HETA 91-131/193-2261
OCTOBER 1992
EPA SUPERFUND SITE
NEWARK, NEW JERSEY

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I. SUMMARY

In December 1990 and April 1991, the Division of Respiratory Disease Studies, National Institute for Occupational Safety and Health (NIOSH), received requests for technical assistance from the Environmental Protection Agency (EPA) and Agency for Toxic Substances and Disease Registry (ATSDR). NIOSH assistance was requested "in determining potential and actual health effects to hazardous waste site workers at the White Chemical site" located in Newark, New Jersey.

Three staff involved with early site remediation reported significant respiratory problems suggestive of airway hyperresponsiveness. These persons primarily worked in the "support zone," where no respiratory protection was worn, and were eventually forced by increasing symptoms to avoid the site entirely. A fire official with airways hyperresponsiveness was reported by a local physician. This fire official had made three fire safety inspections at the site prior to remediation.

On December 18, 1990, as part of a health hazard evaluation being conducted at an adjacent facility, NIOSH investigators met with EPA and ATSDR representatives at the White Chemical site. NIOSH investigators returned to the site and completed health questionnaires with 34 current and former site employees on April 22 and 23, 1991. Several former employees who reported health problems from employment at the site were interviewed.

Air sampling in a new trailer serving as the command post and primary worksite of these employees found a formaldehyde level of 0.65 ppm, exceeding the NIOSH Recommended Exposure Limit of 0.016 ppm. Concerns were also expressed about exposures to gases and vapors drifting from the "hot zone." Repeated quantitative sampling with direct reading instruments of the site's "support" and "hot" zones by the EPA found no measurements exceeding EPA standards.

Three of 31 workers employed at the site at time of interview reported sore throat, nausea, or headache symptoms as work-related. Nine of 31 reported respiratory symptoms not believed to be work-related by NIOSH investigators. An equal number reported dermatitis not believed by NIOSH investigators to be work-related.

Four individuals, one of whom completed the questionnaire during the site visit, reported the development of respiratory symptoms possibly secondary to occupational exposures at White Chemical. Medical records of three of the four persons indicated medical histories and diagnostic test results consistent with a diagnosis of reactive airways disease. Records of the fourth person were unavailable. No further cases suggestive of reactive airways disease or other significant respiratory illness have been reported. Continued site remediation may be responsible for no new cases of disease being reported.

Four persons involved with early site remediation and clean-up of a Superfund hazardous waste site were diagnosed with reactive airways disease. Each primarily worked outside of the area designated as requiring respiratory protection.

KEYWORDS: SIC 4953 (Hazardous Waste Material Disposal), EPA, Reactive Airways Disease, Superfund.

II. BACKGROUND

White Chemical Company is a 4.4 acre Superfund hazardous waste site located in Newark, New Jersey. It is situated in a mixed manufacturing/residential area housing 25,000 people within a one mile radius. Large public housing projects are immediately adjacent to the area.

Wastes from a variety of producers had been stored at the White Chemical facility. Numerous leaking, ruptured and uncovered drums were noted by the Newark Fire Department during fire prevention visits in April/May 1990. A fire inspector who made three visits to the site developed sore throat, persistent cough, and eye irritation after each visit. He wore no respiratory protection during the visits.

On May 15, 1990, the facility was taken over by the New Jersey Department of Environmental Protection and Energy (DEPE). Over 11,000, 55-gallon drums, several hundred cylinders, tanks and vats, and a number of laboratory rooms containing thousands of lab-size containers of materials were discovered. The DEPE reported that "improper management had resulted in numerous open containers; frequent releases of hazardous chemicals; damaged, bulging, unlabelled containers; numerous spills; and incompatible materials being improperly stored together." By August 1990, DEPE exhausted its funding and suspended operations. During the period of DEPE operations approximately 1,000 mostly empty drums were removed.

In response to a DEPE request, the U. S. Environmental Protection Agency designated the location as a Superfund site and assumed responsibility for its clean-up on October 1, 1990. EPA has removed approximately 4,000 empty drums from the site. The remaining 7,000 drums and 12,000 laboratory size containers are being staged and separated by type. Additionally, 126 tanks and ten gas cylinders remain on site.

NIOSH received an EPA request for technical assistance in December 1990, to determine adverse health effects to hazardous waste site workers at the White Chemical site. In April 1991, a similar request was received from the Agency for Toxic Substances and Disease Registry.

New trailers were initially placed at the site to serve as a "command post" for EPA staff and contractors. These trailers were located about 20 feet from the "hot zone." About 40 people were on site, with 35 performing the physical clean-up. These clean-up workers wear protective equipment through the day, removing it only when leaving the "hot zone."

In the beginning of EPA's involvement the first week of October 1990, several EPA employees reported developing cough, dyspnea, and dry mouth and throat. Symptoms continued through March/April 1991. These symptomatic employees were primarily confined to the "support zone" and would only use protective equipment on infrequent excursions into the "hot zone." These employees noted a temporal relationship between symptoms and work exposures.

Due to symptoms experienced by "support zone" staff, the command post was moved to a Newark hotel in late October 1990. While the command post was relocated at the hotel, air sampling by an EPA Emergency Response Team discovered a formaldehyde level of 0.65 ppm in the new trailers, exceeding the NIOSH Recommended Exposure Level of 0.016 ppm. Repeated quantitative sampling with direct reading instruments for halogenated and aromatic hydrocarbons, volatile organic compounds, and zinc found no measurements exceeding EPA, OSHA (Occupational Health and Safety Administration), or NIOSH standards in the site's "support" and "hot" zones.

