

Take Home Lead Exposure in Children of Oil Field Workers

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ABSTRACT

Childhood lead poisoning is a major, preventable environmental health problem. While residential lead-based paint and lead contaminated dust and soil are the most common sources of childhood lead poisoning, children can also be at risk if they live with an adult with a job or hobby that involves exposure to lead. Currently, the Oklahoma Childhood Lead Poisoning Prevention Program (OCLPPP) has a small number of cases of "take home" lead exposure in children of oil field workers. These workers may come in contact with a threading compound, "pipe dope" that can contain large amounts of lead. Workers handling this product may be exposed to lead by not following safety instructions. Additionally workers may not be provided the facilities to shower and change out of the contaminated clothing before leaving the work location. The OCLPPP recommends employers and worksites should consider effective alternative options like lead free biodegradable pipe dopes or dope free connections to prevent workers and their families from adverse health effects associated with lead.

INTRODUCTION

Childhood lead poisoning is a major, preventable environmental health problem, which may cause developmental problems, lower I.Q., behavioral problems, attention deficit disorder, learning problems, language delay, anemia, damage to the nervous system and in severe cases, possibly death particularly in children less than six years of age.^{1,2,3} The Centers for Disease Control and Prevention (CDC) has set a level of concern for children at 10 µg/dL at which recommended specific case management interventions should be implemented to reduce the blood lead levels.

Health effects in adults may include hypertension, infertility, anemia, peripheral neuropathy, damage to nervous system and kidneys.⁴ Lead exposure in pregnant females could lead to adverse health effects in their unborn children.^{4,5}

While the most common risk factor for childhood lead poisoning is residential lead-based paint and lead contaminated dust and soil,⁶ there could be several other sources of childhood lead poisoning including occupational sources. According to the Occupational Safety and Health Administration (OSHA), exposure to lead occurs in at least 120 different occupations.⁷ Workers can potentially bring lead containing products in their vehicles or on clothes and shoes inside their homes and expose

their families.⁸

The Oklahoma Childhood Lead Poisoning Prevention Program (OCLPPP) coordinates statewide efforts to reduce childhood lead poisoning by providing outreach, education, screening, blood lead testing, case management and surveillance services to young Oklahoman children and their families. The OCLPPP also conducts environmental investigations inside the home of a child with a confirmed venous blood lead level of 20 µg/dL or greater or a persistent venous blood lead level of 15 – 19 µg/dL at least three months apart. An environmental investigation is essentially an inspection and evaluation of the child's environment, which includes the home and other sites where the child spends significant amount of time to identify lead sources.

PROBLEM

Currently, the OCLPPP has a small number of cases of "take home" lead exposure in children of oil field workers. The oil and gas industry is strong in Oklahoma. According to the Oklahoma Corporation Commission, there were 2,500 intents to drill (permits) approved during 2009.⁹ Adults who work on the well work over and drill sites may come in contact with a threading compound, commonly known as "pipe dope" that can contain large amounts of lead. American Petroleum Institute specified pipe dope contains about 30% lead by weight and, therefore, can be of concern when disposed of.¹⁰ One of the available pipe dope products contains 60% lead.

Pipe dope is a specially formulated blend of lubricating grease and fine metallic particles that prevents metal-to-metal damage and seals the pipe threads. The workers apply copious amounts of it to the drill-pipe tool joints every time a connection is made. Pipe dope is very difficult to remove from hands, clothing and shoes and is easily transferred to vehicles and to workers' homes if scrupulous precautions such as changing clothes and shoes and washing hands before leaving the worksite are not maintained.

