BLACK LIQUOR RECOVERY BOILER
ADVISORY COMMITTEE

MINUTES OF MEETING
Crowne Plaza Hotel/Atlanta Airport
Atlanta, Georgia
April 2, 3 & 4, 2012

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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REGULAR MEMBERSHIP

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

ASSOCIATE MEMBERSHIP

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

CORRESPONDING MEMBERSHIP

A company residing outside of the United States which finds it impractical to attend meetings on a regular basis because of distance and expenses, but desires to be involved and informed of BLRBAC activities. ***Bylaws - 3.1***

BLRBAC INTERNET ADDRESS: ---- www.blrbac.org/wp

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

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BLRBAC MEETING SCHEDULE

50th Anniversary	***October**	**1, 2 & 3**	**--**	**2012**
Spring	**April**	**8, 9 & 10**	**--**	**2013**
Fall	**October**	**7, 8 & 9**	**--**	**2013**
Spring	**April**	**7, 8 & 9**	**--**	**2014**
Fall	**October**	**6, 7 & 8**	**--**	**2014**
Spring	**April**	**6, 7 & 8**	**--**	**2015**

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

■ Past Chairman Lon Schroeder

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*Changed by Executive Committee Member from previously posted dates due to hotel availability.

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

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

BLRBAC MEETING NOTICE

COVER LETTER — General Information

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

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

SCHEDULE — List of subcommittee activities on Monday and Tuesday

AGENDA — Reports given to Joint BLRBAC Meeting on Wednesday

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

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

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BLRBAC Secretarial Services
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BLRBAC Guidelines & Recommended Practices

Waste Stream Incineration
(Dated: February 2012)

Emergency Shutdown Procedure
(Dated: February 2012)

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

Materials & Welding Guidelines
(Dated: February 2012)

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

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

Personnel Safety & Training
(Dated: February 2012)

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

Post ESP Water Level
(Dated: January 2005)

Checklist and Classification Guide for Instruments and Control Systems
(Dated: February 2012)

Post ESP Guidelines
(Dated: October 2002)

If you have any questions, contact:

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Committee did not meet in the spring of 2012

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‡**Meville Hedges** Babcock & Wilcox 2302 Parklake Drive, NE Suite 300 Atlanta, GA 30345 Tel: 770 621 3907 **mhedges@babcock.com**	**Arnie Iwanick** Harris Group Inc 1750 NW Naito Parkway Portland, OR 97209-2530 Tel: 503 345-4516 Fax: 503 228-0422 **arnie.iwanick@harrisgroup.com**	‡**Olli Kujanpaa** Andritz 10745 Westside Parkway Alpharetta, GA 30004 Tel: 770-640-2571 **olli.kujanpaa@andritz.com**
‡**John Lewis** Fluor Daniel Forest Products 100 Fluor Daniel Drive Greenville, SC 29607-2762 Tel: 864 517-1683 **john.lewis@fluor.com**	**Steven L. Osborne** Babcock & Wilcox 20 S. Van Buren Avenue Barberton, OH 44203 Tel: 330.860.1686 **slosborne@babcock.com**	‡**Paul Seefeld** **(Chairman effective April 5, 2012)** A.H. Lundberg Associates Inc. 6174 Kissengen Springs Ct. Jacksonville, FL 32258 Tel: 904-614-6492 **paul.seefeld** **@lundbergassociates.com**
‡**Michael D. Sides** XL GAPS 1360 Olympia Park Circle Ocoee, FL 34761 Tel: 407-656-4275 Mobile: 407-462-4622 **michael.sides@xlgroup.com**	‡**John Veltre** Chartis 2565 Mohawk Trail Acworth, GA 30102 Tel: 678-347-5406 **john.veltre@chartis.com**	‡**Arie Verloop** Jansen Combustion and Boiler Technologies 12025 115th Avenue N.E., Ste 250 Kirkland, WA 98034-6935 Tel: 425-952-2825 **arie.verloop@jansenboiler.com**
Marla Weinberg International Paper Corporate Technology Center 6285 Tri-Ridge Blvd. Loveland, OH 45140 Tel: 513-248-6789 **marla.weinberg@ipaper.com**		

‡ Denotes attendance at meeting in April of 2012

WATER TREATMENT SUBCOMMITTEE

‡**Tom Madersky**
Power Specialists Assoc. Inc.
531 Main Street
Somers, CT 06071
Tel: 860-763-3241
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‡**Craig Aderman** Sappi Fine Paper NA 89 Cumberland St. P.O. Box 5000 Westbrook, ME 04098-1597 Office: 207-856-3517 Cell: 207-831-2472 **craig.aderman@sappi.com**	‡**Robert Bartholomew** Sheppard T. Powell Associates, LLC 1915 Aliceanna Street Baltimore, MD 21231 Tel: 410-327-3500 **rdb@stpa.com**	‡**Kelli Bastarache** Power Specialists Assoc. Inc. 531 Main Street Somers, CT 06071 Tel: 860-763-3241 **kelli.bastarache @psaengineering.com**
‡**Susan Childress** International Paper 5870 Anderson Road Grovetown, GA 30813 Tel: 706-339-1631 **susan.childress@ipaper.com**	‡**Clark Conley** Metso Power 3430 Toringdon Way, Ste. 201 Charlotte, NC 28277 Tel: 704-414-3468 Cell: 704-936-7408 **clark.conley@metso.com**	‡**Frank Destefano** The Purolite Company 500 Locust Grove Spartanburg, SC 0881 Cell: 864-617-0881 **fdestefano@puroliteusa.com**
‡**Buck Dunton** ChemTreat 4301 Dominion Blvd. Glen Allen, VA 23060 Tel: 804-935-2000 **buckd@chemtreat.com**	‡**Don Flach** Georgia-Pacific Corp. 133 Peachtree St. Atlanta, GA 30303 Tel: 386-336-5584 **don.flach@gapac.com**	‡**Claude Gauthier** The Purolite Company P. O. Box 308, Paris, Ontario Canada N3L 3G2 Tel: 800-461-1500 Cell: 448-4512 **cgauthier@puroliteusa.com**
‡**John Gray** Rayonier Performance Fibers, LLC 4470 Savannah Highway Jesup, GA 31545 Tel: 912-588-8213 Cell: 912-432-2921 **john.p.gray@rayonier.com**	‡**Ken Hansen** Babcock & Wilcox 20 South Van Buren Avenue Barberton, OH 44203 Tel: 330-860-6443 **kehansen@babcock.com**	‡**Norris Johnston** Ashland Hercules Water Tech. 37 Hough Road Lacey's Spring, AL 35754 Tel: 256-650-0049 Cell: 256-520-1011 **nnjohnston@ashland.com**

‡ Denotes attendance at meeting in April of 2012

WATER TREATMENT SUBCOMMITTEE (Cont.)

Dave Kittel Rayonier Performance Fibers, LLC 10 Gum Street Fernandina Beach, FL 32034 Tel: 904-27701486 Cell: 912- 409-5037 **david.kittel@rayonier.com**	‡**Sam Lewis** Delta Training Partners, Inc. 4020 Oleander Drive Wilmington, NC 28403 Tel: 910-790-1988 **slewis@deltatraining.com**	‡**Mitch Morgan** Nalco 1601 W. Diehl Road Naperville, IL 60563-1198 Tel: 630-305-1000 **jmorgan@nalco.com**
‡**Rick Morgan** FM Global Granite Parkway Plano, TX 75024 Tel: 972-731-1869 **rick.morgan@fmglobal.com**	**Richard Morris** Metso Power 3430 Toringdon Way, Suite 101 Charlotte, NC 28277 Tel: 704-281-4703 **richard.morris@metso.com**	‡**Fred Neubauer** Ashland Hercules Water Tech. 1600 Sugar Creek Drive East Mobile, AL 36695 Tel: 251-633-5566 Cell: 251-591-2297 **richard.morris@metso.com**
‡**Tom Przbylski** Boise, Inc. 400 Second Street Int'l. Falls, MN 56649-2327 Tel: 218-285-5011 **tomprzybylski@boisepaper.com**	‡**Alarick Tavares** Georgia Pacific 133 Peachtree Street Atlanta, GA 30303 Tel: 404-652-4000 **ajtavare@gapac.com**	‡**Alvaro Timotheo** Andritz 1115 N. Meadow Parkway Roswell, GA 30076-3857 Tel: 770-640-2500 **alvaro.timotheo@andritz.com**

‡ Denotes attendance at meeting in April of 2012

Registered for the meeting were:

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

Acuren Inspection
Pajaro, Vernon, Augusta, GA
Strand, Jeff, Bolivar, OH

AirTek Construction
Baines, Troy, Neptune Beach, FL
Bringman, Lewis, Linthicum, MD
Moore, Ronnie, Troy, AL
Wells, John, Troy, AL

Alabama River Cellulose
Browning, John, Perdue Hill, AL

Alstom Power
Gibowski, Steve, Pensacola, FL
Harmon, John, Windsor, CT
Hollenbach, Dennis, Windsor, CT
Kistka, Gerry, Jacksonville, FL
Youngk Rick, Chattanooga, TN

American Forest & Paper Assoc.
Grant, Tom, Yonkers, NY

Andritz
Frykmo, Christer, Roswell, GA
Kujanpaa, Olli, Roswell, GA
LeBel, Mark, Roswell, GA
Merriman, Nick, Graz, Austria
Phillips, John, Roswell, GA
Soderlund, Harri, Roswell, GA
Timotheo, Alvaro, Roswell, GA

Aquilex
Power, Stacy, Norcross, GA

Ashland
Knowles, Garth, Ottawa, ON Canada
Johnston, Norris, Laceys Spring, AL
Matheson, Ken, Quispamsis, NB

ASTS/Consultant
Clay, Dean, Milford, OH

Atlantic Combustion Technologies
Digdon, David, Amherst, NS

AXA Matrix Risk Consultants
Garfield, Michael, Lowell, ME
Hayes, Michael, Miamisburg, OH

Babcock & Wilcox
Blair, Michael, Birmingham, AL
Blazer, Phil, Charlotte, NC
Coley, Lance, Birmingham, AL
Hansen, Kenneth, Barberton, OH
Hedges, Meville, Atlanta, GA
Hicks, Timothy, Barberton, OH
Hiner, Larry, Barberton, OH
Hovinga, Mark, Barberton, OH
Kornaker, Greg, Barberton, OH
Kulig, John, Barberton, OH
Yash, John, Atlanta, GA

Boise Inc.
Davis, Matt, Jackson, AL
Erickson, Leonard, Boise, ID
Przybylski, Tom, International Falls, MN

Brunswick Cellulose
Lane, Terry, Brunswick, GA

Caraval Pulp & Paper
Manyoma, Henry, Yumbo, Colombia

CB Anthony Ross
Shanahan, Dennis, Hanover, MD
Vasquez, Edmundo, Hanover, MD

CCA
Schindler, Nathan, Monroe, CT

Registered for the meeting were:

Chalmers & Kubeck
Sharpe, Steve, Cayce, SC
Gattis, Clayton, Watkinsville, GA
Richardson, Curt, Watkinsville, GA

Chartis
Davis, Robert, Toronto, Ont.
DeBeer, Tom, Woodstock, GA
Veltre, John, Acworth, GA

ChemTreat
Graham, Jim, Collierville, TN

CNA Risk Control
Walker, Billy, Apex, NC

CORR System
Ruiz de Molina, Eladio, Birmingham, AL

Delta Training Partners
Lewis, Sam, Wilmington, NC

Des Global
Kratt, Fred, Moorestown, NJ

Diamond Power
Craft, Robert, Lancaster, OH
Mangelli, Lou, Lancaster, OH

Domtar
Avery, David, Bennettsville, SC
Gore, Chris, Bennettsville, SC
Hawkins, Chuck, Kingsport, TN
Worsham, Jesse, Bennettsville, SC

Electron Machine
Callahan, Eric, Griffin, GA
Vossberg, C. A., Umatilla, FL

Emerson Process Management
Sandstrom, Jennifer, Wilmington, NC

Entech Products
Mathis, David, Alabaster, AL
Mathis, Steven, Alabaster, AL

Evergreen Packaging
Holland, Brook, Canton, NC
Gallaher, Ron, Canton, NC

Extra Hand Plant Support Services
Phelps, Bob, Chester, VA

Fluor
Lewis, John, Greenville, SC

FM Global
Baro, Joachim, Frankfurt, Germany
Beaulieu, Andre, Montreal, Que.
Cooke, Craig, Oconomowoc, WI
Cooper, Mark, Woodinville, WA
Crysel, Scott, Plano, TX
Hoffman, Daryl, Kirkland, WA
Huelsbeck, Kevin, Menasha, WI
Lang, David, Little Elm, TX
Moberg, Eric. Plano, TX
Morgan, Rick, Plano, TX
Onstead, Jimmy, Plano, TX
Parrish, David, Norwood, MA
Polagye, Mike, Norwood, MA

FPInnovations
Singbeil, Douglas, Vancouver, BC

George H. Bodman, Inc.
Baxter, Ricky, Kingwood, TX
Bayse, Mike, Kingwood, TX
Bodman, George, Kingwood, TX

Georgia-Pacific
Cornelius, Michael, Palatka, FL
Flach, Don, Palm Coast, FL
Morency, Karl, Atlanta, GA
Moyer, Scott, Jacksonville, FL
Tavares, Alarick, Atlanta, GA

Registered for the meeting were:

Glatfelter
Gentzler, Bill, Spring Grove, PA
Plappert, Bill, Spring Grove, PA

Global Risk Consultants
Smith, Andy, Woodstock, GA

GommiTech
Gommi, Julius, Maple Valley, WA

Graphics Flexible Packaging
Taylor, Jim, Pine Hill, AL

Greif
Allen, Steve, Amherst, VA
King, David, Amherst, VA
Schrock, Eric, Amherst, VA

Houghton Cascade
Leary, Ray, Tacoma, WA

Howe Sound Pulp & Paper
Casey, Shawn, Port Mellon, BC

HSB I&I Co.
Blank, Mike, Buckhead, GA
Sanford, Boyette, Buckhead, GA

Infrafone AB
Finnegan, Monica, Sweden
Rodomista, Vincent, Miami, FL

International Paper
Blackard, Vernon, Loveland, OH
Childress, Susan, Loveland, OH
Coyle, Wendy, Pine Hill, AL
MacIntire, Wayne, Loveland, OH
Navojosky, Frank, Loveland, OH
Sargent, Mark, Loveland, OH

Irving Pulp & Paper
Mott, Dan, Saint John, NB
Mott, Dennis, Saint John, NB

Jacobs Engineering
Rickard, John , Greenville, SC

Jansen Combustion
La Fond, John , Kirkland, WA
Verloop, Arie, Kirkland, WA

John E. Cover Engr.
Cover, John, Birmingham, AL

Kapstone Paper
Coyne, Joe, Roanoke Rapids, NC
Crockett, Tyler, Charleston, SC
George, Tim, Roanoke Rapids, NC
Jones, Billy, Charleston, SC
Ramsey, Phil, Charleston, SC

K-Patents
Gronowski, Eric, Naperville, IL
Hamalainen, Arto, Naperville, IL
Miller, Adam, Naperville, IL
Pyorala, Keijo, Naperville, IL
Wagner, Phil, Naperville, IL

Lincoln Paper & Tissue
LaFlamme, Alan, Lincoln, ME
MacEachern, Pat, Lincoln, ME

Liquid Lignin
Babcock, Bruce, Charleston, SC

Madison Industrial Services
Schneider, Mark, Irving TX
Sherrod, Hank, Irving TX

MeadWestvaco
Andrews, John, N. Charleston, SC
Murch, Doug, Richmond, VA
Sanders, Doug, Phenix City, AL

Registered for the meeting were:

Metso Power
Burelle, Raymond, Charlotte, NC
Christiansen, Gene, Charlotte, NC
Conley, Clark, Charlotte, NC
Cross, Tom, Charlotte, NC
Gantt, Melissa, Charlotte, NC
Morgan, Preston, Charlotte, NC
Smith, Dan, Charlotte, NC
Tanguay, Eric, Charlotte, NC
Ulrich, Jim, Charlotte, NC
Ward, Mike, Charlotte, NC
Weikmann, John, Charlotte, NC

NAES
Broglio, Rob, Houston, TX

Nalco
Hoefs, Steve, Naperville, IL
Morgan, Mitch, Naperville, IL

National Boiler Service
Duplissey, David, Trenton, GA
Mesamore, Mike, Trenton, GA

Nautilus Loss Control
Jackson, Chris, Fox Island, WA

NORAM Engineering
Bucher, Wayne, Birmingham, AL

Northern Pulp
Fry, Robert, New Glasgow, Nova Scotia

Northern Pulp Nova Scotia
MacLeod, Kevin, New Glasgow, NS

Packaging Corp. of America
Lykins, Michael, South Elgin, IL

Power Specialists Assoc.
Bastarache, Kelli, Somers, CT
Henriques, Fabian, Somers, CT
Madersky, Tom, Somers, CT

Process Equip/Barron Ind.
Nolen, Ken, Pelham, AL
Ray, Allen, Pelham, AL

Purolite
Destefano, Frank, Bala Cynwyd, PA
Gauthier, Claude, Bala Cynwyd, PA
Riddle, Amanda, Bala Cynwyd, PA

Rayonier
Gray, John, Jesup, GA

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

RMR Mechanical
Roy, Bob, Cumming, GA

RockTenn
Baker, Ken, Florence, SC
Bray, Chuck, Hopewell, VA
Brock, John, Demepolis, AL
Campbell, Bob, West Point, VA
Edwards, Carl, Florence, SC
Hagins, Hank, Fernandina Beach, FL
Johnson, Tony, Hopewell, VA
LeCroy, Winston, Demopolis, AL
Parten, Greg, Demepolis, AL
Von Oepen, David, Demepolis, AL

SAPPI
Aderman, Craig, Westbrook, ME
Boudreau, David, Fairfield, ME
Finnemore, Chris, Skowhegan, ME

Sheppard T. Powell Assoc.
Bartholomew, Robert, Baltimore, MD

Southern Environmental
Harris, Don, Pensacola, FL

Registered for the meeting were:

Thilmany
Glasheen, Mike, Kaukauna, WI
McCarty, Matt, Kaukauna, WI
West, Mike, Kaukauna, WI

Thompson Industrial Services
Harry, Todd, Sumter, SC
Jackson, Dwayne, Sumter, SC
Wise, Carl, Sumter, SC

Verso Paper
Ja'arah, Majed, Memphis, TN

Wall Colmonoy
Miller, Steve, Cary, NC

Weyerhaeuser
Barreca, Clif, Vanceboro, NC
Benning, Rick, Grande Prairie, Alberta
Burnette, Richard, Oglethorpe, GA
Cole, Jim, Columbus, MS

Weyerhauser (Cont.)
Currie, Rick, Vanceboro, NC
Doyer, Roch, Grande Prairie, Alberta
Harrison, Michael, Port Wentworth, GA
Johnson, Douglas, Charlotte, NC
Jones, Benny, ????
Knowlen, Bruce, Federal Way, WA
Morgan, Charlie, Columbus, MS
Schaeffner, Jeff, Oglethorpe, GA
Slagel, David, Port Wentworth, GA
Soles, Phil, Charlotte, NC
Tipton, Chris, ????

XL GAPS
Franks, James, Somerville, TN
Goddard, Robert, Tupelo, MS
Sides, Michael, Ocoee, FL

****

MAIN COMMITTEE MEETING

INTRODUCTION: BLRBAC Chairman, Scott Moyer, called the meeting to order at 8:00 a.m. on Wednesday, April 4, 2012.

CHAIRMAN: This is the Main Committee Meeting for the spring 2012 BLRBAC. This meeting is called to order. Welcome! Thank you for your attendance and your participation this week. This meeting, as with all BLRBAC meetings, is held in strict accordance with BLRBAC's Anti-Trust Policy.

OLD BUSINESS

ACCEPTANCE OF THE FALL 2011 MEETING MINUTES – Scott Moyer

Meeting Minutes have been posted on the BLRBAC WEB site. Are there any corrections or modifications? Do I have a motion to approve those Minutes as posted? So moved. Second? All in favor? All opposed? The fall 2011 Meeting Minutes have been accepted unanimously.

