



# Wood Dust Mitigation and Control Audit Auditor Worksheet, Questionnaire and Guideline

*July 2014 v.1*



**Company Name:**

**Date:**

**Auditor:**

## Table of Contents

<b>Wood Dust Mitigation and Control Audit Assessment Questionnaire.....</b>	<b>1</b>
1. Combustible Wood Dust Program.....	1
2. Hazard Assessment .....	2
3. Categorization of Risk .....	7
4. Wood Dust Hazard Mitigation and Control .....	8
5. Management of Change .....	21
6. Fire Safety Plan .....	21
7. Training and Orientation .....	22
8. Auditing Internal/External .....	23
<b>Wood Dust Mitigation and Control Audit Element Guidelines and Standards .....</b>	<b>24</b>
Introduction.....	24
1. Combustible Wood Dust Management Program.....	24
2. Hazard Assessment .....	27
3. Categorization of Risk .....	32
4. Wood Dust Hazard Mitigation and Control .....	34
5. Management of Change .....	45
6. Fire Safety Plan .....	45
7. Training and Orientation .....	46
8. Auditing Internal/External .....	66
<b>Appendix A – References and Links .....</b>	<b>67</b>
<b>Appendix B - Sample Interview Questions for Auditors .....</b>	<b>68</b>
<b>Appendix C – Suggested Auditor Qualifications.....</b>	<b>69</b>

## Wood Dust Mitigation and Control Audit Assessment Questionnaire

### 1. Combustible Wood Dust Program

The auditor should confirm the presence of a combustible dust control program and associated policies, guidelines and procedures and confirm if the responsibilities and duties have been clearly defined. Once determined, the auditor should use this information to support observations of the facility and interviews with the responsible parties.

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation/Documentation/Interview</i>
• Does the facility have a combustible dust control program?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is it documented and available for review?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is someone responsible for the overall combustible dust control program and have the duties and responsibilities been clearly defined?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is the overall program reviewed to determine its effectiveness?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is it reviewed on an annual basis?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• By management, by employees?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Was a review of the previous year's audit completed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is a review completed when process changes occur?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is there an evaluation and review process for the installation of new equipment or facilities during the design phase and prior to construction?				
• Have any new safety bulletins/regulations/guidelines related to combustible wood dust accumulation, management, mitigation and control been considered?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

## 2. Hazard Assessment

### Identification of Dust

	Yes	No	N/A	Observation/Documentation/Interview
• Are all areas of the facility inspected to identify areas where combustible dust can accumulate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is this supported with documentation or similar?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are concealed spaces such as attics, false ceilings, crawl spaces, inside duct work, etc. included in inspections?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Does the hazard assessment consider dispersion methods in enclosed areas?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Does the hazard assessment consider other concerns such as seasonal conditions / issues?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is there an effective method to measure the rate of dust accumulated in various areas of the facility?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Has there been a hazardous location assessment conducted for the classification of electrical and gas equipment within the last 5 years or with the installation of any new equipment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Does this method include collection plates, measurement devices, visual observation, etc.?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Dust accumulations are monitored:				
• Daily?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Weekly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Monthly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Quarterly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Other?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is there a system in place to report wood dust accumulation to management/supervisors?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are employees aware of this reporting system?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation/Documentation/Interview</i>
• Has any testing (internal/external) of the dust at the facility been conducted to determine the particle size distribution, moisture content and deflagration index to an accepted standard ( $K_{st}$ , explosivity)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Has this been addressed in the hazard assessment process?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is the $K_{st}$ of the dust tested periodically (i.e., quarterly) to determine if the properties have changed due to atmospheric conditions or the feedstock used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is a method in place to confirm that the size and moisture content of the dust particles has not changed from the original testing?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are measurement devices such as screens or similar used to determine particle size?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Note:** *In the absence of this information, dust should be considered hazardous.*

**Identification of Ignition Sources**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
• Has a survey been completed to identify ignition sources throughout the facility?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Examples of ignition sources are listed below:**

**Hot Work**

• Is a documented hot work policy and procedure in place and a permit system used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Does the hot work policy contain standard industry requirements such as wet downs/clean up of combustibles, dedicated spark watcher, monitoring of area for 4 hours, etc.?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Hot Surfaces**

• Are radiant type heaters used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
➤ Are they shielded from dust accumulation or isolated and cooled down before blow down?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
• Are hot process pipes (steam, thermal oil) in use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are these pipes insulated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are cooling systems provided for equipment as required (i.e., high speed planer, saws, etc.)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is the equipment operation interlocked to the cooling system?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Heating Equipment</b>				
• Is open flame or fuel-fired heating equipment in use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
➤ Are the units located inside of the facility?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Have temporary open flame construction type heaters (salamanders, torpedo heaters, etc.) been identified as a potential ignition source?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is the use of temporary open flame heaters prohibited unless used for <b>temporary emergency</b> heating only?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• If/when temporary open flame heaters are used, are appropriate safety precautions taken including clear spacing from combustibles, protection of fuel line integrity, regular inspection of heater while operating, etc.?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are the combustion controls and gas train inspected and tested annually for fuel fired (natural gas, propane, fuel oil, etc.) appliances?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Friction</b>				
• Have potential friction points been identified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are friction points monitored and cleaned on a regular basis to prevent friction based fires from occurring?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Machine and Processing Equipment</b>				
• Have motors and equipment been identified as potential ignition sources?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

	Yes	No	N/A	Observation /Documentation/Interview
• Is the equipment inspected and maintained on a regular basis to look for overheated bearings, hot motor, sparks from equipment, etc.?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are “open drip proof” type motors in use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are they inspected and cleaned on a regular basis to minimize dust build up inside the unit?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Electrical Systems</b>				
• Is electrical equipment properly isolated (enclosed room) or designed for use in a dusty environment where required (i.e., chipper rooms, hammer mill rooms or other areas where dust is typically in suspension during normal operation)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Note: Wiring and electrical is typically Hazardous Classification II, Division I or II in these specific areas.</b>				
➤ Is a hazard and risk assessment completed on the potential electrical ignition sources (lighting, MCC cabinets, etc.) prior to completing any blown downs or wash downs of the area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
➤ If an electrical ignition hazard is identified, is all equipment (including lighting) de-energized prior to completing any blow downs or wash downs in the immediate vicinity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
➤ In areas where dust blow down is being conducted, is electrical equipment in the area of dust removal dust tight?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• If dust is expected to have settled in equipment that is not dust tight, is this equipment cleaned before re-energizing?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Note: Focus on diligent housekeeping practices within the vicinity of such equipment (5 ft as a general rule at or near floor level, 10 ft minimum at roof/ceilings) to at least help reduce the potential of the equipment becoming an ignition source in the event of electrical overheating or arcing</b>				
<b>Smoking</b>				
• Is smoking controlled and strictly monitored?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are outdoor designated smoking areas provided?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
<ul style="list-style-type: none"> <li>Are appropriate containers provided for the disposal of cigarette butts?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Lightning</b>				
<ul style="list-style-type: none"> <li>Are dedicated lightning rods provided and do they conform to regulations/codes?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Alternatively, are lightning arrestors provided for high voltage gear?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Static Electricity</b>				
<p>When combustible dusts or other materials pass through a duct, static charges on the duct are generated. If a charge is allowed to accumulate on an electrically insulated portion of a duct system it could discharge and ignite the material being conveyed. For this reason, exhaust systems carrying combustible dusts should be electrically bonded and grounded.</p>				
<ul style="list-style-type: none"> <li>Is bonding and grounding provided on all pneumatic duct work that conveys combustible dust?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Is flexible rubber or plastic type ducting utilized anywhere in the system?                             <ul style="list-style-type: none"> <li>➤ Is this ducting grounded and bonded?</li> </ul> </li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Is a program in place to inspect and test the continuity of the grounding and bonding in the plant at least annually?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Tramp Metal</b>				
<ul style="list-style-type: none"> <li>Is metal detection, magnetic separation or air density separation provided prior to fractionating equipment (chippers, hogs, planer, etc.)?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are floor level suction systems (floor sweeps) provided? Are they equipped with magnets on the throat to capture tramp metal?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are they equipped with magnets on the throat to capture tramp metal?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Facility Lighting</b>				
<ul style="list-style-type: none"> <li>Are HID (high intensity discharge), halogen, incandescent type or other lighting used where the lamp operates at high temperatures?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



**Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
<ul style="list-style-type: none"> <li>Have other types of lighting which generate less heat such as fluorescent or LED fixtures been investigated?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are the lamps adequately protected or shielded with covers that will prevent dust from coming in contact with the hot surface of the lamp?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>If metal halide type lighting is used with open fixtures not having a containment barrier are double-walled (type O lamps) used?</li> </ul> <p><b>Note: Luminaries using metal halide lamps should be equipped with a containment barrier that encloses the lamp unless type O lamps are used.</b></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are “dust tight” type light fixtures utilized in dusty environments such as chipper or screener rooms?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**3. Categorization of Risk**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
<ul style="list-style-type: none"> <li>Has the facility categorized the risks associated with combustible dust accumulations?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Does the categorization of risk include documentation that combustible wood dust hazard assessments have taken place?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Does the documentation include categorization based on severity and consequence?</li> </ul> <p><b>Note: The Auditor must verify that the risks associated with combustible wood dust hazards in the Facility have been correctly identified. This must be done through inspection of the Facility. To be in conformance with this question the Auditor must confirm the facility has conducted a hazard assessment and has adequately categorized in order to prioritize their action and response.</b></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

#### 4. Wood Dust Hazard Mitigation and Control

##### Control—Housekeeping

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
• Does the facility have an established housekeeping standard?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are workers and supervisors trained in this standard?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are dedicated clean-up crews provided?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is housekeeping performed on a regular basis to prevent accumulations from exceeding 1/8" thick over 5% of the compartment area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are regular cleaning frequencies established for walls, floors and horizontal surfaces of equipment, ducts, pipes, hoods, beams, ledges, suspended ceilings, etc.?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are spaces inaccessible to housekeeping sealed to prevent accumulations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are housekeeping logs maintained?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is there a written safe work procedure for clean-up and the use of compressed air?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is a hazard and risk assessment completed prior to using compressed air to clean when the pressure is in excess of 15 psi?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are alternative methods (such as brooms, air/water wands, vacuuming) considered and used before compressed use for clean-up?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• If vacuum systems are used, are they properly certified, bonded and grounded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Control—Passive Containment**

