	Economizer, 2 tube leaks in economizer module 2; tube #42 and #44 from the east on the inside header loop.
How discovered:	Walkdown, During an operator round water was discovered coming down an economizer ash hopper wall.
Wash adjacent tube:	YES
Root cause:	Fatigue, Not verified by metallurgical analysis. May be some internal corrosion component as well.
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Apr-18
Sequence of events:	During the operators first round there was no water found in hoppers. At around 2:00 PM an operator noticed water coming from floor drains in the basement. During the investigation of the water source the operator found water coming of the wet hopper downlegs. Water was found coming down the back wall in the east, wet, economizer ash hopper door. ESP was not needed due to being on the back side of the economizer. 12/26/2018@07:05PM An orderly shutdown was started. 12/26/2018@08:01PM Liquor burning stopped 12/26/2018@09:33PM All fuel was removed. The bed was done burning out. 12/28/2018@06:00AM Boiler Hydro complete with no leaks

	12/28/2018@02:00PM Aux fuel introduced to the boiler 12/29/2018@02:00AM Black liquor introduced to the boiler TOTAL DOWNTIME: 54HRS
Repair procedure:	Plugged (2) tubes; Tube 42, 44 on the inside loop of header.
Future prevention:	Tubes in the vicinity of the failed tube were penetrant and thickness checked for issues. The inlet distribution devices were check for integrity. No issues were found. Visual and some PT will be done at the tube to header connections (access is not ideal) in future outages however no proven method of prevention has been developed or shared to date.

SUPPLY, TUBE BELOW FLOOR TUBES

SUPPLY, TUBE BELOW FLOOR TUBES

SPRING 2021-09	
Classification:	Noncritical
Co, Mill, Location:	**International Paper, Eastover Mill, Eastover, South Carolina**
Unit Data:	RB#1,1984, CE, 31381 V2RE, Drums - 2, DCE - NO, Floor - Decanting
Unit Size:	2.35 MMlb DS/day, 348,900 lb/hr steam, 1500 PSIG, 900^{o}F, 1670 PSIG Design
Incident Date/Time:	January 17, 2021, Earliest Indication: 1/17/2021 at 6:00 AM
Downtime hrs, leak/total:	45 hrs
ESP?	**NO**
Leak/Incident Loc:	Other, Lower Vestibule - East hand hole cap on lower waterwall header (feeds 5 left side and 5 right side tubes on the front and rear walls)
How discovered:	Walkdown. Operator noticed steam blowing from top of SDT rising up between mini hoods for spouts while cleaning spouts.
Wash adjacent tube:	NO
Root cause:	Hand hole cap had external corrosion thinning along the bottom due to a weak wash leak in the area. During the 2017 lower furnace rebuild this area had extensive work performed. The stainless steel that protects/covers the lower vestibule had a hole cut in it due to the length of the hand hole cap (this was not part of the design). The cap also made contact with a channel on top of the smelt dissolving tank (clearance issue not identified during rebuild). The cap then “sat” in the bend of the beam which allowed the weak wash to run around the bottom half of the cap and

	corrode the metal.
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Jun-20
Sequence of events:	Field operator was performing their final clean up rounds prior to shift change (1/17/2021 @ 07:00). While cleaning out the spouts they noticed steam rising up from the top of the SDT and up between the spout mini hoods. Operator and their relief went to the ground floor to see if they could find the source. Steam and water were seen spraying out from the side of the lower dead air space toward the SDT. It was determined to be an external leak well below the boiler floor. The Leak Detection (mass balance system) trends were looked at and no obvious leak was detected by the trends; leak detection system did not alarm. Boiler chemistry was in control as was the CBD blowdown conductivity and neither were decreasing. The decision was made to shut down boiler in an orderly manner. Liquor firing reduced at 08:00, co-firing with oil at 08:30, and boiler offline at 10:00. Leak was closely monitored throughout controlled shut down. Boiler was under normal operating conditions at the time of the leak.
Repair procedure:	Ultrasonic thickness testing was conducted along the length of the hand hole cap as well as on the header to determine the extent of the repair needed. There was thinning at the bottom the of the cap as well as the bottom of the nipple back to the header. The cap was cut off and replaced with a new cap. The nipple to header fillet weld had one spot at the bottom with corrosion thinning so the weld was ground out and welded back to desired thickness. Penetrant and radiographic testing was conducted on the repair and the boiler was successfully hydro tested prior to start up.
Future prevention:	The top flange of the channel on top of the smelt dissolving tank was trimmed back to prevent interference between the channel and hand hole cap during boiler expansion. A stainless steel box was built around the new hand hole cap to prevent it from any potential hot water or weak wash leaks in the area. Flow to the weak wash lines that were leaking were cut off until they can be repaired during the outage (April 2021).

SUPERHEATER

SPRING 2021-10	
Classification:	Noncritical

Co, Mill, Location:	**WestRock, Mahrt, Phenix City AL.**
Unit Data:	RB#1,1966, Babcock & Wilcox, BW-PR-97, Drums - 2, DCE - NO, Floor - Sloped to Front
Unit Size:	2.9 MMlb DS/day, 440,000 lb/hr steam, 890 PSIG, 825^{o}F, 1000 PSIG Design
Incident Date/Time:	May 27, 2020, Earliest Indication: 5/27/2020 at 10:30am
Downtime hrs, leak/total:	54.8
ESP?	**NO**
Leak/Incident Loc:	Superheater, The leak was on pendant 14 tube 19 in the primary superheater section.
How discovered:	Leak Detection System, Boiler ID fan speed increased, and steam flow dropped off which prompted operator to make a round where he heard leak.
Wash adjacent tube:	NO
Root cause:	Thermal Fatigue,
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Dec-19
Sequence of events:	Boiler ID fan speed increased rapidly at the same time the steam flow dropped off, around 10:30am 5/27/20. Operators checked the leak detect page to confirm trends and check boiler water conductivity – verified ok. Operator walked down boiler and heard leak while standing at liquor gun ports before going up boiler. Operator called to put all IKs on hold while boiler was walked down. Opened doors in superheater section on 7th floor and confirmed superheater leak. Operator followed orderly shutdown SOP and started 8-hour cooldown at 12:30pm 5/27/20. After cooldown, boiler was washed with Sootblowers and hydro'd to verify leak location. Dutchman repair was installed. Adjacent tube was x-rayed and evidence of cracking was found so tube was weld repaired. Boiler started up and on liquor 5/29/20 7:30pm
Repair procedure:	Section was cut out and Dutchman was installed and PT'd.
Future prevention:	Plan to cut out and install Dutchman on other superheater attachments on upcoming shutdown.

SUPERHEATER

SPRING 2021-11	
Classification:	Noncritical
Co, Mill, Location:	Verso Corporation, Quinnesec Mill, Quinnesec, MI
Unit Data:	RB#, 1989, B&W PR-203, Drums - 2, DCE - No, Floor - sloped

Unit Size:	4.4 MMlb DS/day, 600,000 lb/hr steam, 600 PSIG, 750ºF, 775 PSIG Design
Incident Date/Time:	December 4, 2020 00:09., Earliest Indication: December 3, 2020 at 23:41
Downtime hrs, leak/total:	91 hr 21 min
ESP?	**Yes**
Leak/Incident Loc:	Secondary SH tube, Platen 26, tube 12
How discovered:	High furnace pressure, ID fan maxed out, steam feedwater imbalance
Wash adjacent tube:	No
Root cause:	Long term overheat of SH tube
Leak detection:	Acoustic, mass balance
Bed cooling enhanc	Yes – sodium bicarbonate
Last full inspection:	May 2020
Sequence of events:	23:41 Furnace pressure went from 0.2 to 1.5". ID fan speed noted to be max speed, had been operating within 10 rpm of max speed most of shift. CRO observed this and asked recovery operator to check draft taps. Also, at 23:41 the recovery boiler steam flow took a step change downward by 40 kpph, from 576 kpph to 535 kpph. Operator reported draft taps were not plugged, that the furnace pressure was real. Then sootblowers were held and the sootblower flow control valves closed at 23:53. The Operator reported he could hear noise, and called team leader up to investigate. They identified noise on south side of boiler near sootblowers #4 and #14, which are between the two superheaters. They made the decision to ESP the boiler, and the ESP was initiated at 00:09. Acoustic leak monitoring system did not alarm until 00:20, 11 minutes after ESP had been initiated. Following initiation of the ESP, evaluation of PI trends led to the conclusion that the leak was a superheater tube leak – initially a step change down in superheater steam flow without an increase in Feedwater flow, drum level unaffected, superheater flue gas differential pressures increased at same time as step change in steam flow, water chemistry unchanged. Following a 6-hour waiting period, the ESP walkdown checklist was completed, and then the lights and sirens were turned off. Preparation for bed cooling was started. Bed cooling began at 10:00 AM and was completed by 18:00. The bed temperatures from probing the bed were all 570F or less.