NEW BUSINESS

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

NEW REGULAR MEMBERSHIP - None

NEW ASSOCIATE MEMBERSHIPS

Nautilus Loss Control - Fox Island, Washington - providing consulting services.
Christopher Jacksons is the designated Associate Representative
Beverly Jackson is the designated Alternate Associate Representative

Whertech - Orange Park, FL - provider of protective coatings and weld overlay for boiler tubes
Bill Hammill is the designated Associate Representative
Kevin Smith is the designated Alternate Associate Representative

NEW CORRESPONDING MEMBERSHIPS – None Reported

REGULAR REPRESENTATIVE CHANGES

Boise
Len Erickson remains the designated Representative
Tom Przybylski replaced Tommy Blaylock as the designated Alternate Representative

Global Risk Consultants
Andy Smith replaced Chris Jackson as the designated Representative
Charles Macaulay remains the designated Alternate Representative

Verso Paper
Majed Ja'arah replaced Frank Navojosky as the designated Representative
Edward Chaperon remains the designated Alternate Representative

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

ASSOCIATE REPRESENTATIVE CHANGES

Starr Technical Rick Agency

Donald Pease replaced Phil Jacobsen as the designated Associate Representative
Peter Anderson remains as the designated Alternate Associate Representative

CORRESPONDING MEMBERSHIP CHANGES - None Reported

MEMBERSHIP COMPANY NAME CHANGES

Temple-Inland is currently d/b/a International Paper

This was brought to our attention by Fred Towler, Vice-President of Temple-Inland, on 3/15/12.

*{**Secretary's Note**: The Company Membership List posted on the BLRBAC website is out of date, not reflecting all the mergers, acquisitions, and name changes that have occurred. Anyone who sees something that needs changing should bring it to the attention of the BLRBAC Secretary via fhholich@aol.com}*

2. **EXECUTIVE COMMITTEE REPORT –** Scott Moyer

The BLRBAC Anti Trust Statement was reviewed

The committee met in closed session with subcommittee chairs on Monday afternoon, and again in closed session on Tuesday.

During the meeting with subcommittee chairs, we heard updates on the work of these groups.

Dean clay presented an update to the 50th anniversary celebration preparation. This event will be held during the fall BLRBAC meeting of 2012 on Tuesday night at the Crowne Plaza. Dinner will be served and guests will be invited. Registration fees will be increased slightly to cover the cost of the dinner. The team (Dean Clay, Len Erickson, and Peter Collins) is still looking for speakers, so if you have any ideas, please get with them.

During the last meeting we approved Disclaimer language that has been added to each of our recommended practices.

We met with our counsel and reviewed the status of BLRBAC's incorporation ant other legal items. This is proceeding well, and we expect incorporation to happen this year.

A nominating committee will be assembled prior to the next meeting to recommend the slate of officers to be elected during the Fall 2012 meeting

We have reached an agreement with the hotel to extend our arrangements through 2014.

3. **TREASURER'S REPORT** – Scott Moyer for Len Olavessen

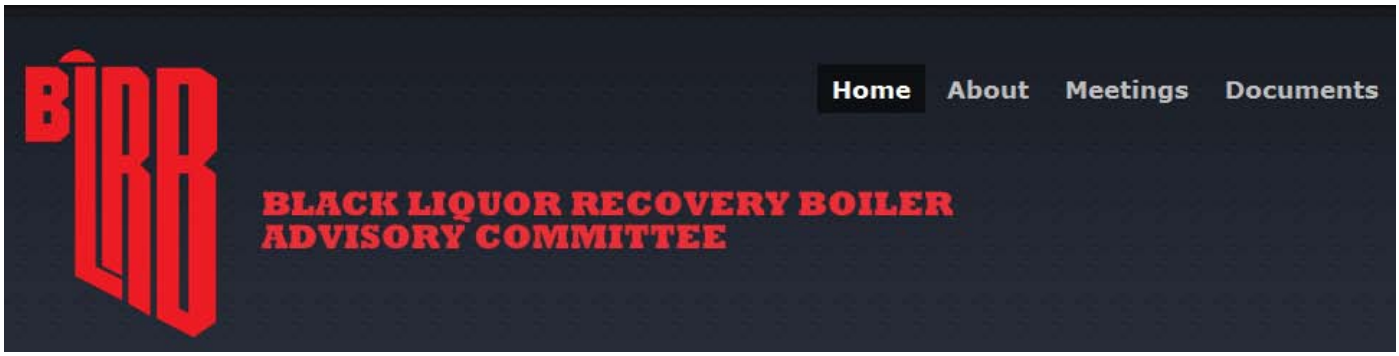
We had 178 advance registrations; thirty-three at the door. Nineteen paper companies, five insurance companies, four boiler manufacturers, associate members, and three guests were represented. We had three non-North American attendees; one each from Austria, Columbia, and Sweden.

No financial summary is available, as our treasurer was not able to join us. We will have this report for the membership during the fall 2012 Meeting.

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

I'll make my comments brief, but I want to let people know we have a new website. We have a new webmaster who reconfigured our site and it is now back to being www.blrbac.org; we no longer need the /wp at the end of the address. I would appreciate any comments and/or feedback that you have on our new website. Our webmaster is willing to entertain any feedback for improvements or any changes that you might like to recommend.

The key to navigation are the four buttons that appear at the top of every page on the site: "Home", "About", "Meetings" and "Documents".



You can click on each one and get drop-down menus to access Meeting Registration, Meeting Minutes, Recommended Practices and Guidelines, Documents for Review & Comment, etc. Currently there are three documents posted for "Review and Comment." None of these will be voted on at this meeting because we only got the website up and running within about the past two to three weeks and people did not have enough time to look at them; even if they knew they were there. Additionally, some of them will be further revised based on subcommittee work from this meeting. They will all be reposted and available for membership review and comment. A notice will be sent out by Barbara Holich letting everyone on the BLRBAC mailing list know when this is done. I encourage you to look at the website periodically. There is good information on there and again please give me your feedback so that we can make it as useful as possible for you, the members of BLRBAC.

4. **SECRETARY'S REPORT** – (Cont.)

SECRETARIAL SERVICES REPORT – Barbara Holich

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

Anyone who wishes to be added or deleted from the BLRBAC e-mail list, please e-mail me (fhholich@aol.com) your intentions. Include your name, company and your e-mail address.

Someone is needed to take the initiative (in the best case scenario, this should be the designated Representative or Associate Representative) to keep me advised of any member company name changes, mergers, etc. so that the BLRBAC database can be properly maintained.

No changes are made to the database until written notification is received (letter or e-mail are acceptable). I keep a file folder for each member company that includes correspondence naming the Representative and Alternate for each organization. These letters usually contain the e-mail addresses I must have in order to maintain the BLRBAC database.

Therefore, be sure that I have your current working e-mail address. BLRBAC notice of meetings and meeting minutes will only be sent via e-mail. If an e-mailed notice is returned to me as "undeliverable," that e-mail address will be deleted from the BLRBAC database after a second attempt has been made.

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

Per BLRBAC's policy, BLRBAC's Secretarial Services will verify receipt of meeting registrations and checks via e-mail when appropriate e-mail addresses are given on the registration form.

I am again requesting that all Meeting Registration Forms be completed in their entirety. This form is the only way I can confirm the accuracy of the BLRBAC database and e-mail address book.
Finally, if you know from past experience that your Accounting Department takes weeks to issue a requested check for registration purposes, just send me your completed Registration Form and a personal check before the posted cut-off date. Then you can get reimbursed from your company at a later date. This will guarantee you are registered at the Advance registration fee. There are no exceptions when paying after the cut-off date, your organization will be required to pay the increased At Door fee.

5. SUBCOMMITTEE REPORTS

5.1 AUXILIARY FUEL REPORT – Bruce Knowlen

The Safe Firing of Auxiliary Fuels Subcommittee did not meet; therefore, no report was given. The subcommittee plans to meet at the Fall 2012 meeting.

5.2 BLACK LIQUOR REPORT – Len Erickson for Mark Sargent

The Safe Firing of Black Liquor Subcommittee held a closed morning meeting with 12 members present and an open afternoon meeting with 11 members and approximately 35 guests.

The BLRBAC Anti Trust statement was read and the Fall 2011 Meeting Minutes were reviewed and approved.

Meeting activities included:
Reviewed SFBL document and Fire Protection for DCE document and offered the following language/suggestion to the Fire Protection for DCE Subcommittee:

During ESP:
- Consider keeping cyclone recirculation pumps running to keep walls of cyclone wet
- Consider keeping cascade drive and cascade agitator running during an ESP
- Consider opening DCE dilution water 100% open during an ESP – ESP would force valve 100% open during an ESP event to prevent solids from increasing with no black liquor flow through the DCE

For Operating Practices; 3.2.2:
- For control room instrumentation; we suggest adding/modifying "Wall washer pressure" to "Wall wash pressure and flow"

The SFBL Subcommittee will review the ESP questionnaire as it relates to reporting live smelt or dissolving tank questionnaire reporting. SFBL is proposing to modify Section 9.B of the Recovery Unit Incident Questionnaire to request more details anytime there is damage associated with a dissolving tank explosion or "puff". Clif Barreca and Len Erickson will solicit input from our subcommittee and submit to either the Executive committee or the ESP Subcommittee for consideration at the fall 2012 meeting.

Reviewed proposed changes for remote isolation of all dilution sources to dissolving tank

- Add: ***"A safe means must be provided to isolate all dilution sources to the dissolving tank in case of suspected crystallization or if live smelt is seen in the dissolving tank".*** The intent is to allow operators to isolate dilution sources from the dissolving tank with either an automatic valve or manual valve without being exposed to the dissolving tank that is in a dangerous condition, live smelt present, dangerous run-off condition, crystallization imminent, etc. We will include typical dilution sources that should be isolated to this language.

5. **SUBCOMMITTEE REPORTS** – (Cont.)
   5.2 **BLACK LIQUOR REPORT** – (Cont.)

Open items brought to the subcommittee prior to the spring 2012 meeting

- A question was raised to our subcommittee to see if there was/is support to change the guidelines to allow the use of a double block and bleed valving arrangement on the water tie-in to the sootblower steam supply line for water washing the boiler, rather than a spool piece. There would be a switch tied to the BMS that would trip the boiler if the water was inadvertently valved into the steam header.

  We discussed as a group and decided that the language as written recommending the use of a spool piece is appropriate and no changes will be made to allow double block and bleed. That being said, there is no reason that a mill location can't enter into discussions with their insurance carrier to seek out agreed upon modification to BLRBAC recommended practices provided there is a protocol agreed to by both parties and strict adherence to routine and emergency procedures are followed.

- A question(s) was submitted regarding dissolving tank agitation. What is the context behind the statement recommending "sufficient back-up system for dissolving tank agitation"? Is it intended to allow operation of boiler with loss of all agitation? Is it intended to ensure agitation until the boiler stops smelting under loss of power? Will sufficient solids accumulation really be a problem if all fuels are tripped and there is no DT agitation? What constitutes "sufficient"?

  The document reads as follows:

  "To minimize the exposure to dissolving tank explosions, the following equipment and features should be provided for all dissolving tanks: … 3. Adequate agitation and sufficient back-up system to prevent solids accumulation in tanks."

  Our response is that "sufficient" agitation is a judgment call for the mill to decide what is appropriate given their particular circumstance. The emergency procedure for loss of agitation should take into account that the operating personnel at each location understand the risks of solids accumulation should regular agitation be lost and that sufficient emergency back-up system is in place. We will be adding the word emergency after sufficient to clarify this issue.

- The Executive Committee asked our subcommittee to review the current language and risks related to Feedwater air heater operation and consider whether any additional recommendations should be included.

  Our subcommittee reviewed the language in SFBL, ESP, SFAF and Personnel Safety documents. We believe there is adequate language for operator/owners to work with their boiler OEM's to ensure during the design and installation of a feedwater air heater that proper safeguards are in place to prevent water from a large leak from reaching the furnace.

- A question was raised if a mill could consider the use of compressed air as an emergency back-up if all sources of water are lost to the spout cooling water system.

5. **SUBCOMMITTEE REPORTS** – (Cont.)
   5.2 **BLACK LIQUOR REPORT** – (Cont.)

We discussed at the open meeting and felt that compressed air is not a good cooling medium and there is the risk the compressed air could act as an air lance if compresses air was added to the spout cooling water system and there was a spout cooling water system leak. We will add more language to our document stating that water is the only cooling medium to be considered for spout cooling water systems.

- Another question was raised at the Open meeting regarding liquor gun valving, pressure gauge location. There was a concern that operators could be exposed to high pressure liquor in case a liquor gun is plugged and the gun hose is uncoupled. We reviewed Figure 9 in the SFBL document and concluded that if proper procedures are followed the liquor pressure gauge in our figure will protect the operator. Provided the procedure are followed, the operator would not be exposed to a release of high pressure black liquor or steam. One caution from our subcommittee is that is incumbent on operating companies to make sure all instrumentation is kept in good operating condition to provide operators and maintenance personnel the information they need to remain safe when working on recovery boilers.

Document changes to be put to membership vote at the conclusion of the October 2012 meeting include:

CHANGES - October 2011 - *Draft*

Chapter 5: Black Liquor Firing Interlock System

- Updated logic and explanation table to clarify role of stable firing in permissive starting logic
  - Figure 2. Permissive Starting Logic for Black Liquor Firing
  - Table 2. Logic Explanation Chart for Figure 2
- Added failure of black liquor header valve and/or black liquor divert valve to be in the correct position for normal operation as an input to the black liquor trip logic.
  - Figure 5. Protective Tripping Logic for Black Liquor Firing
  - Table 5. Logic explanation Chart for Figure 5

Chapter 10: Dissolving Tanks

- Added a recommendation to review dissolving tank design, agitation, and density controls when recovery boilers are upgraded.
- Added a recommendation for mills to have guidelines/emergency procedures for initiating an MFT of the recovery boiler when green liquor density is too high there is impending crystallization. or when the dissolving tank is known or suspected to contain live smelt.
- Added guidance as a new Section 10.4 for recommended actions when green liquor density is too high there is impending crystallization. or when the dissolving tank is known or suspected to contain live smelt.

Chapter 15: Discussion and Background Information

- Added a new Section 15.6 Stable Firing Estalished.
- Added a new Section 15.7 Superheaters Cleared.

5. **SUBCOMMITTEE REPORTS** – (Cont.)

5.2 **BLACK LIQUOR REPORT** – (Cont)

Rick Spangler: I thought that during the open session we discussed the fact that it may be possible to utilize double block and bleed for the sootblower water wash connection. I thought we had discussed that possibly there was a softening of the Subcommittees' position a little bit to allow if someone was fulfilling the intent of the rules with the interlock that that was going to be satisfactory instead of a strict prohibition?

Mark Sargent: What we said was that if you can reach an agreement with your insurance carrier and you have the proper protocol in place, and your insurance carrier and your mill location is satisfied that the double-block and bleed meets the intent of BLRBAC, then I guess we wouldn't have an argument with that.

Rick Spangler: I think there is one other small item that maybe you would want to clarify about the location of the pressure indicating gauge on the liquor gun. There have been some injuries and discussion about whether it is after the last valve or before the last valve as shown. I think we spent a lot of time talking about that.

Mark Sargent: Correct. That was a question that was brought to both Personnel Safety and our Subcommittee regarding the location of the pressure gauge at each liquor gun. In Figure 9 we show a figure of the double-block and bleed which is equipped for steam out and also for the location of the pressure gauge on each liquor gun. There is some thought that if you tried to take a liquor gun out of the furnace and not have the proper block and bleed in place to bleed off the pressure, the operator could be exposed to opening that liquor gun and taking the hose off with the line still pressurized. So it is important to have a good SOP and a good operating practice to make sure the double-block and bleed is strictly adhered to; perhaps using a picture in your SOP to explain to operators exactly how to do that.

Scott Moyer: Another plug here for the WEB site. Mark mentioned several changes to the document that are posted. So this is your chance to provide in-put to that because a lot of you will be impacted by some of these changes.

5.3 **ESP SUBCOMMITTEE REPORT** – John Andrews

The ESP Subcommittee met in closed session on Monday April 2nd with 13 of 13 members represented. The Subcommittee met in open session on Tuesday morning April 3rd with 13 members represented and about 180 guests.

During the open session, the Subcommittee reviewed 27 incident reports from North America. Of the 27 incidents, 10 leaks were classified as critical incidents and 17 were non-critical incidents. One of the Critical Incidents was a leak in the steam coil air heater that leaked condensate into the windbox. Two of the reported incidents were for spout failures and both of those were classified as non-critical. There were no boiler explosions or smelt dissolving tank explosions reported this session. An Emergency Shutdown Procedure (ESP) was performed in 6 of the incidents including 5 of the critical incidents representing 56% of the critical incidents that should have been ESP'd.

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

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

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

Critical Incidents: All cases where water in any amount entered the recovery unit forward of isolating baffles (and therefore would be a similar criterion to the need to perform an ESP). This includes leaks of pressure parts of all sizes. Since small leaks often wash adjacent tubes to failure, this category is important to our learnings. This new definition will result in more entries for the Critical Incident list.

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 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 marks are the non-critical incidents and the red marks indicate the location of the critical incidents. The two spout leaks are indicated by green dots at the spout level and were both classified as non-critical. One incident reported a Steam Coil Air Heater Leak that was classified as critical and is represented by the red dot outside the furnace.

The leaks locations are summarized as follows:

- 9 – Economizer
- 2 – Superheater
- 5 – Boiler Bank / Steam Drum
- 5 – Upper Furnace
- 2 – Screen
- 1 – Lower Furnace
- 1 – Steam Coil Air Heater
- 2 –Smelt Spout Failure

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

Leaks by Boiler Type

The leaks by the number of drums and the back end arrangement were reviewed. There were eight leaks reported in a single drum unit and 19 leaks reported in two drum units.

Six of the leaks were in boilers with Direct Contact Evaporators and 21 were from units with extended economizers. It is clear that there are still several DCE units still in operation. The distribution of leaks in single drum extended economizers was more in line with the numbers of each type installed which is different from the prior meeting were the large majority were in two drum boilers.

Root Cause

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

- 6– Thermal or Mechanical Fatigue
- 7 - Erosion or Corrosion Thinning
- 4 – Unknown
- 4 - Stress Assisted Corrosion or Corrosion Fatigue
- 4 – Overheat
- 2 - Weld Failure

How Discovered

Operator observations during boiler walkdowns continue to be the prevalent method of detecting leaks and accounted for identification of 17 of the leaks (63%) and indicates that operators are continuing to be diligent in looking for leaks. Six of the leaks were identified by the control room and 4 leaks were initially indicated by the leak detection system installed.

Leak detection systems were reported to be installed on units in 10 of the incidents (37%). The leak detection systems were credited with providing the initial indication of 4 leaks and confirmed two additional leaks. An indication that leak detection system are becoming more effective is that they provided the initial indication for 2 economizer leaks which have traditionally been difficult to detect with the leak detection systems.

The Subcommittee has been looking at the time between the initial indication of the leak and the initiation of the ESP. The incidents reviewed showed that for those incidents that provided detailed information on timing, the time between initial indication of the leak and the initiation of the ESP ranged from about ten minutes to 24+ hours. One incident reported running over four hours with definite indications of a leak. The median time to initiate the ESP was about 30 minutes.

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

There were four reports that did not ESP until water was seen in the furnace or on the bed, again indicating that mills were requiring too much confirmation that a leak was present before initiating an ESP.

Incident Review

Figure 2 shows the critical incidents reported each year. The bar for 2012 represents only half of the year so we are on track to keep up with the recent average of near 20 critical incidents per year. Figure 3 shows the history of Recovery Boiler Explosions showing a nice string of years without an explosion with the last one being the Aux Fuel explosion at Vicksburg in 2008.

Figure 4 shows the five year rolling average of reported boiler explosions is at 0.2 after finally getting to zero before the Vicksburg explosion. If we avoid a boiler explosion the for coming year it will be back to zero. Keep up the good work!

Figure 5 shows the history of dissolving tank explosions and there were none reported this year. But recent history indicates that dissolving tank explosions continue to be a problem. Following the recommendations from Section 10 of the Safe Firing of Black Liquor document would prevent many of the reported dissolving than incidents that have occurred in the past.

Figure 6 is a plot of explosion history per 100-boiler operating years. This is a statistical summary of the experience across the industry. The smelt water explosion experience is continuing to trend down over time and is down to under 0.5 explosions per 100 boiler operating years, but the total explosions, which includes all boiler explosions and dissolving tank explosions, decreased to under 0.9 explosions per 100 boiler years since no dissolving tank explosions were reported this year. 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 all need to continue to keep that trending down. Effort should be focused in developing better procedures to handle heavy smelt runs and plugged spouts.

Learnings

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

As we have said before, it is not recommended to expose leaks with pressure still on the boiler. There have been several incidents over the years where small leaks have turned into big leaks and it is not a good idea to have personnel exposed to that risk.

Mills with B&W units that have a hopper support welded to the side walls at the top of the nose should check the area for stress assisted corrosion cracking. Problems have been found in at least two units.

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

Several incidents highlighted the need to maintain the integrity of vibration restraints in the generating bank. Also need to watch for chaffing where vibration bars may cut into tubes.

Corrosion of tubes and headers under the smelt spouts from contact with weak wash from leaks around the spout hoods continues to be a problem. This area should be inspected routinely to identify any problems.

