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| --- | --- | --- | --- | --- | --- | --- |
|  | | Potential consequence / severity of outcome | | | | |
| 1 | 2 | 3 | 4 | 5 |
| Likelihood of harm occurring / frequency of occurrence | | None  no injury or adverse effects | Minor  first aid injury | Moderate  lost time injury | Major  hospital treatment | Catastrophic  disabling injury or death |
| Could happen, but probably never will. | 1 - Rare | 1 | 2 | 3 | 4 | 5 |
| Not likely to occur in normal circumstances. | 2 - Unlikely | 2 | 4 | 6 | 8 | 10 |
| May occur at some time. | 3 - Possible | 3 | 6 | 9 | 12 | 15 |
| Expected to occur at some time. | 4 - Likely | 4 | 8 | 12 | 16 | 20 |
| Likely to occur on many occasions. | 5 – Almost certain | 5 | 10 | 15 | 20 | 25 |

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| Total | Level of risk | Timescale / action |
| 1 to 5 | Low | No additional physical control measures are required however monitoring is necessary to ensure controls are maintained. |
| 6 to 10 | Medium | 3-6 months - efforts should be made to reduce the risk to an acceptable level. |
| 12 to 25 | High, or stop | Immediate - work should not be started until the risk has been reduced to an acceptable level. Where the risk involves work in progress, urgent action should be taken. If it is not possible to reduce risk even with unlimited resources, work will have to be stopped. |

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| **Step 1**  What are the hazards? | **Step 2**  Who might be harmed and how? | **Raw risk rating** | **Step 3**  What do you have in place? | **Step 4**  Is anything further needed?  Yes / No | **Step 5**  Action and review | **Residual risk rating** |
| Spot hazards by:   * Walking around your workplace. * Asking those doing the task what they think. * Checking manufacturers’ instructions. * Considering health hazards. | Identify groups of people:   * employees * lone workers * pupils * service users * temporary / agency staff * contractors * volunteers * members of the public * children (including work experience). | When there are no control measures are in place.  State total score. | List what is already in place to reduce the likelihood of harm or make any harm less serious, examples include:   * guarding * training * procedures, safe systems of work * personal protective equipment (PPE). | You need to make sure that you have reduced risks ‘so far as is reasonably practicable’.  An easy way of doing this is to compare what you are already doing with good practice. If there is a difference, indicate ‘yes’ and list what needs to be undertaken in the action column. | Remember to prioritise hazards that are high-risk and have serious consequences first:   * List the actions required and who needs to complete and by when. * Check actions are correctly completed. * Check controls remain in place. * Review the risk assessment annually, or earlier if there is an incident or if the work activity changes. | Level of risk when all control measures are in place.  State total score. |

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| --- | --- |
| **Activity / operation/ event:** | |
| **Establishment:** | **Assessment date:** |
| **Assessor name / position:** | **Review date:** |

**See the list of suggested actions and control measures required for the hazards identified – below the risk assessment template.**

