Case 380. 37-year-old sheet metal laborer died of smoke and soot inhalation complications as a result of a fire.

A 37-year-old male sheet metal laborer died of smoke and soot inhalation complications as a result of a fire. The decedent's employer was subcontracted by Firm A to reline an aggregate and sand hopper in a six story aggregate silo. The silo had 4 separate aggregate bins. Two of the bins held sand and the other two bins held stone. The bins were fed by a 178-foot conveyor which had a catwalk alongside of it. The decedent and three coworkers were inside the aggregate bins prepping the worn metal by using hand-held grinders and welding ¼-inch 3-foot by 4-foot steel plate in place using a stick welder. An oxyacetylene torch was also present. Two coworkers were welding the steel plate in one hopper while the decedent and his coworker were grinding or prepping walls in another hopper. One of the welders felt heat near his leg and yelled to his coworker who looked up and saw a wall of fire. The fire department's investigation determined that either by a spark, radiant heat and/or conductive heat from the adjacent welding operations the flame-retardant insulation between the hopper and the building structure ignited. The fire then burned through a compressed gas line further feeding the fire. The coworker working with the decedent heard one of the welders yell to get out. One of the welders attempted to get out of the stone bin via a fixed ladder, but was forced back into the hopper due to the heat. This coworker notified the owner of Firm A of the fire, made a second attempt to exit, and was successful. Firm A's owner arrived using the conveyor catwalk to access a cupola space to yell exit directions to the fixed ladder to the three workers still inside of the hoppers. Two of the remaining three welders were able to exit via the fixed ladder and to safety via the conveyor catwalk. The decedent was overcome by smoke at the base of the fixed ladder. He died one week after the incident from complications of smoke and soot inhalation. The space in which the four coworkers were working had not been identified as a permit-required confined space. A hot work permit program was not in place nor was a fire watch utilized.

MIOSHA General Industry Safety and Health Division issued the following Serious citations to the employer at the conclusion of its investigation.

SERIOUS: WELDING AND CUTTING, GI PART 12

- RULE 408.11213(3): The air in a confined space shall be tested with an approved device and purged, if necessary, before any entry.

  (There was no air monitoring conducted in the aggregate bins, which are permit-required confined spaces, prior to welding operations.)

- RULE 408.11213(3): Ventilation shall be provided in the confined space when an employee is present.

  (There was no mechanical ventilation in the aggregate bins, which are permit-required confined spaces, during welding operations.)

- RULE 408.11213(5): An employee who is trained in rescue procedures and with such equipment as is necessary to effect a rescue, if needed, shall be stationed outside the confined space during welding or cutting operations. An employer shall ensure that an effective means of communication is established between employees in the confined space and the attendant. When safety belts and lifelines are used, they shall be provided and used as prescribed in general industry safety standard Part 33 "Personal Protection Equipment," as referenced in R 408.11202, and attached to the welder's body so that his or her body cannot be jammed in a small exit opening.

  (There was no attendant stationed directly outside of the aggregate bins, which are permit-required confined spaces, during welding operations to perform a rescue.)

- RULE 408.11261(2): An observer shall be assigned whenever welding or cutting is done in an area where a fire could start or one of the following conditions exists:

  (a) Appreciable combustible material in the building construction or contents less than 35 feet (10.7m) from the point of operation.

  (b) Appreciable combustible material more than 35 feet (10.7 m) away but easily ignited by spark.

  (c) Wall or floor opening less than a 35-foot (10.7 m) radius from exposed combustible materials in adjacent areas, including concealed spaces in walls and floors.

  (d) Combustible material adjacent to the opposite side of a metal partition, wall, ceiling or roof which is likely to ignite by conduction or radiation.

  (There was no employee assigned to provide fire watch in and around the aggregate bins during welding operations.)

SERIOUS: THE CONTROL OF HAZARDOUS ENERGY SOURCES (Lockout/Tagout) [REF 408.18502], GI PART 85

- RULE 1910.147(c)(4)(i): Procedures shall be developed, documented and utilized for the control of potentially hazardous energy when employees are engaged in the activities covered by this section.

  (Energy isolation procedures were not utilized on the belt conveyor located above the four aggregate bins inside the cupola of the concrete plant.)

- RULE 1910.147(c)(7)(i)(A): Each authorized employee shall receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy

available in the workplace, and the methods and means necessary for energy isolation and control.

(The appropriate level of energy isolation training was not provided to employees performing maintenance on four aggregate bins inside the cupola of the concrete plant. The aggregate belt conveyor was not isolated during the relining project.)

SERIOUS: PERMIT-REQUIRED CONFINED SPACES [REF 408.19002], GI PART 90, 1910.146(c)(9)

In addition to complying with the permit space requirements that apply to all employers, each contractor who is retained to perform permit space entry operations shall comply with requirements of (c)(9)(i) through (c)(9)(iii).

The contractor *company name deleted* did not inform the host employer, *company name deleted*, of the potential hazards created in the space during the relining project or of the contractor's permit-required confined space program.)