	Trends for steam flow, feedwater flow, liquor firing rate, drum level, and furnace pressure are attached. Following completion of the repair, a leak was discovered on the primary superheater drain pipe. The indication followed the toe of the weld, from top center to the 5 o'clock position. This leak was repaired, and this section of pipe will be replaced at the next outage. A photo is attached.
Repair procedure:	Installation of 20 ft Dutchman
Future prevention:	Immediate – reduce RB steam temperature SP from 775 to 750 F. Checked adjacent tubes for signs of overheat – none found. Future - SH tube inspection on next outage, review tube clearing procedures, update superheater temperature SOPs, inspection of attemperator and superheater headers during next outage

SUPERHEATER

SPRING 2021-12	
Classification:	Noncritical
Co, Mill, Location:	**International Paper, Prattville Mill, Prattville AL**
Unit Data:	RB#2 ,1980, Alstom, 20278, Drums - 2, DCE - NO, Floor - Decanting
Unit Size:	3.2 MMlb DS/day, 510,000 lb/hr steam, 1500 PSIG, 900^{o}F, 1740 PSIG Design
Incident Date/Time:	August 27, 2020, Earliest Indication: 8/27/2020 at 2130
Downtime hrs, leak/total:	167 hrs
ESP?	**YES**
Leak/Incident Loc:	Superheater, Intermediate (Final Stage) – Tube 11 Platen 25
How discovered:	Walkdown, Following Operator manual logging of steam/feedwater differential
Wash adjacent tube:	NO
Root cause:	Longitudinal Crack resulting from External Corrosion
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Apr-19
Sequence of events:	Thursday, August 27 at 2145, the Boiler Operator was taking readings and noticed a higher than normal steam: feedwater differential of 24. The Boiler Tender was then instructed to do a walkdown of the boiler with the sootblowers off. Boiler Tender heard a whistling noise on the 7th floor (superheater level) of the boiler. The sound was validated by another member of the Powerhouse and the decision to ESP was executed at 2330. After the four-hour safety window, management made a thorough walkdown of the boiler and announced an all clear. In addition to

	the indication of steam and feedwater separation, there was also a notable change in furnace pressure and ID fan load. There was no indication of a leak on the chemical mass balance, and approximately an hour after the initial feedwater steam separation appeared, a jump occurred in the water mass balance. At the time of the ESP, the boiler was steaming 420,000 Lbs/hr, firing 245 gpm at 68% black liquor solids. After the cool down period and boiler wash, scaffold was installed and inspection was made of the failed tube and of the adjacent superheater platens. Severe scaling and corrosion were noted (This was also noted during the September 2019 ESP). NDE was performed at the guidance of IP Technology and it was determined to replace a total of 9 tubes by installing Dutchmen's. Following the repairs, a Hydro was performed on September 2nd, and an additional tube leak was found in the High Crown Seal Box on Intermediate Superheater Tube 12 Platen 16. The High Crown Seal Box was cut open and revealed a pin hole leak due to fatigue cracking on the bottom side of the weld of the High Crown Seal. The tube was weld repaired under the guidance of IP Technology. A Dutchman will be installed and inspection of additional tubes in the High Crown Seal will also be performed during the next annual outage. A second Hydro was performed following the repairs in the High Crown Seal on September 3rd and no leaks were found. Total boiler downtime for the ESP was approximately 167 hours and the boiler was returned to service on September 3rd, 2020.
Repair procedure:	Cut out low thickness tubes and replaced with Dutchmen.
Future prevention:	Replace outlet tubes 9-12 on Intermediate Superheater platens 15 – 28

BOILER BANK

SPRING 2021-13	
Classification:	**CRITICAL #927**
Co, Mill, Location:	**Domtar, Marlboro, Bennettsville SC**
Unit Data:	RB1,1990, Ahlstrom, 5904, Drums - 1, DCE - NO, Floor - Decanting
Unit Size:	4.4 MMlb DS/day, 635,000 lb/hr steam, 1080 PSIG, 850^{o}F, 1550 PSIG Design
Incident Date/Time:	February 14, 2020, Earliest Indication: 2/14/2020 at 12:30pm
Downtime hrs, leak/total:	62 hrs and 37 min off liquor
ESP?	**YES**
Leak/Incident Loc:	Boiler Bank, sidewall sootblower opening @ IK #60
How discovered:	Walkdown, see Section 2 for detail

Wash adjacent tube:	NO
Root cause:	Fatigue
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Oct-18
Sequence of events:	• Water technician noted unusual decrease/drift in boiler chemistry on day shift of 2/14/20 • Recovery boiler technicians shut down the IK sootblower sequence & performed a walkdown at 2:00pm as follow up • Unusual noise was noted at generating bank area IK #60 and that lance tube appeared to be clean of saltcake • Review of our leak detection tool (PI data worksheet) showed increasing mass balance differential but not up to alarm point yet by the time of ESP • The team initiated a ESP/Rapid Drain on the Recovery Boiler at 2:59pm 2/14/20 • The leak was later located at sootblower #60 on the south tube o Crack was a longitudinal crack on the crown of the bent portion of the sootblower wall opening tube o Was not associated with any weld heat affected zone • National Boiler weld repaired the leak and the boiler was successfully hydro-tested on 2/16/20
Repair procedure:	Weld repair and hydro
Future prevention:	Replace bent tubes on this IK opening during the upcoming March 2020 outage. Complete RT inspection of bent tubes on IK directly across boiler/opposite side. Complete metallurgical analysis of tubes removed from IK opening. Complete phased array inspection of similar openings and visual inspection of others in generating bank area. Investigate possibilities of different ways to inspect IK openings and crotch plates during outages.

BOILER BANK

SPRING 2021-14	
Classification:	**CRITICAL #928**
Co, Mill, Location:	**Clearwater Paper, Lewiston ID**
Unit Data:	RB#4,1971, Babcock and Wilcox, PR-149, Drums - 2, DCE - NO, Floor - Sloped to rear
Unit Size:	1.48 MMlb DS/day, 235,000 lb/hr steam, 600 PSIG, 740^{o}F, 720 PSIG Design
Incident Date/Time:	January 18, 2021,8:13AM Earliest Indication: 1/18/2021 at 8:12AM
Downtime hrs, leak/total:	142

ESP?	**YES**
Leak/Incident Loc:	Boiler Bank, Attachment weld between two tubes
How discovered:	Walkdown, Field assistant noticed salt cake buildup from manway
Wash adjacent tube:	NO
Root cause:	Fatigue, Tube on other side of attachment was plugged in 2011. Believe tube leak started when boiler went on gas previously
Leak detection:	NO
Bed cooling enhanc	YES
Last full inspection:	Sep-19
Sequence of events:	1/18/21 @ 7:45AM – Field assistant notified lead operator about salt cake build up that had been cleaned up on last shift worked 4 days prior being back, located below manway. 1/18/21 @ 7:55AM – Senior operator informed assistant superintendent of issue and group went to inspect area of build up with sootblowers paused. 1/18/21 @ 8:12 – Seeing no external signs crew found ladder and opened manway on south side of boiler above where build up was noticed, steam and water drops were noticed in generating bank hopper area. 1/18/21 @ 8:13AM – Boiler was ESP'd. All ESP system functions were proven to have functioned correctly. After 4-hour minimum re-entry time boiler was walked down, washed area appeared to be coming from generating bank on the sidewall directly above manway with no tubes shown washed clean from manways in the generating bank. 1/19/21 waiting for bed to cool; FD fan turned on briefly for 20 mins 1/20/21 skin casing removed in suspected area and found attachment weld that had failed. Tube plugged; steam drum inspected. FD fan turned on again for 20 mins temp on probes started to spike, shut down. 1/21/21 – Still getting readings over 1100 on thermocouples driven into bed 1/22/21 - Steam lanced bed to break up smelt, 2 hours later bed temps had dropped below 800 degF. Had issues with previously cleared, mixed tank agitators (2 of 2) when starting to wash with carbon steel components failing. Smelt spouts hydro blasted open. 1/23/21 – water wash started at 3:45AM; final washing completed 1:00 PM, furnace dried out using forced draft fan. 4:15 PM Hydro test passed. 6:30 Lower furnace and spouts inspected/accepted. Skin casing replaced at repair location, boiler unlocked, and on the curve at 11:20 PM 1/24/21 @ 3:45 AM - Boiler online on natural gas burners 1/24/21 @ 6:15 AM – First spray back in

Repair procedure:	Plugged tube
Future prevention:	Inspect similar attachments on plugged generating bank sidewall tubes

BOILER BANK

SPRING 2021-15	
Classification:	**CRITICAL #929**
Co, Mill, Location:	**Georgia Pacific, 7530 Hwy 114, Pennington, AL 36916**
Unit Data:	RB# 4, 1993, B&W PR-220, Drums - 1, DCE - No, Floor – B&W Sloped.
Unit Size:	5.4 MMlb DS/day, 883,000 lb/hr steam, 1300 PSIG, 905^{o}F, 1625 PSIG Design
Incident Date/Time:	6/12/20 10:30 AM Earliest Indication: 6/12/20 at 10:30 AM
Downtime hrs, leak/total:	42 hours
ESP?	**No**
Leak/Incident Loc:	Hot side leak on bent tube and adjacent straight tube at IK23 opening in upper gen bank. See attached side view drawing.
How discovered:	Operator basic care (OBC) route on recovery boiler
Wash adjacent tube:	Yes
Root cause:	Crack propagating from crotch plate in IK opening
Leak detection:	Nalco
Bed cooling enhanc	No
Last full inspection:	May 2019
Sequence of events:	The boiler had been in normal operation since a chill and blow had been performed on 5/21/20. The preliminary indication that there was a leak was at 10:30am when an operator performing his basic care route visually identified the leak at the opening for the soot blower lance for IK23. As the leak was in the back-pass area of the boiler and not an immediate threat the decision was made to perform an orderly shutdown of the boiler. The boiler was off at ~ 2:51pm. At this point the tube metallurgy was confirmed, the boiler pressure parts were locked out, the boiler was cooled down and a repair plan made. The repair was completed by contractors and a contractor NDE QC verified the quality of the repair and a successful hydro was completed. The boiler was returned to service on 6/14/20 @ 11:24am for a shutdown duration of 44 hours and 33 minutes.
Repair procedure:	The base metal was restored on this tube followed by a hydro that revealed no leaks.
Future prevention:	.

