



2014 - 2023

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WPAC Safety  
Committee  
Initiatives

# WPAC Member list, Meetings and Shared Resources



[WPAC MEMBER LIST](#)



[WPAC MEETINGS](#)



[SHARED RESOURCES](#)

# WPAC Safety Plans

- [Safety Plan 2015](#)
- [Safety Plan 2016](#)
- [Safety Plan 2017](#)
- [Safety Plan 2018](#)
- [Safety Plan 2019](#)
- [Safety Plan 2020](#)
- [Safety Plan 2021](#)
- [Safety Plan 2022](#)
- [Safety Plan 2023](#)

# Ardent advocate: Q&A with new WPAC Safety Committee chair Julie Griffiths



- We recently sat down with [Julie Griffiths](#), newly appointed chair of the Wood Pellet Association of Canada's (WPAC) Safety Committee. She replaces [Scott Bax](#), who served as chair for 12 years and supported many of our sector's ground-breaking safety initiatives. A big thanks to Scott for his leadership and we look forward to his continued participation on the safety committee.
- In this [interview](#) Julie shares her philosophy on safety leadership and her thoughts on WPAC's recently released 2023 [workplan](#). Julie holds an undergraduate and master's degrees in earth sciences from Dalhousie University in Nova Scotia and currently works as the quality, sustainability and environmental program co-ordinator for Shaw Renewables in Shubenacadie, N.S.

# Power of Pellets: [Innovating Our Way to a Safer Better Product](#)

The latest [video](#) in the *Power of Pellets* series, *Innovating Our Way to a Safer Better Product* highlights some of the pioneering safety initiatives underway over the past few years that demonstrate this unwavering commitment. The video focuses on four main areas: combustible dust, deflagration isolation, belt dryer safety and off-gassing in transportation.



# Annual Safety Summits

- Safety Summit 2016  
[agenda](#) and  
[presentations](#)
- Safety Summit 2017  
[agenda](#) and  
[presentations](#)
- Safety Summit 2018  
[agenda](#) and  
presentations
- Safety Summit 2019  
[agenda](#) and  
[presentations](#)

# WPAC - WorkSafe Joint Combustible Dust Workshop

- [Combustible Dust workshop](#) in July 2014
- The workshop objectives were to improve the pellet industry's collective knowledge about combustible dust (CD) management, to hear the results of WSBC's Phase IV dust inspections, and to learn about WSBC's new combustible dust policy.
- In the morning, participants toured Pinnacle Renewable Energy's Meadowbank pellet plant. The afternoon consisted of presentations and discussions at the University of Northern BC.
- Workshop [Agenda](#) and [presentations](#)

# Incident Investigation Workshop

- Incident Investigation Workshop in November 2018
- This workshop was part of the collaboration between WPAC and WorkSafeBC on implementing Process Safety Management (PSM) in the wood pellet industry.
- During the workshop, participants learned by preparing mock incident investigation reports for several real-life incidents. This enabled participants to analyze and discuss the root causes of these incidents and to recommend corrective actions to prevent their reoccurrence.
- Workshop [Agenda](#) and presentations





# Bow Tie Analysis Workshop

- [Bowtie analysis workshop](#) in Nov 2019
- Introduction to Bow Tie Analysis: Introduce bow tie methodology and its use as a risk assessment tool.
- Examples of developed bow tie analyses can be found here: [Developed Bow Tie Analyses](#).
- Download the full presentation from WorkSafeBC here: [WPAC Bow Tie Analysis presentation](#).
- Development of 6 bowties for industry
  - [Combustible Dust in Conveyance](#)
  - [Combustible Dust in bed dryer](#)
  - [Combustible Dust in the Dryer](#)
  - [Combustible Dust in the Size Reduction Hammer Mill](#)
  - [Silo Ignition](#)
  - [Spontaneous Combustion](#)



# Silo Fire Workshop Prevention and Response

- Silo Fire workshop in Feb 2019
- Silo fire workshop [agenda](#)
- **Topics included** : Causes of silo fires and explosions, Silo firefighting techniques and procedures , Use of nitrogen and foam injection (including retrofitting silos with nitrogen injection) , Personal safety , Fire prevention methods , First responder training , Case studies and Risk assessment and management
- Silo fire workshop [presentations](#)



