BLACK LIQUOR RECOVERY BOILER
ADVISORY COMMITTEE

MINUTES OF MEETING
Crowne Plaza Hotel/Atlanta Airport
April 8, 9 & 10, 2019

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

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

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FUTURE BLRBAC MEETINGS

Fall	**October**	**14, 15 & 16 confirmed**	**2019**
Spring	**April**	**6, 7 & 8 confirmed**	**2020**
Fall	**October**	**5, 6 & 7 contirmed**	**2020**
Spring	**April**	**5, 6 & 7 tentative**	**2021**

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

■ Past Chairman Lon Schroeder

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

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

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

BLRBAC MEETING NOTICE

COVER LETTER — General Information

REGISTRATION FORM — Print and mail to Barbara Holich with appropriate fees before the posted cut-off date.

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

SCHEDULE — List of subcommittee activities on Monday and Tuesday

AGENDA — Reports given to Joint BLRBAC Meeting on Wednesday

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

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

BLRBAC Guidelines & Recommended Practices

LEGAL NOTICE

Emergency Shutdown Procedure
(Dated: October 2012)

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

Materials & Welding Guidelines
(Dated: April 2013)

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

Fire Protection in Direct Contact Evaporators and Associated Equipment
(Dated: February 2016)

Personnel Safety & Training
(Dated: February 2012)

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

Post ESP Water Level
(Dated: January 2005)

Post ESP Guidelines
(Dated: October 2002)

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

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

Recovery Boilers
(Dated: April 2014)

Thermal Oxidation of Waste Streams in Black Liquor Recovery Boilers
(Dated: April 2014)

If you have any questions, contact:

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‡**Scott Holloway** Solenis **sholloway@solenis.com**	**Norris Johnston** Water Wizard Consulting Lacey's Spring, AL Tel: 256-650-0049 Cell: 256-520-1011 **nnjohnston@ashland.com** **h2odocnnj@gmail.com**	**John McGraw** Shepard T. Powell **jwm@stpa.com**
‡**Tom Meehan** FM Global **thomas.meehan@fmglobal.com**	‡**Jason Miller** Andritz Inc. Roswell, GA Tel: 770-640-2528 Cell: 770-335-8529 **jason.miller@andritz.com**	‡**Steve Morrison** Verso Corporation **E-mail Address** steven.morrison@versoco.com
‡**Trevor Murray** Irving Pulp and Paper **E-mail Address** murray.trevor@irvingpulp.com	**Kurt Parks** Packaging Corp. of America Valdosta, GA Tel: 229-559-2257 Cell: 229-415-8557 **kparks@packagingcorp.com**	**Jim Robinson** GE (Infra, Water) Trevose, PA Tel: 215-942-3381 **james.robinson@ge.com**

‡**Denotes attendance at the meeting in April of 2019.**

ATTENDEE LIST

Registered at the meeting were:

3S Team
Pyszynski, George, Skiatook, OK

A.H. Lundberg
Seefeld, Paul, Jacksonville, FL

Ace Power Solutions
Rickard, Ace, Chattanooga, TN

Acuren
Spires, Lawrence, Evans, GA

AF&PA
Grilliot, Wayne, Dayton, OH

AirTek Construction
Baines, Troy, Troy, AL

Andritz
Ahonen, Elisa, Alpharetta, GA
Bunner, Ben, Alpharetta, GA
Herod, Chris, Alpharetta, GA
Imig, Greg, Alpharetta, GA
LeBel, Mark, Alpharetta, GA
McBride, Peter, Alpharetta, GA
Miikkulainen, Pasi, Alpharetta, GA
Miller, Jason, Alpharetta, GA
Morgan, Preston, Alpharetta, GA
Payne, Zack, Alpharetta, GA
Phillips, John, Alpharetta, GA
Rogers, Todd, Alpharetta, GA
Rose, Aaron, Alpharetta, GA
Salmenoja, Keijo, Helsinki, Finland
Shull, Alec, Alpharetta, GA
Timotheo, Alvaro, Alpharetta, GA

Applied Technical Services
Castle, Bill, Marietta, GA

AXA Matrix
Hayes, Michael, Dayton, OH
Willoughby, Keith, Springboro, OH

AXA XL Risk Consulting
Franks, James, Somerville, TN
Goddard, Robert, Tupelo, MS
Sides, Michael, Ocoee, FL

AZZ
Amador, Pedro, Suwanne, GA
Power, Stacy, St. Petersburg, FL

Babcock & Wilcox
DeFusco, John, Charlette, NC
Edwards, Tom, Charlette, NC
Jenny, Paul, Atlanta, GA
Krekeler, Daniel, Barberton, OH
Kulig, John, Barberton, OH
Mason, Brad, Chillicothe, OH
McKelvey, Kenneth, Atlanta, GA
Osborne, Steve, Barberton, OH

Babcock & Wilcox Consultant
Hansen, Kenneth, Madisonville, TN

Babcock Power
Grant, Tommy, Lyman, SC
Puski, Suzette, Lyman, SC

Boiler Service & Inspection
Andrews, John, Raleigh, NC
Clay, Dean, Simsboro, LA

Buckman Laboratories
Call, Fred, Newry, ME

Registered at the meeting were:

CCA Combustion Systems
Acree, Michael, Raleigh, NC

ChemTreat
Graham, Jim, Collierville, TN
Thompson, David, San Diego, CA

Cianbro
Hilton, Mike, Pittsfield, ME
Lerch, Jeffrey, Pittsfield, ME
Reed, Mark, Pittsfield, ME

Clearwater Paper
Austin, Fletcher, Lewiston, ID
Bourassa, Brent, Lewiston, ID
Coffman, Jesse, Lewiston, ID

Clyde Bergemann
Jameel, Ishaq, Atlanta, GA
Steine, Dana, Atlanta, GA
Tandra, Danny, Atlanta, GA

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

Ecolab - Nalco
Dolezal, Scott, Clarkston, WA

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

Envirovac
Warren, Lance, Richmond Hill, GA

Fluor Daniel
Lewis, John, Greenville, SC

FM Global
Britt, Francisco, Frisco, TX
Burgos, Jose, Santiago of Chile
Chaudhuri, Neil, Vaughan, Ont.
Combs, Chris, Alpharetta, GA
Cooke, Craig, Oconomowoc, WI
Crysel, Scott, Frisco, TX
Dondona, Jasbir, Vancouver, BC
Garcia, Arturo, Frisco, TX
Gossen, Derrick, Mishicot, WI
Ham, James, Alpharetta, GA
Hamilton, Shannon, Norwood, MA
Holzer, Keith, Reston, VA
Huelsbeck, Kevin, Sherwood, WI
Keatts, Terry, Spokane Valley, WA
King, John, Windsor, UK, London
Kopec, Edward, Virginia Beach, VA
Labonté, Guy, Montreal, Que.
Maxime, Simard, Montreal, Que.
Meehan, Tom, Brewer, ME
Moberg, Eric, Frisco, TX
Onstead, Jimmy, Frisco, TX
Paine, Matthew, Norwood, MA
Rojas, Juan Pablo, Concepcion, Chile
Seang, Kimmeng, Alpharetta, GA
Silva, Marco, Sao Paulo, Sao Paulo
Teixeira, Rodrigo, Sao Paulo, Sao Paulo
Young, Andrew, La Center, WA
Zamora, Samuel, Frisco, TX

Fossil Power Systems
Clement, Andy, Dartmouth, NS
Donahue, Peter, Dartmouth, NS
Dooks, Rick, Dartmouth, NS

FPInnovations
Tunnicliffe, Matthew, Vancouver, BC
Ren, Wei, Vancouver, BC
Rezaei, Hooman, Vancouver, BC

Registered at the meeting were:

GE Steam Power
Harmon, John, Windsor, CT
Philo, Daryl, Windsor, CT
Semyanko, Ivan, Windsor, CT

Gecko Robotics
Demmer, Troy, Pittsburgh, PA
Kahan, David, Pittsburgh, PA
Vatz, David, Pittsburgh, PA

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

Georgia-Pacific
Browning, John, Atlanta, GA
Burns, Gregory, Mt. Pleasant, SC
Hill, Wes, St. Helens, OR
Johnston, Jennifer, Atlanta, GA
Lentz, Gregg, Brunswick, GA
Meadows, Thomas, Brunswick, GA
Miller, William K., Brunswick, GA
Morency, Karl, Atlanta, GA
Myers, Raven, Norcross, GA
Orender, Robert, Atlanta, GA
Sapp, Kevin, Sugar Hill, GA
Sherlock, Bentley, Atlanta, GA

Global Risk Consultants
Garfield, Michael, Lowell, ME

Green Bay Packaging
Bowers, John, Morrilton, AR
Henry, Ryan, Morrilton, AR
McLeod, Cris, Morrilton, AR
Thurman, John, Morrilton, AR

Greif Paper
Ferguson, Bryan, Amherst, VA
Hedrick, Karl, Amherst, VA

Houghton Cascade
Leary, William R., Chocowinity, NC

Integrated Global Services
Conley, Clark, Richmond, VA

Integrated Test & Measurement
Carlier, Tim, Milford, OH

International Paper
Blackard, Vernon, Loveland, OH
Blair, Michael, Loveland, OH
Bormin, Sergei, Svetogorsk, Russia
Bruce, Mike, Loveland, OH
Childress, Susan, Loveland, OH
Frazier, David, Loveland, OH
Hambrick, Rayamond, Springfield, OR
Huckaby, Jacob, Oglethorpe, GA
Jackbson, Brian, Springfield, OR
Knowlen, Bruce, Federal Way, WA
McCorkhill, Janaki, Oglethorpe, GA
Root, Carson, Springfield, OR
Slagel, David, Rome, GA
Weikmann, John, Charlotte, NC
Wranosky, Tom, Ticonderoga, NY

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

Jacobs Engineering
Cantrell, James, Greenville, SC

Registered at the meeting were:

Jansen Combustion
Campbell, Steve, Kirkland, WA
La Fond, John, Kirkland, WA

Jari Consultoria de Automação
Sopanen, Jari, Mafra, Brazil

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

Kadant Black Clawson
Christiansen, Gene, Lebanon, OH

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

LENRO, Inc.
Olavessen, Len, Bartow, FL

Liquid Solids Control
Vandenburg, Gordon, Upton, MA

Lundberg
Wass, Greg, Redmond, WA

M&M Engineering
Fuhrmann, David, Leander, TX

Marsh & McLennan
Weisenberg, Dale, Calgary, Alberta

Metso
Hanson, Glenn, Cumming, GA
Schutter, Chris, York, PA

Milhous
Ray, Scott, Amherst, VA

Nalco
Gannon, Jim, Naperville, IL
Newkirk, Keith, Sheridan, AR

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

Nautilus Loss Control
Jackson, Christopher, Fox Island, WA

NORAM
Bandekar, Rohan, Vancouver, BC
Bucher, Wayne, Vancouver, BC

Pixelle Specialty Solutions
Chronister, Robert, Spring Grove, PA
Dalrymple, Travis, Chillicothe, OH
Davis, Charles, Chillicothe, OH
Forry, Jeffrey, Spring Grove, PA
Schneider, Kyle, Chillicothe, OH

Power Specialists Associates
Hutton, Katherine, Somers, CT
Madersky, Tom, Somers, CT
Przybylski, Tom, Somers, CT

Purolite
Downey, Don, Bala Cynwyd, PA
Migliore, Chase, Bala Cynwyd, PA

Resolute Forest Products
Andrijeski, Greg, Coosa Pines, AL
Barker, Robert, Thunder Bay, Ont.
Bouchard, Maxime, Dolbeau, Que.
Clark, James, Coosa Pines, AL
Ellard, Ryan, Thunder Bay, Ont.
Nesmith, Daniel, Coosa Pines, AL
Paradis, Marc, Montreal, Que.
Pease, Bruce, Calhoun, TN
Stozier, Glen, Coosa Pines, AL

Registered at the meeting were:

RMIS
Cassel, Raymond, Denver, CO
Sullivan, Lanier, Denver, CO

RMR Mechanical
Roy, Bob, Cumming, GA

Rockwell Automation
Crump, Tom, Mayfield Hts, OH

Sandvik
Day, Katie, Houston, TX

Sappi
Bolduc, Lance, Skowhegan, ME
Boudreau, David, Hinckley, ME
Fredrickson, John, Cloquet, MN

Solenis
Holloway, Scott, Conway, AR

Southern Environmental
Lawton, Roger, Alpharetta, GA

Southern Power Sales
Sullivan, Sean, Bogarat, GA

TAPPI
Stephens, Lisa, Peachtree Corners, GA

Thompson Industrial Services
Gertin, Scott, Sumter, SC
Lantz, Isaac, Sumter, SC
Wise, Carl, Sumter, SC

TTS, LLC
Ruiz de Molina, Eliadio, Birmingham, AL

Valmet
Gadai, Dave, Charlotte, NC
Henke, Sarah, Charlotte, NC

Valmet (Cont.)
Johnson, Dewey, Crowley, TX
Relangi, Ramana, Charlotte, NC
Trivett, Michael, Charlotte, NC
Troha, Terry, Charlotte, NC
Ward, Mike, Charlotte, NC
Waters, Matt, Charlotte, NC
Welch, Kevin, Toano, VA
Yoder, Jeremiah, Charlotte, NC

Verso
Corcoran, Robert, Jay, ME
Frost, Robert, Wilton, MA
Goodhart, Cameron, Jay, ME
Lewis, Jason, Bangor, ME
Morrison, Steve, Kingsport, TN

W. L. Gore & Associates
Ellis, Jim, Elkton, MD
McDearmon, Sean, Elkton, MD

Wellons Power Group
Culver, Michael, Duluth, GA
Smith, Craig, Duluth, GA

WestRock
Clemmons, Curtis, Covington, VA
Geisler, Katie, North Charleston, SC
Golson, Cobb, Jacksonville, FL
Greene, Aric, North Charleston, SC
Moye, William, Evadale, TX
Murch, Douglas, Richmond, VA
Santos, Ricardo, Covington, VA
Sargent, Caleb, Cottonton, AL
Shirley, Wade, Cottonton, AL
von Oepen, David, Dempoulis, AL
Weum, Roger, Panama City, FL

Zeeco
Langstine, Bob, Lawrenceville, GA

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MAIN COMMITTEE MEETING

INTRODUCTION – David Slagel – Chairman:

Welcome to the Spring of 2019 Main Committee Meeting. I appreciate the attendance that we have here this morning and overall for the preliminary sessions. I think we had a pretty decent turnout this go-around which Len will report on in a little bit. At this time the Main Committee Meeting is officially open. Of course, this meeting is being held in strict compliance with BLRBAC's Anti-Trust Statement which we have demonstrated on the screen to my right and your left. I'll start with introductions of the Executive Committee:

David Slagel – Chairman – International Paper
David von Oepen – Vice-Chairman - WestRock
Len Olavessen - Treasurer – Lenro, Inc.
Matt Paine – Publicity Chairman – FM Global
John Phillips – Boiler Representative - Andritz
Jimmy Onstead - Insurance Representative - FM Global

OLD BUSINESS

1. **ACCEPTANCE OF THE FALL 2018 MEETING MINUTES** – David Slagel

With regard to old business, we need to start with the acceptance of the Meeting Minutes of the Fall 2018. This document has been posted on the WEB site. I'm sure everybody has taken the time to thoroughly read that document and to make sure there are no mistakes in there at all! Can I get a motion to accept the Minutes? We have one motion. Seconded? Anybody opposed? Got a second. All in favor? Anybody not in favor? Alright, the Fall 2018 Meeting Minutes have been approved and accepted as posted. Is there any other old business that needs to be discussed before moving on? If not, then we will move on to new business.

NEW BUSINESS

2. NEW MEMBERS/REPRESENTTIVE CHANGES REPORT – Everett Hume

NEW REGULAR MEMBERSHIP

Pixelle

Jeffrey Forry is the designated Representative
Kyle Schneider is the designated Alternate Representative

NEW ASSOCIATE MEMBERSHIP

TTS, LLC

Eladio Ruiz de Molina is the designated Associate Representative
Sara Ruiz de Molina is the designated Alternate Associate Representative

2. NEW MEMBERS/REPRESENTTIVE CHANGES REPORT – (Cont.)

REPRESENTATIVE MEMBERSHP CHANGES

Andritz

John Phillips remains as the designated Representative
Mark LeBel replaces Alvaro Timotheo as the Alternate Representative

GE Steam Power

John Harmon remains as the designated Representative
Ivan Semyanko replaces Lee Dupree as the Alternate Representative

Green Bay Packaging

Ryan Henry replaces Greg Johnson as the Representative
Rich Martuzas replaces Bill Haskins as the Alternate Representative

ASSOCIATE MEMBERSHIP CHANAGES

Jacobs Engineering

James Cantrell replaces John Rickard as the Associate Representative
Apryl Hunter replaces John Carpenter as the Alternate Associate Representative

FPInnovations

Hooman, Rezaei replaces Douglas Singbeil as the Associate Representative
Wenli Duo remains as the designated Alternate Associate Representative

NEW CORRESPONDING MEMBERSHIPS – None reported at this time

REGULAR REPRESENTATIVE CHANGES

Resolute Forest Products

André Boisvert replaced Gregory Graben as the designated Representative
Marc Paradis replaced John Hornsby as the designated Alternate Representative

Verso Paper

Tim Hicks replaced David Slagel as the designated Representative
To be determined Tim Hicks' replacement as the Designated Alternate Representative

ASSOCIATE REPRESENTATIVE CHANGES – None reported

CORRESPONDING MEMBERSHIP CHANGES – None reported

2. NEW MEMBERS/REPRESENTTIVE CHANGES REPORT

MEMBERSHIP COMPANY NAME CHANGES

AXA XL Risk Consulting
Previously known as XL Catlin

Babcock Power
Previously known as Boiler Tube Company

GE Steam Power
Previously known as General Electric

ProcessBarron
Previously known as Process Engineering

MEMBER COMPANY ACQUISITION

GE Steam Power
Acquisition of Alstom Power

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

We also had several other folks who showed interest and we are waiting on receipt of applications. We will have to discuss that during the next meeting.

3. EXECUTIVE COMMITTEE REPORT – Dave Slagel

In the Executive Committee we did review some of the WEB site issues that we have had. We do recognize that there are some posting issues from documents that were brought up in the fall. We are working diligently to try to get those corrected. We have an ESP document that is still in the former review section and it needs to be posted over into the practices section of the WEB site as well as Water Treatment Subcommittee. There is also has an issue with the Waste Steams document. There are two documents that are under review and in reality, there is no documents in the 2017 version that is in the review and should actually be posted in the official documents section. So that will be corrected. There has also been a request from Dean Clay about the Questionnaire. We have had some issues with the Questionnaire that was posted. When you download it does not have drop-down box capability to the selections that he has programmed into that document. We are going to try to understand what those issues are related to that and see if we can get that fixed. In lieu of that, if you do have a need for that document, you can just send him an e-mail directly and he can send you that document so that it is functioning the way he would prefer for it to work.

3. EXECUTIVE COMMITTEE REPORT – (Cont.)

Several other things that we discussed in the meeting will be brought forward as the meeting continues. We do have a number from subcommittees which I'm sure they will report on. They will have changes to their documents which they will be submitting to the Executive Committee for posting and as soon as we get through them, they will be posted out so that you can review them prior to the fall meeting.

4. TREASURER'S REPORT – Len Olavessen

As of yesterday afternoon, our checking balance is $70,818.00. The anticipated expenses for this meeting are $31,300.00. That includes Crowne Plaza expenses, secretarial services, office expenses, printing, etc., that gets us to $31,300.00; so, I estimated the checking balance, after all those checks cleared, is $39,814.00. This is a $5,000.00 increase from the balance before the meeting, but we do have expenses between meetings. They may amount to somewhere in the vicinity of $1,500.00 a month on average. So, this means that we are very stable as far as out checking account balance and we have a reasonable cushion for unexpected expenses.

We have decided to pursue on-line credit card meeting registrations. We will try to get that implemented in time for the fall meeting. I can't guarantee it because there is some programming work which needs to be done in coordination with the bank and getting some people trained up. We are going to try very hard to get that done, but I would not 100% promise this and then not be able to deliver.

The meeting statistics for this particular meeting are very strong. We had 198 Advance Registrations and 45 At Door Registration, for a total of 243 attendees. Among those registrations, there were 15 paper companies, two insurance companies, four boiler manufacturers, 35 Associate companies and eight guests were in that total. This is a fairly diverse group. That's good! We had seven off-shore attendees; one from the United Kingdom, two from Brazil, one from Finland, two from Chile, and one from Russia. Are there any questions about any of that?

The last thing is that I am going to retire after the Fall 2020 meeting as Treasurer of BLRBAC. So, we are going to need a new Treasurer. We would like to have whoever volunteers to take over the job kind of be in an apprentice program for at least two meetings so they would get use to what the rhythm is, what the concerns are and how to handle the various issues that might come up. If anyone is interested, please contact me or anyone on the Executive Committee and we will go from there. The Treasurer is an appointed position by the Executive Committee. The basic duties are that you serve on the Executive Committee, arrange for managed meetings, you pay the BLRBAC bill, and you prepare and submit tax documentation. That is your responsibilities as the Treasurer. You don't necessarily have to do the tax duties as you can hire an accounting firm to handle that for you if you want. In my particular instance, I'm have my own personal CPA firm for my business and personal taxes. They consult with me and help keep me out of jail! So, it is not overly taxing to do that (pun intended). Please, if you have an interest in becoming the Treasurer, you do serve on the Executive Committee, it is not an elective post, it is an appointed post. Are there any questions concerning this position? Thank you.

5. SECRETARY'S REPORT – Matt Paine for Everett Hume

Hello, my name is Matt Paine and I'm filling in for Everett temporarily. Len and Dave stole my thunder, but I'll go through a few points here. Several draft documents will be posted on the BLRBAC website which should be reviewed within the coming months. The second point is that before the Fall meeting we will be looking into advanced on-line registrations using credit card payments. However, as a reminder, for those who continue to mail in their registration with checks, please do not request a delivery confirmation signature as no one may be home to receive and sign for that package.

SECRETARIAL SERVICES REPORT – Barbara Holich

Things always change! Therefore, I will have to learn new procedures just like everyone else. But for those who will continue to submit their completed Advance Registration Forms via U.S. mail, the form should be mailed with your personal or company check.

Also, if you are going to attend BLRBAC, get your registration in early and have the Registration Form filled out completely because this form is the only data I have on who you are, your city/state and other pertinent information, such as, a working e-mail address. When e-mail addresses come back to me at least two times as "undeliverable" that address is removed from the BLRBAC database. For every meeting, that is every six months, I receive approximately 90 to 100 e-mails that are undeliverable for one reason or another. Somebody could be retired, passed away, left their company, just changed their e-mail address, mailbox is full, or misinterpretation of what was written on a new application for membership. Please be very careful with handwritten Registration Forms.

Late comers who register as At Door, but mail forms and payment to me after the cut-off date, are harder to register than 50 or 60 who get their registration to me prior to the posted cut-off date. When I put a sheet of eight badges in the computer for one name, the other seven blank badges are wasted. I can't use that page again because my printer will lock-up or the badge page will get stuck in the printer due to perforated paper.

When someone is sending in any registration by FedEx or UPS and they have asked for a return signature be aware that I work from home, am retired, and I am not sitting there waiting for mail to show up. So, if I'm not home and they have asked for a signature, FedEx or UPS will not leave the envelope. They may try another time, but Frank and I are very often not home during the day; therefore, the package may be sent back to the initial company as undeliverable. Then someone shows up at BLRBAC thinking they have been registered. They will tell the Registrar that their registration was mailed and Frank will tell them that it was never received. That has happened various times in the past. The Registrar will tell them, "It's $200.00." It is not Advance Registration any more, it is now At Door. If your Corporate or Accounting Department is mailing your registration form and check, please tell them in advance DO NOT REQUEST A SIGNATUARE because we may not be there. Our U.S. mailbox is outside and is locked. We have never had a problem receiving U.S. mail.

