Ministry of Defence

SAFETY ALERT

Subject: POTENTIAL CARBON MONOXIDE (CO) RELEASE DURING THE STORAGE OF WOOD PELLETS

Number: 09/12

Health and Safety

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Who should read this:

Top Level Budget Holders, Prime Contractors, Private Finance Initiatives, Public, Private Partnership and other traditionally procured contracts, Project Managers, Site Estate Authority Teams and Property Managers with responsibility for MOD projects and Property Management Works Services (including the legacy work of EWCs/WSMs), Coordinating Authorising Engineers, Authorising Engineers Mechanical and Confined Spaces, Authorised Persons Mechanical and Confined Spaces, and Designers, Installers and Maintainers of equipment using or storing wood pellets.

When it takes effect: Immediate	When it is due to expire: when rescinded

Document Aim:

To raise awareness of the dangers associated with the storage of wood pellets. Since 2002 there have been at least nine fatalities in Europe caused by carbon monoxide poisoning following entry into wood pellet storage areas. Although there have not been any incidents

so far in the UK the use of wood pellets is increasing and awareness of this danger is required.

1. Introduction

Wood pellets are made from dried and milled sawdust and wood shavings that have been compressed into pellets, typically 10-20mm long and 3-12mm in diameter. They do not typically contain any additives or binders. They are classed as a biofuel, a non-fossil fuel.

2. Background

Wood pellets for boilers are normally stored in a large sealed hopper/tank or a storage room that has a screw feeder (auger) connected to the boiler. Alternatively, the hopper/tank can be mounted over the boiler for gravity feeding. Due to the enclosed nature of these hoppers/tanks/rooms, the atmosphere inside can become oxygen depleted and a toxic atmosphere containing carbon monoxide can accumulate. The chemical reactions responsible for carbon monoxide production from wood pellets are assumed to be an auto-oxidation process, especially oxidation of the fatty acids to be found in wood.

Experimentation has shown that small quantities of wood pellets can produce life-threatening quantities of carbon monoxide in a confined space and that there are various factors that will affect the amount of carbon monoxide produced:

- Age - pellets will produce more carbon monoxide within the first six weeks of being manufactured.
- Temperature - more carbon monoxide is produced at higher temperatures.
- Wood type - pellets made from pine contain more unsaturated fatty acids than spruce so produce more carbon monoxide.
- Other factors - carbon monoxide levels will also increase with the amount of available oxygen present, exposed pellet surface area and amount of mechanical abrasion of the pellets that has taken place.

Note: In addition to the risk of carbon monoxide from wood pellets there is also a possibility of carbon monoxide being present because of a back-flow of flue gases via the fuel supply mechanism from the boiler. Causes for this include inadequate equipment being installed or a poorly designed flue.

The full text of the HSE Safety Bulletin and its references can be found on the following hyperlink:

http://www.hse.gov.uk/safetybulletins/co-wood-pellets.htm

3. Requirement

The HSE is advising all those who use, install, maintain or distribute wood pellet boilers and/or manufacture/store/distribute wood pellets to consider the following:

- Wood pellet hoppers/tanks/storage rooms and boilers should always be installed and commissioned by a competent person, normally approved by the manufacturer/supplier. This is particularly important if the installation involves the

replacement of a coal-fired boiler, where existing boiler room and storerooms are often utilised.

- Do not enter the pellet storage area or place your head into a wood pellet hopper as they can contain toxic gases. Personnel are not to enter the hopper/tank unless fully trained and competent in confined space entry procedures. Controls shall be put in place to ensure safe entry as per the HSE's Code of Practice for Working in Confined Spaces. This shall include adequately ventilating the storage area and checking carbon monoxide and oxygen levels with an appropriate device prior to entry. It is recommended that the store room is ventilated at all times, either mechanically or by being designed to have a through draft.

- Ensure that the boiler and pellet feed mechanism etc. is cleaned and serviced by a competent person as specified by the manufacturers' instructions.

- If any problems are encountered with the unit, such as the system not heating correctly or flue gas is flowing into the boiler room, turn the unit off and contact the supplier and/or manufacturer and request assistance.

- Duty holders who store wood pellets, particularly in bulk shall have a suitable risk assessment and safe system of work in place.

- Manufacturers, suppliers and distributors of wood pellets are to provide adequate health and safety information to the user in their materials safety data sheet.

- Warning signs shall be placed on the pellet storage area access door, ideally on both sides so it can be seen when the door is open. The warning sign should include the following information:

    - DANGER - RISK OF CARBON MONOXIDE POISONING - There is a danger to life from odourless carbon monoxide and lack of oxygen. Check atmosphere before entry with an appropriate device. No entry for unauthorised persons. Keep children away from the storeroom.

    - No smoking, fires or naked flames.

    - The room should be adequately ventilated before entering. Keep the door open whilst inside.

    - There is a danger of injury from movable parts.

    - Filling procedures should be carried out accordance to the instructions of the heating installation company and the pellet suppliers.

The MOD advises that all such storage areas should be considered to be Confined Spaces. They should be recorded in the site’s Confined Space Register and entry into them controlled in accordance with the provisions of JSP375, Vol3, Chapter 6 (Safe Working in Confined Spaces).