# Introduction to Process Hazard Analysis Workshop

- Process Hazard Analysis workshop in Nov 2018
- Workshop [agenda](#)
- Process Hazard Analysis (PHA) is one of 14 elements of process safety management (PSM) which include:
  - Process safety information
  - Process hazard analysis
  - Operating procedures
  - Training
  - Contractors
  - Mechanical integrity
  - Hot work
  - Management of change
  - Incident investigation
  - Compliance audits
  - Trade secrets
  - Employee participation
  - Pre-startup safety review
  - Emergency planning and response

# Combustible Gas

## Best Practices in Managing Combustible Gas

Wood pellet plants produce syngas – a highly explosive mix of carbon monoxide, methane, hydrogen and other volatiles – during various stages of the pellet manufacturing process. This combustible gas is produced whenever biomass is subjected to high temperatures in a low-oxygen environment. It often accumulates within enclosed areas such as dryers, ducts, cyclones and piping. If not managed properly, syngas can cause catastrophic fires, explosions and deflagrations resulting in injuries, loss of life and equipment. This combustible gas phenomenon can equally occur in wood and agricultural biomass.

# Combustible Gas

As a result of several recent syngas explosions, the Wood Pellet Association of Canada (WPAC)'s Safety Committee has developed a new educational video titled [Best Practices in Managing Combustible Gas](#) (see next slide) help operators minimize the risks associated with syngas.

This video project was supported through technical and financial support by several partners including the BCFSC, the University of British Columbia [Biomass and Bioenergy Research Group](#), [BioMass Canada Cluster](#), and Agriculture and Agri-food Canada.

## **Combustible Gas Resources**

- [Risk and Mitigation](#)
- [Gap Analysis Form](#)
- [Safety Bulletin - Fire, Deflagration and Explosion Risk Management](#)

# Best Practices in Managing Combustible Gas



The seven-minute [video](#) is packed with vital information. It describes how and where combustible gas will accumulate during the pellet manufacturing process and gives recommendations for reducing risks such as:

- using back-up power during power outages to maintain extraction fans
- considerations for plant design
- determining locations and components that require inspections and regular cleaning to avoid syngas build-up
- using monitoring and alarm systems
- operator training

# Wood Fibre Storage

## Wood Fibre Storage

- [Risk and Mitigation](#)
- [Gap Analysis Form](#)
- [Safety Bulletin - Mobile  
Equipment and Fire Risk  
Management](#)

# Combustible Dust

- Many dusts are combustible. When fine dust particles catch fire while they're suspended in the air, known as deflagration, fire can spread rapidly and sometimes leads to an explosion.
- The followings are a wood pellet combustible dust audit and wood pellet auditor workbooks.
- **Wood Pellet Combustible Dust Audit**
- The **BASE 4 – Pellet Addendum Audit** is intended for any company engaged in pellet manufacturing activities, regardless of their size.
- [BASE 4 - Pellet Addendum Submission form](#)
- **Wood Pellet Auditor Workbooks**
- The BCFSC and WPAC have developed Auditor Workbooks to help enhance safety management systems which can be modified and tailored to suit your needs:
- [Observation Workbook](#)
- [Interview Workbook](#)
- [Documentation Workbook](#)
- [Click Here](#) for additional **Combustible Dust Training and Resources**



# Critical Control Implementation Plan

- WPAC and BCFSC have partnered to pursue a process known as Critical Control Management (CCM) for wood pellet industry.
- [WPAC Critical Control Implementation Project](#)
- [Critical Control Implementation Plan](#)
- The CCM committee, comprised of representatives from WPAC, BCFSC and Dalhousie University, have developed an implementation schedule with the goal of completing bow ties and critical controls to WorkSafeBC by late 2021 for each of WPAC's member plants. BCFSC is providing on-site and online support to all 15 operations in 2021. [See the schedule here.](#)
- **Videos:** [Bow Tie Analysis & Critical Controls](#), [How To Manage Critical Controls](#), [What Are Critical Controls](#)

# SAFETY FOUNDATION WEBINAR SERIES

Complete & pass this 6-part Webinar Series to receive the **Safety Foundation Course** certificate.