I am in the dark as to how credit card registrations will be handled in the future and what information I will receive in order to maintain the BLRBAC database. There must be some type of form e-mailed to me so that I know who had paid by credit card and what information should go into the database.

6. SUBCOMMITTEE REPORTS

6.1 AUXILIARY FUEL REPORT – Bruce Knowlen

The meeting was called to order at about 1:05 PM Monday. The subcommittee last met in the Spring of 2018. There were 8 of 12 subcommittee members and 25 guests in attendance. The BLRBAC policy was displayed and everyone was reminded to follow this in our meeting. The minutes of the last meeting were read and approved unanimously.

The membership list was presented. It was announced that our secretary, Allen Ray, had to leave our group. We have appreciated Allen's help. This session brought back a former member, Ivan Semyanko of GE Power, reinstated. Ivan also graciously agreed to take on the work of secretary too.

New Business: 1) The members and guests were asked if there were any topics for New Business to place on this agenda. No one asked to add a topic at that time. 2) The chair then suggested a topic with a question. Q: *Is there adequate discussion in our document on drum level to ensure boiler safety?* The interaction among the group provided a learning opportunity on the subject as situations were discussed, with stories of events and reactions to handle upsets of the drum. The conclusion of the group was satisfaction with the logic in the document but there was a need to provide more information on this subject somewhere. It was the group's opinion that SFAF should support and encourage the Instrumentation Subcommittee's work to provide the additional detail on level and control.

Old Business: 1) Arrangements are being made to repeat a presentation of flame scanners by authorities on the subject at a future BLRBAC meeting. Our subcommittee has connections to resources to provide this and we hope to have this organized and on the agenda for the Fall 2019 BLRBAC meeting. 2) The status was reported on the new version of the SFAF document. It is being compiled to include edits and changes previously approved by the group, obtain some new figures to edit with previously agreed changes, and a revised and reduced table in Chapter 5.

No additional work was left on the agenda and closing comments were made. It was agreed by the group that at present, the next meeting should be set for the Spring 2020 BLRBAC meeting unless a request for immediate help comes to us. We will continue work to get the release of our new version of the SFAF document and set up the Flame Scanner Presentation as discussed. The meeting was adjourned at 2:40 PM.

We again thank the members and especially all the visitors that contributed to this Spring meeting. We appreciate all that have attended and worked with the subcommittee discussing topics and delivering help to others. We generally hold open sessions and welcome any that have an interest to join us once or become a member. Remember to send your questions to us. The email addresses of the chair and members are in the minutes of BLRBAC.

6.2 ESP SUBCOMMITTEE REPORT – John Andrews

(See ***Appendix I*** – Incident List and ***Appendix II*** – PowerPoint Slides)

The ESP Subcommittee met in closed session on Monday April 8th, 2019 with 12 members represented. We welcome John Harmon who has returned to the Subcommittee as the representative from GE Steam Power which was formerly Alstom Power. Thanks to GE Steam Power for supporting BLRBAC. The Subcommittee met in open session on Tuesday morning April 9th, 2019 with 12 members represented and about 200 guests.

During the open session, the Subcommittee reviewed 29 incident reports from North America and 4 International Incidents. Of the 29 incidents, there were no Smelt Water Explosions reported and no Dissolving Tank Explosions reported during this session. Seven (7) of the reported leaks were classified as critical incidents and 20 were non-critical incidents. One of the critical incidents was a spout water leak that sprayed water into the lower furnace. There was one ESP with no leak reported and one Smelt Leak. An ESP was performed in 12 of the incidents including 6 of the critical incidents representing all of the critical incidents that should have been ESP'd. In the spout leak, the mill appropriately shut off the cooling water to the spout and did not ESP.

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

Incident Locations

The incident locations are summarized as follows:

- 11 – Economizer
- 6 – Superheater
- 2 – Boiler Bank
- 3 – Upper Furnace

- 2 – Lower Furnace
- 1 – Penthouse
- 1 – Lower Vestibule
- 1 – Smelt Spout
- 1 – Smelt Leak
- 1 – ESP No Leak

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 red circle outside the boiler indicates the external water incident from water suspected from a sootblower. The blue dot represents the ESP with no leak.

The attached bar graphs (Figures 2 – 7) show the number of leaks reported by boiler location over the past 14 years in order to see if there is a trend in leaks occurring in a specific area. There does not appear to be any significant trend from any area during that time.

Incidents by Boiler Type

The incidents by the number of drums and the back-end arrangement were reviewed. There were 4 incidents reported in single drum units and 23 incidents reported in two drum units. There were two separate reports from a 3-drum unit in Canada

Three (3) of the reported incidents were in boilers with Cascade Evaporators and 3 of the units had a Cyclone Evaporator. Twenty-three (23) of the incidents were from low odor units with extended economizers.

Leak Cause

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

- 5 - Fatigue either Mechanical or Thermal
- 10 - Weld Failure
- 8 - Erosion or Corrosion Thinning
- 2 - Stress Assisted Corrosion or Stress Corrosion Cracking
- 1 – Overheat
- 1 – Mechanical Damage
- 2 – Unknown

How Discovered

Boiler Walkdown continues to be the major way leaks are discovered showing that operators maintain their diligence for leak detection. Twenty-one (21) of the leaks (72%) were initially indicated by walkdowns. Two leaks were detected by Control Room Instrumentation observations and three leaks were discovered during Hydrostatic Testing. One of the incidents reported that the leak detection system initially identified the leak and 4 others confirmed the presence of the leak during continued investigation.

Leak detection systems were reported to be installed on units in 19 of the incidents (66%).

Time to Initiate the ESP

The time to initiate the ESP system after the initial indication of the leak ranged from less than 5 min to 2 days. The median time from the incident reports that provided information on the timing was 45 min which has been typical over the last several years. The incident that took 2 days from the initial indication of a leak was a floor tube leak near the spouts. The mill was fortunate that a smelt water explosion did not occur.

Incident Review

Figure 8 shows the Critical Incidents reported each year. There were 7 reported this meeting representing only the first half of this. Figure 9 shows the history of Recovery Boiler Explosions showing the last reported smelt water explosion in 2017.

Figure 10 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 11 the five-year rolling average which is now at 0.2 indicating only one explosion in the last 5 years.

Figure 12 is a plot of explosion history per 100-boiler operating years. This is a statistical summary of the experience across the industry. The smelt water explosion experience has dropped slightly to 0.46 explosions per 100 boiler operating years due to the explosions in the last couple of years, but the total explosions, which includes all boiler explosions and dissolving tank explosions, decreased slightly to .84 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 88 smelt water explosions with resulting damage to the boiler. We all need to continue to get those trends going down.

List of Operating Boilers

The BLRBAC Boilers in Service Database currently has 182 active recovery boilers listed, 142 in the US and 40 in Canada with a decrease of one boiler in the US. In the US, the average age is 41.1 years and the oldest is 67 years. The average age in Canada is 41.3 years and the oldest boiler is 72 years which is a 1947 CE unit at Three Rivers, PQ.

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

Learnings

There are several learnings 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.

- A discussion of what happens during upset conditions for vacuum spout systems should be included in operator training to make sure operators recognize the conditions that spout water flow may be interrupted.
- Review spout cooling water piping that goes through spout hoods to see if shielding or protection from smelt leaks may be needed to prevent overheating or boiling the cooling water flowing through the piping and blocking cooling to the spouts.
- After upgrades to increase boiler capacity, minimize other changes in boiler operation until there has been some operating experience with the new arrangement.
- Inspect roof tubes that enter steam drum for corrosion due to wet refractory and wet salt cake from water washing during outages
- Sootblower wall box sleeves should extend slightly into the furnace to minimize condensate dripping on filler plates and tubes to prevent thermal cycling and potential cracking.
- Weld wall box sleeves to external wall box and not to boiler tubes to eliminate stresses on the wall tubes.
- Quality Control is critical for the manufacture of any spout, especially any locally assembled.
- Stress Assisted Corrosion (SAC) usually produces multiple internal cracks. Welding a crack that penetrates to the OD may result in later cracks that extend past the weld repair
- Cracking in handhole caps and at tube to header welds at the economizer inlet header may be caused by thermal cycling from swings in feedwater flow during startups and boiler upsets
- Reference B&W Plant Service Bulletin “Economizer Inlet Header Cracking” for more information on the subject.
- Use of Leading Edge angled sootblower nozzles may contribute to superheater failures due to fatigue cracking from swaying pendants.
- Sootblower poppet pressures should be checked on a regular basis to make sure they are not too high or too low to minimize potential for fatigue cracking if too high and poor cleaning if too low.
- Inspect and repair ties and straps in superheater to limit movement and prevent fatigue failures

- Make sure lower header drains on steam cooled wall panels (found on some 1-drum RB designs) are open during startup to remove any water or condensate that may limit flow of cooling steam during start-up and result in stresses from differential expansion of the tubes
- Limit buttwelds in floor tubes to minimize potential for leaks from poor welds or steam blanketing
- If buttwelds are required in floor tube, inspect the welds for push through to prevent possibility for trapping steam bubbles at the weld causing overheat. Digital x-ray may be better for identifying any problems with push through
- Feeder tubes in lower vestibule and riser tubes in penthouse that have a "low spot" in run should be inspected periodically for internal corrosion or cracking

ESP Guideline Changes

The revised ESP Document that combined the ESP Guidelines and the Post ESP Guidelines was approved last Fall and will soon be posted on the BLRBAC Website.

The Subcommittee has recommended a further revision to clarify that the bypass of the motor protection circuits only includes those internal to the valve actuator and does not include breaker protection circuits.

> "The torque limits, and any other device internal to the actuator, designed to protect the motor or valve, should not be included in the motor control open circuit for the rapid drain valves so that the motor will exert maximum effort to open the valves until the open position limit is reached. The torque limits may be used in the valve test mode if desired."

We are discussing further revisions to the document recommending that mills create boiler side view diagram that clearly indicates sections of the boiler where leaks would be potential Critical Incidents and post the diagram in the control room for operator reference.

We are also discussing if it appropriate to recommend bypassing the torque limits and selector switches of other motorized valves that are part of ESP – not just the Rapid Drain Valves. There is a concern that not having any limitation on closing a motorized valve may result in catastrophic failure if the close limit switch does not function.

Since many mills are looking at outage intervals greater than one year, we are looking at the appropriate time interval to perform the ESP System Functional Check which is currently at maximum of 12 months.

Incident Questionnaires

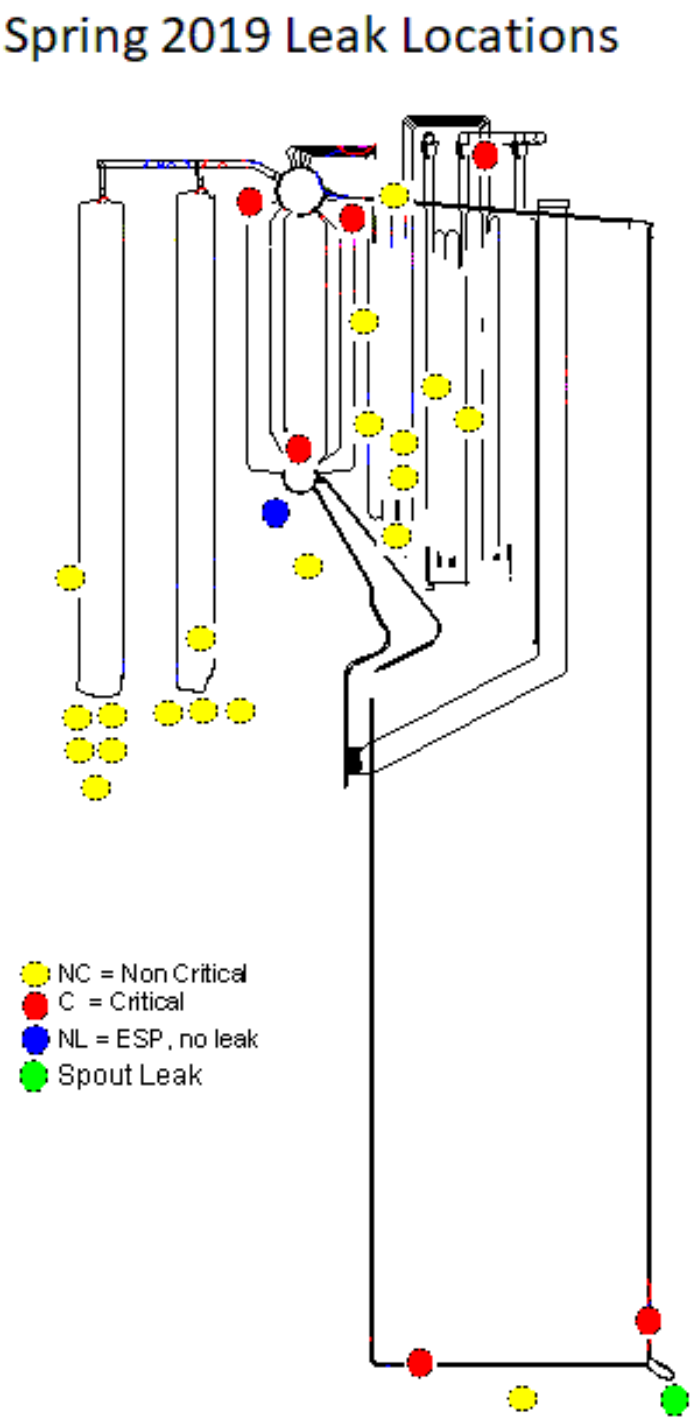
The Incident questionnaires are key to the operation of the ESP Subcommittee. We appreciate the good job that the mills have done in filling them out for their incidents.

Dean has updated the questionnaire to be more interactive and should be easier to complete so be sure to go to the BLRBAC web site to get the latest Questionnaire whenever you need to report on an incident. When you have completed the report, send the file to Dean Clay at **dclay@bsimail.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.

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

Figure 1


Spring 2019 Leak Locations
NC = Non Critical
C = Critical
NL = ESP, no leak
Spout Leak

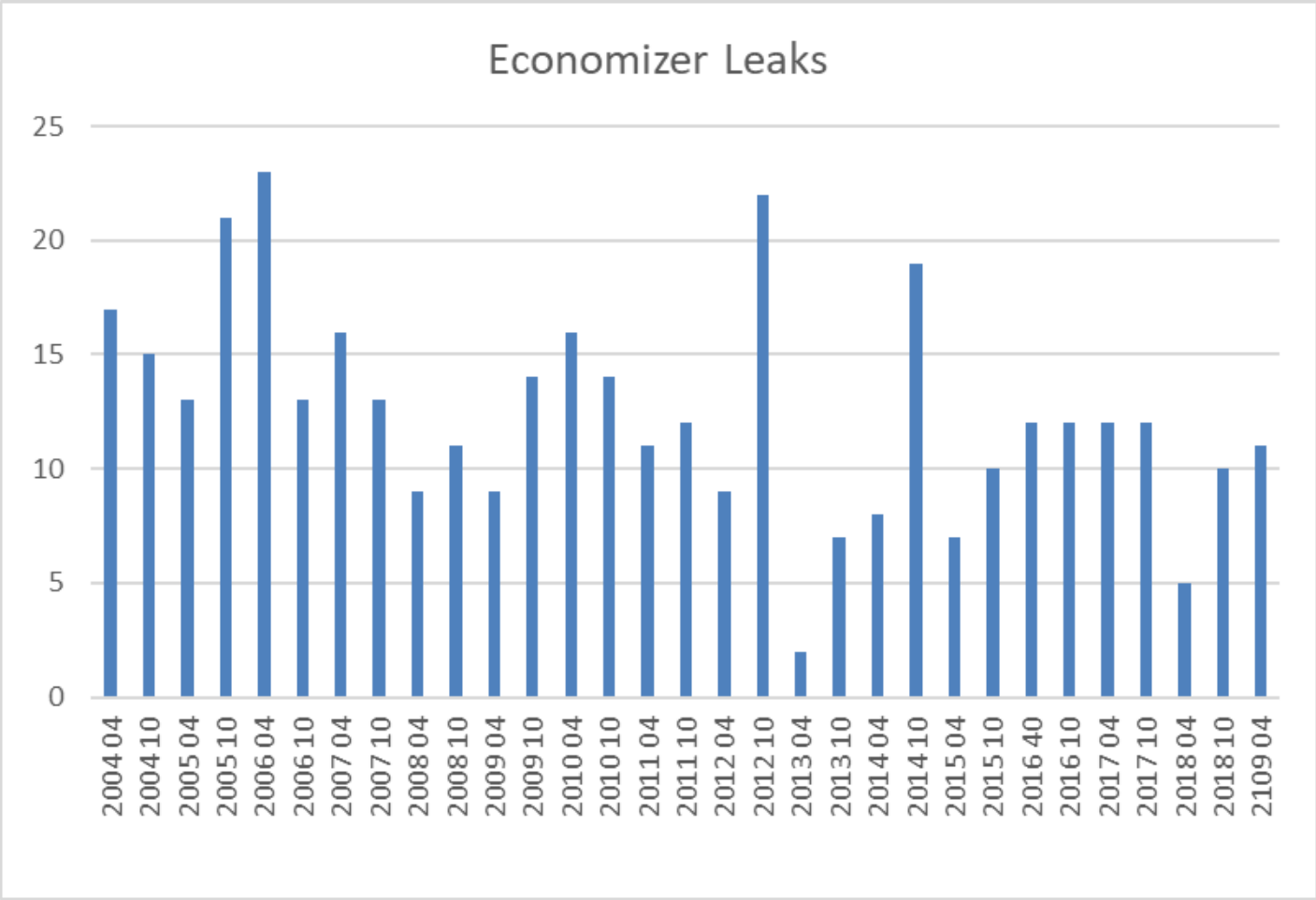

Economizer Leaks
25
20
15
10
5
0
2004 04
2004 10
2005 04
2005 10
2006 04
2006 10
2007 04
2007 10
2008 04
2008 10
2009 04
2009 10
2010 04
2010 10
2011 04
2011 10
2012 04
2012 10
2013 04
2013 10
2014 04
2014 10
2015 04
2015 10
2016 40
2016 10
2017 04
2017 10
2018 04
2018 10
2109 04

Figure 2

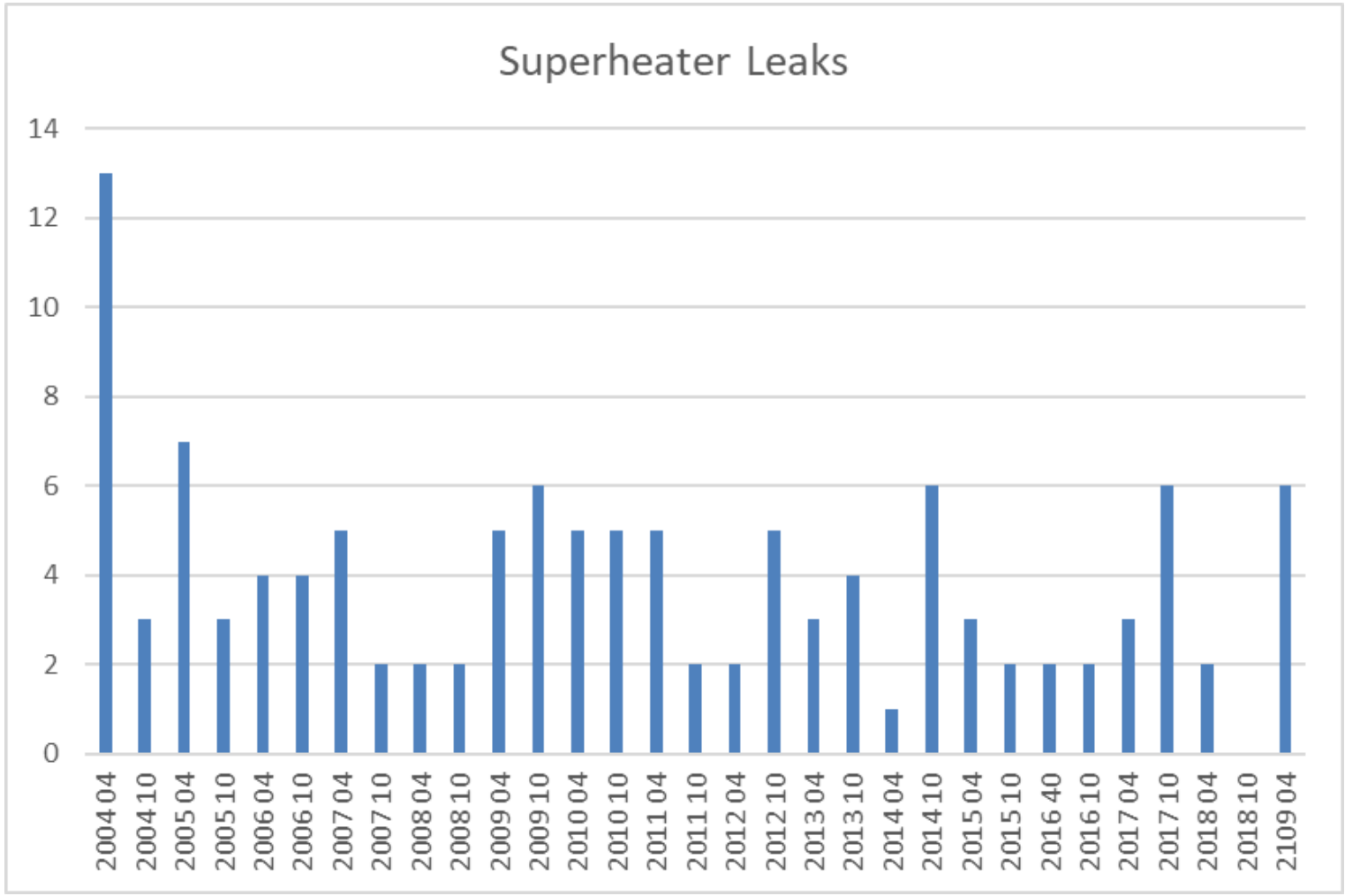

Superheater Leaks
14
12
10
8
6
4
2
0
2004 04
2004 10
2005 04
2005 10
2006 04
2006 10
2007 04
2007 10
2008 04
2008 10
2009 04
2009 10
2010 04
2010 10
2011 04
2011 10
2012 04
2012 10
2013 04
2013 10
2014 04
2014 10
2015 04
2015 10
2016 40
2016 10
2017 04
2017 10
2018 04
2018 10
2109 04