	Yes	No	N/A	Observation /Documentation/Interview
<ul style="list-style-type: none"> <li>The Auditor should verify whether passive controls are in use as well as their effectiveness at containing dust accumulations at the source. Confirmation should be made through physical inspection.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Primary Machine Centres</b>				
<ul style="list-style-type: none"> <li>Are passive containment controls in place at major machine centres such as:                             <ul style="list-style-type: none"> <li>➤ Debarkers <input type="checkbox"/></li> <li>➤ Canters <input type="checkbox"/></li> <li>➤ Edge trimmers/gang saws <input type="checkbox"/></li> <li>➤ Planer/moulder <input type="checkbox"/></li> <li>➤ Chippers/Hogs <input type="checkbox"/></li> <li>➤ Conveyors/Transfer points <input type="checkbox"/></li> <li>➤ Drop outs/chutes <input type="checkbox"/></li> </ul> </li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Based on physical observation does it appear that passive containment features are effective in containing dust at the source?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Is debris diverted away from potential ignition sources such as high speed bearings and electrical motors?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are curtains or other type of enclosures provided to prevent wood dust from drifting into other areas?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<p><b>Note:</b> <i>Curtains or enclosures should ideally be non combustible. If vinyl “strip” type curtains or doors are used, it should be confirmed that the material has an acceptable flame spread rating (ASTM-E84 Class A; &lt;25 flame spread index recommended) and that the material used is “self extinguishing.” The use of temporary enclosures such as plastic tarps or plastic sheeting (construction polypropylene) is strongly discouraged due the high potential for rapid flame spread and smoke development.</i></p>				

**Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
<b>Conveyors</b>				
• Have conveyors been equipped with slides, baffles or ramps at transfer points to guide material into conveyors rather than having large drops which can cause dust plumes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is the speed of the conveyor adequate to move material at a controlled speed rather than “flinging” material off the end of tail spools and drums?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are enclosed conveyors that have a potential for high dust concentration equipped with a dust collection system or mister to prevent the potential for deflagration?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are belt scrapers provided on conveyors at the tail spools?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is conductive belting used where dry material is conveyed (planer shavings, sawdust, etc.) to prevent material from “clinging” to the belt as a result of static accumulation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Control—Construction Features**

The use of proper construction is crucial to prevention and mitigation of loss from fire and explosion in wood handling facilities where a dust hazard exists. Use of proper materials and construction features can reduce dust and debris accumulations, simplify and complement good housekeeping practices, and limit communication and damage should an event occur.

Where a dust hazard exists, new buildings should be constructed of non-combustible or FM approved Class I materials with fire walls, structural elements, walls, arches, floors, and roofs are of approved non-combustible or limited-combustible materials. Alternately, roof structures utilizing glue laminated beams/heavy timber type construction should also be investigated as this type of construction eliminates “pockets” along the ceiling structure inside the I-beams and purlins where dust can accumulate.

Existing buildings that are primarily combustible construction should ensure that upward facing horizontal members are minimized. Where present, areas such as open wood truss roof structures or open wood stud walls should have the open areas enclosed with a material offering a level of fire resistance such as plywood, type X drywall or sheet metal.

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
• Have building design features been utilized/ incorporated to complement housekeeping and reduce dust accumulations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
<ul style="list-style-type: none"> <li>Have rooms and buildings with potential for combustible dust explosion been correctly identified? Examples could include chipper, screener, hog or sander enclosures.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are the interior surfaces of the building designed to facilitate cleaning?</li> </ul> <p><i>Note: Have features such as high gloss paint or enclosing open stud walls/ceilings with plywood or sheet metal can assist with housekeeping and minimize dust accumulation?</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are structural steel members with ledges and horizontal surfaces boxed in or enclosed?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are all enclosed areas fully sealed to prevent dust from entering the enclosure?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are windows, ledges, girders, beams and other horizontal surfaces including light fixtures provided with sharply sloped surfaces (40°—60°) to minimize dust deposits?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Control—Misting**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
<p>The Auditor should verify whether misting controls are in use as well as their effectiveness at controlling dust accumulations. The Auditor should also evaluate whether the systems are viable for use during winter months and should recommend the Facility consider alternatives if systems are deemed inoperable during cold weather.</p>				
<ul style="list-style-type: none"> <li>Are water misting systems utilized to effectively control and contain the dust hazard?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Have the areas been analyzed to ensure the misting system will not create an opposing impact in preventing dust from being conveyed and potentially caking and fouling other areas and mechanical components with wet dust?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
• Have the impacts of misting systems on the effectiveness of the ventilation systems been analyzed to ensure that additional moisture will not cake or foul the duct work?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Can the misting system be operated in the winter months? If not, is there an alternative control in place?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is a daily self-inspection program in place to ensure that misting systems are operational prior to equipment start up?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Control—Engineered Ventilation Systems**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation/Documentation/Interview</i>
<b>General Requirements for Dust Collection Systems</b>				
This section has been broken down to include general questions as well as questions specific to both baghouses (pressurized sock type collectors) and cyclones due to the significant difference in the hazard presented.				
• Has the system been designed and/or reviewed by a qualified contractor or Engineer? Is documentation available for review to support this?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are enclosureless dust systems appropriate for indoor use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Have changes or additions to the dust collection system equipment, design and installation been conducted and approved by a qualified engineer able to determine the adequacy of the system?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
➤ Is documentation available for review to support this?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Based on observations and physical conditions noted, does it appear that the dust collection system is effective at capturing dust at the source?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is the dust collection and transfer equipment located outside, away from important buildings and utilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

	Yes	No	N/A	Observation/Documentation/Interview
<ul style="list-style-type: none"> <li>Has a separate dust-collection system been provided for the welding or filing shop (or similar) to ensure sparks are not collected by a system conveying wood dust?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<p><b>Cyclones</b></p> <p>Cyclones vent wood fines/dust through the top of the unit and should be vented to the exterior of the building to prevent wood dust accumulation inside of the building. The explosion potential is not considered as high with a cyclone due to the open venting at the top of the unit, however if the vent pipe is connected to other equipment such as blower fans (pull through design) or a baghouse, explosion venting should be provided.</p> <p>Ideally cyclones located outside of any building. NFPA 664 permits the installation of cyclones indoors under the following conditions:</p> <ol style="list-style-type: none"> <li>If there is no deflagration or fire hazard</li> <li>If the unit is equipped with a deflagration suppression system</li> <li>If the unit is equipped with relief vents that extend to safe areas outside the building and meets collector strength requirements</li> <li>If the unit is equipped with deflagration relief vents exhausting through listed flame quenching devices and meets collector strength requirements</li> </ol>				
<ul style="list-style-type: none"> <li>Are cyclones located indoors and if so do they satisfy the conditions outlined in points 1—4 above?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Is the cyclone provided with explosion venting?</li> </ul> <p><b>Note: The cyclone vent pipe at the top of the unit should be open to atmosphere (typical configuration is an elbow discharging to atmosphere). If venting is provided in another location, refer to the venting section recommendations under baghouses.</b></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<p>If the vent pipe is connected to other equipment such as blower fans (pull through design) or a baghouse, alternate venting should be provided to prevent backpressure and blowback. Venting should be designed by a qualified engineer with supporting documentation available for review.</p>				
<ul style="list-style-type: none"> <li>Has grounding been provided for the cyclone and associated duct work?</li> </ul> <p><b>Note: Although this question is asked under static electricity, it is worth re-confirming for pneumatic duct work</b></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

	Yes	No	N/A	Observation/Documentation/Interview
<b>Baghouses</b>				
Pressurized Baghouses (sock type collectors with enclosures) present a significantly increased deflagration hazard due to the pressurized enclosure containing combustible dust in suspension. A documented self testing and inspection procedure should be in place for any protective equipment on a baghouse or cyclone ventilation system. Wood dust and resin can obscure detector eyes and spray nozzles. Wood debris can clog abort gates and back draft dampers. These conditions can affect the operation and reliability of the systems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Protective Equipment</b>				
<ul style="list-style-type: none"> <li>Is sprinkler protection (manual or automatic) provided inside of the baghouse?</li> </ul> <p><b>Note: Protection should either consist of a dry pipe type system with fusible link heads or else a “quick connect” type system with open heads.</b></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>If the system is provided with a “quick connection” is a heat detector provided inside the unit to notify employees of a potential emergency situation?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are baghouses which are connected to known spark producing equipment such as high speed sanders, planers, chippers, etc. . been provided with an approved and listed spark detection and suppression system?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Is a high speed abort gate provided as a secondary protection zone after the spark detection/suppression system and prior to the baghouse?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Have baghouses which return filtered air back inside of any buildings been equipped with a high speed abort gate (or other similar effective device) to divert the force of an explosion and any burning material away from the building?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

	Yes	No	N/A	Observation/Documentation/Interview
<b>Deflagration Venting/Isolation Devices</b>				
<ul style="list-style-type: none"> <li>Has deflagration/explosion venting been provided on the baghouse to vent the force of an explosion?</li> </ul> <p><b>Note: The venting should be designed by a qualified engineer with supporting documentation available for review.</b></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Is the venting either shielded or directed away from buildings (or other items subject to fire or pressure damage) and areas where personnel congregate?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Is clear space maintained on both sides of a vent to enable operation without restriction and without impeding a free flow through the vent?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are swing type gates used for explosion venting? Are devices in place (i.e.; latches, springs, etc.) to ensure they cannot re-close and create vacuum conditions that can collapse/implode the protected equipment?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Has a distance of at least two explosion vent diameters between an explosion vent outlet and any large, fixed, flat obstruction (i.e., shielding) been provided?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are rupture disks or blast panels provided with safety cables/chains, physical shielding (see point above regarding spacing) or similar to prevent the panels from discharging from the unit and becoming potential projectiles in the event of an explosion?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Is the explosion venting clearly labelled and marked to warn personnel of the potential hazards?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Has a rotary air lock been provided on the baghouse to prevent the communication of burning material to other areas of the process?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Has a counter-weighted back draft damper been provided on the infeed duct leading to the baghouse?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

	Yes	No	N/A	Observation/Documentation/Interview
<b>Preventative Maintenance</b>				
• Is a preventative maintenance/self inspection program in place with supporting documentation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is the baghouse unit, including the bags, cages and associated duct work properly grounded and bonded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Note: Although this question is asked under static electricity, it is worth re-confirming for pneumatic duct work and dust collectors.</b>				
• Is there a written program defining the frequency of inspections of the baghouse structure, the bags and the unit grounding? Is this documented and available for review?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is the baghouse unit and associated equipment inspected as per the manufactures guidelines, or annually at minimum?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is a preventative maintenance program in place for the regular (as recommended by the manufacturer) self-testing, inspection and cleaning of both the spark detection eyes and suppression nozzles if applicable?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is a preventative maintenance program in place for the regular (i.e., semi-annual) inspection and testing of components such as high speed abort gates and back draft dampers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is there evidence of preventive maintenance programs and tests on the efficiency on engineered ventilation systems?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is a preventative maintenance program in place to periodically inspect dust collection units and their associated duct work (recommended annually or as required) to ensure that they are free from obstructions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

