

Accident Advisory: Worker died after fire at scrap metal yard

Ref: [2021055](#) WSH Alert Accident Notification dated 1 October 2020

On 24 September 2020, an excavator operator was transferring scrap metal into a compactor when a fire broke out. Shortly after, a co-worker found the operator lying on the ground with burn injuries. The operator subsequently succumbed to his injuries at the hospital on 27 September.



Figure 1: Overview of the accident scene with the burnt excavator

Recommendations

Persons in control of similar workplaces and work activities such as occupiers and employers are advised to consider the following risk control measures to prevent similar accidents when carrying out scrap metal operations comprising empty aerosol cans:

Safe handling of empty waste aerosol cans

- Do not accept aerosol cans which are unemptied or damaged as well as faulty cans which are full/partially full, unless your facility is able to empty the aerosol cans in a safe manner and ensure no accumulation of flammable vapours within the work environment*;
- As empty aerosol cans may contain residual amounts of flammable substances, they could pose fire or explosion risks if not properly managed. Therefore, empty aerosol cans should be segregated from other metal waste, placed in separate bins or concrete bays, and labelled accordingly;

*Your company may accept unemptied aerosol cans but you will need to ensure that the aerosol cans are emptied and punctured in a safe manner before recycling them.

- Prior to puncturing, conduct checks to ensure that the aerosol cans are as empty as possible by shaking it and pressing the actuator/nozzle cap button in a well-ventilated environment. Measures should be in place to ensure there is no accumulation of flammable vapours in the work environment which may include the use of local exhaust ventilation, providing flammable gas detection system and ensuring the work environment is free from ignition sources;
- The residual content in empty aerosol cans should be drained before it can be safely processed and recycled. Drained waste should be regarded as hazardous chemicals, managed accordingly, and safely collected and treated, or sent for proper disposal by a toxic industrial waste collector;
- The puncturing procedure for empty aerosol cans should be carried out in an outdoor environment, inside a fume cupboard/chamber or under local exhaust ventilation using an earthed and spark-proof puncturing machine or tool;
- Such puncturing activities should be carried out in a designated safe work area that is well-ventilated and free of ignition sources; and
- Workers should be trained and competent in carrying out the puncturing procedure. They should be equipped with suitable Personal Protective Equipment (PPE) such as face shield, ear plugs, respiratory protection, chemical-resistant gloves, flame-retardant coveralls and safety footwear.

Safe work environment for recovery of punctured waste aerosol cans

- Cordon the metal recovery work area for entry by authorised workers only;
- Employers must communicate to workers the possible hazards that may be encountered during the recovery process and deploy an on-site supervisor to confirm that risk controls are in place prior to work commencement;
- Safe Work Procedure (SWP) to include checking that the aerosol cans have been punctured and free of residual content;
- Deploy only trained and competent workers to operate the excavator;
- Prior to commencing excavator and compactor operations, supervisor and workers should scan the work environment for new on-site hazards and evaluate the need for additional risk controls;
- Empower workers to stop any incompatible work (e.g., welding operations) which may introduce an ignition source to the work environment; and
- Protect recovery workers from contact with the metal waste and possible spray resulting from compactor operations with suitable PPE such as safety helmet, face shield, ear plugs, respiratory protection, chemical-resistant gloves, flame-retardant coveralls and safety footwear;

Emergency preparedness and response

- Form a Company Emergency Response Team and conduct drills for workers in line with the Emergency Response Plan (ERP). The ERP should include an emergency evacuation plan;
- Ensure the availability of fire-fighting facilities (e.g. fire extinguishers, fire hose reels) and first aid equipment at the metal recovery work area; and
- Display on-site the contact information of emergency personnel.

Risk Assessment

Conduct a thorough Risk Assessment (RA) for all work activities to manage any foreseeable risk of fire and/ or explosion during scrap metal operations. The RA should look into the following areas, but not limited to:

- Working closely with waste generators/service buyers to ensure responsible disposal and proper handling of empty aerosol cans prior to submitting them for metal recovery or recycling. Aerosol cans that are not empty, should not be collected;
- Establishing a SWP for empty waste aerosol can puncturing/processing. An enclosed and earthed puncturing device with draining system for aerosol can puncturing

process is recommended to prevent static discharge and unsafe release of flammable gas or vapour into the work environment;

- Implementing a Permit-To-Work system for hot works as a way to prevent incompatible work;
- Installing fixed gas detectors and/ or providing workers with a portable gas monitoring device so that workers can be alerted of flammable gas build-up in the designated work area; and
- Use of technology (e.g. via automated conveyor feeding and/ or remote-controlled transfer operations) to eliminate or reduce the risk of worker exposure to machine and fire hazards.

This advisory is jointly developed by the Ministry of Manpower, Waste Management and Recycling Association of Singapore (WMRAS) and the Workplace Safety and Health (WSH) Council.

Further Information

- Workplace Safety and Health Act
- Workplace Safety and Health (Risk Management) Regulations
- Workplace Safety and Health (General Provisions) Regulations
- Fire Safety Act
- Fire Safety (Petroleum and Flammable Materials) Regulations
- Fire Safety (Company Emergency Response Team) Regulations 2013
- Code of Practice on Workplace Safety and Health Risk Management
- WSH Guidelines on Flammable Materials
- WSH Guidelines on Management of Hazardous Chemicals Programme
- WSH Guidelines for Laboratories Handling Chemicals
- WSH Guidelines on Safe Use of Machinery
- SCDF Guidelines for Emergency Response Plan
- SCDF Guidelines for Company Emergency Response Team
- British Aerosol Manufacturers Association's "Recycling Empty Aerosols from Industrial Commercial and Institutional Premises"

Information on the accident is based on preliminary investigations by the Ministry of Manpower as at 11 December 2020. This may be subject to change as investigations are still on-going. Please note that the recommendations provided here are not exhaustive and they are meant to enhance workplace safety and health so that a recurrence may be prevented. The information and recommendations provided are not to be construed as implying any liability on any party nor should it be taken to encapsulate all the responsibilities and obligations under the law.

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