HETA 95-0047-2485
FEBRUARY 1995
VALDOSTA FIRE DEPARTMENT
VALDOSTA, GEORGIA

NIOSH INVESTIGATORS:
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SUMMARY

On November 15, 1994, the Division of Safety Research (DSR) received a request from three fire fighters with the Valdosta Fire Department for a health hazard evaluation in investigating the circumstances of a hazardous materials incident, which occurred August 5, 1994, at the Lowndes Correctional Institute (LCI) in Valdosta, Georgia. The fire fighters requested technical assistance in reviewing both general and specific issues relating to this hazardous materials emergency response: proper incident command structure; training of personnel; the use of proper chemical protective clothing, including the provision of identically trained and equipped backup personnel during operations; medical evaluations of personnel, including baseline and routine periodic physicals and medical evaluations after exposure; and proper decontamination procedures.

The observations and findings made during this health hazard evaluation were as follows: when chemicals are being measured and mixed at the chemical plant, the facility manager or a supervisor should be present at all times; the fire department should develop written standard operating procedures for hazardous materials responses; fire fighters should be trained on hazardous materials responses, using newly developed procedures; and fire fighters should receive routine periodic medical evaluations.

KEY WORDS: SIC 9224 (Fire Departments), fire fighters, chlorine exposure, hazardous materials.

INTRODUCTION

On November 15, 1994, the Division of Safety Research (DSR) received a request from three fire fighters with the Valdosta Fire Department for technical assistance in investigating the circumstances of a hazardous materials incident on August 5, 1994, at the Landaus Correctional Institute (LCI) in Valdosta, Georgia. The fire fighters requested technical assistance in reviewing both general and specific issues relating to this hazardous materials emergency response which included proper incident command structure; training of personnel; the use of proper chemical protective clothing, including the provision of identically trained and equipped backup personnel during operations; medical evaluations of personnel, including baseline and routine periodic physicals, and medical evaluations after exposure; and proper decontamination procedures.

From December 5 to 7, 1994, NIOSH investigators from the Division of Safety Research travelled to Valdosta, Georgia, to conduct an investigation of this incident. The investigation was coordinated through the Valdosta Fire Department and the Georgia Department of Corrections, and consisted of three phases: (1) a site visit to LCI; (2) interviews with several fire fighters, personnel at the incident site, and the emergency room physician who examined the fire fighters after the incident; and (3) review of fire department policies, procedures, and equipment.

BACKGROUND

On Friday, August 5, 1994, at 1530 hours, a call was placed to the Valdosta Fire Department from the Landaus Correctional Institute (LCI) in Valdosta, Georgia, reporting a hazardous materials incident at the chemical plant. LCI is a medium security institution with approximately 350 inmates. Within the grounds of the institution, LCI operates a chemical plant (part of Georgia Correctional Industries) that formulates raw materials into 48 different products, including floor waxes, dishwashing liquids, window cleaners, low-sudsing detergents, and powdered laundry bleach. The finished products are shipped to a main warehouse, where they are sold and distributed throughout the state to tax supported facilities. Approximately 44 inmates work in the chemical plant, along with a staff of 5 state personnel; the facility manager, 3 supervisors, and a data entry clerk.

On the day of the incident, one of the products being mixed at the chemical plant was 14% powdered laundry bleach. This product is formulated in 1000-pound batches by mixing various percentages of sodium sulfate, sodium tripoly- phosphate, soda ash, and 60% sodium dichloroisocyanurate. According to the Material Safety Data Sheet(MSDS), inhalation of dichloroisocyanurate may produce

throat and respiratory tract irritation; however, the MSDS did not reference any chronic effects from overexposure. A small amount of liquid chlorinated oil is added to the mixture for dust control.

A supervisor or the facility manager is present for the mixing of all products. However, the supervisor for the mixing of this product was called away for a few minutes when the oil was being added to the mixture. Upon returning, he realized that three times the amount of oil had been added to the mixture of two batches. At this time, other than an abnormal texture, there was no indication of any problem with the mixture. Since the plant closes at noon on Fridays, and it was then approximately 0900 hours, the supervisor decided to store the improperly mixed product in paperboard barrels on pallets, for proper reformulation the following Monday. The product was contained in its standard shipping containers: small, plastic lined, 100-pound paperboard barrels with lids. (A few 50-pound barrels were also included). The chemical plant closed at 1130 hours.

At approximately 1500 hours, an officer at LCI noticed smoke issuing from the window at the chemical plant. He notified the lieutenant in charge, and three officers responded to the chemical plant to investigate the smoke. Upon entering the plant, they observed the building half full of smoke and smoldering barrels of powdered laundry bleach. A forklift was used to move the three pallets of smoldering powdered laundry bleach to a concrete drive outside the building. The exothermic reaction of the product created a vapor cloud, but did not result in any fire.