	Yes	No	N/A	Observation/Documentation/Interview
<b>Storage Silos and Bucket Elevators</b>				
Storage silos used to store dry saw dust or planer shavings have the potential for a deflagration if an ignition source is introduced. In addition the silos have the ability to accumulate a static charge as the material is being moved into or out of the silo. Deflagration venting and grounding should be provided for the silo unit.				
Bucket elevators are often used to transfer material into storage silos. Bucket elevators can create potential ignition sources due to belt or bucket misalignment or belt slippage. Alignment and rotation monitors and interlocks should be provided in addition to properly designed explosion venting.				
• Are storage silos equipped with properly designed explosion venting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are the storage silos grounded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are automatic sprinklers or a dry type deluge system with a 'quick connection' provided for the storage silo?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is the storage silo equipped with heat detection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are bucket elevators provided with properly designed explosion venting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are bucket elevators grounded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are bucket elevators equipped with belt slippage/rotation monitors and belt alignment monitors?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
➤ Are these monitors interlocked to stop operation of the bucket elevator?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Control—Preventative Maintenance**

	Yes	No	N/A	Observation /Documentation/Interview
<b>Electrical System Preventative Maintenance</b>				
<p>The consideration should first be to control wood dust accumulation and airborne contaminants. If this is impracticable, the secondary consideration should be to ensure the electrical and gas equipment is properly classified for the hazardous location.</p> <p>For areas where dust cannot be controlled or equipment does not meet regulated requirements, electrical equipment should be located inside dedicated rooms provided with slightly positive air pressure and a constant, relatively cool temperature. All electrical room doors and the cabinets inside these rooms should be tightly closed, sealed and latched. There should be no combustible materials anywhere inside these rooms. This will help ensure that this equipment operates as designed and separates a potential ignition source from combustible wood debris. In situations where a separate room cannot be provided, sufficient housekeeping must be conducted so that all electrical equipment is free of both coarse and fine wood dust accumulations. This includes areas on top of electrical cabinets, inside the cabinets, and on the floor next to the cabinets.</p> <p>Switchgear and other electrical equipment should undergo regular, quick visual inspections. Switchgear should be found operating in a clean, cool, dry and tight environment with no abnormal noises, smells, vibration or heat. All electrical cabinet/room doors should be tightly closed. Areas found with unacceptable levels of dust accumulations should be cleaned right away using a method that is appropriate for the area and hazard, and further investigation should be conducted into the nature of the dust infiltration. Vacuuming is the preferred choice for cleaning inside electrical enclosures. Electrical equipment should be locked-out and de-energized before cleaning.</p>				
<ul style="list-style-type: none"> <li>Is electrical equipment properly maintained and inspected regularly to ensure they do not fail unexpectedly and create an ignition source?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Is Infrared scanning conducted on the electrical distribution system on an annual basis?                             <ul style="list-style-type: none"> <li>➤ Is it performed by qualified personnel (i.e., Thermography Certification)?</li> <li>➤ Does the survey include all switchgear, MCC, bus bars, and power transformers?</li> </ul> </li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>If an infrared camera with imaging capabilities is not available, is there another option to monitor the temperature of bolted connections? i.e., using a non-contact thermometer.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are “hot spots” identified during infrared scanning promptly repaired? Are the repairs documented and available for review?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are repairs documented with a follow up scan performed to ensure the “hot spot” has been eliminated?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

	Yes	No	N/A	Observation /Documentation/Interview
<ul style="list-style-type: none"> <li>Does a schedule exist for MCC panel inspection and cleaning?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Note: Prioritization is based on evaluation of accumulation rates</b>				
<ul style="list-style-type: none"> <li>Is all temporary wiring and use of portable electrical equipment (e.g., radios, fans, and heaters) eliminated where possible?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Is all electrical wiring, fittings and other devices properly sealed and maintained?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are the MCC rooms positive pressurized and properly isolated where located in hazardous areas?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are these rooms inspected regularly (i.e., monthly) to ensure there is no dust ingress into the room or combustible storage?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are the MCC cabinets visually inspected to ensure the cabinet doors and access covers for energized electrical equipment are closed and secured with all fasteners in place?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are PDC/MCC rooms fully enclosed with cable openings sealed with an approved firestop material?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Are non-combustible enclosures provided around electrical panels and MCC's and adequately pressurize and ventilate them to prevent dust accumulations and overheating?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Note: electrical rooms containing MCC panels, switch gear and dry type transformers are permitted to be combustible construction provided that automatic sprinkler protection is provided.</b>				
<ul style="list-style-type: none"> <li>Is inspection, calibration and testing of switch gear (i.e., megger testing) conducted every 3—5 years by a qualified contractor?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>➤ Is documentation available for review?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
<ul style="list-style-type: none"> <li>Is cleanup of electrical equipment, motor control centers (MCCs), electrical rooms, disconnects and power distribution centres performed regularly, by qualified electricians?                             <ul style="list-style-type: none"> <li>➤ A hazard and risk assessment is performed prior to cleanup activities.</li> </ul> </li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Process controls, equipment, and machinery are inspected, tested, and maintained in accordance with the manufacturer’s recommended guidelines and safe practices?                             <ul style="list-style-type: none"> <li>➤ Is documentation available for review?</li> </ul> </li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

***Mechanical Preventative Maintenance***

A preventative maintenance program can vary from a highly complex computerized system that generates and tracks work orders to a paper based system that requires manual entry for tracking.

The key component for the auditor to confirm is the overall effectiveness of the program with a focus on maintenance items which can pose a fire risk. This can be verified by visual observations, document reviews or interviews with maintenance staff.

<ul style="list-style-type: none"> <li>Is a formal preventative maintenance program in place?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Is the program predictive or reactionary?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Is a method in place to log and track items requiring repair or that have been repaired?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Does the program include the inspection of friction producing equipment such as bearings, conveyor spools, belt drives,, etc.?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Is vibration monitoring conducted on rotating equipment?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> <li>Is a thermal/infrared scan performed periodically on large motors and high speed bearings (i.e., planer)? Alternately, is a hand held heat gun used to periodically monitor the bearing temperature?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**5. Management of Change**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
• Does a management of change process exist?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is the hazard of combustible wood dust addressed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is there an action plan to address any identified concerns?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is there a follow-up component to ensure that actions are completed and appropriate controls are implemented?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are relevant policies, work procedures, etc. updated to reflect the change?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are upset conditions (i.e.; ventilation system down) identified as part of the management of change process?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is appropriate action such as increased housekeeping or equipment isolation completed until conditions return to normal?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Have applicable codes and regulations been considered as part of the design and planning of new construction?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**6. Fire Safety Plan**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
• Has the facility developed a Fire Safety Plan in accordance with the BC Fire Code?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is an education and training program provided for the use of fire suppression equipment such as fire extinguishers and hoses?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are local authorities (emergency response personnel) aware of emergency response plans? Have they completed pre-incident planning inspections?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
• Are employees given emergency response training appropriate to their individual (and collective) responsibilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are the emergency procedures for fire and evacuation tested and evaluated on an annual basis?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are site emergency evacuation procedures posted and current?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is an effective means in place to communicate an emergency situation throughout the facility?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are employees knowledgeable about the Fire Safety Plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is someone designated with responsibility for the above program?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

### 7. Training and Orientation

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
• Does the facility have a training and orientation program?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Does the training/orientation program address the combustible dust hazard? Examples are below:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
➤ Characteristics of combustible dust	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
➤ Identification of combustible dust hazards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
➤ Methods of control for combustible dust	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
➤ Identification and control of ignition sources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
➤ Fire fighting controls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
➤ Emergency response procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Has the facility conducted a training needs analysis to determine what employees require specific training pertaining to combustible dust in the workplace?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are contractors subject to indoctrination and training?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



**Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
➤ Does the training include awareness of hazards of combustible dust?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**8. Auditing Internal/External**

**Internal Self Auditing/Internal/External**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
• Does the facility have annual internal wood dust mitigation and control audit or evaluation process?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are internal auditors educated and trained on wood dust mitigation and control?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are there defined standards and protocols used by the internal auditor?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**External Third Party Evaluations**

	<i>Yes</i>	<i>No</i>	<i>N/A</i>	<i>Observation /Documentation/Interview</i>
• Does the facility have independent third party Wood Dust Evaluations once every 3 years?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Is there evidence that the non-conformance items from previous third party audit are corrected in a timely manner?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are the results of the audits communicated to the staff and employees?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

## Wood Dust Mitigation and Control Audit Element Guidelines and Standards

### Introduction

These industry guidelines have been developed for the identification and mitigation of combustible wood dust produced in woodworking operations. The guidelines are as a result of two catastrophic sawmill explosions that occurred in northern British Columbia during 2012. Although the exact cause of the explosions remains under investigation, combustible wood dust is assumed to have been a determining factor. Recent laboratory testing of combustible wood dust has shown the dust to be explosive under certain conditions which include moisture content and particle size.

Many woodworking facilities process feedstock with high moisture content and the resulting dust is large and coarse in nature. These dynamics can change if the sawdust is allowed to accumulate on elevated surfaces which typically allow the dust to dry out and become smaller in size. The woodworking facility should operate under the assumption that dust on elevated surfaces may be explosive under certain conditions and should work towards identifying the hazard and mitigating the risk.

Housekeeping and hazard identification relating to sawdust is paramount for a safe operation as sawdust accumulation and management contributes to a significant hazard within a woodworking facility.

The intent of these guidelines is to focus on the hazard presented by fine, dry wood dust and do not necessarily apply to accumulations of coarse green material (sawdust) that typically builds up on floors or basement areas.

The guidelines listed below are not intended to be a comprehensive study of the hazards of combustible wood dust. The guidelines have been designed to assist the auditor in assessing the hazard of combustible wood dust at woodworking facilities and to demonstrate industry best practices and mitigation strategies.

### 1. Combustible Wood Dust Management Program

#### Combustible Wood Dust Program

The Facility must be able to demonstrate they have a written combustible wood dust management program including a policy and procedures for the management of combustible wood dust. The required policy and procedures of the written program can be contained in the Facility's existing safety management system, maintenance program or as a standalone program.

