BLACK LIQUOR RECOVERY BOILER
ADVISORY COMMITTEE

Meeting Minutes
Crowne Plaza Hotel/Atlanta Airport
Atlanta, Georgia
October 6, 7 & 8, 2003

OBJECTIVE

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

OFFICERS

Chairman:	**Dean Clay** International Paper P. O. Box 7910 Loveland, OH 45140-7910	Tel: 513-248-6564 Fax: 513-248-6679 **dean.clay@ipaper.com**
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Treasurer:	**Ron Hess** HSB Forest Products Group 110 Cedar Cove Court Buckhead, GA 30625	Tel: 706-484-1723 Fax: 706-485-5267 **ronald_hess@hsb.com**

REGULAR MEMBERSHIP

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

ASSOCIATE MEMBERSHIP

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

CORRESPONDING MEMBERSHIP

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

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

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BLRBAC MEETING SCHEDULE

Spring	2004	--	April	5, 6 & 7
Fall	2004	--	October	4, 5, & 6
Spring	2005	--	April	4, 5, & 6
Fall	2005	--	October	3, 4, & 5

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

■ Past Chairman Lon Schroeder

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BLRBAC has created its own WEB Site which is:

www.blrbac.org

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

BLRBAC MEETING NOTICE

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

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BLRBAC Publications List

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

www.blrbac.org

Recommended Practices by BLRBAC

Emergency Shutdown Procedure (ESP)
91kb (October 2003)

Fire Protection in Direct Contact Evaporators and Associated Equipment
162kb (October 2002)

Checklist and Classification Guide for Instruments and Control Systems
409kb (April 2002)

Personnel Safety
47kb (April 1997)

Personnel Training
47kb (April 1997)

Post ESP Guidelines
139kb (October 2002)

Safe Firing of Auxiliary Fuel in Black Liquor Recovery Boilers
653kb (October 2002)

Safe Firing of Black Liquor in Black Liquor Recovery Boilers
492kb (October 2003)

Waste Stream Incineration
374kb (April 2002)

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** Temporary Replacement for Lloyd Moore

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No meeting was held 10/03.

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* = Attended 10/03 Meeting

WASTE STEAMS SUBCOMMITTEE

John Rickard* -- Chairman
Jacobs Engineering
P. O. Box 5456
Greenville, SC 29606
Tel: 864-676-6393; Fax: 864-676-6005
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E. Scott Crysel* FM Global Granite Park One Plano, TX 75024 Tel: 972-731-1658 Fax: 972-731-1820 **scott.crysel @fmglobal.com**	Ned Dye* Jansen Combustion &Boiler Technologies 12025 115th Ave. NE, Ste. 250 Kirkland, WA 98034-6935 Tel: 425-825-0500, Ext. 125 Fax: 425-825-1131 **ned.dye@jansenboiler.com**	Jerry Garner* BE&K Engineering P. O. Box 12607 Birmingham, AL 35202-2607 Tel: 205-972-6432 Fax: 205-972-6300 **garnerj@bek.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**	Brian Kaufmann* Kimberly-Clark 1400 Holcomb Bridge Rd. Roswell, GA 30076-2199 Tel: 770-587-7230 Fax: 770-587-7736 **bkaufmann@kcc.com**	Olli Kujanpaa* Andritz 10745 Westside Parkway Alpharetta, GA 30004 Tel: 770-640-2571 Fax: 770-640-2455 **olli.kujanpaa@andritz.com**

* = Attended 10/03 Meeting

WASTE STREAMS SUBCOMMITTEE (Cont.)

John Lewis* Fluor Daniel Forest Products 100 Fluor Daniel Drive Greenville, SC 29607-2762 Tel: 864-281-8535 Fax: 864-676-7630 **john.lewi@fluordaniel.com**	Wayne Macintire* International Paper P. O. Box 7910 Loveland, OH 45140-7910 Tel: 513-248-6834 Fax: 513-248-6679 **wayne.macintire @ipaper.com**	Rob Orender* Georgia Pacific Corp. 133 Peachtree St., 18th floor Atlanta, GA 30303 Tel: 404-652-4606 Fax: 404-584-1466 **rhorende@gapac.com**
Jean-Claude Patel* A. H. Lundberg Assoc., Inc. 406 Sagebrush Road Naperville, IL 60565 Tel: 630-355-5120 Fax: (630-355-5120 **jc.patel @lundbergassocates.com**	Paul Seefeld* A. H. Lundberg Assoc., Inc. 4577 Pebble Brook Drive Jacksonville, FL 32224-7643 Tel: 904-223-4147 Fax: 904-223-4146 **paul.seefeld @lundbergassociates.com**	H. Bentley Sherlock* Babcock & Wilcox 2302 Parklake Dr., NE, Ste. 300 Atlanta, GA 30345 Tel: 770-621-3947 Fax: 770-621-3922 **hbsherlock@babcock.com**
Michael D. Sides* GE GAP Services 1105 Sanctuary Pkwy, Ste. 200 Alpharetta, GA 30004-4741 Tel: 770-569-7123 Fax: 888-964-7348 **michael.sides@gegaps.com**	B. K. Wadhwani* Coen, Inc. 1510 Rollins Road Burlingame, CA 94010 Tel: 650-686-3271 Fax: 650-686-5655 **bwadhwani@coen.com**	

* = Attended 10/03 Meeting

Registered for the meeting were:

A.H. Lungberg Associates
Patel, Jean-Claude, Naperville, IL
Seefeld, Paul, Jacksonville, FL

Abitibi Consolidated
Collett, Rick, Fort Frances, ON

Alabama River Pulp
Browning, John, Perdue Hill, AL
Davis, Greg, Perdue Hill, AL
Fleming, James, Monroeville, AL
Gornto, Bruce, Perdue Hill, AL
Norris, Mitchell, Perdue Hill, AL
Wilson, Joe, Perdue Hill, AL
Young, Clarence, Perdue Hill, AL

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

Alstom Power
Barna, Joan, Windsor, CT
Farmer, Robert, Beverly, MA
Frykmo, Christe, Alpharetta, GA
Gadai, David, Windsor, CT
Grasso, Bob, Vancouver, WA
Holbrook, John, Sykesville, MD
Hollenbach, Dennis, Windsor, CT
LeBel, Mark, Windsor, CT
Young, Frederick, Chattanooga, TN

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

Andritz, Inc.
Collins, Peter, Alpharetta, GA
Holm, Ralf, Alpharetta, GA
Kujanpaa, Olli, Alpharetta, GA
Kvist, Marko, Alpharetta, GA
Lindh, Timo, Alpharetta, GA
Phillips, John, Alpharetta, GA
Sauiharju, Kari, Alpharetta, GA
Treger, Glen, Alpharetta, GA

Ashland
Diambri, John, Big Harbor, WA

Automation Applications
Vigeant, Mark, Fort Mill, SC

AXA Corporate Solutions
Abel, Frederic, Lyon, France

Babcock & Wilcox
Belandria, Manuel, Atlanta, GA
Dickinson, Jim, Barberton, OH
Kulig, John, Barberton, OH
Lance, Gail, Barberton, OH
Osborne, Steve, Barberton, OH
Pifer, Greg, Barberton, OH
Yash, John, Atlanta, GA

BE&K Engineering
Garner, Jerry, Birmingham, AL

Blue Ridge Paper Products
Hennessy, Kevin, Canton, NC
Single, Stephen, Canton, NC

Boise Cascade
Breaux, Bob, Campti, LA
Erickson, Leonard, Boise, ID
Przybylski, Tom, International Falls, MN
Von Oepen, David, Jackson, AL

Bowater
Hornsby, John, Catawba, SC

Buckman Laboratories
Graham, Jim, Memphis, TN
Olavessen, Len, Memphis, TN

C.N.A.
Walker, Billy, Apex, NC

Registered for the meeting were:

CBC Industrias Pesadas
Takahashi, Nelson Iwao, Sao Paulo, Brazil

ChemTreat
Kanney, Mike, Glen Allen, VA
Zupanovich, John, Glen Allen, VA

Clement Consulting
Clement, Jack, Akron, OH

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

Cooperheat – MQS
O'Connor, Shawn, North Augusta, SC

CORR System
Ruiz de Molina, Eladio, Birmingham, AL

Delta National Kraft
Goss, Joe, Pine Bluff, AR

Diamond Power
Abdallah, Rami, Lancaster, OH
Bunton, Mark, Lancaster, OH
Kaminski, Bob, Lancaster, OH
Tavares, Alarick, Lancaster, OH
Urbach, Jonathan, Lancaster, OH
Whitehead, Brian, Lancaster, OH

Domtar
Meissner, Ken, Ashdown, AR

Eastern Paper - Lincoln Mill
LaFlamme, Alan, Lincoln, ME
MacEachern, Pat, Lincoln, ME
Sanborn, Dennis, Lincoln, ME

Electron Machine Corp., The
Jarrett, Gordon, Umatilla, FL
Vossberg, Carl III, Umatilla, FL
Vossberg, Carl IV, Umatilla, FL

Environmental Elements
Balasic, Paul, Baltimore, MD
Bringman, Lewis, Baltimore, MD
Brown, Mike, Jacksonville, AL
Elam, Stan, Hot Springs, VA
Shanahan, Dennis, Pensacola, FL

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

FM Global
Beaulieu, Andre, Montreal, QU
Brindle, Robert, Alpharetta, GA
Cooke, Craig, Oconomowoc, WI
Cooper, Mark, Bellevue, WA
Harrison, Bob, Vancouver, WA
Hoffman, Daryl, Bellevue, WA
Lamb, Ron, Parsippany, NJ
Lang, David, Bedminster, NJ
Lemay, Brian, Thornhill, Ont.
Matarrese, Rick, Alpharetta, GA
Morgan, Rick, Plano, TX,
Onstead, Jimmy, Plano, TX
Parrish, David, Norwood, MA
Polagye, Mike, Norwood, MA

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

GE GAP Services
Fincher, Daryl, Alpharetta, GA
Franks, James, Somerville, TN
Lynch, Joe, Alpharetta, GA
Merritt, Brad, Charlotte, NC
Rawls, Lynn, Alpharetta, GA
Sides, Michael, Ocoee, FL

GeneralCologne Re
Freeman, Stuart Jr., Atlanta, GA

Registered for the meeting were:

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

Georgia Pacific
Burney, S. L., Atlanta, GA
Durham, Rick, Atlanta, GA
Morency, Karl, Atlanta, GA
Orender, Robert, Atlanta, GA
Smith, Roger, Atlanta, GA

Global Risk Consultants
Jackson, Christopher, Beaverton, OR
Macaulay, Charles, Issaquah, WA
Smith, Andy, Atlanta, GA

Graphic Packaging International
Bard, Marion, Macon, GA
Shaw, Bill, Macon, GA
Tyson, Tanesua, Macon, GA

Gulf States Paper
Tarpley, Donn, Demopolis, AL

Hartford Steam Boiler
Garfield, Michael, Lowell, ME
Hess, Ron, Buckhead, GA

Hercules/GE Betz
Bowen, Glen, Glenwood, NY
Gaus, Jeff, Shreveport, LA
Robinson, James, Trevose, PA

Inland Paperboard & Packaging
Ja'arah, Majed, Orange, TX
Villarrubia, David, Bogalusa, LA

International Paper
Camp, Bill, Prattville, AL
Clay, Dean, Loveland, OH
Fuhrmann, Dave, Loveland, OH
Griffin, Brent, Courtland, AL
Koth, Ken, Eastover, SC

International Paper (Cont.)
MacIntire, Wayne, Loveland, OH
McCarty, Ron, Sandia Park, NM (Ret.)
Sargent, Mark, Loveland, OH
Sparks, Dennis, Vicksburg, MS
White, Ben, Roanoke Rapids, NC

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

Jaakko Poyry
Kankkonen, Sebastian, Vantaa, Finland

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

Jansen Technologies
Drottar, Jerry, Kirkland, WA
Dye, Ned, Kirkland, WA
Verloop, Arie, Kirkland, WA

Kamtech, Inc.
Dean, Jerry, Alpharetta, GA
Ward, Aubrey, Alpharetta, GA
Williams, Jim, Alpharetta, GA

Kimberly-Clark
Fry, Robert, Picton, NS
Kaufmann, Brian, Roswell, GA

K-Patents, Inc.
Hamalainen, Atrto, Naperville, IL
Pyorala, Keijo, Naperville, IL

Kvaerner Pulping
Christiansen, Gene, Charlotte, NC
Geedey, Jim, Charlotte, NC
Hansson, Berth, Charlotte, NC
King, Dave, Charlotte, NC
LeBouthillier, Yvon, Charlotte, NC
Morgan, Preston, Charlotte, NC
Sherrod, Hank, Charlotte, NC
Smith, David, Charlotte, NC

Registered for the meeting were:

Kvaerner Pulping (Cont.)
Wasson, Eric, Charlotte, NC
Weikmann, John, Charlotte, NC

Liquid Solids Control
Sweeney, Michael, Upton, MA

Longview Fibre
Berg, Greg, Longview, WA

Longview Inspection
Cooper, Mike, LaPorte, TX
Rackley, Jack, Charleston, SC
Sweet, Randy, Charleston, SC

Marathon Pulp, Inc.
Rydberg, Blair, Marathon, ON

Marsh, Inc.
Eaves, Dennis, Atlanta, GA
Hyche, Dwight, Meridian, MS
Wallace, Steve, Atlanta, GA

MeadWestvaco
Andrews, John, Charleston, SC
Atkins, Ed, Phenix City, AL
Burns, Gregory, Charleston, SC
Henriques, Fabian, Chillicothe, OH
Lindsey, Larry, Phenix City, AL
Tasker, George, Luke, MD
Will Mike, Phenix City, AL

Mechanical & Materials Engrg.
Moskal, Max, Indian Head Park, IL

National Board of BPVI
Sullivan, Robert, Columbus, OH

Norske Skog
Norton, Bob, Campbell River, BC

Ondeo-Nalco
Totura, George, Naperville, IL

P. H. Glatfelter Co.
Gentzler, William, Spring Grove, PA
Kile, Brad, Spring Grove, PA

Packaging Corp. of America
Ferrell, Larry, Valdosta, GA
Nyberg, Brent, Tomahawk, WI
Pedron, Lester, Counce, TN
Running, Rick, Tomahawk, WI
Stelling, John, Tomahawk, WI

Potlatch
Cox, Gary, Lewiston, ID

Power Specialists Assoc. Inc.
Bernard, Ron, Somers, CT
Blaylock, Tommy, Somers, CT
Madersky, Tom, Somers, CT
Zawistowski, Bob, Somers, CT

Process Engineering, Inc.
Almond, Charles, Birmingham, AL

Process Equipment/Barron Industries
Nolen, Ken, Pelham, AL
Ray, Allen, Pelham, AL

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

RiNan
Pothier, Richard, Peabody, MA

RMR Mechanical
Roy, Bob, Peabody, MA

Sage of America
Ashley, David, Onetewak, TN
Farrow, Mark, Onetewak, TN
Gerep, Marcio, Collegedale, TN
Martell, Glen, Onetewak, TN
Rambo, Edward, Onetewak, TN

Registered for the meeting were:

sappi Forest Products
Aderman, Craig, Westbrook, ME
LePage, Jamie, Cloquet, MN
Merriman, Nick, Mandeni, KZN, So. Africa
Segal, Mike, Cloquet, MN

Simpson Tacoma Kraft Co.
Fay, Michael, Tacoma, WA

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

Smurfit-Stone Container
Boudreau, Donald, New Richmond, QU
Craig, David, Hodge, LA
Groome, Matt, Panama City, FL
McCreary, Sam, Brewton, AL
Pate, Jerry, Brewton, AL
Pikula, Byron, Hopewell, VA
Rehim, Matt, West Point, VA

SOMPO Japan Insurance
Muramatsu, Ken-ichi, Tokyo, Japan

Southern Environmental
Cotton, Rick, Pensacola, FL
Hayes, Charles, Pensacola, FL

St. Anne-Nackawic Pulp Co.
Lamey, Bernie, Nackawic, NB

Tembec
Reed, W.C., St. Francisville, LA
Yielding, Tim, Francisville, LA

Temple Inland Forest Products
Scoggins, Jim, Sugarland, TX

Triple 5 Industries, LLC
McGurkin, Megan, Yardville, NT

Turner Company
Breaux, Ronnie, Baton Rouge, LA

UPM-Kymmene Miramichi, Inc.
Flieger, Ron, Miramich, NB

VISY Pulp & Paper
Watson, Mike, Tumut, Australia

Welding Services, Inc.
Welch, Mike, Norcross, GA

Weyerhaeuser
Avery, David, Bennettsville, SC
Cooley, Mark, Bennettsville, SC
Dixon, Jim, Pine Hill, AL
Gore, Chris, Bennettsville, SC
Larrimore, Brad, Pine Hill, AL
Pepper, Maxwell, Campti, LA
Powell, Joe (Boney), Campti, LA
Williams, Royce, Pine Hill, AL
Worsham, Jesse, Bennettsville, SC

INTRODUCTION

BLRBAC's Chairman, Dean Clay, called the meeting to order at 8:00 a.m. on Wednesday, October 8th.

CHAIRMAN: I'd like to welcome all of you to the fall meeting. This is the BLRBAC Main Committee Meeting. We do have a published agenda and will attempt to follow the agenda this morning. We want to thank you for your continued support and attendance.

Special Note from the Chairman (added subsequent to the meeting):
I regret to inform you that Joan Barna, an active participant in BLRBAC for many years, passed away on October 26, 2003. The many people who have known her both professionally and personally will miss Joan. Anyone wishing to send condolences may send them to her mother at the following address:

Mrs. Janet Barna
14424 Elizabeth DR.
North Huntingdon
Pennsylvania 15642

If anyone wishes to make a donation in memory of Joan Barna, they may do so to the following organization:

Three River Family Hospices
Empire Building, 2nd Floor
3001 Jacks Run Road
White Oak, PA 15131

OLD BUSINESS

ACCEPTANCE OF MINUTES OF SPRING 2003 – Dean Clay

The first item of business is to approve the Minutes from the spring 2003 meeting. As per the BLRBAC procedure, these have been posted on the BLRBAC.ORG Web site. Hopefully, everybody has had a chance to take a look at them. There is also an e-mail announcement that is sent to all members alerting them to when the Minutes are posted. So I'll entertain a motion from the voting members to approve the Minutes. Could I have a second? Following BLRBAC procedures, hopefully the members have a red ribbon. Each company is allowed one vote. Could I see a show of hands to approve the Minutes. The Minutes stand approved as submitted.

NEW BUSINESS

1. NEW MEMBERS/REPRESENTATIVE CHANGES REPORT – Mike Polagye

Yesterday afternoon at the Executive Committee meeting, the Executive Committee reviewed applications for membership from two companies. They were all approved as follows:

NEW REGULAR MEMBERSHIP

Mid-America Packaging, d/b/a Delta Natural Kraft of Pine Bluff, Arkansas
Joseph Goss is the designated Representative
Lynn Taylor is the designated Alternate Representative

NEW ASSOCIATE MEMBERSHIP

RMR Mechanical from Cumming, Georgia
Robert Roy is the designated Associate Representative
Gerald Miletello is the designated Alternate Associate Representative

REGULAR REPRESENTATIVE CHANGES

Alabama River Pulp Company
Chris Needham is the designated Representative

ASSOCIATE REPRESENTATIVE CHANGES

Nalco Company
George Totura is the designated Associate Representative

MEMBERSHIP COMPANY NAME CHANGE

Graphic Packaging International
Previously known as Riverwood International

Nalco Company
Previously known as Ondeo Nalco Company

2. EXECUTIVE COMMITTEE REPORT – Dean Clay

The Executive Committee met on Tuesday afternoon in closed session. We had five of seven members present. We had received two proposed changes to the published BLRBAC guidelines. We have been promised a couple more. So there is active work being done on the guidelines to keep them current.

2. EXECUTIVE COMMITTEE REPORT – (Cont.)

The procedure on changes to BLRBAC documents is: the Subcommittee works on them and then submits them to the Executive Committee for review. We may approve them, in which case they are put on our BLRBAC Web site in a special section for member review and it is also noted in the Minutes that they will be posted there. The other option is that we return them to the Subcommittee with comments. Again, if you will check your Minutes, we will probably have some posted for review because what we plan to do is quickly review a couple of them and if we are in agreement they will be posed on the Web site for review.

When you review them, if you have any comments at all, please just e-mail them to the Subcommittee Chairman. He will be more than happy to review your comments and either agree or disagree with them.

We do have one item to vote on at this meeting. We will cover it when John Andrews gets up. It is a change to the ESP guidelines.

In addition to finances, which of course the Executive Committee talks about all the time, we also talked about meeting attendance. Ron is going to cover this in more detail and give us a breakdown of the various member classifications that are attending. I guess our focus is on maintaining strong operating company participation both in attending the meetings and in active participation on the Subcommittees. We view it as critical that we try to maintain the proportion of the three regular membership categories that BLRBAC was set up in; that is a joint function between operating companies, manufacturing companies and insurance companies. So we would like to keep all our elements working together to maintain recovery boiler safety.

We don't get a whole lot of feedback from the people that aren't attending. Based on my own company, I think most of us believe that it is cost control efforts that might be dropping operator company attendance and then, at least in my own opinion, after that it's probably increased individual workload. I think we are all seeing reductions and although they claim we will maybe do less with less, it usually seems to me to be we will do more with less. But anyway, what that came down to is that we decided we would try to do a simple e-mail survey of the memberships. So we are going to ask a few questions. For people who didn't attend, if they could provide us with just a little feedback on what made their decision. Also, we will have a spot for comments on what we might consider doing differently. That questionnaire should go out shortly after the meeting.