## Safety Foundation Webinar Series

**Human-Machine Interaction (HMI) Part I** (Situation Awareness and Effective Alarm and HMI Design Practices), Jenny Coleman (WorkSafeBC); Charles Bloom, Jamie Errington (Human Centered Solutions)

**Human-Machine Interaction (HMI) Part II** (A journey to improved situational awareness) Jenny Coleman (WorkSafeBC) ; Brian Grantham (WestFraser)

**Safe Handling and Storage of Biomass Part I** (Off-gassing, Self-heating and Silo fire) Fahimeh Yazdan Panah (WPAC/UBC)

**Safe Handling and Storage of Biomass Part II** (Combustible Dust and Combustible Gas) Jeff Mycroft (Fike)

**Bow Tie Analysis Part I** Kayleigh Brown (Dalhousie University)

**Bow Tie Analysis Part II** Cherie Whelan, Bill Laternus (BC Forest Safety Council)

# BELT DRYER SAFETY SYMPOSIUM

NOV. 25, 2020 | 11 A.M. PT



## Belt Dryer Safety

- [Belt Dryer Safety Symposium](#) in November 2020 to share the learnings from past incidents and for individual operators to share in-house safe operating procedures with their industry colleagues
- Belt Dryer Symposium [Agenda](#)
- Belt Dryer Symposium [presentations](#)
- [Key takeaways from WPAC's Belt Dryer Symposium](#)
- [Fact Sheet](#) for the safer operation of direct-heated belt dryers
- Belt Dryer Symposium [recording](#)
- Belt Dryer Final [Report](#)

# Plant Operator Competency Assessment

A Plant Operator's primary job is to maintain steady operation of a pellet plant through the control room controls. This includes monitoring the plant operations to maximize performance and efficiency without risking safety or damaging equipment.

Plant Operators must be able to :

- recognize, evaluate, and control hazards
- maintain quality control
- respond to a range of upset conditions
- understand and consistently apply industry practices and applicable regulations

Recognizing the critical nature of this role, WPAC and BCFSC partnered to develop a consistent set of standards and resources for industry to effectively assess operator competency and provide resources to facilitate both the assessment process and development of competencies.

# Plant Operator Competency Assessment

WPAC was awarded funding by WorkSafeBC through a Small Initiatives Funding Program to support completion of the plant operator competency project. The online learning platform will be available to operations in early 2023.

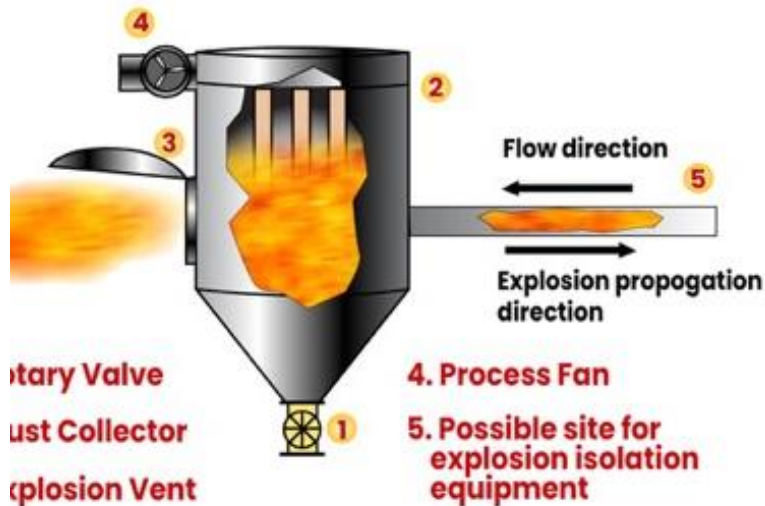
Training modules and competency assessments for operators, as well as supervisors, will be available to WPAC members, as well as others in the manufacturing sector. Topic areas include:

- Human factors,
- Process safety,
- Combustible gas and dust management,
- Ergonomics,
- Personal health and safety,
- Start up and shut-down procedures,
- Human-machine interface (HMI) monitoring,
- Quality control,
- Handling upset conditions, and
- Legislation, regulations and standards.

# Fibre Pile Management

- [This factsheet](#) provides the latest information based on [Biomass and Bioenergy's research Group \(BBRG\)](#) research related to best practices on the safe handling and storage of pellets, part of a four-year research project involving WPAC, the BC Forest Safety Council and BioFuelNet Canada, and funded through the federal Canadian Agricultural Partnership.
- Read more about this ground breaking work in an [interview](#) with Canadian Biomass Magazine and Dr. Shahab Sokhansanj who led this work.

