

**OCCUPATIONAL SAFETY
AND HEALTH STANDARDS BOARD**

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**PROPOSED PETITION DECISION OF THE
OCCUPATIONAL SAFETY AND HEALTH STANDARDS BOARD
(PETITION FILE NO. 505)****INTRODUCTION**

The Occupational Safety and Health Standards Board (Board) received a petition on June 27, 2008, from Mr. Jogen Bhalla, Vice President, AMOT, Inc. (Petitioner). The Petitioner requests the Board to amend the Petroleum Safety Orders – Refining, Transportation and Handling, concerning hazards associated with the use of diesel engines at refineries. The Petitioner recommends adding a requirement that all diesel engines operated at the refineries and associated oil and gas facilities be equipped with automatic air intake shutoff valves.

Labor Code section 142.2 permits interested persons to propose new or revised standards concerning occupational safety and health, and requires the Board to consider such proposals and render a decision no later than six months following receipt. Further, as required by Labor Code section 147, any proposed occupational safety or health standard received by the Board from a source other than the Division must be referred to the Division for evaluation, and the Division has 60 days after receipt to submit a report on the proposal.

SUMMARY

The Petitioner's company manufactures controls and monitoring equipment for internal combustion engines used by the petroleum refineries. The Petitioner notes that diesel engines not properly controlled are a dangerous source of ignition when used in areas where accidental releases of combustible gas, vapor or dust exist. The Petitioner cites recent refinery accidents that were the result of runaway diesel engines and that resulted in 15 deaths and 180 injuries, as well as other data that speak to the seriousness of this hazard.

DIVISION'S EVALUATION

The Division's evaluation report dated September 29, 2008, states the Division supports the petition to the extent that an advisory committee should be convened to consider amendments to Title 8 to require air intake shutoff devices for diesel engines operated in or near industrial processing plants where process failures may result in release of flammable or combustible vapor and diesel engine runaway is possible.

STAFF'S EVALUATION

Board staff's evaluation dated October 6, 2008, states that diesel engines burn fuel by compressing the air/fuel mixture to the point of ignition instead of relying on a sparkplug and ignition timing to ignite the air/fuel mixture as is the case for gasoline engines. Under normal conditions, a diesel engine is stopped by shutting off the fuel supply. During incident conditions, when flammable gas or vapor enters the air intake, the diesel engine may continue to run even when its own fuel source is shut off. This uncontrolled operation of a diesel engine is commonly referred to as a runaway or over-speed condition, and during such operation the fuel gas/vapor concentration in the ambient air will determine the speed (rpm) at which the diesel engine operates. These conditions can result in overheating and catastrophic engine failure, fires and worker injury or fatality. Board staff agrees that a manual or automatic valve installed in the engine's air intake would be effective in shutting off the combustion air and ambient gas/vapor mixture and prevent runaway conditions that could trigger a fire and/or explosion.

Air intake shutoff valves are available in many sizes to accommodate different air intake piping and the available engine compartment space. Engine manufacturers like CAT, Cummins and MTU Detroit Diesel are now offering air intake shutoff valves as factory-installed options; however, the shutoff valves are more commonly installed as after-market devices. The approximate cost for the addition of such valves ranges from \$400 to \$3000, depending on the size of the engine and complexity of the installation. Alternative methods, such as inert gas or carbon dioxide delivery systems, may also be used to limit combustion air into the diesel engines via dilution of the ignitable air-vapor-gas mixture and prevent or stop a runaway condition that could trigger a fire and/or explosion.

Board staff reviewed accident reports from the Texas City refinery explosion, cited by the Petitioner. Board staff considers the Texas City accident case a representative study of the hazards found at refineries and relevant to this petition. Additionally, Board staff reviewed the findings and recommendations from an independent investigative panel (Panel). Board staff believes the Panel's finding that other ignition sources may have ignited the vapor cloud is consistent with the fact that, under normal refinery operations, there are numerous sources of ignition present at refinery sites. These sources of ignition include 1) open-flame furnaces within processing units; 2) flare systems¹, 3) the operation of electric; gasoline and diesel powered vehicles and vehicle mounted equipment, and 4) the operation of stationary internal combustion engines.

The existing ignition sources in the refineries drive the need for refinery design and process safety management to ensure the containment and control of the flammable products.