2. EXECUTIVE COMMITTEE REPORT – (Cont.)

When you go back to share with your company what you have learned from BLRBAC, I would encourage you to send your boss a few highlights; you may be required to do that, I don't know, but I guess the way we see it is that we are in competition for scare resources. Nobody will deny that recovery boiler safety is important, but again lets point out to them when we get back what we picked up from the meeting and what value we think it can bring back to our company.

We also discussed, just in the vein of doing something different, is at the spring meeting we are currently planning on having a BLRBAC sponsored event on Tuesday evening. We don't have any specific details. Dave Gadai of Alstom has generously agreed to put it together for us. So, we will share information as it becomes available. The basic concept was just to have an event where everybody, if they so choose, could come together as opposed to a lot of little hospitality suites. We plan to give that a try and again we look for your feedback.

3. TREASURER'S REPORT -- Ron Hess

For this meeting we had 30 paper companies represented; four boiler manufacturers; and eight insurance/loss control consulting firms. We had 195 people do advance registration and 28 at door registrations. This gave us approximately 223 people registered and about 25 of those did not show up for the meeting. Therefore, the attendance is right around 200 people. We had two attendees from Colombia; one from Brazil; one from Japan; one from Australia; one from Finland; and one from South Africa.

On the financial side of things, we have a certificate of deposit and a checking account for BLRBAC. The CD still stands at $14,000 or $15,000 and our checking account is currently around $35,000 to $36,000. Of course, that is before we pay the bills for this meeting. So we are staying pretty stable on the financial side. As you know we have increased the meeting registration fees. That should help us maintain a stable level even though some of the membership and some of the participation have dropped out. The books were audited in August by E. D. Edwards. Financially we are all set.

Again reiterating, Barbara will be sending an e-mail out with the survey on BLRBAC participation and attendance. We are going to try to keep it short and sweet. We want to get some feedback from all of you to help us get more interest, activity and participation here at the meetings. It will be an opportunity for you in a real quick and easy way to give us some feedback. Your input will help us make adjustments where necessary.

I'm also responsible for organizing the activities here at the hotel. So if something doesn't work right and you weren't satisfied about something or want to change something, feel free to grab me or make comments on the survey. That will help us make adjustments to try to make the meetings the best we can.

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

I have no particular special report to make other than a reminder to all the presenters that the meeting is being taped in the back of the room. That tape will be used as a transcription for Meeting Minutes unless you tell me you are going to give me a written report that you would rather substitute for your verbatim transcription

So when you are giving your report, if you want to have a written report summary submitted, please let me know so that we don't spend time transcribing things we are not going to use.

SECRETARIAL SERVICES REPORT -- Barbara Holich

All Subcommittee Reports must be e-mailed to me in Word 2000 format.

No changes are made to the database until written notification is received. 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 address book. Therefore, be sure that I have your current working e-mail address. BLRBAC notices of meetings and meeting minutes will only be sent via e-mail. If an e-mail address is not working properly, it will be discarded from the BLRBAC database.

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 or supply me with the name and e-mail address of whomever will fill your vacated position.

5. SUBCOMMITTEE REPORTS

5.1 ESP SUBCOMMITTEE REPORT – John Andrews
(See also ***Appendix A*** – Incident List)

The ESP Subcommittee met in closed session on Monday October 6th with 11 of 13 members represented and two guests. Two members, Lloyd Moore and Larry Carter have resigned from the Subcommittee due to job changes. Dean Clay sat in for Lloyd Moore during the meeting.

5. SUBCOMMITTEE REPORTS – (Cont.)

5.1 ESP SUBCOMMITTEE REPORT – (Cont.)

Ken Meissner of Domtar at Ashdown, AR presented their incident report to the closed session Monday afternoon. The Subcommittee met in open session on Tuesday morning. We had 12 of the 13 members represented and about 200 guests.

The Subcommittee received 28 incident reports from North America and 4 International reports. Of the 28 incidents, three were dissolving tank explosions. Seven were critical incidents and 16 were non-critical incidents. In seven of the incidents, an ESP was performed, four of the critical incidents and three of the non-critical. Two spout leaks were reported. The incident reported by Domtar at Ashdown was a superheater leak followed by a smelt water reaction during the sootblower waterwash 33 hours after the ESP. The incident was classified as a critical incident and not as a smelt water explosion because there was no reported damage resulting from the reaction.

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. (This new category is being re-titled Critical Incidents, rather than Critical Exposures, since we are not restricting the cases only to "exposure" of smelt to water, as in the past.)

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

5. SUBCOMMITTEE REPORTS – (Cont.)
5.1 ESP SUBCOMMITTEE REPORT – (Cont.)

Incident Locations

The general locations of the leaks 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 were listed as critical incidents. The leaks locations are summarized as follows:

- 11 – Economizer
- 5 – Superheater
- 5 – Wall Tubes
- 1 – Generating Bank
- 1 – Screen Tube
- 3 – Dissolving Tank Explosion
- 2 – Smelt Spouts

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:

Cracking
- 9 – Fatigue
- 2 – Corrosion Fatigue or Stress Assisted Corrosion
- 6 – Weld Failure
- 3 – Corrosion
- 2 – Erosion
- 1 – Mechanical Damage
- 1 – Overheat
- 1– Thermal Fatigue

How Discovered

Operator observations during boiler walkdowns continue to be the prevalent method of detecting leaks and accounted for identification of 22 of the leaks. Five of the leaks were identified by the control room indications. Of the incidents reported, 11 had leak detection systems installed.

5. SUBCOMMITTEE REPORTS – (Cont.)

5.1 ESP SUBCOMMITTEE REPORT – (Cont.)

One mill reported that the leak detection system initially identified the leak and one reported that the system confirmed the leak. Several of the reports commented that the leaks were so small they were probably below the sensitivity of the detection system. It is important that mill operations be familiar with the capabilities and the limitations of any leak detection system installed.

Incident Review

One of the critical incidents reported was a superheater leak at the Domtar Mill in Ashdown AR. The Emergency Shutdown Procedure (ESP) was performed after a sheared superheater tube at the high crown seal shut down the boiler. The tube failed due to fatigue cracking in the vicinity of the seal weld at the top of the crown seal. The reason the incident was classified as a critical incident was due to the smelt water reaction that occurred about 33 hours after the ESP during the water wash.

The boiler had a large bed when the unit was tripped and the mill utilized enhanced bed cooling using sodium bicarbonate that commenced 24 hours after the shutdown and continued for about eight hours. A smelt water reaction occurred shortly after beginning the boiler waterwash – 33 hours after the ESP. Prior to beginning the wash, the bed had been probed with lances and thermocouples and the temperatures were all below 500 deg F. The floor tube thermocouples were in the 400 – 550 deg F range as well.

The incident was classified as a Critical Incident rather than a Smelt Water Explosion because no damage was found to the boiler as a result of the smelt water reaction.

The mill commented that the explosion occurred in an area just below the access door that was used to probe the bed and that it was an area that was not easy to access with the lances and thermocouple probes. As a result of the incident, the mill has instituted the use of an infrared thermo-vision camera to scan the surface of the bed after an ESP and identify high heat zones in order to better target the lancing and probing operations. They have also extended the time that the boiler area is cleared of personnel to two hours when beginning the boiler water wash.

Blue Ridge Paper Products at Canton, NC reported a second interesting incident. The mill reported on a wall tube leak at the lower bend of a front wall primary air port tube in a composite wall. This is the first report of a tube leak that occurred as a result of composite cracking in a wall tube that propagated completely through the carbon steel tube.

5. SUBCOMMITTEE REPORTS – (Cont.)

5.1 ESP SUBCOMMITTEE REPORT – (Cont.)

Figure 2 shows the critical incidents reported each year. We continue to report critical incidents at rate of about 15 to16 critical incidents per year.

Figure 3 shows that the predominance of explosion history for the recent past has been dissolving tank explosions with four explosions this year. Fortunately, there have been only four smelt-water explosions or other explosions in the last 10 years.

Figure 4 is a plot of explosion history per 100-boiler operating years. The smelt water explosion experience is continuing to trend down over time, but the total explosions seem to be starting to trend up over 1.2 explosions per 100 boiler years. That includes all causes combined, and is being driven by the recent dissolving tank explosions. We all need to continue the making the efforts to try to get that trending back down. Effort should be focused in developing better procedures to handle heavy smelt runs and plugged spouts.

Eight-Foot Rapid Drain Level

There were several incident reports submitted that included the floor tube thermocouple data. All of the data submitted indicated that, within one to two hours after the ESP, the floor temperatures started coming back up, indicating that the floor may be dry. Tom Grace has reviewed bed cooling mechanisms and estimated that the time to properly cool the bed will increase by about 50% if the floor tubes are dry as a result of the reduced heat transfer.

The Subcommittee is still soliciting data on that to try to further evaluate if there should be a change in that 8 ft. level. The document titled "Post ESP Water Level" that is posted on the BLRBAC Web site (www.blrbac.org) under *Incident Reporting & Questionnaires* shows the technique to determine the water level in the lower furnace after an ESP. This is a simple system that can only be used after it is safe to reenter the building and there is no pressure on the boiler. Please also report any information on floor tube temperatures or actual water level measurements after an ESP on the ESP Questionnaire

Recommended Change to ESP Document

The Executive Committee approved the following recommended change to the ESP document in the Spring Meeting and it was posted on the BLRBAC Web site for comments by the full membership. No comments were received between the Spring and Fall Meetings and the wording was accepted by a unanimous vote of the members in attendance.

5. SUBCOMMITTEE REPORTS – (Cont.)
5.1 ESP SUBCOMMITTEE REPORT – (Cont.)

3.13.4 ***Torque Limits***

> The torque limits should not be included in the motor control open circuit for the rapid drain valves so that the motor will exert maximum effort to open the valves until the open position limit is reached. The torque limits may be used in the valve test mode if desired.

The BLRBAC chairman asked for a motion to approve the proposed change. The motion was made and seconded. A vote was taken and the motion passed. The new section will be added to the next revision of the ESP Document. *{BLRBAC Secretary's Note: The document has been revised with a publication date of October 2003 and is posted on the BLRBAC Web site.}*

Interpretations and Clarifications

The committee discussed several questions that had been raised regarding clarification of the ESP Guidelines.

Precipitator Trip – This item is included in the section on "Optional Items to Consider" but is not considered a required function of the ESP system. There may be consideration of taking power off the precipitator if all fans (FD and ID) trip but that is not be part of the ESP logic

Desuperheater Block Valve – A desuperheater block valve is required for systems using feedwater or pumped condensate for attemporating water. Systems using sweetwater condensers can utilize closure of the automatic control valve.

Control Room Indications - The Subcommittee intent is for the operator to be able to monitor the successful completion of the ESP functions from the control room. The "Open" indication for the rapid drain valves and the "Closed" or "Stopped" indication for all other ESP functions should also be available. There is requirement to have an open indication on the manual block valves ahead of the rapid drain valves but a management system should be in place to monitor that the valve are locked in the open position when not used for testing the rapid drain valves.

The Subcommittee will be developing language that clarifies the need to install floor tube thermocouples to monitor floor tube temperatures following an ESP.

5. SUBCOMMITTEE REPORTS – (Cont.)

5.1 ESP SUBCOMMITTEE REPORT – (Cont.)

Revised ESP Questionnaire

The Subcommittee has been working on a revision of the ESP questionnaire. The form has been simplified so that it will be easier to fill out and is more interactive. You will fill out certain sections depending upon the type of incident and the form contains a table that tells you which sections you need to fill out and which sections you can leave blank.

This revised questionnaire has been posted on the Web site. We would appreciate any comments on it, if you find it simpler or not, and any suggestions for further improvement.

Whenever you need to fill out an ESP Questionnaire please go into the BLRBAC Web site and pull up the latest copy of the form. The form can be filled in electronically and send it in by e-mail or it can be printed out and filled in by hand and mailed in. Either way is appreciated. But please fill it out and send it in.

5. SUBCOMMITTEE REPORTS – (Cont.)

5.1 ESP SUBCOMMITTEE REPORT – (Cont.)

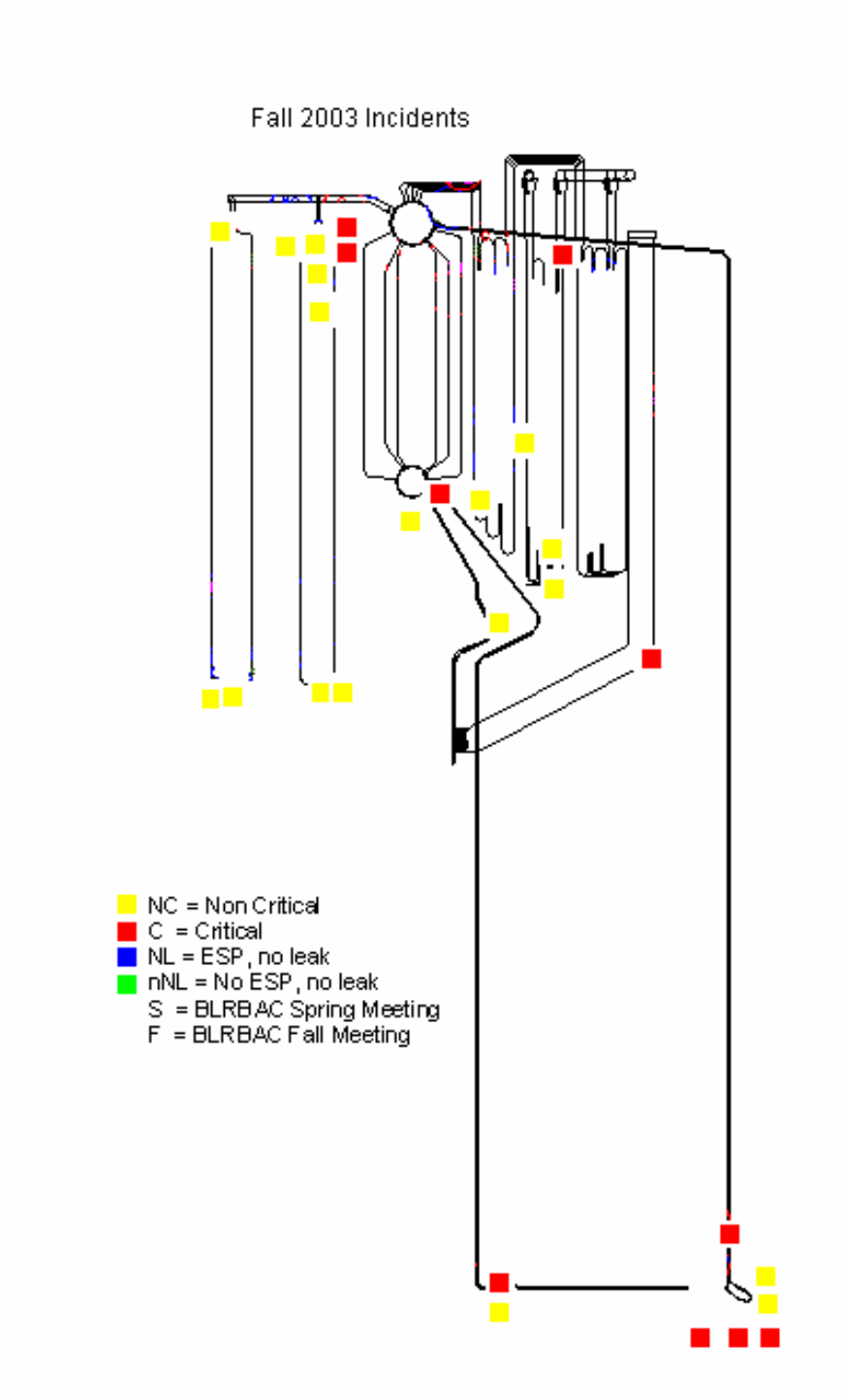


Figure 1

5. SUBCOMMITTEE REPORTS – (Cont.)

5.1 ESP SUBCOMMITTEE REPORT – (Cont.)

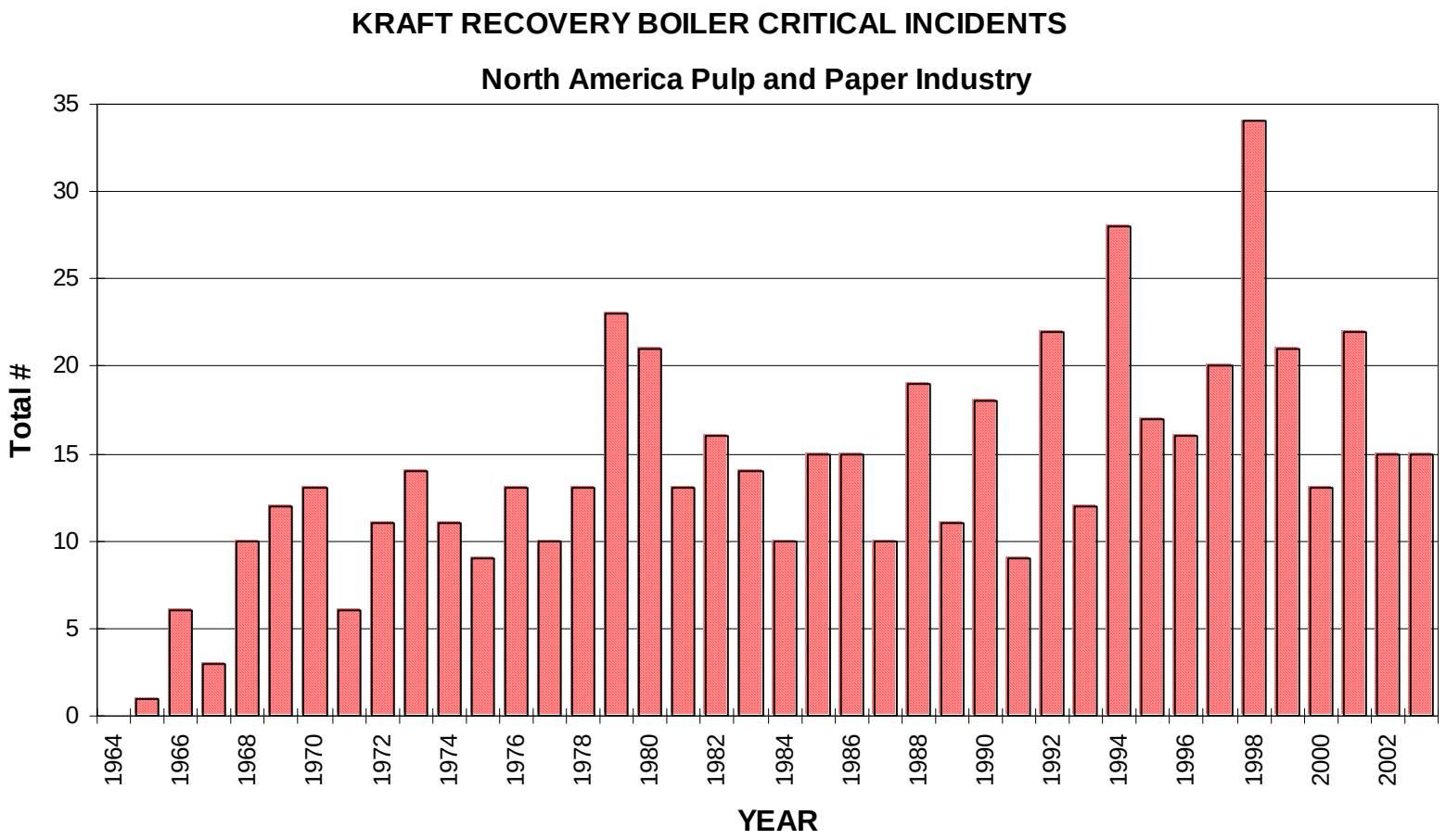


Figure 2

(Critical Incident Classification Began in 1995. Prior to 1995 this category was defined as Critical Exposures.)