In an attempt to improve the work environment, a replacement "used" trailer was located at the site on October 31, 1990, and triple air filtration was added on December 21, 1990. The air filtration system contained a charcoal filter, was operated in a positive pressure mode, and was designed to filter incoming air for formaldehyde, acid gases, and organic gases. On December 7, 1990, the command center was moved from the hotel to the "used" trailer on the White Chemical Site. Effected employees noted fewer symptoms while inside the replacement trailers. However, exposures to unfiltered outdoor air continued to occur due to frequent opening of the trailer door and the filter's efficiency of less than 100%. There have been no further physical modifications to the command center, but ATSDR recommended to EPA that the command center be relocated further from the "hot zone." EPA has decided not to act on this recommendation due to security difficulties outside the fenced area.

The incidence of fuming drums reportedly increased during warm and humid weather. During rainy weather conditions in late March 1991, some workers noticed odors in the command area and experienced symptoms of dyspnea. Rainy days with thermal inversions often accompanied a change in wind direction, which would direct chemical emissions from the "hot zone" toward trailers in the command center.

As of October 1991, the site contained approximately 7,300 chemical drums. Of these, 3000 have been repackaged

(overpacked), 3000 were considered to be in satisfactory condition as is, and 1300 were White Chemical products in good condition in their original containers. Laboratory tests have identified hundreds of different chemicals.

On site employees work either in the "hot zone" wearing self-contained breathing apparatus (SCBA) and "moon suits," or in the support area with no special protection. Air measurements at the site's perimeter for halogenated and aromatic hydrocarbons, volatile organic compounds, and zinc have not exceeded background levels.

III. METHODS

NIOSH medical investigators made a site visit to White Chemical on April 22 and 23, 1991. All 28 current employees at the time of the visit and six former employees who had reported with medical problems completed an occupational health questionnaire. The NIOSH investigators also met with physicians from a local occupational medicine clinic where several workers were treated. Medical records of some affected employees were obtained and reviewed.

IV. RESULTS

One of the six former workers reported occupational asthma associated with the site. This individual, who no longer works at the site, would not authorize release of private medical records. Three of the 34 current or former workers reported mild symptoms possibly related to work: sore throat (2) and nausea and headache (1).

Respiratory symptoms not related to work were reported by 8 of the 34 workers, and an equal number reported current dermatitis not related to work. The determination of work relatedness was made by the NIOSH investigators.

Two security guards with constant unprotected time in the "support zone" reported no health problems. Each of these employees had four to five months unprotected exposure on the perimeter of the "hot zone." Their chemical exposures should have been similar to those experienced by symptomatic employees, except they did not spend time in the "command post" trailer.

Two additional persons reporting adverse health effects from the White Chemical Company site refused to complete NIOSH health questionnaires. However, they did allow access to their private medical records. Both persons were based in the command post trailers and experienced cough and respiratory tract symptoms severe enough to require control by steroids. Neither showed evidence of airway obstruction on baseline pulmonary function testing. One had a clearly positive methacholine challenge, while the other had inconclusive methacholine challenges (< 20% decrease in FEV_1, a finding suggestive of airway hyperresponsiveness[1].) These lung function decrements were completely reversed after administration of an inhaled bronchodilator. A third individual had made several fire inspection visits to White Chemical prior to its management by New Jersey DEPE. At the time of these inspections he wore no respiratory protection. He had bronchoscopy during an acute exacerbation of his symptoms which revealed significant mucosal inflammation. None of the three are present smokers nor have a history of significant respiratory disease. In the three cases, respiratory symptoms occurred within several hours to two weeks after initial exposures at the White Chemical site. Eventually, all three individuals were forced by increasing respiratory symptoms to avoid the site entirely.

V. CONCLUSIONS

In general, the NIOSH investigators did not find a large number of work-related health complaints. Some workers did mention irritation from occasional strong odors believed to originate from an adjacent brewery or other local industries.

Our data suggest three individuals developed reactive airways disease secondary to occupational exposures at the White Chemical site. One of these inspected the site three times prior to its management by New Jersey DEPE. The other two were located at the site during early remediation efforts and are no longer employed there. Vapor clouds were reported to intermittently enter the "support zone," so the observed airways hyperreactivity may be a reactive airways dysfunction syndrome[2] (RADS) variant (no acute high exposure to respiratory irritants, but repeated low-dose exposures). No air sampling was conducted during any of these incidents, so no relationship to an exposure could be assessed. Another possibility is that these individuals developed symptoms secondary to formaldehyde exposures from the trailers.

No further cases suggestive of reactive airways disease or other significant respiratory illness have been brought to the attention of site management or were detected by the questionnaire survey. It is possible that susceptible individuals had already selected themselves out of the environment due to respiratory symptoms. Another possibility

is that actual occupational exposures were decreasing due to continued site remediation.

As of the NIOSH site visit of April 22-23, 1991, no currently working employee had significant work-related respiratory symptoms. Thus, either all susceptible employees left the work force at White Chemical site and/or exposures at the site had been reduced below threshold limits.

VI. RECOMMENDATIONS

1. No further physical site modifications appear necessary at this time.
2. Only aged trailers should be used at the site to reduce exposure to formaldehyde.
3. During warm rainy conditions, "support zone" employees should minimize unprotected exposure time outside of the filtered trailers.

VII. REFERENCES

1. George, R. B., et. al., (1990): Chest Medicine - Essentials of Pulmonary and Critical Care Medicine, P. 120, 2nd Edition, Williams & Wilkins, Baltimore, Maryland.

2. Brooks M., Weiss M. A. and I. L. Bernstein (1985): Reactive Airways Dysfunction Syndrome (RADS) - Persistent Asthma Syndrome after High Level Irritant Exposures. Chest 88:376-384.

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