BOILER BANK

SPRING 2021-16

Classification:	**CRITICAL #930**
Co, Mill, Location:	**Georgia Pacific, 7530 Hwy 114, Pennington, AL 36916**
Unit Data:	RB# 4, 1993, B&W PR-220, Drums - 1, DCE - No, Floor – B&W Sloped.
Unit Size:	5.4 MMlb DS/day, 883,000 lb/hr steam, 1300 PSIG, 905^{o}F, 1625 PSIG Design
Incident Date/Time:	9/22/20 @ 08:45AM Earliest Indication: 9/22/20 @08:45AM
Downtime hrs, leak/total:	N/A
ESP?	**No**
Leak/Incident Loc:	Boiler bank IK 12 opening tube
How discovered:	Hydrostatic test being performed after completion of CMO
Wash adjacent tube:	No
Root cause:	Crack propagating from crotch plate in IK opening
Leak detection:	Nalco
Bed cooling enhanc	No
Last full inspection:	May 2019
Sequence of events:	The boiler had been involved in a CMO and was being prepared to return to service. A hydrostatic test was conducted, and this leak was found on the cold side of the tube at soot blower opening for IK12. Water from the hydro was drained back below the leak. Tube material and leak repair plan were verified. The leak was repaired by removing and replacing the damaged section of tube. The welds had NDE contractor x-ray inspection done and a successful follow up hydro. The boiler then continued to be prepared to be returned to service.
Repair procedure:	The section of tube was removed and replaced with a dutchman, the welds were x-rayed and a successful hydro performed.
Future prevention:	Pursue replacing IK wall panels in the gen bank section of boiler.

BOILER BANK

SPRING 2021-17	
Classification:	**CRITICAL #931**
Co, Mill, Location:	**International Paper, Orange Mill, Orange, TX**
Unit Data:	RB#1,1967, B&W, PR-108B, Drums - 2, DCE - Cyclone, Floor - Sloped to Front
Unit Size:	2.7 MMlb DS/day, 254,000 lb/hr steam, Operating: 850 PSIG, 835^{o}F, MAWP: 975 PSIG
Incident Date/Time:	December 14, 2020, 9:00 pm, Earliest Indication: 12/13/2020 at 12:00 pm
Downtime hrs, leak/total:	45 hrs
ESP?	**YES**

Leak/Incident Loc:	Boiler Bank, Tubes 22 in rows 47 and 48 at the mud drum
How discovered:	Walkdown, Operator noticed water dripping from the west generating bank hopper.
Wash adjacent tube:	YES
Root cause:	Thinning External, Near drum corrosion. Rubbing from a displaced vibration bar may have accelerated.
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Jul-19
Sequence of events:	At approximately 8:30 pm on 12/14/2020, boiler was firing 210 gpm and steaming 240 kpph. Operator, during a normal boiler walkdown, noticed water dripping from the west generating bank hopper. After involving other operations personnel, a slight change in feedwater/steam and mass balance was identified beginning a day earlier. Operations personnel then opened the doors and heard the leak. Operator in the field notified the control room via radio and the control room operator initiated an ESP at 9:00 PM. All ESP procedures were followed correctly. All ESP functions worked as designed. When all fuel was removed and the FD fan cut back, the ID fan tripped on low furnace pressure, also taking down the FD and tertiary fans. The ID fan was running at max rate when the ESP was initiated. RB evacuation time was extended to 6 hours.
Repair procedure:	Plugged tube 22 in rows 47 and 48
Future prevention:	Near drum NDT and vibration bar inspection

UPPER FURNACE, ABOVE HIGHEST AIR ENTRY

UPPER FURNACE

SPRING 2021-18	
Classification:	Noncritical
Co, Mill, Location:	Graphic Packaging Int, Texarkana Mill, Domino, Texas
Unit Data:	RB#1, 1972, B&W, PR-144, Drums - 2, DCE - No, Floor - Slope
Unit Size:	2.6 MMlb DS/day, 408,000 lb/hr steam, 650 PSIG, 770 ^{o}F, 775 PSIG Design
Incident Date/Time:	November 4, 2020, Earliest Indication: November 4, 2020 at 8 AM
Downtime hrs, leak/total:	23.5

ESP?	**No**
Leak/Incident Loc:	Upper Furnace, Side wall tube #1, RHSW, cold side of tube.
How discovered:	Operating electrician was working on an IK limit switch and saw steam/water blowing out through the insulation and skin from the side of the boiler, just above the buckstay.
Wash adjacent tube:	No
Root cause:	Fatigue at buckstay clip attachment weld
Leak detection:	Yes, mass balance
Bed cooling enhanc	NA
Last full inspection:	9/2020
Sequence of events:	At approximately 8 AM on November 4, 2020 the operating electrician was called to work on an IK on the mud drum floor of #1 recovery boiler. He saw water/steam coming through the insulation & skin on the boiler RHSW under #4 IK. He called the boiler AO and foreman to investigate. After inspecting the generating bank and economizer hoppers it was determined that it was an external leak only. There was no separation on the steam and water trends and there were no furnace pressure issues. Liquor was removed at 8:30 AM and the bed was burned out. The fire was out at 1:50 PM and the boiler was brought down on the curve and locked out by 8 PM. Repairs complete at 10:15 PM and completed a dry hydro at 2:45 AM. The unit stayed down the next day for repairs to the FD fan. The boiler was fired and brought on line at 2:25 AM and liquor started at 6:30 AM.
Repair procedure:	Removed buckstay clip, excavate area until all the surface crack has been removed, clean and PT to assure crack removed. TIG weld area with stringer beads.
Future prevention:	Plan to replace tube at the next annual outage.

LOWER FURNACE, BELOW HIGHEST AIR ENTRY

SPRING 2021-19	
Classification:	**CRITICAL #932**
Co, Mill, Location:	**Canfor Pulp Limited, Northwood RB1, Prince George, BC**
Unit Data:	RB#1, Started 1965, CE, CA64127, Drums - 2, DCE - NO, Floor - Decanting
Unit Size:	4.00 MMlb DS/day, 627,800 lb/hr steam, 652 PSIG, 752^{o}F, 750 PSIG Design
Incident Date/Time:	December 31, 2020, Earliest Indication: 12/31/2020 at 0855
Downtime hrs, leak/total:	122.8 hours (5 days 2hrs 50 minutes)
ESP?	**YES**
Leak/Incident Loc:	Lower Furnace, below highest air entry, rear wall about 4ft above the floor tubes.
How discovered:	Walkdown
Wash adjacent tube:	NO
Root cause:	Other
Leak detection:	YES
Bed cooling enhanced:	NO
Last full inspection:	Sep-18
Sequence of events:	8:05am Liquor was shut off for a planned 'thermal shed' of the saltcake buildup on the roof. 8:55am Interim steam chief was performing a routine inspection of the lower furnace (visibility is good when off liquor) upon which the tube leak was discovered on the rear wall about 4ft above the floor. Checked bed camera cooling air in vicinity of suspected leak to confirm this wasn't the source of suspected leak (it was isolated and camera port was found smelted over anyways) and discussed with senior operator and shift engineer. 9:10am ESP triggered due to considerable amount of molten smelt in the bottom of the furnace still.
Repair procedure:	Tube Pup with cold side window welds. CIMS RP-23
Future prevention:	Unknown at this time.