5. SUBCOMMITTEE REPORTS – (Cont.)

5.1 ESP SUBCOMMITTEE REPORT – (Cont.)

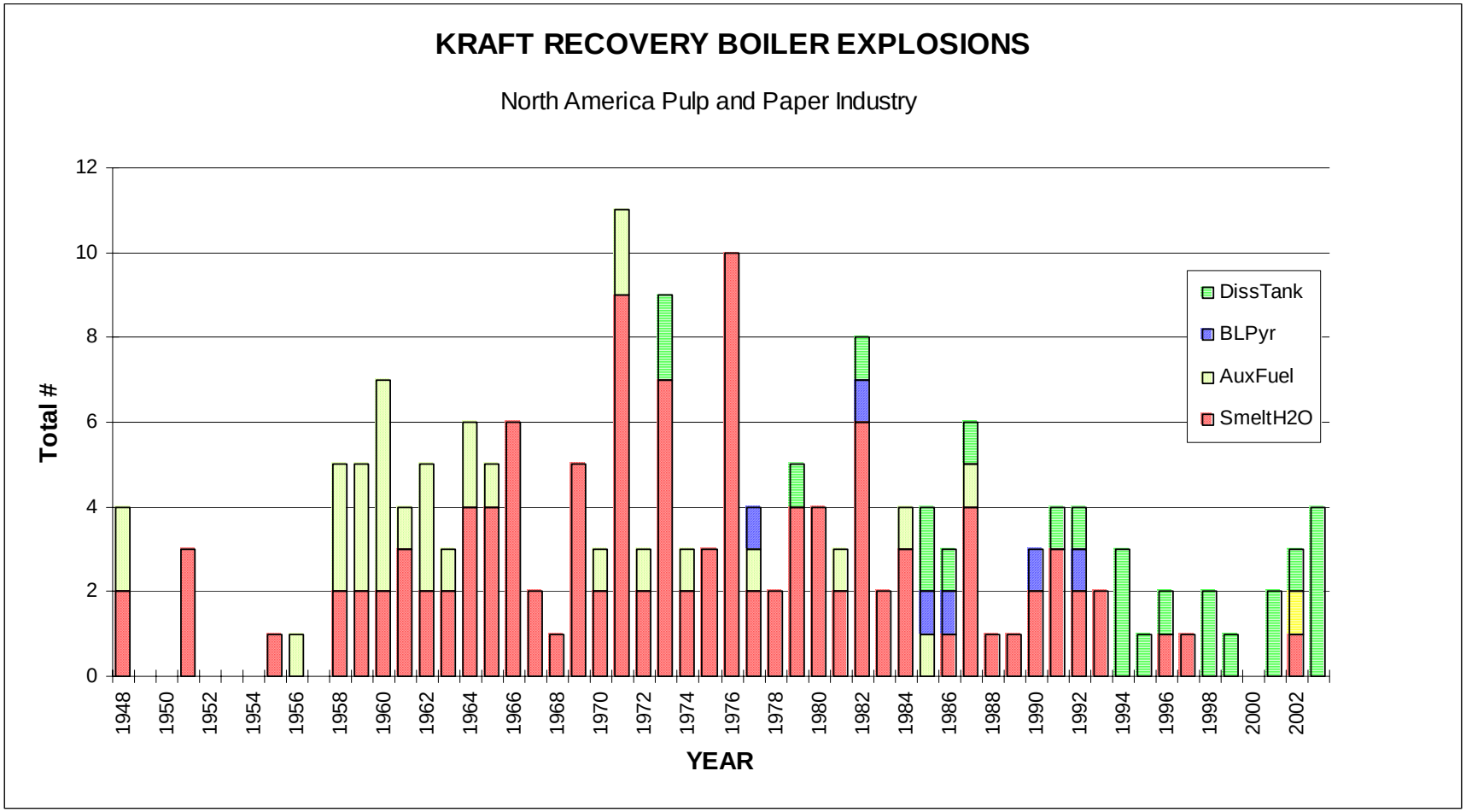


Figure 3

5. SUBCOMMITTEE REPORTS – (Cont.)

5.1 ESP SUBCOMMITTEE REPORT – (Cont.)

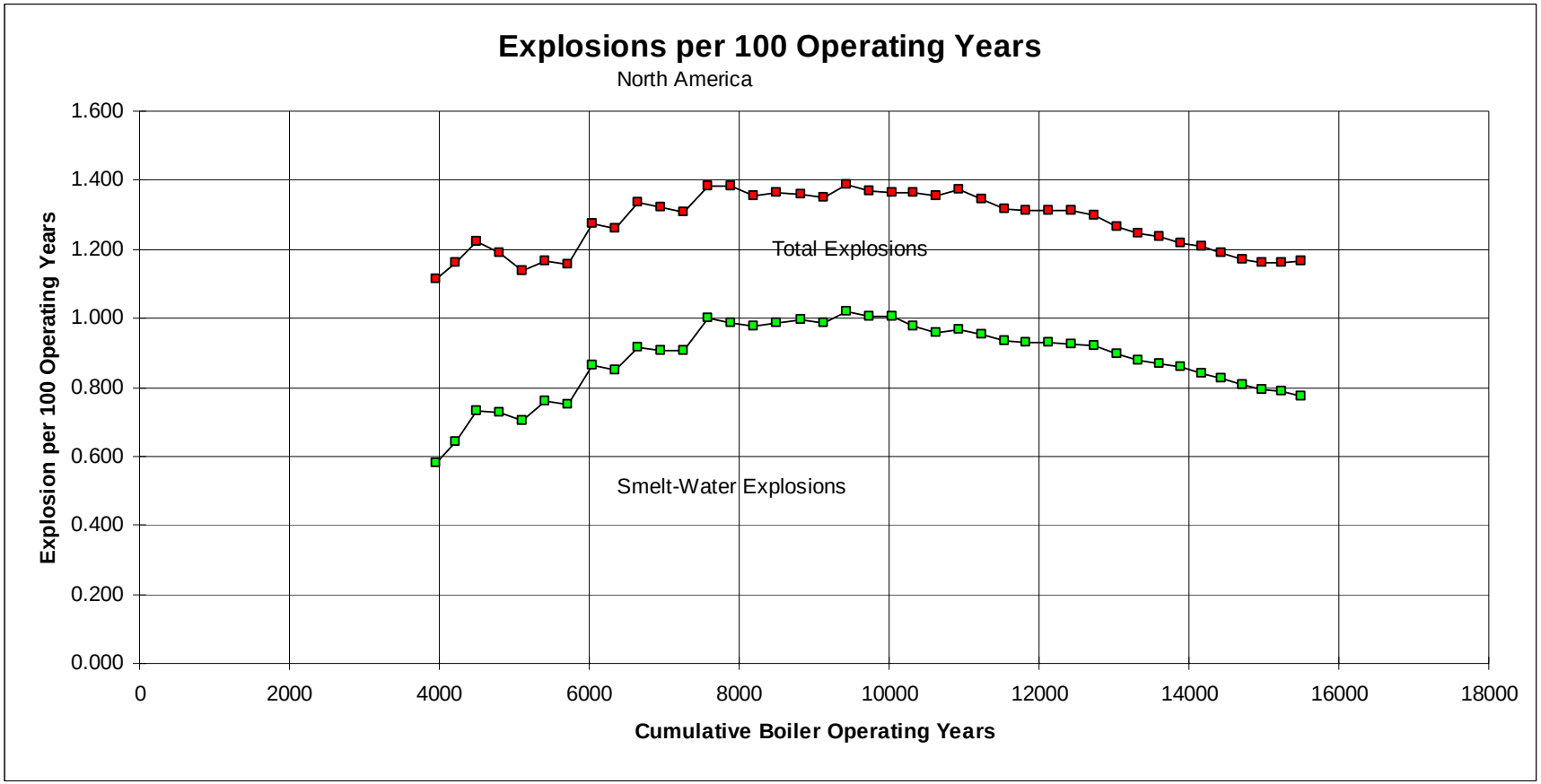


Figure 4

5. SUBCOMMITTEE REPORTS – (Cont.)

5.1 ESP SUBCOMMITTEE REPORT – (Cont.)

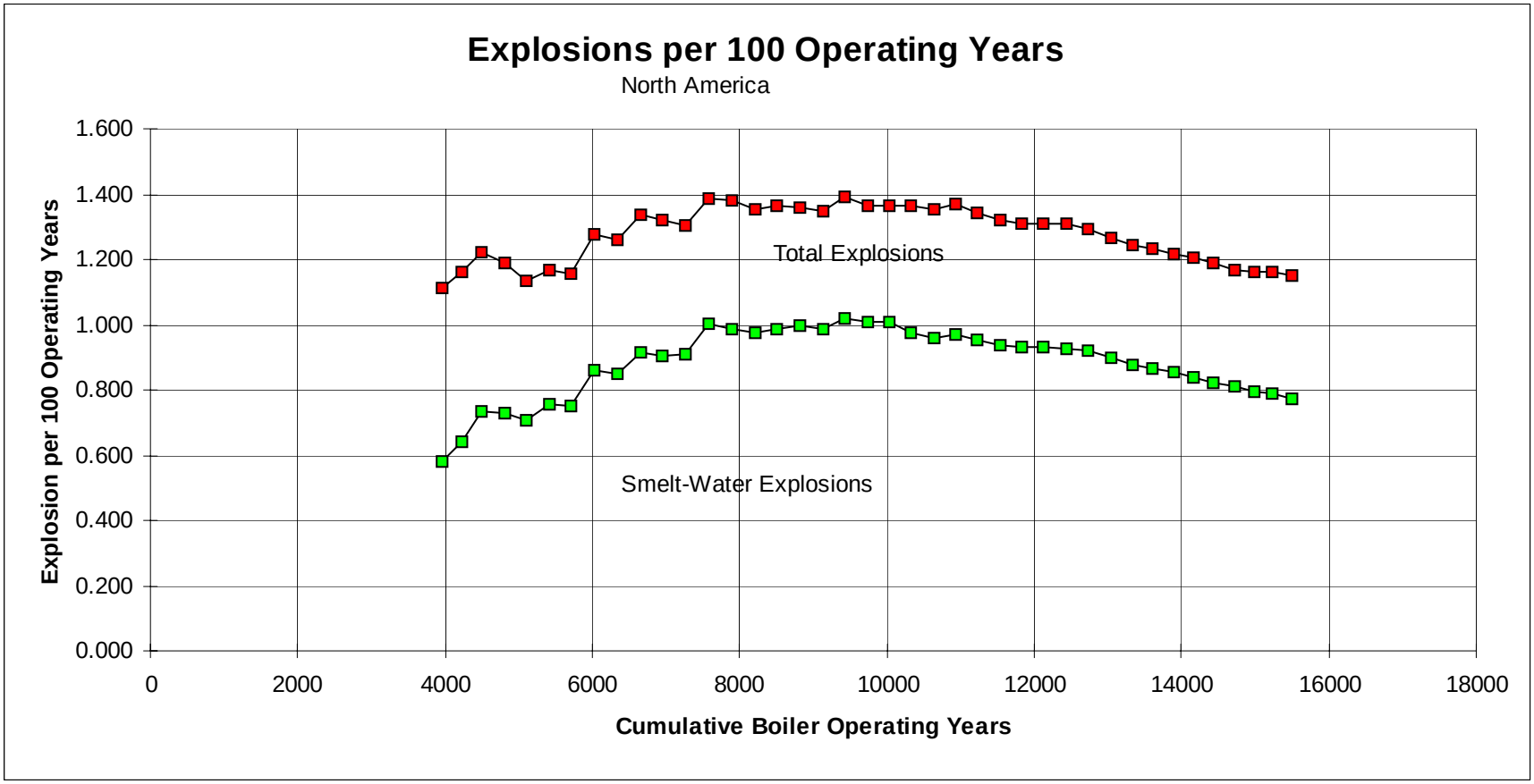


Figure 5

5. SUBCOMMITTEE REPORTS – (Cont.)

5.2. INSTRUMENTATION SUBCOMMITTEE – Dave Avery

The Instrumentation Subcommittee met in two separate sessions Monday. The morning meeting was a closed working session with nine members present. The subcommittee proceeded with a review of the comments received from the Executive committee about our "Functional Testing" draft submitted to them last spring.

The subcommittee worked through the comments incorporating some of them and taking others under advisement. The draft language was reworked to clarify ideas, while simplifying the process to insure that the end user understands the "Spirit of the addendum".

The afternoon session was an open meeting with nine members and eleven guests present. This session was devoted to completing the edit on the "Functional Test" draft. I would like to thank "our" guests who play an integral role as 'comprehension reality checkers' for several of our editorial points. It was with their help that we were able to complete our edits and resubmit our proposal to the Executive Committee for comments. *{BLRBAC Secretary's Note: The proposal is posted on the BLRBAC Website for membership review and comment as a "Preliminary Draft." The proposal has not been reviewed and approved by the Executive Committee and will not be voted on at the Sprint 2004 meeting.}*

The session wrapped-up by accepting a new subcommittee member after a brief open discussion.

Next Spring our morning and afternoon sessions will be open. The agenda will focus on developing a few examples of functional testing (bearing in mind to keep the required time to perform these test to a minimum).

CHAIRMAN: Subcommittees are always open to comments. After you work on a document long enough it can become totally unintelligible sometimes. Not that theirs is!

5.3. MATERIALS & WELDING SUBCOMMITTEE – Joan Barna (presented by Max Moskal)

Max Moskal opened the meeting with introductions. Chairman Joan Barna was unable to attend. Members and guests were introduced.

Old Business:

2.1 "Recommended Guidelines for Materials & Welding for Black Liquor Recovery Boilers"

Max Moskal reviewed the contents of the draft document that was last distributed by Joan Barna (March 2003). It was noted that the sections needed to be reviewed and formatted, and that a "Forward" must be written, as is included in posted BLRBAC approved documents. An example of this is on the website.

5. SUBCOMMITTEE REPORTS – (Cont.)

5.3 MATERIALS & WELDING SUBCOMMITTEE – (Cont.)

(Note from BLRBAC Secretary: Many of the subcommittees have found the Foreword to be a useful means of providing background and/or explanatory statements. There is, however, no mandatory requirement for a Foreword.)

Mike Welch agreed to serve as task group chair to format the document and to provide a technical review of Section I, Welding. He also agreed to prepare the Foreword section. Fabian Henriques agreed to serve as task group chair to provide a technical review of Section II, Materials. Comments on the sections should be submitted directly to Mike Welch (mwelch@wsi.aquilex.com) and Fabian Henriques (fah1 @meadwestvaco.com), with a copy to Dan Phillips (dphillips@industra.com).

The current draft of the 31-page document will be immediately distributed via email to those attending (and other subcommittee members, not present). Members and guests were urged to submit **comments to Welch (Section I) and Henriques (Section II) by the deadline of November 30, 2003.**

Jim Dixon noted that there are three versions of the Handhole Cap write-up (by Phillips, Dixon and Garfield). These need to be pulled together and inserted as Chapter 10. He provided a CD with approximately 50 photos showing stages of hand hole plug removal and installation. Mike Welch will handle these.

There was discussion was on whether quality control and inspection guidelines might be included in the Materials & Welding document. It was generally agreed that the document should be pushed ahead in the present format (two sections: Welding and Materials), with additional sections such as inspections and tests added later.

Mike Welch provided a suggested "Format for a Repair," which he may use in the document.

Timetable for Review:

- Moskal to distribute present draft — October 15, 2003
- Member/Guest comments to Welch & Henriques — November 30, 2003
- Revised document distributed to subcommittee — March 1, 2004
- Document approval — Spring 2004 Meeting

There was discussion on whether task group work meetings need to be held prior to the Spring 2004 Meeting. The need for this would be determined by Mike Welch and Fabian Henriques, and set up for Monday morning (prior to the regular afternoon meeting at the April 2004 BLRBAC Meeting).

5. SUBCOMMITTEE REPORTS – (Cont.)

5.3 MATERIALS & WELDING SUBCOMMITTEE – (Cont.)

2.2 Acceptable Dents in Tubes

Max Moskal is working on guidelines for acceptable sizes of dents in furnace wall and screen tubes. He reported that B&W has guidelines for deformations or indentations in tubes regarding fabrication and operating criteria. Steve Osborne will assist with the B&W guidelines. Alstom and Kvaerner do not have guidelines. John Sullivan will determine if the ASME Post-construction committee on repairs and testing has available documents relating to dents in tubes.

Other Business:

There was general discussion on BLRBAC procedures for adopting guidelines. It was related that guidelines must first be approved by the subcommittee, and then submitted to the Executive Committee for comments and suggestions. Following approval by the Executive Committee, the document is posted for general membership review and comment and then must be adopted at the Main Committee meeting.

CHAIRMAN: Again, we are looking forward to receiving this document, but keep in mind that it will be different from our other guidelines. We are not attempting to say that this is the preferred way to do it or that this is the correct way to do it. What we are attempting to do is to share useful information put together by a group of people. I'm sure there are other experts that will say, "I'm not going to do it that way!" That's fine with BLRBAC. So again it is going to be a best effort and I think we will all find it useful. We are not going to replace the ASME Code or the NBIC, but are simply sharing information. Again, we are looking forward to it.

5.4 PERSONNEL SAFETY – Robert Zawistowski

The Personnel Safety Subcommittee met in an "open" session on Monday, October 6, 2003. There were 15 members and 28 guests in attendance during the morning meeting. A "closed" session meeting was held on Monday afternoon for editing of the revised Personnel Safety document.

Representation at our meeting included original equipment manufacturers ALSTOM Power, Andritz, Babcock & Wilcox, CORR Systems, Inc., Diamond Power, Kvaerner and Triple 5 Industries. Representation from insurance and insurance service companies included AXA Corporate Solutions, FM Global, GE-GAPS, Global Risk Consultants and HSB.

5. SUBCOMMITTEE REPORTS – (Cont.)

5.4 PERSONNEL SAFETY – (Cont.)

Operating company representation included, Abitibi-Consolidated, Boise Paper, Eastern Fine Paper, Gulf States Paper, International Paper Company, MeadWestvaco, Mid-America Packaging, Packaging Corporation of America, Potlatch, Tembec, and VISY Pulp & Paper. Water treatment company representation included Buckman Laboratories International. Consultant representation included The National Board, RSI and Power Specialists Associates, Inc.

We had three requests for information clarification since the last meeting. These questions were reviewed along with our responses.

A generic ESP Flow Chart was reviewed to see if there might be personnel safety concerns. In reviewing this chart we questioned a number of areas where we thought there might be ways to perform additional checks from a remote location such as the control room before sending personnel into the field. However, we recognized that this generic chart was apparently made from a site-specific one. We suspect there may have been reasons for checking things in a specific order that was not known to us. At this point we do not see a need to incorporate this chart into the Personnel Safety document.

We received information that BLRBAC guidelines do not comment on normal water wash guidelines. The committee agreed that this was an important function that can have a direct impact on personnel safety. We elected to take this item under consideration to be worked on over the winter and addressed during the Spring 2004 meeting.

A question was raised about performing recovery boiler system audits and a lack of information on this topic in our guidelines. It was determined that AF&PA already has a guideline established for auditing. Rather than duplicate this process we suggest referring the AF&PA document if you have auditing questions.

The Personal Safety document was edited in an afternoon closed session following comments made by the Executive Committee and ESP Subcommittee. This final draft will be resubmitted to the Executive Committee for review shortly after the fall 2003 meeting. Assuming this document passes the Executive Committee, it will be made available for membership review on the BLRBAC web site when the meeting minutes are posted this fall. If the document passes membership review this winter, a spring 2003 vote is possible. *{BLRBAC Secretary's Note: The Executive has reviewed and approved the document for membership review and comment. It is posted on the BLRBAC Web site (www.blrbac.org) under the link titled "Documents for Review and Comment."}*

5. SUBCOMMITTEE REPORTS – (Cont.)

5.4 PERSONNEL SAFETY – (Cont.)

We have noted that there are a growing percentage of non-users on our subcommittee. Personnel Safety receives its best input from operating people in the development of our guidelines. We would like to encourage more users of recovery boilers to become involved in this or other subcommittees.

5.5 PRESS RELEASE & PUBLICITY SUBCOMMITTEE REPORT – Craig Cooke

CHAIRMAN: Next on our Agenda is our Subcommittee of one. Craig Cooke, who covers news releases and publicity, has chosen not to say anything. He assures me we are getting published in several pulp & paper journals, etc. So, if you have any comments on that, please send them to Craig.

5.6 SAFE FIRING OF AUXILIARY FUEL REPORT – Dave Streit

CHAIRMAN: Next on the Agenda is Safe Firing of Auxiliary Fuel. They did not meet and we have no report. If you do have any comments and/or questions on auxiliary fuel, again Dave Streit is the Chairman. His e-mail address, mailing address, phone number, etc. are in the Meeting Minutes. Please forward any comments to him. They are kind of on an "as needed" basis. If they have something they feel needs to be covered, there will be a meeting scheduled.

5.7 SAFE FIRING OF BLACK LIQUOR REPORT – Len Erickson

The closed meeting was held with eight members and four guests present. An additional 50 guests attended the open meeting. The following items were discussed and acted on during the sessions:

The Spring 2003 minutes were reviewed and approved.

Electron Machine has requested a change to SFBL, Chapter 6, Paragraph 6.2, to add portable refractometers as an "Acceptable" measurement technique for off line solids measurement. The document currently lists "Hand Held Refractometers" as "Not Recommended". Electron Machine presented the technology to the committee in closed session and to the general membership during the open session. The committee agreed to form a working group consisting of Ari Verloop, Majed Ja'arah, and Brad Merritt to explore the impact and draft language for review by SFBL during the spring meeting. The committee noted is concerned with the measurement of only the dissolved solids portion of the black liquor; however, it realizes that refractometer application technology has improved over the last ten years.

5. SUBCOMMITTEE REPORTS – (Cont.)

5.7 SAFE FIRING OF BLACK LIQUOR REPORT – (Cont.)

Weyerhaeuser has proposed a revision to SFBL for high solids systems that re-circulate back to a pressurized storage tank requiring a "Fail to closed position" valve in the recirculation line between the ring header and the pressurized storage tank to prevent the backflow of liquor in the event of a divert or ESP. Manufacturers who supply high solids systems that require pressurized storage tanks also supply these valves. However, not all users purchase the complete system from the manufacturer. The committee agreed that this should be in our recommended practice. Richard Wiseman will submit draft language and flow sheet to the committee at the spring meeting.

IP has proposed adding the black liquor pumps and steam sources as items that also trip to SFBL Figure 4 "Black Liquor Tripping Logic". The committee reviewed the proposed logic change in both the closed and open sessions, and agreed with the proposed change. The revised Figure 4 was voted on and approved by the committee for submittal to the executive committee & general membership. *{Note from BLRBAC Secretary: This change was reviewed by the Executive Committee and approved for membership review and comment. It is posted on the BLRBAC Web site (www.blrbac.org) under the link "Documents for Review and Comment."}*

The Revision to SFBL providing for the use of a keyed interlock switch for water washing the lower furnace has been combined with a review of the SFBL starting & tripping logic diagrams, (Figures 2 & 4). It was noted during the open session and during the operating problems session that over one half of the companies were washing the lower furnace during water washes. Of those that wash the lower furnace, six companies had an interlock system and switch. The remainder use either mechanical or electrical jumpers to bypass the interlock (gun door) switches. The committee is asking operating companies that have lower furnace wash switches to send their logic to Mark Sargent, Len Erickson, or Scott Moyer. A proposed Logic revision will be submitted to SFBL for review & approval at the spring meeting.

