

# Combustible Dust Sustained Compliance Initiative November 01, 2013 to January 31, 2014

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## Project Summary Report

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Prevention Services

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## 1. Executive Summary

WorkSafeBC re-inspected 144 active sawmills in the province between November 1, 2013 and January 31, 2014. These targeted inspections were in support of the ongoing Combustible Dust Strategy that was initiated in 2012. The objective of these targeted inspections was to evaluate current compliance with combustible dust management requirements, and confirm that every sawmill has an effective and sustainable compliance plan.

A core team of ten officers received additional training to enhance industry and hazard awareness, and to ensure consistency in the delivery of the inspections. Each inspection was considered a joint inspection, with a core team member accompanied by a local officer.

Inspection results indicate that many sawmill operators have put significant efforts into improving the management and control of combustible dust, with a substantial number of employers found to be in compliance with the Occupational Health and Safety (OHS) combustible dust regulations. Over the past two years many employers have invested in improved engineering controls in addition to manual dust cleanup efforts. It is apparent that in most mills demonstrating robust combustible dust programs, clean-up crews are utilized in support of effective dust collection at source, and are not the primary control measure.

In total 144 locations were inspected. 83 locations were in compliance at the time of inspection and received no orders related to combustible dust. Many of these locations had dust control plans incorporating significant engineering controls to augment and mitigate the amount of manual dust cleanup required. However, not all employers are currently achieving compliance; 61 were issued orders related to combustible dust regulations. Often the areas of concern were outside of normal production areas; i.e. basements, overhead areas, areas behind electrical cabinets, and outside and secondary areas. In general, it was found that these 61 employers need to expand their programs to include hidden and elevated areas, including vertical surfaces and contained areas within mechanical or electrical enclosures.

Included in those 61 employers, a total of 13 stop work orders were issued to 11 separate employers. These stop work orders were issued as a result of unacceptable accumulations of secondary dust and other significant violations. In most cases, the offending areas could be cleaned effectively on the same day allowing production to resume on the subsequent shift.

The inspections have confirmed that employers are aware of their responsibilities under the OHS regulation with respect to combustible dust, and continue to take steps to achieve sustained compliance with the regulations.

## 2. Introduction

### 2.1. Overview

WorkSafeBC re-inspected all sawmills in the province between November 1, 2013 and January 31, 2014. Any sawmill that was active (operating) during these months was included in the initiative. Some sawmills initially targeted were found to be not operating when inspected. In total, 144 sawmills were inspected and those results are included in this report.

### 2.2. Background

Sawmills in British Columbia are considered a high risk industry and workplace and as such receive frequent inspections by WorkSafeBC Prevention Officers. Since 2012 the frequency of inspections has been increased significantly as has the targeted nature of inspections in support of the ongoing Combustible Dust Strategy.

WorkSafeBC's overall Combustible Dust Strategy considers five elements required for a combustible dust explosion to occur. An understanding of these elements is crucial to understanding the objectives of this initiative.



Figure 1: The Fire Triangle

Three basic elements are needed to create a fire: fuel, heat, and oxygen (fig 1). In this case, combustible dust is the fuel. Ignition sources, such as friction points, equipment failure, or electrical faults, provide heat. Oxygen is available in the ambient air.

Two additional elements are required to produce an explosion as opposed to a fire: dispersion and confinement. The existence of all five of these elements creates the conditions for a combustible dust explosion (fig 2).

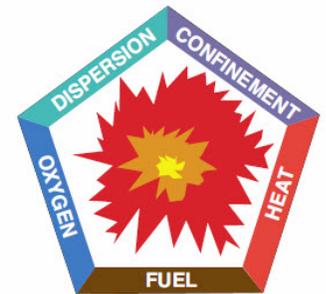


Figure 2: The Explosion Pentagon

Any combustible material, such as wood, can burn rapidly (deflagrate) when finely divided into a dust (e.g. sawdust or wood particulate). When this dust is suspended in air (dispersed) in the right concentration and ignited within a confined or enclosed space or building, it may explode, threatening worker safety through fire, secondary explosions, flying debris, and building collapse.