Mills should establish definitive shutdown criteria for low boiler water pH excursions in order to minimize any second guessing or delays in shutting down with low pH.

We continue to hear of incidents that the time to identify leaks and initiate an ESP is excessive and in many cases mills require definitive proof that a leak is present as shown by the four incidents that did not initiate an ESP until water was observed in the furnace. It is human nature to discount the indications that a leak is present and to come up with alternate explanations of the cause for the tell-tale signs they are seeing. Training must emphasize leak identification and must caution operators to not to be too quick to explain away the signs that a leak is present.

Management must also emphasize that operators have the authority and responsibility to initiate an ESP without having to seek approval from supervision. In addition, they need to "walk the talk". Even though the official policy may be that operators have the authority, if management undermines that authority by subtly indicating that they must be in the loop of all major operational changes, the operators will be reluctant to perform an ESP without approval from supervision.

There have been some indications that mills may be reluctant to perform an ESP because of concern for damaging the boiler in the process. The Subcommittee reviews the incident questionnaires for any reports of damage to the boiler as a result of performing an ESP. Except for a couple of reports of superheater weld tie cracks, there have not been any recent reports of significant damage.

In the past there were a couple of incidents where all the ESP actions did not function properly that damage was reported. So it is clear that the risk to the unit of damage as a result of performing an ESP is minimal and is far exceeded by the risk of major damage from a smelt water explosion that may occur if the ESP is not performed in a timely fashion.

Clarification of "Dedicated Stand –Alone"

The Subcommittee is continuing to work on the appropriate language for a clarification of "Dedicated Stand-Alone" as it refers to the ESP system architecture. Recommended language changes to the ESP Document were recently posted to the BLRBAC web site for review and comment. We have recommended an additional minor additional change as shown in the bold text below:

5. SUBCOMMITTEE REPORTS – (Cont.)

5.3 ESP SUBCOMMITTEE REPORT – (Cont.)

Recommended Change to second sentence of Chapter 1:

> Upon initiation of the Emergency Shutdown Procedure, ~~a dedicated, stand-alone~~ the system shall perform the following automated actions:

Add paragraph to the after bulleted items on Page 4

> The Emergency Shutdown Procedure functions must be "energized to activate" and executed either by means of relay technology and hard-wiring or other Recovery Boiler Safety System as defined in Chapter 4 of the *Checklist and Classification Guide for Instruments and Control Systems*. It must not be possible to alter the system unintentionally or to alter the system during operation of the boiler. Any time **maintenance is done or** modifications are made to the system, the system shall be functionally tested prior to putting the unit back on line. Whatever technology is utilized, the BMS or DCS systems can be used to monitor operation of the functions.

Delete "Dedicated Stand Alone" definition from Section 3.24

If anyone has any comments or questions concerning the proposed language changes, please contact John Andrews or Jules Gommi. Depending on comments received, this proposed language should be up for approval in the Fall 2012 meeting.

Direct Contact Evaporators and ESP

During the meetings there was continued discussion of an incident that was reported in the last spring concerning a boiler that initiated an ESP and subsequently had a cascade fire.

Some points that we would like to stress is that mills need to be able to maintain dilution to the DCE after and ESP. Dilution water is not one of the water sources that are intended to be shut of with an ESP. The Subcommittee affirmed that the requirements for the fire protection of the DCE should supersede the ESP guidelines in regard to operation of fans and dampers.

The Subcommittee has recommended the following language changes to the ESP Document, indicated in **bold,** in order to minimize any confusion between the two guideline documents.

3.8 Shut Off All Water and Steam Sources

- This does NOT include Spout Shatter Steam, **Dilution Water for Direct Contact Evaporators** and Spout Cooling Water.

5. SUBCOMMITTEE REPORTS – (Cont.)

5.3 ESP SUBCOMMITTEE REPORT – (Cont.)

•Stop All Water and Steam Supplies

– Immediately shut off feedwater and all other water and steam sources to the boiler except smelt shatter steam, **dilution water for direct contact evaporators** and smelt spout cooling water. (For spout water leaks, see Section 3.19.)

3.11 Fans and Dampers

– If any fans, including the ID fan(s), trip immediately prior to initiating an ESP or during an ESP, leave them tripped. Restarting the fans~~, or allowing them to seek full flow,~~ can cause excessive heat release, or cause a combustibles explosion. The system should be checked to make sure that other control logic could not override ESP logic **except in the event of an actuation of the DCE Fire Protection System.**

These recommended changes will be posted on the BLRBAC website for comments and should be up for approval during the Fall meeting.

The Subcommittee will be looking at the Post ESP Guidelines as well to provide additional guidance on considerations for units with a DCE.

List of Operating Boilers

The lists of Operating Boilers in the USA and Operating Boilers in Canada are posted on the BLRBAC Website and will be updated by Jules Gommi. Please submit any updated information to Jules, especially for mill ownership changes.

Incident Questionnaires

The Subcommittee appreciates the effort that is required to prepare the incident questionnaires since it is important to receive that information in order to help BLRBAC continue to provide guidelines for the industry.

The ESP Questionnaire continues to be updated and mills are requested to obtain the current version from the BLRBAC website if an incident needs to be reported. The completed form should be submitted to Jules Gommi at the e-mail address listed on the form. Please note that Jules' mail box is limited to a file size of 10 megabytes so please consider this limit when submitting the report. When submitting the report please use the MS Word format .doc rather than in PDF format and use .jpg format for illustrations and photos. If the report is over 10 meg, send illustrations in a separate e-mail.

Jules 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 Jules to see if there is a problem.

Figure 1

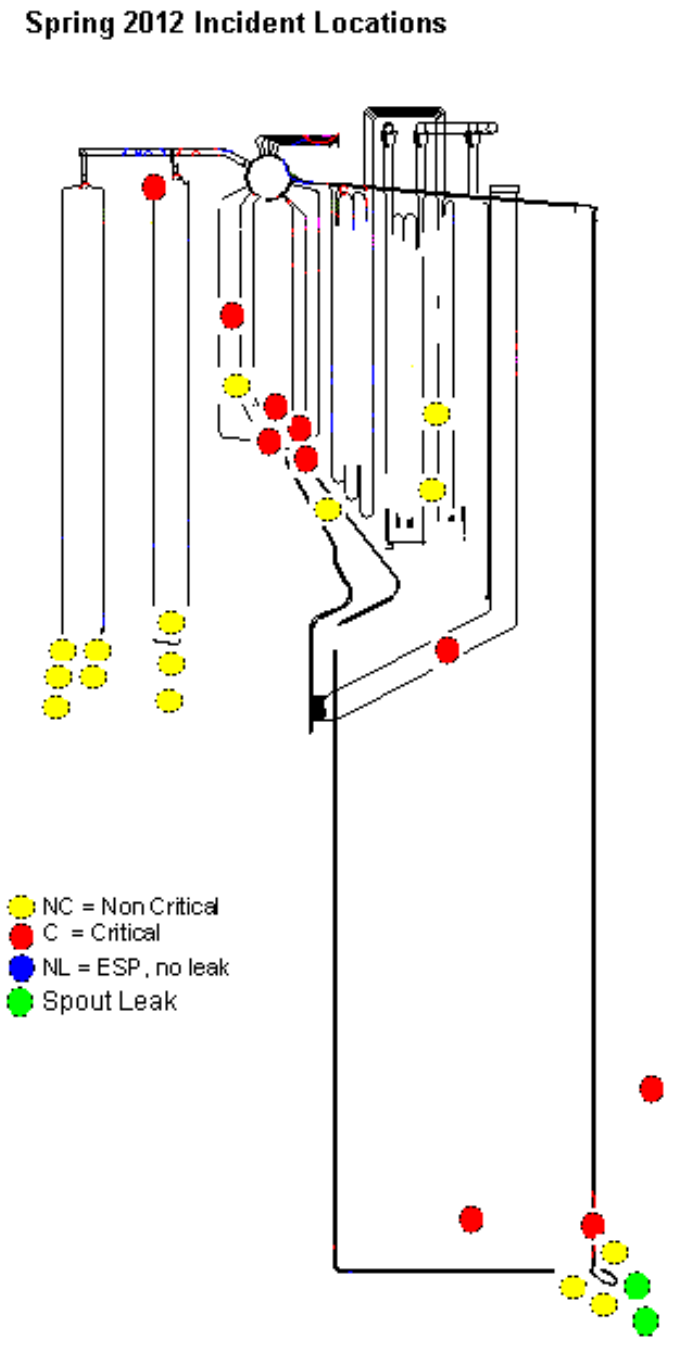

Spring 2012 Incident Locations
NC = Non Critical
C = Critical
NL = ESP, no leak
Spout Leak

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

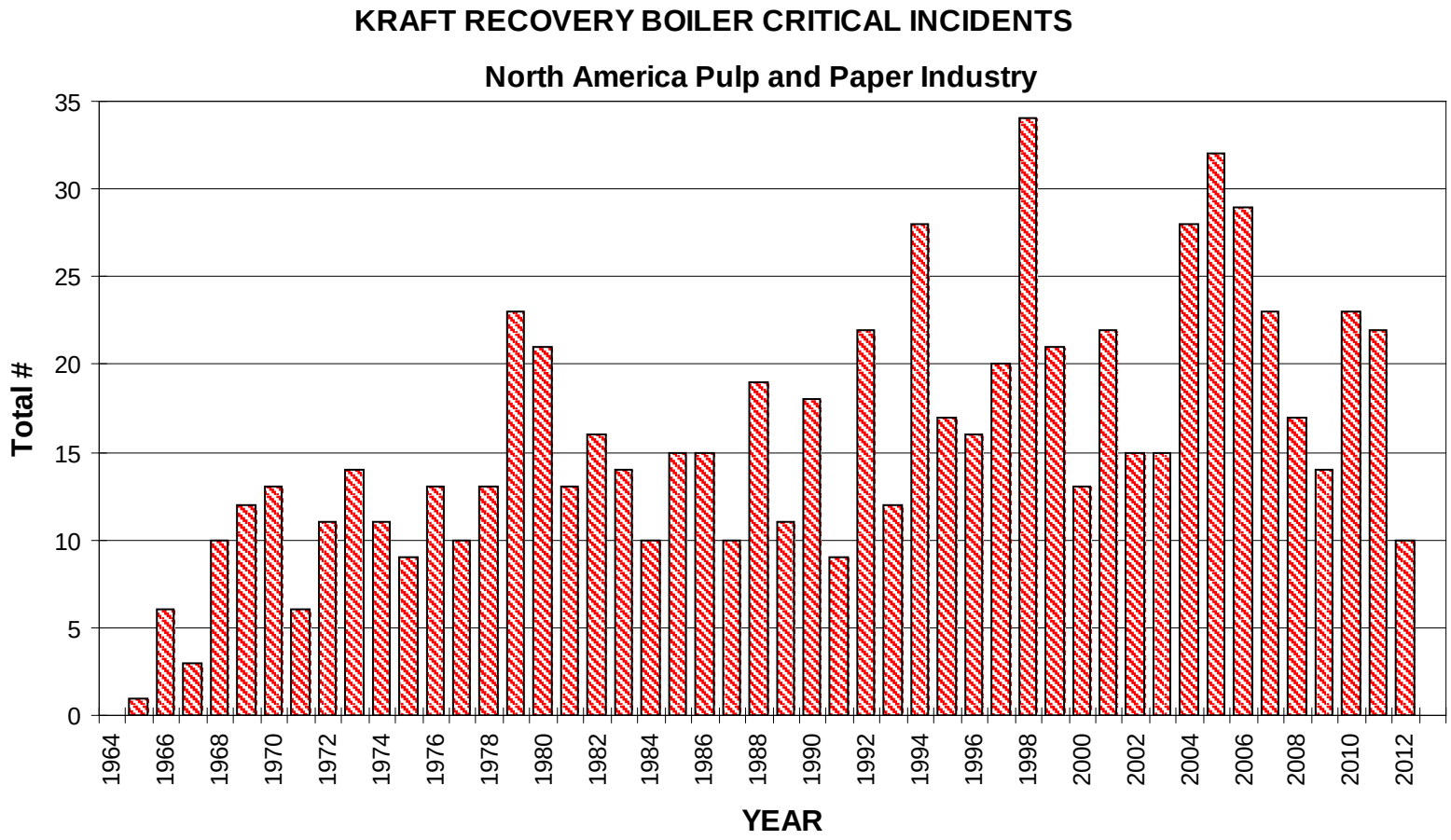
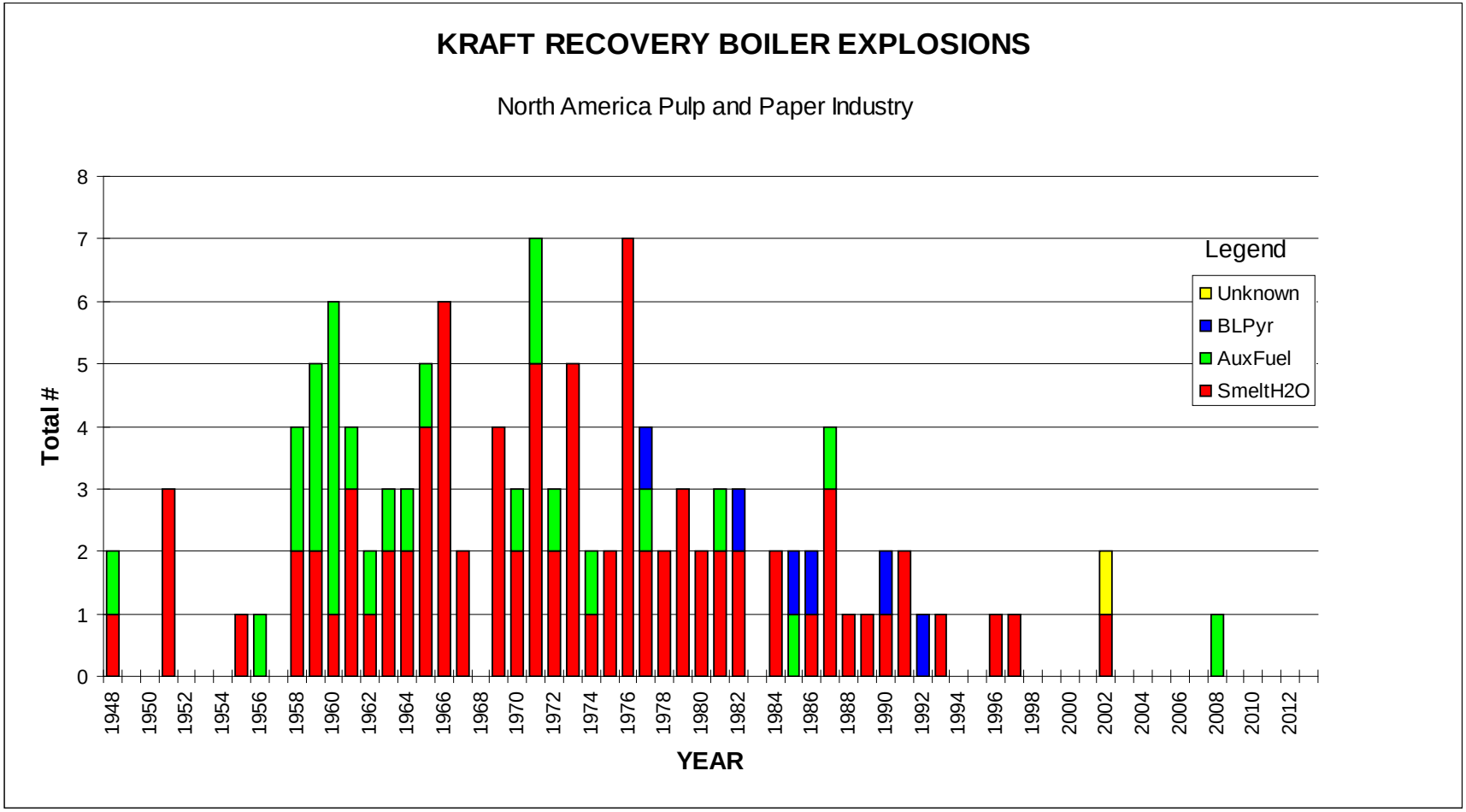


Figure 3


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
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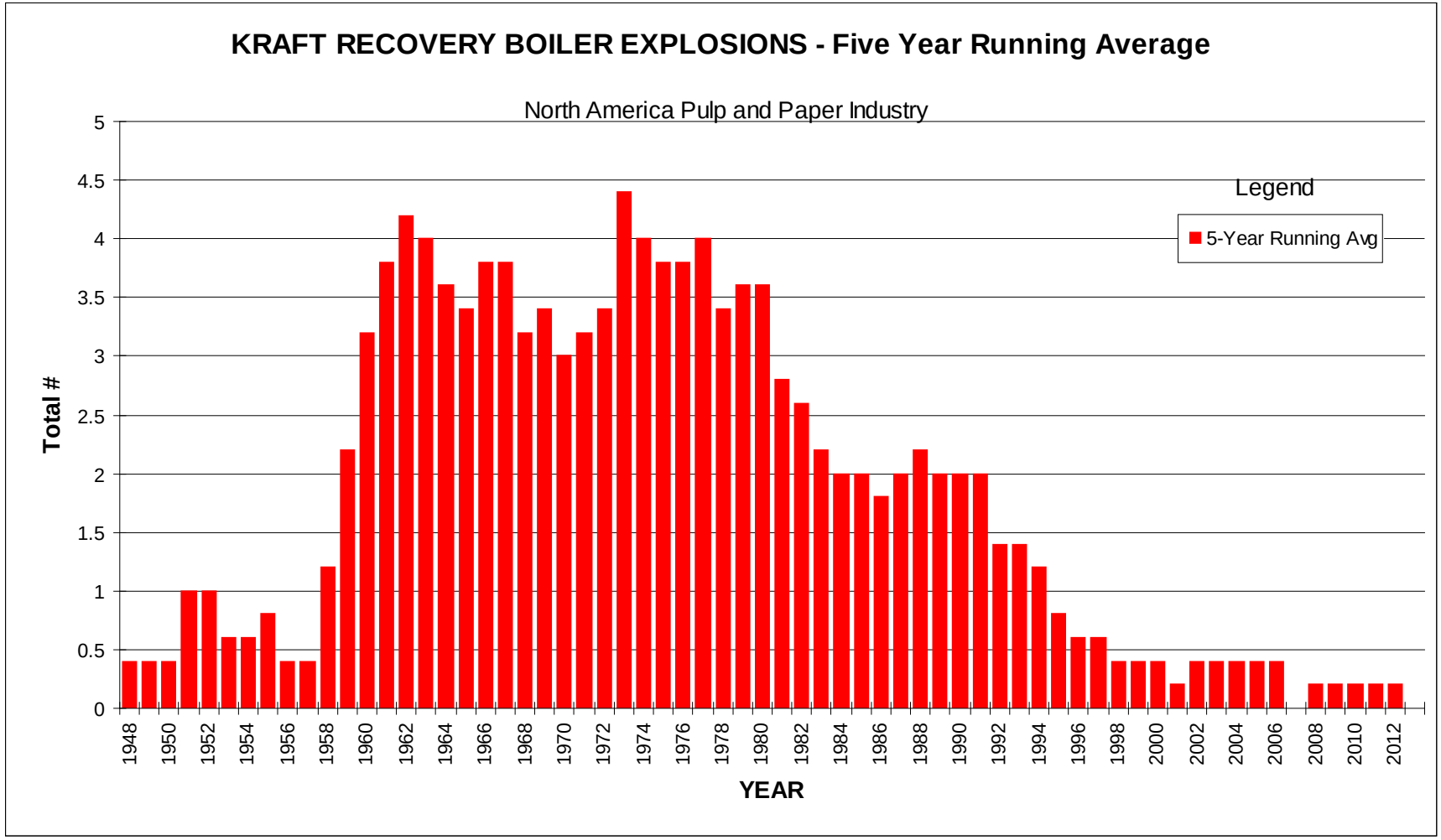
2008
2010
2012