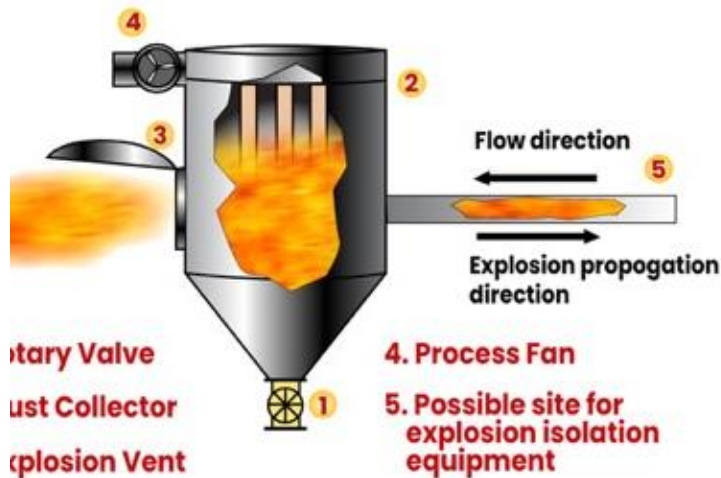
# Deflagration Isolation



Explosions can propagate to other locations in the plant. However, these risks can be mitigated with explosion isolation technologies, which contain the explosion. This explosion isolation prevents it from spreading throughout the entire process plant. Figure courtesy of CV Technology.

- On July 18 2022. the Wood Pellet Association of Canada (WPAC), BC Forest Safety Council (BCFSC), Dalhousie University and Canadian Biomass Magazine hosted a webinar, Analysis of Deflagration Isolation in Wood Pellet Production for Safer Operation.
- Purpose: Outline the [report](#) Analysis of Deflagration Isolation in Wood Pellet Production for Safer Operation to enhance the ability of management and decision-makers to effectively consider key areas of focus.

# Deflagration Isolation



Explosions can propagate to other locations in the plant. However, these risks can be mitigated with explosion isolation technologies, which contain the explosion. This explosion isolation prevents it from spreading throughout the entire process plant. Figure courtesy of CV Technology.

- **Outline:**
  - Combustible dust hazards and deflagration propagation
  - Overview of deflagration isolation
  - Deflagration isolation methods
  - Common locations for isolation
  - Managing failure modes and degradation factors of isolation methods
  - Incorporating deflagration isolation
  - Other recommended activities for facilities to consider
- Final [report](#) Analysis of Deflagration Isolation in Wood Pellet Production for Safer Operation.