Eliminating any one of these five elements mitigates the risk of a combustible dust explosion. While oxygen cannot be eliminated due to its presence in the ambient air, the other four elements of the mechanism can be controlled to a significant extent through appropriate risk assessments and through safe and effective dust capture and removal methods.

The intention of this initiative was to inspect based on the Occupational Health and Safety Regulations (OHSR) that address each of the remaining four elements – fuel sources, ignition sources, containment, and dispersion. A list and explanation of the related regulations is included in Appendix 5.1.

### 2.3. Objective of the Initiative

The objective of the initiative was to evaluate current compliance with combustible dust management requirements and confirm there is an effective and sustainable compliance plan moving forward. Effective and sustainable compliance is defined as the implementation of a robust and comprehensive compliance plan that will function effectively today and in the months and years ahead.

### 2.4. Consultation & Education

WorkSafeBC Prevention Services, as well as Industry & Labour Services, were in consultation with industry and union leadership in the months leading up to this initiative and heard clearly during these conversations that the health and safety of sawmill workers is the top priority for all parties. Through industry groups such as the CEO Task Force and the Manufacturers Advisory Group (MAG) it was established that senior industry leadership understands their responsibilities with respect to compliance with the OHS regulation, and is committed to the goal of safe sawmills in British Columbia.

At the onset of the initiative, meetings were held with industry representatives regarding the goals, inspection focus, and timeframes of the initiative. A letter was also delivered to all sawmill employers in the province outlining the upcoming initiative.

Several hazard alerts and industry updates have been issued regarding specific OHS regulations and compliance guidelines related to the hazard identification and safe removal of combustible dust. These have been distributed to industry associations and posted on the WorkSafeBC public website. In addition to these channels of information, all relevant materials were hand delivered to sawmills by officers during this initiative.

## 3. Operational Details

### 3.1. Officer Selection and Training

A group of ten WorkSafeBC Prevention officers were selected to lead the inspections. There was a pre-existing high level of industry subject matter expertise on the team. Four of the officers had direct industry experience in sawmills, with another four having wood product manufacturing experience. All officers have previously been part of the ongoing combustible dust inspections and had received specific training in hazard identification and inspectional processes through prior assignments.

The core team of officers received additional combustible dust training before the initiative and ongoing subject matter expertise was provided during inspections. The training was based on all material gleaned from the iterative consultation and education process outlined in the overall Combustible Dust Strategy. Industry experts as well as employers were consulted to refine the training and the focus of the targeted inspections.

Dedicated subject matter expertise and management oversight was seconded to implement and monitor the initiative, including reviewing all inspection reports and any considerations for sanctions.

### 3.2. Inspection Focus and Process

In order to gauge sustainable compliance, the inspections focused on three key areas of risk:

1. the management of combustible dust accumulations (fuel source);
2. the design, installation and maintenance of dust collection, conveyance and ventilation systems (containment and dispersion, control of all risks);
3. the inspection and maintenance of equipment and ensuring that equipment is operated within manufacturer's specifications (ignition source)

Details outlining the inspection approach are provided in Appendix 5.2 and 5.5.

This initiative was also designed to add further standardization to the inspection process, officer decision making, and communication with employers. The composition of the team, geographic inspectional assignments, and inspectional processes were all considered in the design.

The core team of officers inspected outside of their normal geographic boundaries in order to bring a fresh view of each sawmill. These officers partnered with a local area officer to complete each targeted inspection, resulting in a minimum of two officers jointly inspecting each work location. The goal of these joint inspections included maintaining consistency, utilizing local knowledge and relationships, and enhancing local officer expertise through mentoring. The local area officers accompanying the core team officers provided an ancillary benefit by including a review of other high risk regulations like lock-out, safeguarding of equipment, and mobile equipment operation.

Results from the initial targeted inspections produced one of four outcomes:

1. An operating location demonstrated compliance and had no orders issued; a follow-up inspection was not required.
2. An operating location did not demonstrate compliance but no imminent hazards were identified; an order under the appropriate OHS regulation was issued and the local area officer completed a follow-up inspection to confirm compliance. All orders resulted in consideration for a subsequent sanction (warning letter or penalty).
3. An operating location did not demonstrate sustained compliance and an imminent hazard was identified; a stop work order was issued and the core team officer completed a follow-up inspection and considered a subsequent sanction.
4. An operating location was issued a repeat stop work order on a follow-up inspection; the core team officer issued a directive requiring the employer to submit ongoing evidence of compliance to the officer and Prevention manager on a weekly basis while the employer remedied deficiencies in their combustible dust program.

