

Health Consultation

HEALTH IMPLICATIONS OF BREATHING SMOKE DURING THE
FIRE AT DETCO INDUSTRIES INCORPORATED

CONWAY, FAULKNER COUNTY, ARKANSAS

EPA FACILITY ID: ARR000012955

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

Agency for Toxic Substances and Disease Registry

Division of Health Assessment and Consultation

Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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INDUSTRIES INCORPORATED

CITY OF CONWAY, FAULKNER COUNTY, ARKANSAS

EPA FACILITY ID: ARR000012955

Prepared by:

Arkansas Department of Health
Under Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

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Statement of Issues and Background

Statement of Issues

In August of 2004, the Arkansas Department of Health (ADH) was requested by a community representative for approximately 100 Conway residents to investigate whether maladies experienced by those community members might be related to breathing smoke during the Detco Warehouse fire, on January 6, 2004. Visible smoke was present during the fire (Appendix A, Figures 1-2).

ADH obtained air-sampling data collected on the day of the fire by the 61st Civil Support Team (61st CST) of the Arkansas National Guard. The purpose of this document is to examine the potential adverse health effects associated with breathing the smoke from the fire. ADH has prepared this health consultation under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR).

Background

ADH addressed the potential health effects associated with the ingestion and dermal pathways as they related to the Detco Warehouse fire in two previous health consultations. ADH concluded the soil in the residential yards adjacent to the Detco Warehouse, and the surface water runoff originating from firefighting efforts posed *no apparent public health hazard*. Conclusions were made after having reviewed the specific media sampling data collected by the Arkansas Department of Environmental Quality (ADEQ) [1-2].

Detco Industries Incorporated is located in an industrial park at 605 East Robins Street, Conway, Faulkner County, Arkansas. Incorporated in 1988, Detco produces liquid products, powders, and a line of aerosol products and other industrial chemicals for use in industrial maintenance. The facility regularly stored and used methanol, hydrofluoric acid and sulfuric acid (Appendix B, Table 1).

At approximately 11:00 a.m. on January 6, 2004, an explosion occurred in the 37,000-square-foot Detco Warehouse used to produce industrial chemicals. The fire generated a large quantity of smoke. Persons reported seeing the smoke plume 30 miles away from the fire [3]. As a result of the uncertainty of the dangers associated with the site, evacuation of a ½-mile radius was initiated. This included residents in 190 mobile homes, three houses, an elementary school, a day-care center, and a paper factory that employs 540 people [4]. The exact number of people potentially exposed to the smoke is not known. It is estimated that approximately 1,000 people may have been exposed to the smoke before being evacuated, including 31 Detco employees.

The 61st CST screened the air around the facility [5]. The 61st CST entered the area of the fire at 4:42 p.m. (Commander, 61st CST, personal communication with ADEQ, January 7, 2004); almost 5 hours after the fire had begun. The 61st CST used Draeger colorimetric tubes, MultiRAE, and HAPSITE chemical identification system for testing air quality. These instruments are qualitative screening tools used for a wide range of chemicals. They provide critical entry decision-making information in minutes, what could otherwise take days or even weeks if samples were collected and sent to a lab.

Detco hired an independent contractor to collect air-sampling data as well. Information related to the independent contractor's sampling activities was not available to ADH, and therefore not considered in this health consultation.

The 61st CST air-screening results using the Draeger colorimetric tubes for Phosgene (a major industrial chemical used to make plastics and pesticides) and acid gases indicated no detects (no color changes). The MultiRAE instrument indicated a concentration of 0.4 parts per million (ppm) of volatile organic compounds (VOCs) and 4.0 ppm carbon monoxide. The HAPSITE chemical identification system did not detect any chemicals above a strength index (SI) of 600. The 61st CST used a SI above 700 in the presumptive analysis phase to warrant further tests. No further tests were performed.

Discussion

Exposure to, or contact with, chemical contaminants drives the ADH health consultation process. Chemicals may adversely affect people only if exposure occurs; that is, they must come into contact with the chemicals and absorb them into their bodies. The presence of chemical contaminants in the environment does not always result in contact and contact does not always result in the chemical being absorbed into the body. The most common ways people come into contact with chemicals are by inhalation (breathing), ingestion (eating or drinking), or by dermal contact (absorption through skin) with a substance containing the contaminant.