Figure 3

Figure 4

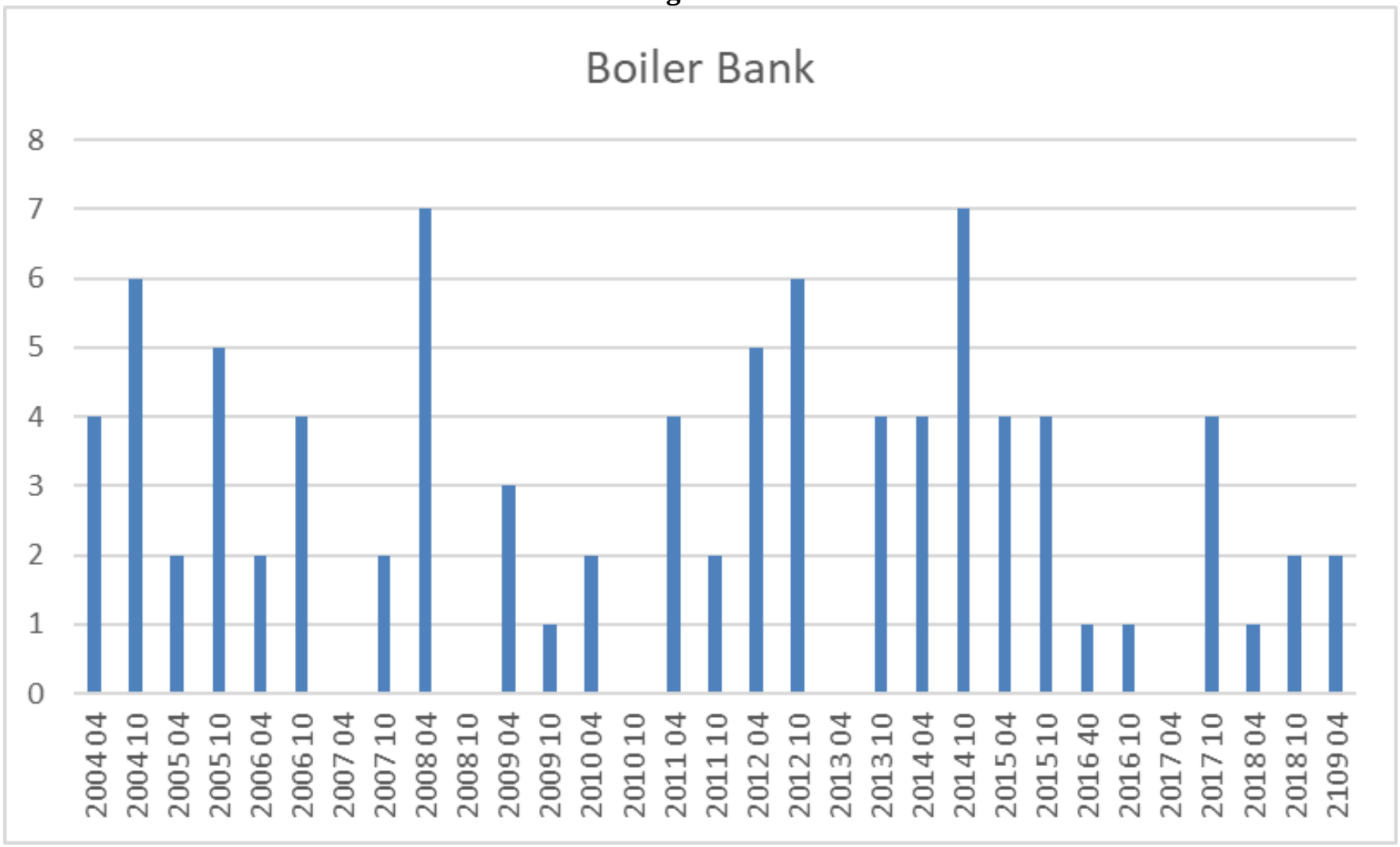

Boiler Bank
8
7
6
5
4
3
2
1
0
2004 04
2004 10
2005 04
2005 10
2006 04
2006 10
2007 04
2007 10
2008 04
2008 10
2009 04
2009 10
2010 04
2010 10
2011 04
2011 10
2012 04
2012 10
2013 04
2013 10
2014 04
2014 10
2015 04
2015 10
2016 40
2016 10
2017 04
2017 10
2018 04
2018 10
2109 04

Figure 5

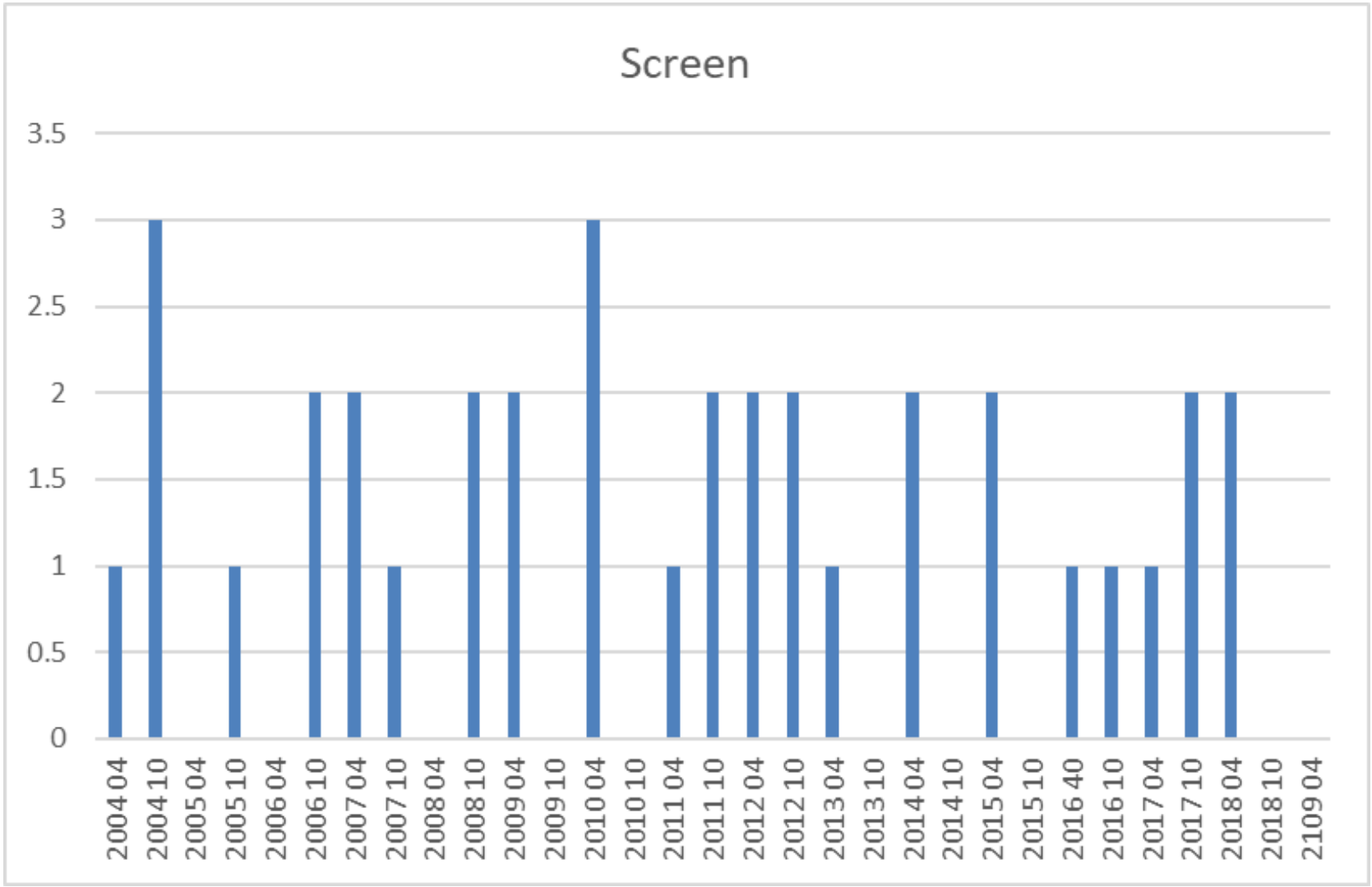
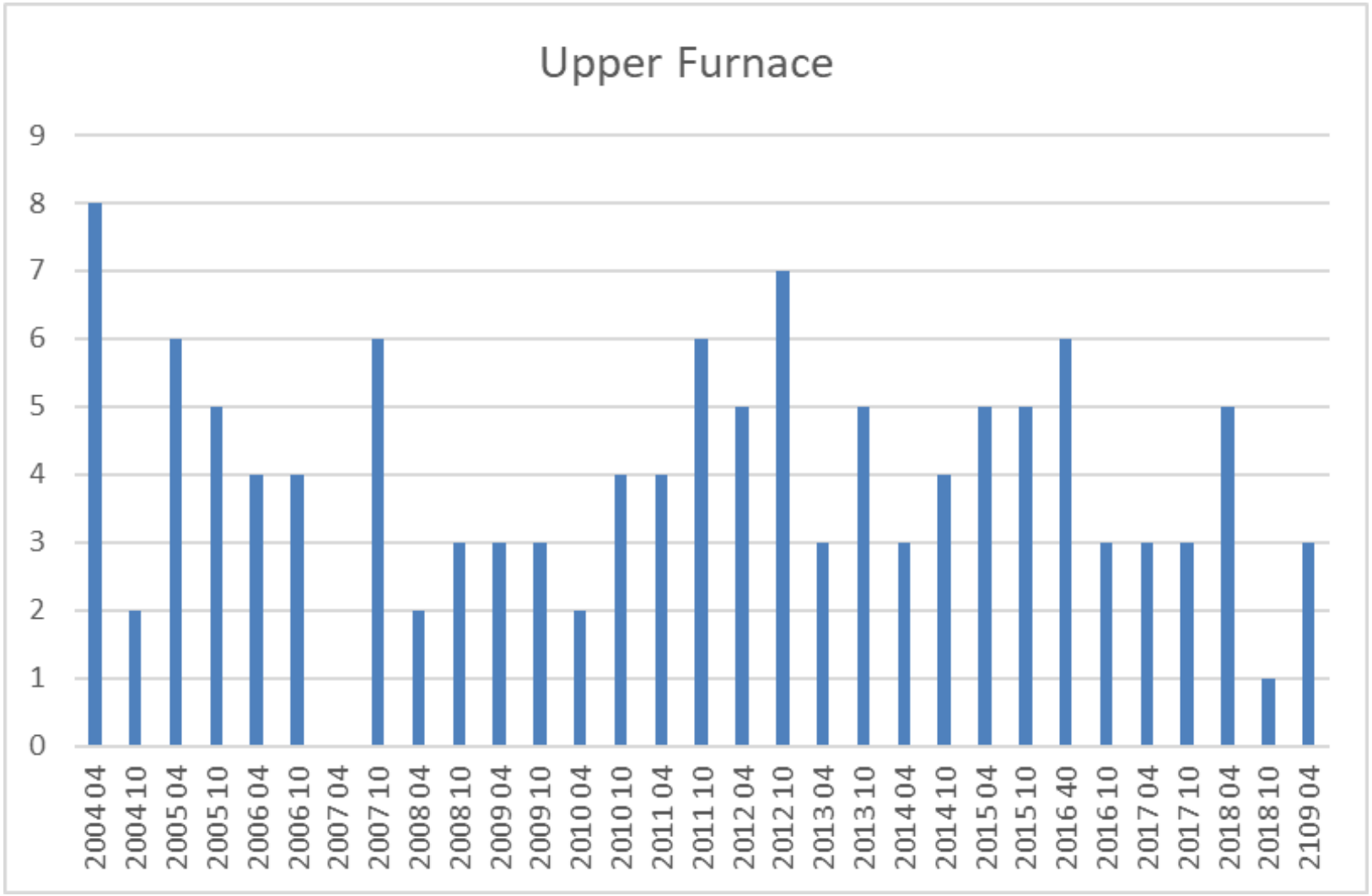

Screen
3.5
3
2.5
2
1.5
1
0.5
0
2004 04
2004 10
2005 04
2005 10
2006 04
2006 10
2007 04
2007 10
2008 04
2008 10
2009 04
2009 10
2010 04
2010 10
2011 04
2011 10
2012 04
2012 10
2013 04
2013 10
2014 04
2014 10
2015 04
2015 10
2016 40
2016 10
2017 04
2017 10
2018 04
2018 10
2109 04

Figure 6


Upper Furnace
9
8
7
6
5
4
3
2
1
0
2004 04
2004 10
2005 04
2005 10
2006 04
2006 10
2007 04
2007 10
2008 04
2008 10
2009 04
2009 10
2010 04
2010 10
2011 04
2011 10
2012 04
2012 10
2013 04
2013 10
2014 04
2014 10
2015 04
2015 10
2016 40
2016 10
2017 04
2017 10
2018 04
2018 10
2109 04

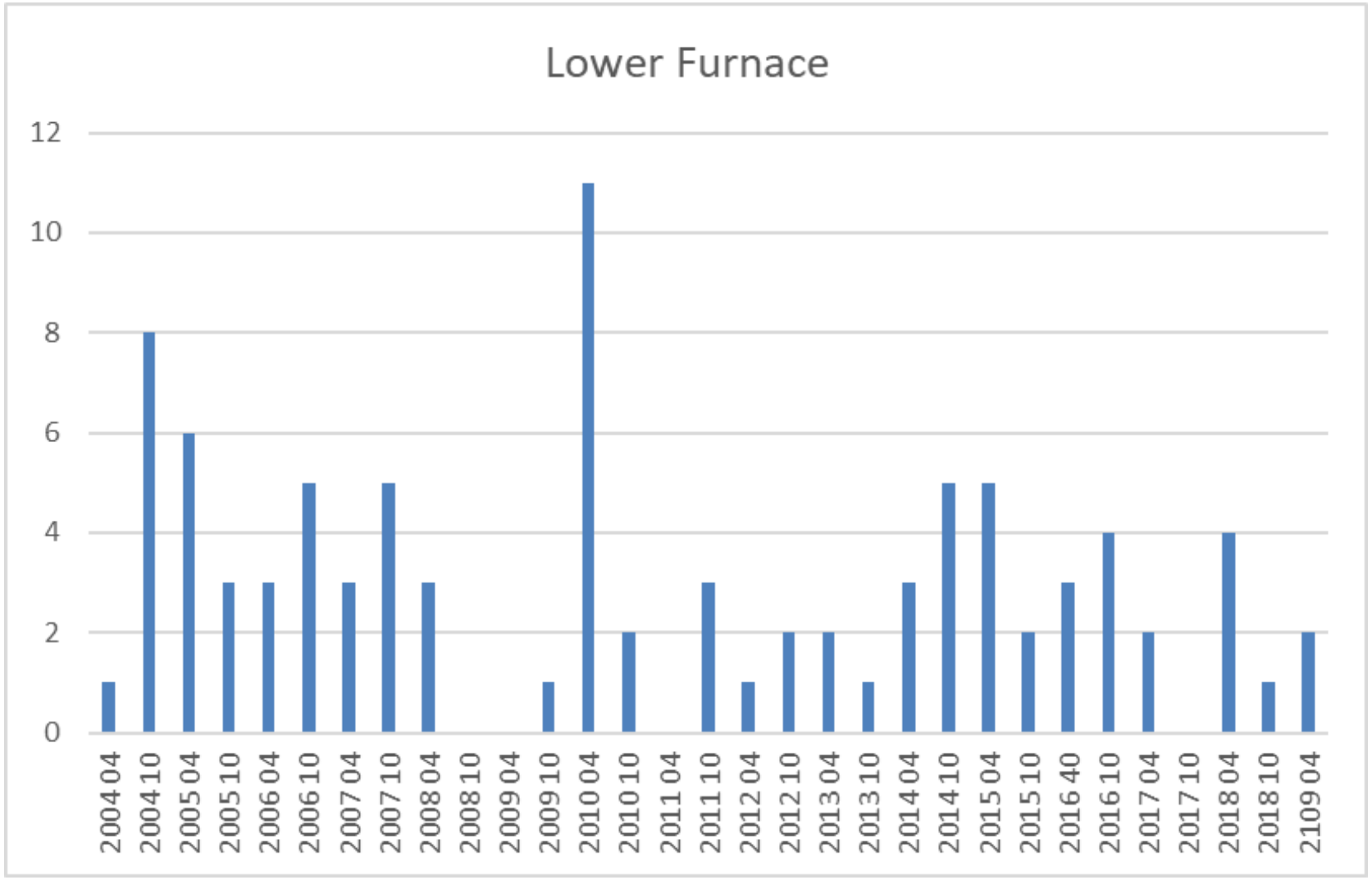
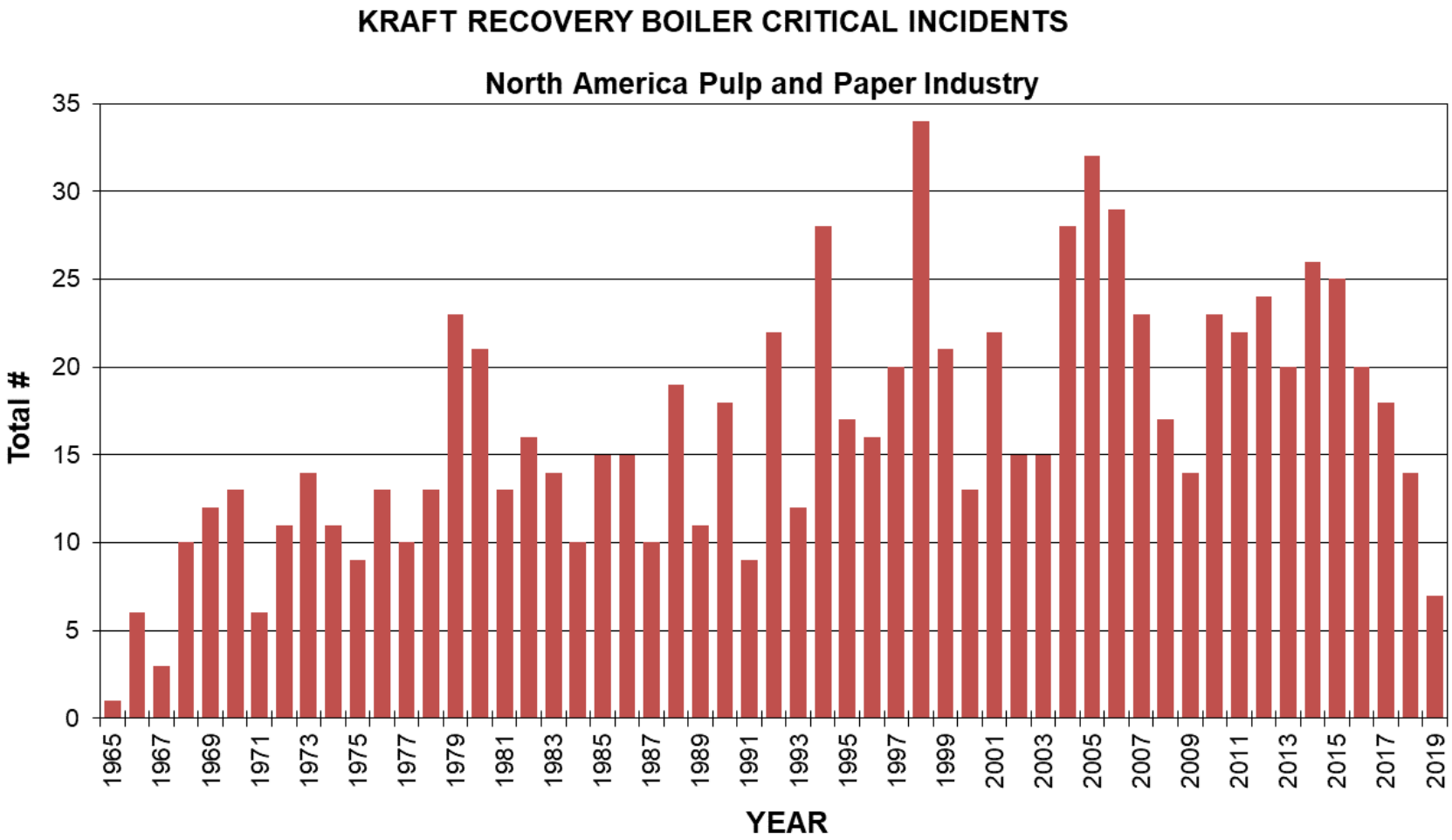

Lower Furnace
12
10
8
6
4
2
0
2004 04
2004 10
2005 04
2005 10
2006 04
2006 10
2007 04
2007 10
2008 04
2008 10
2009 04
2009 10
2010 04
2010 10
2011 04
2011 10
2012 04
2012 10
2013 04
2013 10
2014 04
2014 10
2015 04
2015 10
2016 40
2016 10
2017 04
2017 10
2018 04
2018 10
2109 04

Figure 7

Figure 8
(Critical Exposure Classification Began in 1965, Changed to Critical Incident in 1999)



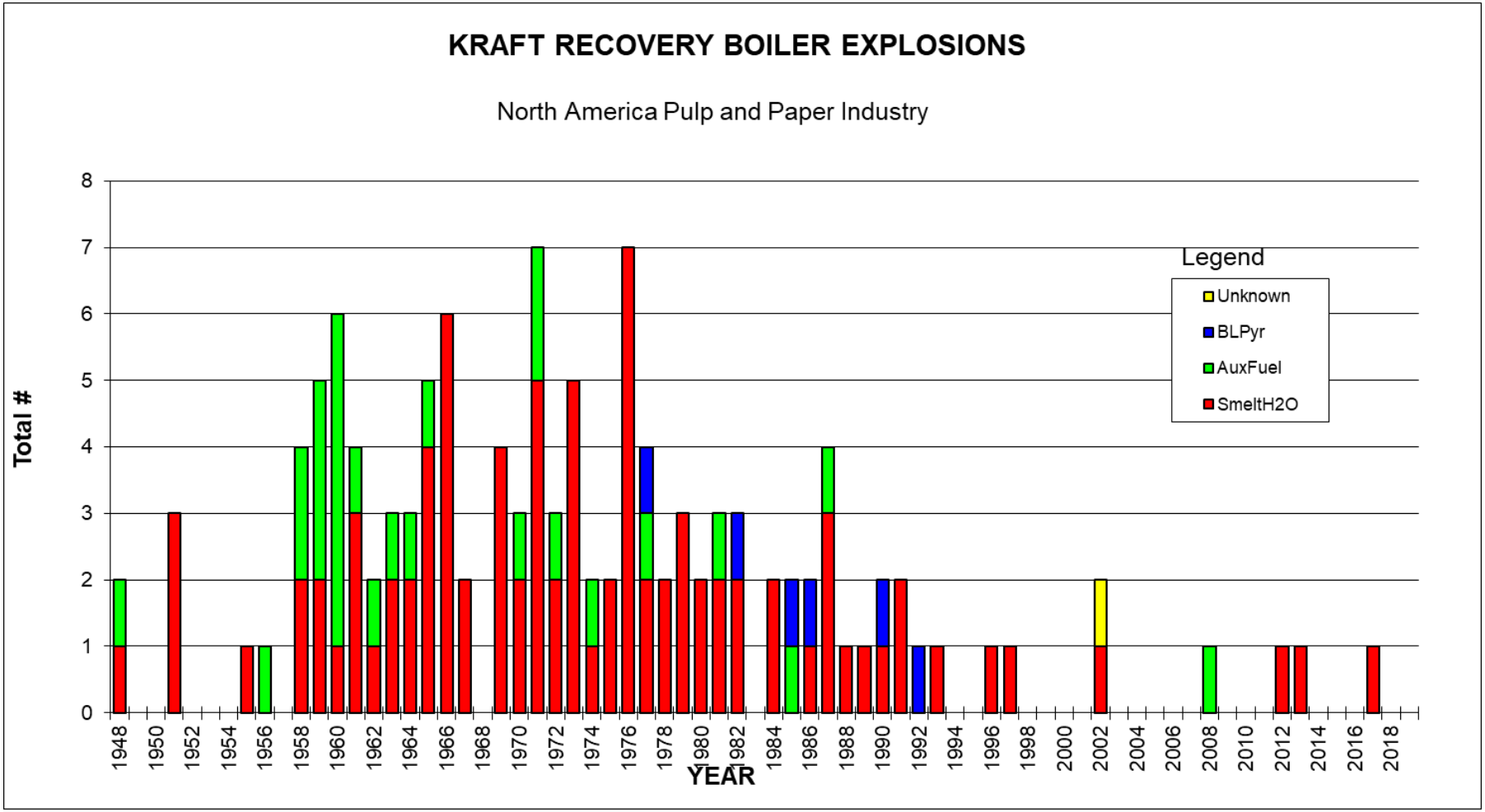

KRAFT RECOVERY BOILER EXPLOSIONS
North America Pulp and Paper Industry
Total #
YEAR
Legend
Unknown
BLPyr
AuxFuel
SmeltH2O
0
1
2
3
4
5
6
7
8
1948
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018