The auditor should confirm the presence of a combustible dust control program and confirm if the responsibilities and duties have been clearly defined. The program should be considered a 'working document' that is reviewed by management and employees on a regular basis and is periodically revised to include information such as new safety bulletins, industry regulations/guidelines etc. The document should also be revised when process changes occur.

Once it has been determined that a combustible wood dust program is in place, the auditor should use this information to conduct interviews with the responsible parties.

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

A combustible dust control program should include some or all of the following elements:

- An identification of combustible wood dust in the workplace
  - When wood dust is allowed to accumulate on elevated surfaces such as horizontal members (purlins, ledge, cable trays, MCC panels, etc.) or allowed to build up on wall surfaces the possibility exists for a flash fire or explosion if a concentration of dust becomes airborne with an ignition source present. This risk can be mitigated through proper identification and remediation of the hazard.
- An identification of ignition sources
- Ignition sources can include hot work, hot surfaces, heating equipment, friction, machine and processing equipment, electrical systems, smoking, lightning, static electricity, tramp metal/foreign material and facility lighting
- A hazard assessment process
  - The combustible dust control program should include a means and method of evaluating wood dust accumulation rates throughout the facility.
  - The combustible dust control program should recognize dust and debris build up within concealed spaces.
  - Risk categories for dust accumulation should be defined with associated priorities and action plans outlined.
- A hazard mitigation and control process
- A corrective action management process
  - A method for tracking and logging completion of the action items identified during internal tours or inspections should be implemented.
- A hazard change management process
  - As part of the combustible dust program and hazard identification, change management process should be in place to determine any increased risks are present due to a change in equipment or processes.
- A fire incident investigation process
- Operational responsibilities and accountability
- Orientation and training of employees and contractors
- Emergency Preparedness and Response Plan
- An annual program review process

The Auditor is to only identify if all the elements specified in the question exist. The remainder of the Audit will determine the Facility's conformance with these program elements.

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

### Management Review

The Auditor must verify through interview and review of relevant documentation that:

- An annual program review process exists
- A review of the program took place

An annual review should include some or all of the following:

- A review of the previous year's Audit
- Confirmation that action items from previous Audit were completed or are in progress (documentation and field verification)
- Consideration for new regulations/guidelines related to combustible wood dust accumulation, management, mitigation and control
- Consideration for changes to facility, process, etc.
- Updated policy and procedures (if necessary)

### Assigned Responsibility

As part of the combustible wood dust management program, roles and duties must be clearly defined. A documented list should be developed which outlines the responsibilities of the personnel participating in the program.

The Facility must be able to provide a written list or matrix that identifies areas of responsibility and who at the Facility are assigned these responsibilities.

Areas of responsibility should include:

- Orientation and training of employees
- Hazard assessment processes
- Audit program including inspection, measuring and monitoring of combustible wood dust accumulations
- Tracking and completion of corrective actions
- Housekeeping
- Engineered dust mitigation and controls (ventilation, construction features, passive containment, misting systems)
- Electrical/Mechanical PM program
- Emergency Preparedness and Response Plan
- Annual combustible wood dust program review

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

If the Auditor determines the Facility is not in conformance with this question the Auditor must identify the missing areas of responsibility to the Facility.

### Qualified Personnel

The Auditor must verify that personnel assigned to individual areas of responsibility are qualified to manage those areas.

A person shall be considered qualified by their training, education or experience or any combination of these three criteria.

Verification shall be made through interviews of individuals, review of training records, and other means. There will undoubtedly be some subjectivity to the assessment but the intent is to ensure that people having responsibility for the dust management program are knowledgeable in their assigned areas, are actively involved in the program and are providing more than pure administrative contributions.

*If individuals who were found not to be qualified to manage the areas of responsibilities assigned to them, the Auditor must identify them to the Facility's Manager.*

## 2. Hazard Assessment

### Identification of Dust

The Facility should be able to produce a document that provides indication on what areas of the Facility have been included in the assessment and that identifies where hazardous combustible wood dust accumulations can exist. All areas of the facility should be inspected to identify areas where combustible dust can accumulate. This inspection should include concealed spaces such as attics, false ceilings, crawl spaces, etc.

As part of the inspection process an effective method to measure the rate of dust accumulation in the various areas of the facility to ensure that it does not exceed the industry standard.

**Note:** *The industry standard has determined a hazardous combustible wood dust condition exists where accumulations of greater than 1/8th inch exist on elevated surfaces over 5% of the area of the building/compartment. Consideration should be given to potential for deflagration propagation as impacted by physical building or process compartmentalization.*

The Auditor must verify the elements of the hazard assessment process. To verify, the Auditor should review the hazard assessment documentation.

A hazard assessment process should include:

- Identification of all areas where combustible wood dust can accumulate in the Facility including concealed spaces
- Identification of potential ignition sources
- Identification of combustible wood dust properties through laboratory testing
- Categorization of risk
- Mitigation and control strategies
- Follow up

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

- Management of change process
- Some facilities may choose to determine the combustibility of the wood dust in their facility through laboratory testing. Laboratory testing is not a substitute for good housekeeping practices, but testing can determine the explosivity and subsequent hazard of the dust produced by the facility.
- Testing should be completed periodically (i.e., quarterly) to determine if the properties have changed due to atmospheric conditions or the feedstock being processed. Testing should include samples throughout the facility including dust accumulations on elevated surfaces.
- All wood dust should be assumed to be potentially hazardous and explosible. Laboratory testing and scientific evaluation with regular monitoring and re-testing is a valuable tool to minimize and manage the risk. Typical laboratory testing includes the following;
  - Moisture content
  - Mean / median particle size and distribution
  - Explosion Severity (Pmax & Kst)
  - Ignition Sensitivity (MIE, MIT & MEC)

### Identification of Ignition Sources

Potential ignition sources throughout the facility should be identified and where possible, removed or isolated. As part of the hazard and risk identification, the facility should be able to produce a document that identifies where potential ignition sources exist. Ignition sources include but are not limited to:

- Hot work
- Hot surfaces
- Open flame or fuel-fired heating equipment
- Friction points
- Machine and processing equipment
- Electrical systems
- Static electricity
- Smoking
- Lightning
- Tramp Metal/Foreign material
- Facility Lighting

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

For each ignition source, the Auditor must evaluate whether appropriate controls were put in place to eliminate the ignition source. Examples for some ignition sources include the following:

### Hot Work

Hot Work has been identified as a potential ignition source and all hot work activities should be strictly controlled and monitored.

- Wood working facilities should have a documented hot work policy and procedure in place and should utilize hot work permits.
- The hot work policy should contain standard industry requirements such as wet downs/clean-up of combustibles, dedicated spark watcher, monitoring of area for 4 hours, etc.

### Hot Surfaces

Hot surfaces have been identified as a potential ignition source. Hot surfaces with temperature exceeding approximately 200°C (ignition of wood flour in a layer is approximately 260°C) should be identified throughout the facility. These hot surfaces should be removed, shielded/isolated or encapsulated wherever possible.

- Radiant type heaters should be shielded from dust accumulation. The hot surfaces should be allowed to cool down before any dust blow downs are conducted.
- Permanently installed, forced air type heating equipment (including electrical forced air heaters) should be located in areas free from dust accumulation. The heaters should be periodically inspected to ensure they are free from dust accumulation. The hot surfaces should be allowed to cool down before any dust blow downs are conducted.
- Hot surfaces such as steam/thermal oil pipes should be insulated and encapsulated with a non-combustible covering (i.e.; metal).
- Cooling systems for planers, saws etc. should be interlocked to stop operation and alert the operator to prevent the machinery from overheating and becoming a potential ignition source.

### Heating Equipment (Temporary)

Temporary, construction type heaters (salamanders, torpedo heaters, etc.) have been identified as a potential ignition source

- Use of these heaters should be prohibited unless used for temporary emergency heating only.
- If/when used appropriate safety precautions are taken including clear spacing from combustibles, protection of fuel line integrity, regular inspection of heater while operating etc.
- Combustion controls, fuel lines and gas train should be inspected and tested annually for permanent or temporary fuel fired (natural gas, propane, fuel oil etc.) appliances.

### Friction

Friction points have been identified (open belts, conveyor spools, nip points) as a potential ignition source

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

- Friction points should be identified, monitored and cleaned on a regular basis to prevent friction based fires from occurring.

### Machine and Processing Equipment

Machine centres and processing equipment have been identified as potential ignition sources.

- The machinery and equipment should be inspected and maintained to prevent overheated bearings, hot motors, spark from equipment etc.
- Open drip proof type motors should be inspected on a regular basis for dust accumulation inside the motor and cleaned as required. As an alternative, 'totally enclosed, fan cooled motors' should be investigated as these motors do not permit the ingress of dust into the motor.

### Electrical Systems

Electrical equipment has been identified as a potential ignition source.

- Electrical equipment should be properly isolated (enclosed room) or designed for use in a dusty environment where required (i.e., chipper rooms, hammer mill rooms or other areas where dust is typically in suspension during normal operation). Electrical equipment designed for use in a dusty environment is typically *Hazardous Classification Group II, Division 2, Group G* in these specific areas.
- Thermographic/IR surveys on the electrical distribution equipment should be performed annually with any anomalies repaired.
- Regular inspection and cleaning of MCC cabinets should be performed.
- If an electrical ignition hazard is identified, all electrical equipment including lighting should be de-energized prior to completing any blow downs or wash downs in the immediate vicinity.
- In areas where dust blow down is being conducted, the electrical equipment in the area of dust removal should either be dust tight or fully cleaned prior to re-energizing.

### Smoking

Uncontrolled smoking has been identified as a potential ignition source.

- Smoking should be strictly prohibited within any building used for the processing or storage of wood products. Smoking should also be prohibited within mobile equipment used on the property.
- Designated smoking areas should be provided. Ideally these areas should be located away from any major building and should be free from combustibles in the immediate area.
- Appropriate containers should be provided for the safe disposal of cigarette butts.

### Lightning

Lightning has been identified as a potential ignition source.

- Dedicated lightning rods should be provided in areas subject to electrical storms.



## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

- Alternatively, lightning arrestors should be provided for high voltage gear.

### Static Electricity

Static electricity has been identified as a potential ignition source. When combustible dusts or other materials pass through a duct, static charges on the duct are generated. If a charge is allowed to accumulate on an electrically insulated portion of a duct system it could discharge and ignite the material being conveyed. For this reason, exhaust systems and their associated equipment should be electrically bonded and grounded.