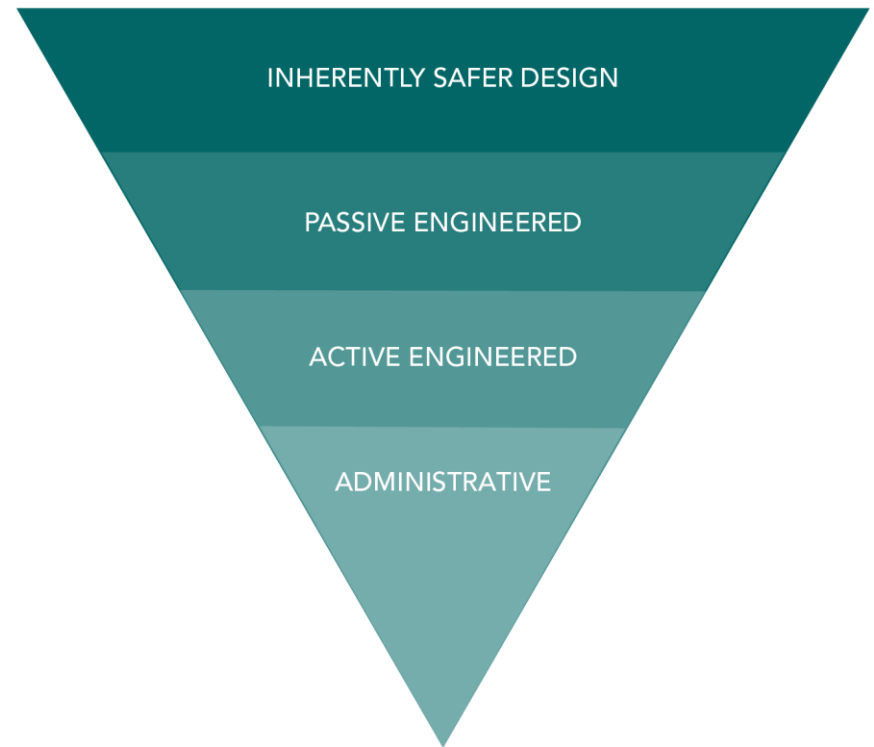


# Inherently Safer Design (ISD)

- The Wood Pellet Association of Canada held for a [15-minute online safety huddle](#) on Nov. 16, 2022 to explore how to effectively integrate inherently safer design (ISD) at wood pellet plants.
- ISD focusses on elimination of hazards and treatment of hazards at the source. It is based on four principles – minimization, substitution, moderation and simplification.
- The webinar was led by Kayleigh Rayner Brown, MAsc., P.Eng., a process safety specialist and Director of Obex Risk Ltd.

# Inherently Safer Design (ISD)

- ISD can be considered during hazard analysis, incident investigation and management of change. It can be integrated using example-based guidance, ISD checklist questions and ISD workshops.



# Inherently Safer Design (ISD)

- ISD Resources
  - [Full safety huddle webinar recording](#)
  - [Safety huddle slides](#)
  - [Full research report](#)
  - [ISD in wood pellet production Safety Share factsheet](#)
  - [Graphical Abstract: Inherently safer bow ties for dust hazards in wood pellet production](#)
  - [ACS Omega Journal Article \(Open-Access\) “Application of process hazard analysis and inherently safer design in wood pellet production”](#)

# Process Safety Management (PSM)

- [New grant supports process safety management research](#)
- Project: Integrating Process Safety Management into Canadian Wood Pellet Facilities that Generate Combustible Wood Dust
- Funded by WorkSafeBC Innovation at Work
- Project is collaboration of WPAC, BCFSC, Dalhousie University, Dust Safety Science and Obex Risk Ltd.
- Project objective: Development of PSM integration tool to explicitly and effectively consider PSM elements in wood pellet production
- Identifying PSM system implementation appropriate for size, scale, and complexity of wood pellet operations

# Process Safety Management (PSM)

- WPAC members completed survey to help understand areas and PSM elements to prioritize and support for implementation
- PSM elements include process safety culture, key performance indicators and management of change
- Research outcomes and support for operations will be provided in 2023



Podcast : History of the Wood Pellet Association of Canada and the Safety Committee with Gordon Murray



## DSS131: History of the Wood Pellet Association of Canada with Gordon Murray

### Dust Safety Science: Improving Combustible Dust Safety in the Workplace

In this episode of the Dust Safety Science podcast, Gordon Murray shares the history of the Wood Pellet Association of Canada and the formation of WPAC's safety committee.





## Podcast : Identifying & Implementing Critical Controls in Wood Pellet Facilities with Cherie Whelan



### DSS132: Identifying & Implementing Critical Controls in Wood Pellet Facilities with Cherie Whelan

#### Dust Safety Science: Improving Combustible Dust Safety in the Workplace

In this episode, Cherie Whelan shares strategies that wood pellet facilities can use to identify and implement critical dust control systems.





Podcast : Implementing Inherently Safer Design using Bowtie Analysis for Combustible Dust Hazards with Dr. Paul Amyotte, P.Eng.



**DSS133: Implementing Inherently Safer Design using Bowtie Analysis for Combustible Dust Hazards with Dr. Paul Amyotte, P.Eng.**

Dust Safety Science: Improving Combustible Dust Safety in the Workplace

In this episode, Dr. Paul Amyotte, P.Eng. explains how inherently safer design can be implemented using bowtie analysis.







Podcast : Application of Bow Tie Analysis and Inherently Safer Design in Canadian Wood Pellet Mills with Kayleigh Rayner Brown, MAsc., P.Eng.



**DSS184: Application of Bow Tie Analysis & Inherently Safer Design in Canadian Wood Pellet Mills with Kayleigh Rayner Brown**

**Dust Safety Science: Improving Combustible Dust Safety in the Workplace**

In this episode, Kayleigh Rayner Brown from Obex Risk goes over the steps involved with application of bow tie analysis and inherently safer design in Canadian wood pellet mills.