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| **Step 1**  Identify the hazards | **Step 2**  Who might  be harmed and how? | **Raw risk rating** | **Step 3**  What do you have in place? | **Step 4**  Anything further  needed?  **Yes / No** | **Step 5**  Action and review | | | |
| state total score | **Action required** | **Residual risk rating**  state total score | **Responsible**  **person** | **Date completed** |
| 1 - No annual service or maintenance regime leading to worn components, possible blockages within the system which has the potential to cause a dust concentration which could lead to an explosion and a build-up of Carbon Monoxide (CO). | Contractors, employees, temporary or agency staff and other 3rd parties – injury or harm caused by CO poisoning and explosion/fire. |  |  |  |  |  |  |  |
| 2 - Build-up of CO leading to poisoning. | Contractors, employees, temporary or agency staff and other 3rd parties – injury or harm caused by being poisoned. |  |  |  |  |  |  |  |
| 3 - Danger of moveable parts e.g. rotary arm (agitator) that sweeps the biomass fuel into the auger. | Contractors – injury or harm caused by mechanical parts. |  |  |  |  |  |  |  |
| 4 - Explosion or fire. | Contractors, employees, temporary or agency staff and other 3rd parties – injury or harm caused by an explosion or fire. |  |  |  |  |  |  |  |
| 5 - Possible wood gas escape from biomass boiler combustion chamber which can lead to the fuel load on the grate to gasify.  *A problem is unlikely to occur providing the boiler flue has been designed to evacuate the boiler combustion chamber in the event of a total electrical failure.* | Contractors, employees, temporary or agency staff – injury or harm cause by gas inhalation. |  |  |  |  |  |  |  |
| 6 - Combustion chamber flash-back when opening the chamber doors. | Contractors – injury or harm caused by flash-back. |  |  |  |  |  |  |  |
| 7 - Inappropriate oxygen content to the boiler to ensure full combustion process. | Contractors, employees, temporary or agency staff – injury or harm caused by explosion or fire. |  |  |  |  |  |  |  |
| 8 - Operation of boiler by unskilled personnel, leading to malfunction of boiler. | Contractors, employees, temporary or agency staff – injury or harm caused as not competent to use equipment. |  |  |  |  |  |  |  |
| 9 - Excessive inhalation of dust leading to respiratory disease. | Contractors – injury or harm caused by dust inhalation. |  |  |  |  |  |  |  |
| 10 - Manual Handling injuries. | Contractors – manual handling injury caused. |  |  |  |  |  |  |  |
| 11 - Delivery Vehicle collisions with pedestrians. | Contractors, employees, temporary or agency staff and other 3rd parties – injury or harm caused by collision with delivery vehicle. |  |  |  |  |  |  |  |