- Appropriate grounding should be provided for all equipment capable of generating a static charge.
- Appropriate bonding and grounding should be provided on all pneumatic duct work that conveys combustible dust.
- Flexible rubber or plastic type ducting that can accumulate a static charge should be bonded and grounded.
- A program should be in place for the inspection and continuity testing of the bonding and grounding in the facility. This inspection and testing should be completed on an annual basis.

### Tramp Metal/Foreign Contamination

Tramp metal and foreign contamination within processes that cut, shape or pulverize wood have been identified as potential ignition sources. Tramp metal/foreign contamination within pneumatic conveyance systems has also been identified as a potential ignition source.

- Metal detection, magnetic separation or air density separation should be provided prior to fractionating equipment.
- Floor level suction systems (floor sweeps) should be eliminated wherever possible or else equipped with magnets to capture tramp metal

### Facility Lighting

Lighting has been identified as a potential ignition source. Wood processing facilities typically have HID (high intensity discharge) lighting in use. This type of lighting operates at high temperatures and can be a potential ignition source. Metal halide type HID lighting has replaced most mercury vapour lighting due to greater efficiency and the environmental concerns of mercury. High pressure sodium HID lighting can also be in use, but this type of lighting is not as common for interior use as metal halide lighting due to the colour spectrum. Halogen and incandescent type of lighting can also be found in use.

- Exposed light bulbs regardless of type should be adequately protected or shielded with covers to prevent dust from coming into contact with the hot surface of the lamp.
- “Dust tight” type light fixtures should be utilized in dusty enclosures such as chipper or screener rooms or other areas where dust can be found in constant suspension.
- If metal halide type lighting is used with open fixtures not having a containment barrier, double walled, type O lamps should be used. Type E (enclosed fixture required) bulbs are to be used only where the lamp is provided with a suitably rated enclosed fixture. Metal halide lights operate with a high internal pressure and there is the potential for an arc tube rupture which may eject hot particles from the lamp unless either enclosed fixtures or appropriately rated (type O) lamps are used.

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

- HID lamps should only be operated in its designated operating position.
- HID lamps should only be operated with the compatible ballast, rated fixture (open/closed, wattage) and socket.
- Metal halide lamps should be turned off (cycled) for a minimum of 15 minutes per week to reduce the possibility of arc tube rupture in continuously operating installation.
- Halogen lamps should be used only in halogen approved fixtures. Fixtures should fully contain any parts of the lamp in the event of a lamp burst.
- The heat levels of the light and the ballast must be considered for installations in all locations, and systems must be in place to ensure that they are kept free for dust build-up

### 3. Categorization of Risk

#### Risk Categories

As part of the hazard and risk identification, a risk categorization system should be in place at the facility. The risk categories should have action plans associated with each hazard classification.

The Auditor should look for documented categorization of the risk associated with the combustible wood dust hazard. Categorization should include some form of quantification of risk based on several factors including but not limited to the following:

- Accumulations
- Significant dust clouds (potential/actual)
- Ignition sources
- Dust properties
- Existing controls

An action/response should be associated with each category and will depend on severity and consequence.

An example of risk categorization is as follows (the categorization at the Facility may differ in its detail but should have some similarity in identifying varying degrees of risk severity and corresponding actions):

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

- Severe Risk
  - Severity—heavy accumulations on all elevated surfaces over a wide area in a single normally occupied compartment
  - Consequence—imminent risk of a damaging explosion
  - Action—immediate shut down and clean up; all machinery must be de-energized and shut down during clean up
- High Risk
  - Severity—significant accumulations over a wide area in a single compartment
  - Consequence—risk of a localized event involving combustion of dust and under accumulated unfavourable conditions, could give risk to a wider event
  - Action—must be attended to immediately; all machinery must be de-energized and shut down during clean up
- Moderate Risk
  - Severity—lesser accumulations of dust in isolated areas that are not extensive; this category may apply to compartments where the accumulation of dust layers is lower or to localized areas with higher accumulations
  - Consequence—risk of a localized event involving combustion of dust and under accumulated unfavourable conditions, could give risk to a wider event; lower than the previous categories of “High” and “Severe”
  - Action—should be attended to in the short to intermediate terms (up to 1 week) with a view to eliminating or controlling the risk on an ongoing basis
- Low Risk
  - Severity—tolerable accumulations of dust on elevated horizontal surfaces (or vertical walls); other factors including accumulation of coarser material
  - Consequence—potential risk of a localized event involving combustion of dust but would require accumulated unfavourable conditions
  - Action—this category can be managed using normal (current) control measures; if there are Low accumulations over wide areas or in numerous instances throughout, it may be appropriate to elevate the rating to Moderate with corresponding action
- No Risk
  - Severity—no significant accumulations of fine dust.
  - Consequence—this category recognizes that very coarse sawdust accumulated at floor level does not represent an explosion hazard.
  - Action—no specific or special actions required, normal (current) control measures satisfactory

The Auditor must verify that the risks associated with combustible wood dust hazards in the Facility have been correctly identified. This must be done through inspection of the Facility.

#### 4. Wood Dust Hazard Mitigation and Control

The auditor must identify what the Facility has implemented to control the combustible wood dust hazard.

Controls may include but are not limited to the following:

- Housekeeping
- Passive containment
- Construction features
- Misting
- Engineered ventilation systems including cyclones and baghouses
- Ignition source management
- Deflagration management

For all areas subjected to the hazard assessment, the Auditor must evaluate whether the controls are appropriate.

##### Control—Housekeeping

The facility should ensure that housekeeping is performed on a regular basis to prevent dust accumulations from exceeding 1/8 inch thick over 1,000 sq. ft. or as specified through analysis of dust explosiveness for the location, whichever is less. Regular cleaning frequencies should be established for walls, floor and horizontal surfaces of equipment, ducts, pipes, hoods, beams, ledges, suspended ceilings, etc.

Dust accumulations should be minimized on elevated, horizontal surfaces. The use of compressed air for clean up purposes should be discouraged and minimized as it can place the dust into suspension and increase the potential for a deflagration if an ignition source is present. Preferred methods are sweeping, vacuuming or water wash down. If blow downs are required, an air/water wand type system should be utilized. WorkSafe BC limits the use of compressed air to a maximum of 15 psi unless a hazard and risk assessment has been performed.

If vacuuming is used, the unit should be properly designed and rated for the exposure (Class II, Division 1). Vigorous sweeping should be avoided to prevent a dust cloud from forming during clean-up activities. Caution should be exercised around electrical appliances if water is used for clean-up.

Spaces inaccessible to housekeeping shall be sealed to prevent accumulations.

The following checklist is provided to facilitate documentation of housekeeping practices:

- The Facility has an established housekeeping standard
- Workers and supervisors trained in this standard
- Dedicated cleanup crews are provided
- Dust accumulations are minimized on elevated, horizontal surfaces and are kept below 1/8 inch thick over 5% of the compartment area

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

- Regular cleaning frequencies are established
  - Walls
  - Floors
  - Horizontal surfaces of equipment
  - Ducts
  - Pipes
  - Hoods
  - Beams
  - Ledges
  - Suspended ceilings
  - Other
- Spaces inaccessible to housekeeping are sealed to prevent accumulations
- Housekeeping logs are maintained
- There are written safe work procedures for clean-up and the use of compressed air
- Methods other than compressed air blow down are employed for housekeeping
  - Brooms
  - Air/water wands
  - Other

*The Auditor, through review of safe work procedures or other relevant documents that instruct, or direct employees, and through employee interviews and facility inspections confirm if the method and frequency of housekeeping efforts is sufficient to ensure combustible wood dust accumulations on elevated surfaces do not exceed 1/8" over 5% of the compartment area.*

### **Control—Passive Containment**

Machinery and equipment used to cut, shape, pulverize, chip or transfer wood fibre has the ability to generate large quantities of dust throughout the process. The points listed below are industry recognized standards for minimizing dust accumulation at commonly found machinery and equipment in woodworking facilities.

#### **Debarkers, Canters, Edgers Trimmers Best Practices**

Debarkers, canters and edgers are the primary and secondary break down machines used in sawmills and can generate large quantities of coarse sawdust, wood debris and shavings. If not properly managed, the sawdust can dry out over time, become airborne and settle on elevated surfaces

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

throughout the facility. The risk of a fire in these areas is considered low—moderate, however due to the volume of sawdust and debris created by these machines, dust mitigation practices should be in place.

- Machine centers that produce debris require chuting and drop outs to conveyors so as not to collect debris, particles or combustible dust on or beside the machine center.
- Consider location of drop-outs, grizzlies, etc. to adequately capture debris at the machine center and also any carry over that may be carried forward on belts or the boards after the machine center.
- Consider shielding the machine center to contain debris so that it falls into the appropriate system, this may include strategies such as curtains, or steel sheeting to prevent sawdust and debris from spraying from knives and saws.
- Divert debris away from potential ignition sources such as high speed bearings and electrical motors.
- Consider shears and other passive strategies to divert material streams to drop outs or vacuum systems.
- Where possible consider solid flooring rather than grating after machine centers that tend to carry sawdust on boards (such as trimmers) to avoid depositing material into uncontrolled areas such as basements where fine dust is separated and can potentially collect on cable trays, beams, pipes heaters, etc.
- Also consider scraper conveyors to periodically clean debris.
- Install misters above machine centers that produce airborne dust that cannot be contained by other methods.
- Completely sealed machine centers will require misting and or an extraction system if the potential for creating a deflagration hazard in the confined space exists.
- Isolate machine centers where possible using curtains or other type of enclosures to keep dust from drifting into other areas.
- Control material spillage and uncontrolled dust plumes in the basement level that is caused by falling debris from the operating floor.

### Planer Best Practices

Planer machines can produce fine dust as well as shavings. Most fine dust will be generated at the pineapple rolls and the planer rolls. Due to the friction created through the planer either by the rolls or by debris caught in rolls the risk of fire in this location is high.

- Bed plates and line bars require a cooling system that is maintained and continuously circulates coolants into areas. Maintenance of these systems requires checks and procedures to ensure that ports are free of obstructions, pumps are operating within parameters and that these systems are purged and maintained according to the manufacturer specifications.
- Planer line ups that ensure line bars and bed plates are level and true will ensure that friction points are not created.
- The planer has many high speed bearings, a thermal scan performed periodically will assist in determining a potential bearing failure.
- Real time vibration monitoring systems or thermal sensing devices at the planer are recommended to prevent or avoid ignition or the spread of fire.