The Committee was advised that an error has been found in the on-line version of SFBL. Figures 2 and 4 on pages 28 & 33 are incorrect. The versions of the Black liquor starting and tripping logic diagrams that were approved in 1999 were not incorporated. These will be updated soon. *{Note from the BLRBAC Secretary: Revisions have been made to Figures 1, 2, 3, and 4 and are included in the October 2003 release of the Recommended Practice for the Safe Firing of Black Liquor and is posted on the BLRBAC Web site.}*

5. SUBCOMMITTEE REPORTS – (Cont.)

5.7 SAFE FIRING OF BLACK LIQUOR REPORT – (Cont.)

The following comments and questions came from members/guests:

- A member location asked if any mills were using pumped recirculation as a method of emergency agitation. Neither the committee nor any of the members in attendance at the SFBL open meeting or operating problems session knew of any mills that were.
- Locations in attendance were asked how many had provisions installed for emergency agitation of the dissolving tank.
  - 25 had provisions for emergency agitation-
    - 20 use steam
    - 5 use air
- Locations in attendance were asked what method they use for off line solids testing.
  - 25 moisture balance of some type
  - 4 Microwave ovens
  - 3 bench top refractometers
- Locations in attendance were asked how many had provisions installed for back-up/ emergency shatter sprays..
  - 6 locations reported that they have back-up/emergency shatter sprays.

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

CHAIRMAN: Thank you, Len. That [the PowerPoint presentation used during the report] was a good display of computer technique. The next Subcommittee to report is Fire Protection in Direct Contact Evaporators. Jerry Vuoso had been the chairman. He resigned and I'm happy to note the Executive Committee has approved Chris Jackson as the current chairman. The Subcommittee then proposed to the Executive Committee Craig Cooke as co-chairman. We are in agreement.

5.8 FIRE PROTECTION IN DIRECT CONTACT EVAPORATORS REPORT – Chris Jackson

The Subcommittee held an open session Monday morning with four members and ten guests present. Jerry Vuoso, our Chairman since the reactivation of the subcommittee has resigned his position at the request of his company and so the first order of business was to select new officers. After the normal process of nominating and voting, Craig Cooke was chosen to be our new Vice Chairman and I was chosen to be Chairman. Joe Lynch volunteered to perform the duties of secretary. These choices were submitted to the Executive Committee and were approved.

Currently there are seven active members of the subcommittee. Loss Prevention Engineering and/or Insurance companies employ four of these members. Only two are users. It is a concern of the subcommittee that we do not have more representation by the owners and users of the

5. SUBCOMMITTEE REPORTS – (Cont.)

5.8 FIRE PROTECTION IN DIRECT CONTACT EVAPORATORS REPORT – (Cont.)

equipment we are writing guidelines for. If you own and operate Cyclone or Cascade Evaporators, we would ask that you consider participating as a member of our subcommittee.

Shortly after the current document was approved by the membership an anecdotal report of a fire in a Cascade Evaporator was brought to the subcommittee. No incident report was completed and no details were available except that there was a fire suppression system in place that proved to be less than effective. Manual firefighting was required to suppress the fire. The details of this would be extremely interesting to the subcommittee and an effort will be made to bring more details to the meeting in April.

The subcommittee heard from Craig Aderman of SAPPI about the refurbishment of a fire suppression system on a Cascade Evaporator. During the design of the new system a question came up about steam nozzle spacing. After deliberation the subcommittee decided to submit a change to the Executive Committee for consideration. The requirement to place steam nozzles every ten feet in horizontal ductwork is considered too restrictive and the proposed revision will allow the system designer more flexibility. *{BLRBAC Secretary's Note: The proposed revision was reviewed by the Executive Committee and was approved for Membership Review and Comment. . It is posted on the BLRBAC Web site (www.blrbac.org) under the link "Documents for Review and Comment."}*

The subcommittee was asked by one member company to look at the possibility of including an interlock in our list of recommended controls that would initiate a liquor divert in the event the Cascade wheel stopped. After discussion it was decided such an interlock would not add to the safety of the operation. It was decided the current list of alarmed conditions and the recommendation to have appropriate procedures and training in place was sufficient to assure a safe operation.

Our final topic of discussion concerned the Incident Questionnaire. The consensus of the subcommittee was that in its current form, the questionnaire is too cumbersome to fill out and submit. A Task Force was formed to examine the questionnaire and decide how best to re-write it to be more accessible. This effort will be lead by Craig Cooke who will have the assistance of three volunteers who are users of the equipment. The goal will be to reduce the questionnaire from its current nine pages and make it look more like the ESP Incident Questionnaire. It was suggested that one strategy might be to separate the questionnaire into two; one for Cascades and one for Cyclones. The Task Force will bring its suggestions to the meeting in April and we hope to have a more useful document posted on the website shortly thereafter. The incident questionnaire is currently contained in the *Recommended Good Practice for Fire Protection of Direct Contact Evaporators and Associated Equipment* posted on the BLRBAC Web site.

5. SUBCOMMITTEE REPORTS – (Cont.)

5.8 FIRE PROTECTION IN DIRECT CONTACT EVAPORATORS REPORT – (Cont.)

That constitutes the work done by the subcommittee this meeting. We intend to stay active and be available to revise the document as the member companies begin to use it. We encourage owners and users of DCEs to let us know of any incidents relating to their fire protection systems and send questions and concerns to the subcommittee. Thank you for your attention. Are there any questions?

5.9 WASTE STREAMS REPORT – John Rickard

The Waste Streams Subcommittee met in closed session at 8:00 AM on October 6, 2003 with 12 members present. Four new members attended, Mike Sides of GE GAP Services replacing James Franks, Jerry Garner of BE&K Engineering replacing Barry Siedel, Rob Orender of Georgia Pacific and Jean-Claude Patel of A.H. Lundberg Associates. B.K. Wadhwani joined in the afternoon.

We reviewed one question that had been submitted since the spring meeting. It pertained to measuring pressure of DNCG as a permissive to firing. The subcommittee decided that the question should be answered by explaining the need for the pressure permissive and suggesting that a "management of change" (like HAZOP) procedure be used to test their design.

The subcommittee is getting input suggesting changes to the guidelines for gaseous waste stream incineration. Also, we haven't completed the guidelines for the blending of liquid waste streams with black liquor nor started guidelines for firing liquid waste streams in independent burners. We discussed priorities for selecting our tasks. Our primary effort will be to continue to develop the guidelines that are needed for various methods of thermal oxidation of waste streams in recovery boilers. If the existing document is shown to create an unsafe condition, we will shift our attention to correcting that condition. Lower priority will be given to changes concerning application of equipment or technology. The lowest priority will be assigned to changes that are economic, i.e., that are asked to reduce the cost of implementing the guidelines.

The value of "management of change", like HAZOP or PSM, received attention. Our guidelines involve waste streams in and near the boiler house. As a waste stream incineration system is designed, it will reach beyond the scope of our document. Using BLRBAC guidelines does not ensure that the <u>entire</u> system is safely designed.

The next work item was to establish maximum flow rates for waste streams as requested by a document review two meetings ago. Maximum flows as a percentage has been set for methanol and secondary sludge. Using soap as an example of other waste streams, the subcommittee discussed the pros and cons of setting an upper limit on flow. Each mill is

5. SUBCOMMITTEE REPORTS – (Cont.)

5.9 WASTE STREAMS REPORT – (Cont.)

unique, depending on wood species and number of recovery boilers. Each recovery unit is unique with regards to heat input, flue gas flow and other waste streams being incinerated, so setting one maximum flow rate could cause problems by being too high or too low. Our preferred method is to recommend using a management of change technique to determine the maximum flow for each boiler. This method applies to soap, tall oil and spent acid or brine, if it is added after the point of final concentration.

The afternoon session convened at 1 PM in an open meeting. There were 11 subcommittee members present and 4 visitors. We continued work on our guidelines revisions, creating flow sheets for streams that are added after final liquor concentration. Also we listed our firing interlocks, discussed if interlock diagrams were justified and decided that our present written interlock descriptions are adequate. Our revised liquid waste streams guidelines will be resubmitted to the Executive Committee before the spring meeting.

CHAIRMAN: Next we have a series of speakers who are going to update us on other associations and their work on recovery boiler safety.

6. AMERICAN FOREST & PAPER ASSOCIATION 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, we have 27 companies in the Program including four non-AF&PA member companies. We are continuing to contact and encourage those other companies with recovery boilers, who are not in the Program, to join with the current members in the cooperative efforts for safe operation and research to improve the reliability of the recovery boilers. All companies operating recovery boilers gain directly from the benefits of the Program.

Operational Safety Seminars

After we had the lowest attendance at the Operational Safety Seminars in 2002, attendance reached almost a record high of 148 operators for the three seminars held this year. After we had considered discontinuing them due to the low attendance, we were very happy that companies reconsidered the seminars to be most informative and helpful in operator training. The Committee decided to hold three seminars again this year. The two explosions last year may have something to do in making companies more thoughtful in sending people to learn from this experience. Since the seminars were started in 1985, over 1,950 people have attended. We hope we will again have high attendance and help to avoid future upsets in the recovery boiler area. Thus, the payout for repairing and lost production will be avoided.

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

Explosion Monitor

Mr. Jack Clement continues in his role as the AF&PA explosion monitor. He is also working with the BLRBAC ESP Subcommittee on collecting, reporting and tracking recovery boiler incidents.

Training Program

The Organization and Training Subcommittee is continuing to review the uses of the AF&PA Recovery Boiler Training Program. The Subcommittee is analyzing the results of the survey of the mills regarding their use of the material and possible tie-ins with CBTs. Some mills still do not have the Training Program although the Committee recommends that this material is essential to all operators. We will be meeting shortly to see what steps need to be taken to increase the use of the training program.

Recovery Boiler Char Bed Cooling following an ESP

Earlier this year, the final report on the **Recovery Boiler Char Bed Cooling following an ESP** project was completed along with the video produced by Drs. Grace and Tran. Copies of the final report were distributed to Program members. In August, members of the Program were sent the report on "Thermal Characteristics of Char Bed Materials," which was part of this study. The final summary report for the Char Bed Cooling study will be completed and distributed to the Program members shortly.

Damage Mechanism

After a long delay, the "**Damage Mechanism"** project sponsored by the R&D Subcommittee, and working with the Pressure Vessel Research Council (PVRC) of the Welding Research Council (WRC) to create a document on damage mechanisms has been finalized. This document defines and describes various damage mechanisms for API-579. Dr. Bennett and M&M Engineering are to be congratulated for their endless efforts to complete this document. Copies of the report will be distributed to the Program members as soon as it is completed in the next few weeks.

Overheat Floor Tube Failures

The R&D Subcommittee is reevaluating the need for further research into the **Overheat Floor Tube Failures in Chemical Recovery Boilers**. You may recall that the study to investigate the experiences in this was completed earlier this year. Work had been done in this area by various sources, but had not been published. The Subcommittee has been encouraging the publication of this work to further the project.

Non-Destructive Technologies for Detecting Waterside Deposits

A study to identify potential **non-destructive technologies for detecting waterside deposits in recovery boiler furnace wall tubes**, sponsored by the R&D Subcommittee, was conducted at Mc Dermott Technology (MTI). The goal of this project was to identify non-destructive methods for cost-effectively scanning large tube areas for waterside deposit locations. An AF&PA Advisory Group, headed by Mr. Evans of IP is working with the MTI team on this study. The Advisory Group consists of representatives from operating companies, manufacturers and a water treatment company. We expect

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

this study's final report to be completed and reviewed within the next few weeks. We expect to distribute the final report to the Program members before the end of the year. It is expected that future research will be recommended, and the Subcommittee will investigate this.

Chemical Cleaning

AF&PA conducted a survey of the members regarding the timing of chemical cleaning - how it is decided and the time between cleanings. The response was very interesting. Responses were received from 25 of the 27 company members. We found there are boilers that have never been chemically cleaned. This information will be looked at further and we will have a presentation regarding chemical cleaning at our next Conference in February.

Agenda 2020

AF&PA is continuing to work with the US Department of Energy in the Agenda 2020 program to develop projects with a vision for the future. There are a number of projects currently underway with funding from DOE including gasification. DOE is reviewing this effort for the future.

Annual Meetings and Conference

AF&PA's annual Recovery Boiler meetings and Conference will be held February 3rd and 4th in Atlanta. The Conference is open to all operating companies, insurers and manufacturers. The presentations will include reports on the projects currently sponsored by the AF&PA Recovery Boiler Program; a status report on the research projects in the Agenda 2020 program funded by DOE and subcommittee reports on their accomplishments; leak detection, training systems using simulations on DCS systems; cracking and corrosion; non-destructive technologies for detecting water-side deposits; views on chemical cleaning and others. 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 your will plan to attend next year's Conference.

CHAIRMAN: As Tom noted, a recovery boiler explosion certainly picks up the interest in attending meetings. Certainly we are not proposing that as a method to pick up BLRBAC attendance. What we would much rather prefer is that you point out when you get back that there are still, by the incident review and the number of critical incidents, a lot of potential for explosions, damage and injuries out there. I congratulate everyone for the prompt response and decision to ESP in critical incidents. I think that is our greatest protection along with the full implementation of the logic based safety systems that we have. Again, it is important to remind people that even though if we seem to be declining in recovery boiler explosions, which we certainly all strive for, thee is still a need to meet and work together.

7. TAPPI RECOVERY BOILER SUBCOMMITTEE REPORT – Karl Morency

CHAIRMAN: Next is on the agenda is the update on TAPPI. Karl has indicated there is nothing specific to be report at this point. TAPPI is having a meeting at the end of this month in Chicago.

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

The National Board Synopsis of Boiler and Pressure Vessel Laws, Rules and Regulations are now available in hard copy and compact disk. Future plans are to have this information available on the National Board Web site.

Agreement with ASME now authorizes the National Board to sell copies of out-of-print ASME Codes. Apparently the National Board library has one of the more complete collections of these out-of-print codes; specifically the Boiler and Pressure Vessel Code. The National Board will fill requests for information encompassing as little as single pages up to complete Codebooks. This activity is designed to assist repair organizations in obtaining specific codes of construction used in the original fabrication of an item to be repaired or altered. To request copies, contact our Technical Department and a staff engineer will retrieve the specific information, inform the inquirer of the cost, and transfer you to our Order Department for shipping details.

The Training Department has begun the use off electronic media for a home study course. There has been an overwhelming response to the Pre-commission Examination Course. More courses for the home study format are being planned; for example, a course on "Controls and Safety Devices for Automatically Fired Boilers" is being developed and is scheduled for release by January 2004. To keep current with training offerings, check the National Board website. If you wish to have specialized training, contact the Training department or speak with me and we will try to accommodate if it is within our sphere of knowledge.

The National Board Inspection Code (NBIC) update is as follows:

- NBIC 2003 Addendum was approved August 2003. It will be distributed in December 2003 and become mandatory on July 1, 2004.

- A complete rewrite of NBIC Part RB, Inspection Requirements has been accomplished and includes inspection information for various types of boilers including black liquor recovery boilers.

- A proposed revision to the present wording for black liquor recovery boilers is available for your comment. (Appendix B contains two draft versions: the original submitted by the National Board for inclusion with these minutes and a proposed revised draft prepared by Dave Parrish, FM Global.) Please send any comments to either cwithers@nationalboard.org before January 1, 2004 or Dave Parrish (david.parrish@fmglobal.com).

8. NATIONAL BOARD OF BOILER & PRESSURE VESSEL INSPECTORS' REPORT – (Cont.)

- NBIC Committee requests any feedback regarding industry needs for inspection and repairs or alterations to pressure equipment for inclusion in the NBIC (especially Yankee Dryers-Appendix K).

- NBIC is presently expanding repair methods to include other than welded repair such as mechanical type repairs.

9. WESTERN CANADA BLRBAC REPORT – Bob Norton

The spring meeting was held in Prince George on April 16th, 2003. There were 35 people in attendance for the meeting.

8 Incidents were reviewed,

Peace River, December 20, 2002
B&W, 1990, Contract No. 761401
Right wall tube #15 from the front wall. 18" below floor tubes at a butt weld. The boiler was ESP'd.
This leak was picked up by acoustic leak detection.
Root cause; lack of fusion, poor tube alignment, lack of weld material on inconel overlay tube at butt weld. Insufficient cut back of inconel overlay during weld preparation.

Canfor, April 2,2003
CE, 1966, CA-64127
5th hanger tube on the second platen of the primary superheater
Boiler tripped on high furnace pressure. Operators checked the boilers by opening doors with the sootblowers off and found steam noise at a door on the 7th floor. The boiler operators did not perform an ESP.
Root cause: appears crack started at the clip arrangement and propagated until the tube actually separated.

Canfor, April 4,2003
CE, 1966, CA-64127
On the sidewall below the floor on an attachment weld between the spout wall& attachment weld to the tube. This was behind the rear wall of the doghouse on the left wall rear spout. Had to cut a way in. the boiler was not ESP'd.
The operator making a round noticed water and steam bubbling out of small opening at the side of the doghouse external to the furnace and doghouse. A sample was taken and the phosphate and pH confirmed it was boiler water.
Root Cause: the stitch weld nearest the wall box had a very heavy weld buildup and carried over almost tying into the wall box. The crack developed in the weld between the wall box and center of the stitch weld.

WESTERN CANADA BLRBAC REPORT – (Cont.)

Grande prairie January 5,2003
CE, 1973,CA-70129
Sootblower #13 opening, left hand water wall, at about 242 elevation.
Sootblower mechanic was working in the area and thought he could hear a steam leak, he informed the operator, who investigated and confirmed the leak. The boiler was ESP'd.
Root cause pinhole leak due to porosity in old weld overlay

Campbell River, January 25,2003
B&W, 1963, Contract #5350
Severed tube at economizer inlet header. The boiler shutdown with no ESP.
Leak discovered by the fireman on a boiler walk-down.
Root cause, thermal stress
A total of 6 leaks in this unit between January 25th and April 10th.

Kamloops, November 9, 2002
CE, 1965, Contract # CA64103
Economizer tube leak, no ESP
Leak discovered by operator on walkdown
Root cause, stress assisted corrosion

Kamloops, December 24, 2002
CE, 1965, Contract # CA64103
Superheater tube leak, no ESP
Operator noted steam flow drop on control room panel
Root cause, overheating of the superheater

Technical Papers presented

- Aker Kvaerner, Chemical cleaning.
  - Using a reverse circulation method with nitrogen as the circulating agent. The method used is performed in a shorter schedule than the soak and rinse and post alkaline boil-out method, thereby saving valuable shutdown time.
- Alstom, Construction methods of generating bank tube removal
  - Using an automated tool for removal of the tubes
- Andritz, Recovery boiler air system upgrades
- Babcock and Wilcox, Enhancing Circulation Analysis
  - The heat absorption distribution in the furnace becomes an important design parameter in evaluating the circulation adequacy of the unit

The fall meeting will be held in Vancouver, B.C. on November 5th & 6th, 2003. The group will be celebrating the 40th anniversary of WCBLRBAC.

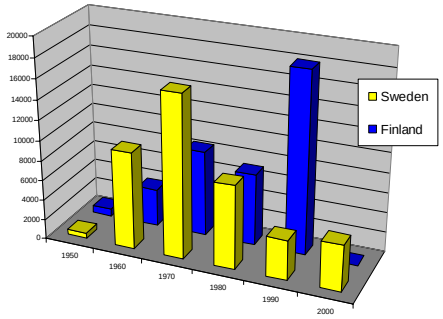
10. ACTIVITIES OUTSIDE NORTH AMERICA REPORTS

10.1 REPORT FROM FINLAND – Sebastian Kankkonen

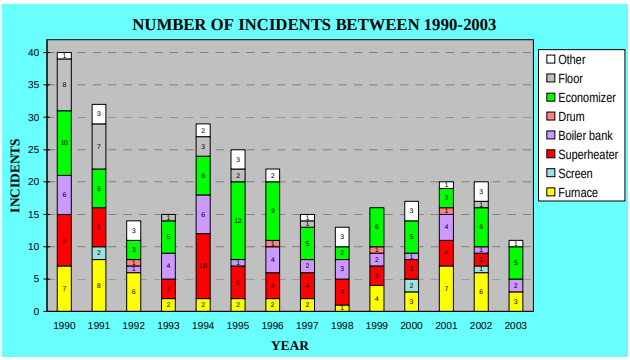
(Note: ***Appendix C*** contains the PowerPoint Slides Used During the Report)

I'm going to tell you about the Finish Recovery Boiler activities this year. We have 22 operating recovery boilers at 18 different mills. We have a total black liquor firing capacity of 84 million pounds per day and the average boiler size is 3.7 million pounds per day. I think only one boiler had studs and we don't have any direct contact evaporators any more. The average age of our black liquor recovery boilers is 19.1 years. Next year we will have a new boiler that will be the biggest operating boiler in the world. The average boiler age will drop by approximately 2 years.

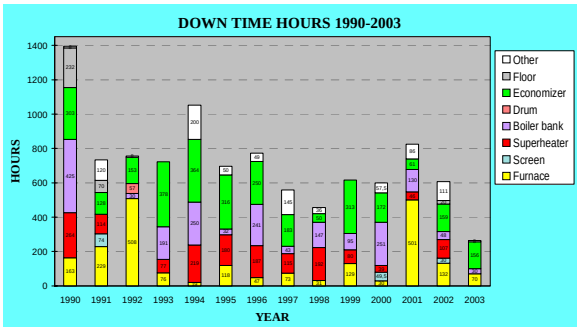
Here we see the capacity in Scandinavia. The yellow is Sweden. They built their boilers mainly in the '70's. In Finland we built a lot of new capacity in the '90's. We haven't built any boiler yet in the most recent years, but the average age of capacity in Finland and Sweden is almost the same.