Figure 4


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
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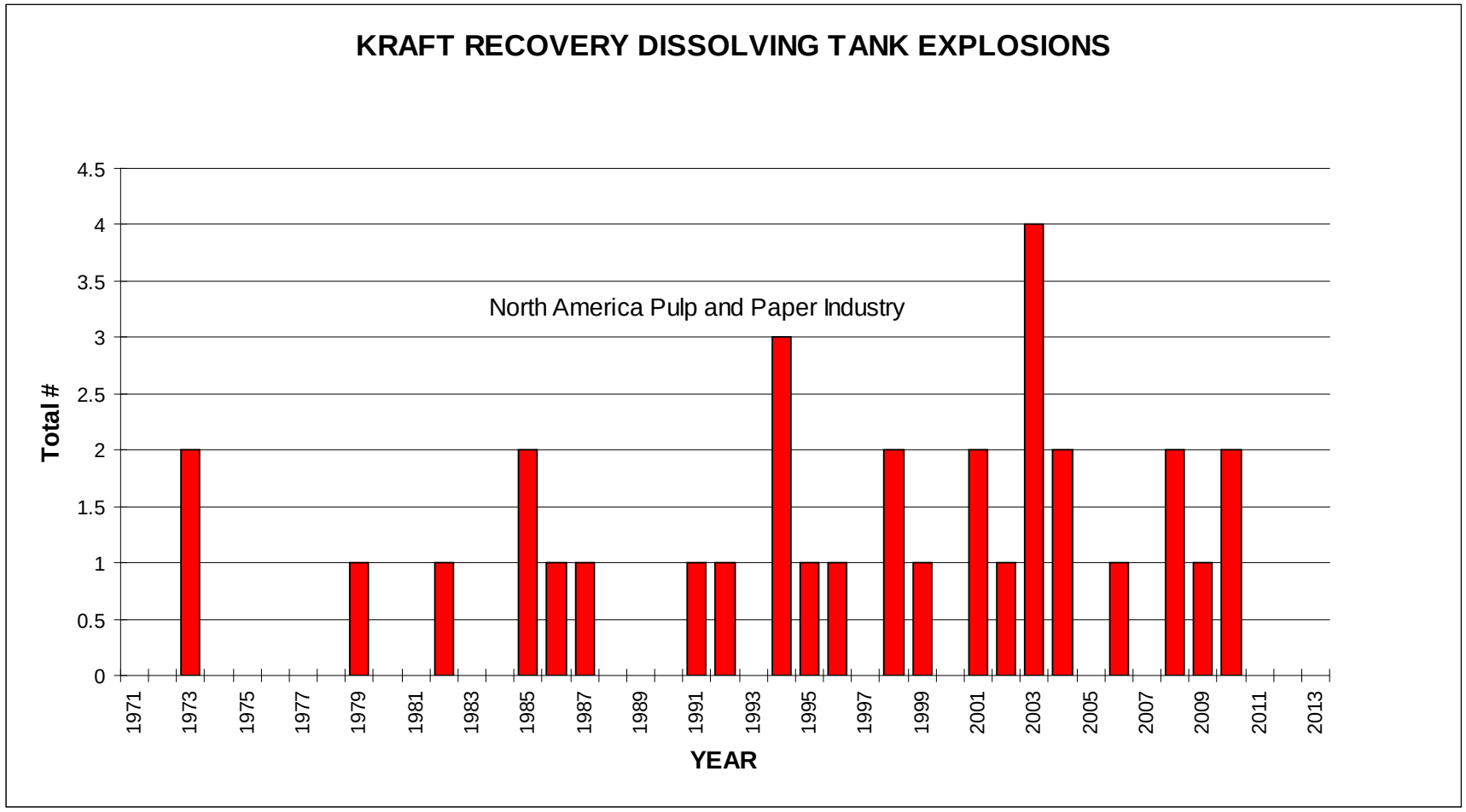
2008
2010
2012

Figure 5


KRAFT RECOVERY DISSOLVING TANK EXPLOSIONS
North America Pulp and Paper Industry
Total #
YEAR
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
1971
1973
1975
1977
1979
1981
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1989
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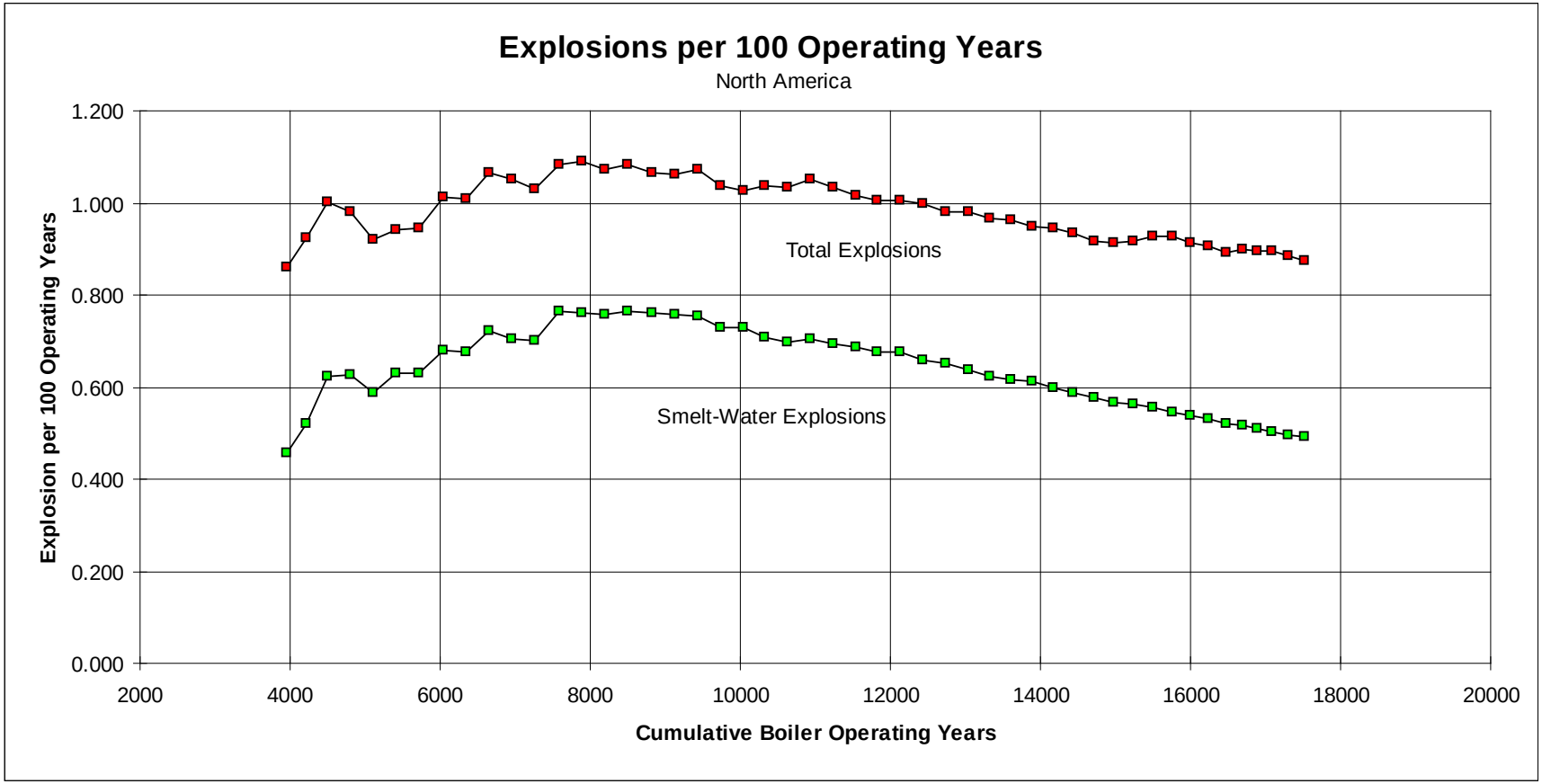
2007
2009
2011
2013

Figure 6


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

5. **SUBCOMMITTEE REPORTS** – (Cont.)

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

Good morning. The Fire Protection in Direct Contact Evaporators Subcommittee met Monday morning in open session. There were a total of ten in attendance; five of which were members of the committee. We reviewed the Antitrust policy and reviewed and accepted the April 2011 Minutes. We meet on an annual basis in April.

There were no new incidents or fires, but the February 2011 incident associated with an ESP continues to provide our committee with plenty to discuss and document revisions to consider.

We reviewed the incident last year and there have been ongoing discussion with the ESP and Safe Firing of Black Liquor Subcommittees to assure that all documents are consistent in providing needed direction, especially during upset conditions.

Overall our document, mainly generated in 2002, is good in providing needed direction; however, there is the need for some further direction related to upset conditions, especially some specifics related to prevention and preventing fires that occur when there is an upset.

Our document already has some of that direction; however, knowing that some additional direction would be good, we also need to keep in mind that there are many different operations. What may make sense for one operation may not work for another. We need to be cautious with the wording and not be too prescriptive.

We are working on revisions and are hopeful of getting a revised document to the Executive Committee by October 2012. We are open to getting other ideas and feedback. Some of the measures now being considered for addition to the document:

- Automatic dilution on ESP
- Monitoring cascade amps during upsets
- Maintaining dilution during an upset
- Keeping cyclone recirculating and cascade rotating during an upset
- Control room activation of back-up fire protection and dampers
- Monitor not just cyclone water wall wash pressure, but also the flow
- Automatic activation of steam smothering during certain upsets, such as, as ESP. There should be no shut-down of a cascade or cyclone on ESP.

Please remember to complete a Direct Contact Evaporator Incident Questionnaire for any and all fires. The recent event is an excellent example. The DCE fire is a painful experience, not just the pain of enduring the serious fire loss, but also the pain of sharing your lessons learned with your peers and the lessons you learned the hard way. These lessons are helpful to all who operate direct contact evaporators. Even minor incidents can help us learn some lessons; so please report them all!

All are welcome to attend our meetings and we are always looking for new members.

5. **SUBCOMMITTEE REPORTS** – (Cont.)

5.5 **INSTRUMENTATION REPORT** – Dave Avery

The instrumentation subcommittee met in open session on Monday morning with 10 out of seventeen members and 10 guests. Our session began with introductions of members and guest.
We reviewed our current membership and reluctantly accepted four resignations from current members: Mike Fay – Simpson Tacoma Kraft Company, Gail Lance – Babcock & Wilcox Company, Roger Smith – Georgia Pacific and John Browning – Georgia Pacific. I want to thank each of these members for their past contributions on helping the sub-committee improve our: "Recommended Good Practice" and sharing in our robust conversations about Recovery Boiler safety issues. The subcommittee membership wishes these guys much success as their adventures continue.

We are fortunate that we were able to accept two new members to the committee as a follow-up to the resignations. Greg Kornaker – Babcock & Wilcox will replace Gail Lance, C A Vossberg – Electron Machine. I want to thank these newest members for joining and I am looking forward to their contributions. We are still open to inviting new membership to help us in our tasks. If you have interest please contact me at your convenience.

We read the antitrust statement and continued on with a review of last October's minutes and the minutes were accepted. The new BLRBAC disclaimer was presented to the group before we proceeded with new business.

New business: A question was presented concerning drum level measurement and tripping.
Examining the information presented the group was able to reach consensus and adequately answer the presenters question.

Old Business: several modifications were presented for Section 3.6, HMI Interface, and Section 3.8, System Security. Several members and guest volunteered to review and rework the proposed wording for Section 3.6. While they worked this issue, the remaining group in attendance worked through 3.8.

Our volunteer group returned with workable solutions that were incorporated into the document.
Our main focus with these updates is to keep the intent while not being to prescriptive.

The afternoon session had nine members and five guests in attendance. Dave Boudreau presented a review of checklist section "G" "Black Liquor and Green Liquor Systems". The existing practice was gleaned for information and placed into the checklist as needed. This section has been completed since the spring meeting and is being incorporated into our completed checklist assembly. Our timeline is set for the completion of the update and our subcommittee is committed to making the goal. The target date for presentation to the membership is the spring of 2014.

Finally, I want to thank our guests for working very well with the subcommittee today. We were able to accomplish something together. I am looking forward to the next session to see how much more we can do together.

5. **SUBCOMMITTEE REPORTS** – (Cont.)

5.6 **MATERIALS & WELDING REPORT** – Jesse Worsham for Dave Fuhrmann

The Materials and Welding Subcommittee met Monday morning, April 2, 2012, with nine members and 12 guests.

Mark LeBel of Andritz was accepted as a new member of the subcommittee.

The meeting was opened with a review of the BLRBAC Antitrust statement and meeting minutes.

The subcommittee reviewed the BLRBAC disclaimer.

The subcommittee then reviewed the documents that are posted for comments.

Two additional definitions, copper sulfate test and Magnetic Lift Off were developed and will be submitted to the Executive committee for review.

A brief discussion was held on ceramic used in the superheater section for fouling.

The subcommittee adjourned for lunch and reconvened Monday afternoon with 12 members and 13 guests.

Bill Hammill and Kevin Smith of Whertec provided a presentation on Laser Clad.

The subcommittee adjourned.

Items considered for future consideration were:

- Superheater side to side tie installation
- New technology in weld examination and acceptance criteria

5.7 **PERSONNEL SAFETY REPORT** – Louis Mangelli for Robert Zawistowski

The Personnel Safety Sub-committee met in an open session on Monday, April 2, 2012. There were 5 members (out of 18) plus 28 guests in attendance during the meeting.

The BLRBAC anti-trust statement was reviewed. The minutes of the last meeting were read and accepted.

Representation at our meeting by regular members and guests included original equipment manufacturer Diamond Power; representation from insurance and insurance service companies included FM-Global; operating company representation at this meeting included Domtar, Georgia-Pacific, Glatfelter, Greif, Irving Pulp & Paper, Kapstone, Lincoln Pulp & Tissue, Northern Pulp, Rock-Tenn, Sappi, Thilmany, LLC, Propal, and Weyerhaeuser. Consultant representation included RSI and one independent consultant.

5. **SUBCOMMITTEE REPORTS** – (Cont.)
   5.7 **PERSONNEL SAFETY REPORT** – (Cont.)

The Executive Committee has updated the BLRBAC disclaimer. This was reviewed with the subcommittee. There was very little discussion on this topic as this was an administrative procedure.

An inquiry was made to suggest the Personnel Safety document should contain guidelines on "Management of Change" prior to the meeting. There was good discussion on this topic in general. Summary points of the discussion included the following: Management of Change should filter down and up all parties in the mill and changes should be documented; various mills have processes to capture and record change and it was agreed there is a need to capture key elements; and mills may be working with contracted companies to provide engineering services and those companies may not be in close coordination with all mill practices and communications and personnel experience level seems to be less than it used to be. In summary mills have a process in place to manage change, but they vary from mill to mill. It was suggested that BLRBAC should have a general guideline that mills should have a Management of Change process, but we should not specify how an individual mill goes about implementing that process.

An suggestion was made prior to the meeting that the Personnel Safety document should contain guidelines for the inclusion of explosion corners. Independent consultant Rick Spangler spoke on this topic and presented a Power Point presentation regarding explosion incidents and the amount of damage sustained in boilers both having explosion corners and those that did not. There was discussion both during and after the presentation. This discussion included some thoughts that explosion corners might be effective in reducing damage, but only with lower impact explosions. There was a general discussion about personnel safety if a unit had explosion corners. Are the areas around the corners prohibited for personnel exposure? What is the cost and how long does it take to retrofit? Mills should prevent explosions vs. having explosion corners. It was cited that BLRBAC Personnel Safety addresses explosion corners in Section 2.2, *Explosion Protection*. It was stated that three out of four boiler manufacturers currently provide explosion corners in their design (Alstom, Andritz and Metso), one does not (B&W).

Prior to the meeting an inquiry was received asking if BLRBAC had any information or recommendations with regard to eye protection, specifically addressing the topic of light ray intensity. A response was written stating that to the best of our knowledge the topic had not been discussed from this perspective. During the meeting there was a discussion about what practices are in use for eye protection against exposure to radiant heat. Among the products currently in use are face shields, mirrored, magic mirrored, tinted and clear safety glasses. It was not completely clear to the subcommittee during the meeting why this question had been asked so it seemed as though more information was needed in order to decide if the subcommittee needs to take any action with respect to our current guidelines. *(Note: Bob Zawistowski received the initial inquiry, but was not present at the meeting. The inquiry was made to see if we had any information on whether or not anyone has determined if operators viewing an operating furnace needed specific types of eye protection to protect their eyes from the intensity of the light rays.)* This topic will be revisited during the October 2012 meeting.

5. **SUBCOMMITTEE REPORTS** – (Cont.)

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

AF&PA is currently developing a proposal to study various materials used for PPE around recovery boilers. A copy of this proposal was sent to the Subcommittee Chair for review and comment. This was reviewed, commented and returned to AF&PA. This edited proposal was reviewed to inform the subcommittee what AF&PA intended. A discussion about PPE ensued. Safety practices around liquor guns and PPE was discussed. It was brought up that PPE for areas around drum level gauges needs to be addressed as well as smelt spout areas. Ways to reduce risk were discussed. There was a lot of discussion about marking areas off, the use of signage and how far or close is "safe." Restricting access was also discussed.

The subcommittee continues to work on the "Common Practices Guidelines." The initial draft of the document was submitted to the Executive Committee last fall for their review. This generated questions from Dave Fuhrmann and Scott Moyer which were reviewed in this meeting. There was some discussion about "pointed" or "chisel" edged rods on smelt spouts. Two users indicated they need to use rods like these due to their liquor chemistry (soda process).

Toward the end of the meeting there was a discussion about "Unsafe Acts," a theme we use to discuss near misses and accidents in mills. There was a discussion about hazards to avoid and that the subcommittee should consider guidelines along the topics of "Good Practices, and Not so Good Practices."

Between the October 2011 and April 2012 meetings there were no requests for clarification or document interpretation.

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

Karl Morency: I was just going to suggest that since you are looking into the subject of explosion corners, there was an extensive study done by AF&PA into that subject and you might want to review that as part of the input to your discussions.

5.8 **PUBLICITY & NEWS REPORT** – Dave Parrish

No report was made at the meeting. However, following the Main Committee Meeting, Dave Parrish, Scott Moyer, and John Andrews met with Kenneth Patrick (TAPPI) and it was agreed extra publicity for the 50th Anniversary meeting in October would be made through the TAPPI e-newsletter, TAPPI Ahead of the Curve. It was also agreed during the Executive Committee Meeting with Subcommittee Chairs that the existing publicity appears well suited for reaching individuals within the field of membership for BLRBAC.

5. **SUBCOMMITTEE REPORTS** – (Cont.)

5.9 **WASTE STREAMS REPORT** – Arie Verloop for John Rickard (Chaired by Paul Seefeld)

On April 2, 2012, the Waste Streams Subcommittee met in closed session at 9:00 AM with 11 members present and in an open session at 1:00 PM with 11 members and six guests present.

At the start of both the morning and afternoon session the BLRBAC antitrust statement was reviewed.

Last meeting's minutes were reviewed and approved by a unanimous vote.

John Veltre of Chartis has joined the subcommittee. Ann Plank has resigned from the subcommittee.

Arie Verloop will take over the list of recovery boilers that fire waste streams previously maintained by Ann Plank.

The present guidelines have a 50% MCR steam generation permissive for firing CNCG and SOG. This permissive is questioned regularly. After discussion the subcommittee agreed that the 50% permissive is good when the boiler is operating on auxiliary fuel only. However, when liquor is being fired in a stable manner and in accordance with Safe Firing of Black Liquor Guidelines, there is adequate heat in the furnace so that CNCG and SOG can be incinerated even if the steaming rate is below 50%. The following new guidelines for minimum boiler load were unanimously approved:

- The permissive to fire CNCG or SOG the boiler will either be above 50% MCR steam generation (this could be with auxiliary fuel only) or the boiler must be stably firing black liquor. For tripping, the boiler must be below 50% MCR and liquor is not being fired.

There are reports that in other parts of the world recovery boilers are operated at full load without a continuous igniter for CNCG and SOG streams and the subcommittee has been asked if a continuous igniter is necessary. The requirement for a continuous igniter is a valuable part of the minimum load permissive. It provides a very safe method for ensuring that the NCGs are ignited. Also, for NCGs from a batch digester system, there is a high variation in gas concentration due to the step function nature of a batch operation. There must be a positive ignition source present to ensure ignition. After discussion the subcommittee voted unanimously to keep the continuous igniter requirement.

In paragraph 4.4.2 there is a requirement to trip DNCG if the alternate vent valve is not closed. This requirement does not exist for CNCG or SOG. Discussion of this topic resulted in agreement that this requirement is not part of the boiler safe firing, it is part of the NCG system logic. As such, the subcommittee voted unanimously to delete the tripping requirement from chapter 4.

In paragraph 3.5 there is a statement concerning lack of fire side corrosion issues from waste stream incineration. This statement is not true and the subcommittee voted unanimously to delete the sentence.

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

There is a drafting error in figure 6 at the end of chapter 5, CNCG and SOG. Valve CG4 must be moved to a location between CG3 and CG5. This is also true for SOG's valve SG4, it must be between SG3 and SG5. This will be revised.

Ventless transfer has been a point of discussion over the past two years. To reduce CNCG or SOG venting time, there has been a desire to transfer gases directly into a recovery furnace. Current guidelines require a two step process where gases are directed to a vent located just ahead of the boiler and when permissives are satisfied, gases are transferred into the furnace. The problem with ventless transfer is that it constitutes remote burner operation. CNCG and SOG burners are operated as an auxiliary fuel and must be started locally. Note that a ventless transfer can be made away from a recovery boiler to another type of incineration device. A paragraph will be added to the guidelines concerning ventless transfer.