**Suggested actions / control measures for the hazards identified:**

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| Hazards: | Suggested actions / control measures: |
| 1 – No annual service or maintenance regime leading to worn components, possible blockages within the system which has the potential to cause a dust concentration which could lead to an explosion and a build-up of Carbon Monoxide (CO). | * Ensure the boiler and pellet feed mechanism etc. is cleaned and serviced by a competent person as specified by the manufacturers’ instructions (usually carried out annually). * Regular maintenance by user - follow the manufacturer’s instructions. * Regular weekly visual inspections. * Regular emptying of the ash bins. * Regular greasing of induced draught fan bearings. * Manual brushing of the flue ways. |
| 2 - Build-up of CO leading to poisoning and/or asphyxiation or death. | * Appropriate controls to ensure safe entry for working in confined spaces - see the Health and Safety Executive’s document: [Safe Work in Confined Spaces](http://www.hse.gov.uk/pubns/priced/l101.pdf). * Implement a Permit to Work System as part of the working in confined spaces procedures and follow method statement for safe entry to storage area. * Ensure a suitable work activity risk assessment/method statement is in place and reviewed as necessary. * Appropriate restricted access to the storage area e.g. interlocking key to entry doors. * Only appropriately trained competent persons in confined space procedures to enter the storage area. * Continuous ventilation of the storage area, either mechanically or by being designed to have a through draught. * Always ventilate fuel storage area before entry. * The silo must not be entered when there is a delivery of fuel is emptied into the store. * Do not enter the storage area until you are sure it is safe to do so. * Installation of CO detectors to the plant room/boiler house and the pellet storage area - follow manufacturers guidance for maintenance and the correct siting of detectors. * Use a portable CO detector to check the air quality prior to entry of the storage area. If detectors highlight the presence of CO, turn the heating unit off following the appropriate manufacturer’s instructions, contact the supplier and/or manufacturer and request assistance. * If entry to the storage area is required due to a possible plant failure, re-evaluate the plan of entry on your method statement. Before entry, follow your emergency protocols, ensuring that two people are present (one for entry and one to witness the entry and raise alarm if required). If there is any reason to believe fumes may be present, then entry should not occur until 30 minutes after this has dissipated. * Ensure a safe system of work is followed when working in the storage area e.g. consideration given to duration of work time, effective communication channels, appropriate PPE such as overalls, a rated dust mask (a disposable respirator of class FFP2 (EN149) or re-usable cartridge P2 (EN143). * Fuel storage to be kept free from any water ingress (wet fuel leads to fermentation which can have associated risks of dangerous gas build up). * Warning signs must be placed on both sides of the storage access entry door(s) so that it can be seen when the door is open. The warning signs should include the following information:   DANGER – RISK OF CARBON MONOXIDE POISONING  There is danger to life from odourless carbon monoxide and lack of oxygen. Check atmosphere before entry. No entry for unauthorized persons. Keep children away from storeroom. |
| 3 - Danger of moveable parts e.g. rotary arm (agitator) that sweeps the biomass fuel into the auger. | * Procedures for an interlocking system are in place to shut off the hopper delivery and isolate the auger prior to entry. * Only competent trained persons to carry out any operational issues with any moving parts as specified by the manufacturers. * A Permit to Work must be in place before any work commences, and both the premises manager and contractor must complete the appropriate sections of the form at the appropriate times. The Permit must be clearly displayed at a suitable location in the work area, prior to commencement of the work. |
| 4 - Explosion or fire. | * Scheduled maintenance regime of the biomass boiler and all its components (flue ducts and chimneys etc.). * Correct operating procedures as per the manufacturer’s instructions are followed. * Possible installation of a water sprinkler system (this is not a legal requirement however it is considered good practice). * Combustible materials are not stored in the boiler house. * The fuel storage area is used only for its intended purpose (no other combustible materials are stored. * There are no possible ignition sources within the fuel storage area, particularly electrical fittings. * If it is necessary to install electrical equipment within the fuel storage area, the equipment should be suitably IP (ingress protection) rated against dust ingress (IP 50 or 60). Please note if such equipment is installed it requires ongoing maintenance, expertise is unlikely to be available from ‘local’ electricians. * Use battery operated or intrinsically safe lamps when inspecting fuel stores. * Dust concentration is effectively controlled within the wood storage area to prevent dust accumulation and ensure that dust cannot escape into other areas such as the boiler room. * Restricted access controls are in place for the boiler house and pellet wood store. * A good quality fuel supply is purchased. |
| 5 – Possibility of wood gas escape from biomass boiler combustion chamber which can lead to the fuel load on the grate to gasify.  *A problem is unlikely to occur providing the boiler flue has been designed to evacuate the boiler combustion chamber in the event of a total electrical failure.* | * The manufacturer’s control system is followed to shut down a biomass boiler in a controlled fashion before removing electrical power from the boiler house. * Only fully trained operators shut down the biomass boiler. |
| 6- Combustion chamber flash-back when opening the chamber doors. | * Regular checks of the oxygen reading on the display panel are made - reading should not be less than 3% 02 on startup. |
| 7 - Inappropriate oxygen content to the boiler to ensure full combustion process. | * Fully trained operators only to monitor the Lambdatronic controller panel of the biomass boiler to identify faults within the system. * Only competent contractors carry out any remedial works. |
| 8 - Operation of boiler by unskilled personnel leading to malfunction of boiler. | * Only fully trained and competent persons operate the boiler. * Restricted access to boiler house and fuel storage area. * Permit to work system for maintenance activities. |
| 9 - Excessive inhalation of dust leading to respiratory disease. | * Appropriate control measures are in place to minimise the inhalation of dust. * The appropriate personal protection equipment face mask BS 4275 EN149 2001 FFP2/3 is used when emptying ash bins, brushing the flue ways or any other dust control related tasks. |
| 10 - Manual handling injuries. | * A work activity assessment is in place for the loading/unloading of pellet deliveries. * All personnel receive manual handling training. * Mechanical aids are used to move heavy items. |
| 11 - Delivery vehicle collisions with pedestrians. | * A vehicle and pedestrian risk assessment is in place. |