Here we see the number of incidents during the last few years. This year we have mostly had economizer leaks -- six of them. Two leaks in the boiler bank; one other leak that I'm going to tell you some more about; and then three furnace incidents. One of them was a huge salt cake that a mill dropped in the bottom of the boiler. They have a lot of experience in doing that; therefore, they repaired it quite quickly this time. They were actually up there looking at it between the superheaters when it fell down. It was quite a thump!



Here we see downtime hours. I'm happy to say that the Finish mills have significantly decreased their service time in these incidents. Six economizer leaks and repair time is only 156 hours. Two boiler bank leaks were about 30 hours; so that's about 15 hours each. It's rare that restorations take more than 48 hours.



11. ACTIVITIES OUTSIDE NORTH AMERICA REPORTS – (Cont.)

11.1 REPORT FROM FINLAND – (Cont.)

Here we see some pictures. This one shows sootblower passage damage.

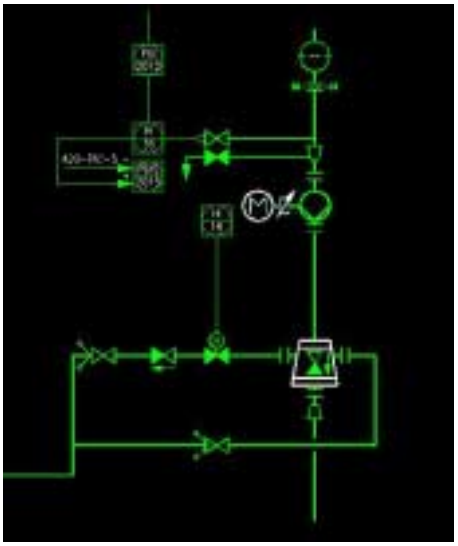
On this economizer we can see that leak on the pipe here. It's an old boiler that will be replaced next year.

This is a steam distribution tube that is corroded by washing water from the outside.

Here we have a leaking wall tube with corrosion from the outside as well.

12. ACTIVITIES OUTSIDE NORTH AMERICA REPORTS – (Cont.)

12.1 REPORT FROM FINLAND – (Cont.)



Here we have an interesting incident. This picture is not from the mill. It is a similar picture. One of these valves was leaking. They were planning to replace it. When they tried to detach the valve, the whole line broke down. This line is just a pump and a bypass line back to the feed water tank. This line was carbon steel and if the valve is leaking then the lines could corrode. So, our message was that this line when replaced should be of at least some degree of stainless steel. This would make it more corrosion resistant. I think it was ½ mm. This line had been 6.3 originally. This is not an old mill.

Our activities include a lot of research. We buy research from universities and consultants. One of the main research projects has been the release of sulfur compounds at the operating plants by analyzing the black liquor. We try to predict which sulphur containing gases are emitted and in which stages. We also have done a recommendation for safety logics and our biggest research topic is the future recovery boiler design – how to increase the power to heat ratio. We are dreaming of boilers with steam pressures of up to 160 bar (2300 psi) and 560 degrees C (1040 F). So we can match the steam values of modern power plants. Right now I think all our recovery boilers, except one, are operating at about 80 bar and 480 - 490 degrees Celsius. The next one will be started up at 495 degrees Celsius, 92 bar and it can be increased by 10 bar and 10 degrees C respectively.

A topic that was most recently finished is monitoring of the recovery boiler and operating procedures for leak situations. Each mill will have its own leaflet on how to respond when a leak is discovered in a recovery boiler.

Future Research: We will continue to look at the releases of sulfur compounds at the evaporation plant. We will make measurements of other types of black liquor. One topic that was recently started was carbon dioxide emissions; how to reduce them by mineral carbonization in the pulp and paper industry. This has just started and will be finished in 2006.

13. ACTIVITIES OUTSIDE NORTH AMERICA REPORTS – (Cont.)

13.1 REPORT FROM FINLAND – (Cont.)

Other future research will include the best practices of black liquor firing, taking count of what kind of black liquor guns are used along with operating temperatures, pressures, etc. Also, the reducing of risks in the recovery boilers, recovery boiler instrumentation (what can be measurements and what is the minimum acceptable instrumentation); and the reuse of recovery boiler ESP fly ash – What can you do with it? And what is the cost to dump it somewhere.

Coming Activities: Next week we have a recovery boiler day in Helsinki. We have the operator days in January. And then we have our 40 year anniversary conference scheduled for May 2004. It is my hope that some of you will attend. Tom Grant is packing his bags already. We will have ten technical sessions.

14. OPERATING PROBLEMS SESSION REPORT – Karl Morency

There was a large turnout Tuesday with good participation for an hour and a half. The following topics were discussed during the session.

1. **Only 37% of the 187 advance registrations are from Operating Companies. How many are actually from mills? If the number of mills attending is decreasing, is the Operating Problems session an appropriate use of time? Are there too many technical meetings competing for attendees?** A show of hands indicated that the majority of operating company attendees represented mills with the balance from corporate. It was noted that economic times have been tough and curtailment has been placed on travel. It is important to maintain BLRBAC through these lean times. This remains the best forum available for operators/operating companies to ask questions and seek input from peers. BLRBAC has a specific focus of recovery boiler safety and this remains a high priority at all mills. The curtailments on travel are having a more severe impact on other technical meetings. In comparison, BLRBAC attendance has remained relatively strong.

2. **One of the biggest reasons for downtime at one mill is cleaning the cascade wheel. Shutdown occurs every 10-12 weeks. What can be done to increase the run time?**
   The ten to twelve weeks this mill is experiencing appears to be quite good versus what other mills are experiencing. Another mill reported similar run times with about 64% solids. Controlling the residual active alkali content will help with viscosity control.
   Other mills reported operating at 65%, 68%, and 71% liquor solids with majority in the 67-68% range. One mill tried changing rotation, speed, liquor recirculation, and using additives in efforts to increase run times. They operate at 70% solids and gets 4-6 weeks. Lower solids make things worse.

11. OPERATING PROBLEMS SESSION REPORT – (Cont.)

3. **What methods are used for scenario training of tube leaks and dissolving tank emergencies? Does it include operators only or management personnel as well? What other emergencies are addressed?** Refer to the BLRBAC Personnel Safety document. There is some good advice and guidance in there. It is critical that operators know how to recognize when there is a leak in the boiler and initiate an ESP immediately. There was a recent incident report in which the operator failed to recognize that there had been a major tube rupture and spent nearly 45 minutes trying to restore water level in the drum. The result was a smelt water explosion.

   RBT2 offered by AF&PA and the training package offered by Delta have information on recognizing tube leaks. AF&PA also offers Operational Safety Seminars three times a year that provide scenario training based on actual incidents. This is an excellent format that allows operators to interact with representatives from other mills and exchange information and ideas related to recognizing and reacting to tube leaks and dissolving tank emergencies.

   Another important aspect of operator training is to insure that they understand the capabilities and limitations of leak detection systems. There were 12 incidents reported on today where leak detection systems were present. Although there were some systems that were not in service at the time, only two leaks were detected by the systems. Leak detection system vendors need to review these incidents where leak was not detected to determine why. It is important that the systems are properly installed and maintained if the operators are going to rely on them.

4. **Do DCS system graphics provide data in a format that allows operators to recognize leaks or are they "cloaking" the information making leak detection more difficult? Were the analog control systems more effective in presenting information in a format that the operators could understand?** One mill is configuring their DCS to present trend indications similar to the old style analog display. Mills should review their current displays to determine if they provide information in a format that allows operators to recognize that they have a problem.

5. **Green liquor density control. What systems work well?** One mill was having agitator problems. After increasing agitator speed, a side affect was much better control of density. They were having insufficient agitation, but didn't know it. DP cells on tank (flushed to prevent plugging) with temperature compensation works well provided tank mixing is maintained and adequate.

6. **What has been the operating life of the diaphragms on Rosemont liquor gun pressure transmitters?** Three mills have them. Run 3 or 4 years at 28% sulfidity with 316 stainless.. One mill getting 6-9 months at 32% sulfidity using Inconel. One mill at higher sulfidity is getting 3-6 months with stainless transmitters.

11. OPERATING PROBLEMS SESSION REPORT – (Cont.)

7. **What methods have been successful in drying tangent tube boilers following water-wash to prevent cold side corrosion?** (Tangent tube boilers have no seal between tubes in the upper furnace.) Six attendees' reported having this design.

   Several air dry with ambient air. Some dry for 4-6 hours using heated air from a 140 psi air heater. Water in boiler improved drying time. Neither have had problems with cold side corrosion but it is important to check for this. There is one report that firing the boiler on auxiliary fuel to dry it out after water washing reduces the drying time but the corrosion rate during drying is greater due to the higher temperature. Regardless of boiler type, attendees 2:1 do some kind of drying following waterwash.

8. **How many mills use liquor guns to wash lower furnace?** About half. How many have an interlock key switch? 50% have either a key or logic in the DCS. The other 50% use some form of jumper. The Safe Firing of Black Liquor Committee is in the process of developing logic to incorporate an interlock key switch in the recommended logic. Interlock switches include liquor gun doors and refractometers. The committee requested that logic examples be sent to them to help develop some generic logic.

9. **Is liquor viscosity a limitation to burning at higher solids?** No response.
   Noted that everyone wants to operate at higher solids. Higher solids will result in higher viscosity.

10. **What is the experience using dry spouts? How often are they being changed? Is an update on recent operating experience available?** One mill has been running for 5 years with dry spouts. Extensive R&D was done to get the right metallurgy. Initially they had very short life. Shields were added on the underside to prevent green liquor from splashing on the bottom of the spout. The temperature of the spout has to be below 150 F before washing out the doghouse. The longest operating interval to date has been 9 months. They will not go back to water-cooled spouts. In most cases the spouts just wear out, but some times there is cracking.

    Third generation spouts are now commercial. Chemistry control and spout geometry have been key development areas. Additional development is being done with geometry at the smelt belt line. One mill has 23 months of operation. Spouts were completely used up by this point. The next generation of spouts is expected to last 24 months. Freezing of smelt on the spout is more of a problem at start-up than with water-cooled spouts. In operation, the spout operates at or near smelt temperature. The supplier remains committed to their development and believes that improved safety and the potential for lower operating costs will continue to create a demand.

11. OPERATING PROBLEMS SESSION REPORT – (Cont.)

11. **How many mills are using restrictor plates to limit smelt flow after opening plugged spouts?** Limited response. Operator safety has been the major concern with regard to using restrictor plates. A remote operated smelt restrictor device has been prototyped. The restrictor plate is on a swing arm that is released from the level above.
Restrictor has to be put in immediately when trickle begins following opening of a spout. Once flow is heavy, there is no opportunity to put restrictor in place because of concerns about operator safety.

12. **A mill with a 1983 vintage C-E boiler currently using flat spray nozzles is considering going back to the original conical spray nozzle design. They asked whether any mills are currently using the conical design.** There was no response.
Three or four mills with C-E boilers reported that they are using B&W wedge nozzles.

13. **Use of oil as start-up fuel. Is there a reliability program that has been successful?** A significant number of mills reported that they used fuel oil, but none reported that they had what they considered to be reliable burners.

14. **Are there alternatives to keeping doghouses clean besides shutting down and washing?** Mills with mini-hoods advised that they don't have this problem.

15. **Iron sulfide deposit on tubes in the lower furnace can be extremely hard and is very difficult to detect because it is similar in appearance to the tube metal. UT readings will include the thickness of the scale resulting in a false tube thickness measurement (the reading is higher than actual).** One mill had a 1/8-inch layer that was included in the tube thickness readings. The stud contractor detected the scale and reported it to mill personnel. (A presentation on this subject was given at the technical session on Wednesday.)

16. **What has been the experience using ceramic tile to protect floor tubes in decanting hearth recovery boilers?** The purpose of the tiles is to protect the floor tubes from exposure to flowing molten smelt that can result in overheat failures. There has been mixed success with the original pre-cast tiles. It is difficult to check on the condition of the tiles because after shutdown they are under frozen smelt. Some mills have reported the tiles to be gone after one year while others have reported that the tiles have held up for 2-3 years. (A presentation on this subject was given at the technical session on Wednesday.)

17. **What type of device are mills using for off-line solids measurement?**
Moisture Balances -25
Bench top refractometers – 3
Microwaves – 4

18. **What has been the experience regarding the difference between refractometer solids readings and off-line methods at high solids?** One mill reported several percentage differences.

11. OPERATING PROBLEMS SESSION REPORT – (Cont.)

19. **How many have back-up dissolving tank agitation?**
More than 20 mills have a back-up method for dissolving tank agitation. (Most use steam.) No one reported using recirculation. Caution was expressed about extended use of steam because of reduced agitation and the potential for the tank to fill with solids which can result in safety issues. One mill reported that they monitor temperature when agitating with steam.

20. **Experience using magnetic devices to prevent scaling in liquor lines.** One mill has had two years of success with magnets. They used to need high-pressure wash, but now can remove the buildup with a hose. Another mill used a "scale watcher unit" for 6 years and reduced scale washing time from 30 to 4 hours. Another mill advised that they had little or no success with it. It is often difficult to asses the effectiveness of the magnetic devices because of other operational changes that have been made to address scaling problems.

CHAIRMAN'S CLOSING COMMENTS:

TIME & PLACE OF NEXT MEETING: The next meeting will be held on April 5, 6 & 7, 2004, at the Crowne Plaza Hotel/Atlanta Airport, in Atlanta, Georgia.

ADJOURNMENT:

CHAIRMAN: I'd like to adjourn the meeting. Again, the Technical Presentations will start up at 10:00 a.m. Everyone have a safe trip home!

TECHNICAL SESSION:

"Hidden Risks of Sulphidation of Furnace Tubes & a Field Proven Way to Avoid It"
presented by Marcio Gerep of Sage Industrial

"Enhancing Recovery Boiler Floor Tube Protection with SmeltGuard (superscript: TM) Tiles"
presented by Mark Lebel of Alstom Power

2003 October - 1	**Critical Incident No. 575**
Location:	**Georgia-Pacific Corporation, Monticello, Mississippi**
Unit:	No. 2 Recovery Boiler. CE Contract No. 16065-20765. Startup 1966.
Size:	2.4 million ppd solids. Steam flow 402,000 lb/hr. Operating @ 875 psig & 825F. Design @ 1035 psig. 2 drum boiler/cascade evaporator
Incident Date:	March 20, 2003
Leak/Incident Loc:	**Economizer –** Initial pinhole leak propagated into a catastrophic rupture 12.5 in. in length and 2.7 in. in width. Leak was in 3rd row from the back (row next to sootblower cavity), 3rd tube from the left sidewall, and 87 in. below the top economizer header (approx half way between two sootblower elevations). Failure occurred at vertical weld of front fin to the tube. Initial leak where tube thinned appeared to have thinned and rapidly corroded a 2nd area until tube burst. Water did make it into furnace area.
Downtime hrs due to leak/total:	Total downtime 102 hours
ESP?	ESP was performed. Current irrevocable policy is to not enter recovery area for 6 hours.
Classification:	**Critical Incident**
How discovered:	Boiler tripped on high furnace pressure.
Leak detection:	Ondeo Nalco Trasar/Mass Balance system did not detect the initial leak as it was too small before the catastrophic failure..
Sequence of events:	After boiler trip, First Tender went to remove liquor guns from the furnace and heard loud booming noises in the furnace and saw liquor blowing out of the gun ports. Guns not removed, and 1st Tender returned to control room to verify ID fan running and liquor diverted. First Tender & Utilities Supervisor went to operating floor; booming had changed to a loud roaring sound. Supervisor called control room for Operator to ESP the unit.
Bed cooling:	No
Wash adjacent tube:	Adjacent tubes were washed.
Repair procedure:	Three tubes removed and plugged at top and bottom headers.
Root cause:	Localized corrosion at the tube-to-fin weld interface. Good thickness 2 ft. above & below failure. Cause of localized thinning not reported.
Future prevention:	Detailed inspection of economizer section during next major outage.
Last full inspection:	Last NDT inspection March 2003. Chemically cleaned in Nov. 1995 with Hydrochloric Acid

2003 October – 2	
Location:	**Weyerhaeuser, Johnsonburg Mill, Pennsylvania**
Unit:	Tampella Contract No. 90132. Startup 1993.
Size:	2.2 million ppd solids. Operating at 1250 psig & 900F. Design at 1600 psig. Single drum/large economizer
Incident Date:	May 30, 2003
Leak/Incident Loc:	**Economizer** – Two cracks in welds between tubes and extruded lower header. Tube 1 in Platen 33 at 7 0'clock and Tube 5 in Platen15 at 6 o'clock position on the low side of sloped section of tube entering the header at feedwater inlet to economizer (No. 1 economizer)
Downtime hrs due to leak/total:	Total downtime – 26 hours
ESP?	No ESP
Classification:	**Non-critical Incident**
How discovered:	During a routine walkdown, operator noticed moisture in the ash conveyor
Leak detection:	None installed
Sequence of events:	Operator noticing the water suspected an economizer leak as there had been several leaks over the past 3 years. Liquor was pulled and an orderly shutdown taken. Internal inspection identified the leaks in the welds, which were ground out and repaired.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Leak ground out and overlay welded.
Root cause:	Corrosion fatigue cracking had been determined by lab results from previous similar leaks
Future prevention:	Undergoing replacement of No. 1 economizer inlet headers during annual outages.
Last full inspection:	Last NDT inspection May 2003. Acid cleaned in 1993.

2003 October – 3	
Location:	**MeadWestvaco, Mahrt Mill, Phenix City, Alabama**
Unit:	No. 2 Recovery Boiler. Tampella Contract No. 337. Startup 1990.
Size:	3.5 million ppd solids. Steam Flow-561,000 lb/hr. Operating @ 890 psig & 790F. Design @ 1100 psig. Single drum boiler/large economizer
Incident Date:	March 5, 2003
Leak/Incident Loc:	**Economizer –** ¼ in. crack at termination of square-cut fin on Tube No. 8 in front bank (tube next to front side of sootblower cavity, 23rd element from left wall. 1.5 in. below roof.
Downtime hrs due to leak/total:	Total downtime – 49.5 hours/46.5 hours due to leak.
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	Leak discovered while opening doors. Boiler was being inspected during a chill and blow after bed was burned out.
Leak detection:	No leak detection system.
Sequence of events:	During outage inspection for plugging or tube leaks, water was observed through an open door to be spraying from the hot economizer toward the baffle at the rear of the generating tubes. There had been a slight increase in feedwater/steam differential during week prior to leak discovery. No change in boiler water solids. No unusual noises and no moisture in ash conveyors. Boiler walkdowns are every two hours; IKs are shut off once a day during a walkdown
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Tube removed by cutting near headers and plugging at the headers. Procedure to plug tubes is to cut window in top of header, weld in plug through the widow, & restore header integrity. Mill has removed one row of tubes at cavity to provide access for inspection of stitch welds on vibration restraints.
Root cause:	Mechanical stress resulting from original design when ash hopper was supported by the economizer tubes. Also, unintended load placed on tubes when a casing joint was not sufficiently flexible. 40 leaks in front bank (Economizer II) since startup; 7 in the last 4 years.
Future prevention:	Support had been modified earlier.
Last full inspection:	Last NDT inspection September 2002. Chemically cleaned with inhibited HCl in 1990 when started up.

2003 October – 4	
Location:	**MeadWestvaco, Mahrt Mill, Phenix City, Alabama**
Unit:	No. 2 Recovery Boiler. Tampella Contract No. 337. Startup 1990.
Size:	3.5 million ppd solids. Steam Flow-561,000 lb/hr. Operating @ 890 psig & 790F. Design @ 1100 psig. Single drum boiler/large economizer
Incident Date:	May 13, 2003
Leak/Incident Loc:	**Economizer –** ¼ in. circumferential crack at termination of square-cut fin 1.5 in. below roof in Economizer II. First tube next to rear side of sootblower cavity, 22nd element from right wall.
Downtime hrs due to leak/total:	Total downtime – 48.3 hours
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	Leak discovered while opening doors. Boiler was being inspected prior to a water wash after bed was burned out. Pluggage requiring a water wash was in primary superheater section.
Leak detection:	No leak detection system.
Sequence of events:	During outage inspection for plugging or tube leaks, water was observed through an open door to be spraying from the hot economizer toward the cold economizer (Economizer I). No change in boiler water solids. No unusual noises and no moisture in ash conveyors. Boiler walkdowns are every two hours; IKs are shut off once a day during a walkdown
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Tube removed by cutting near headers and plugging at the headers. Procedure to plug tubes is to cut window in top of header, weld in plug through the widow, & restore header integrity. Mill has removed one row of tubes at cavity to provide access for inspection of stitch welds on vibration restraints.
Root cause:	Mechanical stress resulting from original design when ash hopper was supported by the economizer tubes. Also, unintended load placed on tubes when a casing joint was not sufficiently flexible. 41 leaks in front bank (Economizer II) since startup; 8 in the last 4 years.
Future prevention:	Support had been modified earlier.
Last full inspection:	Last NDT inspection September 2002. Chemically cleaned with inhibited HCl in 1990 when started up.