We have a revision to our guidelines in progress for presentation to the Executive Committee soon. The majority of changes concern blending liquid waste streams with black liquor. Changes agreed to during this meeting will be added to the guidelines.

Paragraph 5.6.1 requires that certain CNCG valves be located in a safe location. The value of this requirement was discussed by the subcommittee and we decided to consider it during the fall meeting.

In the afternoon open meeting we reviewed the morning's work. Hank Beder made a presentation on NCG constituents. It was a very thorough presentation. Hank answered questions after his presentation. Slides from the presentation are included in Appendix B – Composition of NCG and SOG.

This coming October's afternoon open meeting of Waste Streams will focus on operating experience. Everyone with waste streams incineration experience is especially invited to attend the meeting, learn from others and share their experiences.

The Waste Streams Subcommittee is always open to new members who would like to assist with guideline support and creation. Especially we would like to have more subcommittee members with operating experience. Operations personnel, please consider our invitation for your BLRBAC participation.

Paul Seefeld will take over the chairmanship of the Waste Streams Subcommittee starting after this spring BLRBAC meeting. *{Secretary's Note: The Executive Committee accepted the recommendation that Paul Seefeld be the new chairman of the Waste Streams Subcommittee at it closed meeting on Tuesday evening and expresses thanks to John Rickard for his years of dedicated service as chairman.}*

5. **SUBCOMMITTEE REPORTS** – (Cont.)

5.10 WATER TREATMENT REPORT – Tom Madersky

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

Twenty (20) subcommittee members attended both sessions of the meeting; the subcommittee membership profile for those in attendance was as follows:

- Three (3) OEMs
- Seven (7) mill representatives
- One (1) insurance representative
- Nine (9) BLRBAC Associate Members (8 of the 9 in attendance represented water treatment companies).

Bob Bartholomew from S.T.Powell Associates was welcomed as a new subcommittee team member.

The spring meeting activities were as follows:

- The BLRBAC Antitrust Policy was reviewed; the membership lists updated and key line items from the fall 2011 subcommittee meeting minutes were discussed.

- We then split up into two teams. One team started production of the chemical cleaning section; the other team completed resource development and performed a final edit of the recovery boiler **Drum Tube and Header Circuitry** section.

- In the afternoon session the entire subcommittee reviewed and provided input specific to what was produced by both teams.

- It was agreed upon by the attendees that the chemical cleaning resource would be electronically distributed to all subcommittee members in an effort to capture their thoughts regarding content and formatting. April 20th was established as the reply deadline.

- We adjourned at 2:15

- In the fall of 2012, we will have a **closed** morning session. In that session, the subcommittee membership will perform a final edit on the **Recovery Boiler Drum, Tube and Header Circuitry** section.

Once the final edit is completed, we intend to submit that document (our 5th document) to the executive committee for their review and comments.

5. **SUBCOMMITTEE REPORTS** – (Cont.)
   5.10 **WATER TREATMENT REPORT** –

- We will also enter into a detailed discussion regarding depth of content and formatting for the **Chemical Cleaning** text that the team produced during this session. We are targeting to complete the final draft of the **Chemical Cleaning** section next year and then move on to the deaeration section.

- We will have an **open** session in the afternoon. The subcommittee plans on reviewing and discussing any input from the executive committee relative to the first four documents that had been previously submitted.

Pending the Executive Committee's final edit and approval, we will request that the original 4 (four) documents be posted following the fall 2012 meeting.

Once posted the entire membership will have an opportunity to review and provide comments and/or suggestions. We will take that input under advisement in the spring 2013 session.

We would, again, like to thank all of the subcommittee members for their participation and valued contributions.

6. **AMERICAN FOREST & PAPER ASSOCIATION RECOVERY BOILER REPORT** – Tom Grant

The AF&PA Recovery Boiler Program is continuing in its efforts to produce greater awareness of safe practices and improvement in the operation, maintenance, safety and efficiency of recovery boilers.

Membership

Currently, 31 companies (pending what changes have taken place) participate in the Program including 8 non-AF&PA member companies. There are 3 other companies operating recovery boilers that are not in the Program. The Program members represent over 95% of the total production of sulphate pulp in the U. S. We continue to encourage them to join with the current members in the cooperative efforts for the safe operation and research to improve the reliability of the recovery boilers. All companies operating recovery boilers benefit directly from the Program's activities, including the research.

Currently, there are 102 mills operating 171 recovery boilers in the U. S. They produce about 40% of the total energy used in the U. S. pulp and paper industry. The average age of the boilers is over 30 years. Over 67% of the boilers were installed prior to 1979.

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

New Subcommittee Co-Chairmen for the Operations & Maintenance Subcommittee

The Committee is happy to announce that Mr. Don Flach of Georgia-Pacific and Mr. Frank Navojosky of International Paper have agreed to serve as co-chairmen of the Operations and Maintenance Subcommittee. They replace Mr. Dean Clay and Mr. Dave Streit who have retired after serving on the Committee for over 20 years. We thank them for all the time and effort they gave in leading the great work done over these years.

Recovery Boiler Explosions

We are very happy with the outstanding efforts of those operating the recovery boilers; we have no explosions to report. We hope this will continue. It is a great accomplishment to have had only one explosion in the last 4 years and only three in the last 13 years. Looking back at John Andrews' charts, we see very few years when there were no explosions. Although we continue to have a number of critical incidents during these last few years, we have not had any explosions. We continue to stress the need for training in the safe operations of the boilers. The Committee has increased its efforts to research ways to reduce dissolving tank explosions.

Operational Safety Seminars

Last year we had a total of 71 attendees for the two seminars in Atlanta. They represented 13 companies from 21 mills. Two seminars are scheduled for this year – one will be held April 17 – 18th and the second will be held May 15 – 16th. Both will be held in Atlanta. Information regarding the seminars (registration forms for the seminars and hotel along with the agenda were sent to all company representatives, alternates and mill superintendents in January). We have a number of registrations already made for both sessions. The committee asks that all companies seriously consider sending people to these valuable seminars.

The Committee felt that having the two half day sessions instead of the full day and one-half day sessions, at the request of a number of companies, avoids additional time away from the mill. The seminars have also been reformatted to further improve the discussions and "preaching and teaching" the information available.

Recovery Boiler Reference Manuals

The AF&PA Recovery Boiler Reference Manuals are being reviewed for any possible new information. They are being converted to Microsoft Word so that future revisions may be made more easily and be available electronically.

Review of the AF&PA Recovery Boiler Safety Audit Guidelines

The Operation and Maintenance Subcommittee has reviewed the AF&PA Recovery Boiler Safety Audit Guidelines which was last revised in 2004. We expect that the revised document will be approved and be available shortly. When it is approved it will be distributed to member companies and made available on the AF&PA website.

Study on Smelt Dissolving Tank Explosions

The Research & Development Subcommittee received a draft proposal to sponsor a study for "Mitigating the Risk of Smelt-Water Explosions in Dissolving Tanks." The Committee felt that the proposal was too research focused and discussed it with the proposer. Later, the Committee was informed that due to health issues the lead role had to withdraw from the study.

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

The Committee is now looking to focus on an analysis of BLRBAC, OEM and operating company data with the goal of recommending design and operating best practices to minimize the risk of dissolving tank explosions. It is looking for possible lead investigators for this work. The Operations and Maintenance Subcommittee is also looking to develop best practices around dissolving tank related issues, but avoiding any overlap of work by the R & D Subcommittee. The O & M Subcommittee is drafting a questionnaire that will be sent to all company representatives and mill superintendents to solicit input to develop best practices in operating dissolving tanks safely. The O & M Subcommittee will also be looking at RB functional trip testing procedures.

Study of Heavy Smelt Runoffs

The R & D Subcommittee discussed a possible study of Heavy Smelt Runoffs with Dr. Tran at the University of Toronto. He explained that some research is underway at the University on smelt jet interaction, smelt-green liquor interaction in the dissolving tanks, and smelt surge detection. The results of this work should complement the R & D Subcommittee project on smelt dissolving tank risk mitigation and be presented in conference papers over the next year or two.

Evaluation of Drying Out Recovery Boilers after a Water Wash

The Research & Development Subcommittee is considering a basis study for the evaluation for drying out recovery boilers after a water-wash, as this is typically on an outage critical path and the benefits and risks are not universally understood. The subcommittee is preparing a request for a proposal document to be distributed for consideration by several researchers.

Updating "Kraft Recovery Boilers" Blue Book

The revision of the "Kraft Recovery Boilers" blue book is nearing completion. Most chapters have been completed and reviewed. The remaining chapters are expected to be completed by the end of June. The final draft will be reviewed by members of the subcommittee

Proposal for Research of Protective Clothing and Equipment

A draft proposal was submitted to the R & D Subcommittee to launch a critical review of the materials that are available for use for personnel protection around black liquor recovery boilers.

The subcommittee discussed possible materials testing groups that might take on the study. It was agreed to contact the BLRBAC Personnel Safety Subcommittee for suggestions.

Other Research Projects Under Review

The Committee discussed possible new research projects related to recovery boiler safety including: shatter jet nozzle standards; the use of infrared (IR) scanners for monitoring superheater inlet gas temperature during recovery boiler start-ups; boiler leak verification that limits personnel exposure, and practical experience with CNCG, rectified methanol, and HVLC gas burning in recovery boilers.

The Committee discussed the need to periodically revisit boiler inspection protocols, why to look, where to look and how to look for, e. g., evidence of SAC and FAC (flow accelerated corrosion).

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

Annual Meetings and Conference

AF&PA's annual Recovery Boiler Meetings and Conference was held in Atlanta February 7th and 8th and was very successful. As usual, the Conference was open to all operating companies, insurers, vendors and manufacturers. The presentations included reports on the projects currently sponsored by the AF&PA Recovery Boiler Program and subcommittee reports on their accomplishments, reports from Sweden, Norway and Finland on their recovery boiler committees' activities, as well as other research being done outside of AF&PA related to recovery boilers. The object of the Conference is to keep not only the members advised, but also the remainder of the recovery boiler community, as well. We hope that many of you will plan to attend next year's Conference which will be held in Atlanta in February.

7. **NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTORS REPORT** - Terry Parks

No report.

8. **TAPPI RECOVERY BOILER SUBCOMMITTEE OF STEAM & POWER REPORT** –Alarick Tavaris

(See Appendix C for *"TAPPI Power and Recovery Boiler Subcommittee Update")*

9. **WESTERN CANADA BLRBAC REPORT** – Shawn Casey

Western Canada BLRBAC continues to have good attendance to both the fall and spring meetings since moving it to Richmond, British Columbia which is in close proximity to the Vancouver international airport. The meetings are supported well by suppliers and vendors. The three boiler manufacturers who continue to support our meeting presented recent updates for the Industry.

I have encouraged all of the Mills to ensure all incidents are submitted to BLRBAC even if they are found on a hydro as it is very important that we continue to learn off of each other to maintain the safety and reliability of our units.

I will again take the learnings from the incidents and the operating problem session from this BLRBAC meeting back to the Western Canada BLRBAC membership to share.

We have recently started up our own web site www.wcblrbac.org and will start to populate it more as time goes on.

Issues we are having in Western Canada is the availability of operations, technical and maintenance personal as we are having to compete with the fast growing oil sands industry. This is not only driving up our costs but making it very hard to schedule our outages for maintenance.

Our spring meeting will be held in two weeks again at the River Rock Casino in Richmond, anyone who would like more information on this please contact me or Bill Downing

Again thank-you for another great meeting here in Atlanta!

10. **ACTIVITIES OUTSIDE NORTH AMERICA REPORTS**

No reports.

11. **OPERATING PROBLEMS SESSION REPORT** – Scott Moyer for Jim Hinman

The Operating Problems Session was held Tuesday afternoon with approximately 150 guests present. Topics included ESP Decision making by operators, Acid cleaning, Flooded drum startup, drum level measurement error, and other topics of interest to the audience. After the Operating problems session, Karl Morency presented a summary of economizer failure causes that was based on two TAPPI TIP's and an AFPA study on Economizers.

CHAIRMAN: Following the main committee meeting there will be two technical presentations:

- An introduction to Infrafone
- Lignin Removal from Black Liquor

Also, at 1:00 PM the TAPPI steam & Power/Energy Management Committee spring meeting will be held at this hotel.

NEXT MEETING - BLRBAC's 50TH ANNIVERSARY

Crowne Plaza Hotel
Atlanta GA
*October 1, 2 &3, 2012

* This meeting is being held the first week of October due to hotel availability.

Any other questions or comments? If not, can I have a motion to adjourn the meeting? Second? All in favor? Opposed? The business meeting of spring 2012 BLRBAC is concluded. Thank you much for your participation. Everyone have a safe trip home!

Appendix A – Summary of Incidents

ECONOMIZER

SPRING 2012 - 01	
Classification:	**Non Critical**
Location:	**Domtar, Johnsonburg, PA**
Unit:	1993 Tampella #90132, 1-drum Large economizer
Unit Size:	2.8 MM lb ds/day; 400,000 lb/hr steam at 1250 psig, 900°F, 1600 psig design
Incident Date:	Nov 9, 2011
Downtime hrs, leak/total:	26.7/26.7
ESP?	**No**
Leak/Incident Loc:	Crack in weld between economizer tube and lower header.
How discovered:	Walk down. Saw wet ash.
Wash adjacent tube:	No
Root cause:	Historically stress-assisted corrosion (SAC); stress corrosion fatigue cracking caused by a combination of thermal expansion of the tube length, and the cantilever effect of the sloped portion of the tube. Metallurgical analysis on past failures has shown poor shop welds to be root cause of failure.
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	October 2011
Sequence of events:	**9Nov**: 01:30 During walk down, saw damp ash in economizer conveyer. Orderly shutdown. 02:40 Liquor out. Burned out bed. Lock-out. 10:00 Began water wash of economizer. Inspected site. Drained water. Began repair. 17:00 Completed repair. 21:30 Hydro OK. 23:45 Unit on line **10Nov:** 05:20 On liquor.
Repair procedure:	Grind out defect, and weld repair
Future prevention:	During the past 7 years there have been numerous leaks in the #1 Economizer section

ECONOMIZER

SPRING 2012 - 02	
Classification:	**Non Critical**
Location:	**Domtar, Johnsonburg, PA**
Unit:	1993 Tampella #90132, 1-drum Large economizer
Unit Size:	2.8 MM lb ds/day; 400,000 lb/hr steam at 1250 psig, 900°F, 1600 psig design
Incident Date:	Nov 21, 2011
Downtime hrs, leak/total:	28.7/28.7
ESP?	**No**
Leak/Incident Loc:	2 leaks: both were cracks in weld between econ tube & lower header, row 10 5th up; row 12 2nd up
How discovered:	Walk down. Saw wet ash.
Wash adjacent tube:	No
Root cause:	Historically stress-assisted corrosion (SAC); stress corrosion fatigue cracking caused by a combination of thermal expansion of the tube length, and the cantilever effect of the sloped portion of the tube
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	October 211
Sequence of events:	**21Nov**: 17:00 During walk down, saw damp ash in economizer conveyer. Orderly shutdown. 20:00 Liquor out. Burned out bed. Lock-out. **22Nov:** 04:30 water wash of economizer done. Inspected site. Drained water. Began repair. 12:2 Completed repair. 16:30 Hydro OK. 23Nov: 00:10 Unit on line (gas). 00:40 On liquor
Repair procedure:	Grind out defect, and weld repair
Future prevention:	During the past 7 years there have been numerous leaks in the #1 Economizer section

Appendix A – Summary of Incidents (Continued)

ECONOMIZER

SPRING 2012 - 03	
Classification:	**Non Critical**
Location:	**Domtar, Hawesville, KY**
Unit:	#4 RB 1997 Ahlstrom #59072, 1-drum Large econ, decanting hearth
Unit Size:	2.7 MM lb ds/day; 415,880 lb/hr steam at 1250 psig, 860°F, 1550 psig design
Incident Date:	December 12, 2011
Downtime hrs, leak/total:	26.5
ESP?	**No**
Leak/Incident Loc:	¼" circumferential crack in toe of weld of 2: feeder tube to feed distribution header, bottom of cold economizer
How discovered:	LeakTrac alarm prompted walk down. Saw moisture in cold econ ash conveyor.
Wash adjacent tube:	No
Root cause:	Initial weld slag or porosity failure due to thermal cycle stress
Leak detection:	Yes LeakTrac (Ashland-Hercules), Alarm of chemical mass balance prompted walk down
Bed cooling enhanced	No
Last full inspection:	October 2010
Sequence of events:	**12Dec**: During walk down, saw excessive moisture in #1 (cold) econ ash conveyor. Since no entry to furnace, tried to run for week. **13Dec**: Monitoring showed getting worse. 11:00 Took off liquor. 14:50 Orderly shut down. Repairs made. **14Dec**: 08:30 restart. 17:20 Liquor fire.
Repair procedure:	Weld at leak ground out and re-welded
Future prevention:	Mag particle testing at next outage. This is 3d similar failure since March 2009

ECONOMIZER

SPRING 2012 - 04	
Classification:	**Non Critical**
Location:	**Domtar, Hawesville, KY**
Unit:	#4 RB 1997 Ahlstrom #59072, 1-drum Large econ, decanting hearth
Unit Size:	2.7 MM lb ds/day; 415,880 lb/hr steam at 1250 psig, 860°F, 1550 psig design
Incident Date:	February 7, 2012
Downtime hrs, leak/total:	23.5
ESP?	**No**
Leak/Incident Loc:	Two ¼" circumferential cracks in toe of weld of 2" feeder tube to feed distribution header, bottom of cold economizer
How discovered:	Walk down. Saw moisture in cold econ ash conveyor. Leak alarm same time.
Wash adjacent tube:	No
Root cause:	Stress induced by feedwater header hanging up at the casing seal.
Leak detection:	Yes LeakTrac (Ashland-Hercules). Leak Alarm same time as walk down discovery
Bed cooling enhanced	No
Last full inspection:	October 2010
Sequence of events:	**5Feb**: 09:00 During walk down, saw water in #1 (cold) econ ash conveyor. Since small, run until tomorrow. Later, saw leak impinging on adjacent tube. **6Feb**: 00:01 Pulled liquor. **7Feb**: 00:01 Off liquor. Repair made. 18:38 Fire in unit. 23:25 Liquor fired.
Repair procedure:	Welds at leaks ground out and re-welded.
Future prevention:	Removed old style casing seals. Inspected all area tubes with wet florescent mag particle. This is 4th & 5th similar failure since March 2009

Appendix A – Summary of Incidents (Continued)

ECONOMIZER

SPRING 2012 - 05	
Classification:	**Non Critical**
Location:	**Domtar Paper Company, Marlboro Mill, Bennettsville, SC**
Unit:	#1 RB, 1990 Ahlstrom, #5904, 1-drum Large econ, Decanting hearth
Unit Size:	4.4 MM lb ds/day; 635,000 lb/hr steam at 1080 psig, 850°F, 1550 psig design
Incident Date:	Feb 14, 2011
Downtime hrs, leak/total:	41.5
ESP?	**No**
Leak/Incident Loc:	Circumferential crack in economizer lower elbow, #1 Econ tube (lower header) at gas outlet just before precip outlet
How discovered:	Walk down. Saw water in #1 economizer drag conveyor
Wash adjacent tube:	No
Root cause:	Crack in elbow bend, not associated with weld
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	Nov 2010
Sequence of events:	During rounds, saw wet salt cake in #1 econ conveyor. Outlet flue gas temp affected. No steam/water differential. Took controlled shut down.
Repair procedure:	Crack ground and welded out
Future prevention:	Tubes in same area PT checked for similar cracks. No other cracks found. Thickness of cracked tube found to be good. Will replace that bend during Nov 2011 annual outage and do a more thorough inspection of these bends on both #1 & #2 Economizers.

ECONOMIZER

SPRING 2012 - 06	
Classification:	**Non Critical**
Location:	**Verso Paper, Androscoggin, Jay ME**
Unit:	#1RB, 1965 CE 2564 2-drum Large economizer 1984, **Sloped** hearth
Unit Size:	1.8 MM lb ds/day; 296,000 lb/hr steam at 900 psig, 825°F,1050 psig design
Incident Date:	July 17, 2011
Downtime hrs, leak/total:	36.5/36.5
ESP?	**No**
Leak/Incident Loc:	3/16” pinhole, 9” above lower header, row 5 tube 56, of cold H_2O In (center) econ module
How discovered:	Control panel steam/feedwater differential
Wash adjacent tube:	No
Root cause:	Oxygen pitting
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	April 2011
Sequence of events:	Saw panel steam/feedwater differential at rate of 2000 lb/hr/day. Shut soot blowers. No leak noise. Shut long-flow hopper liquor, and saw % solids to furnace increase3.2%, indicating water in hopper. Visual of economizer saw an area washed clean of salt cake. Did orderly shutdown for repair.
Repair procedure:	Dye penetrant exam to find extent. Ground out indication. Did weld repair. PT on final weld. UT’d surrounding tubes, but no washing found.
Future prevention:	New Deaerator in capital plan. Since 1997, seven oxygen pitting leaks near lower header.