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

- Pineapple rolls require dust extraction systems or misting system to prevent the distribution of airborne dust.
- Dropouts and a conveyor system under the planer and Planer Bridge is recommended to remove debris from the planer area.
- Planer machine should be isolated in a room to avoid the spreading dust to other areas of the mill.

### Chippers and Chip Screens Best Practices

Due to the action of Chippers and Chip screens there is a high potential to segregate fine particles of dust.:

- Where possible isolate these devices in separate rooms that are appropriately vented and sealed. Sealed motors should be used. Since these areas have a high risk potential for fine dust appropriate maintenance and cleaning activities are required to ensure that combustible dust is managed within limits.
- **Mitigation Alternative:** Where it is not possible to isolate these areas misting to control air borne dust, curtain and or sealing around points creating dust can be used.

### Vibrating Conveyors Best Practices

Vibrating conveyors have a high potential to efficiently separate fine dust from other materials.

- Dust extraction systems designed to extract finer particles should be incorporated in the design of the conveyor to avoid carrying fine dust downstream. Fines should be removed prior to entry into the chipper.
- Adequate pans at the head and tail ends, as well as passive containment (skirting) where applicable at the sides to avoid having separated materials exit the system.
- Misting systems should be considered but may have an opposing impact in preventing dust from being conveyed and potentially fowling the springs and other mechanical components.

### Belt and Chain Conveyors Best Practices

- Ensure conveyor pans are sufficiently sized to contain all materials. Holes, transition, etc. should be “leak free”.
- Consider slides at transition points to guide material into conveyors rather than having large drops which can cause dust plumes. Likewise consider slower speeds adequate to move the material rather than “flinging” material off the end of head spools and drums.
- Enclosed conveyors that have a potential for high dust concentration will need to have a dust collection system or mister installed to prevent the potential for deflagration. These conveyors are typically found at the discharge end of chippers.
- Belt conveyors often build up static electrical charges which will cause fine dust to stick to the belt. Fine dust will then be deposited at the support rollers. Belt scrapers can be used to clean the belt at strategic locations to avoid the build up of dust in non desirable areas.

### Decks and Deck Chains Best Practices

- Lumber decks will often collect sawdust from boards transferred onto the decks. Where possible it is most desirable to minimize or eliminate dust from falling on lumber deck utilizing drop outs prior to the landing areas.
- Decks must be well maintained and sealed so that loose material does not fall into an uncontrolled area underneath the decks on beams, lights, MCC's, etc.
  - **Mitigation Alternative:** Alternatively decks can have openings in strategic locations where the material can be collected and conveyed to a dust extraction system or other waste system.
- Consider the location of decks and the location of head and tail sprockets as these areas typically drag material underneath the deck. Preferably there will be an extraction area underneath or chuting to direct material into a waste conveyor.
  - **Mitigation Alternative:** In the absence of a conveyor, chuting to a waste bin or a controlled area away from ignition sources may be used.

### Control—Construction Features

The use of proper construction is crucial to prevention and mitigation of loss from fire and explosion in wood handling facilities where a dust hazard exists. Use of proper materials and construction features can reduce dust and debris accumulations, simplify and complement good housekeeping practices, and limit communication and damage should an event occur.

Where a dust hazard exists, new buildings should be constructed of non-combustible or FM approved Class I materials with fire walls, structural elements, walls, arches, floors, and roofs are of approved non-combustible or limited-combustible materials. Alternately, roof structures utilizing glue laminated beams/heavy timber type construction should also be investigated as this type of construction eliminates “pockets” along the ceiling structure inside the I-beams and purlins where dust can accumulate.

Construction should prevent fire or explosion from propagating into or from adjacent compartments and should utilize passive fire protection features (separation, fire walls, and partitions, draft curtains) to accomplish this. Rooms or buildings should also be provided with deflagration venting to safe outside location.

Interior surfaces should be designed to facilitate cleaning. Walls should be smooth to prevent dust adherence and should have no ledges. The use of wall materials that allow dust to adhere to it (i.e., cellulose or cementitious type fireproofing, peg board, donnacona board, etc.) should be avoided. Structural steel that has horizontal surfaces (I-beams, U-shaped channel upwards facing or sideways facing) should be boxed in. Windows, ledges, girders, beams and other horizontal surfaces including light fixtures should have tops sharply sloped (45—60 degrees) to minimize dust deposit.

Existing buildings that are primarily combustible construction should ensure that upward facing horizontal members are minimized. Where present, areas such as open wood truss roof structures or open wood stud walls should have the open areas enclosed with a material offering a level of fire resistance such as plywood, type X drywall or sheet metal. If enclosing an area, it is important to fully seal the cavity to prevent wood dust from entering.

*The Auditor should verify whether building design features have been utilized/incorporated to complement housekeeping and reduce dust accumulations.*



## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

### Control—Misting

Water misting systems can be effectively utilized to assist with dust control, but should not be used as a substitution for good housekeeping practices.

Water misting systems can be utilized inside or above machine centres where dust is produced due to the action of saws, knives or other cutting/shaping or pulverizing devices.

Stand alone blower type misting systems are also available which can cover wide areas of the facility such as above debarkers or canter machines.

When considering water misting systems, the area should be analyzed to ensure the system will not create an opposing impact in preventing dust from being conveyed and potentially caking and fowling other areas and mechanical components with wet dust.

The following checklist is provided to facilitate documentation of misting system implementation:

- Water misting systems are utilized to help contain dust around machine centres
- There is no evidence of an opposing impact from use of the system
- The system can be used in winter months without concern for cold weather damage

*The Auditor should verify whether misting controls are in use as well as their effectiveness at controlling dust accumulations. The Auditor should also evaluate whether the systems are viable for use during winter months and should recommend the Facility consider alternatives if systems are deemed inoperable during cold weather.*

### Control—Engineered Ventilation Systems

Dust collection systems are a key element to reducing or eliminating the dust hazard within the building. In some cases, additional systems or more collection points may need to be added to mitigate the dust hazard on a more permanent basis. Where installed, collectors and cyclones should ideally be located outside or as a minimum, explosion venting provided to the outside, with isolation devices provided where potential for re-entry to building is a concern.

Where needed, dust collection equipment should be of sufficient size and capacity to maintain the required airflow and efficiently separate the wood dust from the air before the air is exhausted. It should be constructed entirely of non-combustible materials. The dust collection equipment should be designed by an engineer or qualified contractor acceptable to the authority having jurisdiction. If the auditor cannot verify the details of the specification and design, an independent inspection should be requested by a qualified third party.

Dust collection systems require periodic inspection and maintenance to ensure the units operated as designed. Due to the hazards of pneumatically conveying wood dust, protective equipment such as spark detection and suppression systems are often in place for larger systems, in particular baghouses. A documented self testing and inspection procedure should be in place for any protective equipment on a baghouse or cyclone ventilation system. Wood dust and resin can obscure detector eyes and spray nozzles. Wood debris can clog abort gates and back draft dampers. These conditions can affect the operation and reliability of the systems.

This section has been broken down to include general information for both baghouses (pressurized sock type collectors) and cyclones due to the significant difference in the hazard presented.

The following points should be considered when inspecting the dust collection/ventilation system:

### General Requirements for Dust Collection Systems

- Electrical Interlocks: Equipment required to have a dust-collecting system shall be interlocked to prevent it from operating if the dust-collecting system is not in operation.(BC Fire Code [2012] 5.3.1.8.)
- The system should be designed and/or reviewed by a qualified contractor or engineer. Documentation should be available for review to support this.
- No changes to the dust collection system equipment, design and installation should be made until approved by a qualified individual able to determine the adequacy of the system. This should be complemented by engineering plan reviews from underwriters/risk consulting firms (where applicable/available).
- Ideally, separate dust-collection systems for each process area should be used to minimize the chance of one dust explosion involving many operations.
- Dust collectors with a deflagration hazard should be designed and constructed in accordance with one (or more) of the following options:
  - Constructed of welded steel or other non-combustible material of sufficient strength to withstand the maximum unvented deflagration pressure of the material being collected.
  - Protected by a deflagration suppression system, with a design strength exceeding the maximum reduced deflagration pressure of the material being collected.
  - Equipped with deflagration relief vents, with a design strength exceeding the maximum reduced deflagration pressure of the material being collected.
- Ducts should be constructed of metal or other non-combustible material, and of adequate strength and rigidity to meet service conditions and installation requirements.
- Changes in duct sizes should be designed to prevent the accumulation of material by utilizing a tapered transformation piece with the included angle of the taper not more than 30 degrees.
- A preventative maintenance program should be in place to periodically inspect dust collection systems and their associated duct work (recommended annually or as required) to ensure that they are free from obstructions.
- Locate dust collection and transfer equipment outside, away from important buildings and utilities. *Note: see section under cyclones regarding indoor installation as per NFPA 664*
- Separate dust collection systems should be in place for non compatible equipment such as exhaust systems for the welding or filing shop to ensure sparks are not collected by a system conveying wood dust.
- All dust collection equipment including the pneumatic duct work should be bonded and grounded. Pressurized baghouses (sock type collectors) should have the cages and bags grounded and bonded in addition to the unit and duct work. The bonding and grounding should be inspected and tested for continuity on an annual basis.

## **Cyclones**

Cyclones vent wood fines/dust through the top of the unit and should be vented to the exterior of the building to prevent wood dust accumulation inside of the building. The explosion potential is not considered as high with a cyclone due to the open venting at the top of the unit, however if the vent pipe is connected to other equipment such as blower fans (pull through design) or a baghouse, explosion venting should be provided.

Ideally cyclones located outside of any building. NFPA 664 permits the installation of cyclones indoors under the following conditions:

1. If there is no deflagration or fire hazard
2. If the unit is equipped with a deflagration suppression system
3. If the unit is equipped with relief vents that extend to safe areas outside the building and meets collector strength requirements
4. If the unit is equipped with deflagration relief vents exhausting through listed flame quenching devices and meets collector strength requirements

Cyclones should be located outside unless the installation satisfies points 1-4 above.

## **Baghouses**

Pressurized Baghouses (sock type collectors with enclosures) present a significantly increased deflagration hazard due to the pressurized enclosure containing combustible dust in suspension. A documented self testing and inspection procedure should be in place for any protective equipment on a baghouse or cyclone ventilation system. Wood dust and resin can obscure detector eyes and spray nozzles. Wood debris can clog abort gates and back draft dampers. These conditions can affect the operation and reliability of the systems.