Figure 9

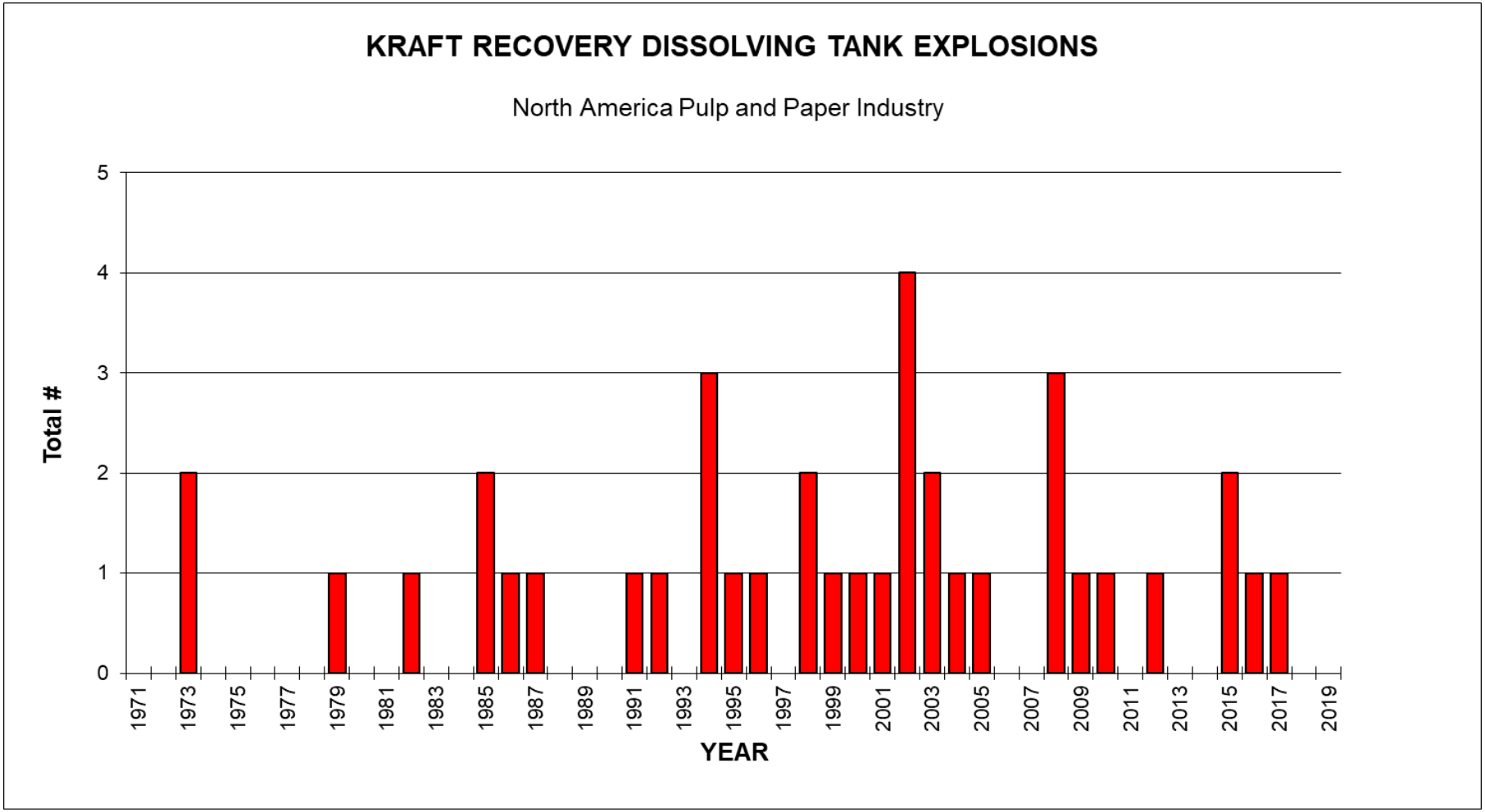

KRAFT RECOVERY DISSOLVING TANK EXPLOSIONS
North America Pulp and Paper Industry
Total #
0
1
2
3
4
5
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019
YEAR

Figure 10

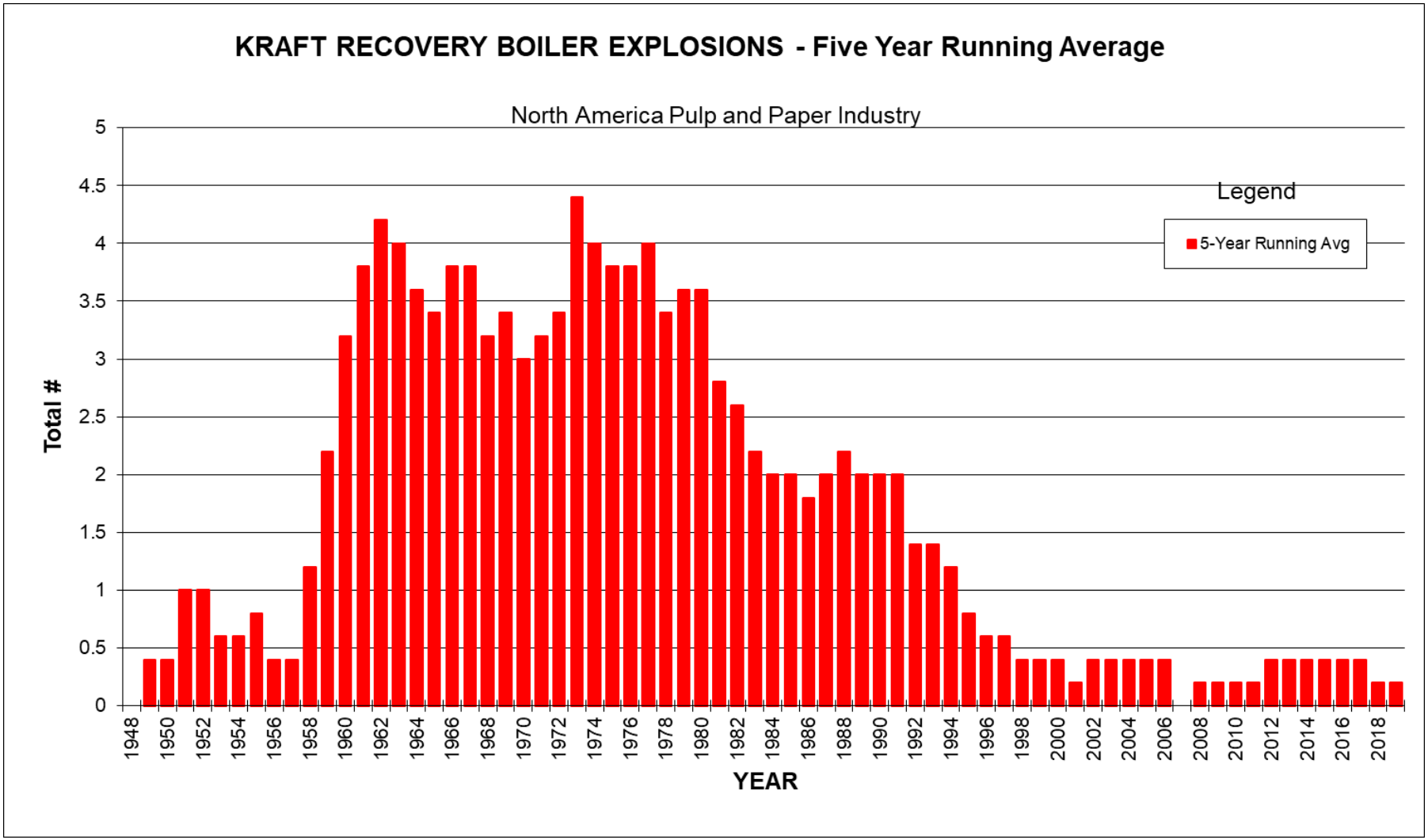

KRAFT RECOVERY BOILER EXPLOSIONS - Five Year Running Average
North America Pulp and Paper Industry
Legend
5-Year Running Avg
Total #
YEAR
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
1948
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000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

Figure 11

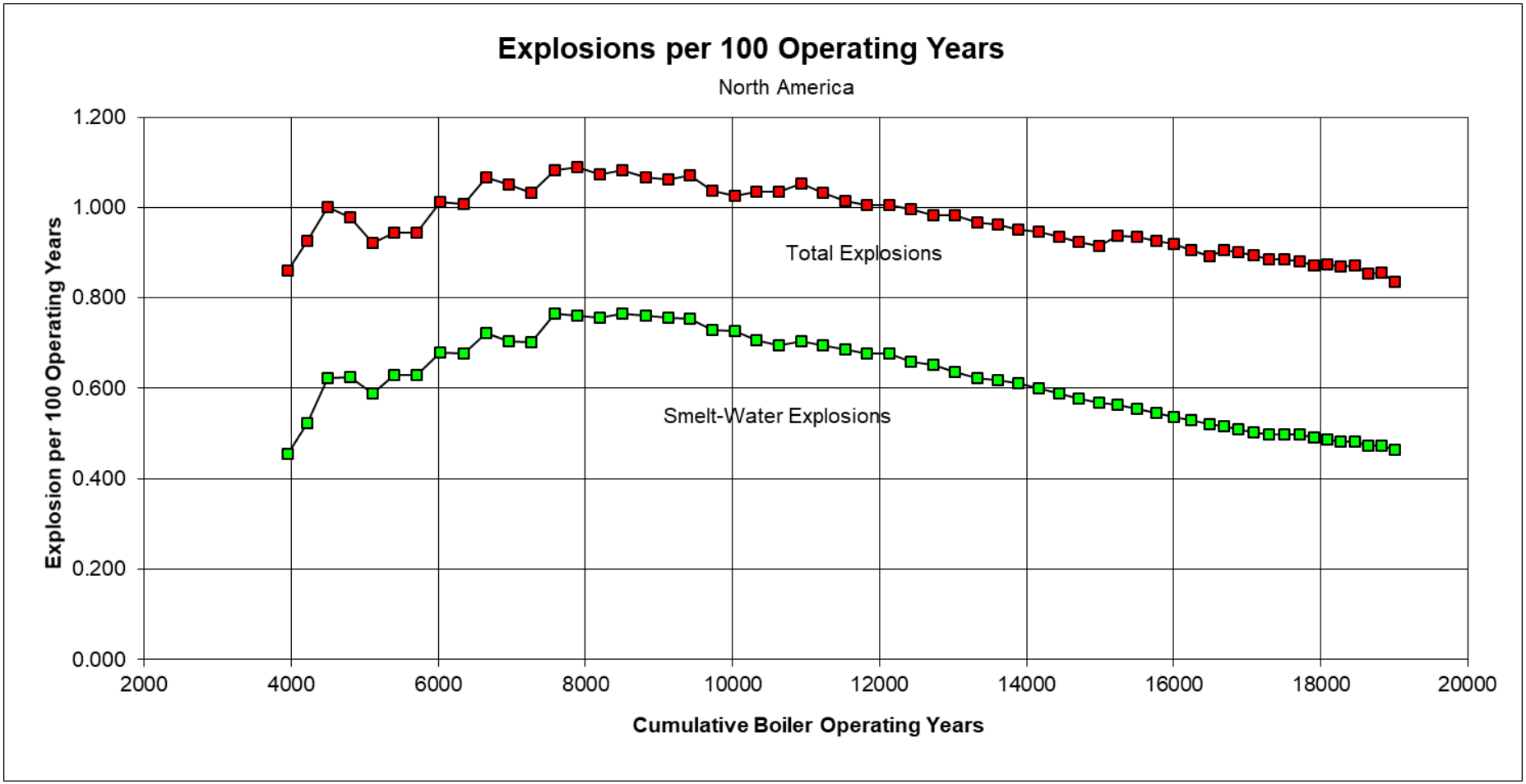

Explosions per 100 Operating Years
North America
Explosion per 100 Operating Years
1.200
1.000
0.800
0.600
0.400
0.200
0.000
Total Explosions
Smelt-Water Explosions
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
Cumulative Boiler Operating Years

Figure 12

6.3 FIRE PROTECTION IN DIRECT CONTACT EVAPORATORS REPORT – Craig Cooke

The Fire Protection in Direct Contact Evaporators Subcommittee met in Open session Monday morning. We had seven members, and six guests in attendance (13 total attendees). This ties our record attendance for our subcommittee and the participation and contributions were appreciated.

We reviewed the BLRBAC Anti-trust policy. We also reviewed and approved the April 2018 minutes.
The first order of business was to review the March 6, 2018 DCE fire at IP Riegelwood (two-wheel cascade). Fire protection was a water deluge system and it worked very well. It was able to gain control of the fire within about 6 minutes. Temperatures dropped quickly with water application from 1000 F to 330 F. After the fire, the ductwork was inspected and found to be quite clean. CAUTION: Fires should not be considered as a suitable method for cleaning! There was no apparent damage and the only loss was some production. Downtime was limited to less than 10 hours.

The incident did raise issues worthy of further review by our committee. We will also be sending questions to the people at Riegelwood to clarify our understanding of the events.

The initiating events were unusual. A circuit breaker tripped when a precipitator heater/blower motor tripped. This same circuit also fed the cascade drive, resulting in stoppage of the cascade rotation. This happened twice, about 2.5 hours apart. The second trip was when the fire occurred and the temperatures went up to 1000 F within 3 minutes. Our discussions and follow-up questions center on the following:

- What was happening between the two trips? Was the cascade down that entire time?
- We would like to see temperature charts or records for the cascade outlet spanning time before any trip till the fire was out.
- Did loss of cascade rotation cause an MFT? Were fans operating during the trips?
- There seemed to be a delay in the water deluge system being tripped. Roughly 10-minute delay after they reached 1000 F. What caused this delay?
- Did ID fan trip due to fire system activation? FD fan inlets all closed per the report.
- Should the cascade be on a separate electrical circuit?

We had previous discussions on steps that can be taken to assure fire protection piping and nozzles are open, well maintained and free of plugging. We are at the point where we will be posting recommended document additions. These revisions will likely be voted on at the next session, so please provide any comments prior to that. Section 3.3, the last bullet relates to fire protection nozzles having means to keep them clean as we have seen a history of the plugging. We propose adding the following sub-bullets:

- Provide a means to inspect and clean the fire protection nozzles on a routine basis (i.e. nozzle piping arrangement should allow for rodding out)
  - Fire protection nozzles should be placed in an area accessible for cleaning, maintenance and visual inspection or a means to access the nozzles should be provided.
  - Fire protection nozzles should be arranged in a way that they can be inspected and cleaned, such as in a T-configuration with a quarter turn valve to allow rodding out of the piping. The quarter turn valve should be located on the outside portion of the tee so that it does not impair the path of steam to the boiler. When the valve is opened, a rod can be used to open the piping obstructions. Proper safety measures should be established so the steam source is isolated during rodding procedures.
  - The steam system should be tested regularly by purging the steam lines to assure the piping is not compromised or plugged. The steam supply valve should be arranged in a way to flow steam without tripping the boiler. Infrared thermal imaging cameras are a good tool to verify steam flow through the nozzles and identify pluggage while steam is activated.

One of our members brought to light a recent incident at their mill. The cascade reel shaft broke and they found a second one with two cracks. These shafts were 45 years old and everyone with a cascade is likely in a similar situation. Tube welds failing on the cascade wheel were occurring and in retrospect could have served as an alert to the developing problem. The broken shaft obviously shut down the cascade and it could have resulted in a fire. Fortunately, they were able to bypass that cascade. They also have water wash nozzles on ducts and at other key points that were used to keep things cool and dilute. NDE should be considered and it was indicated ultrasonic shear wave worked well in discovering the cracks on their other cascade. (NOTE: Unscheduled shaft replacement could be 6 weeks.)

Some additions to our guide may be warranted. The following is initial verbiage to Add to Bullet 3.7.6 'Structure Cascade Wheel Shaft should be inspected and tested on a regular basis to assure structural integrity. Failure of a shaft can result due to fatigue over time and result in a cascade trip, possible fire situation, and long-term interruption to operations until the shaft is repaired/replaced.

Ultrasonic Sheer Wave Testing has proven to be one effective means to test the shaft integrity.

Failure of wheel tube welds at an increased rate can be an indication of shaft failure.

Lastly, we discussed a note I received from Len Erickson. There are two events, a) a stalled cascade wheel, and b) a fire in a cascade evaporator that he feels should initiate an MFT. I was able to assure him that the DCE guide does recommend MFT with the high-high alarm point, along with activation of the fire suppression system. The cascade wheel stoppage is a point of on-going discussions. This also relates to discussions our group had related to the recent fire incident. Some mills do MFT with wheel stoppage, but some may also be handling it with EOPs and measures such as bypassing the cascade and activating water wash nozzles.

We urge reporting of all fire incidents; minor and severe. Valuable lessons can be learned from both minor incidents that are quickly and easily dealt with as well as the larger and more severe fires.

Our next meeting will be April 2020, always an Open Session, Monday morning. We encourage attendance and always welcome new members.

Craig Cooke: Any questions?

Dean Clay- BSI: If you are recommending a master fuel trip, have you talked to the Black Liquor Subcommittee so all this can be on the same logic sheet.

Craig Cooke: Okay, as far as just with high, high temperature that I think should already be there.

Dean Clay- BSI: No, no, we are talking about the wheel stuff.

Craig Cooke: This is just the early discussion of that. We are not yet suggesting that. There was a suggestion that this was maybe a good idea, but there were also thoughts that a lot of mills have other ways of handling it besides a master fuel trip. So, it is kind of a w work in progress, but it is a good point.

Any other questions? Thank you.

6.4 INSTRUMENTATION REPORT – Dave Avery

The instrumentation subcommittee met in open session on Monday morning with 10 members and 14 guests. Our session began with reading the antitrust statement continuing with introductions of members and guest. We reviewed minutes from our October meeting and approved them as presented.
A new tool was introduced to the attendees to help keep them involved with our subcommittee, a new Question/Inquiry Management form was provided to them for submitting questions if they would like to use it in addition to any active questions present during our open discussion session. This could be possibly could be include with registration packet.

Turning to our agenda we reviewed the progress Drum Level measurement:
Bruce Knowlen and Eladio Molina led the update on proposed:

CHAPTER 5 GUIDELINES FOR STEAM DRUM CONTROL

In the implementation of a modern Drum Level Control System, there are many factors to consider. These include the control scheme, the method of level detection and physical installation, methods of compensation, the approach for calibration and startup, and addressing the delivery of water, as well as many complicating factors. Because most recovery boilers produce significant quantities of steam and there exists the need for multiple devices to ensure safety, these guidelines will focus on various level measurement methods to provide accurate level indication and control, and the use of a 3-element control system while the boiler is under normal operating conditions.

The development of this topic potentially includes Control System Scheme, Level Instruments and Drum Connections, Differential Level Configuration, Compensation, Installation and Feed-water control, Alarms and shutdown. Discussions for this scheme will include Drum Level Measurement, Circulating Systems, Non-Circulating Systems and Complications in Level Measurement, ASME code for Gage Glass. Level Measurement components will also be a part of this work. Participants at our meeting were offered a rough draft of progress and they accepted to receive and email of the draft documents (we are looking for review and feedback from them to us develop this product). This will continue over the next several meeting before we will have a project ready to present the membership.

Reaching out to our guest and members a request for topic of interest was presented with the following result, A lot of discussion around trades, IOT, remote control, future infrastructure, how to staff the future jobs. We recognize the "Internet of Things" is real and a growing part of instrumentation, cameras, hand held operator interfaces, long distance remote control etc.…. we will have to address these items as it pertains to our control systems and the safety of our recovery boilers. We continued with a spirited debate on how to recruit and retain talented people to learn our systems and maintain them for all our future. While we did not resolve this issue the fact that we are having good discussions about this subject we may be able to find some small way to positively make a difference in our communities we have to keep trying.

The afternoon session had 7 members and 6 guests we continued discussions around "IOT" with more items to come. We reviewed our continuing assignments which are:

- Checklist update
- Drum Level Measurement/Control
- Another look at NFPA85 vs BLRBAC for a definitive recorded position. (I will be working with Bob Langstine of ZEECO to review this one more time)
- Follow-up on The Qualified E&I definition for submission and future posting.

We have one membership change Fossil Power Systems Rep Peter Donahue is being replaced by Andy Clement.

Final thought if you are interested in a rewarding experience come by check us out and join us and be a part of making a positive difference for future.

6.5 MATERIAL & WELDING REPORT - Mike Blair

MORNING SESSION:
The Materials and Welding Subcommittee met in Open Session on Monday morning, April 4, 2019.

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

Attendance
8 members and about 15 guests attended the morning session.

Old Business
The meeting minutes from the spring 2018 Subcommittee meeting were reviewed and accepted. Worked on the Bulletin regarding Copper Contamination of welds.

New Business
Asked for volunteers to review the portions of Section 3 of the Personnel Safety Guidelines, to see if there are items that should be in the Materials and Welding Guidelines. Jesse Worsham volunteered to work on that, to put together a list of what is duplicated or what should be moved.

Asked for volunteers to review the Materials and Welding Guidelines to correct formatting issues. Dave Fuhrmann volunteered to work on that.

Members
Nine members who have not attended since 2015 or 2016 were removed from the subcommittee members list...

Document Development
The subcommittee made final comments on the Bulletin for Copper Induced Cracking in Boiler Tubes in preparation to forward this to the Executive Committee.

AFTERNOON SESSION:
The Materials and Welding Subcommittee met in Open Session on Monday afternoon, April 8, 2019.

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

Attendance
9 members and about 24 guests attended the afternoon session.

Presentations
Danny Tandra from Clyde-Bergemann made a presentation on the sootblower lance tube failure at Peace River. Presentation stating that the root cause was gearbox misalignment that lead to excessive stresses on the lance tube to flange weld.

Pedro Amador from AZZ made a presentation on in-situ weld overlay on furnace wall tubes above the clad termination line.

Document Development
None in the afternoon.

6.6 PERSONNEL SAFETY REPORT – John Fredrickson

The Personnel Safety Sub-committee met in an "open" session on Monday, April 8, 2019. There were 7 members (out of 16) plus 32 guests in attendance during the meeting.

Representation at our meeting by regular members and guests included original equipment manufacturers Andritz, Babcock & Wilcox and Valmet. Service Providers 3-S Team, WL Gore, Gecko Robotics and GH Bodman Inc. Engineering Companies, Jansen Combustion & Boiler Technologies and Cianbro Construction. Representation from AXA Matrix and FM Global attended the meeting. Operating company representation was present at this meeting with representatives from Georgia-Pacific, Green Bay Packaging, International Paper, Irving Pulp & Paper, Pixelle, SAPPI NA, Rayonier AM, Clearwater Paper, Resolute Forest Products, Verso, and WestRock. Consultant representation included AF&PA.

The BLRBAC anti-trust statement was read.
Contact information for all committee members in attendance were confirmed or updated as needed.

A sign-in sheet was passed around for a record of attendance and contact information.

A sheet to capture topics of discussion from members/guests for group participation was sent around and the suggestions were used to spur discussion during that part of the meeting.

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

WL Gore presented an update on the production of their smelt protection PPE.

WL Gore – PPE review and update – Jim Ellis, Sean McDearmon
Gore will *not* continue to make Vulcan smelt protection PPE garments because the business case is not strong enough and will not license technology to others because of the proprietary nature of the components used. They are still working on a multi-hazard garment and are looking for P&P mill use-trials similar to what was done on the smelt PPE. The new multi-hazard garment will provide protection from steam, chemical and will be hi-vis (GL, BL, Heavy BL). They were clear that it is not suitable for smelt protection because the outer layer is fibrous, so smelt will stick.