Appendix A – Summary of Incidents (Continued)

ECONOMIZER

SPRING 2012 - 07	
Classification:	**Non Critical**
Location:	**Verso Paper Androscoggin, Jay, ME**
Unit:	#1 RB, 1965 CE # 2564 2-drum with 1984 Large econ, retro sloped hearth
Unit Size:	1.8 MM lb ds/day; 296,000 lb/hr steam at 900 psig, 820°F, 1050 psig design
Incident Date:	Nov 16, 2011
Downtime hrs, leak/total:	29.5 hr
ESP?	**No**
Leak/Incident Loc:	4 pinhole leaks, 1/8" – 3/16", 3" – 9" above lower header of cold H_2O In (center) econ module
How discovered:	Panel showed steam/feed water differential alarm.
Wash adjacent tube:	Yes
Root cause:	Oxygen Pitting of 3, 4^{th} washed by adjacent leak.
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	April 2011
Sequence of events:	Steam/feed water differential, identified leak, began orderly shutdown, repair completed
Repair procedure:	Dye penetrant exam. Surrounding tubes were UT'ed. Ground out indications and performed weld repair. PT on final welds.
Future prevention:	Currently doing excellent O_2 control. Leaks from earlier bad control. New Deaerator in capital plan. Since 1997, increasing oxygen pitting leaks near lower header.

ECONOMIZER

SPRING 2012 - 08	
Classification:	**CRITICAL INCIDENT 766**
Location:	**Tolko Manitoba Kraft Papers,** The Pas Manitoba, CAN
Unit:	1969 CES #CA-69108, 2-drum DCE cascade, Decanting hearth
Unit Size:	1.75 MM lb ds/day; 219,000 lb/hr steam at 750 psig, 825°F, 800 psig design
Incident Date:	Nov 13, 2011
Downtime hrs, leak/total:	33 hr
ESP?	No
Leak/Incident Loc:	Pin hole leak 1" above top attachment weld, in top of economizer, back wall, left corner tube approx 91 ft above floor.
How discovered:	Walk down. Saw moisture on buck stay.
Wash adjacent tube:	No
Root cause:	- (ed: Likely SAC)
Leak detection:	No
Bed cooling enhanc	No
Last full inspection:	August 2011
Sequence of events:	Saw leak Nov 13th. Boiler taken off line on 14th to do repairs, done from outside boiler. Boiler hydroed and put back on line.
Repair procedure:	Overlay Repair: Cracked area excavated and examined with dye penetrant. Root pass welded with SMAW E6010 and examined with PT. Fill and cover pass completed with SMAW E7018 and examined with PT
Future prevention:	We will be looking at the other tubes in this area next shutdown. No previous issues in this area.

Appendix A – Summary of Incidents (Continued)

ECONOMIZER

SPRING 2012 - 09	
Classification:	**Non Critical**
Location:	**Northern Pulp Nova Scotia, New Glasgow, CANADA**
Unit:	1967 B&W/Andritz #5940, 2-drum DCE cyclone, 1995 B&W Large econ
Unit Size:	3.25 MM lb ds/day; 477,000 lb/hr steam at 900 psig, 850°F, 1050 psig design
Incident Date:	August 24, 2011
Downtime hrs, leak/total:	80
ESP?	**No**
Leak/Incident Loc:	1/8" pinhole, tube 4 row 20, at lower econ header, below boiler baffle
How discovered:	Panel: small steam-water differential
Wash adjacent tube:	**Yes** tube 5 row 21
Root cause:	Soot blower erosion & downtime corrosion from wet salt cake between tubes and lower header.
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	Oct 2010
Sequence of events:	**24Aug**: morning: panel showed small differential in steam-water trend. Walk down. Nothing found. No PO4 loss. After noon, O2 probe being replaced. Instrument tech saw in rear half of econ casing. Reduced black liquor. Orderly shut down. 19:00 Liquor out. Cooled unit. Staged for repairs.
Repair procedure:	9 tubes removed to access failed tubes. All were plugged and welded. Ut and dye pen were used to check for a pattern.
Future prevention:	Tube sent out for study. Next shutdown more testing by Acuren. Try to do a better job washing economizer headers.

BOILER

SPRING 2012 - 10	
Classification:	**Non Critical**
Location:	**RockTenn, West Point, VA**
Unit:	#5 RB, 1992 B&W PR-219, 1-drum Large econ, Sloped Hearth
Unit Size:	3 MM lb ds/day; 493,000 lb/hr steam at 1225psig, 900°F, 1450 psig design
Incident Date:	October 10, 2011
Downtime hrs, leak/total:	25
ESP?	**No**
Leak/Incident Loc:	<1/16" Pinhole in Boiler bank tube, behind arch (1-drum), 124' elev.
How discovered:	Walk down. Saw steam coming from behind boiler lagging
Wash adjacent tube:	No
Root cause:	Not determined yet
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	June 2011
Sequence of events:	10Oct 08:30 During walk down saw steam escaping from under insulation on front wall of 1-drum boiler bank. Checked panel for leak indications, draft change, steam/feedwater change, or bed condition (camera).None found. Confirmed steam escaping in front wall of generating bank behind nose arch. Since no water entering furnace, began orderly shut down. Stopped liquor firing. Burned out bed, done 14:30 Unit taken off line. When drum pressure reached 500 psi, removed insulation in area and leak located behind a V-shaped, buck stay attachment clip. The attachment clip had been welded to the wall membrane and not the tube.
Repair procedure:	Pin hole partially ground out to depth of 0.16", leaving a remaining thickness of 0.06" to prevent burn through during welding. The ground tube was visually and magnetic particle inspected, no defects noted. Ground area was filled with carbon steel weld metal using the GTAW process.
Future prevention:	Tube will be removed during next annual outage and sent out for analysis

Appendix A – Summary of Incidents (Continued)

BOILER

SPRING 2012 - 11	
Classification:	**CRITICAL INCIDENT 767**
Location:	**Domtar**, Hawesville, KY
Unit:	#3 RU 1986 Ahlstrom #39445, 2-drum Large econ, Decanting hearth
Unit Size:	2.1 MM lb ds/day; 360,000 lb/hr steam at 1250 psig, 860°F, 1475 psig design
Incident Date:	October 28, 2011
Downtime hrs, leak/total:	14/146
ESP?	**Yes**
Leak/Incident Loc:	Circumferential crack at lower boiler drum, 3d row from front, center of bank; this washed ½" hole in next tube, 4th row from front, at wide end of swage, 8" above drum.
How discovered:	Control panel showed steam-feed water split. Then saw water entering lower furnace.
Wash adjacent tube:	Yes
Root cause:	Fatigue crack
Leak detection:	Yes
Bed cooling enhanced	No
Last full inspection:	Sept 2010
Sequence of events:	**Early October:** Minor steam-water split for 2 weeks due to heavy blow down to offset hardness excursion. **27Oct**: morning: Saw steam/feed water split. No noise during walk down. **28Oct**: morning: Steam-water split growing wider than blow down. Checked further correlations. 13:05 Realized strong possibility of 50 – 100 kpph leak. First thought in superheater. 14:34 Pulled liquor for furnace observation. Nothing seen, but heard sound. Feed water flow showed 100 kpph even when drum feed shut. Called to repair flow meter. Backed off unit even more: 16:26 pulled fire, shut fans. Still no confirmation. Treatment company confirmed chemical losses indicate leak. Next inspection saw water running down inside furnace wall by gun port, where draft through port lifted it over bed. 17:04 ESP'd unit and evacuated. **29Oct**: 07:30 (+14.5 hr) Infrared gun upper furnace at 230F, bed surface at 165F; floor tube cold side at 195F. 08:35 Started ID and 3o fans to speed cooling. 09:30 Started 1o and 2o fans. 16:30 started water wash. **30Oct**: 00:30 Wash done. 03:00 Filled unit for leak test. Found leaks at mud drum. Began scaffolding. **31Oct**: For deposit weight tests (DWD), cut 1 floor tube, 1 primary air level tube and 1 boiler tube Dutchman samples and sent to lab. Access for weld repair of boiler tube leaks not good. **1Nov**: 01:00 Began removing tubes and plugging drums. DWD test results 7.25 g/ft^2. **2Nov**: 06:00 hydro complete OK
Repair procedure:	Removed both tubes and plugged both steam and mud drum.
Future prevention:	Operator training of value of communication. More water treatment and boiler operations interchange may have allowed earlier ESP.

Appendix A – Summary of Incidents (Continued)

BOILER

SPRING 2012 - 12	
Classification:	**CRITICAL INCIDENT 768**
Location:	**Temple-Inland,** Orange TX [ed: now I.P.]
Unit:	#1 RB, 1967 B&W, PR-108A 2-drum DCE Cyclone,
Unit Size:	2.77 MM lb ds/day; 254,000 lb/hr steam at 850 psig, 825°F, 975 psig design
Incident Date:	December 31, 2011
Downtime hrs, leak/total:	33/40
ESP?	**No**
Leak/Incident Loc:	<1/8" pinhole at attachment weld in boiler rear sidewall behind buck stay. Tube 20 from front, 8th from side
How discovered:	Walk down.
Wash adjacent tube:	No
Root cause:	Stress corrosion cracking at attachment weld where was exposed to tramp air from casing crack
Leak detection:	Yes. Nalco RBLI. Didn't detect but confirmed.
Bed cooling enhanced	No
Last full inspection:	October 2011
Sequence of events:	31Dec: 01:00 saw water drip at 7th floor buck stay. Confirmed as leak due to water and steam noise, boiler rear sidewall behind buck stay. Leak detection data confirmed, but not yet at alarm point. ESP not needed.01: 13 Controlled shut down began. 01:18 Pulled liquor. 03:50 Bed burned out. Made repairs.
Repair procedure:	Cleaned area, burred down to good metal at pinhole Pad weld overlay
Future prevention:	Similar failure August 2011. Tubes to be replaced on next outage. Entire sidewall replacement in 3 years.

BOILER

SPRING 2012 - 13	
Classification:	**CRITICAL INCIDENT 769**
Location:	**CPLP-Intercon,** Prince George, British Columbia
Unit:	1968 Babcock & Wilcox, # 825-1710, 2 Drum, Long Flow Economizer, Sloped hearth
Unit Size:	3.57 MM lb ds/day; 528,000 lb/hr steam at 605 psig, 800°F, 700 psig design
Incident Date:	January 2, 2012
Downtime hrs, leak/total:	47.25 hr
ESP?	No
Leak/Incident Loc:	Crack ¾ way around boiler tube, at mud drum, 2nd tube from hot side, west side of boiler.
How discovered:	Walk down. Heard leak.
Wash adjacent tube:	No
Root cause:	Anti-vibration bars deterioration: damaged or missing from west side; corrosion from tramp air from hopper..
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	April 2010
Sequence of events:	**2Jan**: Leak heard, pulled liquor, identified leak
Repair procedure:	Dye-penetrant testing. Plugged leaking tube.
Future prevention:	Repair & replace vibration bars at next outage.

Appendix A – Summary of Incidents (Continued)

BOILER

SPRING 2012 - 14	
Classification:	**CRITICAL INCIDENT 770**
Location:	**CPLP-Intercon**, Prince George, B.C.
Unit:	1968 Babcock & Wilcox, # 825-1710, 2 Drum, Large economizer, Sloped hearth CRN #52357
Unit Size:	3.74 MM lb ds/day; 528,000 lb/hr steam at 605 psig, 770°F, 700 psig design
Incident Date:	January 30, 2012
Downtime hrs, leak/total:	82 hrs 34 min.
ESP?	No
Leak/Incident Loc:	Crack 1/2 way around boiler tube, at mud drum. 2nd tube from hot side, west side of boiler
How discovered:	Walk down. Heard leak.
Wash adjacent tube:	No
Root cause:	Anti-vibration bars deterioration: damaged or missing from west side; corrosion from tramp air from hopper..
Leak detection:	N/A
Bed cooling enhanced	N/A
Last full inspection:	April 2010
Sequence of events:	Spoutman heard noise in boiler near mud drum. Liquor was pulled When liquor was mostly out of boiler, leak could be viewed, pulled liquor, viewed leak, unit controlled shutdown. Made repair
Repair procedure:	Tube identified by dye penetrant and plugged
Future prevention:	Anti vibration bars replaced that were broken or missing. Generating bank hopper will be replaced April 2012.

Appendix A – Summary of Incidents (Continued)

BOILER SCREEN

SPRING 2012 - 15	
Classification:	**CRITICAL INCIDENT 771**
Location:	**Lincoln Paper and Tissue, Lincoln ME**
Unit:	#2 RB, 1972 B&W, PR-151, 2-drum Large econ, Sloped hearth
Unit Size:	1.7 MM lb ds/day; 250,000 lb/hr steam at 600 psig, 650°F, 750 psig design
Incident Date:	Nov 27, 2011
Downtime hrs, leak/total:	124
ESP?	**No**
Leak/Incident Loc:	Ruptured, sheared tube that started as crack in bottom ¼" band of weld circumference where ID corrosion was evident. Butt weld in 2" boiler screen tube at top of swage that comes from 2-31/32" rear wall arch tubes, just above boiler hopper baffle, 4th tube in.
How discovered:	Panel showed unusual drum pressure (65 psi lower than header), prompting walk down. Heard steam leak. Found steam blowing into boiler hopper.
Wash adjacent tube:	No
Root cause:	Weld ID corrosion, pending analysis.
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	28Sept 2011
Sequence of events:	**27Nov**: 06:00 Panel showed unusual drum pressure (65 psi lower than header and hog fuel unit), prompting walk down. Heard steam leak. Found steam blowing into boiler hopper. No visible water. Panel now normal. Added aux fuel decreased liquor. 07:30 Pulled liquor. Burned out bed. 13:23 Bed burned out. Began orderly shut down. 13:25 Aux fuel trip. 13:30 Auto FW valve full open, drum level drop, drum pressure drop. Closed FW, opened vents. 13:40 Saw tube leak very bad. 15:00 Tube had sheared, possibly at 100 psi. Large volume of water into hopper. Trickle of water running down furnace cavity wall. Cooled unit started repairs.
Repair procedure:	Replaced failed tube from 1"below swage up to steam drum. Remaining 17 welds PT'd, radiographed and shear wave UT'd. 10 tubes rejected by shear wave plus one marked for analysis, so 11 tubes cut out and replaced with 12" sections. Repairs inspected by shear wave and hydro. 1 repair weld indication repaired. 2nd hydro OK
Future prevention:	No previous history. Also tested similar swage welds for furnace screen. More NDE at next outage. Analysis of two tubes underway. Request industry feed back of similar failures.

Appendix A – Summary of Incidents (Continued)

SUPERHEATER

SPRING 2012 - 16	
Classification:	**Non Critical**
Location:	**Weyerhaeuser Flint River, Oglethorpe, GA**
Unit:	#1 1980 B&W PR-198, 2-drum Large economizer, Sloped hearth
Unit Size:	5.28 MM lb ds/day; 749,000 lb/hr steam at 900psig, 825°F, 1175 psig design
Incident Date:	May 27, **2010**
Downtime hrs, leak/total:	253.2 hr
ESP?	**Yes**
Leak/Incident Loc:	Primary superheater tube 7, platen 31. (Then Tube 3 Pl 32; then Tube 5 Pl 32)
How discovered:	Heard loud POP
Wash adjacent tube:	No
Root cause:	Overheat failure (thin-lipped burst) due to water blockage-phosphate residue buildup in SH loop, from Yarway leak-through
Leak detection:	Yes
Bed cooling enhanced	No
Last full inspection:	March 2010
Sequence of events:	**27May** 04:35 Loud pop noise from furnace. 04:55 Loud roar from SH area. Initiated ESP. 17:05 – 18:00 Re-entry check. 23:00 Fill unit and back-fill SH, and inspection found thin-lip burst #7/pl31 and another nearby. **28May** 1:50 Waterwash. 10:10 Start repairs. **30May** 14:00 Repairs complete. 18:00 Start hydro. Found pinhole in bulge, lower bend, tube 3 platen 32. 20:00 Pressure off, ready for repair. **31May** 00:00 Repairs complete. 03:50 Hydro complete. 04:00 Scaffold out. 07:12 First fire 08:02 Too rapid temp rise. Reduced oil fire.14:41 On line. 16:04 A SH temps > 600oF. 16:38 BL fired at 140gpm. 21:09 BL up to 285gpm.23:15 Heard loud leak noise, located upper furnace SH area. Boiler hopper dry. 23:32 Operator-tripped unit due to high furnace pressure. 23:43 Roar sound louder. Stopped feedwater flow. 23:55 Open SH vents. **1Jun** 00:02 Pulled liquor. 01:27 Fire for bed burn-out. 6:01 Bed down. 07:00 LOTO. 10:38 Water wash SH. 21:00 Inspect for repairs. Found thin-lip burst of SH tube 5 Platen 32. **6Jun** 03:00 Repairs complete. 05:00 Fill fo hydro. 09:00 Hydro OK. 11:00 First fire. 17:15 All SH > 600; Unit steaming. 18:15 On liquor.
Repair procedure:	Removed failed tube and several adjacent tubes and replaced with new tubing.
Future prevention:	Added TC's to all primary outlet tubes to assure clearing. Removed high Level Yarway from service, and will examine. Later will replace drum internals with B&W low pressure drop design to ensure no carryover.

Appendix A – Summary of Incidents (Continued)

SUPERHEATER

SPRING 2012 - 17	
Classification:	**Non Critical**
Location:)	**SAPPI, Somerset Mill,** Skowhegan (Hinckley), ME
Unit:	#1, 1976, Combustion Engineering, 21774, 2 drum, 1984 Alstom Superheater
Unit Size:	5.5 MM lb ds/day; 804000 lb/hr steam at 900 psig, 855°F, 1050 psig design
Incident Date: 2/2/12	February 2, 2012
Downtime hrs, leak/total:	4.5 days
ESP?	No
Leak/Incident Loc:	Dissimilar metal weld failure, Final superheater, platen 10 from left wall tube 15 from front; .165 SA 209 T-1 to .220 SA 213 304H
How discovered:	Acoustic leak detection. Triple 5 Acoustic and Nalco Trasar
Wash adjacent tube:	No
Root cause:	Dissimilar metal weld failure
Leak detection:	Yes Triple-5 & Trasar
Bed cooling enhanced	No
Last full inspection:	October 2011
Sequence of events:	**2Feb**:During startup after maintenance, acoustic leak detection alarmed. Checked and saw steam/feedwater differential. Did walk down with soot blowers off. Heard steam leak noise. Observed superheater platen moving abnormally. Did controlled shutdown. Did repair. Did X-ray test. Hydro OK.
Repair procedure:	Cut out weld, welded in new dutchman, x-ray tested, hydro tested OK
Future prevention:	Ongoing problem area

Appendix A – Summary of Incidents (Continued)

SCREEN

SPRING 2012 - 18	
Classification:	**CRITICAL INCIDENT 772**
Location:	**Boise Paper, Jackson, AL**
Unit:	#2 RB, 1974 CE # 24272, 2-drum DCE cascade, decanting hearth
Unit Size:	1.7 run at 2.4MM lb ds/day; 300,000 lb/hr steam at 650 psig, 750°F, 750 psig design
Incident Date:	Oct 21, 2011
Downtime hrs, leak/total:	72/72
ESP?	**Yes**
Leak/Incident Loc:	Furnace Screen: 2 leaks, 3/8" or less cracks in toe of two tangent tube stitch welds tube platen #15, tube 1 from bottom and platen #21, tube 7
How discovered:	Panel: Acoustic leak detection and water chemistry
Wash adjacent tube:	Yes. Washed ¼" holes in platen15 tube 2 and platen 21 tube 8.
Root cause:	Stress induced cracking)SAC) and corrosion fatigue at root termination of the weld. For one, ID crack met OD crack.
Leak detection:	Yes. Triple-5 AMS-2
Bed cooling enhanced	No
Last full inspection:	Nov 2010
Sequence of events:	**12Oct**: 19:42 Boiler trip from electrical outage. **13Oct**: 08:44 Restart.2 upper furnace acoustic sensors in alarm. Kept checking. **17Oct**: 19:30 5 sensors in alarm. Found external steam leak in floor drain – thought to be noise source. **18Oct**: 03:00Water chem shows drop in phosphate from 10-12 to 8 ppm. Kept checking. **19Oct**: PO_4 down to 6 ppm. Found leaking blow down valve – thought to be reason. **20Oct**: 11:00 Valve seated OK, but PO_4 down to 5.5 ppm. 15:00 Still low. **21Oct**: 09:00 Started controlled shutdown and cleared non-essentials. 09:30 Liquor out. 09:41 Water now visible inside furnace upper furnace. 09:42 **ESP'd unit**. Effect of ESP. During hydro a stitch weld on primary superheater was leaking. Crack ground out and repaired. Tube replaced three weeks later during annual outage. A section of rapid drain piping failed, allowing steam and boiler feedwater to enter building. Rupture size of a nickel located between two economizer rapid drain valves.. Rapid blow down drain lines & manual boiler drain lines were replaced at annual outage.
Repair procedure:	Four tubes removed
Future prevention:	Nov 2011 outage did mag. particle & real time digital X-ray: 610 repairs! Changes start-up to include open-door listening for all load trips. Adjusted steam-feed water differential more sensitive. Nalco Trasar on order. Will replace screen tubes 2012