### ***Protective Equipment***

- Sprinkler protection (manual or automatic) should be provided within the baghouse enclosure. Protection should either consist of a dry pipe type system with fusible link heads or else a 'quick connect' type system with open heads. If a quick connect system is provided, the baghouse should be equipped with a heat detector inside the unit to notify employees of a potential emergency situation.
- Baghouses connected to known spark producing equipment such as high speed sanders, planers, chippers, etc. should be provided with an approved and listed spark detection and suppression system.
- To further protect the baghouse, a high speed abort gate should be provided as a secondary protection zone after the spark detection/suppression system and prior to the baghouse. Baghouses which return filtered air back inside of any building should be equipped with a high speed abort gate (or similar effective device) to divert the force of an explosion and any burning material away from the building.

### ***Deflagration Venting/Isolation Devices***

- Deflagration/explosion venting is required on the baghouse in order to vent the force of an explosion. The venting system should be designed by a qualified engineer with supporting documentation available for review.
- Explosion venting should be constructed of material that is as light in weight as possible to minimize the vent area required.

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

- The venting should be shielded or directed away from buildings (or other items subject to fire or pressure damage) and areas where personnel congregate. The venting area should be clearly marked or fenced to alert personnel to the potential hazard.
- Clear space should be maintained on both sides of a vent to enable operation without restriction and without impeding a free flow through the vent. A distance of at least two explosion vent diameters between an explosion vent outlet and any large, fixed, flat obstruction (i.e., shielding) should be provided.
- Rupture disks and blast panels should be provided with safety chains or cables, physical shielding (see point above regarding spacing) or similar to prevent the panels discharging from the unit and becoming potential projectiles in the event of an explosion.
- Where explosion venting devices swing out of the way rather than rupture, use gravity or mechanical devices (i.e.; latches, springs etc.) to ensure they cannot re-close and create vacuum conditions that can collapse/implode the protected equipment.
- The vent opening should be free and clear. Vent closure operation should not be hindered by deposits of snow, ice, paint, corrosion, or debris, or by the build-up of deposits on their inside surfaces.
- A rotary air lock should be provided on the baghouse to prevent the communication of burning material to other areas of the process.
- Physical isolation protection (i.e., counter-weighted back draft damper or fire damper) should be provided on the infeed duct leading to the baghouse.
- When ducts pass through a physical barrier that is erected to segregate dust deflagration hazards, physical isolation protection should be provided to prevent propagation of deflagrations between segregated spaces.

### Preventative Maintenance

- A preventative maintenance/self inspection program should be in place with supporting documentation. The program should include the frequency of inspection for the baghouse structure, the bags and the grounding of the unit.
- The baghouse unit and associated equipment should be inspected as per the manufacturers' guidelines or annually at minimum.
- A preventative maintenance program should be in place for the regular (as recommended by the manufacturer) self-testing, inspection and cleaning of both the spark detection eyes and suppression nozzles if applicable.
- A preventative maintenance program should be in place for the regular (i.e., semi-annual) inspection and testing of components such as high speed abort gates and back draft dampers.
- The baghouse unit, including the bags and ducting should be grounded.
- The baghouse unit and associated equipment should be inspected as per the manufactures guidelines, or annually at minimum.

### Storage Silos and Bucket Elevators

Sawdust, shavings and wood fines collected by the dust collection systems are often stored in silos for use as fuel for other parts of the process (i.e., wood fired thermal oil or hot water systems). The material is often conveyed into the silos using bucket elevators.

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

Storage silos used to store dry saw dust or planer shavings have the potential for a deflagration if an ignition source is introduced. In addition the silos have the ability to accumulate a static charge as the material is being moved into or out of the silo. Deflagration venting and grounding should be provided for the silo unit.

Bucket elevators are often used to transfer material into storage silos. Bucket elevators can create potential ignition sources due to belt or bucket misalignment or belt slippage. Alignment and rotation monitors and interlocks should be provided in addition to properly designed explosion venting.

- Silos and bucket elevators should be equipped with properly designed and engineer deflagration/explosion venting.
- Grounding should be provided for storage silos and bucket elevators.
- Automatic sprinkler protection or a dry type deluge system with a 'quick connection' should be provided for the storage silo.
- Heat detection devices (spot type or rate of rise) should be provided within the silo unit to detect any significant increases in temperature.
- Bucket elevators should be equipped with belt slippage/rotation monitors and belt alignment monitors. These monitors should be interlocked to stop operation of the unit and notify the operator.

### **Control—Preventative Maintenance**

#### ***Electrical System Preventative Maintenance***

All electrical equipment should ideally be located inside dedicated rooms provided with slightly positive air pressure and a constant, relatively cool temperature. All electrical room doors and the cabinets inside these rooms should be tightly closed. There should be no combustible materials anywhere inside these rooms. This will help ensure that this equipment operates as designed and separates a potential ignition source from combustible wood debris.

In situations where a separate room cannot be provided, sufficient housekeeping must be conducted so that all electrical equipment is free of both coarse and fine wood dust accumulations. This includes areas on top of electrical cabinets, inside the cabinets, and on the floor next to the cabinets.

Switchgear and other electrical equipment should undergo regular, quick visual inspections. These inspections should be performed with the switchgear energized and in its normal operating condition. Switchgear should be found operating in a clean, cool, dry and tight environment with no abnormal noises, smells, vibration or heat. All electrical cabinet/room doors should be tightly closed. Areas found with unacceptable levels of dust accumulations should be cleaned right away using a method that is appropriate for the area and hazard. Vacuuming is the preferred choice for cleaning inside electrical enclosures. Electrical equipment should be locked-out and de-energized before cleaning.

The following points should be considered for the electrical system preventative maintenance;

- Electrical equipment should be properly maintained and inspected regularly to ensure the components do not fail unexpectedly and create an ignition source.
- Infrared scanning should be conducted on the electrical distribution system on an annual basis. The scanning should be performed by either an external contractor or an employee who have been certified to Level I. Level I certification is the first of three levels of infrared training the ITC offers. Level I infrared thermographers are typically new to infrared thermographic diagnostics. That does not imply that they are entry-

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

level condition monitoring technicians, indeed many Level I professionals have years of experience in building and maintaining complex systems. Level I thermographers generally follow a written test procedure to evaluate specific types of equipment in their facility. They can operate their infrared cameras and software and identify and measure thermal anomalies based on thermal patterns, comparisons with similar equipment, and their own experience.

- “Hot spots” identified during infrared scanning should be repaired. Critical or Serious faults should be repaired promptly.
- Repairs are documented with a follow up scan performed to ensure the “hot spot” has been eliminated.
- A schedule should be in place for electrical room enclosure inspection and cleaning.
- All temporary wiring and use of portable electrical equipment (i.e., radios, fans and heaters) should be eliminated wherever possible.
- Ideally MCC cabinets and other electrical distribution equipment should be located in dedicated enclosures, particularly in hazardous areas. The rooms should be provided with positive air pressure drawn from a clean air source. The rooms should be inspected and cleaned on a regular basis to ensure there is no dust ingress into the room and that the room remains free of combustible storage.
- Dedicated electrical rooms should meet the requirements of the BC Building Code for service room construction. All penetrations/openings should be sealed with a fire-rated stopping compound. The electrical safety regulation requires an electrical equipment vault when that room contains oil-filled electrical equipment (refer to CDN Electrical Code Part 1). Electrical equipment vaults must have a 3 hour fire rating unless the room has automatic sprinkler protection, which reduces the requirement to a 2 hour rating. Other service rooms containing electrical equipment require a 1 hour fire rating (refer to the BC Building Code for specifics)
- A schedule should be in place for MCC panel inspection and cleaning; prioritization is based on evaluation of accumulation rates. Electrical wiring, fittings and other devices should be properly sealed. Open MCC cabinets should be visually inspected on a regular basis to ensure the cabinet doors and access covers for energized equipment are closed and secured with all fasteners in place.
- The electrical switch gear and distribution breakers should be calibrated and load tested (i.e.; megger testing) every 3 – 5 years by a qualified contractor.

### **Mechanical Systems Preventative Maintenance**

A preventative maintenance program can vary from a highly complex computerized system that generates and tracks work orders to a paper based system that requires manual entry for tracking.

The key component for the auditor to confirm is the overall effectiveness of the program with a focus on maintenance items which can pose a fire risk. This can be verified by visual observations, document reviews or interviews with maintenance staff.

The following points should be considered for the mechanical system preventative maintenance program;

- A formal preventative maintenance program should be in place. The program can be either predictive or reactionary.
- A method should be in place to log and track items requiring repair or that have been repaired.
- The program should include the inspection of friction producing equipment such as bearings, conveyor spools, belt drives, etc.

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

- Vibration monitoring should be considered for rotating equipment.
- Temperature monitoring or infrared scanning should be considered on large motors and high speed bearings (i.e.; planer)

### 5. Management of Change

A management of change process should exist at the facility. The Auditor must review the Facility change management process to confirm that combustible wood dust hazard is considered when evaluating the impact of change.

The following points should be considered for the management of change program;

- Management of Change process should exist.
- Combustible wood dust hazard is addressed in the management of change program.
- A process should be in place to re-evaluate the hazard when an equipment or process change occurs. The process should include identification, communication and management of change in the facility.
- A risk and hazard assessment should be completed for hazards associated with combustible wood dust that may result from the change.
- Action plans should be developed to address any identified concerns.
- A follow-up process should be in place to ensure that actions are completed and appropriate controls are implemented.
- Relevant policies, work procedure, etc. should be updated to reflect the change.
- Upset conditions such as temporarily disabled ventilation systems etc. should be identified as part of the management of change process.
- An appropriate action plan such as increased housekeeping or equipment isolation should be completed until conditions return to normal.

### 6. Fire Safety Plan

The Auditor should confirm that the Facility has reviewed and updated its Fire Safety Plan to include changes that may be required to accommodate hazards associated with combustible wood dust. For example, have muster station locations been reviewed in terms of proximity to buildings where a combustible dust explosion could occur? Another example may be use of explosion proof emergency lighting and exit signs in buildings where a combustible dust explosion could occur.