After discussion in the committee meeting, the Personnel Safety committee encouraged WL Gore representatives to reconsider their position and continue research on smelt protection and the inclusion of this capability in a garment that can be made available to our industry. As an alternate, provide pricing and a predicted periodic or limited (scheduled) production run to owners to make this garment available to our industry…Both WL Gore representatives were supportive of our request and would take our input back to their Company leadership for reconsideration. Audience comments were as follows:

Mills would be willing to order if knew "when", sort of like other materials with long lead times….
WL Gore representatives made No promises…

The committee discussed next steps with Gore… Owner Companies may seek to use purchasing influence to change their position? Committee is willing to hear from WL Gore again to see what they have to report in the Fall of 2019.

Based on this decision by WL Gore, the committee will update the status of other previously considered smelt protection PPE options – Revisit Carbon X, Petrolite…. Will try to have other companies present their current offering to the subcommittee the Fall 2019.

We completed the review and made final edits to the clearing of plugged ash hoppers section and agreed by committee vote that we were done with the document and it was ready to incorporate into the next revision of our section.

Open discussions were held on numerous topics pulled from the list submitted by participants.

The meeting ended at 11:33 am.

There were no requests for clarification or interpretation in the last six months.

In closing, we are always welcome to new committee members who can participate in any capacity even if you can only attend meeting intermittently.

6.7 PUBLICITY & NEWS REPORT – Matt Paine

BLRBAC has posted several meeting notices on various WEB sites. Also, BLRBAC and TAPPI are continuing with the cost program and advertising in prominent publications.

6.8 SAFE FIRING OF BLACK LIQUOR REPORT – Vernon Blackard

SFBL Subcommittee Meetings – Monday 8:30 AM (CLOSED) and 01:00 PM (OPEN). Sub Chair meeting on Monday 4 pm. Main meeting report out Wednesday 8 am.

Agenda:

- Open the meetings. Closed and Open.
- Review BLRBAC Anti -Trust statement
- Introduce members. 10 MEMBERS CLOSED AND 48 MEMBER AND GUEST OPEN MEETING.
- Review and approved the FALL 2018 meeting minutes. APPROVED.
- Reviewed draft document and voted to submit it to Exec Committee for possible posting on BRBAC website for main committee vote in Fall 2019 meeting. Tom Wransosky cleaned up document during closed meeting as we went through it again.
- New Business – Discussed with Wes Hill about guidelines for units with more than one dissolving tank for section 10.3 DT design.
- CLOSE MEETINGS – CLOSED AND OPEN

6.9 WASTE STREAMS REPORT – Kevin Sapp for Paul Seefeld

The Waste Streams Subcommittee met at 9:00 on Monday with full attendance of the ten members. Mark Cooper of FM Global has retired and is off the subcommittee. He is being replaced by Neil Chaudhuri. In addition, a Westrock representative, Cobb Golson, has asked to be on the subcommittee. The members/attendance list will be updated and sent to Barbara.

Morning (Closed) Session topics:
We read the anti-trust and approved the minutes from the April 2018 meeting. We did not have a quorum to conduct business in the October 2018 meeting.

We are going to be adding two sections to chapter 4, BLOX system sources and CTO system sources. Both are to be classified as weak gas sources. The BLOX system will be treated as a separate source due to the large volume of flow makes it impractical to combine with any existing DNCG system. The CTO system sources are also to be classified as weak gasses and will be documented in a similar fashion as the chip bin gas source.

We have converted figure 4 and figure 5 to Visio and are updating the two documents. We will probably have figure 6 converted for distribution and review by the subcommittee before the October 2019 meeting. The intent is to make any changes via email before the fall meeting and have the figures ready to submit to the EC for approval into the document. We are not planning to make any significant process related changes that would require a vote by the membership.

The document on the site is still labelled as April 2016. There have been two updated documents submitted and approved since then. We need to confirm that the site document reflects the changes submitted on 1/18/2018 and approved in the April 2018 meeting.

There were no questions submitted to the subcommittee in the last 18 months. Our current document has been reviewed and updated chapter-by-chapter since 2015 so it is pretty robust. There are no foreseen topics to address that would require us to meet more than once per year after we incorporate the BLOX and CTO acidulation sources.

Afternoon (Open) Session:
We had seven committee members and seven guests in the afternoon session. We reviewed our discussions related to the BLOX and CTO reactor sources being incorporated into the document. There were no questions related to the BLOX or CTO sources. We discussed the proposed updates to the drawings and there were no related questions.

A question was asked regarding the permissive to disengage the igniter. Most of the questions on this topic revolve around the amount of time needed between the introduction of the CNCG and the point at which the igniter could be put in idle. The document does not

specify a limit; just that the permissives and the interlocks are met.

6.10 WATER TREATMENT REPORT – Tom Przybylski

- The water treatment subcommittee met in open session for both morning and afternoon sessions. There were 13 subcommittee members in attendance for the morning session along with 24 guests. The afternoon session included 13 subcommittee members and approximately 10 guests

- Membership changes included the replacement of Jeff Fox with Jim Gannon from Nalco. We welcome new members Trevor Murray from Irving Pulp and Paper and Steve Morrison from Verso. Sam Lewis has left the subcommittee.

- The morning and afternoon sessions started with a review of the BLRBAC antitrust statement.

- Meeting minutes from last fall were approved

- Both the morning and afternoon sessions were spent rereading the chemical cleaning document for clarity, grammar, completeness and cohesiveness.

- The major topics of discussion included discussion about phosphate hideout and how it manifests in boiler water chemistry.

- We included information about locations (particularly certain provinces in Canada) that require certification and registration of valves and piping attached to boilers for chemical cleans.

- We included information about environmental considerations when draining a chemical cleaning solution.

- There was significant discussion about flushing on several fronts. First was our recommendation to flush all non-vertical circuits and headers following a clean. Since not all of these circuits are accessible, we included “accessible” as a qualifier. There are some headers that may require being cut due to deposition and lack of handhole access, but these were uncommon enough that they were not worth covering in this document

- A second topic on post-cleaning flushing included the term “good quality water” that we specify for flushing. Good quality could

indicate demineralized water, even though it is relatively corrosive. After significant discussion, we settled on low TSS, low pressure, high volume water for flushing.

- The group felt that the portion of the document that covers the actual cleaning process, was rather limited compared to the preplanning and flushing portions of the document. The complicating factor with this is that there is so much variation in chemical cleaning procedures depending on the composition of deposits, deposit layering, and boiler design among other considerations. In the end, we listed minimum steps that should be in every procedure, regardless of stages and chemistry types.

- Our agenda included starting testing and sampling protocols as time permits, but there was not enough time to do so.

- We adjourned at 3:10PM.

- Our subcommittee appreciates the contributions of all subcommittee members and guests in attendance.

David Slagel: This concludes our Subcommittee Reports. We did not have anything that was submitted for this go around in need for a vote, but I think we are going to have a relatively active fall. So please keep your eye on the WEB site for postings so that we are prepared to deal with that in October.

7. 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 North American companies that operate recovery boilers. Program activities are funded by member company dues.

In 2018, the AF&PA Recovery Boiler Program was opened to all Canadian Mills that operate Recovery Boilers. We currently have 21 member companies in the AF&PA Recovery Boiler Program. Our membership currently represents 94% of USA and 27% of Canadian Chemical and Semi-chemical pulp production.

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.

The Operation & Maintenance Subcommittee sponsored two (2) Recovery Boiler Operational Safety Seminars in 2018 (in April & May). A total of 111 attendees participated in the 2018 Safety Seminars. Operators, supervisors, superintendents, process engineers, and maintenance professionals from 11 companies and 29 mills attended. Over 3,700 people have attended the seminars since they were started in 1985. We continue to receive excellent comments and ratings from the attendees. The attendees receive valuable information and insight from the dialogue among the attendees and monitors of the seminars. The six (6) table top exercises or case studies, used in the Safety Seminars, are based on recent actual Recovery Boiler Incidents and help operators and supervisors make decisions when to ESP a recovery boiler. As more senior operators and supervisors retire, training will continue to increase in importance. Companies are finding these seminars to be an important part of their safety & training programs. We recommend that all companies and mills seriously consider sending people to these valuable seminars.

The 2019 AF&PA Recovery Boiler Operational Safety Seminars are scheduled for April 23-24 and May 14-15 at the Atlanta Airport Marriott Hotel. Dean Clay and John Andrews of Boiler Services & Inspection LLC (BSI) are the Safety Seminar Monitors. The Safety Seminar cost is only $350 per attendee for member companies and $700 per attendee for non-member companies. Attendance is limited, so Register Early!

The 2019 AF&PA Recovery Boiler Annual Conference & Meetings were held on February 5-6 in Atlanta. We had a record turnout with a great mix of Operating Companies, Manufacturers, Research Specialists, Vendors, and Insurers. The 2019 Conference Theme was Dissolving Tank Safety. Presentations included reports on new developments in our industry, currently sponsored AF&PA Recovery Boiler Program projects, Subcommittee reports on their accomplishments, reports from Canada, Sweden, Norway and Finland on their Recovery Boiler committee activities, as well as other Recovery Boiler related research being done in the industry.

The 2020 AF&PA Recovery Boiler Annual Conference & Committee Meetings are scheduled for February 4-5, 2020 at the Atlanta Airport Marriott Hotel. We schedule these for the 1st Tuesday & Wednesday of each February. The Conference is open to everyone interested in Recovery Boilers. The objective is to keep the members and the recovery boiler community informed about new developments and industry

best practices. Mark your calendars! We hope to see you there!

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.

The Operation & Maintenance Subcommittee completed its work on developing the "Recovery Boiler Functional Checks Document". It is a great reference document for helping mills develop procedures for functional testing of interlocks and trips on Recovery Boilers. The new document is available for downloading from the AF&PA Recovery Boiler Program website. We encourage all mills to review the document.

The Operation & Maintenance Subcommittee is currently working to formalize recommendations from the Dissolving Tank Survey and BLRBAC Incidents Study completed by Dr. Tom Grace. Great progress was made at the February 5, 2019 meeting and it will be finalized at the February 4, 2020 annual meeting. Like the "Recovery Boiler Functional Checks Document", it will be distributed to the members and posted on our website. Given the number of Dissolving Tank issues, we feel this will be a great help to the industry. The next Operation & Maintenance Subcommittee Project will be "The Impact of extended run time on Recovery Boiler operation, maintenance, risk, areas of concern, & criteria for allowing extensions".

The "Kraft Recovery Boilers" Textbook (Blue Book) was sold by TAPPI. Three thousand books were originally printed, and the inventory is sold out. The "Kraft Recovery Boilers" Textbook is getting a major update for the next printing. We are very pleased to have Dr. Honghi Tran of the University of Toronto leading this project. This project is nearly complete.

Dr. Tran and other well-known recovery boiler experts have submitted the 16 chapters for the new book, which are currently being reviewed by TAPPI and the publisher. We are very excited about this new Textbook and feel it will advance the knowledge and understanding of Recovery Boilers and will be a great help to the industry. When our new "Kraft Recovery Boilers" Textbook is completed it will be included as part of the TAPPI Kraft Recovery Operations Course. The new Textbook will be available for sale in late-2019.

The Research & Development Subcommittee developed an industry survey on recommended clothing for safe use around recovery boilers. Clothing must be heat resistant, resistant to chemical attack, provide mobility, and be comfortable. We did a limited distribution of the survey in the USA and Canada for testing. The comments and feedback were incorporated, and we are ready to distribute the survey to all North American mills.

The Research & Development Subcommittee is very interested in doing Generating Bank and Screen tube studies. One (1) in eight (8) Screen tube leaks reported to BLRBAC resulted in an explosion. Also, one (1) in twenty-five (25) Generating Bank tube leaks reported to BLRBAC resulted in an explosion. These studies will build on earlier work by the AF&PA Recovery Boiler Program. The start date for these studies will be considered after the funding requirements for publishing the new "Kraft Recovery Boilers" Textbook is determined.
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

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

Contact information for Wayne Grilliot: wayne_grilliot@afandpa.org or (937) 602-1892.

8. TAPPI STEAM & POWER/ENERGY MANAGEMENT REPORT – Danny Tandra
Energy Recaust Committee Chair

No written report submitted at this time.

9. WESTERN CANADA BLRBAC REPORT – Mike Trivett from Valmet

The Western BLRBAC meeting was held two weeks ago in Vancouver on March 26th and 27th. There were eight mill representatives present due to heavy shutdown period. About six regular mill representatives, who would have been there, were tied up in shutdowns or other emergencies.

For the closed meeting date about 25 attendees total, including the boiler makers, guests, etc. We talked about some of the recent incidents, the Harmac including two or three incidents.

We talked about a few other issues. Canfor Intercon mill had a smelt rush issue and they found that after the last shutdown, the mini hood dissolving tank extensions were free and not welded to the tank roof and the smelt rush they blew those off of the top of the tank and moved them about four inches or so. They have a new SOP to make sure that those are actually welded to the tank after any maintenance.

Other discussions were in a round table session. There were lots of discussions on lime kiln, ring formation and best practices, ongoing. Burning waste gases and NCG and other waste streams in the lime kilns. We discussed an issue at Alpac with high copper in feedwater. There was a

discussion briefly yesterday about needing to clean generating bank tubes and chemical cleaning. Condensate return from Flakt dryers, attention to water quality, polishing and cleaning and keeping from going into the boiler water.

The second day of the meeting there were six presentations chosen by the Western BLRBAC Steering Committee with a technical focus for their particular interests. I didn't remember what was on the list, but did recall a presentation on bed imaging cameras that was interesting and upcoming developments for 3D bed volume determination from cameras.

10. ACTIVITIES OUTSIDE NORTH AMERICA REPORTS
No report was given at this meeting.

11. OPERATING PROBLEMS SESSION REPORT – David von Oepen

The Operating Problems Session was held on April 9th. There was very good membership participation at this session. We had 20 questions submitted with very good responses. We had a wide variety of topics covered and very good audience participation. A main topic of discussion was around safe operation of soot blowers, operation of contractor training, the participation and evacuation drill, and some good conversations about tube deposit and management of the boilers. There was good participation during this important session. This concludes the Operation Problems Session Report. Any questions on that?

I would like to remind everybody that we have two technical presentations following this meeting:

"Clinker Detection System"
Presented by Ryan Welker, Integrated Test & Measurement (ITM)

"Most Typical Failures in Recovery Boilers – A Statistical Approach"
Presented by Keijo Salmenoja, Andritz

Please stick around as these will prove to be very informative.

CLOSING COMMENTS:

David Slagel – CHAIRMAN: Just a reminder that the next meeting of BLRBAC is going to be October 14, 15 & 16, 2019. Don't go by what was previously posted on the WEB site as it is going to be corrected. These dates will appear in the Fall 2019 Meeting Notice and they have been confirmed by the Crowne Plaza Hotel Representative. I hope all of you folks will be able to attend.

This concludes the Main Committee Meeting. I'll now entertain a motion to adjourn the meeting? Do I have a second? I finally got a motion to second that. I'm not sure you folks want to leave yet. All in favor? Anybody opposed? The Main Committee Meeting is officially over. Everybody, enjoy the rest of the day and travel safe!

APPENDIX I
INCIDENT LIST

NO LEAK

SPRING 2019-01	
Classification:	Not Critical (NC)
Co, Mill, Location:	**International Paper, Bogalusa Mill, Bogalusa, LA**
Unit Data:	RB#20,1966 (original), 1980 (Rebuilt), B&W, Original PR68, Rebuilt (1980) PR202, Drums - 2, DCE - Cyclone, Floor - Decanting
Unit Size:	2.8 MMlb DS/day, 388,000 lb/hr steam, 850 PSIG, 825^{o}F, 1050 PSIG Design
Incident Date/Time:	March 11, 2018 6:19pm, Earliest Indication: 3/11/2018 at 6:14pm
Downtime hrs, leak/total:	65.5
ESP?	**YES**
Leak/Incident Loc:	Other, No leak detected
How discovered:	Control Room, Operator observed significant drop in furnace pressure and steam flow with a significant feedwater flow.
Wash adjacent tube:	NO
Root cause:	Operator Error, Operator saw multiple indications that could have been a result of a tube leak, and made a judgement call to ESP. The furnace draft decreased instead of increasing in the case of a tube leak.
Leak detection:	NO
Bed cooling enhanc	YES
Last full inspection:	Mar-17
Sequence of events:	Following shift change, night shift control room operator observed significant decrease in steam flow and furnace draft at 6:14 pm. Feedwater flow also increased significantly. Boiler was stable on day shift, so no indications of issues prior to shift change. Control room operator made the decision to ESP based on indications seen, concerned that there could be a large tube leak in the boiler. Following the ESP, building remained clear for 4 hours before initial walk down to locate possible leak. Initial walk down resulted in no obvious leak found. Unburned black liquor was observed in south spout during the walk down. The bed was hotter toward right rear of furnace. Southland Fire mobilized to cool bed with sodium bicarbonate. Following bed cooling, boiler was filled with water for low pressure (180psi) hydro. No leak was observed. Boiler pressure was increased to 800psi, with no leak observed. Completed water wash, dried out, and re-pressurized boiler to 800psi for third hydro, with no leak observed. BSI was on site and observed third hydro with the mill and the contractor (Brown and Root) personnel. After determining no leak present, boiler was re-fired. Further investigation of data determined furnace blackout occurred, resulting in the indications observed by the control room operator at the time of the ESP event.
Repair procedure:	N/A – no leak detected.
Future prevention:	Operator refresher training and scenario drills

OTHER

SPRING 2019-02	
Classification:	Critical **905**
Co, Mill, Location:	**Verso, Wisconsin Rapids**
Unit Data:	RB#2,1976, CE, 27074, Drums - 2, - Cascade, Floor - Decanting
Unit Size:	1.6 MMlb DS/day, 200,000 lb/hr steam, 1275 PSIG, 900^{o}F, 1450 PSIG Design
Incident Date/Time:	December 26, 2018, Earliest Indication: 12/26/2018 at 12:55pm
Downtime hrs, leak/total:	60
ESP?	**YES**
Leak/Incident Loc:	Other, Water supply line to the SH attemperator in the Penthouse
How discovered:	Walkdown, Operator noticed water coming of the penthouse, water was following attemperator line
Wash adjacent tube:	NO
Root cause:	Weld Failure, Once the attemperator pipe and the 90-degree elbow were separated it was noted that the pipe end was damaged during the reaming process. Click here to enter text.
Leak detection:	YES
Bed cooling enhanc	YES
Last full inspection:	Jun-18
Sequence of events:	12/26/2018 Wednesday 1:00pm Operator was doing boiler walk down inspection when he noticed water coming out of the Penthouse (water was following the attemperator line). Operator notified the control room at 12:55 after a brief discussion the control room operator initiated ESP at 1:00pm. • Operator follow the ESP checklist 2:00PM Call placed to Quinnesec that we need the bed cooling equipment and Operators help us extinguish the bed 9:00pm All clear giving and ESP system was reset. • Open up penthouse to investigate possible leak sources. • Cascade wash spool installed • 2 Quinnesec team members driving down to assist with bed cooling. Thursday 2:00am Bed cooling equipment from Quinnesec arrived at the mill 7:00am Quinnesec team members on sight and doing safety training. • Still can see hot spots on bed 8:00am Started to stage equipment for bed cooling 11:00am Equipment set up just waiting for Tinner to make up some end pieces for wand 12:00am Safety time out to review bed cooling procedure with operators 1:00PM Started to cool bed. 6:00pm Bed cooling complete Bed probes showing 250 degree. Rods where also installed into

	bed for 45 minutes, 600 and 900 temperature crayon where also used to verify no hot spots. • Started to fill boiler for hydro to verify/locate the leak in the penthouse 7pm Leak verified to be on 2' socket weld elbow. 9pm Modified Fireside lock out complete • Jamar and BSI entered penthouse for better look. • Started to drain boiler to operating level and water side lock out. • Jamar started to remove penthouse casing 11pm Water side lock out complete and work began. Friday 7am Jamar finished with repairs The damaged pipe end was removed and still allowed enough material present to establish a good fit. The 90-degree elbow tested by Acuren before repairs were conducted to verify no internal or surface issues were present. Acuren used Wet Fluorescent Magnetic Particle method which revealed no issues upon completion. Acuren Ultrasonically tested the two sections of Attemperator pipe as well. Lowest to Highest data read .258 to .292 with no issues present • Acuren also tested existing welds to the attemperator nozzle and the 90-degree existing socket welds (Wet Fluorescent Magnetic Particle testing) and check out good. • Water wash completed 10am Hydro to 1100# was completed and no leaks were found. In side of boiler was still wet from water wash so pressure was reduced to 500# and held for 3 hours. 1pm 2nd walk down still showed the boiler was dry and free of any leaks. • Boiler was unlocked and ready to fire off on gas.
Repair procedure:	The damaged pipe end was removed and still allowed enough material present to establish a good fit.
Future prevention:	Acuren used Wet Fluorescent Magnetic Particle method which revealed no issues upon completion. Acuren Ultrasonically tested the two sections of Attemperator pipe as well. Lowest to Highest data read .258 to .292 with no issues present Acuren was also tasked to test the existing welds to the attemperator nozzle and the 90-degree existing socket weld both welds had Wet Fluorescent Magnetic Particle testing performed which revealed no issues once completed.

SMELT SPOUT

SPRING 2019-03	
Classification:	NC
Co, Mill, Location:	**Resolute Forest Products, Calhoun, TN**
Unit Data:	RB#3,1994, Ahlstrom, #404006, Drums - 1, DCE - NO, Floor - Decanting
Unit Size:	4.5 MMlb DS/day, 697,000 lb/hr steam, 900 PSIG, 825^{o}F, 1164 PSIG Design
Incident Date/Time:	December 18, 2018, 6:28am Earliest Indication: 12/18/2018 at 6:05am
Downtime hrs, leak/total:	78
ESP?	**YES**
Leak/Incident Loc:	Smelt Spout, Smelt was leaking from #4 spout opening, operator lost spout cooling water indication
How discovered:	Walkdown, Operator in field saw smelt running down from top of dissolving tank
Wash adjacent tube:	NO

Root cause:	Other, Inserted spout seal failure
Leak detection:	YES
Bed cooling enhanc	YES
Last full inspection:	May-18
Sequence of events:	The unit was operating normally firing with 5 liquor guns on the morning of December 18th, 2018. The nightshift field operator had completed his last round at around 5:40 am and everything was ok. At 6:05 am the operators could hear abnormal booming coming from the dissolving tank. To investigate they went to the 2nd floor spout deck to check the spouts and shatter jets. They discovered smoke coming from the ground floor. They went down to see what was burning and saw smelt running off the top of the dissolving tank on the south side. The smelt had caught sections of the vertical plastic chemical splash curtain on fire, which was burning and generating smoke inside the building. The field operator then returned to the spout deck to investigate the sources of the smelt leak. The #4 spout was identified to be the source of the smelt flow as they could see the smelt running behind the spout. They attempted to plug the spout, however this did not work to stop the flow. At this time an orderly shutdown of the boiler was initiated and the field operator went to the control room to get his full face respirator and then proceeded pulling liquor guns from the boiler. In the control room, the operators saw the cooling water flow on this spout decrease to zero. At this point the control room operator was unsure where this cooling water was going as there were not any water leaks reported earlier by the field operator. They suspected that the spout cooling water may be entering the furnace and initiated an ESP of the boiler at 6:28 am. The field operators evacuated the boiler building safely once the ESP was initiated. The #4 spout packing had failed allowing smelt to leak out between the spout insert and the wall box sleeve. The leaking smelt flowed over the spout cooling water piping before flowing atop the dissolving tank. It is believed that this caused the spout cooling water to flash causing a false loss of spout cooling water flow indication. The spouts have a vacuum, eductor driven, water cooling system.
Repair procedure:	Removed spout and replaced ceramic rope, mortar, and refractory. All spouts were replaced with new spouts.
Future prevention:	Investigate alternative seal materials and spout installation techniques.