LOWER FURNACE, BELOW HIGHEST AIR ENTRY

SPRING 2021-20

Classification:	**CRITICAL #933**
Co, Mill, Location:	**Clearwater Paper, Lewiston ID**
Unit Data:	RB#5,1987, Gotaverken, 711150, Drums - 1, DCE - NO, Floor - Sloped to rear
Unit Size:	4.8 MMlb DS/day, 750,000 lb/hr steam, 1250 PSIG, 900^{o}F, 1500 PSIG Design
Incident Date/Time:	July 23, 2020,6:50PM Earliest Indication: 7/23/2020 at 6:30PM
Downtime hrs, leak/total:	168
ESP?	**YES**
Leak/Incident Loc:	Lower Furnace, below highest air entry, Lower swage on tangent tube below primary air port
How discovered:	Walkdown, Field assistant noticed localized blackout
Wash adjacent tube:	NO
Root cause:	Stress Assisted Corrosion (SAC)
Leak detection:	NO
Bed cooling enhanc	NO
Last full inspection:	Sep-19
Sequence of events:	7/23/20 @ 6:30PM – Field assistant noticed localized blackout in corner of boiler while performing cleaning rounds on primary air ports with some minor steam present in ductwork. 7/23/20 @ 6:35AM – Senior operator and supervisor went to check air heater telltale drains, and drained a small amount of water out of the ductwork drains. Investigated windbox and both windboxes on either side appeared clear of black out. No popping or hissing was present. Supervisor called for extra PO4 tests to be ran to check boiler water residuals. No changes in ID fans noticed or liquor solids. 7/23/20 @ 6:50 – Walk down of the area with assistant superintendent, shift supervisor and operators showed increased steam coming from windbox, upon further investigation water was seen bubbling up at crotch of primary airport. Boiler was ESP'd. At time of ESP all other windboxes were clear on both sides of blackout and even looking into furnace from south side showed normal smelt/char in furnace with no signs of blackout. 7/24/20 – Bed cooling 7/25/20 @ 12:45 AM – water wash started, boiler then dried out with air heaters 7/25/20 @ 9:20 PM – Boiler filled for hydrotest, leak found at floor, no other leaks visible. 7/25/20 – 7/29/20 –Repairs ongoing to replace swage/tangent tube, refractory seal box for windbox, and airport opening. Replaced failed tube and one each side that showed some cladding cracks in area of leak. 7/30/20 – Boiler hydro passed at 3:10 AM – Windbox re-assembled, fireside lockout pulled, boiler on the curve at 1:00 PM; first spray back in boiler 7:15 PM

Repair procedure:	Replaced tube
Future prevention:	Plan Digital RT on lower furnace swages with outage starting April 11th, 2021

INTERNATIONAL INCIDENT

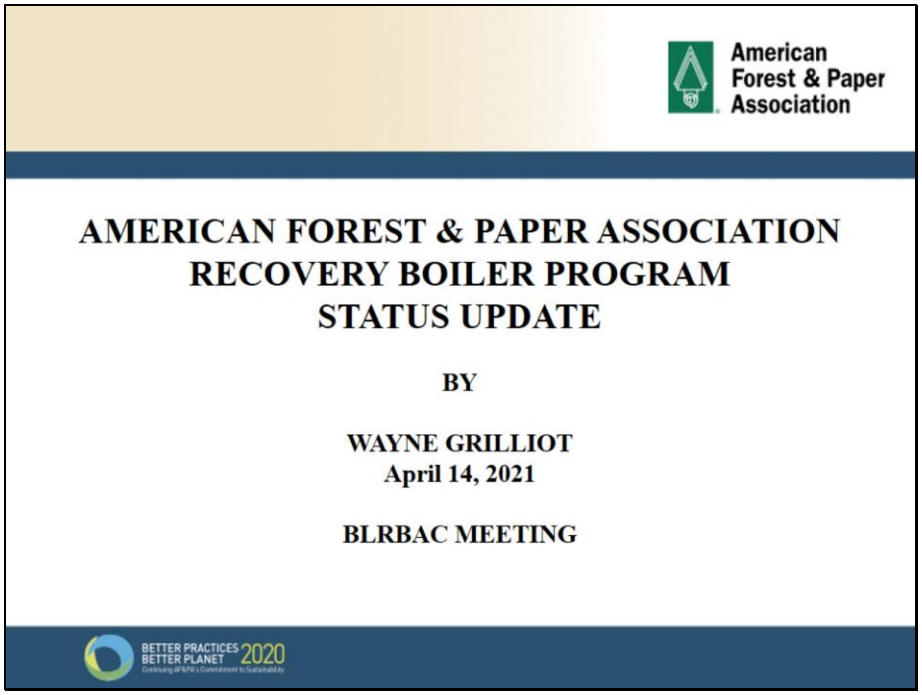
ECONOMIZER

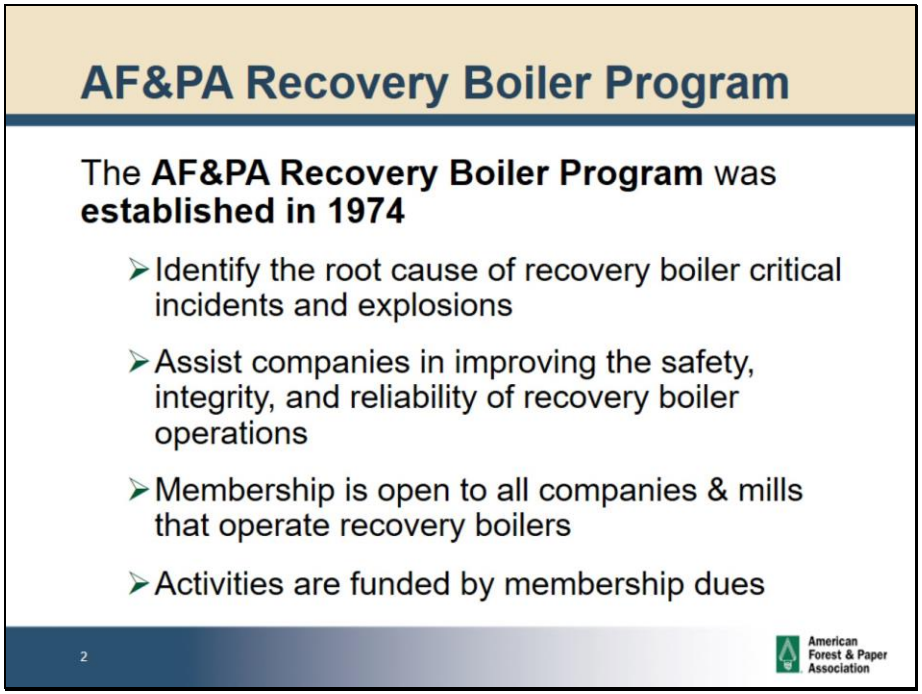
SPRING 2021x1175	
Classification:	International, not classified
Co, Mill, Location:	**ZAO International Paper. Svetogorsk**
Unit Data:	RB#3,1981, TAMPELLA, TAMPELLA, Drums - 2, DCE - NO, Floor - Decanting
Unit Size:	1.6 MMlb DS/day, 264,000 lb/hr steam, 550 PSIG, 824ºF, 711 PSIG Design
Incident Date/Time:	August 26, 2020, Earliest Indication: 8/25/2020at 11:00 PM
Downtime hrs, leak/total:	20
ESP?	**NO**
Leak/Incident Loc:	Economizer, Leak on #48 panel, 1 stage
How discovered:	Walkdown, the RB-3 operator had found a wet area in the hopper
Wash adjacent tube:	NO
Root cause:	Thinning External, cold back-end temperatures on this boiler resulting in excess corrosion.
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Jun-19
Sequence of events:	August 25, 2020 23:00 the RB-3 operator found a moisture in the ECO#1 hopper. Following the procedure, the boiler was switched to oil to burn 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 (ECO#1) - 3 hrs.
Repair procedure:	Tube was plugged at the header
Future prevention:	Complete a more thorough visual and UT spots of concern. The boiler is currently being modeled

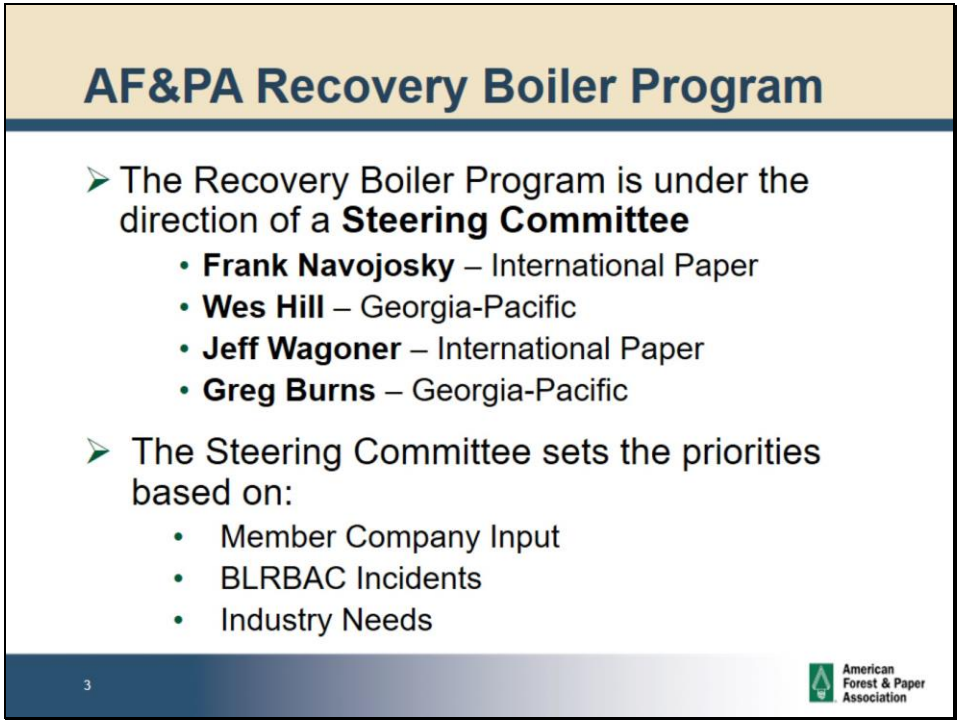
	for a potential rebuild and OEM's are aware as they study this boiler of the low exhaust temperatures.