Appendix A – Summary of Incidents (Continued)

UPPER FURNACE

SPRING 2012 - 19	
Classification:	**Non Critical**
Location:	**Verso Paper,** Quinnesec, MI
Unit:	#1 RB, 1985, B&W, 2 drum, Large Econ Sloped hearth
Unit Size:	4.08 MM lb ds/day; 620,000 lb/hr steam at 600 psig, 750°F, 800 psig design
Incident Date:	February 2, 2012
Downtime hrs, leak/total:	11 /16.1 hrs
ESP?	No
Leak/Incident Loc:	1 ½" crack leak at boiler hopper casing attachment weld to exterior side of wall tube, behind arch
How discovered:	Walk down on Start-up after water wash
Wash adjacent tube:	No
Root cause:	Fatigue Crack at weld joint (with weld undercut) of generating bank hopper casing. SAC from inside also possible
Leak detection:	Yes Acoustic Triple-5. Did not indicate.
Bed cooling enhanced	No
Last full inspection:	May 2011
Sequence of events:	**1Feb**: 22:51 Water wash complete. Aux fuel start-up.**2Feb**: 04:40 During start-up after water wash, during walk down, saw leak on 7th floor. 05:10 Confirmed was exterior. Boiler not at operating pressure yet No bed in unit. Tripped unit, cooled, drained. 13:15 Made repair. 15:05 Hydro OK.15:40 Fired unit. 21:04 On line. 22:12 Liquor fired.
Repair procedure:	Ground out, Welded.
Future prevention:	Inspected opposite side Wet Mag, No indications .Additional NTD in future

LOWER FURNACE

SPRING 2012 - 20	
Classification:	**Non Critical**
Location:	**Mackenzie Pulp Mill Corp, Mackenzie, BC, Canada**
Unit:	1972 B&W, #6810, 2-drum Large Economizer, Sloped hearth
Unit Size:	3.3 Million lbs/day; 520,000 lb/hr steam at 650 psig, 750°F, 750 psig design
Incident Date:	Feb 16, 2011
Downtime hrs, leak/total:	52.5 hours
ESP?	**No**
Leak/Incident Loc:	Two linear indications, Rear wall tube, cold side, adjacent to dissolving tank dog house hood
How discovered:	Walk down. Visual from ground floor
Wash adjacent tube:	No
Root cause:	High caustic weak wash from dissolving tank wall washers sprayed onto cold side of tubes and lower header, causing corrosion and wash out thinning.
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	July 2010
Sequence of events:	**16Feb** Saw leak from ground floor. 10:00 Orderly shut down. 21:00 Started repair. **17Feb** 08:30 Repair complete. 09:30 Start unit fill. Found pinhole missed during repairs. Drained unit. 18:30 Started repair. 20:00 Repair complete. 21:00 Start unit fill. **18Feb** 01:30 Fill complete. 03:00 Hydro complete.07:20 Light-off. 14:30 On line, ready for liquor
Repair procedure:	Linear indications completely ground out, Groove weld repairs made to tubes and weld metal build-up applied. Three other areas of low indications also required weld metal build-up. Sizes ranged from 2"x 2", 3"x 2", and 4"x 2". All weld repairs made using WPS 1101. All repairs were below the SS clad area of the tube.
Future prevention:	Installed hanging plate during outage to prevent reoccurrence. Will complete permanent repair to dissolving tank hood during October 2011shutdown

Appendix A – Summary of Incidents (Continued)

LOWER FURNACE

SPRING 2012 - 21	
Classification:	**Non Critical**
Location:	**Mackenzie Pulp Mill Corp, Mackenzie, BC, Canada**
Unit:	1972 B&W, #6810, 2-drum Large Economizer, Sloped hearth
Unit Size:	3.3 Million lbs/day; 520,000 lb/hr steam at 650 psig, 750°F, 750 psig design
Incident Date:	Sept 25, 2011
Downtime hrs, leak/total:	60 hr
ESP?	**No**
Leak/Incident Loc:	Pin hole leak on tube to header fillet weld, Rear wall tube, cold side, adjacent to dissolving tank dog house hood
How discovered:	Walk down. Visual from ground floor
Wash adjacent tube:	No
Root cause:	Previous high caustic weak wash from dissolving tank wall washers sprayed onto cold side of tubes and lower header, causing corrosion at fillet weld
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	July 2010
Sequence of events:	**25Sep** 20:00 Saw leak from ground floor. Suspected same as previous April. Began orderly shutdown. **26Sep** 21:30 Repair complete after cutting window from inside diss tank.**27Sep** 17:25 Hydro OK **28Sep** 04:30 Unit on gas. 11:30 Unit on line, ready for liquor
Repair procedure:	Tube metal build up on fillet weld and overlaid of thinned areas of tubes 73,74
Future prevention:	Lowered weak wash shower to ensure no spray back. Already installed hanging plate during outage to prevent reoccurrence. Will complete permanent repair to dissolving tank hood during October 2011shutdown

LOWER FURNACE

SPRING 2012 - 22	
Classification:	**CRITICAL INCIDENT 773**
Location:	**Tembec Pulp Group, Skookumchuck, BC**
Unit:	HP51841, 1993 ABB Alstom, CA91105, 1-drum Large econ
Unit Size:	3.49 MM lb ds/day; 463,000 lb/hr steam at 630 psig, 750°F, 900 psig design
Incident Date:	July 20, 2011
Downtime hrs, leak/total:	108.75/119 (4.9 days)
ESP?	**Yes**
Leak/Incident Loc:	2 leaks, both with horizontal cracks up to 1.5", primary air port openings, 1 just below upper bend, 1 at upper bend, opposite walls of furnace
How discovered:	Walk down. Saw a primary air port blacked out.
Wash adjacent tube:	No
Root cause:	Local overheating. Very heavy localized deposits >100 mg/cm$^{2.}$ Jan 28, 2010 Significant acid excursion down to 6.4 pH. Insufficient monitoring. Recent changes to primary-secondary air ratios. (Minor: Spring 2011 Skookumchuck river flooding put organic content into feedwater treatment.)
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	Sept 2010
Sequence of events:	**20Jul**: 13:00 Walk down. Saw blacked out primary air port. No water visible. Tried manual cleaning of port, not successful. 17:15 Saw steamy condition. 17:25 Esp'd unit. **21Jul**: 05:30. Bed still glowing. **22Jul**: Unit still cooling. **23Jul**: 01:30 TC's indicate cooled OK (=56 hours). 13:00 Water wash complete. 17:30 Filled unit. Found leaks. Repairs made. Inspected and found additional 4 sets of surface cracks, also repaired. **24Jul**: 05:30 Repairs complete. Hydro OK. 21:30 Fired unit. **25Jul**: 05:30 On line. 06:15 Liquor divert issue. 16:30 On liquor.
Repair procedure:	Tube stainless cladding ground out. Copper sulfate check carbon steel for stainless. Ground out cracks with V-grooves. Liquid penetrant (LP) grooves. TIG rod E7018/shield metal repair with LP first pass and final pass. Replaces stainless clad with 309L TIG rod overlay.
Future prevention:	Plan Sept 2011 to replace the two sidewalls at primary (3') and secondary (5') and their headers. Conduct thorough investigation as to cause. Found waterside deposits. Did chemical cleaning Sept 2011. Review recommendations for supplemented water treatment facility. Improved monitoring.

Appendix A – Summary of Incidents (Continued)

LOWER FURNACE

SPRING 2012 - 23	
Classification:	**CRITICAL INCIDENT 774**
Location:	**Tembec Pulp Group, Skookumchuck, BC**
Unit:	HP51841, 1993 ABB Alstom, CA91105, 1-drum Large econ
Unit Size:	3.49 MM lb ds/day; 463,000 lb/hr steam at 630 psig, 750°F, 900 psig design
Incident Date:	August 27, 2011
Downtime hrs, leak/total:	76.5 hr
ESP?	**Yes**
Leak/Incident Loc:	Two 3/8" hole leaks: 4' above primary air port opening, front wall and secondary air port opening right wall.
How discovered:	Walk down. Heard jet-like sound at secondary level. Boiler chemical residuals dropping. Difficulty keeping one spout flowing.
Wash adjacent tube:	No
Root cause:	Local overheating. Very heavy localized deposits >100 mg/cm$^{2.}$ Significant acid excursion Jan 28, 2010. Insufficient monitoring. Recent changes to primary-secondary air ratios. (Minor: Spring 2011 Skookumchuck river flooding put organic content into feedwater treatment.)
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	Sept 2010
Sequence of events:	**27Aug**: Walk down. Heard jet-like sound at secondary level. Boiler chemical residuals dropping. Difficulty keeping one spout flowing. **28Aug**: 02:20 ESP'd unit. **29Aug**: 06:25 Bed cooled OK 09:40 Began water wash. 18:15 Water wash complete. 21:45 Unit locked out. **30Aug**: 00:01 Filled unit. Found front and side wall leaks. 02:30 Made repairs. Inspected other areas. 6 overlays done. 08:00 Repairs complete. 12:20 650psig hydro OK after waiting for wash water to dry. 16:15 Staging removed. 22:30 Fired unit. **31Aug**: 05:30 On line. 06:45 On liquor.
Repair procedure:	Tube stainless cladding ground out. Copper sulfate check carbon steel for stainless. Ground out cracks with V-grooves. Liquid penetrant (LP) grooves. TIG rod E7018/shield metal repair with LP first pass and final pass. Replaces stainless clad with 309L TIG rod overlay. Included repair and overlay of 6 added tubes.
Future prevention:	Plan Sept 2011 to replace the two sidewalls at primary (3') and secondary (5') and their headers. Conduct thorough investigation as to cause. Also consider front wall condition. Found waterside deposits. Did chemical acid cleaning Sept 2011. Review recommendations for supplemented water treatment facility. Improved monitoring.

Appendix A – Summary of Incidents (Continued)

LOWER FURNACE

SPRING 2012 - 24	
Classification:	**Non Critical**
Location:	**Harmac-Pacific, Nanaimo, BC CANADA**
Unit:	#6 RB, 1963 B&W # 5315, 2-drum Large economizer Sloped hearth
Unit Size:	3.3 MM lb ds/day; 520,000 lb/hr steam at 600 psig, 750°F, 780 psig design
Incident Date:	October 31, 2011
Downtime hrs, leak/total:	30
ESP?	**No**
Leak/Incident Loc:	Fatigue crack on front wall behind spout doghouse external to furnace. Doghouse attached to a series of seal blocks and keys along front wall. Keys are welded to seal blocks which in turn are welded to tubes and membrane.
How discovered:	Walk down. Saw steam around doghouse by #1 spout.
Wash adjacent tube:	No
Root cause:	Fatigue crack
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	Oct 2011
Sequence of events:	**31Oct**: Unit just started after annual outage, 3 hour on liquor. During walk down, saw steam around doghouse by #1 spout. Concluded it was a leak. Controlled shut down. Pulled liquor, shutdown and cooled. Removed doghouse around #1 spout. Staged for access. Rear wall of doghouse removed. Leak identified at seal blocks carrying the floating tabs that the doghouse attaches to.
Repair procedure:	Crack ground out and repaired. SS removed for overlay and seal block left off until next outage.
Future prevention:	Next outage more extensive investigation of all blocks and attachments will be made.

STEAM COIL AIR HEATER (SCAH)

SPRING 2012 - 25	
Classification:	**CRITICAL INCIDENT 775**
Location:	**RockTenn, West Point, VA**
Unit:	#4 RB, 1975 CE 21975, 2-drum
Unit Size:	2.7 MM lb ds/day; 427,000 lb/hr steam at 1225 psig,9 00°F, 1360 psig design
Incident Date:	October 21, 2011
Downtime hrs, leak/total:	56/118
ESP?	**Yes**
Leak/Incident Loc:	Center section, SCAH
How discovered:	Heard loud noise: Walk down saw water coming down right side of boiler casing just below primary air duct
Wash adjacent tube:	First rupture likely caused added failures
Root cause:	**??** Apparently noise that operators heard was a section of steam coil air heater failing. Initial failure damaged remaining coils in that section. Rupture of coils allowed water carry-over into primary air duct.
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	-
Sequence of events:	**18Oct**: Mill-wide power failure tripped unit. **20Oct**: 20:20 Start warm-up on #6 oil. **21Oct**: 02:15 heard very loud water-hammer-like noise. Walk down saw water coming down the right hand side of the boiler casing just below the primary air duct in between primary wind boxes. 02:35 Shut fire; investigated. No melted smelt yet. No water seen entering furnace. Decided not to ESP. When fire was out, panel showed rapid drop drum level. 02:43 ESP'd unit. 12-hour evacuation. 14:43 Entry and inspection. Heat gun bed temps all below 180F. Floor tube TC's all below 180F. Water found lying in bottom of primary air duct. Hydro'd unit, but no leaks found. Washed unit and re-hydro'd. Again no leaks found. Tested SCAH for leaks. A third of tubes damaged, all in center bank. Damaged coils were isolated. **23Oct**: 11:15 Unit started up and on line.
Repair procedure:	Temporary: Center bank of coils have been isolated Long Term: New coils have been ordered and will be installed during next annual outage.
Future prevention:	Installed tattle tale on primary duct to allow view if water present in ducting. Procedure for routine testing of SCAH will be implemented prior to next annual outage.

SPOUT

SPRING 2012 - 26	
Classification:	**Non Critical**
Location:	**Northern Pulp Nova Scotia, New Glasgow, CANADA**
Unit:	1967 B&W/Andritz #5940, 2-drum DCE cyclone, 1995 B&W Large econ, 2011 Spouts
Unit Size:	3.25 MM lb ds/day; 477,000 lb/hr steam at 900 psig, 850°F, 1050 psig design
Incident Date:	October 31, 2011
Downtime hrs, leak/total:	-
ESP?	**No**
Leak/Incident Loc:	Spout
How discovered:	Panel: spout low flow alarm:
Wash adjacent tube:	**no**
Root cause:	Loss of spout cooling water.
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	Oct 2010
Sequence of events:	**31Oct**: Unit was at reduced load. Control room alarms rang. Cooling water flow to # 3 smelt spout was lost. Spout was switched to pressure flow. Because of a hole in the spout, smelt was now spitting out of spout on to floor. Black liquor was diverted and unit tripped off.
Repair procedure:	4 new smelt spouts were flown in and installed after several-hour system flush.
Future prevention:	-

SMELT SPOUT

SPRING 2012 - 27	
Classification:	**Non Critical**
Location:	**Georgia-Pacific, Camas, WA**
Unit:	#4 RU, 1974 CE, 2-drum Large econ, decanting hearth, 2010 Alstom spouts
Unit Size:	2.5 MM lb ds/day; 400,000 lb/hr steam at 650 psig, 750°F, 680 psig design
Incident Date:	Jan 3 and 19, 2011
Downtime hrs, leak/total:	28 hr
ESP?	**No**
Leak/Incident Loc:	Spouts. Spout cooling water leak at the boiler side of the trough weld to the cooling tube
How discovered:	Walk down. Saw water at tip of spout
Wash adjacent tube:	No
Root cause:	External erosion - high temperature wastage in areas of compromised heat transfer
Leak detection:	Yes Nalco Trasar
Bed cooling enhanceed	No
Last full inspection:	April 2011
Sequence of events:	New spouts installed April 2010. First spout failed 3Jan2011. Water isolated and spout plugged. Second spout failed 19Jan2011 during bed run off while executing a planned shutdown. Unit taken offline and spouts replaced during the outage window with four in kind new spouts. All four spouts were packaged and sent off for failure analysis.
Repair procedure:	Full replacement with upgraded chromized spouts from Alstom
Future prevention:	Smelt Spout chromized upgrade to add additional protective layer and improve liquor sulfidity control to targets.

Appendix A – Summary of Incidents (Continued)

ECONOMIZER

SPRING 2012 – Intl	**Intl 1120**
Classification:	**Not Classified (Non-criical)**
Location:	**Mondi Swiecie, Swiecie, Poland**
Unit:	# 3, 1986 Ahlstrom-Finland #5516, 2-drum, 1991 Alstom Large Econ, decanting hearth
Unit Size:	4.45 MM lbs/day, 631,000 lb steam/hr at 840 psig, 825oF, 900 psig design
Incident Date:	October 9, 2011
Downtime hrs, leak/total:	"0 – Planned shutdown" [Ed: more likely 3 – 4 days]
ESP?	No
Leak/Incident Loc:	1" crack in thinned region of a lower supply pipe near supply header welds of hot econ bank
How discovered:	Walk down. Saw water in ash conveyer under hot econ.bank
Wash adjacent tube:	No
Root cause:	[Ed: some appearance of internal erosion and/or corrosion thinning]
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	August 2010
Sequence of events:	**9Oct:** 03:00 Walk down. Saw water in ash conveyor under hot econ bank. Reviewed leak location. Reduced load. 05:00 burned out bed. 06:55 Pulled oil fire. 19:00 Started economizer wash. 24:00 Inspected econ. Started repairs and testing. Besides leaking supply pipe, found all 20 pipes needed replacement.
Repair procedure:	Butt-welded in 20 .5 m sections. X-rayed welds.
Future prevention:	.Checked cold econ supply tubes. All OK for now. Necessary repairs to be done next year's outage.

ECONOMIZER

SPRING 2012 – Intl	**Intl 1121**
Classification:	**Not Classified (Non-critical)**
Location:	**Sappi Kraft, Tugela, South Africa**
Unit:	# 2SRF, 1962 B&W, 28468, 2-drum, DCE
Unit Size:	.5 MM lbs/day, 112,000 lb /hr at 900 psi 62 bar), 825F (440C), 1050 psig (72.39 bar) design
Incident Date:	December 21, **2009**
Downtime hrs, leak/total:	0 / 10 hr (during planned outage)
ESP?	No
Leak/Incident Loc:	Small pinhole, near bottom, lower bend, outer (cold) tube, of 6-tube economizer
How discovered:	Walk down during shut down. Saw water dripping from ash hopper
Wash adjacent tube:	No
Root cause:	Suspect internal corrosion {Ed: O2 pitting?]
Leak detection:	No
Bed cooling enhanced	No
Last full inspection:	Feb-Mar 2009
Sequence of events:	**21Dec09:** 10:00 Unit off line for planned outage. Walk down. Saw water dripping from ash hopper. Opened manhole and confirmed. Repair done during planned outage time. 20:00 done
Repair procedure:	Weld overlay
Future prevention:	Will cut out tube section in May 2010 outage for analysis. Similar failures in past.

Appendix B – Composition of NCG and SOG

Composition of NCG and SOG

Presented to the
Waste Streams Sub-Committee
BLRBAC
Spring 2012 Meeting

Hank Beder
HB Consulting LLC

Introduction

- The last ten years have seen greater acceptance in using the Recovery Boiler as a logical location for burning odorous sulfur gasses.
- These would include:
  - CNCG – Concentrated Non-Condensible Gas
  - DNCG – Dilute Non-Condensible Gas
  - CB NCG - Chip Bin Non-Condensible Gas
  - SOG – Stripper Off-Gas

2

Introduction

- The Waste Streams Sub-Committee has devoted much of its efforts to providing the industry with guidelines for safe burning of these potentially flammable/explosive gasses.
- The NCASI (Nat'l Council for Air and Stream Improvement) has performed extensive studies into the composition and quantities of NCG and finds extremely wide variations among mills.

3

Introduction

- This presentation provides typical values for NCG and SOG based on these studies, augmented from personal experience and briefly highlights some of the factors that can influence the composition of these gasses.

4

Concentrated NCG (CNCG)

- Often referred to as LVHC (Low Volume, High Concentration) NCG, or Strong Gas
- While a myriad of volatile compounds, including MEK, acetone, and acetaldehyde, are generated during pulping and spent liquor processing, the major contaminants represented in NCG streams are TRS compounds, primarily H_2S, MeSH, DMS, and DMDS.

5

Concentrated NCG (CNCG)

- Terpenes, primarily alpha and beta pinene, are present to the extent that cooling temperatures limit their maximum concentration and most of the turpentine condenses in the condensates in equilibrium with the CNCG.
- Similarly, most of the methanol generated from CNCG sources is condensed as well.
- Although CO_2 is produced during cooking, its solubility in alkaline black liquor is very high and its concentrations in NCG is very low.