2003 October- 5	
Location:	**MeadWestvaco, Mahrt Mill, Phenix City, Alabama**
Unit:	No. 2 Recovery Boiler. Tampella Contract No. 337. Startup 1990.
Size:	3.5 million ppd solids. Steam Flow-561,000 lb/hr. Operating @ 890 psig & 790F. Design @ 1100 psig. Single drum boiler/large economizer
Incident Date:	JULY 23, 2003
Leak/Incident Loc:	**Economizer -** ¼ in. circumferential crack at fin 1.5 in. below roof in Economizer II. Tube No. 8 is first tube next to front side of sootblower cavity, 22nd element from right wall.
Downtime hrs due to leak/total:	Total downtime – 38.1 hours
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	Boiler was being inspected after the boiler tripped due to a loss of instrument air
Leak detection:	No leak detection system.
Sequence of events:	During outage inspection, water was observed through an open door to be spraying from the hot economizer (Economizer II) toward the cold economizer (Economizer I). No unusual noises and no moisture in ash conveyors during boiler walkdowns preceding incident. Boiler walkdowns are every two hours; IKs are shut off once a day during a walkdown
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Tube removed by cutting near headers and plugging at the headers. Procedure to plug tubes is to cut window in top of header, weld in plug through the widow, & restore header integrity. Mill has removed one row of tubes at cavity to provide access for inspection of stitch welds on vibration restraints.
Root cause:	Mechanical stress resulting from original design when ash hopper was supported by the economizer tubes and unintended load placed on tubes when a casing joint was not sufficiently flexible. Also, vibration of tubes due to failed stitch weld at fins. 42 leaks in front bank (Economizer II) since startup; 9 in the last 4 years.
Future prevention:	Support had been modified earlier for support by the sidewall casing. Plant considering removing a row of economizer tubes to provide access for repair of stitch welds and tube repairs.
Last full inspection:	Last NDT inspection September 2002. Chemically cleaned - inhibited HCl in 1990 when started up.

2003 October - 6	**Critical Incident No. 576**
Location:	**International Paper, Prattville, Alabama**
Unit:	Recovery Boiler No. 2. CE Contract 20278. Startup 1980.
Size:	3.2 million ppd solids. Steam flow 457,000 lb/hr. Operation @ 1450 psig and 900F. Design at 1500 psig. 2 drum / large economizer
Incident Date:	March 17, 2003
Leak/Incident Loc:	**Economizer –** 5 in. long thin lip failure in 2nd tube from right wall of the front economizer bank and 2nd row to the rear in the uppermost sootblower position.
Downtime hrs due to leak/total:	Downtime due to leak- 24 hours/ downtime total 81 hrs 50 min.
ESP?	ESP was performed. Current irrevocable policy is to stay out of recovery area for 24 hours. Minimal water in tubes after ESP
Classification:	**Critical Incident – possibility that water from leak could enter the furnace**
How discovered:	High furnace pressure trip.
Leak detection:	Hercules Leak Trak detection system in operation did not detect nor confirm leak. Boiler on-line for only a short time (~ 16 hours) & insufficient data gathered for system to determine a leak.
Sequence of events:	Boiler placed on-line following an annual outage and everything normal. Approx 12 hours after liquor firing began, there were numerous alarms – liquor had been diverted, drum level dropping drastically, feedwater flow off top of chart, and high furnace pressure. ESP initiated ~ 1 minute after alarms.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	UT measurement of tubes forming sootblower pass determined need to plug 21 additional thinned tubes.
Root cause:	Localized thinning of tube in sootblower pass (erosion/corrosion) caused by condensate in lance, improper poppet valve pressure or faulty steam traps.
Future prevention:	Find a way to UT very tight spacing of sootblower cavity tubing. There is no access from sootblower cavity. Increase sootblower maintenance.
Last full inspection:	Inspected March 10, 2003. Chemically cleaned March 2002

2003 October– 7	
Location:	**Norske Canada, Crofton, British Columbia**
Unit:	No. 4 Recovery Boiler. ABB Contract CA-88105. Startup 1991.
Size:	4.0 million ppd solids. Steam flow 587,000 lb/hr. Operating @ 600 psig & 750F. MAWP @ 800 psig. Single drum / large economizer
Incident Date:	May 26, 2003
Leak/Incident Loc:	**Economizer –** 1/16 inch pinhole at butt weld approximately 24 inch above bottom header of last section of economizer (feedwater inlet). Tube 17 from left hand side in 3rd row of 5 row module. Weld had been made 3 weeks earlier when a section of tube had been installed.
Downtime hrs due to leak/total:	
ESP?	None
Classification:	**Non-critical Incident**
How discovered:	Water observed in ash hopper conveyor
Leak detection:	Nalco RBLI system in operation did not detect leak.
Sequence of events:	Unit on-line at ~ 450,000lb/hr steam flow when water was observed and shutdown
Bed cooling:	No enhancement
Wash adjacent tube:	No
Repair procedure:	Installed 8 inch 'pup' (Dutchman)
Root cause:	Defect in butt weld made in April 2003 when a 26" stub had been installed because of some metal loss of tube wall. X-ray review post-leak showed no indication of defect that would have resulted in weld rejection
Future prevention:	
Last full inspection:	Last inspection April 2003. Acid cleaned in 1996.

2003 October – 8	
Location:	**International Paper, Androscoggin Mill, Jay, Maine**
Unit:	No. 1 Recovery Boiler. CE Contract DE-193. Startup 1965. Kvaerner revamp 1985.
Size:	1.8 million ppd solids. Steam flow 296,000 lb/hr. Operating @ 900 psig & 825F. 2 drum/ large economizer
Incident Date:	June 26, 2003
Leak/Incident Loc:	**Economizer –** 180º crack in upper tube to header weld resulted in "door-like" 2" by 8" rupture of adjacent tube. A total of 7 tubes were gouged or washed by water spraying out of crack. Economizer was added in an extended flue during 1985 revamp.
Downtime hrs due to leak/total:	Total downtime 142 hours
ESP?	Boiler was ESPd –current irrevocable policy is that people stay out of recovery area for 4 hours
Classification:	**Non-critical Incident (Economizer installed 1985 located downstream of existing, small economizer and connecting flue arrangement precluded water entering the furnace**
How discovered:	Drum level could not be maintained after tube ruptured.
Leak detection:	None installed.
Sequence of events:	Boiler tripped on low drum level when feedwater valve could not maintain water level. Shift manager noted differential between steam and feedwater flows and initiated ESP 3 minutes after initial observation of problem. Hydro test revealed 3 leaks at superheater lugs at top of bends and a furnace sidewall leak; these are believed to have resulted from the ESP.
Bed cooling:	Bed cooled with CO2 sparger applied to bed in multiple locations estimated to have saved 16 hours of downtime.
Wash adjacent tube:	Yes
Repair procedure:	Eight tubes total were plugged. Three required stubs to be added because gouge was to close to header.
Root cause:	Undetermined
Future prevention:	Carried out spot check of tube to header welds in surrounding area and at lower header. No cracks found. Additional testing during annual outage.
Last full inspection:	Last inspection April 2003. Acid washed May 2001 using HCl and Thiourea stage.

2003 October – 9	
Location:	**Kimberley-Clark Inc., Terrace Bay, Ontario**
Unit:	CE Contract. Startup 1978. Revamp 1980.
Size:	2.4 million ppd solids. Steam flow 370,000 lb/hr. Operating @ 900 psig & 850F. Design @ 1025 Psig. 2 drum boiler / large economizer.
Incident Date:	January 6, 2003
Leak/Incident Loc:	**Economizer –** initial factory seal weld of tube to lower header cracked and escaping water washed adjacent tube causing a 2" fish mouth rupture. Crack in 1st row at economizer gas inlet, 20 tubes in from left side. Economizer has 8 rows into header.
Downtime hrs due to leak/total:	Total downtime 52 hours
ESP?	ESP was performed. Current irrevocable policy is to stay out of recovery area 24 hours.
Classification:	**Non-critical Incident**
How discovered:	Boiler pressurized and a loud roar heard
Leak detection:	None installed
Sequence of events:	All conditions were normal when at 0225 hours, boiler went positive and a loud roar was heard. Shift Engineer evaluated the situation and determined the leak was in the economizer. Before Shift Engineer could radio the control room, Operator initiated ESP because of concern that the Shift Engineer was in the vicinity when the leak occurred.
Bed cooling:	No
Wash adjacent tube:	Yes
Repair procedure:	Ruptured tube was removed and plugged at upper and lower headers. Crack at header was 'gouged' and welded
Root cause:	Failure of factory weld.
Future prevention:	Lower header inspected by NDT company and no other sites were found to be suspect.
Last full inspection:	Last inspection September 2002. Boiler acid cleaned in 1991.

ESP Subcommittee Notes:

- The root cause may have been fatigue or stress assisted corrosion failure at this location.
- The Operator has the authority to initiate an ESP and, based on information available to the Subcommittee, his decision to ESP appears to be sound judgment.

2003 October – 10	
Location:	**International Paper, Texarkana, Texas**
Unit:	B&W Contract PR-186. Startup 1976
Size:	4.55 million ppd solids. Steam flow 763,000 lb/hr. Operating @ 1050 psig & 813 F. Design @ 1200 psig. 2 drum / large economizer
Incident Date:	August 21, 2003
Leak/Incident Loc:	**Economizer –** Pin hole in hand hole cap weld located in lower header of center module
Downtime hrs due to leak/total:	Total downtime 31 hours.
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	The primary economizer rotary ash valve shut down and investigating operator observed water in the economizer hoppers
Leak detection:	None installed
Sequence of events:	Upon discovery of the water in the hoppers, liquor was removed and the bed burned out. After the boiler was cooled, the leak was identified and boiler then drained
Bed cooling:	Not applicable
Wash adjacent tube:	No
Repair procedure:	Gouge old cap weld. Repair seat & weld in a new cap.
Root cause:	Hole likely due to slag inclusion.
Future prevention:	Not applicable
Last full inspection:	Last inspection April 2003. Chemically cleaned in 1996 with HCl.

2003 October – 11	
Location:	**International Paper, Natchez, Mississippi**
Unit:	No. 7 Recovery Boiler. CE Contract 21073. Startup 1974. CE Revamp Contract No. 50089 in 1990
Size:	3.4 million ppd solids. Steam flow 535,000 lb/hr. Operating @ 1250 psig & 900F. Design at 1410 psig. 2 drum / large economizer
Incident Date:	March 20, 2003
Leak/Incident Loc:	**Superheater –** ¼ inch hole in primary superheater tube due to thinning.
Downtime hrs due to leak/total:	
ESP?	ESP was initiated. Current irrevocable policy is to stay out of recovery area 4 hours
Classification:	**Non-critical Incident**
How discovered:	Operator heard leak during equipment Basic Equipment Care Walkdown with sootblowers disabled. .
Leak detection:	The steam/feedwater ratio leak detection system did not detect the leak as it was too small.
Sequence of events:	Operator noticed a roaring noise and vapor was observed coming out of a casing hole on front side of mud drum. Believing it to be a SH leak, but in close proximity to water tubes, decision was made to ESP. Prior to walkdown, the bed had appeared cooler than normal based on poor smelt flow and high char content in the smelt flow from the spouts. After shutdown, it was determined that this was the result of a primary air flow controller failure.
Bed cooling:	None used
Wash adjacent tube:	No
Repair procedure:	Hole was weld repaired and thinned area was overlaid. Both fell within IP Guidelines for weld repair.
Root cause:	Sootblower rubbing the tube. 29 year old SH experiencing creep that causes misalignment of platen and interference with sootblower operation. Similar failure occurred previously on another tube from opposite sootblower.
Future prevention:	Sootblower removed from service. (Boiler has since been removed from service.)
Last full inspection:	Last inspection September 2002. Chemically cleaned at same outage with acid/Rodine Inhibitor

2003 October – 12	
Location:	**Inland Paperboard & Packaging, Inc., Rome, GA**
Unit:	No. 4 Recovery Boiler. CE Contract in 1967. Tampella revamp in 1992.
Size:	1.5 million ppd solids. Steam flow 249,528 lb/hr. Operating at 850 psig & 825F. Design @ 985 psig. 2 drum / large economizer
Incident Date:	April 17, 2003
Leak/Incident Loc:	**Superheater –** 4 SH leaks. Primary II SH, 9th platen from north – outer loop crack in bottom of loop & inner loop attachment weld. Sec SH Section- cracks in bottom of outer loops of 1st and 3rd platens from south.
Downtime hrs due to leak/total:	Total downtime 62 hours & 20 min.
ESP?	None
Classification:	**Non-critical Incident**
How discovered:	Operator heard tube leak while boiler off liquor and opening door to inspect for pluggage.
Leak detection:	Nalco Trasar System was in operation but did not detect nor confirm leak.
Sequence of events:	At time of leak being heard, there was no steam/feedwater flow deviation, drum level was maintained and no water entering the furnace. Boiler had been on oil for 24 hours while green liquor lines were hydroblasted. Liquor firing had just started with 2 of 4 guns in furnace and then terminated because of lime kiln problems. On hearing the leak, it was determined no water was entering the furnace and the boiler was shutdown in normal manner and minimal bed did not require to be burned out.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	All loops removed and replaced
Root cause:	No report.
Future prevention:	Boiler reportedly out of service
Last full inspection:	Last inspection October 2002. Chemically acid cleaned in 2001

2003 October – 13	**Critical Incident No. 577**
Location:	**Domtar, Ashdown, Arkansas**
Unit:	CE Contract No. 27477. Startup 1979. B&W Revamp in 1989.
Size:	4.2 million ppd solids. Steam flow 560,000 lb/hr. Operating @ 850 psig & 850F. Design @ 1075 psig. 2 drum / large economizer
Incident Date:	April 5, 2003
Leak/Incident Loc:	**Superheater –** SH tube sheared completely approximately 1 inch below weld at high crown seal in penthouse.
Downtime hrs due to leak/total:	Total downtime 83 hours
ESP?	ESP performed. Current irrevocable policy is to stay out of recovery area 6 hours
Classification:	**Critical Incident - Smelt water reaction during water wash. No discernable damage. Explosion occurred approx 34 hours after ESP and 10 hours & 22 minutes after start of cooling with bicarbonate.**
How discovered:	Leak detection system and walk downs
Leak detection:	Alert Systems Recovery Boiler Advisor was in service and alarmed the leak
Sequence of events:	April 5 – 2123 Boiler bank differential pressure alarmed 2144 DCS feedwater/steam diff alarmed; 100,000 lb/hr difference. ID fan speed increasing 2145 Operator walkdown commenced with sootblowers stopped 2147 Leak heard at 6th floor (steam drum is on 10th floor) 2157 Boiler ESPd with all personnel in control room April 6 2200 Started cooling bed with bicarbonate April 7 0130 Last smelt pool found 0330 Last pile of burning char found 0630 Probed bed. Temperature in 500F range. Floor TCs in 400-550F range. Tubes dry. 0655 Bed visually inspected. No signs heat. Cooled bed pulled from wall 2-3”. Boiler evacuated & ESP lights turned on per SOP for start of water washing. 0700 Started water wash in economizer. 4 IKs at once (500 to 600 gpm) 0720 Started washing back of generating bank 0745 First IK blown in SH 0800 IKs at bottom SH blown. ESP lights off. Floor wet. Slowly filling boiler for hydro 0822 Helper went to open SH vents & check drains. Heard 2 quick explosions. Char & sparks came out of gun doors Operator shutdown IK wash pump and pushed ESP buttons. Explosion sprayed a 2nd man with green liquor and char; minor chemical burns. Area cleared for 6 hours with rapid drain valves open 1430 Inspected boiler. No damage found. Depression in left corner. Looked like a 1 to 2 ft hot spot (small, localized area) had reacted with water.
Bed Cooling:	Used sodium bicarbonate with 47 220 cu. ft. nitrogen cylinders.
Wash adjacent tube:	No
Repair procedure:	Installed dutchman
Root cause:	Fatigue crack about 1 inch below support weld to high crown seal. Tube had been x-ray inspected October 2002 and no indications of a problem with weld to tube was found. This was the third similar failure in the past 8 months. Sixteen of thirty-one tubes have new dutchmen installed.
Future prevention:	Remaining tubes will have new dutchman installed. Also, SOP revisions: Will use floor tube temperatures and thermal imaging camera to identify hot spots. Hand probing with thermocouple will be used to probe identified hot areas. CO_2 will be used to selectively extinguish hot spots and break up surface of bed. Boiler will be evacuated for two hours while washing superheater section.
Last full inspection:	Last complete inspection September 2001. Acid cleaned 1998

2003 October – 14	
Location:	**Interstate Paper, Riceboro, Georgia**
Unit:	B&W Contract PR-99. Startup 1968
Size:	1.4 million ppd solids. Steam flow 219,000 lb/hr. Operation @ 725 psig & 750F. Design @ 750 psig. 2 drum/small economizer/scrubber (no DCE)
Incident Date:	July 3, 2003
Leak/Incident Loc:	**Superheater** – failure (crack) at side-to-side "D" link tie in primary superheater installed with original boiler.
Downtime hrs due to leak/total:	Total downtime 35 hours off liquor, 30 hours off steam
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	Operator check at SH level in preparation for a chill and blow heard steam noise upon opening doors
Leak detection:	Trasar leak detection system installed, but not fully operational
Sequence of events:	Boiler was shut down to repair FD fan bearing & damper controller. Decision made to perform chill and blow, and operating crew opened doors to identify areas for concentrated blowing. Leak heard at Primary SH area. With IKs valved out, as well as other noises, visually identified location. Continued with chill & blow to clean surfaces for repair. Repaired fan used to cool boiler
Bed cooling:	Tried CO_2 lance to cool bed but could not get gas from cylinder
Wash adjacent tube:	No
Repair procedure:	SH tube crack repaired by grinding out and rewelding with a TIG root pass & 9018 electrode for capping. Reattached "D" link above repair with 9018 electrode. Post hydro.
Root cause:	Old welding technology for weld of Inconel Link to SA-178A tube.
Future prevention:	Used updated attachment weld procedure.
Last full inspection:	Last inspection 2002. Last chemical cleaning 1981.

2003 October – 15	
Location:	**MeadWestvaco, Mahrt Mill, Phenix City, Alabama**
Unit:	No. 1 Recovery Boiler, B&W Contract PR-97, Startup 1966. Andritz revamp 1997.
Size:	2.7 million ppd solids. Steam flow 440,000 lb/hr. Operation @ 880 psig & 790F. Design @ 1000 psig. 2 drum/ large economizer
Incident Date:	July 30, 2003
Leak/Incident Loc:	**Superheater –** fish mouth rupture ~ 65' above floor in lower bend of primary outlet tubes in 7th element from wall, 2nd tube. Tube TC showed high temperature ~ 5 hours before increase in fan speed observed with no change in steam flow.
Downtime hrs due to leak/total:	Total downtime 59.3 hours
ESP?	None performed
Classification:	**Non-critical incident**
How discovered:	Sudden increase in ID fan speed followed by 40,000 lb/hr decrease in steam flow, followed by separation of steam and feedwater flows
Leak detection:	None installed
Sequence of events:	Operator put sootblowers on hold and there was no significant change in steam flow. Control tech entered control room and reported a steady noise at liquor gun openings like a stuck sootblower. There seemed to be nothing unusual. Lights & siren activated to clear building of contractors. The shift supervisor and tech asst entered boiler house to identify leak. Primary superheater elements observed to be swinging. Liquor flow decreased in steps until oil burner installed to burn out the bed. Tube with fishmouth failure could be seen from front observation door.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Tubes cut in the penthouse and capped at the headers.
Root cause:	Overheating due to crack at tongue and groove tie
Future prevention:	A 5 year program started in 2002 to replace the entire superheater. Similar problem occurred twice in 2002.
Last full inspection:	Inspected June 2003. Acid cleaned 1997 with inhibited HCl.

ESP Subcommittee questions that the flow through the crack at a lug could cause a flow decrease through the tube sufficient to cause overheating

2003 October – 16	
Location:	**International Paper, Riegelwood, North Carolina**
Unit:	Plant Unit No.5, CE Contract No. 20980. Start up 1982.
Size:	5.52 million ppd solids. Steam flow 900,000 lb/hr. Operating @ 850 psig & 820F. 2 drum / large economizer
Incident Date:	July 1, 2003
Leak/Incident Loc:	**Generating Bank –** Mud Drum blowdown line on west side sheared at first butt weld external to the boiler setting.
Downtime hrs due to leak/total:	Downtime for repairs – 17 hours. Total downtime liquor to liquor – 26 hours
ESP?	ESP was initiated.
Classification:	**Non-critical Incident-leak external to boiler proper**
How discovered:	Control room operator noted FW valve opening and steam flow dropping.
Leak detection:	
Sequence of events:	At 1245 hrs, Operator noticed FW valve opening in response to drum level demand. Steam Flow began to drop. Fireman directed to check and saw water coming down side of boiler external to furnace. Going to the 7th floor, saw steam/water blowing out at bottom of mud drum between boiler and economizer. Informed Operator the source could not be determined and to ESP the boiler. ESP at 1300 hrs
Bed cooling:	
Wash adjacent tube:	No
Repair procedure:	
Root cause:	Either faulty weld and/or long term vibration. Similar failures have occurred in recent years.
Future prevention:	Supports reinstalled and will test for vibration.
Last full inspection:	Boiler inspected annually

2003 October – 17	**Critical Incident No. 578**
Location:	**International Paper, Franklin, Virginia**
Unit:	No. 4 Recovery Boiler. ABB-CE Contract No. 1263. Startup 1964
Size:	1.75 million ppd solids. Steam flow 273,500 lb/hr. Operating @ 600 psig & 750F. Design @ 700 psig. 2 drum boiler / DCE
Incident Date:	March 19, 2003
Leak/Incident Loc:	**Furnace Screen –** small leak at original field butt weld that had been ground too much at a location that aligned with porosity
Downtime hrs due to leak/total:	Total downtime 76 hours
ESP?	No. Incident report declares that a leak in the screen should have resulted in ESP initiation and any future screen leak will be cause for ESP in this decanting hearth boiler with a large smelt pool.
Classification:	**Critical Incident**
How discovered:	Drop in boiler water conductivity
Leak detection:	Mass Balance system in operation did not indicate the leak.
Sequence of events:	Boiler water conductivity dropped over a one week period from 550 umhos to 250 umhos. Numerous walkdowns found no signs of a leak. All blowdown lines traced for indication of external leakage. Boiler put on oil and after 20 hours began opening doors looking & listening for a leak. When door opened near screen, small flamelike pattern observed coming from a screen tube. No signs of water, but flame like projection from tube was 10” long by 5” wide. Boiler immediately shutdown.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Leak area ground out, MT tested and rewelded. Again, MT tested
Root cause:	Loss of tube material due to grinding to much of the weld cap at tangent point of tube. Area lined up with porosity in an old butt weld
Future prevention:	Inspection of stitch welds during June 2003 outage specifically looking for previous repairs.
Last full inspection:	Last inspection June2002. This area was not inspected at that time.