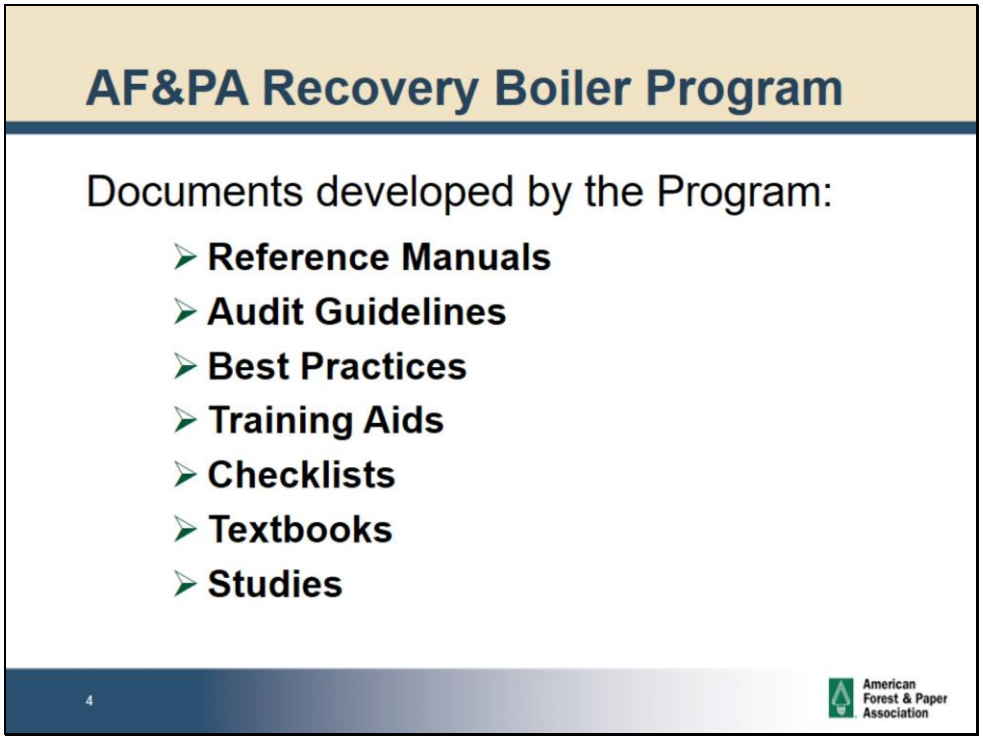
APPENDIX II
ESP POWER POINT PRESENTATION
Diagrams have been embedded in The ESP report above.

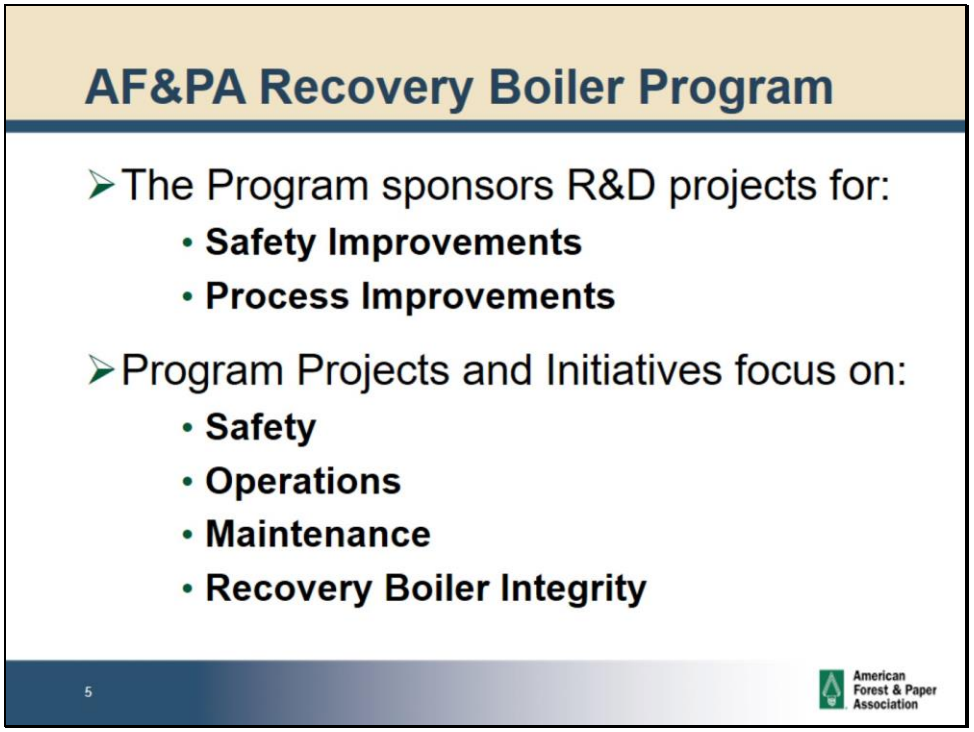
APPENDIX III
AF&PA Presentation

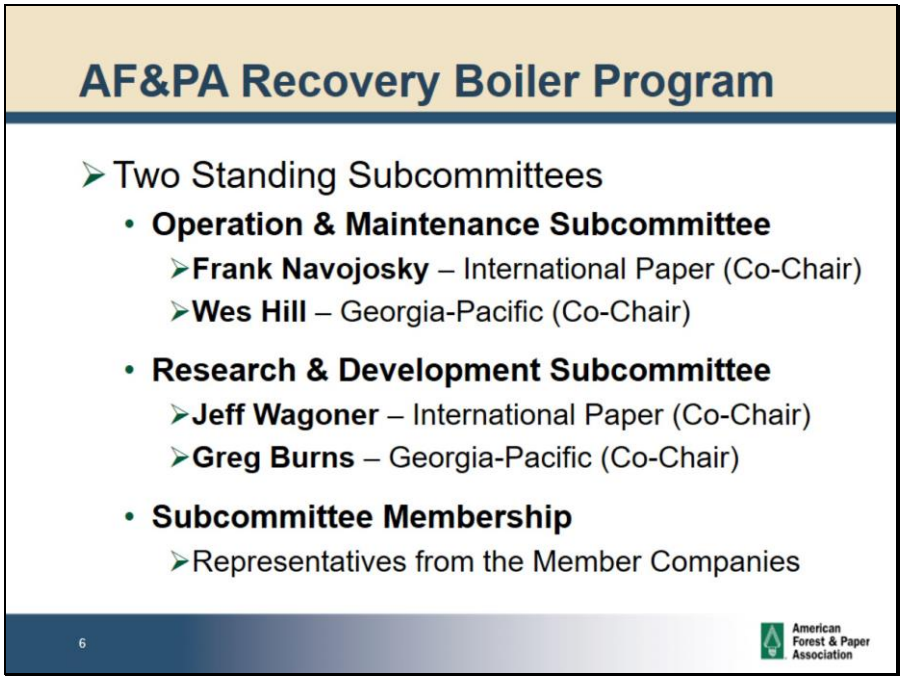



AF&PA Recovery Boiler Program
The AF&PA Recovery Boiler Program was established in 1974
Identify the root cause of recovery boiler critical incidents and explosions
Assist companies in improving the safety, integrity, and reliability of recovery boiler operations
Membership is open to all companies & mills that operate recovery boilers
Activities are funded by membership dues
2
American Forest & Paper Association


AF&PA Recovery Boiler Program
The Recovery Boiler Program is under the direction of a Steering Committee
Frank Navojosky – International Paper
Wes Hill – Georgia-Pacific
Jeff Wagoner – International Paper
Greg Burns – Georgia-Pacific
The Steering Committee sets the priorities based on:
Member Company Input
BLRBAC Incidents
Industry Needs
3
American Forest & Paper Association


AF&PA Recovery Boiler Program
Documents developed by the Program:
Reference Manuals
Audit Guidelines
Best Practices
Training Aids
Checklists
Textbooks
Studies
4
American Forest & Paper Association


AF&PA Recovery Boiler Program
The Program sponsors R&D projects for:
Safety Improvements
Process Improvements
Program Projects and Initiatives focus on:
Safety
Operations
Maintenance
Recovery Boiler Integrity
5
American Forest & Paper Association


AF&PA Recovery Boiler Program
Two Standing Subcommittees
Operation & Maintenance Subcommittee
Frank Navojosky – International Paper (Co-Chair)
Wes Hill – Georgia-Pacific (Co-Chair)
Research & Development Subcommittee
Jeff Wagoner – International Paper (Co-Chair)
Greg Burns – Georgia-Pacific (Co-Chair)
Subcommittee Membership
Representatives from the Member Companies
6
American Forest & Paper Association


Membership
In 2018, the Recovery Boiler Program was opened to Canadian Mills
In 2019, the Recovery Boiler Program was opened to South American Mills
The AF&PA Recovery Boiler Program
25 Member Companies
95% of the USA & 41% of Canadian Chemical & Semi-Chemical pulp production capacity
Our 1st South American Member joined in 2020
7
American Forest & Paper Association