6

Appendix B – Composition of NCG and SOG (Continued)

Concentrated NCG (CNCG)

- Air infiltration accounts for much of the oxygen present in CNCG. Ideally, the oxygen content should always be below the limiting oxygen concentration (LOC) for the flammable components in the CNCG. In general, the LOC for CNCG is taken as about 10-11% with target levels of about 6% (60% of LOC) when sampled.
- The assumption that CNCG concentrations are typically above the Upper Explosive (or Flammability) Limit), UEL, is rarely the case and the actual concentrations of flammable components fall in the explosive range. Controlling the actual flammability of the CNCG relies on keeping the oxygen content below the LOC.

7

Concentrated NCG (CNCG)

- **Characteristics**
  - High concentration of reduced sulfur, TRS, particularly MeSH and DMS
  - Total volatiles – XX-XXX,000 ppm
  - Ideally low in $\%O_2$
  - Relatively low flow
    - Ideally < 0.2 acfm/tpd
    - Typically < 1000 acfm

8

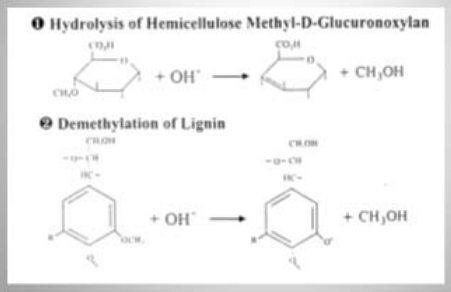
Concentrated NCG (CNCG)

- **Sources**
  - Digester
    - Relief and Flash Steam Condensers
    - Turpentine Recovery System
    - Batch Blow Heat Recovery System
  - Evaporators
    - Vacuum Pump discharge
    - Vacuum Ejector Hotwell or Seal Tank
  - Foul Condensate Stripping System
    - Feed Tank vent
    - Stripping System Condenser vent where total vapor condensing is practiced

9

Composition of CNCG

- **Methanol Formation**



10

Composition of CNCG

- **TRS Formation**
  - Sulfide reacts with methoxy groups to form these major NCG compounds:

$CH_3OH + HS \rightarrow H_2O + CH_3SH$	Methyl Mercaptan
$CH_3SH + CH_3SH \rightarrow CH_3SSCH_3$ (DMDS)	Dimethyl Di-Sulfide
$CH_3SH + CH_3OH \rightarrow H_2O + CH_3SCH_3$ (DMS)	Dimethyl Sulfide
$HS + \text{Wood acids} \rightarrow H_2S$	Hydrogen Sulfide

  - All of the above compounds are much more volatile than water and tend to concentrate in vapor whenever black liquor is evaporated or flashed.

11

Factors Affecting CNCG Composition

- Hardwood or Softwood
  - Hardwood lignin contains syringyl groups with two methoxy units on the benzene ring.
  - Hardwood does not contain significant levels of turpentine
  - Hemicellulose content of Softwoods is about 16% compared to about 21% for Hardwood. Hemicellulose degradation accounts for most of the methanol produced during cooking.
  - NCASI data, however, shows little difference in methanol generation for bleachable grades of HW and SW pulp, most ranging from 19-23 lbs methanol/adt

12

Appendix B – Composition of NCG and SOG (Continued)

Factors Affecting CNCG Composition

- Sulfidity
  - Increasing sulfidity produces a proportional increase in TRS formation
- Yield
  - Increased digester yield based on preservation of hemicellulose reduces the methanol available for reaction.
  - Bleachable grades cook to lower kappa nos.
- Anthraquinone
  - Preserves hemicellulose and reduces methanol generation.

13

Factors Affecting CNCG Composition

- Cooking strategy
  - Delignification to a given kappa no. can be achieved by changing H-factor or by changing EA:Wood
    - Increasing EA:Wood increases the sulfide to methanol ratio.
    - Increasing cooking time increases organic sulfide formation.
  - Extraction Liquor flow and temperature conditions
  - Recycling of black liquor

14

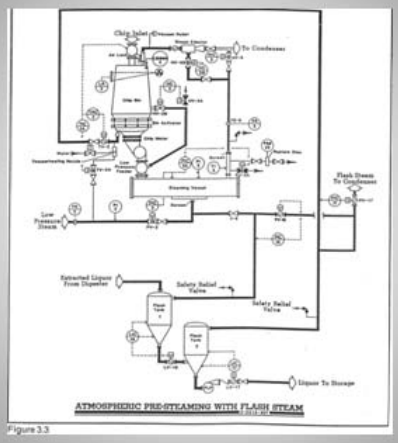


Figure 3.3

15

Factors Affecting CNCG Composition

- Semi-Chemical production
  - Semi-chemical spent liquor (either from green liquor or sufite cooking) will lower the pH of the mixed kraft liquor increasing the vapor pressure of H_2S and its concentration in CNCG.
  - CNCG from green liquor semi-chemical production will be higher in H_2S

16

Factors Affecting CNCG Composition

- Use of Digester extraction liquor flash steam for chip pre-steaming
  - Transfers CNCG contaminants to the Chip Bin vent and reduces flow of CNCG.
  - Flash steam demand varies seasonally with chip temp.
- Batch or Continuous Digesters
  - Batch cooking is more likely to experience higher rates of air infiltration between Digester blows.
  - Digester relief during batch time to temperature is when air is expelled from the chips into the CNCG system, unlike pre-steaming chip bins for continuous digesters.

17

Factors Affecting CNCG Composition

- Batch or Continuous Digesters
  - Concentrations will cycle with each Batch Digester blow
  - Batch cooking usually involves re-cycling of black liquor to provide target liquor to wood ratio.
- Conventional Batch or Displacement Cooking
  - Liquor is not flashed during displacement cooking and is subjected to extended storage and re-use at elevated temperatures. Organic sulfide concentrations can be expected to be higher.

18

Appendix B – Composition of NCG and SOG (Continued)

Factors Affecting CNCG Composition

- Vapor Phase or Hydraulic Continuous Digesters
  - The use of compressed air to maintain pressure in vapor phase digesters contributes air to the CNCG.
- Evaporator Vacuum System
  - Direct contact of NCG with Vacuum Pump seal water or by vacuum Ejector condensing will saturate water with volatiles.
- Black Liquor Oxidation
  - Weak BLO systems will significantly lower TRS contributions from the Evaporators (affecting CNCG) and downstream liquor storage tanks (affecting DNCG);

19

Factors Affecting CNCG Composition

- White Liquor Scrubbing
  - Pre-scrubbing CNCG with caustic or white liquor absorbs nearly all of the H_2S and Methyl Mercaptan, leaving DMS as the primary component.
  - Recirculation of MeSH increases levels in NCG.
  - % O_2 will increase
  - DMDS may increase
- Cooling of CNCG
  - Organic sulfides, terpenes, methanol and ammonia condense with increased cooling. At condensing temperatures of CNCG, most of the turpentine, methanol and ammonia are condensed into the digester and evaporator foul condensates.

20

Factors Affecting CNCG Composition

- Stripping of foul condensates
  - TRS strippers designed to remove TRS from condensates typically operate with total condensing of vapors such that the resulting NCG is combined with the CNCG from the digesters and evaporators.
  - Condensed Methanol Strippers designed to produce a concentrated methanol solution similarly generate NCG that is combined with CNCG from the digesters and evaporators.

21

Factors Affecting CNCG Composition

- Stripping of foul condensates
  - NCG from stripping will contain high concentrations of methanol in equilibrium with the high concentration of methanol in the reflux condensate.
  - Most Kraft mills operate vapor phase methanol Strippers that produce a separately handled Stripper Off-Gas (SOG).

22

Factors Affecting CNCG Composition

- Handling Method
  - Conveying CNCG by Fan or Liquid Ring Compressor results in CNCG as generated by the process.
  - Conveying CNCG by Steam Ejector will do likewise if the Ejector discharge is condensed.
  - Conveying CNCG by Steam Ejector without condensing the Ejector discharge is the safest and more common method of handling and adds significant levels of moisture to the CNCG to the point of Incineration.

23

Typical CNCG Composition

	CNCG	
NCASI TB-973 derived		
	ppm at 500 cfm	**% of TRS**
Acetaldehyde	137	
Methanol	7834	
Ethanol	133	
Acetone	689	
MEK	241	
Ammonia		
Turpentine	1708	
H2S	10897	25%
MeSH	20231	46%
DMS	10215	23%
DMDS	876	2%

24

Appendix B – Composition of NCG and SOG (Continued)

Typical CNCG Composition

	CNCG			
NCASI TB-973 derived - Avg mill data			Mill C - 2/3 HW	
	ppm at 500 cfm	% of TRS	ppm	% of TRS
Acetaldehyde	137			
Methanol	7834			
Ethanol	133			
Acetone	689			
MEK	241			
Ammonia				
Turpentine	1708			
H2S	10897	25%	43830	44%
MeSH	20231	46%	41245	42%
DMS	10215	23%	14177	14%
DMDS	876	2%	ND	0%

25

Typical CNCG Composition

Effect of White Liquor Scrubbing

			CNCG					
NCASI TB-973 derived - avg mill data			Mill A w/MeOH Stripper - SW			Mill B w/TRS Stripper-SW		
	ppm at 500 cfm	% of TRS	ppm Into WLS	% of TRS	ppm From WLS	ppm Into WLS	% of TRS	ppm From WLS
Acetaldehyde	137							
Methanol	7834		185000		93			
Ethanol	133							
Acetone	689		1530		145			
MEK	241		360		52			
Ammonia								
Turpentine	1708		1925		330			
H2S	10897	25%	13000	9%	150	48000	25%	0
MeSH	20231	46%	92000	63%	230	104000	54%	17000
DMS	10215	23%	38000	26%	30000	41000	21%	46000
DMDS	876	2%	960	1%	190	ND	0%	12000

26

Dilute NCG (DNCG)

- Often referred to as HVLC (High Volume, Low Concentration) NCG, or Weak Gas
- Composition will differ from CNCG:
  - Excludes Evaporators, which tend to be higher in H_2S
  - Not typically scrubbed
  - Its high air content limits the condensing of any volatile components, including turpentine and methanol except under very cold conditions [i.e., The concentration of turpentine and methanol must reach saturation concentrations before condensing can occur.]

27

Dilute NCG (DNCG)

- **Characteristics**
  - Low concentration of volatiles – X,000 ppm
  - Normally operates well below the LEL
  - May or may not include Chip Bin NCG
  - High air content with $\%O_2 > 18\%$
  - High flows
    - Typically 4,000-10,000 acfm
    - Can be very high (15-25,000 acfm or more) if system includes vacuum washer vents

28

Dilute NCG (DNCG)

- **Sources**
  - Blow Tank
  - Chip Bin, if not handled separately
  - Washer Filtrate Tanks
  - Washer Hoods
  - Oxygen Delignification System
  - Brownstock Knotters/Screening System
  - Black Liquor Storage Tanks
  - Contaminated Condensate Tanks

29

Factors Affecting DNCG Composition

- Factors affecting the composition of CNCG similarly affect DNCG.
- Nearly all sources of DNCG are alkaline and will have a lower fraction of H_2S than CNCG which is heavily influenced by the Evaporator vacuum system.
- Number of sources collected for a DNCG system is highly variable.

30

Appendix B – Composition of NCG and SOG (Continued)

Factors Affecting DNCG Composition

- Collection of Oxygen Delignification system vents will contribute CO to the DNCG.
- Use of condensates for Brownstock and Oxygen system washing will increase methanol levels in the washer vents.
- Vacuum DNCG flow contribution is significantly greater than that from pressure washers.

31

Factors Affecting DNCG Composition

- DNCG Systems may or may not include the Chip Bin vent.
  - In general, systems that **exclude** the Chip Bin vent will operate < 10% of the LEL, which for mixed TRS is typically < 2000 ppm.
  - In general, the Chip Bin vent, under upset conditions, can contribute significant levels of TRS and turpentine, particularly when Digester extraction liquor flash steam is used for pre-steaming. It is the main, if not only, source of flammable contaminants that can raise concentrations above 100% of the LEL.

32

Typical DNCG Composition

			DNCG			
NCASI TB-973 derived			TB 849		Mill D	
	calculated ppm at 10,000 cfm		5 mill avg ppm at 9500 cfm		DNCG w/ CB NCG at 10,000 cfm	
		% of TRS		% of TRS		% of TRS
Acetaldehyde	11					
Methanol	409				318	
Ethanol						
Acetone	4				15	
MEK	20				7	
Ammonia						
Turpentine	91				354	
H2S	8	1%	32	14%	44	1%
MeSH	108	15%	9	4%	910	25%
DMS	469	64%	178	76%	2639	72%
DMDS	56	8%	16	7%	63	2%

33

Chip Bin NCG (CB NCG)

- Contaminants reflect composition of Digester extraction liquor flash steam plus additional terpenes vaporized from wood chips during pre-steaming.
- Air is the dominant component displaced by steam from between as well as within the chips.
- Dilution air is often added to lower contaminant concentrations when CB NCG is to be combined with DNCG or conveyed by fan.

34

Chip Bin NCG (CB NCG)

- **Characteristics of CB NCG**
  - Air is the dominant component
  - Flow is about 1.2 +/- cfm/tpd
  - Primary contaminant is MeSH for high yield (unbleached grade) cooking and DMS for low yield (bleached grade) cooking well as turpentine from resinous softwood cooking
  - Subject to surges in contaminant concentrations under upset conditions

35

Factors Affecting CB NCG Composition

- Flash steam pre-steaming
  - Diverts CNCG components into CB NCG
- Hardwood terpene content is vey low
- Bin top temperature
  - Higher temperature increases flash steam demand
  - Increases turpentine volatilization
- Upset Chip Bin operation
  - Blow through of flash steam into the vapor space

36

Appendix B – Composition of NCG and SOG (Continued)

Typical CB NCG Composition

		CB NCG		
			Mill E	Mill F
NCASI TB-973 derived			Bleached	Unbleached
	ppm	% of TRS	% of TRS	% of TRS
Methanol	2200			
Ethanol	40			
Acetone				
MEK	47			
Ammonia				
Turpentine	1951			
H2S	122	3%	1%	10%
MeSH	1222	26%	26%	65%
DMS	3199	69%	72%	20%
DMDS	118	3%	1%	5%

37

Stripper Off-Gas (SOG)

- SOG is the vapor product of foul condensate stripping for methanol removal.
- Methanol and TRS are the dominant components.
- Bleached mills typically generate 19-23 lbs MeOH/t, 2/3 of which are typically recovered for stripping.
- Unbleached mills typically generate 2/3 of the amount of methanol.
- EPA Cluster Rules require at least 92% methanol removal which results in removal of nearly all the other volatile components in the foul condensates being stripped.

38

Stripper Off-Gas (SOG)

- **Characteristics of SOG**
  - Steam typically represents 40-60% of SOG.
  - Methanol typically represents 60-75% the volatile components; TRS is about 20-25%.
  - Most (3/4 at one mill) of the nitrogen entering the Digester with the wood ends up as ammonia in the SOG and accounts for its particularly obnoxious odor.
  - Air content of SOG is very small.
  - Flow is about 0.5-0.6 acfm/t for bleached grades

39

Factors Affecting SOG Composition

- Hardwoods and certain softwoods, such as Hemlock, contain few terpenes.
- Unbleached vs Bleachable grade cooking
  - Unbleached cooking to high yields and kappa no. reduce the generation of methanol.
- Sulfidity
  - Increased sulfidity increases the sulfur content of the SOG

40

Typical SOG Composition

SOG at 55% Steam

NCASI TB-973 derived		% of TRS
Methanol	27.4%	
Ethanol	0.7%	
Acetone	1.8%	
MEK	0.1%	
Ammonia	1.3%	
Turpentine	0.7%	
H2S	2.5%	19%
MeSH	6.2%	47%
DMS	3.4%	26%
DMDS	1.0%	8%

41

Summary

- Expect wide variations in concentrations among mills due to the many process and operating factors involved.
- CNCG composition is mostly affected by Flash Steam pre-steaming of chips, Stripping System contributions, Batch or Continuous cooling and White Liquor Scrubbing.
- Chip Bin NCG composition is mostly affected by use of flash steam for pre-steaming and bin temperature.
- DNCG is mostly affected by the presence of CB NCG and whether Brownstock washer and Oxygen system vents are collected.
- SOG is primarily affected by Stripper operation.

42

Appendix B – Composition of NCG and SOG (Continued)

References

- NCASI Technical Bulletin No. 702 "Acetaldehyde, Acetone, Methanol, and Methyl Ethyl Ketone Contents of Kraft Mill Condensates", October 1995
- NCASI Technical Bulletin No. 849 "Compilation of Speciated Reduced Sufur Compounds and TRS Emissions Data for Kraft Mill Sources", August 2002
- McKean etal, Vol 51, No.12, "Kinetics of Methly Mercaptan and Dimethyl Sulfide Formation in Kraft Pulping", December 1968
- McKean etal, Vol 50, No.8, "Effect of Kraft Pulping Conditions on the Formation of Methyl Mercaptan and Dimethyl Sulfide", August 1967
- Tsuchiya etal, Vol 55, No.5, " Prediction and Generation of Odorous Gases From Kraft Pulp Mills", May 1972

43

References

- NCASI Technical Bulletin No. 646 "Emission Factors for Boilers, Kraft Pulp Mills and Bleach Plants", January 1993
- NCASI Technical Bulletin No. 884 "Compilation of Criteria Air Pollutant Emissions Data at Pulp and Paper Mills Including Boilers", August 2004
- NCASI Technical Bulletin No. 973 " Compilation of Air Toxic and Total Hydrocarbon Emissions Data for Pulp and Paper Mill Sources – A Second Update", February 2010

44

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- Tamara Ferro of Weyerhaeuser Co.'s technical library for reference assistance
- Ashok Jain of NCASI Southern Region
- Ann Plank and colleagues at AH Lundberg Associates, Bellevue, WA for their critique and suggestions

45

TAPPI Power and Recovery Boiler Sub-Committee

Objectives:

To develop & disseminate information, and provide best practice guidelines related to:

- Design & operation of recovery boilers, evaporators, NCG systems & related equipment
- Steam generation from solid fuels, such as coal, bark, wood refuse and MSW
- Thermal and electric power cycle design, operating performance and energy policy considerations
- Design, application and operation of gasification technologies for biomass and black liquor.

Activities:

- Develop TIP's (Tech. Info. Papers/Proc.)
- Support TAPPI Conferences with technical program items, coordination

1

Recovery Boiler – Released TIP's

- Specification for Procurement of Recovery Boiler Economizer (2009)
  - Developed from AF&PA Economizer Study
- Recommended Test Procedures for Black Liquor Evaporators (2008)
  - Documents test procedures for evaporators
- Recovery Boiler Sootblowers (2009)
  - Two TIP's – "The Basics" and "Practical Guidelines"
- Recovery Boiler Performance Calculation Forms
  - Long Form/in publication form - Short Form/includes spreadsheet

2

Recovery Boiler – Released TIP's

- Stripping of Kraft Pulping Process Condensates–Regulations, Design & Operations (2008) – Review 2012
- Collection and Burning of Concentrated NCG's – Regulations, Design, Operation (2008) – Review 2012
- Recovery Boiler Energy Efficiency Improvements (2008)
- Estimating the First Melting Temperature of Fireside Deposits in Recovery Boilers (2004)

3

Recovery Boiler – Released TIP's:

- Chloride and Potassium Measurement and Control in the Pulping and Chemical Recovery Cycle (2005)
- Guidelines for Replacement of Generating Bank Tubes with Expanded Joints in Two-drum Boilers (2009)
- Guidelines for Operating and Maintenance Impacting Recovery Boiler Economizers (2009)
  - Appendix 2 from recent AF&PA economizer study

4

Water Treatment Activities

- Keys to Successful Cleaning of Boilers
- Water Quality and Monitoring Requirements for Paper Mill Boilers Operating on High Purity Feedwater
- Water Quality Guidelines and Monitoring Requirements for Paper Mill Boilers Operating with Softened Make-up Water
- Design Engineer Decisions Tree – Paper Mill Boiler Feedwater
- Response to Contamination of High Purity Boiler Feedwater
- Evaluating Reverse Osmosis for Treating Make-up to the Boiler Feedwater in a Pulp and Paper Mill
- Water Treatment Related Opportunities for Energy Conservation in a Paper Mill Powerhouse

5

Meetings:

- Meetings are held twice per year
  - Next Meeting, Following BLRBAC Spring Meeting
  - Wednesday April 4, 2012; 1:00 pm – 4:00 pm
  - TAPPI PEERS Conference; Savannah, Ga
  - Monday, October 15, 2012

6