In response to the initial call, the Valdosta Fire Department responded with Car 200; Engines 1, 2, and 4; Rescue 1 with trailer; and Tower 2. The captain in Car 200 arrived at the front gates of LCI, assumed command, and gave the order for the engine companies and rescue unit to take-up position behind his car. The captain met with prison officials outside the fence and discussed the situation. The captain had two fire fighters from Rescue 1 suit up in Class A suits and self-contained breathing apparatus (SCBA), enter the grounds and chemical plant to survey the situation. The fire fighters reported there was one, possibly two, broken, smoldering barrels on the floor in the chemical plant that had fallen off the pallets when they were moved. The barrels on the pallets on the outside were also smoldering. When Rescue 1 exited the fenced area, a second team suited up and entered to attempt clean up of the chemical plant

(NOTE: one of the fire fighters from Rescue 1 stated his suit was leaking around the cuff). Car 101, with the deputy fire chief arrived at this time and assumed command of the incident.

At approximately 1600 hours, the facility manager of the chemical plant arrived at LCI. He met with the deputy fire chief and informed him the product they were dealing with was powdered laundry bleach. The facility manager then entered the prison grounds without any type of respiratory protection, and wearing only a disposable plastic suit--and began to physically move the barrels from the pallets so the product would not be clustered in one location. (NOTE: According to the facility manager, he was exposed to the smoldering product probably as much, if not more, than anyone else and did not experience any ill effects.)

After the facility manager told the deputy fire chief the product was powdered laundry bleach, a decision was made to break open all smoldering barrels with pike poles and flood them with water to diffuse the reaction. Several firemen assisted in breaking open the barrels; their personal protective equipment and clothing varied. Some fire fighters wore Class A suits, some wore turnout gear with SCBA, and some wore turnout gear without SCBA.

Engine 1 was moved into the prison grounds to spray water (initially a thin foam spray) on the smoldering barrels. At first, the wind was blowing to the north, carrying the vapor cloud away from the fire fighters. However, a rain storm from the north moved in, which caused the product reaction to increase, and the change in wind direction sent the vapor cloud right over the path of the fire fighters and the decontamination (decon) area. The fire chief arrived on the scene and recommended the trucks and decon area be moved further down the road, out of the vapor cloud, which now covered the area. The deputy fire chief gave the order to move the vehicles and the decon area down the public road which fronted LCI, away from the vapor cloud.

Medical Aspects: Reports conflict with regard to the nature and degree of irritation caused by the large vapor cloud which engulfed the fire fighting scene for a time during the rain storm. Some fire fighters, with no respiratory protection, and close exposure, cited only a mild laundry bleach odor and no irritation. Others noted a stronger odor or chlorine smell, tearing of the eyes, and coughing.

At the advice of the EMT personnel at the scene, seven staff from LCI and approximately 17 fire fighters were advised to be examined at the local hospital. All of the LCI staff were discharged back to duty, apparently with no significant symptoms or medical findings. All but three of the fire fighters were also discharged from the local emergency room. Three were kept overnight for observation, and were discharged the next morning.

According to the emergency room staff, initial findings were mild upper respiratory tract and throat irritation. Two fire fighters have reported subsequent upper respiratory tract conditions including sinusitis, although the exact relationship of these conditions to the incident under discussion has not been fully elucidated by examining physicians.

INVESTIGATION

On August 5, 1994, a hazardous materials (chemical spill) incident at the Landaus Correctional Institute (LCI) was reported to the Valdosta Fire Department. Some fire fighters said they detected a strong chlorine odor; others did not notice any odor. Several fire fighters were treated at the hospital emergency room, and three remained overnight. Primary complaints were respiratory and sinus problems. Three fire fighters with the Valdosta Fire Department requested an investigation be conducted into the circumstances of this hazardous materials incident.

On December 5, 1994, the NIOSH investigators met with the Director for Safety and Environmental Regulations for the Georgia Department of Corrections, and a chemical consultant for Georgia Correctional Industries. This meeting was to discuss their final reports submitted on this incident, and to gather information on the circumstances of this incident from the Correctional Industries' viewpoint.

On December 6, 1994, the NIOSH investigators conducted an opening conference with the Valdosta Fire Department fire chief in his office to discuss the purpose of the NIOSH investigation and the proposed schedule of events, and to obtain a list of fire fighters to interview. After the opening conference, the NIOSH investigators proceeded to the LCI to conduct a site visit with the Director for Safety and Environmental Regulations for the Georgia Department of Corrections, and a chemical consultant for Georgia Correctional Industries. Discussions were held with the chemical plant facility manager, the deputy warden, and several correctional facility officers. These individuals explained the plant's operation and provided information on the events that occurred on the day of the incident.