Operational Safety Seminars
The O&M Subcommittee sponsors the Recovery Boiler Operational Safety Seminars
Main Objective: Safe Operation of Recovery Boilers
Three (3) Virtual Safety Seminars were held in 2020
122 participants representing:
11 companies
22 mills
Operators, supervisors, superintendents, maintenance professionals, engineers, and managers attended
8
American Forest & Paper Association

Operational Safety Seminars

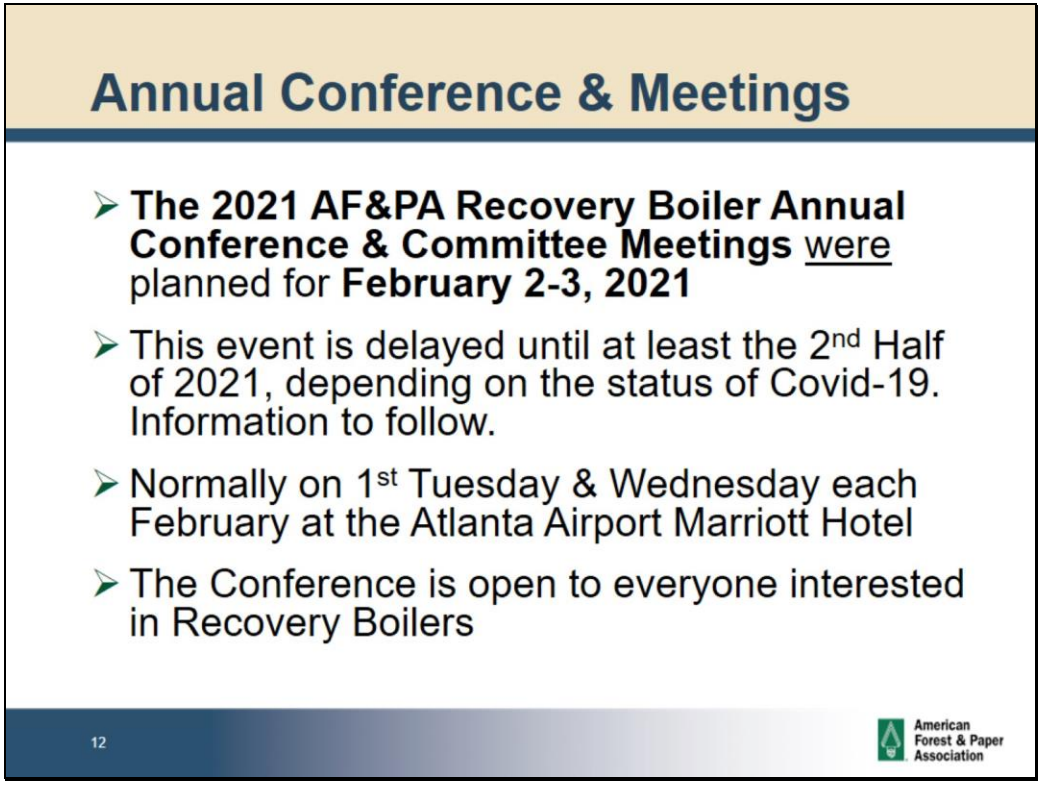
- Attendees receive valuable information and insights from the dialogue among the attendees and monitors of the seminars
- The tabletop exercises help operators and supervisors make the important decision **when to ESP a Recovery Boiler**
  - The six (6) Case Studies used are based on actual recent BLRBAC Recovery Boiler Incidents
  - Six (6) new Case Studies are used each year
- Over **4,000** people have attended the seminars since they were started in 1985

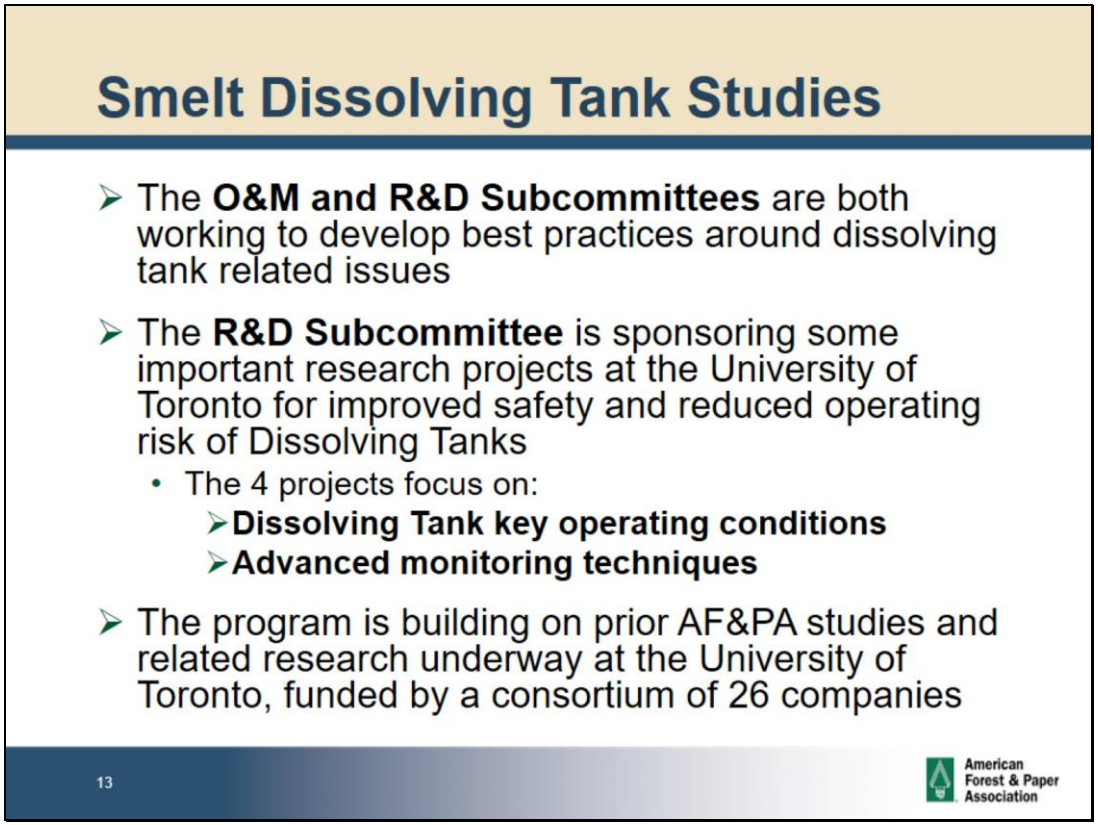
9

American Forest & Paper Association


Operational Safety Seminars
As more senior operators and supervisors retire, training continues to increase in importance
Companies are finding these seminars to be an important part of their safety & training programs
We continue to recommend that all companies and mills seriously consider sending people to these valuable seminars
10
American Forest & Paper Association


Operational Safety Seminars
The 2021 Recovery Boiler Operational Safety Seminars are again in a virtual format (Covid-19)
March 10, 2021 (7:45 am – 5:00 pm) Eastern Time
April 7, 2021 (7:45 am – 5:00 pm) Pacific Time
May 5, 2021 (7:45 am – 5:00 pm) Eastern Time
Safety Seminar Monitors
John Andrews, BLRBAC ESP Subcommittee Chairman
Dean Clay, BLRBAC ESP Subcommittee Secretary
Attendance is great – 165 people have registered so far!
The Virtual Format allowed greater attendance from more distant mills.
More people can attend due to the lower registration fee (only $200 for members). +No travel time or cost!
11
American Forest & Paper Association


Annual Conference & Meetings
The 2021 AF&PA Recovery Boiler Annual Conference & Committee Meetings were planned for February 2-3, 2021
This event is delayed until at least the 2nd Half of 2021, depending on the status of Covid-19. Information to follow.
Normally on 1st Tuesday & Wednesday each February at the Atlanta Airport Marriott Hotel
The Conference is open to everyone interested in Recovery Boilers
12
American Forest & Paper Association