OCLPPP's investigation of recent pipe dope related cases revealed that some workers using this product may not be utilizing adequate personal protective equipment, such as oil resistant gloves or may not be following other instructions such as washing hands before smoking, eating, or drinking as specified on the Material Safety Data Sheet (MSDS). Additionally, some employers may not be providing shower and other facilities to make sure that workers change out their possibly contaminated work cloths before leaving the work site. Finally, workers also launder the work clothes at home along with other family items potentially spreading the lead contamination. As per OSHA Lead standard, 29 CFR

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1910.1025, workers should not take contaminated work clothes home to be washed and employers are required to provide for the cleaning of protective work clothing to prevent dispersion of lead. Additionally, workers should be adequately informed about lead hazards as per OSHA Hazard Communication standard, 29 CFR 1910.1200.

CASE REPORTS

The OCLPPP has identified pipe dope containing lead along with lead-based paint hazards as the most likely cause of lead poisoning in at least four children, including two siblings, of three oil field workers working with pipe dope between 2006 and 2009. The four children were in the age range of 6 to 22 months while their blood lead levels ranged from 18 µg/dL to 30 µg/dL, high enough to cause potentially irreversible health effects.

Blood lead tests of workers along with environmental lead levels of their clothes, shoes and other household items such as furniture are often good indicators of potential “take home” lead exposure. Two of the three workers had elevated blood lead levels of 29 µg/dL and 39 µg/dL while one worker did not get a lead test. Elevated environmental lead levels were found in work clothes as well as inside the laundry room washing machines which were used to wash work clothes along with other family clothes. Additionally, elevated environmental lead levels were found in the work shoes as well as household furniture like recliners where the workers used to sit with their children without changing work clothes. Key recommendations made to the families included:

- Workers should not enter the residence until showered and changed into clean clothes and shoes.
- At no time, should a worker pick up child while in work clothes and has not taken precautions as to contaminate child’s clothing, toys, household furniture, sleeping quarters, etc.
- Family should keep work clothes separate before, during & after washing.

Although these cases account for a very small percentage of the total elevated blood lead level cases, there could be more undocumented cases as a result of oil field workers taking lead home. This is based on previously mentioned assumptions that work sites that use this compound may not be providing adequate education and protection for their workers to ensure that workers and their families are protected from harmful effects of pipe dope that contains lead. Additionally, employers might not be aware of the availability of other substitutes.

RECOMMENDATIONS

To prevent workers from exposure of lead in pipe dope and to ensure that this exposure does not extend beyond the work site, the OCLPPP recommends employers and worksites to work with the Oklahoma Department of Labor’s Safety Pays OSHA Consultation Division, the Mid-Continent Exploration & Production Safety (MCEPS) Network, as well as CDC’s National Institute of Occupational Safety and Health (NIOSH).

The Oklahoma Department of Labor’s *Safety Pays* OSHA Consultation Division provides free consultation service to Oklahoma’s private sector businesses. They have a professional staff of safety consultants and industrial hygienists to help identify occupational hazards and develop strategies to eliminate hazards and comply with OSHA requirements. This

voluntary, non-punitive and confidential program is designed to assist employers in preventing injuries and illnesses.

MCEPS Network promotes safety, health and environmental improvement in the exploration and production of oil and gas in Oklahoma, and other neighboring states. The network fosters a work environment that relies upon open communication and trust to raise the awareness of personnel in oil and gas production, operations, and servicing to industry hazards and safe practices.

NIOSH is the federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. The agency operates Oil and Gas Extraction Safety and Health Program, which works closely with the oil and gas extraction industry and other stakeholders to conduct extensive field research and efforts for prevention of injuries and illnesses among oil and gas extraction workers.¹¹ Under this program, NIOSH researchers have developed, patented and licensed two novel methods for detection and removal of toxic metals from skin: the Handwipe disclosing method for the presence of lead and Wipes and methods for removal of metal contamination from surfaces.^{12,13} Employers are encouraged to leverage NIOSH’s industrial hygiene expertise at no cost for implementing effective interventions.

Given the health hazards associated with pipe dope containing lead, employers and worksites should also consider effective alternative options like lead free biodegradable pipe dopes or dope free connections.^{10,14}

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