¹ A flare system is process plant disposal equipment designed to receive and combust waste gases from emergency relief valve discharge or process vents. In an oil refinery, flares convert flammable vapors to less hazardous materials. Flare system equipment includes a vessel, or "knockout drum," that is sized appropriately to safely contain any liquid discharge. After the liquid is removed, the remaining gases are safely combusted by a flare burner.

Compromises in containment and process safety management in or near the process units will often result in fires and explosions because of the presence of ignition sources, including the open flame furnaces.

Under normal operating conditions, sources of ignition, such as those created by the open-flame furnaces, mobile and stationary diesel engines, pose no hazard when all flammable gas and vapor releases are controlled by routing these away from critical areas through vent-stacks or controlled burns in flare systems.

During process incident conditions where containment fails and flammable vapor, gases and liquids are released, the control of ignition sources becomes critical. During these emergency conditions, the control of the ignition hazard posed by the operation of electric drives and internal combustion engines in or on vehicles, as well as stationary equipment, can be problematic unless pre-established administrative controls effectively manage the operation of such vehicles and equipment. Administrative operating controls include the following:

- 1) Limiting access and controlling traffic.
- 2) Prohibiting idling while parked or when equipment is not in use.
- 3) Prohibiting operation during alarm conditions.
- 4) Limiting operations in classified hazardous locations.
- 5) Prohibiting the operations when ambient gas and vapor levels are above a specified % lower explosive limit.

During process safety incidents or emergency operations, when the above administrative controls are not applicable or are ineffective in controlling hazards associated with runaway diesel engines, engineering controls, including the safety device proposed by the Petitioner, may protect workers. The incident conditions described above include emergency shutdown of the refinery during natural disasters or major power failures when diesel powered back-up generators, pumps and compressors are required to enable a controlled and safe shutdown of the processing units. Additionally, emergency operations would include rescue and recovery of workers, the mitigation of releases and fire fighting operations where exposure to flammable materials is likely and where employees are exposed to stationary and vehicle mounted diesel powered water pumps, backup generators and emergency vehicles.

The Petitioner's recommendations, requiring the unconditional installation of air intake shutoff devices on all diesel powered vehicles and vehicle-mounted equipment is not necessary. Effective administrative controls are available and are currently required under Sections 3203, Injury and Illness Prevention Program, and 5189, Process Safety Management of Acutely Hazardous Materials, of the General Industry Safety Orders, to identify and abate or control hazards, including those hazards associated with runaway diesel engines. However, stationary equipment powered by diesel engines is routinely used for emergency backup during power and equipment failures and emergency shutdown of processing units where the probability of containment breaches and the creation of a flammable explosive atmosphere are more likely. Diesel engines operated during these conditions would benefit from the installation of air intake shutdown devices. Additionally, diesel powered stationary and vehicle mounted equipment and

diesel powered emergency response vehicles used during incidents and emergency operations are likely to be utilized when flammable gas and vapor exposure exists and would therefore benefit from the use of an air intake shutoff device.

Based on information gathered in the course of staff's investigation, Board staff believes that portions of the Petitioner's recommendation, to expand the Petroleum Safety Orders – Refining, Transportation and Handling, to require air intake shutoff devices on all diesel powered stationary and vehicle mounted equipment and vehicular diesel engines operating in refineries, be granted to the extent that an advisory committee be convened by Board staff to consider the Petitioner's request, and if appropriate, develop a rulemaking proposal for presentation to the Board at a future Public Hearing.

Board staff recommends that the advisory committee limit its considerations to expanding the current standard to require air intake shutoff devices only for stationary and vehicle mounted diesel powered equipment that will likely be exposed to hazards of containment failures and diesel powered equipment and vehicles powered by diesel engines used as emergency backup and used during incidents, and during abatement and emergency operations.

CONCLUSION AND ORDER

The Occupational Safety and Health Standards Board has considered the petition of Mr. Jogen Bhalla, Vice President, AMOT, Inc., to make recommended changes to the Petroleum Safety Orders – Refining, Transportation and Handling, concerning hazards associated with the use of diesel engines at refineries. The Board has also considered the recommendations of the Division and Board staff. For reasons stated in the preceding discussion, the Petition is hereby granted to the extent that a representative advisory committee be convened to consider requiring air intake shutoff devices on all diesel powered stationary and vehicle mounted equipment and vehicular diesel engines operating in refineries. The Petitioner should be invited to participate in the advisory committee deliberations.