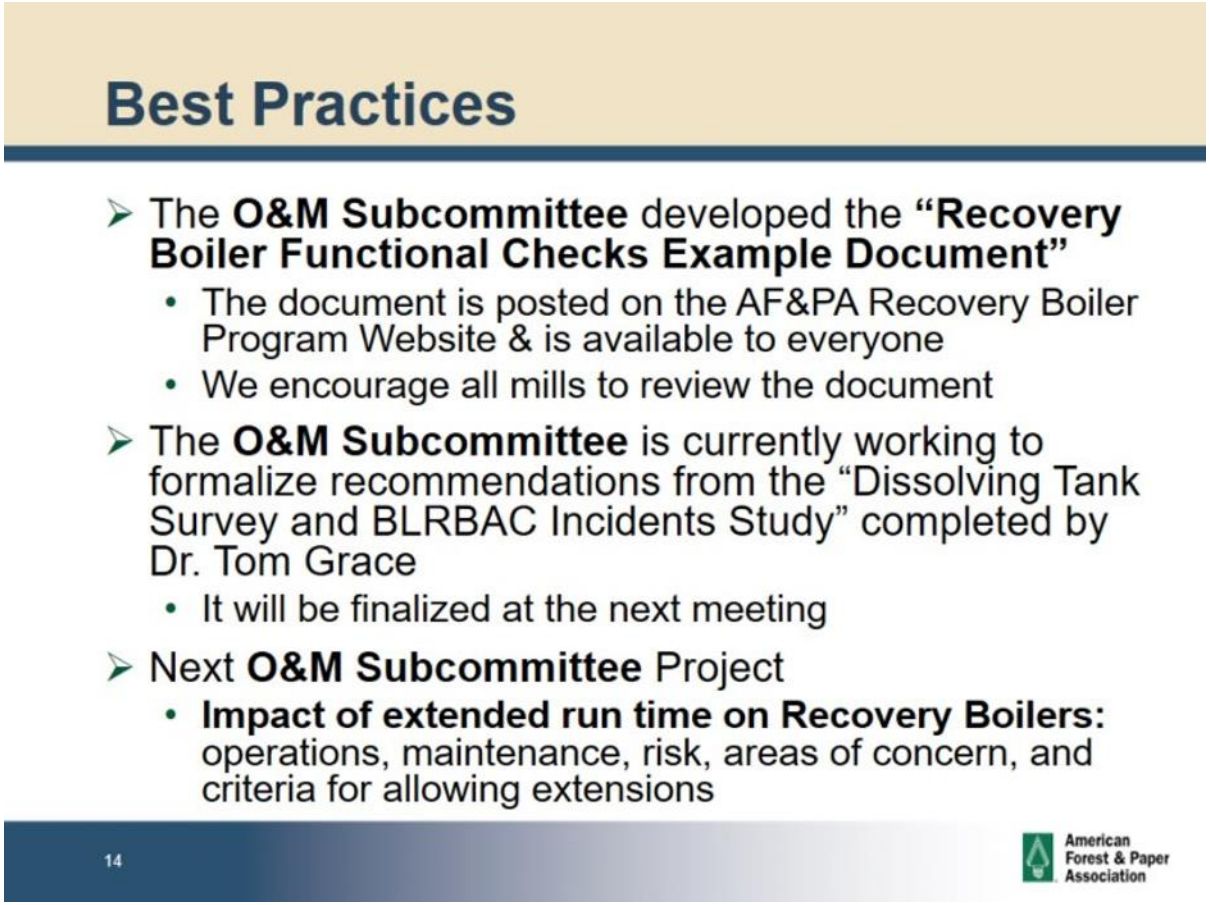

Smelt Dissolving Tank Studies
The O&M and R&D Subcommittees are both working to develop best practices around dissolving tank related issues
The R&D Subcommittee is sponsoring some important research projects at the University of Toronto for improved safety and reduced operating risk of Dissolving Tanks
The 4 projects focus on:
Dissolving Tank key operating conditions
Advanced monitoring techniques
The program is building on prior AF&PA studies and related research underway at the University of Toronto, funded by a consortium of 26 companies
13
American Forest & Paper Association

Smelt Dissolving Tank Studies

- The **O&M and R&D Subcommittees** are both working to develop best practices around dissolving tank related issues
- The **R&D Subcommittee** is sponsoring some important research projects at the University of Toronto for improved safety and reduced operating risk of Dissolving Tanks
  - The 4 projects focus on:
    - **Dissolving Tank key operating conditions**
    - **Advanced monitoring techniques**
- The program is building on prior AF&PA studies and related research underway at the University of Toronto, funded by a consortium of 26 companies

13

American Forest & Paper Association


Best Practices
The O&M Subcommittee developed the "Recovery Boiler Functional Checks Example Document"
The document is posted on the AF&PA Recovery Boiler Program Website & is available to everyone
We encourage all mills to review the document
The O&M Subcommittee is currently working to formalize recommendations from the "Dissolving Tank Survey and BLRBAC Incidents Study" completed by Dr. Tom Grace
It will be finalized at the next meeting
Next O&M Subcommittee Project
Impact of extended run time on Recovery Boilers: operations, maintenance, risk, areas of concern, and criteria for allowing extensions
14
American Forest & Paper Association

Kraft Recovery Boilers "Blue Book"

- **The AF&PA R&D Subcommittee sponsored the publication of the new Kraft Recovery Boilers, Third Edition textbook**
- **Dr. Honghi Tran** of the University of Toronto led the effort to author the new book
- Dr. Tran and 7 other world-renowned recovery boiler experts completed the 16 chapters of the new book
- AF&PA & TAPPI worked together to publish & sell the new book – Now available through TAPPI Press!!!

15

American Forest & Paper Association

Technical Editor & Chapter Author

HONGHI TRAN obtained his B.Sc. and M.Eng. from Shizuoka University in Japan, and his PhD from the University of Toronto in 1982. Honghi is Frank Dottori Professor of Pulp and Paper Engineering and Director of the Pulp & Paper Centre in the Department of Chemical Engineering and Applied Chemistry. He helped establish and direct consecutively 12 large industrial research consortia, focusing on issues related to energy and chemical recovery in kraft pulp mills. Honghi has authored or co-authored over 300 refereed papers and has 8 patents. Honghi has chaired the TAPPI Kraft Recovery Course since 2006. He was named a TAPPI fellow in 2000, PAPTAC fellow in 2015, and Canadian Academy of Engineering Fellow in 2016. Honghi received numerous prestigious awards including the 2013 PAPTAC's John S. Bates Gold Medal and the 2017 TAPPI Gunnar Nicholson Gold Medal. He was inducted to the Paper Industry International Hall of Fame in 2017.

Chapter Authors

TERRY ADAMS was an independent technical consultant to the pulp and paper industry in the area of chemical recovery until he retired in 2017. He obtained a B.Sc. from the University of California at Santa Barbara, a M.Sc. from the University of Michigan, and a Ph.D. from Drexel University with a specialty in combustion. Terry has worked as a Professor at the University of British Columbia, a Combustion Scientist at Weyerhaeuser Co., and since 1986 an independent consultant with a client base of over a hundred mills. He co-authored Kraft Recovery Boiler Physical and Chemical Processes, TAPPI Press, published in 1988 with Dr. Jim Frederick, and is the editor and co-author of Kraft Recovery Boilers, TAPPI Press, published in 1997.

16

Chapter Authors

MIKKO HUPA is a Chemical Engineering Professor at the Åbo Akademi University (ÅAU) in Turku, Finland. Mikko has supervised more than 40 PhD Theses and authored or co-authored more than 350 journal papers in the areas of high temperature chemistry, biomass and black liquor combustion and gasification, and fluidized bed combustion. Mikko has wide experience as an industrial consultant on issues of chemical aspects of combustion and energy processes. He has served as President of the International Flame Research Foundation, an international organization on industrial combustion with 250 member organizations in nearly twenty countries around the world. Mikko was named a TAPPI Fellow in 2005. Since 2015 he has worked as the President of his university ÅAU.

WILLIAM J. (JIM) FREDERICK, Jr. received his BS, MS, and PhD degrees in Chemical Engineering from the University of Maine. Jim has been active in kraft chemical recovery since 1975, both in industry, research, and consulting. Jim has been active with both TAPPI and the AIChE Forest Products Division throughout his career. He received the AIChE Forest Products Division's award in 1998, and he was named a TAPPI Fellow in 2007. He co-authored the book Kraft Recovery Boiler Physical and Chemical Processes (American Paper Institute, 1988), was a contributing author to Kraft Recovery Boilers (TAPPI Press, Atlanta, 1997). He is the lead author on a new book, Black Liquor Evaporation, to be published by TAPPI in 2019.

17

Chapter Authors

ANDREW K. JONES is a Senior Engineering Fellow at International Paper (IP) where he fosters the implementation on new process innovations. Previously he was the recovery boiler SME. He has been with IP since 1997. Previously he worked for ABB/Combustion Engineering leading an R&D group. He received his PhD from the Institute of Paper Chemistry in 1989. Andy is active in TAPPI, having led the Engineering Division, and was conference chair for the TAPPI PEERS conference. He won the TAPPI Engineering Leadership and Service Award in 2004. He was the conference chair for the ICRC (International Chemical Recovery Conference). Andy was named a TAPPI Fellow in 2016 and he received the Engineering Division Technical Award and Beloit Prize in 2018.

DOUGLAS SINGBEIL holds a BSc in Chemistry and an MSc in Metallurgy from the University of British Columbia. He began his career with FPInnovations (formerly Paprican) in 1982 as a research scientist. He has since served in numerous roles, including Corrosion Group Leader, Research Leader for Bioenergy & Corrosion, Research Manager for Process Engineering, and is currently Industrial Sector Leader for BioProducts. Over his career, Doug has addressed corrosion in recovery and biomass boilers, digesters and other process equipment. He has authored/co-authored more than 60 papers. He received awards for several of these, including the 1998 and 2004 ISCPPI Walter Mueller Awards and 2005 PAPTAC Weldon Medal. He was appointed a Fellow of NACE International in 2009.