SMELT SPOUT

SPRING 2019-04	
Classification:	Critical **906**
Co, Mill, Location:	**Harmac Pacific. Nanaimo, British Columbia, Canada.**
Unit Data:	RB #6, 1963, B&W, 825-1689, New lower furnace 1983, Drums - 2, DCE - NO, Floor - Sloped to Front
Unit Size:	3.2 MMlb DS/day, 460,000 lb/hr steam, 600 PSIG, 750^{o}F, 750 PSIG Design
Incident Date/Time:	September 10, 2018, Earliest Indication: 9/7/2018 at 6 PM
Downtime hrs, leak/total:	34 hrs
ESP?	**NO**
Leak/Incident Loc:	Smelt Spout, Water was observed interacting with smelt on the spout and spattering smelt around the spout area on #4 spout. Crack in furnace end of inserted spout.
How discovered:	Walkdown, Normal spout cleaning round leak was discovered
Wash adjacent tube:	NO
Root cause:	Thermal Fatigue, This particular spout experienced routine pluggage requiring frequent operator intervention for smelt flow to be restored
Leak detection:	NO
Bed cooling enhanc	NO
Last full inspection:	Apr-18
Sequence of events:	Operator performing rounds noted excessive smelt splatter at #4 Spout. Shift Engineer called to spout to investigate. Decision to plug spout and isolate cooling water to affected spout. Monitored remaining spouts and boiler over the next couple of days. Boiler shutdown and spout replaced.
Repair procedure:	Spout was replaced with brand new from warehouse
Future prevention:	Evaluate spout change frequency

ECONOMIZER

SPRING 2019-05	
Classification:	NC
Co, Mill, Location:	**Domtar, Hawesville, Ky**
Unit Data:	RB#3,1987, Ahlstrom, 39445, Drums - 2, DCE - NO, Floor - Decanting
Unit Size:	2.1 MMlb DS/day, 360,000 lb/hr steam, 1250 PSIG, 860^{o}F, 1250 PSIG Design
Incident Date/Time:	November 20, 2018, Earliest Indication: 11/20/2018 at 7:30 AM
Downtime hrs, leak/total:	22’30”
ESP?	**NO**
Leak/Incident Loc:	Economizer, Tube leak on the edge of an old pad weld
How discovered:	Walkdown,
Wash adjacent tube:	NO

Root cause:	Weld Failure, Porosity at edge of old pad weld
Leak detection:	NO
Bed cooling enhanc	NO
Last full inspection:	Sep-18
Sequence of events:	On 11/20/18 at approximately 7:30 AM during a walkdown we found water in the #1 economizer ash conveyor. We had an orderly shutdown fire out at 5:00 PM 11/20/18 and repaired the leak. We completed a successful hydro and fire in at 11:30 AM 11/21/18. Steaming in header at 3:30 PM 11/21/18.
Repair procedure:	Ground out hole and re-welded.
Future prevention:	Inspect during outage.

ECONOMIZER

SPRING 2019-06	
Classification:	NC
Location:	**Verso Paper, Androscoggin Mill, Jay, ME**
Unit:	RB1, 1965, CE2564, 2-drum, sloped floor (Gotaverken rebuild), large econ (CE addition)
Unit Size:	2.35 MM lb ds/day, 296,000 lb/hr steam at 900 psig 810°F, 1000 psig design
Incident Date:	August 1, 2018
Downtime hrs, leak/total:	19 hr 35min
ESP?	**No**
Leak/Incident Loc:	1/16" pin hole leak on tube 9 row 1 just off the lower header of the Extended Long flow Economizer
How discovered:	Operator performing daily walk down heard the leak and observed water in the economizer hopper
Wash adjacent tube:	No
Root cause:	O2 pitting in the tubes at the inlet header. This is a long term issue for this boiler (past practices in the early years of operation for this boiler). Multiple leaks over time.
Leak detection:	Yes
Bed cooling enhanc	No
Last full inspection:	June 2018
Sequence of events:	0600 8/1/2018 – Operator performing rounds, reported hearing leak and observed water in the economizer hopper 0630 8/1/2018 – Gas in the boiler/reduce liquor firing, began burning out the bed 0655 8/1/2018 – All liquor out of the boiler 0930 8/1/2018 – Smelting stopped, floor verified to have no bed. Fire out of the boiler 1330 8/1/2018 – Drain boiler 2230 8/1/2018 – Repairs complete 0330 8/2/2018 – Dry hydro 0915 8/2/2018 – Fire in 1435 8/2/2018 – boiler on line
Repair procedure:	Area of leak UT'd for sufficient thickness of the area. Pad/spot weld repair made per Company policy. Dye penetrant check of repair post procedure followed by a hydrostatic test.
Future prevention:	Improved control/variability in feedwater temperature, DO and DA pressure.

ECONOMIZER

SPRING 2019-07	
Classification:	NC
Location:	**Verso Paper, Androscoggin Mill, Jay, ME**
Unit:	RB1, 1965, CE2564, 2-drum, sloped floor (Gotaverken rebuild), large econ (CE addition)
Unit Size:	2.35 MM lb ds/day, 296,000 lb/hr steam at 900 psig 810°F, 1000 psig design
Incident Date:	November 21, 2018
Downtime hrs, leak/total:	27 hr
ESP?	**No**
Leak/Incident Loc:	1/16" pin hole leak on tube 3 row 1 just off the lower header of the Extended Long flow Economizer
How discovered:	Operator performing daily walk down observed water in the economizer hopper
Wash adjacent tube:	No
Root cause:	O2 pitting in the tubes at the inlet header. This is a long term issue for this boiler (past practices in the early years of operation for this boiler). Multiple leaks over time.
Leak detection:	Yes
Bed cooling enhanc	No
Last full inspection:	June 2018
Sequence of events:	1145 11/21/2018 – Operator performing rounds, reported he observed water in the economizer hopper 1200 11/21/2018 – Gas in the boiler/reduce liquor firing, began burning out the bed 1400 11/21/2018 – All liquor out of the boiler 1620 11/21/2018 – Verified smelt bed burned out, pulled fire out of the boiler 2030 11/21/2018 – Boiler down from 4 hour curve, drain boiler 0900 11/22/2018 – Repairs complete, visually checked furnace for a bed and verified DCS floor thermocouples, started back fill for hydro 1230 11/22/2018 – Dry hydro 1335 11/22/2018 – Fire in 1902 11/22/2018 – boiler on line
Repair procedure:	Performed UT in the area of leak and adjacent tubes for sufficient thickness. Pad/spot weld repair made per Company policy. Dye penetrant check of repair post procedure followed by a hydrostatic test.
Future prevention:	Past practices have been corrected. Currently controlling DO and DA pressures and maintaining a constant feed water temperature..

ECONOMIZER

SPRING 2019-08	
Classification:	NC
Co, Mill, Location:	**WestRock, Panama City, FL**
Unit Data:	RB2, 1972 Combustion Engineering V2R, Contract # 27070, Drums - 2, DCE - Cascade, Floor - Decanting
Unit Size:	2.97 MMlb DS/day, 398,000 lb/hr steam, 450 PSIG, 750ºF, 570 PSIG Design
Incident Date/Time:	January 11, 2019, Earliest Indication: 1/11/2019 at 4:30pm
Downtime hrs, leak/total:	24
ESP?	**NO**
Leak/Incident Loc:	Economizer, Tube Butt Weld Above Lower Header
How discovered:	Walkdown, Operator saw water on lower economizer
Wash adjacent tube:	NO
Root cause:	Thinning Internal, pitting, Internal pit in Weld. Leak appeared to be caused from an internal pit. Due to its location from the lower economizer it may have been caused by an oxygen event sometime in the life of the unit.
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	May-18
Sequence of events:	Shift change was at 3:30 pm. At 4:30pm the Field Operator was conducting a unit walkdown with the sootblowers out of service when he noticed water on the lower Economizer header. The operator called for the Supervisor and Assistant Superintendent to confirm the suspected leak as it was in a non-critical component. Plans were made in the mill to allow the boiler to be shutdown. At 6:30pm the boiler was taken off liquor and the bed was burnt out. The boiler was taken off line at 11:45 to start the cool down for repairs. The Gas side lockout was completed, and a partial Water side Lockout was completed during the night shift. At 7:00am on January 12th the leak could be seen as a pit in a butt weld about 18” above the lower economizer header. The Weld was ground out, repaired and a dye penetrant inspection was completed. The boiler was unlocked and back on line at 8:30pm - liquor was fired at 11:45pm
Repair procedure:	Weld was removed at leak location and replaced
Future prevention:	Inspection of all welds in this area will be completed on Annual outage in May 2019

ECONOMIZER

SPRING 2019-09	
Classification:	NC
Co, Mill, Location:	Georgia Pacific, CSO, Cedar Springs, Ga
Unit Data:	#3 Recovery Boiler, 1974, Contract PR160, Drums - 2, DCE - NO, Floor - Sloped to Front
Unit Size:	3.0 MMlb DS/day, 497,500 lb/hr steam, 880 PSIG, 900^{o}F, 1025 PSIG Design
Incident Date/Time:	September 25, 2018, Earliest Indication: 9/25/2018 7:30 AM
Downtime hrs, leak/total:	58 hrs
ESP?	**NO**
Leak/Incident Loc:	Economizer, Leak was noted to have been coming from the bottom of the #3 pendant's (3rd from the north) supply line in the east economizer bank. Closer inspection revealed the exact location of the failure to be on the supply pipe's bottom tangent, approximately 2" from its header connection.
How discovered:	Walkdown, Discovered by operator.
Wash adjacent tube:	NO
Root cause:	Unknown, It is suspected the cause could be the result of an arc strike performed during original fabrication and was never removed/addressed properly. This is suspected due to the deeper pitting noted around the indication and its location near the header weld. However, the exact cause could not be determined without an unmodified (no repairs) sample having been removed for metallurgical analysis. This was not possible due to the selected repair method.
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Apr-18
Sequence of events:	On 9/25/18 at approximately 7:30 am, operators reported seeing a very small amount of water at the north economizer ash hopper outlet. The water was in droplet form, not a stream or spray and there was not enough in quantity to actually wet the hopper wall. Several access doors above the area were opened with no visible signs of water. No unusual noises were present. Sootblower steam was valved out but the quantity of water observed did not change. No changes were seen in steam/feedwater separation and the leak detection system did not indicate a problem. Due to downtime on another boiler, the situation was monitored throughout the day with no changes observed in leak quantity, noise or operational parameters. The other boiler came online around 4:30 PM and at 4:45 PM, auxiliary fuel was started and liquor flowrates reduced. All liquor was pulled at 5:20 PM. Afterward access doors were opened for additional inspection. No signs of water were observed from the access doors, however water droplets were still present at the hopper outlet. Due to the location of the water observed, the decision was made to burn out the bed and perform an orderly shutdown. The unit was fully shut down at 2:00am on 9/26/18. After cooldown, water wash and dryout, a hydro was performed to locate the source of the water.
Repair procedure:	The leak area was weld repaired using a TIG procedure with 70S-2 filler metal.
Future prevention:	The repaired area will be removed and replaced during the next annual maintenance outage.

ECONOMIZER HEADER INSPECTION ACCESS

SPRING 2019-10	
Classification:	NC
Mill & Location:	**WestRock Fernandina Beach, FL**
Unit Data:	RB#4,1970, B&W, PR-126, Drums - 2, DCE - NO, Floor - Sloped to rear
Unit Size:	3 MMlb DS/day, 492,000 lb/hr steam, 875 PSIG, 825ºF, 1000 PSIG Design
Incident Date/Time:	January 4, 2017, 12:00
Downtime hrs, leak/total:	25
ESP?	**NO**
Leak/Incident Loc:	Economizer Header Inspection Access, Hand Hole Cap
How discovered:	Walkdown, Saw evidence of water in hopper
Wash adjacent tube:	NO
Root cause:	Weld Failure, Crack in the weld.
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Dec-16
Sequence of events:	While making normal operating rounds the 1st Assistant Operator saw indication of moisture in the economizer hopper. The boiler was shutdown in a control fashion after the bed was burned out. After the fire was pulled, the upper hopper manway door was opened to discover a leak on the North 4th Row Header hand hole cap.
Repair procedure:	MT was used to identify the size of the crack. PT was used to verify the crack was completely removed. Then the cap was rewelded. There was a post weld PT then a hydro to test the weld.
Future prevention:	This is a repeat failure of hand hole caps in the economizer. At one time there was a material compatibility issue F-22 caps in a carbon steel header. Some of the replacement caps have suspect welds (only two pass) The mill is replacing about 8 caps a year during the annual out to eliminate this issue.

ECONOMIZER HEADER INSPECTION ACCESS

SPRING 2019-11	
Classification:	NC
Mill & Location:	**WestRock Fernandina Beach, FL**
Unit Data:	RB#4,1970, B&W, PR-126, Drums - 2, DCE - NO, Floor - Sloped to rear
Unit Size:	3 MMlb DS/day, 492,000 lb/hr steam, 875 PSIG, 825ºF, 1000 PSIG Design
Incident Date/Time:	December 18, 2017, 22:00
Downtime hrs, leak/total:	27
ESP?	**NO**
Leak/Incident Loc:	Economizer Header Inspection Access, Hand Hole Cap

How discovered:	Walkdown, Saw evidence of water in hopper
Wash adjacent tube:	NO
Root cause:	Weld Failure, Crack in the weld.
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Dec-16
Sequence of events:	While making normal operating rounds the 1st Assistant Operator saw indication of moisture in the economizer hopper. The boiler was shutdown in a control fashion after the bed was burned out. After the fire was pulled, the upper hopper manway door was opened to discover a leak on the North 3rd Row Header hand hole cap.
Repair procedure:	Visual Inspection revealed a ¼" hole in the hand hole cap weld. PT was used to verify the crack was completely removed. Then the cap was rewelded. There was a post weld PT then a hydro to test the weld
Future prevention:	This is a repeat failure of hand hole caps in the economizer. At one time there was a material compatibility issue F-22 caps in a carbon steel header. Some of the replacement caps have suspect welds (only two pass) The mill is replacing about 8 caps a year during the annual out to eliminate this issue.

ECONOMIZER HEADER INSPECTION ACCESS

SPRING 2019-12	
Classification:	NC
Mill & Location:	**WestRock Fernandina Beach, FL**
Unit Data:	RB#4,1970, B&W, PR-126, Drums - 2, DCE - NO, Floor - Sloped to rear
Unit Size:	3 MMlb DS/day, 492,000 lb/hr steam, 875 PSIG, 825^{o}F, 1000 PSIG Design
Incident Date/Time:	April 3, 2018, 21:00
Downtime hrs, leak/total:	28
ESP?	**NO**
Leak/Incident Loc:	Economizer Header Inspection Access, Hand Hole Cap
How discovered:	Walkdown, Saw evidence of water in hopper
Wash adjacent tube:	NO
Root cause:	Weld Failure, Crack in the weld.
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Dec-16
Sequence of events:	While making normal operating rounds the 1st Assistant Operator saw indication of moisture in the economizer hopper. The boiler was shutdown in a control fashion after the bed was burned out. After the fire was pulled, the upper hopper manway door was opened to discover a leak on the 3rd cap from North on 4th Row Header hand hole cap.
Repair procedure:	MT was used to identify the size of the crack. PT was used to verify the crack was completely removed. Then the cap was rewelded. There was a post weld PT then a hydro to test the weld.
Future prevention:	This is a repeat failure of hand hole caps in the economizer. At one time there was a material compatibility issue F-22 caps in a carbon steel header. Some of the replacement caps have suspect welds (only two pass) The mill is replacing about 8 caps a year during the annual out to eliminate this issue.

ECONOMIZER

SPRING 2019-13	
Classification:	Critical **907**
Co, Mill, Location:	**Harmac Pacific, Nanaimo British Columbia**
Unit Data:	RB#5,1953, Combustion Engineering, CA-51126, Drums - 3, DCE - NO, Floor - Decanting
Unit Size:	1.6 MMlb DS/day, 175000 lb/hr steam, 600 PSIG, 750^{o}F, 675 PSIG Design
Incident Date/Time:	February 23, 2019, Earliest Indication: 2/23/2019 at 16:30
Downtime hrs, leak/total:	60 hours
ESP?	**YES**
Leak/Incident Loc:	Generating bank economizer feeder tube
How discovered:	Walkdown, Discovered during routine leak check
Wash adjacent tube:	NO
Root cause:	Weld Failure,
Leak detection:	NO
Bed cooling enhanc	NO
Last full inspection:	Apr-18
Sequence of events:	16:30 • Shift Engineer was informed of a possible tube leak in No.5 recovery by the recovery engineer. The recovery assistant had just opened up a furnace door as part of a routine leak check and thought he saw some water. • The Shift Engineer met the operator in the recovery control room; he said he wasn't sure if he saw water or not, that it was a in small area in the superheater. He said he couldn't hear anything. shut off the sootblowers again, and proceeded to the 5th floor. •The caution lights were turned on around this time. • We opened up the furnace door on the right-hand side nearest the gen bank, 5th floor level where the assistant had seen something. Looking in with a good flashlight, there was what looked to be moisture behind a piece of flat bar attached between the superheater tubes, about 4 rows in. There was no sound of any leak. • The door directly across on the opposite wall was opened as well; some water was dripping just inside this door from directly above, but was attributed to condensate from the sootblower above the door; the lance was hot/poppet valve leaking by. •We checked to see if the moisture seen on the right-hand side at the flat bar could have possibly been from a sootblower in the area, confirmed it was not. 16:50 • Shift Engineer went to the recovery control room and informed the operator to start pulling liquor as a precaution and to for us to get a better look inside the furnace. • The Shift Engineer then went back to the office to meet the Shift Engineer coming onto night shift. •The Shift Engineers went to No.5 recovery, where the suspect area was inside the furnace at the 5th floor. We then opened up a door on the 6th floor, right hand side, and could see what looked

	to be wet streaks on some of the superheater tubes. We then went to the top floor, and opened up the clean out ports on the right side. When we opened and cleared the port nearest the steam drum, we could see moisture inside on the tubes and accumulated saltcake. There was no sign of any moisture looking inside the other port. •At this point we agreed that there was most likely a leak. 17:15 • We went to the recovery control room where we informed the recovery engineer that we thought there was a leak. There was a brief discussion; the Shift Engineer said we needed to do an ESP as we suspected there was water entering the furnace. 17:20 •The ESP was initiated from the DCS.
Repair procedure:	Tube attachment weld was excavated and weld metal build up applied
Future prevention:	Survey remaining feeder tubes during 2019 Outage

ECONOMIZER

SPRING 2019-14	
Classification:	NC
Co, Mill, Location:	**International Paper, Bogalusa Mill, Bogalusa, LA**
Unit Data:	RB# 21,1989, B&W, PR211, Drums - 1, DCE - NO, Floor - Sloped to rear
Unit Size:	3.3 MMlb DS/day, 504,600 lb/hr steam, 875 PSIG, 825^{o}F, 1,050 PSIG Design
Incident Date/Time:	July 14, 2018, Earliest Indication: 7/13/2018 at 11:50pm
Downtime hrs, leak/total:	64.98 hrs
ESP?	**NO**
Leak/Incident Loc:	Economizer, #2 economizer, 4th tube, 1st platen from the north, approximately 5' below 8th floor
How discovered:	Other, #2 economizer collection conveyor chain came off sprocket. Field operator went to inspect and observed large volume of water in hopper. Liquor was pulled and further visual inspection identified tube leak location.
Wash adjacent tube:	NO
Root cause:	Thinning External, Lab analysis determined external wall thinning likely cause of tube failure, however internal pitting was also observed on the tube section.
Leak detection:	NO
Bed cooling enhanc	NO
Last full inspection:	Mar-17
Sequence of events:	On 7/13/18, RB21 was in the process of starting up following a 480V switchgear distribution failure. Shortly after liquor firing, the control room operator received an alarm that the #2 economizer collection conveyor stopped. The field operator, shift mechanic, and FLL went to the 5th floor to inspect the conveyor. The chain came off the sprocket. While inspecting the conveyor, the group observed water leaking from the boiler casing on the north side of the conveyor (approximately 11:50pm). Suspecting a tube leak, the hopper door was opened to inspect. Water drained from conveyor, but no obvious large flow of water could be seen. With no risk of water entering the furnace and suspecting possible IK condensate, the team waited one hour to determine if the water dried out. When water was still present, the team pulled liquor to further investigate for tube leak location. At approximately 4:26am, the leak was identified in the north section of the #2 economizer above the 6th floor. A bed burnout and orderly shutdown following SOP-0025-RBG commenced. The boiler was locked out at 7am 7/14/18. The #2 economizer was water washed and drained for repair of the failed tube. Upon inspection of the economizer, a pinhole leak was identified approximately 5' below the 8th floor, 4th tube, 1st platen from the north side of the boiler. Brown and Root completed repair, Boiler hydro was performed following tube repair on 7/15 at approximately 6pm. No internal tube leaks detected, however the isolation valve on the steam drum to the drum level transmitter was found leaking. Brown and Root removed the leaking valve and welded a new valve in the line. Second hydro was performed successfully at 7/16 4am. Boiler drum level was lowered to operating level and startup SOP-0027-RBG R4 was followed to bring boiler back online.
Repair procedure:	Brown and Root removed boiler casing for access to failed tube. Approximately 8' tube section

	and surrounding membrane were removed between 7th and 8th floors, north side of the boiler. New tube section, membrane, and boiler casing were installed. BSI representative was on site with ATS to oversee the repair.
Future prevention:	Plan to do spot NDT next outage on No. 2 economizer to identify any wall thickness issues.

ECONOMIZER HEADER INSPECTION ACCESS

SPRING 2019-15	
Classification:	NC
Co, Mill, Location:	**International Paper; Riverdale Mill; Selma, AL**
Unit Data:	RB# 1,1966, B&W, PR-98, Drums - 2, DCE - NO, Floor - Sloped to Front
Unit Size:	1.8 MMlb DS/day, 290,000 lb/hr steam, 650 PSIG, 800^{o}F, 725 PSIG Design
Incident Date/Time:	January 11, 2017, Earliest Indication: 1/11/2017 at 10:15
Downtime hrs, leak/total:	29 hours
ESP?	**NO**
Leak/Incident Loc:	Economizer Header Inspection Access, LHS header, right side Hand Hole Cap, on the second economizer
How discovered:	First Helper on a Basic Care round discovered excessive water coming from the Economizer Hopper on #1 Recovery Boiler. A leak at a Hand hole cap on a lower economizer header was identified on January 11th 2017. Upon shutdown and inspection, the leak was present at the LHS header, right side Hand Hole Cap, on the second economizer header from front.
Wash adjacent tube:	NO
Root cause:	The opening in the header may have been oversized with an excessive gap present and the header seat not refurbished as normal protocol when the header caps are replaced. This would allow the weld to be more exposed to erosion, less weldment in needed areas and failure.
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Mar-16
Sequence of events:	On day shift of Wednesday, January 11, water was observed by First Helper coming from the economizer during operator round. A decision was made to do a normal shutdown of the boiler. On January 11, 2017 Liquor out of the boiler at 13:00. Started Burning out the bed at 13:00. Fire out of the boiler at 20:00 and started cooling down the boiler. LOTO the fireside completed at 05:00 on 1/12/17. Boiler drained and waterside locked out and contractor stated the repair at 10:00. Repair and NDE were completed at 17:45. Waterside unlocked and started filling the boiler for hydro at 19:00. Hydro was completed and the boiler was dry at 23:00 on 1-12-17. The boiler was unlocked fire in the boiler at 07:30 on 1-13-17. Boiler on line at 21:00, on liquor at 22:30. A sizable hole was present in the fillet weld on the front side of the hand hole cap. This appears to be result of defective welding during the hand hole caps last installation. It appears that the leak had been present for some time.
Repair procedure:	The hand hole cap was removed to allow the header to be restored and a new hand hole cap to be properly fit and welded.
Future prevention:	Random PT of 10%-15% of untouched caps every other outage.