On the afternoon of December 6, 1994, the NIOSH team returned to the main fire station to interview the fire fighters who were involved in or concerned over this incident. All interviews were conducted in private using the office of the deputy fire chief. All fire fighters interviewed were informed of the purpose of the visit and their cooperation was requested during this investigation. The interviews covered the following areas: the hazardous materials incident at LCI, incident command, training on hazardous materials response, standard operating procedures for hazardous materials response, personal protective clothing and equipment, respiratory protection, medical evaluations after

the incident, and baseline and periodic physicals.

On December 7, 1994, the NIOSH team returned to the main fire station to complete the interviews with fire fighters and other staff, observe the equipment used during a hazardous material response, visit the fire station where respirator maintenance is performed, check respirator maintenance records, review training records, interview the deputy fire chief, and interview and conduct a closing conference with the fire chief.

The NIOSH team received full cooperation and assistance from all parties during all aspects of the HHE. The observations and findings made by the NIOSH team during this investigation are outlined below:

When chemicals are being measured and mixed at the LCI chemical plant, either the facility manager or a supervisor is present to observe correct measurements and procedures. However, on the day of the incident, the person supervising the mixing of the dry chlorine bleach was called away for a few minutes, and an incorrect mixture was made.

The fire department does not have any written standard operating procedure for hazardous materials responses.

Fire fighters receive only an entrance medical examination. No routine periodic medical evaluations are done to assess the fire fighters' ability to carry out their fire fighting or hazmat activities, or to safely wear a respirator. This deficiency also makes it difficult to determine the extent to which the continuing medical complaints of a few of the fire fighters are related to the incident versus pre-existing conditions.

Class A suits were stored in a large wooden box on the rescue trailer. One of the suits was caught between the lid and the box. Possible damage to the suits may occur from this type of storage.

General respirator maintenance procedures appeared to be well organized and carried out according to appropriate regulations and guidelines.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: The fire department should develop written Standard Operating Procedures for hazardous materials responses.[1-7]

Discussion: The Valdosta Fire Department should develop and implement a written procedure that includes, but is not limited to, the following areas: responsibilities, training, and competencies of responders, incident response planning, fire department policies, application of procedures for incident levels, incident command, personal protective equipment, decontamination, safety, and communications.

Recommendation #2: The fire department should provide periodic medical examinations of fire fighters.[1,4,6,8-10]

Discussion: Periodic physical examinations as stated in 29 CFR 1910.120, 40 CFR 311, NFPA l582, and ANSI Z88.6. They are intended to help ensure that fire fighters are able to safely carry out their often strenuous work activities. Periodic medical examinations would also allow the determination of the medical fitness of fire fighters to wear SCBA, as required under 29 CFR 1910.134 for general industry. Periodic medical evaluations would also help assess any adverse effects from workplace exposures.

One factor contributing to the absence of periodic medical examinations appeared to be the belief that an extensive potential exposure list (all chemicals used by all industries in the county) was needed to determine which required screening tests should be included. The NIOSH team believes this view is clearly in error, and that periodic medical evaluations should be conducted for all fire fighters as soon as possible.

Recommendation #3: The Landaus Correctional Facility should require a supervisor be present 100% of the time when chemicals are being mixed.

Discussion: The improper handling and mixing of chemicals at the Landaus Correctional Facility chemical plant have the potential for significant adverse results. Therefore, it is recommended that a supervisor be present 100% of the time during this process. If the supervisor must be called away from the operation, another supervisor should assume responsibility, or the operation should be temporarily halted.

REFERENCES

1. NFPA [1992]. NFPA 1500: Standard on Fire Department Occupational Safety and Health Program, National Fire Protection Association, Quincy, MA.

2. NFPA [1990]. NFPA 1561: Standard on Fire Department Incident Management System, National Fire Protection Association, Quincy, MA.

3. NFPA [1992]. NFPA 471: Recommended Practice for Responding to Hazardous Materials Incidents. National Fire Protection Association, Quincy, MA.

4. 29 Code of Federal Regulations 1910.120, Hazardous Waste Operations.

5. 40 Code of Federal Regulations 355.30, Emergency Planning and Notification.

6. 40 Code of Federal Regulations 311, Worker Protection.

7. 40 Code of Federal Regulations 300.215, National Hazardous Substances Pollution Contingency Plan.

8. NFPA [1992]. NFPA 1582: Chapter 2, Standard on Medical Requirements for Fire Fighters. National Fire Protection Association, Quincy, MA.

9. ANSI Z88.6-84: Standard for Respiratory Protection - Respirator Use - Physical Qualifications for Personnel. American National Standards Institute, Inc. NY, NY.

10. 29 Code of Federal Regulations 1910.134, Respiratory Protection.

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