The following points should be considered to facilitate documentation of the Fire Safety Plan:

- An education and training program should be provided for the use of fire suppression equipment such as fire extinguishers and hoses
- Local authorities (emergency response personnel) should be aware of emergency response plans
- Pre-incident planning inspections by emergency response personnel should be conducted in conjunction with plant management with a focus on hazardous areas
- Employees should be given emergency response training appropriate for their individual (and collective) responsibilities

## Wood Dust Mitigation and Control Audit – Questionnaire / Guidelines

- Emergency procedures for fire and evacuation should be tested and evaluated on an annual basis
- Site emergency evacuation procedures are posted and current
- An effective means to communicate an emergency situation throughout the facility should be in place
  - Intercom
  - Sirens or alarms
  - Other
- Employees must be knowledgeable about the Fire Safety Plan
- An individual(s) shall be designated with responsibility for the above program

### 7. Training and Orientation

The Auditor must determine if the training being provided is adequate for the hazards and risks associated with combustible wood dust in the Facility.

The indoctrination, education and training programs should include information on:

- Characteristics of combustible dust
- Identification of combustible dust hazards
- Methods of control for combustible dust
- Identification and control of ignition sources
- Fire fighting controls
- Emergency response procedures

The Auditor should evaluate the indoctrination, education and training programs through review of training materials, safe work procedures and training records. The Auditor should consider the following:

- The Facility should integrated combustible wood dust awareness and training into the safe work procedures
- The Facility should conduct a training needs analysis to determine what employees require specific training pertaining to combustible wood dust in the workplace
- Employees should be knowledgeable of their responsibilities pertaining to combustible wood dust in the workplace (this can be confirmed through interviews of employees identified in the training needs analysis)
- Contractors should be subject to indoctrination and training with a specific focus on the hazards of combustible dust

The auditor must confirm that contractors are provided with appropriate training, education and orientation programs as well. If possible, this should be confirmed by interviewing a sample of trades people and other contractors.

*To be in conformance with this question the Auditor must confirm the above criteria is met in all areas where hazard controls have been implemented.*



## 8. Auditing Internal/External

The Facility should ideally have an internal auditing program in place or else utilize an external auditor to identify potential dust hazards and mitigation options.

- The facility should have an annual internal wood dust mitigation and control audit or evaluation process in place
- Internal auditors if in place should be educated and trained on wood dust mitigation and control. External auditors if used should be fully educated and trained on the hazards and mitigation controls related to combustible dust
- Defined standards and protocols should be used by either internal or external auditors
- The facility should engage the services of a 3<sup>rd</sup> party auditor to complete a formal Wood Dust Evaluation once every 3 years
- Any non-conformance items identified from previous 3<sup>rd</sup> party audits should be corrected in a timely manner
- Results of the audits (internal or external) should be communicated to management and employees

### Disclaimer

This *Wood Dust Mitigation and Control Audit Auditor Worksheet, Questionnaire and Guidelines* (these “*Guidelines*”) have been developed and, subject to the terms and conditions set out in this disclaimer, are made available by the Manufactures’ Advisory Group (“MAG”) to assist British Columbia wood product’s producers (“Producers”) and auditors engaged by Producers (“Auditors”) with, among other things, the identification of combustible wood dust produced in wood products production operations, the assessment of the hazards of combustible wood dust, the adoption of industry best practices and mitigation strategies, and compliance with applicable regulatory requirements.

These *Guidelines* are provided to all users on an "AS IS" basis and MAG, its members, and all its and their respective affiliates and subsidiaries (the “MAG Group”) do not provide and disclaim any and all warranties, guarantees and representations with respect to these *Guidelines*, any and all information, statements, advice, suggestions or guidance contained therein, and any use thereof or reliance thereon whatsoever, whether express, implied, statutory or otherwise, including without limitation, any warranties, guarantees or representations as to the accuracy, completeness, usefulness or fitness of these *Guidelines* for any purpose including compliance with applicable regulatory requirements.

All Producers, Auditors and other users of these *Guidelines* should consult with professional advisors including legal counsel in assessing and complying with their obligations under applicable regulatory requirements and should not rely on in any way on these *Guidelines* or any information, statements, advice, suggestions or guidance contained therein in assessing and complying with such obligations.

The MAG Group disclaims any and all liability arising out of or in connection with any use of these *Guidelines* and shall not be responsible or liable for any use of or reliance on these *Guidelines* or any loss, injury, damage or claims of any kind or nature resulting from such use or reliance whether suffered or incurred by the Producer, the Auditor, any other user or any third party, or to make any corrections to these *Guidelines* or to provide any support or assistance with respect to it.

Each Producer, Auditor or other user of these *Guidelines* acknowledges and agrees that it is solely responsible for deciding if, when and how to use these *Guidelines*, and does so at its, his or her sole risk and further agrees to hold the MAG Group harmless for any loss, injury, damage or claims that may be suffered or incurred (including by third parties) arising out of any use thereof. Under no circumstances shall the MAG Group be liable for any loss, injury, damage or claims including incidental, special or consequential damages, arising from any use of these *Guidelines*.

By using, copying, modifying or distributing these *Guidelines* in whole or in part, or in any way, all users accept, without limitation or qualification, all of the terms and conditions in this disclaimer.

Permission to use and copy these *Guidelines* for any purpose and without fee is hereby granted, provided that the above disclaimer notice appears in all copies.

## Appendix A—References and Links

- WorkSafeBC “Sawmills”: [http://worksafebc.com/news\\_room/features/2012/sawmills/default.asp](http://worksafebc.com/news_room/features/2012/sawmills/default.asp)
  - Order: [http://worksafebc.com/news\\_room/news\\_releases/assets/nr\\_04\\_26\\_12/SawmillDirective.pdf](http://worksafebc.com/news_room/news_releases/assets/nr_04_26_12/SawmillDirective.pdf)
  - Combustible Dust Strategy Phase 1 (sawmills):  
[http://www.worksafe.wcb.bc.ca/news\\_room/features/2012/assets/pdf/Combustible%20DustStrategyPhase1.pdf](http://www.worksafe.wcb.bc.ca/news_room/features/2012/assets/pdf/Combustible%20DustStrategyPhase1.pdf)
  - Combustible Dust Strategy Phase 2 information bulletin:  
[http://www.worksafebc.com/news\\_room/features/2012/assets/pdf/IBCombustibleDustStrategy.pdf](http://www.worksafebc.com/news_room/features/2012/assets/pdf/IBCombustibleDustStrategy.pdf)
- Emergency Management BC (Office of the Fire Commissioner): <http://www.embc.gov.bc.ca/ofc/services/index.htm>
  - Fire Safety Planning for buildings containing wood dust producing operations (FIPI letter):  
[http://www.embc.gov.bc.ca/ofc/services/bulletins/pdf/ib\\_fsp\\_building\\_wood\\_dust.pdf](http://www.embc.gov.bc.ca/ofc/services/bulletins/pdf/ib_fsp_building_wood_dust.pdf)
  - Combustible Dust: [http://www.embc.gov.bc.ca/ofc/services/bulletins/pdf/ib\\_combustible\\_dust.pdf](http://www.embc.gov.bc.ca/ofc/services/bulletins/pdf/ib_combustible_dust.pdf)
- BC Safety Authority: <http://www.safetyauthority.ca/>
  - Orders:
    - <http://www.safetyauthority.ca/alert/electrical-safety-order-electrical-equipment-located-sawmills>
    - <http://www.safetyauthority.ca/alert/safety-order-combustible-dust-hazard-wood-processing-facilities>
- FP Innovation: <https://fpinnovations.ca/Pages/home.aspx>
  - 2013 Industry Dust Sampling Report: [http://www.cofi.org/wp-content/uploads/2012/07/dust\\_sampling\\_protocol.pdf](http://www.cofi.org/wp-content/uploads/2012/07/dust_sampling_protocol.pdf)
  - Sampling Protocols: [http://www.cofi.org/wp-content/uploads/2012/07/dust\\_sampling\\_protocol.pdf](http://www.cofi.org/wp-content/uploads/2012/07/dust_sampling_protocol.pdf)
- NFPA: References; to but not limited to;
  - NFPA 664: Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities
  - NFPA 654: Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids
  - NFPA 69: Standard on Explosion Prevention Systems
- FM Global Data Sheets
  - Prevention and Mitigation of combustible dust explosion and fire; Data Sheet 7-76  
<http://www.fmglobal.com/FMGlobalRegistration/Vshared/FMDS0776.pdf>

## **Appendix B—Sample Interview Questions for Auditors**

1. What are the hazards of dust accumulations and when are the levels deemed hazardous?
2. What do you do to protect yourself from the hazards of wood dust accumulations?
3. Where do you go to find out more information on the hazards of wood dust?
4. Are you aware of your right to refuse unsafe work?
5. What training have you had on the hazards of wood dust?
6. How often is this education and training reviewed?
7. What are your responsibilities for managing the hazards of wood dust?
8. What methods do you use to clean up wood dust?
9. What sort of training have you received regarding the Fire Safety Plan and emergency response procedures?
  - A) Are there drills? When was the last one?
  - B) What are your responsibilities on the Fire Safety Plan and emergency response procedures?

## Appendix C—Suggested Auditor Qualifications

To ensure the credibility and value of the wood dust mitigation and control audit, the audit should be conducted by an individual that is qualified to make a comprehensive evaluation the facility as well as the programs employed to define and manage the dust hazard. Although auditor qualifications are not strictly defined at this time, a combination of the following is suggested as minimum requirement for an individual conducting the audit:

- Industry knowledge and work experience in woodworking facilities, sawmills in particular – minimum 3 to 5 years
- Understanding and knowledge of applicable codes, standards and guidelines
  - NFPA – dust hazard classification, fire and explosion prevention, boiler and combustion safety, etc.
  - IEC – classification of explosive atmospheres
  - BC Fire Code – hazardous processes and operations
  - BC Building Code – service room construction requirements
  - Canadian Electrical Code – electrical installations and safety requirements
  - CSA codes – natural gas and propane installation, storage and handling
- Education and/or professional designation
  - Professional Engineer (P. Eng.) or Engineer-in-Training (E.I.T.)
  - Applied Science Technologist (A.S.T.) or Certified Engineering Technologist (C.E.T.)
  - Canadian Risk Manager (C.R.M.)
  - Certified Fire Protection Specialist (C.F.P.S.)
  - National Fire Protection Association (N.F.P.A.) fire inspector certification (CFI or CFI-II)
  - Certified Fire and Explosion Investigator (C.F.E.I.)
  - Inspector/auditor from a regulating authority such as B.C.S.A., WorkSafe BC or O.S.H.A. with direct experience in the woodworking industry
  - Journeyman electrician with knowledge on hazardous electrical classifications
- Specific education, training and experience related to auditing of industrial facilities and management programs/systems

Please note that the codes, standards, guidelines, education and professional designations referenced above are primarily for Canada. Where appropriate, the international equivalent should be considered.