SUPERHEATER

SPRING 2019-16	
Classification:	NC
Mill & Location:	**WestRock Fernandina Beach, FL**
Unit Data:	RB#4,1970, B&W, PR-126, Drums - 2, DCE - NO, Floor - Sloped to rear
Unit Size:	3 MMlb DS/day, 492,000 lb/hr steam, 875 PSIG, 825^{o}F, 1000 PSIG Design
Incident Date/Time:	October 8, 2018, 09:30
Downtime hrs, leak/total:	39.25
ESP?	**NO**
Leak/Incident Loc:	Superheater, Hairpin loop on the primary outlet platen #27 (8 tubes in from North wall). There was a crack on both sides of the centerline of the loop. The loop was sent to the WestRock lab for failure analysis.
How discovered:	Walkdown, The operator heard a faint noise, isolated sootblowers and noise remained
Wash adjacent tube:	NO
Root cause:	SAC, Failure analysis showed superheater bend failed from corrosion fatigue
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Dec 2017
Sequence of events:	While making normal operating rounds the 1st Assistant Operator heard a faint noise near the mud drum. The steam supply to the sootblowers was isolated to insure the noise was not from a leaking poppet valve. The noise was present after isolating the sootblower supply so the decision was to shutdown to investigate the cause. The boiler was shutdown in a control fashion after the bed was burned out. After the boiler was cooled a hydro was performed to investigate. A leak was found with the hydro on the outlet of the primary superheater.
Repair procedure:	The loop was replaced. The adjacent tubes were UT and visually inspection to insure there was no thickness loss or other damage.
Future prevention:	During the January 2019 outage, we plan to shear wave adjacent loops to see if any internal cracking can be found.

SUPERHEATER

SPRING 2019-17	
Classification:	NC
Co, Mill, Location:	**Evergreen Packaging, Pine Bluff**
Unit Data:	RB#3,1959, Babcock and Wilcox, p-60, Drums - 2, DCE - Cyclone, Floor - Sloped to Front
Unit Size:	1.4 MMlb DS/day, 205lb/hr lb/hr steam, 1250 PSIG, 850^{o}F, 1275 PSIG Design

Incident Date/Time:	November 19, 2018, Earliest Indication: 11/19/2018 at 7:50pm
Downtime hrs, leak/total:	
ESP?	**YES**
Leak/Incident Loc:	Superheater, secondary outlet
How discovered:	Boiler Trip,
Wash adjacent tube:	NO
Root cause:	Unknown,
Leak detection:	NO
Bed cooling enhanc	YES
Last full inspection:	Jan-18
Sequence of events:	At 7:50 pm on 11/19/2018 #3 recovery boiler tripped. The first out on the BMS computer indicated unstable liquor firing. The control room retracted the soot blowers. When the operator went to remove the liquor guns, they noticed the boiler blowing back from the gun ports and at that time began walking down the boiler and observed a loud noise coming from the upper floors of the boiler. At 7:50 pm the boiler was operating @ 1212 PSI and the steam flow was 102 KPPH with a feed water flow of 106 KPPH. The steam drum water level prior to the trip was + .133. At 8:00pm the decision to ESP the boiler was given as they could not be sure if water was entering the furnace.
Repair procedure:	A Dutchman was installed
Future prevention:	

SUPERHEATER

SPRING 2019-18	
Classification:	NC
Location:	**Verso Corp. Androscoggin, Jay, Maine**
Unit:	RB2, 1976, B&W, PR-182, 2 Drum, long flow economizer
Unit Size:	3.0 MM lb ds/day; 365,000 lb/hr steam at 900 psig, 810°F, 1050 psig design (MAWP)
Incident Date:	July 7, 2018
Downtime hrs, leak/total:	104 Hours
ESP?	Yes
Leak/Incident Loc:	Superheater T & G lug tear (small leak at the toe of a weld discovered upon hydro) and upper primary superheater loop shear.
How discovered:	Large leak detected by leak detection system and operator walkdown.
Wash adjacent tube:	No
Root cause:	Fatigue. Metal fatigue initiated from the failed T&G lugs as a result of sootblower lance tube coming in contact with the pendant (The failed tube is out for full metal analysis).
Leak detection:	Yes, Buckman Recovery Boiler Advisor
Bed cooling enhanc	Injection of Liquid CO2 into remaining bed
Last full inspection:	July 2017
Sequence of events:	The #2 Recovery Boiler was operating under “normal” conditions with a steaming rate of 265kpph on liquor (165gpm). 65% liquor solids.

On 7/7/2018 at 0000 hrs the control room operator and Process Manager were alerted to the RBA leak detection system having an elevated mismatch in the steam and feedwater differential (20-25 kpph actual stm/feedwater differential… however the mismatch indication in this case is a sustained/time based average which brings in other factors such as stm/feedwater flow, CBD flow, mud drum blow valve position, superheater relief valve position, etc.). Initial field verifications gave no indication of a leak (boiler water tests/operator walkdowns). At 0100 hrs liquor firing was reduced and additional walkdowns conducted to look for a leak based on the information from the leak detection system. At 0140 hrs liquor was completely removed and the operating personnel performed a thorough walkdown of the boiler with no evidence (sight or sound) of a leak observed. At 0300 hrs, the Area Manager was notified of the leak detection program again alerting to a leak. At 0330 hrs the Area Manager reviewed the RBA (leak detection program), boiler water test results and also conducted another walkdown with no evidence of a leak. All boiler chemistry tests (PO4, alkalinity and caustic addition) showed normal and level. After consulting with the Power Plant Manager, liquor was reintroduced to the boiler at 0521 hrs. After a liquor divert on low solids at 0627 hrs, liquor was reintroduced at 0755 hrs. At 0807 hrs it was observed that there was a large steam/feedwater differential (approximately 150 kpph) and personnel immediately looked for any other symptoms of a leak. Observations at this time: Furnace Pressure – Steady at -0.45” with a SP of -0.4”, Drum level – Steady at +1.8” with a SP of +2.0 and ID Fan Speed – Steady at 25% output.

The Area Manager and the Power Plant (head) Operator went to the operating floor to look/listen at the liquor gun ports and did not hear/see any indication of a leak. Since there was no physical or statistical evidence of a leak, operating personnel were suspecting an instrumentation issue with the steam flow transmitter. The Operator and Area Manager then proceeded to the top of the boiler to verify that there was no leak present. Once there, an observation of ash/fume was present in the air. At this time, a high pressure leak could be heard (internal to the boiler). An ESP was called for and immediately initiated at 0812 hrs.

A headcount of personnel was conducted. The post ESP checklist was completed and the boiler was isolated for the 4 hour minimum wait period. Floor thermocouples were monitored and all registered to be decreasing following the ESP.

After the wait period, the boiler was visually inspected from top to bottom. There was no immediate observation of a failed boiler component. Nothing could be seen from the access door to the penthouse. Very little to no bed was present at the time of the ESP since liquor had been removed for several hours previously in order to conduct inspections.

The small area of bed/char that was present was probed and temperatures recorded. Liquid CO2 was injected into these areas. All areas were below 500 degrees after 8 hours.

The initial backfill for hydro revealed a failed superheater tube (platen 9) between the intermediate and secondary loops, inside the penthouse. After cleaning, installing staging, making repairs to

	the initial leak and conducting a hydro, a visual inspection of the upper furnace, revealed two failed T & G lugs on tube 4 of the same platen. Both of which had through wall cracks at the toe of the weld. A 3' dutchman repair was performed to encompass both leaks (initial PT of the area did not indicate cracking). A heavy sootblower rub on the same platen required a spot repair. The boiler was hydrostatically tested to 850 psi where an additional leak (on an outer loop, adjacent to the original leak in the penthouse) was found. A repair to this area was made and after a successful hydro, the boiler was returned to service.
Repair procedure:	Dutchman "outer loop" at/above the roof penetration. Dutchman where T&G lugs were torn off. Weld repair on outer super heater loop (penthouse). Weld repair on sootblower rub (all repairs conducted per Company policy). Note: The secondary superheater outer loop (repair) was replaced during the August 2018 annual outage.
Future prevention:	Continue with annual inspection and replacement of lugs.

SUPERHEATER

SPRING 2019-19	
Classification:	NC
Mill & Location:	**Verso, Escanaba Mill, Escanaba, MI**
Unit Data:	RB#10, 1972, B&W PR-138, Drums - 2, DCE - No, Floor – Sloped.
Unit Size:	3.95 MMlb DS/day, 560 lb/hr steam, 1475 PSIG, 900 F, PSIG Design
Incident Date/Time:	October 13, 2018, Earliest Indication: None
Downtime hrs, leak/total:	6
ESP?	**NO**
Leak/Incident Loc:	Secondary Superheater front bank of pendent #25 tube #8
How discovered:	Hydro. Weeping superheater tie found during the hydro following the 2018 annual outage
Wash adjacent tube:	NO
Root cause:	Crack in heat affected zone on the tube tie weld. The failure of the tube tie clip was on the inside of the clip and was not able to be spotted by visual inspection. The leak required the tube tie to be cut away to see the crack. The root cause of the failure of the weld is due to the original installation. It was common during the time of this installation to weld stainless tube ties to carbon steel tubes using the higher metallurgy (ie. Stainless) electrode. This results in stresses at tube ties ripping away carbon tube material and resulting in failures. We now make all tube tie installations and repairs using the lower metallurgy material as the weld electrode to allow the tube tie to break away from the weld instead of damaging a tube.
Leak detection:	
Bed cooling enhanc	NO
Last full inspection:	Oct 2018
Sequence of events:	The Recovery Boiler was shutdown for annual outage in October 2018. Going into the outage

	there were no indications of leaks in the boiler. Boiler inspections during boiler cooldown did not give any indication that there were any leaks in the boiler. All repair work was completed and a final hydro was being completed prior to scaffold removal for startup. The hydro identified a leak at a secondary superheater tube tie. Water was weeping down a secondary superheater and dripping onto the nose arch. The crack was small.
Repair procedure:	Grind out crack, PT, Weld repair, Hydro
Future prevention:	Visual inspection of tube ties during outages and hydro before startup.

SUPERHEATER

SPRING 2019-20	
Classification:	NC
Co, Mill, Location:	**Harmac Pacific, Nanaimo British Columbia**
Unit Data:	RB#5,1953, Combustion Engineering, CA-51126, Drums - 3, DCE - NO, Floor - Decanting
Unit Size:	1.6 MMlb DS/day, 175000 lb/hr steam, 600 PSIG, 750^{o}F, 675 PSIG Design
Incident Date/Time:	January 1, 2019, Earliest Indication: 1/1/2019 at 16:30
Downtime hrs, leak/total:	62 hours
ESP?	**YES**
Leak/Incident Loc:	Superheater, Leak was in a butt on the lower bend of the low temperature superheater directly on the inlet side of the generating bank
How discovered:	Walkdown, Discovered during routine leak check
Wash adjacent tube:	NO
Root cause:	Weld Failure, The leak was due to galvanic corrosion along the fusion line of the stainless steel filler and the carbon steel tube
Leak detection:	NO
Bed cooling enhanc	NO
Last full inspection:	Apr-18
Sequence of events:	Operator noticed dampness inside inspection door on last shift round during leak check. Fluid ash appeared to be present. Shift Engineer and Operator attended for inspection and noticed steam blowing in the vicinity of a gen bank attachment weld. Decision was made to ESP the boiler.
Repair procedure:	Tube bend was removed and replaced with new composite tube. Carbon to carbon weld was completed. No corrosion cap was added.
Future prevention:	Survey remaining superheater bend attachment welds and develop replacement program

SUPERHEATER

SPRING 2019-21	
Classification:	NC
Co, Mill, Location:	**International Paper, New Bern, NC**
Unit Data:	RB#1,1968, CE, 11667, Drums - 2, DCE - NO, Floor - Decanting
Unit Size:	4.2 MMlb DS/day, 630,000 lb/hr steam, 835 PSIG, 825^{o}F, 1000 PSIG Design
Incident Date/Time:	June 25, 2018, Earliest Indication: 6/23/2018 at 8 PM
Downtime hrs, leak/total:	117
ESP?	**NO**
Leak/Incident Loc:	Superheater, Final superheater stage – fish mouth
How discovered:	Other, Mechanic commented on steam coming from sootblower lance while changing poppet

	valve
Wash adjacent tube:	NO
Root cause:	Erosion/corrosion of tube face due to boiler pluggage and channeling, along with condensate from a leaking poppet valve.
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Apr-17
Sequence of events:	A poppet valve on a sootblower in the superheater section was changed on 23-Jun at 20:00. The mechanic reported steam coming back through the lance. Began monitoring and checking for a tube leak. Follow up on the sootblower lance tube on 25-Jun at 09:00 indicated a steam leak inside the furnace. Leak detection system supported a small steam leak (but no boiler water leak). The boiler was taken down in an orderly fashion.
Repair procedure:	Replaced 12' section of tube.
Future prevention:	Maintain water wash intervals and improve poppet valve inspection procedure.

BOILER BANK

SPRING 2019-22	
Classification:	NC
Co, Mill, Location:	**International Paper, Grande Prairie, Ab. Canada**
Unit Data:	RB# 2,2007, Kvaerner Power Inc., GPP4901, Drums - 1, DCE - NO, Floor - Decanting
Unit Size:	4.9 MMlb DS/day, 811,140 lb/hr steam, 1500 PSIG, 950^{o}F, 1784 PSIG Design
Incident Date/Time:	August 9, 2018, Earliest Indication: 8/9/2018 at 21:16
Downtime hrs, leak/total:	80 hours
ESP?	**YES**
Leak/Incident Loc:	Boiler Bank, Economizer 3 and Gen Bank cavity membrane Water Wall (GB cavity front wall) tube No.1 from the left wall, approximately 4 feet up from the lower header at the attachment weld to the hopper casing.
How discovered:	Walkdown
Wash adjacent tube:	NO
Root cause:	Thermal Fatigue, OD originated crack at the weld termination of a large uncooled fin. (Part of the hopper side / front wall corner casing)
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Sep-17
Sequence of events:	Boiler was coming back on liquor after a PMO, liquor flow was 200 GPM, and steam flow was 645,000 lbs/hr and the boiler was stable, the FW flow was 668,000 lbs/hr. Boiler drum at operating level and stable. All waste gas streams were being burned in the furnace. At 21:16 the Shift engineer noticed a large amount of water spraying outside the boiler on the 8th floor, left side while doing his walk down. Water/steam was spraying out of the boiler in the gen bank header area and running down the side of boiler. Feed water operator immediately tested for chemical residuals, results were normal. Boiler operator checked the steam flow, water flow and steam/FW flow differential trends, nothing unusual noticed on the trends. A controlled shutdown was initiated but the shift engineer in the field determined that because of the size of the leak he was observing and fearing water could make its way into the furnace area ordered an ESP @ 21:23.
Repair procedure:	Temporary repair by excavation of the defect area and full penetration weld build up, will replace the tube at next shutdown in April 2019.
Future prevention:	Work with OEM to determine path forward and inspect other similar locations.

SPRING 2019-23	
Classification:	Critical **908**
Co, Mill, Location:	**International Paper, Prattville Mill, Prattville AL**
Unit Data:	RB#1,1967, CE, 1965, Drums - 2, DCE - Cascade, Floor - Decanting
Unit Size:	2.47 MMlb DS/day, 320,000 lb/hr steam, 900 PSIG, 830^{o}F, 1040 PSIG Design
Incident Date/Time:	November 15, 2018, Earliest Indication: 11/15/2019 at 12:00 AM
Downtime hrs, leak/total:	74.25 h
ESP?	**YES**
Leak/Incident Loc:	Boiler Bank, existing mud drum plug from added sootblower pass
How discovered:	Walkdown, Operator heard indications of a leak, confirmed by another
Wash adjacent tube:	NO
Root cause:	Other, Cracking at weld believed to be associated with corrosion from acid cleaning
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Oct-17
Sequence of events:	RB1 had been experiencing plugging issues in generating bank and economizer for a couple weeks leading up to this event. The mill had taken the liquor off the boiler the week before with oil fire for steam generation and continued to run the sootblowers in an attempt to clean up the boiler as had been done in previous years. Prior to the walkdown, the boiler had been experiencing backpressure out of the gun ports. During the shift walkdown AROUND 11:30 pm, the boiler tender believed that he heard what sounded like a leak near the economizer/mud drum area of the boiler on the right side. He called the setup shift supervisor to inspect. The shift supervisor then called down to the control room and a boiler operator training on another job came up to verify. The crew leader believed that he saw some possible separation between the water flow and steam and the ID fan speed had been increasing significantly for the previous two shifts undetected. The operations team decided to perform an ESP at 12:15 am. Immediately after the ESP, operations management was informed and made their way to the mill. During initial investigation, the belief was that the Recovery Boiler was plugged with saltcake and that there were no obvious indication of a tube leak. A previous ESP was performed on RB1 in 2015 after hearing a whistling noise, but there was no leak and the boiler was plugged with saltcake. No definitive separation between the steam flow and the water flow could be found after trending. Furnace draft had been degrading over the course of 12 -16 hours and ID fan was speeding up. After the 4 hour waiting period and the initial walkdown, the mill began opening doors for inspection. The boiler was obviously plugged with saltcake and there were no indications of a leak in the furnace. Operations decided completed bed cool down, hydro was performed and initial leak was found. The mill moved forward with water washing the furnace. After the water wash, another hydro was performed and the leak was identified on the mud drum at a plugged tube in the center of the drum where a sootblower pass was installed in 1973. We had a previous failure in a similar spot on the hydro before startup in Fall of 2017.

Repair procedure:	Dye Penetrant Test, Removed and Replaced 3 plugs in drum tube openings
Future prevention:	Next annual outage will do visual inspection on all existing plugs and suspect plugs will be addressed.

ROOF

SPRING 2019-24	
Classification:	Critical **909**
Co, Mill, Location:	**Evergreen Packaging, Pine Bluff Ar.**
Unit Data:	RB#2 recovery boiler,1958, Babcock and Wilcox, PR-37, Drums - 2, DCE - Cyclone, Floor - Sloped to Front
Unit Size:	1.4 MMlb DS/day, 202,000 lb./hr. steam, 1250 PSIG, 900^{o}F, 1400 PSIG Design
Incident Date/Time:	August 12, 2018, Earliest Indication: 8/12/2018 at 8/12/2018@7:06am
Downtime hrs, leak/total:	139.5 Hrs.
ESP?	**YES**
Leak/Incident Loc:	Roof, Near steam drum, the #24 and #25 roof tubes in row A were the tubes that failed. Tube #24 had a .75" x 1.5" hole and tube #25 had a split approximately .25".
How discovered:	Boiler Trip, Boiler tripped on High furnace pressure upon further investigation water was seen below the steam drum spraying down.
Wash adjacent tube:	YES
Root cause:	Unknown, no lab results at this time
Leak detection:	NO
Bed cooling enhanc	NO
Last full inspection:	Mar-18
Sequence of events:	#2 recovery boiler was in the process of going down to repair an external chemical feed line leak Prior to the trip and subsequent ESP. 7:06 am - #2 recovery boiler tripped on high furnace pressure. A walk down inspection of the boiler at this time showed no signs of a blown tube. The drum level was a -.1 Boiler was purged and fired on natural gas. During a second walk-down of the boiler there was some steam noticed on the 8th floor of the boiler coming out around the super-heater thermo-couple electrical box on the west side of the penthouse. 9:34 am – An inspection door was opened on the 7th floor below the thermos-couple box and at this time water was seen spraying down the tubes. The #2 recovery boiler was Rapid drained at this time.
Repair procedure:	Replaced stubs to the outside swage on 9 tubes (row A replaced tubes #20-#27 and row b tube #7) and also seal welded 18 additional tubes in the same area of the drum.
Future prevention:	We will be performing an in depth inspection of the area on the next annual to assist in determining or path forward .

UPPER FURNACE, ABOVE HIGHEST AIR ENTRY

SPRING 2019-25	
Classification:	NC
Co, Mill, Location:	**Georgia Pacific, CSO, Cedar Springs, Ga**
Unit Data:	RB#2, M25-0501, B&W, 1991, PR215, Drums - 1, DCE - NO, Floor - Sloped to Front
Unit Size:	2.5 MMlb DS/day, 497,500 lb/hr steam, 880 PSIG, 830^{o}F, 1075 PSIG Design
Incident Date/Time:	March 24, 2018, Earliest Indication: 3/24/2018 at 12:30 AM
Downtime hrs, leak/total:	~16 Hours
ESP?	**NO**
Leak/Incident Loc:	Upper Furnace, above air entry, 10th floor elevation, RH Sidewall, in the bent tube opening for IK-18. This particular area of the boiler sidewall is steam cooled (not water bearing). The leak was spraying into the furnace from the LH tube of the 2-pack opening.
How discovered:	Hydro Test, Visual observation during a post outage hydro
Wash adjacent tube:	NO
Root cause:	Stress Assisted Corrosion (SAC), Root caused determined from ATS (Applied Technical Services)
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Mar-17
Sequence of events:	RB2 was shut down for the 2018 annual outage on March 16, 2018. The bed was fully burned out, the boiler taken offline, cooled down, water washed and dried per normal procedures. A pre-outage hydro was then conducted with no indication of any leaks. Routine pressure part work was performed during the outage. However, no work other than routine inspections were performed in the area of the failure. A post outage hydro was conducted during the evening of March 23, 2018. The leak was discovered by 3rd party inspection personnel during the hydro walkdown/inspection. ESP was not applicable since the boiler was already down
Repair procedure:	A single dutchman containing the bent section was installed to remove the area containing the defect. NDE was performed on the new welds and a hydro was also successfully conducted.
Future prevention:	Limit starts & stops on tube attachment

UPPER FURNACE, ABOVE HIGHEST AIR ENTRY

SPRING 2019-26	
Classification:	NC
Co, Mill, Location:	**IP Columbus Cellulose Fibers, Columbus, MS**
Unit Data:	RB# 1,1989, Babcock and Wilcox, 526-0212, Drums - 1, DCE - NO, Floor - ecanting
Unit Size:	6.5 MMlb DS/day, 943,000 lb/hr steam, 1500 PSIG, 925^{o}F, 1825 PSIG Design
Incident Date/Time:	February 8, 2019, Earliest Indication: 2/8/2019 at 12:30
Downtime hrs, leak/total:	41.1
ESP?	**NO**
Leak/Incident Loc:	Upper Furnace, above air entry, Convection Pass Tube Panel, steam circuit (see Section 11 for exact location)

How discovered:	Walkdown, Observed steam and loud noise when sootblowers were shutdown
Wash adjacent tube:	NO
Root cause:	Thermal Fatigue, Splice weld between the membrane and filler plate cracked and propagated to the tube
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	Mar-18
Sequence of events:	Friday February 8 the CRO asked his shifter to go troubleshoot sootblower #8 located one floor above the leak due to failure alarms on the IK. When the shifter arrived to the IK he noticed steam puffing from the floor below around IK #86 and notified operations to come inspect the source. The recovery operator, team leader, and shift manager all came to inspect the steam leak. After inspecting the leak the team looked at boiler feed chemicals, mass balance trends, and furnace pressures and noticed no indications of water entering the furnace. At that time they removed the insulation from around the tube panel under IK #86 and observed a steam leak from the convection pass external to the boiler. The failed tube is located on the convection pass (steam cooled) tube panel that is located between the rear most tube of the RHSW and the generating bank section. This is an extension of the superheater section. See Section 11. The unit was shutdown for repairs on February 8th, 3:05 pm.
Repair procedure:	Removed crack then weld overlay the tube
Future prevention:	Visual and PT examination during major outage