Chapter Authors

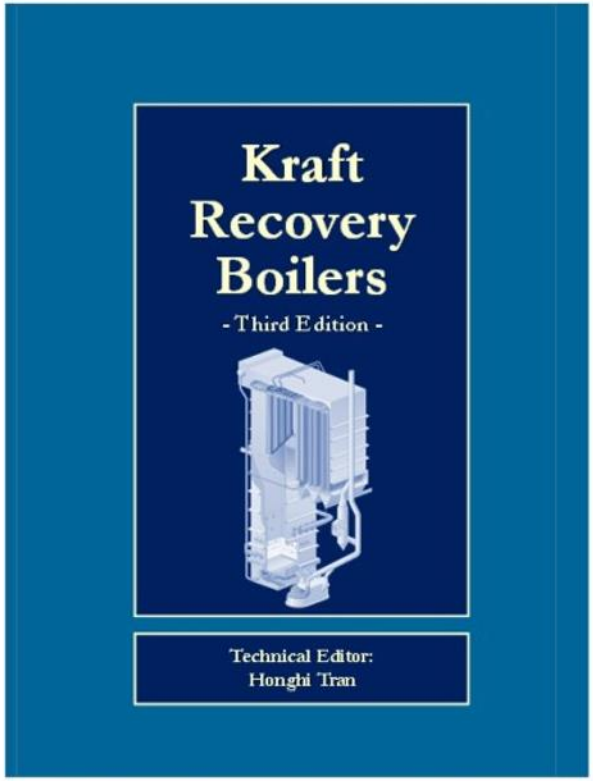
W.B.A. (SANDY) SHARP is a consultant specializing in solving corrosion and materials problems in pulp and paper mills and chemical plants. He has master's degrees in Metallurgy and in Corrosion from Cambridge and London Universities in the U.K. and a Ph.D. in Chemistry from the University of Ottawa. Sandy's materials engineering experience includes 28 years leading corrosion control efforts within Westvaco (now WestRock). He has published 62 technical papers in refereed journals. He developed TAPPI's short course on solving corrosion problems and has won TAPPI's Joachim Leadership and Service Award and Engineering Division Award. Sandy is a TAPPI Fellow, a Materials Technology Institute Fellow, and the first NACE (Corrosion Engineers' Association) Fellow from the pulp and paper industry.

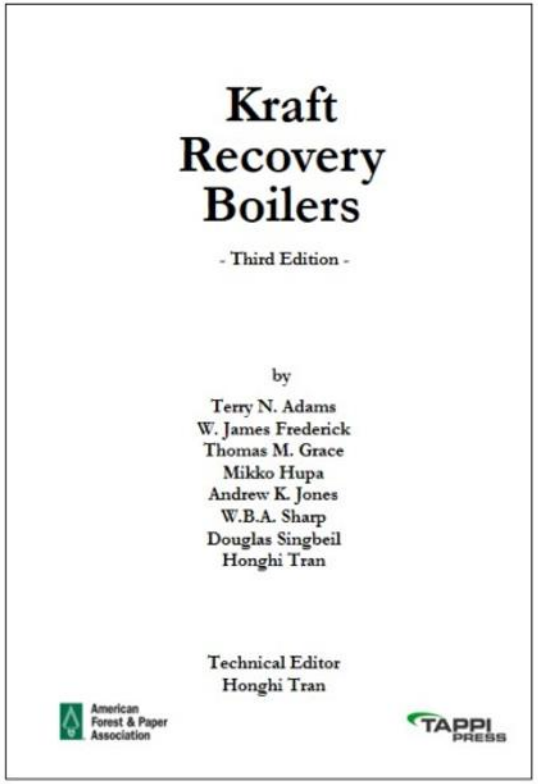
Chapter Authors

THOMAS M. GRACE obtained a B.S. in chemical engineering at the University of Wisconsin and a Ph.D. from the University of Minnesota. He was a faculty at the Institute of Paper Chemistry (now IPST at Georgia Tech) for 22 years, and an adjunct professor at the University of Toronto for 15 years. He formed T. M. Grace Company in 1988, consulting on recovery boilers and chemical recovery. Tom has a long involvement with BLRBAC and the AF&PA Recovery Boiler Committee, investigating recovery boiler explosions for 25 years. He authored many papers and book chapters on chemical recovery. Tom was awarded the TAPPI Gunnar Nicholson Gold Medal in 2001 and inducted to the Paper Industry International Hall of Fame in 2003.

Thomas "Tom" Michael Grace
October 3, 1938 - February 3, 2021

20


Kraft
Recovery
Boilers
- Third Edition -
Technical Editor:
Honghi Tran


Kraft
Recovery
Boilers
- Third Edition -
by
Terry N. Adams
W. James Frederick
Thomas M. Grace
Mikko Hupa
Andrew K. Jones
W.B.A. Sharp
Douglas Singbeil
Honghi Tran
Technical Editor
Honghi Tran
American
Forest & Paper
Association
TAPPI
PRESS

21

www.tappi.org/publications-standards/Bookstore

Take Advantage of a 25% Discount on All TAPPI Press Publications During the Month of April

This is a great time to master new skills and restock your corporate or personal library. Offer applies to print AND ebook formats. Simply enter promo code April25 at check out.

Like the spring flowers, these savings won't last long. The TAPPI Press Spring Savings event ***ends April 30, 2021.***

There are many titles to choose from in the Bookstore. These engineering and pulping titles have been selected just for you:

22

Recovery Boiler Program Information

- AF&PA Recovery Boiler Program Website:
  http://www.afandpa.org/our-industry/recovery-boiler-program
- Recovery Boiler Program General Information
- Information on Available Documents
  - Publications
  - Studies
  - Training Aids
  - Standards

23

American Forest & Paper Association

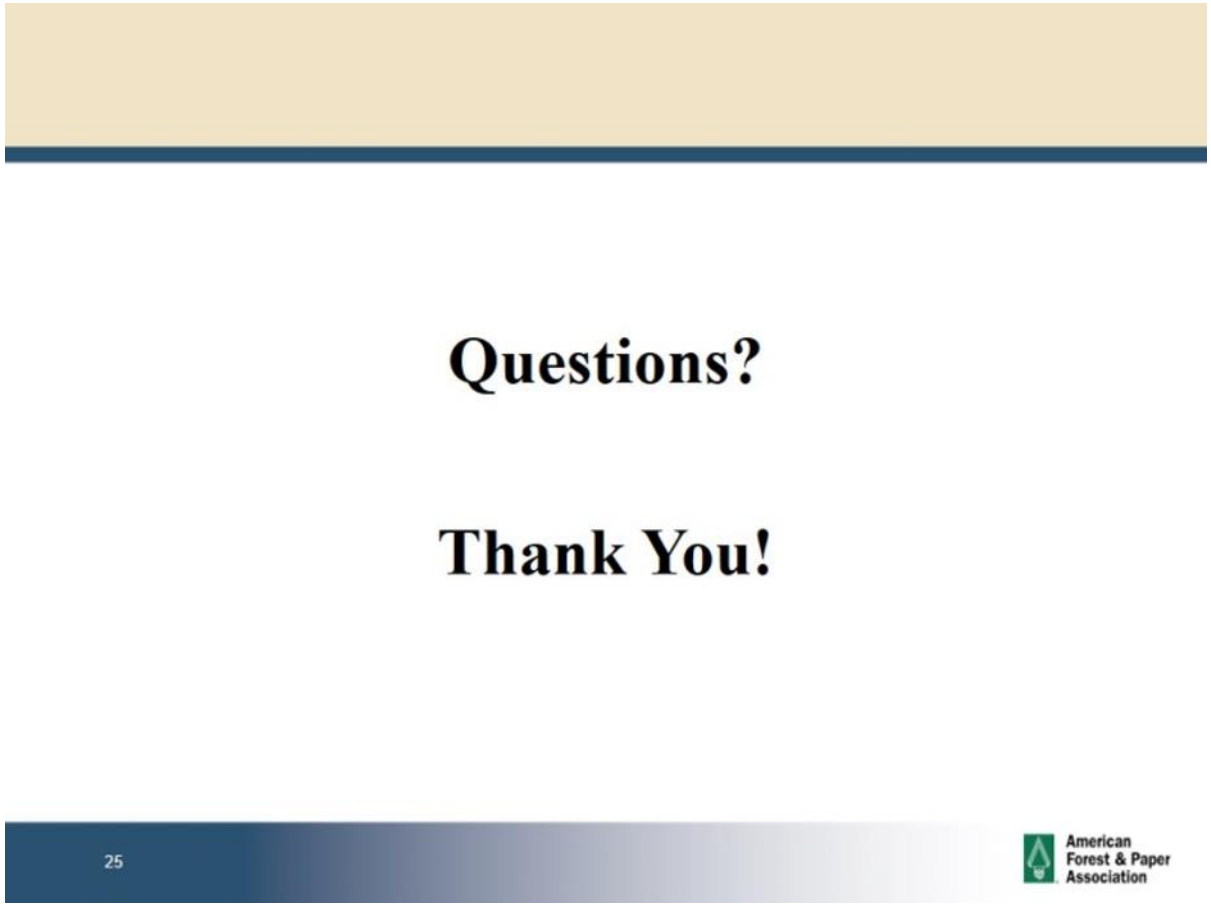
Contact Information

- AF&PA Website:
  http://www.afandpa.org

- AF&PA Recovery Boiler Program Website:
  http://www.afandpa.org/our-industry/recovery-boiler-program

Wayne Grilliot
AF&PA Recovery Boiler Program
Email: wayne_grilliot@afandpa.org
Mobile: +1 (937) 602-1892

American Forest & Paper Association


Questions?
Thank You!
25
American Forest & Paper Association