ESP Subcommittee notes this to be a 40 year old weld

2003 October – 18	
Location:	**Longview Fibre Co., Longview, Washington**
Unit:	No. 18 Recovery Boiler. CE Contract 01956. Startup 1965. ABB-CE Revamp Contract 72796 in 1997.
Size:	2.1 million ppd solids. Steam flow 279,000 lb/hr. Operating @ 850 psig & 750F. Design @ 895 psig. 2 drum boiler / DCE
Incident Date:	July 10, 2003
Leak/Incident Loc:	**Upper Furnace (above Tertiary Level)** – 1-1/2 inch longitudinal crack along the toe of the membrane weld that initiated at the termination of the membrane weld on cold side of rearmost straight tube in the right sidewall 108 ft. above the floor.
Downtime hrs due to leak/total:	Total downtime 16 hours
ESP?	No
Classification:	**Non-critical Incident – leak external to furnace and water could not enter the furnace**
How discovered:	Operator walkdown
Leak detection:	None installed
Sequence of events:	Furnace being restarted burning natural gas following a 10 day outage. Bed was hard, dry and flat. At 400 psig drum pressure, helper noticed steam & water leaking from right rear sidewall just above nose arch. As leak appeared to be behind nose arch, gas firing stopped and confirmed no water entering furnace. Unit cooled and lagging & insulation removed.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Crack ground out, dye penetrant tested & weld repaired
Root cause:	Stress at the toe of the membrane weld. This straight tube #109 is attached by membrane to #110 that bends & bifurcates to form the generating bank sidewall.
Future prevention:	½" Crack found in same location on opposite sidewall that was confined to the membrane. "Dressed up" membrane weld termination points between adjacent tubes both sides to eliminate high stress riser. Subsequently, determined incorrect field work when rebuilt in 1997. OEM drawing specifies membrane between the two tubes to be split for approx 3 ft. Next shutdown will remove casing and correct error.
Last full inspection:	Last inspection March 2003. Chemically cleaned in 1997 with caustic boil/HCl/passivation

2003 October – 19	
Location:	**Daishowa Marubeni International, Peace River, Alberta**
Unit:	B&W Contract 761401. Startup 1990
Size:	3.785 softwood/3.276 hardwood ppd solids. Steam flow 563,200 lb/hr. Operating @ 925 psig & 815F. Design @1120 psig. 2 drum / large economizer
Incident Date:	December 20, 2002
Leak/Incident Loc:	**Lower Furnace (below floor) –** leak in a sidewall butt weld located in vestibule where Inconel overlay tube welds to carbon steel tube. Weld radiographed during installation.
Downtime hrs due to leak/total:	Total downtime 131 hours.
ESP?	ESP performed. Time required to stay out of recovery area depends on bed size.
Classification:	**Non-critical Incident – leak below floor**
How discovered:	Acoustic leak detection system for the lower furnace elevation alarmed.
Leak detection:	Triple Five Acoustic system & mass balance system in operation.
Sequence of events:	Investigation of alarm confirmed an abnormal noise at liquor nozzle elevation. ESP initiated 38 minutes after alarm.
Bed cooling:	Cooling with sodium bicarbonate injection with nitrogen propellant credited with saving 12 hours.
Wash adjacent tube:	No
Repair procedure:	Cut out failed weld and weld in a “pup” (18” Dutchman).
Root cause:	Insufficient cut-back of Inconel overlay during preparation of tube for assembly of membrane panel. Location had marginal tube alignment and gap quite large on one side. Weld built-up from the CS tube side in large, high heat input passes. Only a thin (as little as 1 mm thick) ligament of weld metal contacted bevel on Inconel overlay tube. Found areas of local remelting and hot cracking consistent with high overheat.
Future prevention:	Inspect all other welds and repair as required. Improve quality control to prevent repeat occurrences. Ensure weld procedures are adequate for job.
Last full inspection:	Last inspection October 2002. Chemical cleaned with chelant in October 1995.

2003 October – 20	**Critical Incident No. 579**
Location:	**Blue Ridge Paper Products Inc., Canton, North Carolina**
Unit:	No. 10 Recovery Boiler. B&W Contract PR-87. Startup 1965. Lower furnace replace with 304L composite tubing ~ 11 years ago.
Size:	2.7 million ppd solids. Steam flow 374,000 lb/hr. Operating @ 450 psig & 725F. Design @ 505 psig. 2 drum / DCE.
Incident Date:	January 29, 2003
Leak/Incident Loc:	**Lower Furnace –** 0.6 inch circumferential crack near the crown of lower bend of front wall primary airport composite tube 41 ½" above floor. 27th tube from left viewed from inside the furnace.
Downtime hrs due to leak/total:	Total downtime 129 hours
ESP?	ESP was initiated. Current revocable policy is to stay out of recovery area 24 hours
Classification:	**Critical Incident**
How discovered:	Assistant operator discovered leak while cleaning primary airports
Leak detection:	None installed
Sequence of events:	Assistant operator, who had been qualified for 2 weeks, notified more experienced operators who agreed on presence of a leak. Leak also observed by shift manager, maintenance coordinator and superintendent. ESP initiated 20 minutes after initial discovery.
Bed cooling:	Bed cooling by Southland Fire using nitrogen propelled sodium bicarbonate credited with saving 30+ hours
Wash adjacent tube:	No
Repair procedure:	Replace ~ 6 ft. of tube including the entire bent length
Root cause:	Thermal fatigue resulting from thermal cycling in lower bend of tube forming primary airport opening. Report notes deposits in primary bent openings to be in the 30-35 gram/sq. ft. range. Appears cracking in the composite layer propagated into the carbon steel.
Future prevention:	Full inspection of primary openings found no other signs of cracks at this location in any other tube openings. There were reportedly a few small cracks at the toe of the membrane weld below the port opening. There was no evidence of overheating in any tubes at this elevation. Because of the overall furnace condition, the deposition was not considered to be the cause of the failure. Tube sampling for deposition analysis has been in secondary air zone, but will be focused on the primary ports in the future. Adding thermocouples in some primary openings to monitor tube temperatures. A 3 tube section sample removed 3 months after incident showed approx the same deposit weight in a bent port tube as the tube that has failed with no evidence of cracking.
Last full inspection:	Last inspection May 2002. Chemically cleaned late '80's with HCl acid

2003 October – 21	
Location:	**Weyerhaeuser Co., Prince Albert, Saskatchewan**
Unit:	Local Unit K58-5101. B&W Contract C-7810. Startup 1999.
Size:	3.8 million ppd solids. Steam flow 634,900 lb/hr. Operating @ 1250 psig & 900F. Design @ 1525 psig. Single drum / large economizer
Incident Date:	February 2, 2003.
Leak/Incident Loc:	**Smelt spout –** Pinhole leak in the weld between face plate and trough on the front plate at spout No. 2 discharge. Insertable spouts fabricated of 625 Inconel plate. In operation ~ 8 months. Leaks at ~ 5 and 7 o'clock positions of smelt flow surface level.
Downtime hrs due to leak/total:	Total downtime 103.19 hours.
ESP?	ESP not initiated
Classification:	**Smelt spout leak – non-critical**
How discovered:	Spoutman went to rod spouts and saw water leak on spout water cooling jacket.
Leak detection:	Acoustic leak detection system not in service.
Sequence of events:	After water discovered, spout plugged & smelt flow dropped.
Bed cooling:	No enhancement
Wash adjacent tube:	No
Repair procedure:	Installed new carbon steel spouts. Necessary to use "off-the- shelf" spouts to get back on-line.
Root cause:	Corrosion and thinning of front plate (at discharge) of spout due to sulfidation of the metal
Future prevention:	Four new spouts installed. Looking into options of alternative spout metallurgy.
Last full inspection:	Last inspection May 2002.. Chemical cleaning has never been used.

2003 October – 22	**See Incident No. 27**
Location:	**Weyerhaeuser Co., Prince Albert, Saskatchewan**
Unit:	Local Unit K58-5101. B&W Contract C-7810. Startup 1999.
Size:	3.8 million ppd solids. Steam flow 634,900 lb/hr. Operating @ 1250 psig & 900F. Design @ 1525 psig. Single drum / large economizer
Incident Date:	May 1, 2003.
Leak/Incident Loc:	**Smelt spout –** Spouts installed after Incident No. 21 developed a pinhole leak in the weld between face plate and trough on the front plate at spout No. 2 discharge. In operation ~ 3 months. Same general location of leaks as in Incident No. 21. Cooling water temperature at 165F increased only about 2F through spouts.
Downtime hrs due to leak/total:	Total downtime _ hours.
ESP?	ESP not initiated
Classification:	**Smelt spout leak – non-critical**
How discovered:	Spoutman went to rod spouts and saw water leak on spout water cooling jacket.
Leak detection:	Acoustic leak detection system not in service.
Sequence of events:	After water discovered, spout plugged & smelt flow dropped. Liquor pulled two days later.
Bed cooling:	No enhancement
Wash adjacent tube:	No
Repair procedure:	Installed new spouts of chromized carbon steel.
Root cause:	Corrosion and thinning of front plate (at discharge) of spout due to sulfidation of the metal
Future prevention:	Looking into options of alternative spout metallurgy. All carbon steel spout lasted 82 days. 2 leaks in February had different metallurgy. Also, more frequent inspection.
Last full inspection:	Last inspection May 2003. Chemical cleaning has never been used.

2003 October – 23	**Dissolving Tank Explosion List No. 23**
Location:	**International Paper, Roanoke Rapids, North Carolina**
Unit:	No. 6 Recovery Boiler. CE Contract 17455. Startup 1956.
Size:	1.286 million ppd solids. Steam flow 188,000 lb/hr. Operating @850 psig & 760F Design @ 1000 psig. 2 drum boiler / DCE
Incident Date:	October 12, 2002
Leak/Incident Loc:	**Dissolving Tank Explosion –** west spout broken off seal box by explosions in the dissolving tank. The pattern of bolts breaking indicated a downward force on the spout.
Downtime hrs due to leak/total:	Total downtime 48 hours
ESP?	No ESP. Operators left area prior to incident.
Classification:	**Dissolving Tank Explosion**
How discovered:	Operators heard a loud explosion and saw smelt that had blown out of the spout enclosure
Leak detection:	Mass balance system was in operation. Not applicable to incident
Sequence of events:	Boiler shutdown at 0600 hrs to wash cascade and liquor system. Smelt bed burned down. One oil gun in service to maintain pressure. Blew sootblowers for 2-1/2 hours in afternoon. At 2000 hrs, drum pressure was falling and 2 oil guns in service. Oil system tripped several times and pressure decayed. Smelt spouts observed to be frozen with no smelt runoff. At 2300 hrs, propane torch used on west spout with 2 oil burners in service to keep boiler hot. Keeping torch lit required shutting down the scrubber fan. High level in tank noted. At 2325 hrs, smelt flow becomes heavy and personnel turned off torch and exited area. At 2340 hrs, 4 to 6 explosions are heard. Operator shutdown oil system.
Bed cooling:	No
Wash adjacent tube:	Not applicable
Repair procedure:	All three spouts changed as a precautionary measure although only the west spout was damaged by the explosion
Root cause:	Operators 'unchoked' west smelt spout with a large pool of smelt in the boiler which resulted in a heavy discharge of smelt that caused an explosion.
Future prevention:	Review training procedure for plugged spouts. Policy mandated to not leave spout unattended. Monitor tank level & not to operate with high level. Use steam coil to keep boiler hot during shutdown, not oil burners. When oil burners being used, rotate on a regular basis. Monitor bed for smelt pools and remove oil burner if necessary. Establish a plugged spout procedure.
Last full inspection:	Last inspection 2002. Acid cleaned in Nov. 1998.

2003 October – 24	**Dissolving Tank Explosion List No. 24**
Location:	**International Paper, Eastover, South Carolina**
Unit:	No. 2 Recovery Boiler. Tampella Contract No. 343. Start up 1991.
Size:	4.65 million ppd solids. Steam flow 665,000 lb/hr. Operating @ 1500 psig & 860 F. Design @ 1500 psig. Single drum / large economizer.
Incident Date:	November 8, 2002
Leak/Incident Loc:	**Dissolving Tank –** high smelt runoff and reaction in smelt dissolving tank displaced hood 10 ft. Debris blown into walls 50 ft from spout. Series of reactions for ~ 20 minutes; building vibration. Steam flow at 730,000 lb/hr.
Downtime hrs due to leak/total:	Outage time due to explosion- 79 hrs / Total downtime 93 hrs
ESP?	ESP was performed. Current revocable policy is to stay out of area 6 hours.
Classification:	**Dissolving Tank Explosion**
How discovered:	Loud noise heard originating from the spout deck
Leak detection:	Statistical Mass Balance in operation. Not applicable
Sequence of events:	Operator went to spout deck and observed a large amount of smoke/vapor/process debris coming from spouts. Control Room instructed to divert liquor. Operator returned to control room for discussion and then went again to spout deck where smoke/vapor still thick and spout hood now laying on deck. Loud booming & building vibration continued. Shatter jet steam blowing from ruptured hoses around the spouts. Area evacuated & ESP initiated ~ 10 minutes after first loud noise. Cooling water to spouts cut off.
Bed cooling:	Sodium bicarbonate injected onto bed estimated to have saved 8 hrs.
Wash adjacent tube:	Not applicable
Repair procedure:	Repaired damaged equipment & replaced all four spouts. Test of spouts and adjacent boiler tubes did not reveal any leaks.
Root cause:	Low sulfidity of smelt resulted in a high viscosity, partially frozen “jellyroll” smelt that reacted in the dissolving tank. Mill sulfidity very low (24.6 on Nov. 10). On Nov. 8 date of incident, actual sulfidity of as-fired liquor probably lower as digester problems required a significant feed of OSB (caustic industrial effluent) due to low liquor inventory. Only source of sulfur makeup is ClO2 salt cake brine. The No. 2 recovery boiler operates spouts at a lower than normal cooling temperature which may have increased freezing in the spouts.
Future prevention:	Long term action plan of investigation & review of equipment & practices to reduce risk of future incidents, including procedures for proper addition of OSB. Sulfidity in liquor cycle should be > 28.
Last full inspection:	Last inspection October 2002. Chemically cleaned October 2002 with HCl with nitrogen injection

2003 October - 25	**Dissolving Tank Explosion List No. 25**
Location:	**International Paper, Androscoggin, Maine**
Unit:	B&W Contract PR-182. Startup 1976
Size:	2.56 million ppd solids. Steam flow 365,000 lb/hr. Operating @ 900 psig & 810F. Design @ 1000 psig. 2 drum /
Incident Date:	July 8, 2003
Leak/Incident Loc:	**Dissolving Tank –** dissolving tank explosion moved tank 6 inches and damaged surrounding and related equipment, as well as smelt deck plate lifted and moved 3 – 6 ft. & breaking concrete agitator bases. One corner of deck plate bent up 12". All 3 spouts angled by tank movement.
Downtime hrs due to leak/total:	Total downtime 66 hours
ESP?	No
Classification:	**Dissolving Tank Explosion**
How discovered:	Not applicable
Leak detection:	None
Sequence of events:	Boiler off liquor and firing oil for routine inspection of west precipitator chamber. Chill & blow initiated for superheater cleaning at 0900. One of two east spouts open although smelting had stopped. Oil burned in four burners closest to spout wall. At 1435, start of a feedwater pump caused low voltage and ID fan tripped. Boiler re-fired & on line at 1555. Working to open west spout and remove rod from east spout. At 1900, Primary air reduced in front of spouts. Some areas of bed had small pools of molten smelt, including in front of east spout. Unable to open any spout using rods and propane torch. Fuel oil firing at 30 gpm continued. Next day @ 0100. Rod removed from east spout and spout open, No smelt flow. No visible signs of molten smelt in front of primary ports. Operators continued to work at opening east and west spouts. At 0435, operators obtained a larger hole at east spout Small amounts of smelt/saltcake jelly roll fell into tank with no impingement by shatter jet steam. Within a few minutes, small explosions resulted & magnified. Operators .retreated from area. At 0442, team leader inspected area but when about 15' from spouts, there were 2 large explosions. Aux fuel tripped and all operators called to control room. Three smaller explosions. No liquor was fired throughout the incident. It is believed additional ash shed when the ID fan tripped.
Bed cooling:	No
Wash adjacent tube:	Not applicable
Repair procedure:	New tank had been installed prior April. Tank pulled into position and new anchors installed. All tank welds were PT & minor indications repaired.. Smelt spouts replaced. Spout openings & hoods MT examined; no areas of cracking found. Installed new pump & agitator bases
Root cause:	Large smelt flow when east spout opened
Future prevention:	Clarification of & adherence to procedures. Training for multiple combinations of scenarios.
Last full inspection:	Last inspection April 2003. Boiler acid cleaned in 1997

2003 October- 26	
Location:	**Georgia-Pacific Corporation, Palatka, FL**
Unit:	No. 4 Recovery Boiler. ABB-CE Contract CE 22974. Startup 1976. ABB-CE revamp Contract Alstom 22974-V2RE in 1993.
Size:	4.6 million ppd solids. Steam flow 732,000 lb/hr. Operation @ 1250 psig & 850F. 2 drum/ large economizer
Incident Date:	June 15, 2003
Leak/Incident Loc:	**Economizer –** 45th tube from south side of boiler in west section of Economizer (lowest gas temperature) cracked and then pulled completely away approx 2 inch from upper header. This tube is 45 ft long and jet from stuck sootblower hit tube approx 6 feet below header. Tube was 3 rows away from cavity where sootblower stuck for about ½ hour. Sootblower lance did not strike tube.
Downtime hrs due to leak/total:	Total downtime 42.5 hours
ESP?	No
Classification:	**Non-critical Incident**
How discovered:	Operator heard the sound of water released when tube separated from header as he was at location checking a sootblower hung up in cavity
Leak detection:	Buckman water chemistry system in operation does not detect economizer leaks
Sequence of events:	Approx 15 minutes prior to tube failure, operator went to care for a sootblower stuck in the economizer. Lance tube was stuck all the way in boiler. Unable to back out lance with air wrench, operator went to get a 'puller'. On return, he heard the water release from the failure. High furnace pressure tripped the boiler. Water was going into Chemical Ash Tank and overflowing (water is normally used in tank for sluicing economizer hoppers).
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Tube cut at both headers and stubs plugged
Root cause:	Corrosion fatigue on ID . Tube weakened by corrosion fatigue most likely initiated at a corrosion pit. Cyclic loading over time resulted in tensile overload. Stuck sootblower No. 54 in economizer cavity probably resulted in causing final failure.
Future prevention:	If blower is stuck in boiler, reduce steam flow to 5000 lb/hr
Last full inspection:	Last inspection May 2003. Chemically cleaned with acid May 2003 except for economizer

2003 October - 27	**Critical Incident No. 580**
Location:	**Norske Canada, Crofton, BC**
Unit:	No. 3 Recovery Boiler. B&W Contract C-70810. Startup 1974. B&W revamp contract No. 691-7646 in 1991.
Size:	2.8 million ppd solids. Steam flow 350,000 lb/he. Operation at 625 psig & ___. Design @ 750 psig. 2 drum / large economizer
Incident Date:	September 17, 2003
Leak/Incident Loc:	**Upper Furnace –** Leak from a 1/4" crack in tube at upper end of bull nose under last pass of superheater washed 1/8" pinholes in two adjacent tubes and washed superheater bend. *[Description is interpreted by the ESP Subcommittee as a crack in weld termination on seal block (approx 4 inch high) between bull nose and sidewall.]* Leak washed out baffle plate and two adjacent tubes and blocks. [*The description indicates this is probably the junction of the bull nose tubes and vertical rear wall support tubes.]*
Downtime hrs due to leak/total:	Total downtime 83 hours
ESP?	No. Area was evacuated.
Classification:	**Critical Incident**
How discovered:	Operator observation
Leak detection:	Trasar System in operation detected and confirmed the leak
Sequence of events:	Boiler had been operating for about 6 hours on oil and natural gas when water was observed leaking from under casing. Boiler shutdown and depressurized for inspection.
Bed cooling:	No
Wash adjacent tube:	Yes
Repair procedure:	Installed two 20" tube sections and overlaid 3rd wall tube as well as washed SH bend
Root cause:	Tube cracked at weld termination
Future prevention:	Remove baffle box and inspect welds on all seal blocks
Last full inspection:	Last inspection October 2002.