LOWER FURNACE

SPRING 2019-27	
Classification:	Critical **910**
Co, Mill, Location:	Resolute Forest Products, Coosa Pines Mill, Coosa Pines, AL
Unit Data:	RB#3; 1976, CE 31174, Drums – 2; Large Economizer., Floor - Flat
Unit Size:	3.85. MMlb DS/day, 550,000 lb/hr steam, 600 PSIG, 725.^{o}F, 900 PSIG Design
Incident Date/Time:	2/8/2019 2:42 PM., Earliest Indication: 2/8/19. at 8:00 AM
Downtime hrs, leak/total:	88 hrs 16 mins.
ESP?	Yes
Leak/Incident Loc:	#4 Start-Up Burner Tube Bend – Lower Furnace Between Primary and Secondary Air
How discovered:	Rodding Boiler and Walk-Downs
Wash adjacent tube:	
Root cause:	Sulfidation Corrosion
Leak detection:	Steam/Feedwater Differential Followed by Operator Walk-Down
Bed cooling enhanc	Yes
Last full inspection:	October 2018
Sequence of events:	2/8/19 6:00 AM – It was noted by area management that the steam-feedwater differential had increased and notification was made to area operators to be on the lookout for anything out of the ordinary. 7:00 AM – Outside Operator noticed that the Southwest corner of the bed was not burning. Operator initially believed that the previous shift had not done a proper job of rodding in that

	corner of the boiler causing the bed to not get sufficient air. Operator began rodding the air port and was successful getting the bed to start smelting. 9:00 AM – Boiler checks were under way – no increase in furnace pressure was seen, no speed increase in the ID Fan was seen, there were no unusual popping noises coming from the bed, there were no unusual smells coming from the bed indicating a black out condition, Boiler Excess O_2 did not change, there was no change in the boiler flue gas temperature, attemperator valve %, or steam temperature, there were no changes seen in the upper furnace pressures, and no changes were seen in the precipitators, and there were no leaking blow down tubes noticed. 9:00 AM – Full boiler walkdown was conducted. Nothing out of the ordinary was observed. 10:00 AM – Area Instrumentation Mechanic was instructed to calibrate the boiler outlet steam flow meter. There is a history of the boiler outlet steam flow meter not reading correctly. Instrument was checked and there was no change in the output of the flow meter. 1:00 PM – Steam-Feedwater differential was still elevated. Sootblowers were stopped and the boiler was walked down with the Lead Operator and Area Management. Nothing out of the ordinary was observed. 1:42 PM – Sootblowers restarted. 2:00 PM – Outside operator while making his round saw that the Southwest corner of the bed was not continuing to burn down and attempted to rod out the ports and noted hard buildup. The operator also noticed the rod was wet. 2:20 PM - Outside Operator notified lead operator and area management. Lead Operator and Area Management inspected the Southwest corner 2:42 PM – Decision was made to ESP and the boiler ESP was initiated. Throughout the day (prior to ESP) boiler conditions were held constant. 2/9 – 2/12 Re-entry into the boiler house was allowed 12hrs after the ESP and cooling of the boiler and smelt bed was initiated with additional air flow from the boiler fans. A smelt bed cooling company was later called in to speed up the bed cooling to allow water washing the boiler. After the smelt bed had been verified safe to water wash, hydroblasters cleaned the upper furnace to make the boiler safe for entry. Upon entry the leak was identified without hydro, thickness testing was performed on the failed tube and all associated openings in suspect areas. An additional thinned area was located on the bent tube opposite the failed tube in the same opening and both tubes were cut out of the boiler and replaced with new bent tubes. The boiler was hydro'd during the startup phase and no additional leaks were found. Gas burners then lit and the boiler brought up on a pressure curve per procedure with no incidents.
Repair procedure:	Replace Bent Tube Section
Future prevention:	Enhanced NDE Testing and apply metal spray to all lower furnace walls

FURNACE FLOOR

SPRING 2019-28	
Classification:	Critical **911**
Co, Mill, Location:	**Georgia Pacific, Leaf River, New Augusta, MS**
Unit Data:	RB#062-001-001,1984, 1983, SN 4142 / CN 551-992, Drums - 1, DCE - NO, Floor - Sloped to rear
Unit Size:	6.8 MMlb DS/day, 1,006,000 lb/hr steam, 1250 PSIG, 900^{o}F, 1491 PSIG Design
Incident Date/Time:	August 21, 2018, Earliest Indication: 2/18/2018 Click or tap here to enter text.
Downtime hrs, leak/total:	108 hrs
ESP?	**YES**
Leak/Incident Loc:	Furnace Floor, Floor tube #152 of 154 (third tube from left hand side wall) had a leak 1" below the upper weld line on the sloped section of the floor. Tubes 150, 151 and 152 had a bulge on the tube. The tube leak was 7' from the front wall (upper end of floor).
How discovered:	Walkdown, An operator discovered the leak while manually cleaning the primary air ports. Water was observed on the rod.
Wash adjacent tube:	NO
Root cause:	Overheat, Root cause is believed to be excessive push-through at a butt weld that resulted in steam blanketing caused by the accumulation of steam on the crown of the tube on the upstream side of the weld. Localized heavy smelt runoff may have been a contributing factor. The tube that failed was installed in 2011 and had ~4" on each end of the panel that did not have weld overlay applied. Metallurgical analysis concluded the tube "ruptured due to a combination of localized overheating, external damage, external erosion, and internal corrosion".
Leak detection:	YES
Bed cooling enhanc	YES
Last full inspection:	Nov-17
Sequence of events:	Beginning 8/18 the northwest corner of the boiler began to experience black outs on the primary air level. On the night of 8/18 operators noted that they thought something fell from the upper furnace which shook the recovery boiler and knocked off primary rodders. The operators walked the boiler down but did not observe any leaks. 8/19- turned the IKs off to look for leaks but nothing discovered. 8/20- experienced more black outs in NW corner. 8/20 8:00 PM started changing liquor gun nozzles to see if the nozzles were causing the NW corner of the boiler to black out. After midnight, operator discovered water while rodding the 2nd and 3rd primary wind box on the left wall and ESP was initiated. After cooling the bed with sodium bicarbonate, the boiler was water washed and personnel entered for inspection on 8/22. A tube leak was discovered on floor tube number 152 of 154 floor tubes. Tubes 150-152 had bulges below the floor panel butt weld in the 4" area that did not have any weld overlay from original installation. There are 33 tubes that have this 4" gap of bare carbon steel tubing at the upper floor butt weld and all were overlaid with Inconel 625 during the outage. The balance of the floor tubes below the butt weld are studded carbon steel down to the

	rear wall header. The tubes above the weld line are Sanicro 38 composite tubes. There have been corrosion problems in the studded portion of the floor, and the mill has an on-going program to replace the studded tubes with Inconel 625 weld overlay, multi lead ribbed (WOL MLR) tubing. (MLR tubing was not used when the failed tube was installed in 2011.) Current tubing that is being installed on the floor is multi-lead ribbed tubes to the reduce the potential for steam blanketing. After the 2019 outage, 108/154 floor tubes will be Inconel 625 WOL MLR.
Repair procedure:	3 - 18" Sanicro 38 composite tube dutchman were installed. A borescope inspection was done to check for obstructions - none were found. There are 33 tubes that have a 4" gap of bare carbon that were all weld overlaid with Inconel 625 at the upper weld line during the repairs.
Future prevention:	Inconel 625 WOL multi-lead ribbed tubes will be installed on the furnace floor. GP best practice also includes not having buttwelds in the floor tubes.

SUPPLY, TUBE BELOW FLOOR TUBES

SPRING 2019-29	
Classification:	NC
Co, Mill, Location:	**International Paper; Riverdale Mill; Selma, AL**
Unit Data:	RB# 1,1966, B&W, PR-98, Drums - 2, DCE - NO, Floor - Sloped to Front
Unit Size:	1.8 MMlb DS/day, 290,000 lb/hr steam, 650 PSIG, 800^{o}F, 725 PSIG Design
Incident Date/Time:	May 22, 2017, Earliest Indication: 5/22/2017 at 10:15
Downtime hrs, leak/total:	29 hours
ESP?	**NO**
Leak/Incident Loc:	Supply, 4" Supply Tube LHSW Lower Header, Tube #3 in Lower Vestibule
How discovered:	Hydro Test, Post outage start up hydro
Wash adjacent tube:	NO
Root cause:	Corrosion pitting, water side. The phenomenon has developed over a long period due to the inability for those areas to drain completely.
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	May-17
Sequence of events:	On May 22, water was observed coming from the lower vestibule casing during the post outage hydrostatic test. Leak was not associated with any work done during the outage. The Leak was a hole in the 4" supply tube LHSW lower header, tube No. 3 in the lower Vestibule. The repair performed was weld repair (Base Metal Restoration). Unit was locked out for repair at 10:30 on Monday, May 22 with repair completed at 13:00. Post repair hydro was completed at 07:55 May 24.
Repair procedure:	Base metal restoration performed after conference with IP CoE.
Future prevention:	Review in detail tube sensitivity to external damage before entry; Random UT of 15%-20% every other outage.

INTERNATIONAL INCIDENTS

SUPERHEATER

SPRING 2019-x1165	
Classification:	
Co, Mill, Location:	**International Paper do Brasil, Luiz Antônio**
Unit Data:	RB#1,1991 / 2005, CBC, CBC / Andritz, Drums - 2, DCE - NO, Floor - Decanting
Unit Size:	3.307 MMlb DS/day, 529,109.04 lb/hr steam, 1109 PSIG, 842^{o}F, 1123 PSIG Design
Incident Date/Time:	January 12, 2018, Earliest Indication: 1/12/2018 at 4:40 (GMT-3)
Downtime hrs, leak/total:	10,5h (6h repair; 4,5 h Hydrotest)
ESP?	**NO**
Leak/Incident Loc:	Superheater, Second level of the tertiary Superheater Ties
How discovered:	Hydro Test, Internal Inspection during the Hydro test
Wash adjacent tube:	NO
Root cause:	Fatigue, Mechanical fatigue
Leak detection:	YES
Bed cooling enhanc	YES
Last full inspection:	Jan-18
Sequence of events:	The leak was found during the hydrostatic test after the annual outage. The leak was on the second level of the tertiary superheater ties. Tube #19 panel 11 was replaced with Dutchman (1200 mm in length). A new hydrostatic test was executed and approved.
Repair procedure:	Installed a dutchman.
Future prevention:	Visual and PT inspection of all SH ties durinig the annual outage.

SUPERHEATER

SPRING 2019-x1166	
Classification:	
Mill & Location:	**ZAO International Paper. Svetogorsk**
Unit Data:	RB#3,1981, TAMPELLA, Drums - 2, DCE - NO, Floor - Decanting
Unit Size:	1.6 MMlb DS/day, 264,000 lb/hr steam, 550 PSIG, 824^{o}F, 711 PSIG Design
Incident Date/Time:	July 12, 2018, 10:00
Downtime hrs, leak/total:	39,5
ESP?	**NO**
Leak/Incident Loc:	Superheater, Leak on #14 platen, loop #3, II stage
How discovered:	Walkdown, the RB-3 operator heard that there is a strange noise on the IIISH right side in the boiler furnace while the sootblower was turned off.
Wash adjacent tube:	NO
Root cause:	Thinning External, The loop has ruptured in two places. Thin lipped rupture. Corrosion thinning caused the leak. Damage is caused by external erosion corrosion. Erosion removes external scales exposing fresh metal to corrosion.
Leak detection:	NO
Bed cooling enhanc	NO
Last full inspection:	Jun-18
Sequence of events:	12 July, 2018 10:00 (AM) the RB3 operator heard a strange noise on the III SH, right side of the boiler while the sootblowers were turned off for the operator walk down. Following the procedure, the boiler was switched to the oil for burning the bed. The following actions: - burning the bed - 6 hrs.; - Shutdown and cooling down the boiler - 5 hrs., the temperature was controlled with the portable thermocouples; - Washing the heating surfaces - 5 hrs.;
Repair procedure:	Loop replacement by welding
Future prevention:	Work on boiler tuning and reduce a carryover**.** Review the boiler operating procedures.

SUPERHEATER

SPRING 2019-x1167	
Classification:	
Co, Mill, Location:	**International Paper, Mogi Guaçu-SP, Brazil**
Unit Data:	RB#4, 1985, B&W PR-208, Drums - 2, DCE - Cyclone, Floor - Sloped to rear
Unit Size:	0.640 MMlb DS/day, 77162 lb/hr steam, 400 PSIG, 662^{o}F, 550 PSIG Design
Incident Date/Time:	September 28, 2018, Earliest Indication: 9/28/2018 at 00:21
Downtime hrs, leak/total:	Liquor: 113,6h / Steam: 106,6h
ESP?	**NO**
Leak/Incident Loc:	Superheater, Second pass superheater 6th loop.

How discovered:	Boiler Trip, Pressure profile and field inspection.
Wash adjacent tube:	NO
Root cause:	Fatigue, Stress between tube and roof sealing plate. Probably the crack initiated on the “sleeve” weld.
Leak detection:	NO
Bed cooling enhanc	NO
Last full inspection:	May-18
Sequence of events:	Data and time of the shutdown: 28/09/2018 00:21am. At 0:21am the boiler tripped on high furnace pressure, no abnormal liquor burning or char bed conditions was notice before the trip. The operator realized that the boiler pressure and outlet steam pressure went down fast, the pressure dropped from 25 kgf/cm² to 8 kgf/cm² quickly. Stopped the Sootblowers and the seal air fan for sootblower to inspect the boiler. The field operator and the supervisor Opened the furnace door on the south side of the boiler (7th floor) and did see a loop out of position. After the boiler tripped, the steam drum level went down, feedwater valve was closed and decision was made to not ESP the boiler. Thermocouples were inserted in the bed to monitor the char bed temperature. It took 52 hours for the temperature to reach 426 degrees C (800 F). The boiler was water washed and inspected. All the superheater tubes were inspected and the fracture point was found between the boiler and penthouse, at secondary superheater 6th loop. 2 tubes replaced as described in section 1. No further damage detected.
Repair procedure:	2 tubes 1400 millimeter each were replaced (# 6 and #2). One was the fractured tube and the other was replaced for being in a similar condition as #6 (sleeve protection welded on the tube) to prevent future similar failures of tube #2.
Future prevention:	Installed the sleeve protection fixed with bolts for the two tubes (#2 and #6). A project to install new superheater ties was initiated to reduce the superheater movement.

FURNACE FLOOR

SPRING 2019-x1168	
Classification:	
Co, Mill, Location:	**International Paper, Rajahmundry, India**
Unit Data:	RB#4,2006, Andritz, GB-055, Drums - 1, DCE - NO, Floor - Decanting
Unit Size:	1500 T ds/day, 210 TPH steam, 65 bar, 465 °C,
Incident Date/Time:	December 16, 2018, Earliest Indication: 12/16/2018 at 7.30 A M

Downtime hrs, leak/total:	154 hrs
ESP?	YES
Leak/Incident Loc:	1. Furnace Floor, Two leaks and one dent at different locations on same tube (in a span 400 mm length) found near RSW on side wall seal bar to floor tube, near sidewall tube 41. (From boiler front side) . Near the repair location attended in Dec-17.
How discovered:	2. Through walk down on A-shift of 16th December at 7.30 am the operator and shift in charge observed Smelt bubbling near primary airport 14 and it is confirmed there is tube leak , at 07:45 AM ESP was performed immediately
Wash adjacent tube:	NO
Root cause:	Visual check shows steam blanketing (overheating) on the tube leak locations. This suggest lack of proper cooling and/or water flow through this tube. Tube thinning is also near the leak locations . But No root cause identify for steam blanketing .
Leak detection:	YES
Bed cooling enhanc	NO
Last full inspection:	July 18
Sequence of events:	On 16 Dec 2018 at 7.30 AM operator observed that smelt bubbling / Char bed puffing at near PA 14. At 7.45 AM Emergency shut was activated . at 10AM on 21.12.2018 oil firing started after completion of maintenance works. at 4PM on 21.12.2018 liquor firing started. at 5.30PM on 21.12.2018 boiler taken into range.
Repair procedure:	Removed 4 tubes of RHS 850 mm in length to access the failed floor tube. Replaced 920 mm tube section on the failed tube. Total 10 butt welds of which 8 welds for Side water wall panel and 2 welds for floor tube. DPT all the welds root pass and X-rayed all welds made.

APPENDIX II

ESP POWER POINT PRESENTATION

Embedded in ESP subcommittee report

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THE AMERICAN FOREST & PAPER ASSOCIATION RECOVERY BOILER PROGRAM REPORT BY

WAYNE GRILLIOT

April 10, 2019

BLRBAC MEETING ATLANTA, GEORGIA

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 North American companies that operate recovery boilers
- Activities are funded by member company dues

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AF&PA Recovery Boiler Program

- The Recovery Boiler Program is under the direction of the **Steering Committee**
  - **Karl Morency** – Georgia-Pacific
  - **Frank Navojosky** – International Paper
  - **Jeff Wagoner** – International Paper
  - **Wes Hill** – Georgia-Pacific
- The Steering Committee sets the priorities based on:
  - Member Company Input
  - BLRBAC Incidents
  - Industry Needs

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AF&PA Recovery Boiler Program

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**
- **Research & Development Programs**

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AF&PA Recovery Boiler Program

Documents developed by the Program:

- **Reference Manuals**
- **Audit Guidelines**
- **Best Practices**
- **Training Aids**
- **Checklists**
- **Textbooks**
- **Studies**

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AF&PA Recovery Boiler Program

- The Program sponsors R&D projects
  - **Safety Improvements**
  - **Process Improvements**
- Drive improvements in:
  - **Safety**
  - **Operations**
  - **Maintenance**
  - **Recovery Boiler Integrity**

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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**
- **Karl Morency** – Georgia-Pacific (Co-Chair)
- **Jeff Wagoner** – International Paper (Co-Chair)
  - **Subcommittee Membership**
- Representatives from the Member Companies

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Membership

- In 2018, the Recovery Boiler Program was opened up to all Canadian Mills that operate Recovery Boilers

- The AF&PA Recovery Boiler Program
  - **21 Member Companies in North America**
  - **94% of the USA Chemical pulp production**
  - **27% of Canadian Chemical pulp production**

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Operational Safety Seminars

- The **O&M Subcommittee** sponsors the **Recovery Boiler Operational Safety Seminars**
  - Main objective – Safe Operation of Recovery Boilers
  - Two (2) Safety Seminars are held each year
  - April & May - Atlanta Airport Marriott Hotel
  - 111 participants in 2018
- Operators, supervisors, superintendents, maintenance professionals, engineers, and managers attend. In 2018:
  - 11 companies were represented
  - 29 mills were represented

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Operational Safety Seminars

- Attendees receive valuable information and insight from the dialogue among the attendees and monitors of the seminars
- The table top exercises help operators and supervisors make the important decision **when to ESP a Recovery Boiler**
  - The six (6) case studies used are based on recent actual Recovery Boiler Incidents
- Over 3,700 people have attended the seminars since they were started in 1985

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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

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Operational Safety Seminars

➢ The 2019 Operational Safety Seminars

- **April 23-24, 2019**
- **May 14-15, 2019**
    - **Atlanta Airport Marriott Hotel**
    - Safety Seminar Monitors
        - **Dean Clay**, Boiler Services & Inspection (BSI)
        - **John Andrews**, Boiler Services & Inspection (BSI)
    - **Only $350** per attendee for member companies
    - Non-member companies - $700 per attendee
    - Attendance is limited – **Register Early!**

Annual Conference & Meetings

2019 AF&PA Recovery Boiler Annual Conference & Committee Meetings

- February 5-6, 2019 @ the Atlanta Airport Marriott Hotel
- Conference Theme – **Dissolving Tank Safety**
- Great attendance, with a good mix of:
  - **Operating companies**
  - **Manufacturers**
  - **Research Specialists**
  - **Vendors**
  - **Insurers**

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Annual Conference & Meetings

- **Objective:** Keep the members and the recovery boiler community informed about:
  - **New developments**
  - **Industry Best Practices**
- The presentations included:
  - **New equipment & process technology**
  - **New research developments**
  - **Industry best practices**
  - **AF&PA Program activities & project updates**
  - **Industry ESP & Incident History**
  - **BLRBAC activity updates**
  - **TAPPI Energy, Recovery & Recaust Committee Report**
  - **Updates from the Canada, Sweden, Norway, and Finland Recovery Boiler Committees**

2020 Annual Conference

- **2020 AF&PA Recovery Boiler Annual Conference & Committee Meetings** are scheduled for **February 4-5, 2020**
- Atlanta Airport Marriott Hotel
- 1st Tuesday & Wednesday of February
- The Conference is open to everyone interested in Recovery Boilers
- **We hope to see you there!**

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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

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Best Practices

- The **O&M Subcommittee** developed the **"Recovery Boiler Functional Checks AF&PA 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 February 4, 2020 meeting
  - Next O&M Sub. Project - The Impact of extended run time on Recovery Boiler operation, maintenance, risk, areas of concern, criteria for allowing extensions

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“Kraft Recovery Boilers” Blue Book

- **Dr. Honghi Tran** of the University of Toronto is leading the effort to author a new **AF&PA “Kraft Recovery Boilers” Textbook**
- Dr. Tran and other well-known recovery boiler experts have completed the 16 chapters of the new book
- The AF&PA & TAPPI are working together to publish the new book
- The new Kraft Recovery Boilers textbook will be used in **TAPPI’s Kraft Recovery Operations Course**
- The new book will be available in late 2019!!!

Protective Clothing

- The **R&D Subcommittee** developed an industry survey on recommended clothing for safe use around recovery boilers. Clothing must be:
  - **Heat resistant**
  - **Resistant to chemical attack**
  - **Provide mobility**
  - **Comfortable**
- We did a limited distribution of the survey in the USA and Canada for testing
- Incorporated the comments and feedback
- We are ready to distribute the survey to all North American mills

Recovery Boiler Generating Bank and Screen Tube Studies

- The **R&D Subcommittee** is very interested in doing Generating Bank and Screen tube studies
- 1 in 8 Screen tube leaks reported to BLRBAC resulted in an explosion
- 1 in 25 Generating Bank tube leaks reported to BLRBAC resulted in an explosion
- These studies will build on earlier work by the AF&PA Recovery Boiler Program

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Recovery Boiler Program Information

- AF&PA Recovery Boiler Program Website:

http://www.afandpa.org/our-industry/recovery-boiler-program

- Available Documents
  - Publications
  - Studies
  - Training Aids
  - Standards
  - General Program Information

American Forest & Paper Association

Contact Information

- AF&PA Recovery Boiler Program Website:

http://www.afandpa.org/our-industry/recovery-boiler-program

- AF&PA Website:

http://www.afandpa.org

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The Finnish Recovery Boiler Committee (FRBC)

55th Anniversary International Recovery Boiler Conference

Radisson Blu Marina Palace, Turku, Finland on June 5–7, 2019

55th Anniversary International Recovery Boiler Conference

The Finnish Recovery Boiler Committee (FRBC) has promoted safe, economic, and environmentally friendly operation of black liquor recovery boilers and closely related processes since 1964. Year 2019 will mark the 55th year for this activity. To celebrate the occasion, the Finnish Recovery Boiler Committee has arranged an International Seminar.

Radisson Blu Marina Palace Hotel in Turku, Finland on June 5-7, 2019

Radisson Blu Marina Palace, Turku, Finland on June 5–7, 2019

The conference program will be consisted of presentations from internationally known researchers and experts in the area of recovery boiler development and control of the recovery boiler related processes.

Conference fee:
The conference fee is 570 EUR + VAT including Wednesday June 5 Get together cruise
Thursday June 6 Conference lectures, material, meals and dinner Friday June 7 Return trip from Turku to Helsinki by bus

- **The conference language is English.**
- **The conference fee does not include the accommodationMore information about the 55th Anniversary International Recovery Boiler Conference can be found from conference website:**

http://www.soodakattilayhdistys.fi/55th-anniversary-conference/introduction.
If *you have any questions please, contact the secretariat:*

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