For further details on the process related to a stop work order and a list of operating locations that received this order please see Appendix 5.3.

### 3.3. Sanction Consideration Process

Sanctions are considered on every order issued. Officers have two main types of sanction considerations at their disposal: warning letters and penalties. Both types of sanctions are tools intended to motivate employers to comply with the Workers Compensation Act (WCA) and adhere to OHS regulations. Officers adhered to two policies outlined in WCA Section 196 regarding sanctions: D12-196-1 and D12-196-2. They apply to both warning letter and administrative penalties. The application of either sanction is dependent on several factors, including the level of risk related to combustible dust violations and motivation required of the employer.

When considering the appropriateness of a sanction and in particular whether a warning letter or administrative penalty was appropriate, officers considered the following factors:

- the potential for serious injury, illness or death in the circumstances; and
- the likelihood that a warning letter will be sufficient to motivate the employer to comply in the future, taking into account:
  - i. the extent to which the employer was or should have been aware of the hazard;
  - ii. the extent to which the employer was or should have been aware that the *Act* or regulations were being violated;
  - iii. the past compliance history of the employer; and
  - iv. the effectiveness of the employer's overall program for compliance

In general, the higher the level of risk encountered, the higher the level of sanction was considered and applied.

### 3.4. Jurisdictional Referrals

This initiative recognized the shared goals of WorkSafeBC, the BC Safety Authority, and the Office of the Fire Commissioner to reduce the risk that fire represents to workers in industrial operations, and to improve compliance to the fire code and BC Safety Standards Act.

In consultation with other BC safety agencies, protocols were established for the referral of employer non-compliance and hazard concerns within the jurisdiction of those agencies.

#### 3.4.1. Fire Inspection and Prevention Initiative (FIPI)

During combustible dust inspections, officers asked facility owners to provide documentation of fire code compliance. If the employer did not have a Fire Safety Plan, the plan appears inadequate, or significant fire safety issues were observed during the inspection, a referral was made to the FIPI office. FIPI then follows up with the Office of the Fire Commissioner to action the referral.

#### 3.4.2. BC Safety Authority

Similarly during the combustible dust inspections, officers that noticed potential violations that fell under the jurisdiction of the BC Safety Authority were instructed to submit a referral form to that agency for follow-up. A primary example was dust accumulation near or inside electrical boxes.

## 4. Inspection and Enforcement Results

### 4.1. Inspections and Orders Related to Combustible Dust

Inspection Detail	Total
Employer locations inspected	144
Inspections related to Combustible Dust regulations <sup>1</sup>	249
Employer locations in compliance	83
Employer locations not in compliance	61
Number of Orders related to Combustible Dust regulations	93
Number of stop work orders	13

For photo examples of both compliance and non-compliance related to combustible dust regulations see Appendix 5.4

### 4.2. Inspections and Orders Related to Other Regulations

Order Type	Total
Employer locations inspected	144
Number of Orders related to other regulations	237
Inspections related to other regulations	220

### 4.3. Sanctions

Sanction Details	Total
Total number of sanctions recommended <sup>2</sup>	20
Number of warning letters recommended	17
Number of penalties recommended	3

### 4.4. Referrals

Referral Details	Total
Number of referrals sent to BC Safety Authority (BCSA)	13
Number of referrals sent to Fire Inspections and Prevention Initiative (FIPI)	94

<sup>1</sup> Multiple inspections occurred at the same location

<sup>2</sup> Sanction considerations occur on any order issued for combustible dust

## 4.5. Resourcing

Resourcing Details	Total
Total number of officer FTE involved on the core inspection team	<b>10 FTE</b>
Total number of person-hours directly related to combustible dust inspections under this initiative	<b>~ 3,360 hours</b>

## 4.6. Enforcement Summary and Initiative Findings

Since 2012 the consultation, education, and enforcement activities incorporated in the overall Combustible Dust Strategy have had a cumulative impact on the control and management of combustible dust. The strategy has required employers to focus attention and resources upon the development and implementation of an effective combustible dust management program. Inspection results indicate that many sawmill operators have put significant efforts into improving the management and control of combustible dust, with a substantial number of employers found to be in compliance with the Occupational Health and Safety (OHS) combustible dust regulations. Over the past two years many employers have invested in improved engineering controls in addition to manual dust cleanup efforts. It is apparent that in most mills demonstrating robust combustible dust programs, clean-up crews are utilized in support of effective dust collection at source, and are not the primary control measure.