Whether adverse health effects occur depends on: 1) the toxicological properties of the chemicals; 2) the manner in which the person contacts the chemical; 3) the concentration of the chemical; 4) how often the exposure occurs; 5) how long the exposure occurs; and 6) how much of the chemical is absorbed into the body during each exposure event. Health assessors use comparison values as screening tools to evaluate environmental data relevant to exposure pathways.

The data provided to ADH by the 61st CST were insufficient to determine if adverse health effects were likely to have occurred from inhalation of the smoke from the fire. The 61st CST did not perform air screening of the site until approximately 5 hours after the fire began. The instruments were used to provide critical area entry decision-making information to the emergency response personnel. Specific locations where the screening took place and the number of screening tests performed were not included in the report prepared by the 61st CST. The report does not state the screening protocol used. The HAPSITE chemical identification system uses the SI value range of 700-1000 as a basis for further analysis for chemicals found at the site. No compounds were noted above a SI of 600. These values are a measure of the similarity of a compound detected with that of a known compound within the systems library (data base). It does not necessarily indicate the contaminants (and their respective concentration) that were actually in the air.

Health Effects Related to Smoke

Our body's respiratory system has natural defenses to protect against some types of dirty air. Smoke is a sign of air pollution composed of fine particulates and gaseous products of burning materials containing carbon [6]. However, fine particulate matter (PM) and gases may by-pass the lungs defenses. Infections, such as sinusitis or bronchitis, are more likely to occur as a result of the buildup of PM in the mucus membranes. The people most vulnerable to air pollution (including smoke) are those with pre-existing disease of the cardio-pulmonary system. The level of risk to air pollution is dependent on duration of exposure, the quantity/level, and the overall health condition of the individual [7].

Community Health Concerns

ADH investigated the public health concerns received from community members during a meeting held in January 2004, and from correspondence. An August 2004 letter from an attorney representing some of the community members reported that community members had expressed a variety of symptoms, including: headaches, blurred vision, dizziness/lightheadedness, lack of energy, impaired taste, loss of appetite, diarrhea, upset stomach, nausea, vomiting, burns/burning of face, facial sores, itching skin, rash, raw nostrils, raw sinuses, sore throat, loss of voice, coughing, shortness of breath, heart palpitations, and chest pain. Visible smoke was present during the fire, and most community concerns were specifically related to the smoke plume.

Child Health Considerations

In communities faced with air, soil, water, or food contamination, the many physical differences between children and adults demand special emphasis. Children could be at greater risk than are adults from certain kinds of exposure to hazardous substances. Children play outdoors and sometimes engage in hand-to-mouth behaviors that increase their exposure potential. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Finally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus, adults need as much information as possible to make informed decisions regarding their children's health. The data provided to ADH by the 61st CST were insufficient to determine if adverse health effects in children from inhalation of the smoke during the fire were likely to have occurred.

Conclusions

ADH reviewed air-sampling data collected by the 61st CST on January 6, 2004, following the fire that destroyed the Detco Warehouse in Conway, Arkansas. Since air sampling data were not collected during the onset and first several hours of the fire, data were insufficient to determine if adverse health effects were likely to have occurred from breathing the smoke during the fire. On the basis of the available limited information, ADH has concluded that inhalation of the smoke from the Detco Warehouse fire posed an *indeterminate public health hazard*, during the fire. This category is used in ATSDR's documents when a professional judgment about the level of

health hazard cannot be made because information critical to such a decision is lacking; data or information are not available for all environmental media to which humans may be exposed; and there are no community-specific health outcome data to indicate that the site has had an adverse impact on human health.

Recommendations

No recommendations are indicated at this time.

