Notes from the Field

Acute Pesticide-Related Illness Resulting from Occupational Exposure to Acrolein — Washington and California, 1993–2009

Acrolein is an aquatic herbicide used in the western United States to prevent impaired water flow in irrigation canals. Despite its toxicity, few cases of acrolein-related illness have been reported in the literature. On August 15, 2012, an irrigation district notified the Washington State Department of Labor & Industries (L&I) of acrolein-related illness in one of its pesticide applicators. L&I inspected the site and interviewed the exposed worker, coworkers, and employer. The Washington State Department of Health assisted by obtaining medical records, interviewing the patient and hospital staff, and reviewing information obtained from L&I. To look for additional cases, CDC reviewed data from the SENSOR-Pesticides program* and the California Department of Pesticide Regulation for 1993–2009, the most recent years of data availability, and identified seven additional cases of acute acrolein-related illness.

A licensed aquatic pesticide applicator aged 57 years, previously healthy and employed for 15 years by an irrigation district in Washington, was exposed to acrolein while monitoring an application† to an irrigation canal in the Quincy-Columbia Basin. The man was not wearing the label-required respiratory protection, gloves, or a long-sleeved shirt§ when he investigated a leak in the connection between the acrolein tank and the metal assembly through which acrolein flows.

Almost immediately after exposure to the leak the worker had burning, watery eyes. Within 2 hours he experienced throat tightness, difficulty breathing, inability to swallow, moderate phlegm production, vomiting, and inability to talk because of dyspnea. He was admitted to the intensive-care unit and approximately 6 hours after exposure developed right facial droop but no other weakness or paresthesias. Supportive treatment was provided, including administration of epinephrine. Approximately 48 hours after exposure, the patient went into ventricular fibrillation and concomitantly experienced a grand mal seizure. His condition was ultimately stabilized, and he was discharged to home after a 3-week hospitalization. He received a diagnosis of lateral medullary syndrome and continued to have dysphagia, right-sided facial droop, and left-sided altered thermal skin sensitivity. He returned to work at the irritation district for 1 month in January 2013 but is not currently working because of ongoing medical conditions.

CDC identified seven additional cases of acute acrolein-related illness in the United States during 1993–2009, all in California. Five cases were among workers employed by irrigation districts, of whom four were pesticide applicators and one maintained pesticide application equipment. Six of the workers were men, and the mean age was 41 years (range: 24–53 years). Four workers had low severity illness, and three had illness of moderate severity.¶ Common symptoms were eye irritation (five workers), headache (three), dyspnea (two), and skin irritation or burns (two). No worker was hospitalized, but two lost time from work.

Acrolein is highly volatile, producing an extremely irritating vapor that is highly reactive and acts by degrading cellular structures by cross-linking proteins (*1*). Acrolein also can produce inflammation of the heart, and ventricular fibrillation can occur in the setting of epinephrine administration combined with an acrolein-induced catecholamine release (*2*). Although acrolein is measureable in blood and urine, these tests are not commonly available and are not useful in assessing exposure (*3*).

Because of its toxicity, acrolein is applied only through closed systems, which prevents its release into the air. Such systems are not closed during set up and break down, and visual inspection of application equipment can involve exposure to leaks; therefore, applicators must comply with stringent requirements for personal protective equipment (PPE) when performing these activities (*1*). Use of a closed application system combined with annual training, applicator certification,** adherence to the manufacturer's other operating procedures for acrolein (*4*), and compliance with PPE requirements are expected to

* Additional information available at http://www.cdc.gov/niosh/topics/pesticides/overview.html.

† Magnacide H Herbicide, Baker Petrolite Corporation, EPA registration number 10707-9.

§ Label-required PPE includes a long-sleeved shirt and long pants, shoes, and socks, chemical-resistant gloves made of butyl rubber, and a National Institute of Occupational Safety and Health–approved full-face respirator with either an organic-vapor-removing cartridge with a prefilter approved for pesticides or a canister approved for pesticides.

¶ Severity of illness and injury of cases can be categorized into four groups using standardized criteria for state-based surveillance programs: low, moderate, high, and death. In low severity cases, illness/injury usually resolves without treatment and <3 days are lost from work. Moderate severity cases involve non–life-threatening health effects that are generally systemic and require medical treatment. No residual disability is detected, and time lost from work is ≤5 days. Additional information available at http://www.cdc.gov/niosh/topics/pesticides/pdfs/pest-sevindexv6.pdf.

** Additional information available at http://www.epa.gov/oppfead1/safety/applicators/applicators.htm.

effectively prevent exposures of concern to workers (*1*). Use of nonchemical means to prevent clogging of irrigation canals with weeds and algae (e.g., mechanical harvesting, sediment removal, canal lining, and replacing the canal with piping) have been considered by irrigation districts in Washington but found not feasible because of cost and the potential for increased risk for injury to workers (*5*).

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Workers' Memorial Day — April 28, 2013

Workers' Memorial Day recognizes workers who died or suffered from exposures to hazards at work. In 2011, a total of 4,069 U.S. workers died from work-related injuries (*1*). Most fatalities from work-related illness are not captured by national surveillance systems, but an estimate for 2007 was 53,445 deaths (*2*). Several national surveillance systems report new cases of nonfatal work-related injuries and illnesses, although no system captures all cases. In 2011, nearly 3 million injuries and illnesses to private industry workers and 821,000 to state and local government workers were reported by employers (*3*). In the same year, an estimated 2.9 million work-related injuries were treated in emergency departments, resulting in 150,000 hospitalizations (CDC, unpublished data, 2013).

Based on methods that focus on medical costs and productivity losses, the societal cost of work-related fatalities, injuries, and illnesses was estimated at $250 billion in 2007 (*2*). Methods that include consideration of pain and suffering would result in a higher estimated societal cost (*4*). CDC is working to better describe the burden of fatalities, injuries, and illnesses suffered by workers; additional information is available at http://www.cdc.gov/niosh/programs/econ/risks.html.

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Fatal Injuries in Offshore Oil and Gas Operations — United States, 2003–2010

During 2003–2010, the U.S. oil and gas extraction industry (onshore and offshore, combined) had a collective fatality rate seven times higher than for all U.S. workers (27.1 versus 3.8 deaths per 100,000 workers). The 11 lives lost in the 2010 Deepwater Horizon explosion provide a reminder of the hazards involved in offshore drilling. To identify risk factors to offshore oil and gas extraction workers, CDC analyzed data from the Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI), a comprehensive database of fatal work injuries, for the period 2003–2010. This report describes the results of that analysis, which found that 128 fatalities in activities related to offshore oil and gas operations occurred during this period. Transportation events were the leading cause (65 [51%]); the majority of these involved aircraft (49 [75%]). Nearly one fourth (31 [24%]) of the fatalities

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