2003 October- 28	**Critical Incident No. 581**
Location:	**Tembec Industries Inc., Skookumchuck, British Columbia**
Unit:	ABB Contract No. CA-91105. Startup 1993
Size:	3.4907 million ppd solids. Steam flow 463,200 lb/hr. Operation @ 630 psig & 750F. Design @ 900 psig. Single drum / large economizer.
Incident Date:	September 10, 2003
Leak/Incident Loc:	**Lower Furnace –** '1/2" transverse crack on crown of floor tube adjacent to No. 12 sidewall tube in right rear corner of flat floor, decanting furnace. Tube at this location is an extension of the wall tube lower bend and is a composite tube (2.5" OD x 0.195" wall thickness; 0.135" carbon steel plus 0.060" stainless steel outer layer). Butt weld to carbon steel floor tube is ~ 12 inches away from failure. A floor support beam centerline is about 41 inches from wall and about 6 inches from failure that is on side towards wall.
Downtime hrs due to leak/total:	Total downtime 56 hours
ESP?	ESP performed. Current revocable policy is to stay out of area 8 hours.
Classification:	**Critical Incident**
How discovered:	Operator inspecting port rodder operation observed unusual burning condition in right hand rear corner
Leak detection:	None installed
Sequence of events:	Operator investigating air port rodder reported rodder was catching on smelt buildup in windbox and stopping part way through cycle. Smelt had burned through the windbox and was flowing to the basement where smelt burned the wiring to the dissolving tank agitator. Approx 25 hours later, RB Supervisor called manager to report irregular combustion in front of windbox (A small smelt pool with frequently occurring erratic waves). Boiler taken off liquor and on natural gas to inspect area with no change in smelt appearance. Manager advised supervisor to initiate ESP if he thought there was a leak. ESP initiated.
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Crack ground out and repaired using 80SD2 for the carbon steel and 309 SS for the 2nd pass and capped with 308 SS
Root cause:	Indication of impact on crown of tube by a chipping hammer. Sidewall scallop bar seal had been replaced 2 years earlier and chipping hammers were used to remove smelt bed.
Future prevention:	
Last full inspection:	Last inspection April 2003. Chemically cleaned in 1993

ESP Subcommittee recommends further analysis of root cause. Steam blanketing could be caused at chipping hammer impact point if the wall of tube was pushed inward.

2003 Oct. – INTL 1	**International Incident No. 1084**
Location:	**Australian Paper, Maryvale, Victoria, Australia**
Unit:	No. 5 Recovery Boiler. B& W Contract No. 7105. Startup 1974. Ahlstrom revamp contract in 1992.
Size:	1.85 million ppd solids. Steam flow 256,000 lb/hr. Operating @ 900 psig & . Design @ 915 psig. 2 drum boiler / DCE
Incident Date:	June 25, 2003
Leak/Incident Loc:	**Economizer –** the 11th tube in the 3rd row from the boiler bank inlet ruptured and broke away from the upper header. A 10 year old tube plug in the adjacent header tube hole was leaking and thinned the tube that ruptured.
Downtime hrs due to leak/total:	Total downtime – 39 hr 50 min
ESP?	No
Classification:	
How discovered:	Boiler tripped on high furnace pressure
Leak detection:	None installed
Sequence of events:	Boiler tripped when recovery boiler operator out of control room. Another operator in the control room contacted the PR operator and tried to increase feedwater flow to hold drum level. PR operator returned to control room noticed cascade DCE level rising rapidly and boiler drum pressure decaying rapidly. As the furnace was unchanged, economizer leak concluded. Operator shutoff feedwater
Bed cooling:	No
Wash adjacent tube:	Tube that ruptured was thinned by an adjacent tube plug leak
Repair procedure:	Ruptured tube plugged in top and bottom headers. Leaking plug repaired. Access to the ruptured tube required removing the front two rows of tubes and these were plugged at the top and bottom headers
Root cause:	
Future prevention:	
Last full inspection:	

2003 Oct. – INTL 2	**International Incident No. 1085**
Location:	**Sappi Tugela RSA, Mandeni, KwaZulu-Natal, Republic of South Africa**
Unit:	Unit SRF-1. B&W Contract S-9710. Startup 1955.
Size:	Steam flow 84,500 lb/hr. Operation @ 900 psig and 825F. Design @ 988 psig. 2 drum boiler
Incident Date:	October 11, 2002
Leak/Incident Loc:	**Economizer –** weld tear at an insulation support outer interbank tube, Row 5
Downtime hrs due to leak/total:	The unit was scheduled for a statutory shutdown the following day
ESP?	No
Classification:	
How discovered:	Operator observed water flowing from behind the economizer casing
Leak detection:	No
Sequence of events:	
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	
Root cause:	Differential expansion between tube and the insulation/casing
Future prevention:	Area is being redesigned
Last full inspection:	Inspected August 2001

2003 Oct.–INTL 3	**International Incident No. 1086**
Location:	**Sappi Tugela RSA, Mandeni, KwaZulu-Natal, Republic of South Africa**
Unit:	Unit SRF-1. B&W Contract S-9710. Startup 1955.
Size:	Steam flow 84,500 lb/hr. Operation @ 900 psig and 825F. Design @ 988 psig. 2 drum boiler
Incident Date:	February 3, 2003
Leak/Incident Loc:	**Economizer –** small weld tear
Downtime hrs due to leak/total:	The unit was scheduled for a shutdown for water washing the following day
ESP?	No
Classification:	
How discovered:	Operator observed water flowing from behind the economizer casing
Leak detection:	No
Sequence of events:	
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	
Root cause:	Differential expansion between Header 7 upper tube section and the fixed portion of the tube which had been plugged lower down
Future prevention:	
Last full inspection:	Inspected August 2001

2003 Oct.–INTL 4	**International Incident No. 1087**
Location:	**Sappi Usutu, Swaziland**
Unit:	Local Unit ID 16033/2. ICAL Contract SB 130. Startup 1971
Size:	516 t/day (1.137 million ppd) solids. Steam flow 60t/hr (132,000 lb/hr). Operating @ 620 psig & __.
Incident Date:	March 12, 2003
Leak/Incident Loc:	**Superheater –** pinhole leak in lower 3rd bend from right hand sidewall.
Downtime hrs due to leak/total:	Total downtime 54 hours
ESP?	No
Classification:	
How discovered:	Abnormal noise heard in bullnose area during walkdown. Noise continued when all sootblowers stopped. Man way doors opened and leak was visible
Leak detection:	None installed
Sequence of events:	
Bed cooling:	No
Wash adjacent tube:	No
Repair procedure:	Three superheater bends were changed. Two additional bends had been thinned
Root cause:	Tube thinning (erosion) caused by partially blocked gas passes and gas taking path less blocked preferentially
Future prevention:	Timely waterwash schedules to be undertaken
Last full inspection:	

The following is a recommendation to the National Board Inspection Code (NBIC) Inservice Inspection of Pressure Retaining Items, Part RB, to add provisions for Black Liquor Recovery Boilers as RB-5602.

Please review and return comments by November 15, 200.

RB-5602 BLACK LIQUOR (KRAFT OR SULFATE) RECOVERY BOILERS

Boilers of this type are used in the pulp and paper industry. Black liquor is a by-product of the pulping process. It contains organic and inorganic constituents and is concentrated from about 10% solids to at least 58% solids for firing in the boilers. The organic material that is dissolved in the pulping process combusts and the spent pulping chemicals form a molten pool in the furnace. The molten material or "smelt" drains from the furnace wall through smelt spouts into a smelt dissolving tank for recovery of the chemicals. Ultimately, the by-product of the recovery process is steam used for processing and power. Gas or oil auxiliary burners are used to start the self-sustaining black liquor combustion process and may be used to produce supplemental steam if sufficient liquor is not available.

The recovery combustion process requires a reducing atmosphere near the furnace floor and an oxidizing atmosphere in the upper furnace for completion of combustion. Pressure parts within the furnace require protection from the reducing atmosphere and from sulfidation. The rate of corrosion within the furnace is temperature dependent. Boilers operating up to 900 psi (6200 kPa) typically have plain carbon steel steam generating tubes with pin studs applied to the lower furnace to retain a protective layer of refractory or "frozen" smelt. Above 900 psi, the lower furnace tubes will typically have a special corrosion protection outer layer. The most common is stainless steel clad "composite tube." Other protection methods are corrosion resistant overlay welding, thermal or plasma spray coating and diffusion coating.

The unique hazard of these boilers is the potential for a steam explosion if water should be combined with the molten smelt. The primary source of water is from pressure part failure permitting water to enter the furnace. The owner's inspection program is carefully developed and executed at appropriate intervals to ensure pressure part failure that could admit water to the furnace is avoided. A second source of water is the liquor fuel. Permitting black liquor of 58% or lower solids content to enter the furnace can also result in a steam explosion. The black liquor firing controls include devices to automatically monitor and divert the liquor from the furnace if solids content is 58% or lower.

In addition to the general inspection requirements for all watertube type boilers, particular awareness in the following areas is necessary.

- Furnace – the type and scope of wall, roof, and water screen tube inspection is dependent on materials of construction, type of construction and mode of boiler operation. In all cases, furnace wall opening tubes need inspection for thinning and cracking. The typical water-cooled smelt spout can admit water to the furnace if the spout fails. Common practice is to replace these spouts in an interval shorter than that in which failure is known to occur.
- Water – percentage of solids contained in the black liquor before entering the furnace should be closely monitored. Verify the black liquor firing system will automatically divert the liquor if solids drop to or below 58%.
- Corrosion/erosion – the potential consequence of corrosion or erosion (smelt-water explosion due to pressure retaining part failure) requires a well planned and executed

inspection program by the owner. Maintenance of boiler water quality is crucial to minimizing tube failure originating from the water side.

- Tubes – depending on type of construction, inspect for damage to or loss of corrosion protection, thinning, erosion, overheating, warping, elongation, bulging, blistering, and misalignment. If floor tubes may have been mechanically damaged or overheated, clean the floor and perform appropriate type of inspection for suspected damage. Excursions in water treatment may result in scale and sludge on internal surfaces, creating conditions of poor heat transfer and ultimately causing crack or rupture of tube.
- Welds – leaks frequently originate at welds. The owner and repair agency should carefully plan and inspect all repair welds that could admit water to the furnace. Tube butt welds that could admit water to the furnace should be examined by a volumetric NDE method acceptable to the Inspector. Tube leaks at attachment welds may originate from internal stress-assisted corrosion (SAC). Minor upsets in boiler water quality and improper chemical cleaning may initiate SAC.
- Emergency Response to Water Entering Furnace – Operators of Kraft recovery boilers should have a plan to immediately terminate all fuel firing and drain water from the boiler if a tube is known or suspected to be leaking into the furnace. This system may be called "Emergency Shutdown Procedure" or "ESP." The Inspector should confirm the ESP is tested and maintained such that it will function as intended and that operators will activate the system when a leak into the furnace occurs or is suspected.
- Overheating – tube rupture due to overheating from low water level may admit water to the furnace. The Inspector should verify a redundant low-water protection scheme is provided and maintained.

Comments should be referred to:

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Proposed Revision NB02-1101 REWRITE OF PART RB

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PROPOSED WORDING

RB-5602 BLACK LIQUOR (KRAFT OR SULFATE) RECOVERY BOILERS

Boilers of this type are used in the pulp and paper industry. Black liquor is a by-product of the pulping process. It contains organic and inorganic constituents and is concentrated from about 10% solids to at least 58% solids for firing in the boilers. The organic material that is dissolved in the pulping process combusts and the spent pulping chemicals form a molten pool in the furnace. The molten material or "smelt" drains from the furnace wall through smelt spouts into a smelt dissolving tank for recovery of the chemicals. Ultimately, the by-product of the recovery process is steam used for processing and power. Gas or oil auxiliary burners are used to start the self-sustaining black liquor combustion process and may be used to produce supplemental steam if sufficient liquor is not available.

The recovery combustion process requires a reducing atmosphere near the furnace floor and an oxidizing atmosphere in the upper furnace for completion of combustion. Pressure parts within the furnace require protection from the reducing atmosphere and from sulfidation. The rate of corrosion within the furnace is temperature dependent. Boilers operating up to 900 psi (6200 kPa) typically have plain carbon steel steam generating tubes with pin studs applied to the lower furnace to retain a protective layer of refractory or "frozen" smelt. Above 900 psi, the lower furnace tubes will typically have a special corrosion protection outer layer. The most common is stainless steel clad "composite tube." Other protection methods are corrosion resistant overlay welding, thermal or plasma spray coating and diffusion coating.

The unique hazard of these boilers is the potential for a steam explosion if water should be combined with the molten smelt. The primary source of water is from pressure part failure permitting water to enter the furnace. The owner's inspection program is carefully developed and executed at appropriate intervals to ensure pressure part failure that could admit water to the furnace is avoided. A second source of water is the liquor fuel. Permitting black liquor of 58% or lower solids content to enter the furnace can also result in a steam explosion. The black liquor firing controls include devices to automatically monitor and divert the liquor from the furnace if solids content is 58% or lower.

In addition to the general inspection requirements for all watertube type boilers, particular awareness in the following areas is necessary.

- Furnace – the type and scope of wall, roof, and water screen tube inspection is dependent on materials of construction, type of construction and mode of boiler operation. In all cases, furnace wall opening tubes need inspection for thinning and cracking. The typical water-cooled smelt spout can admit water to the furnace if the spout fails. Common practice is to replace these spouts in an interval shorter than that in which failure is known to occur.
- Water – percentage of solids contained in the black liquor before entering the furnace should be closely monitored. Verify the black liquor firing system will automatically divert the liquor if solids drop to or below 58%.
- Corrosion/erosion – the potential consequence of corrosion or erosion (smelt-water explosion due to pressure retaining part failure) requires a well planned and executed

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inspection program by the owner. Maintenance of boiler water quality is crucial to minimizing tube failure originating from the water side.

- Tubes – depending on type of construction, inspect for damage to or loss of corrosion protection, thinning, erosion, overheating, warping, elongation, bulging, blistering, and misalignment. If floor tubes may have been mechanically damaged or overheated, clean the floor and perform appropriate type of inspection for suspected damage. Excursions in water treatment may result in scale and sludge on internal surfaces, creating conditions of poor heat transfer and ultimately causing crack or rupture of tube.
- Welds – leaks frequently originate at welds. The owner and repair agency should carefully plan and inspect all repair welds that could admit water to the furnace. Tube butt welds that could admit water to the furnace should be examined by a volumetric NDE method acceptable to the Inspector. Tube leaks at attachment welds may originate from internal stress-assisted corrosion (SAC). Minor upsets in boiler water quality and improper chemical cleaning may initiate SAC.
- Emergency Response to Water Entering Furnace – Operators of Kraft recovery boilers should have a plan to immediately terminate all fuel firing and drain water from the boiler if a tube is known or suspected to be leaking into the furnace. This system may be called “Emergency Shutdown Procedure” or “ESP.” The Inspector should confirm the ESP is tested and maintained such that it will function as intended and that operators will activate the system when a leak into the furnace occurs or is suspected.
- Overheating – tube rupture due to overheating from low water level may admit water to the furnace. The Inspector should verify a redundant low-water protection scheme is provided and maintained.

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ACTIVITIES

Sebastian Kankkonen
Secretary

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Recovery Boiler Operation Data

- 22 Boilers in operation at 18 mills
- Total BL firing capacity 38 000 tds/day
  84 million ppd
- Average boiler size: 1740 tds/day
  3.7 million ppd
- Average boiler age: 23.2 yrs
- per BL capacity 19.1 yrs

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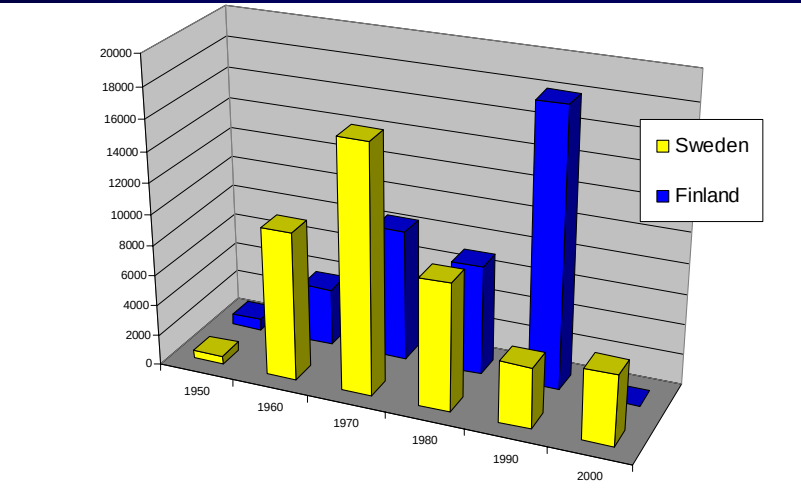
Scandinavian capacity



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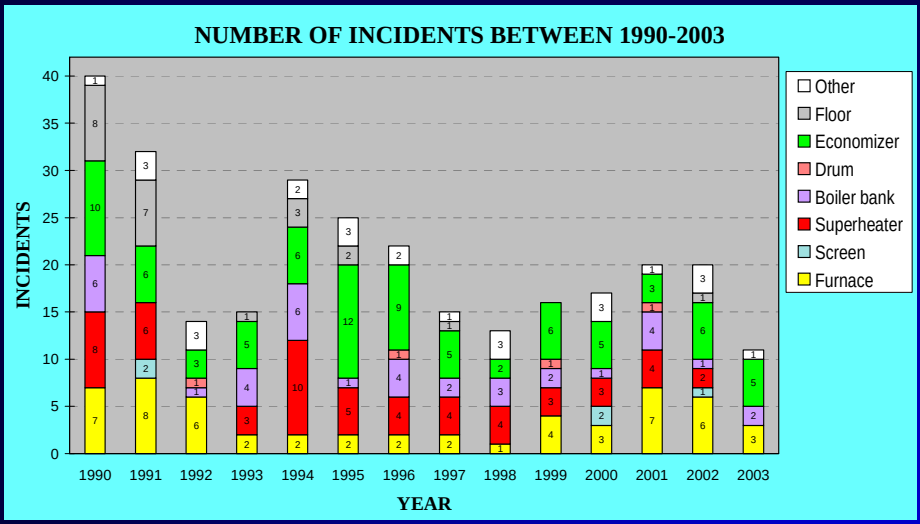

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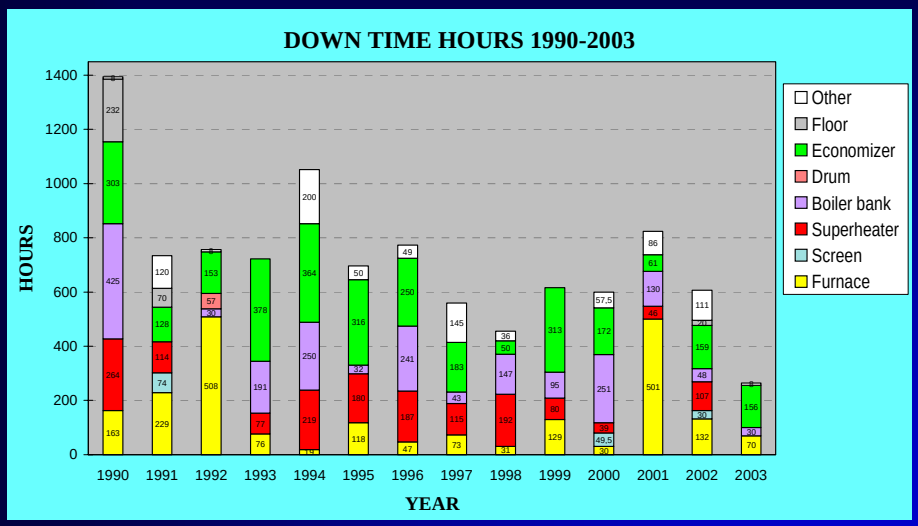

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Sootblower passage damage

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Corroded distribution tube

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Corroded wall tube

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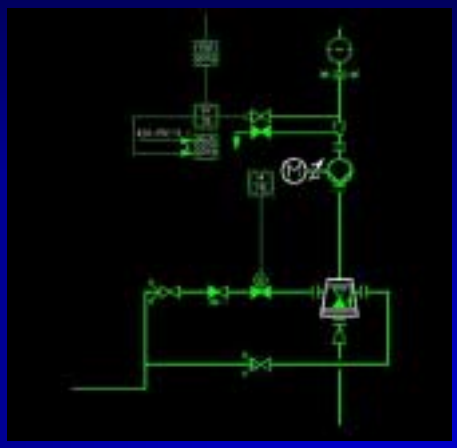
FW line leak

- A valve in the FW by pass line leaked
- Erosion casued pipe to break during service
- Carbon steel not erosion resistant



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Recent research topics

- Release of sulphur compounds at the evaporation plant
- Recommendations for Safety Logic design
- Future Recovery Boiler design – ways to increase the power to heat –ratio
- Monitoring of the RB and procedure for leak situations

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Future research

- Release of sulphur compounds at the evaporation plant (part 2)
- CO_2 emissions: mineral carbonation and pulp and paper industry
- Best practices of BL firing
- The reducing of risk at the RB
- RB basic instrumentation
- The re-use of RB precipitator fly ash

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Coming Activities

- Recovery Boiler Day 2003 Oct 16th in Helsinki
- Operator Days 21-22nd Jan 2004
- Finnish Recovery Boiler Committee 40 year Anniversary Seminar 12-14th May 2004

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FRBC 40 yr Anniversary

- Dr Klaus Niemelä, KCL: Early history of black liquor research: recovery of by-products and cooking chemicals
- Dr Andy Jones, International Paper: Energy Efficient Burning of Black Liquor - 40 Years of Progress
- Dr Tom Grace, T.M. Grace Co.: What Goes on in the Char Bed
- Professor Raimo Alén, University of Jyväskylä: Combustion behavior of black liquors from different delignification conditions
- Professor Jim Frederick, Georgia Tech University: Sodium chemistry

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- Professor Larry Baxter, Brigham Young University: Chlorine
- Professor Honghi Tran, University of Toronto: Fouling
- Dr Keijo Salmenoja, Oy Metsä-Botnia Ab: Superheater corrosion in modern recovery boilers
- Dr Kristiina Iisa, Chalmers University: Emissions
- Professor Mikko Hupa, Åbo Akademi: Advances in understanding of corrosion and combustion in RB
- Dr Jim Keiser, ORNL: Corrosion, bottom tubes, air ports

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