Public Health Action Plan

Public Health Action Plans (PHAPs) are developed to describe actions to be taken by ADH at and in the vicinity of sites subsequent to the completion of the health consultation. The purpose of the PHAP is to ensure that health consultations not only identify public health hazards, but also provide a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. The public health actions implemented by ADH are as follows:

Completed Actions

- ADH evaluated soil samples analyzed by ADEQ in January 2004.
- ADH initiated a community needs assessment in January 2004.
- ADH attended a public meeting in January 2004, along with ADEQ and local city officials to inform residents about re-entry into their homes.
- ADH prepared a soil data health consultation in September 2004.
- ADH evaluated surface water samples analyzed by ADEQ in January 2004.
- ADH prepared a surface-water data health consultation in January 2005.
- ADH evaluated qualitative air-screening values provided by the 61st CST in January 2005.

Future Activities

- ADH will provide concerned residents and other interested stakeholders with copies of this completed health consultation on the health implications of breathing smoke during the Detco fire.
- ADH will provide health education activities in the vicinity of the Detco Warehouse as needed and/or requested.

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Certification

This health consultation for Detco Industries, Incorporated was prepared by the Arkansas Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodology and procedure existing at the time the health consultation was initiated. Editorial review was completed by the cooperative agreement partner.

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The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.

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6. Yu, Ming-Ho. (2005) *Environmental Toxicology: Biological and Health Effects of Pollutants* (2nd ed.). CRC Press LLC.
7. American Lung Association of San Diego and Imperial Counties. *Fire Smoke and Health FAQ's*. Retrieved March 7, 2005, from http://www.lungsandiego.org/environment/adults_fire_smoke_faqs.asp

Appendix A - Figures

Figure 1. Detco Warehouse ablaze on January 6, 2004



Figure 2. View from Interstate 40 of smoke rising from Detco Warehouse fire on January 6, 2004



Appendix B - Table

| Table 1. List of chemicals known to be in the warehouse on January 6, 2004, and estimated quantities. | | | |
|---|----------|-------------------------------------|----------|
| Chemical Name | Quantity | Chemical Name | Quantity |
| 140 Solvent | 110 gal | Pylam powdered dyes | 500 lbs |
| A-70 gas-propellant | 1000 lbs | Methyl isobutyl ketone | 55 gal |
| Sodium dichloro-s-triazinetrione | 500 lbs | Sodium bicarbonate | 1000 lbs |
| Nitric acid | 55 gal | Sodium carbonate | 1000 lbs |
| Coco Betaine | 200 gal | Sodium glucomate | 1000 lbs |
| Dipropylene glycol | 55 gal | Sodium hexametaphosphate | 1000 lbs |
| Duraplus 2 – floor finish | 440 gal | Sodium hydroxide | 1500 lbs |
| Fragrances, arryllessenee, Value | 500 gal | Sodium hypochlorite | 110 gal |
| Hexane | 200 gal | Sodium metasilicate pentahydrate | 1000 lbs |
| 2-Butoxyethanol | 200 gal | Sodium tripolyphosphate | 1000 lbs |
| Acetone | 55 gal | N94 Ethylenediaminetetraacetic acid | 500 lbs |
| Mineral Spirits | 110 gal | Sulfuric acid | 55 gal |
| Potassium hydroxide | 600 gal | Mor Glo 4 – floor finish | 440 gal |
| Light Emitting Polymer Naptha | 200 gal | Disodium cocoampho dipropionate | 55 gal |
| Methyl ethyl ketone | 55 gal | Methanol | 7000 gal |
| Ethanol | 55 gal | Tetrapotassium pyrophate | 500 lbs |
| Hydrochloric Acid | 600 gal | Propylene glycol | 55 gal |
| Hydrogen Fluoride | 220 gal | Trichloroethylene | 55 gal |
| Hydroxyl acetic acid | 55 gal | Trisodium phosphate | 1000 lbs |
| Isopropanol | 110 gal | Perchlorethylene | 55 gal |
| Methylene chloride | 110 gal | Petro 22 – surfactant | 55 gal |
| Kerosene | 110 gal | Hydroxyethylidenediphosphonic Acid | 55 gal |
| Kraton – SBS rubber granules | 500 lbs | Phosphoric acid | 500 gal |
| lbs = pounds; gal = gallons | | | |
| List developed from Site Safety/Incident Action Plan | | | |