In total, 83 locations were in compliance at the time of inspection and received no orders related to combustible dust. Many of these locations had dust control plans incorporating significant engineering controls to augment and mitigate the amount of manual dust cleanup required. However, not all employers are currently achieving compliance; 61 were issued orders related to combustible dust regulations. Often the areas of concern were outside of normal production areas; i.e. basements, overhead areas, areas behind electrical cabinets, and outside and secondary areas. In general, it was found that these 61 employers need to expand their programs to include hidden and elevated areas, including vertical surfaces and contained areas within mechanical or electrical enclosures.

Included in those 61 employers, a total of 13 stop work orders were issued to 11 separate employers. These stop work orders were issued as a result of unacceptable accumulations of secondary dust and other significant violations. In most cases the offending areas could be cleaned effectively on the same day, allowing production to resume on the subsequent shift. Two locations inspected during this initiative received a second stop work order. The two locations that were subject to a repeat stop work order have been directed to participate in a closely monitored sustained compliance plan which includes weekly submissions to WorkSafeBC Officers regarding their combustible dust management process. Officers are inspecting these locations at an increased frequency during this monitored phase to ensure the workplaces remains in compliance with WorkSafeBC requirements and expectations.

The number of stop work orders issued due to an imminent hazard identified has dramatically reinforced for employers their obligations under the regulation. Repeat inspections at these locations have confirmed compliance with the regulation over the short-term, and these

locations will be subject to a high frequency of ongoing inspections to confirm compliance is maintained while the locations implement more robust programs.

Feedback provided from many employers and the results of these targeted inspections supports that the maintenance of a program based largely upon manpower efforts is very difficult to sustain over time. Employers preferring manual clean-up have identified that it has required significant increases in manpower, training, supervision and education and is often subject to unplanned absences disrupting the cleaning regime.

Employers who have invested in point of origin dust collection and/or other controls designed to contain and remove the dust as close to where it is produced have fewer problems sustaining their combustible dust programs. Employers who still rely heavily on manual clean-up may experience larger challenges maintaining sustained compliance due to unforeseen or unexpected events such as production increases, staff absences, and re-deployment of clean-up personnel. It is apparent that in most mills demonstrating robust combustible dust programs, clean-up crews are utilized in support of effective dust collection at source, and are not the primary control measure.

Difficulties with programs that rely primarily on manual clean-up are leading many employers to investigate and invest in improved engineering controls – ventilation extraction systems, containment and improved conveyor transfer processes – to mitigate the amount of dust cleanup required. It is expected that this process will continue for some time as these capital expenditures are often being implemented on a quarterly or annual basis. Some employers have also experienced delays in securing qualified contractors and engineers to design and implement engineering controls. The continued development and installation of engineering controls for combustible dust concerns will need to be monitored by WorkSafeBC to verify that over time the sustainable compliance required in each mill is achieved.

The sawmills have also been investing in upgrades to their electrical systems including pressurized MCC panels, monitors on motor drives, improved positioning of MCC panels and cable trays being realigned to a vertical stance to mitigate dust build up.

The benefits of having a core team of officers to conduct inspections included delivery of a more consistent inspection experience and a higher level of knowledge regarding combustible dust. The process of involving local area officers in the inspections provided an opportunity to share knowledge and maintain relationships with local employers.

#### 4.7. Next Steps

WorkSafeBC will continue to consult with industry in support of ongoing progress to achieve sustainable compliance programs.

Combustible dust inspections will continue in sawmills and where there is non-compliance, orders will be issued. Any repeat non-compliance will result in sanction considerations.

The knowledge transfer between the core team involved in this initiative and local area officers will support consistency in the inspection process.