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Fact Sheet

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LEAD-BASED PAINT HAZARD MITIGATION

The Problem

Exposure to lead is associated with adverse health effects, including permanent damage to the central nervous system. White lead pigments were once used to make durable house paints with good hiding power, and red lead made an excellent corrosion inhibiting primer for metals. Lead exposure can result from the ingestion of paint chips or dust from deteriorating house paints or from improper paint removal. Young children are at greatest risk from this exposure. The U.S. Army has over 101 million square feet of buildings dating to World War II and earlier. Many of the structures were built before the 1978 ban on lead-based paint (LBP). The Army maintains 166,000 family housing units, of which about 65 percent are over 25 years old and may contain LBP. Many Army installations also have historic buildings and some of the established LBP abatement options are not compatible with historic preservation. Management of the LBP hazard for historic structures is unique and has to comply with the overall historic preservation plan.

Technologies/Status

The U.S. Army Construction Engineering Research Laboratory (CERL) is demonstrating and evaluating emerging technologies for LBP hazard mitigation at Army installations. The following technologies are being demonstrated and evaluated.

Abrasive blasting with a chemical stabilizer additive (Blastox^{TM}) was demonstrated on wooden structures at Fort Meade, MD; Fort Carson, CO; and Fort Hood, TX. This technology was also demonstrated on steel elevated water storage tanks at Fort Meade. Blastox^{TM} is a proprietary blasting additive designed to stabilize the waste generated by abrasive blasting for the removal of the lead-based coating. The cost of removal was about $3 per square foot.

Environmentally compatible chemical paint strippers have recently become available as replacements for more hazardous chemicals such as sodium hydroxide and methylene chloride. Alternate chemical strippers were evaluated in the laboratory for removing paint from wooden specimens. An environmentally friendly chemical stripper, Enviro-strip 3^{TM}, was evaluated on wooden structures at Fort Meade. Carbon dioxide (CO_2) blasting also was evaluated on wood structures at Fort Meade. The technology does not work for think paints (30 to 50 mils) on wooden structures. However, it has been successfully demonstrated for removal of thin coatings on metallic structures.

Sponge media blasting was evaluated on wooden structures at Fort Meade. This media incorporated traditional abrasive particles, such as garnet grit, in a water-based urethane foam. Full scale demonstrations using sponge media blasting will be conducted at Fort Benning, GA. A demonstration of laser paint stripping is planned at Kelly Air Force Base, TX.

X-ray fluorescence (XRF) lead detection equipment was demonstrated at Fort Benjamin Harrison, IN. Two types of XRF analyzers were used to measure lead levels in paint on residential and child care facilities and the results were compared.

Additional demonstrations on historic buildings to evaluate abrasive blasting with a chemical stabilizer, heat gun, and chemical strippers, were conducted at Fort McPherson, GA, in March 1995.

CERL is evaluating new environmentally friendly technologies for chemical stripping, laser paint removal, and flash lamps. One novel technology, patented by CERL, uses molten glass to remove LBP from steel, structures. Inside the glass, the lead ions, along with the pyrolytic organic paint, are trapped within the silicate tetrahedral network. The leaded glass and carbon vitrify, immobilizing the lead ions within the glass network, which prevents leaching. The coefficient of thermal expansion difference across the glass-substrate interface and the quenching stresses in the glass cause the glass to crack and spall off the substrate. The crumbled glass fragments can be collected, remelted/recycled, and disposed of as nonhazardous waste. Thermal spray removal of lead-based paint was demonstrated and validated for a steel bridge at Rock Island Arsenal in September 1997 and for an aircraft hanger in Hawaii in 1998. Another technology patented by CERL uses microwave coupling compounds to remove the paint. The surface to be depainted is coated with a microwave coupling compound and a chemical stabilizer and then exposed to microwave energy. The patents on vitrification and microwave-assisted paint stripping viable patents, need to be developed further to make these processes commercially viable. CERL, in conjunction with the Navy, have developed a lead hazard assessment and management system (HALO).

Benefits/Savings

The most significant benefit of this work is optimized management of the hazards and costs associated with LBP abatement and enhanced health protection for Army personnel and their families. This work will yield a decision tree and new technologies for LBP hazard mitigation at Army installations which are cheaper, faster, and environmentally sound.

Points of Contact

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