Michigan Department of Transportation - M•DOT

Mates

Issue No. 53 May 1991

SAFETY PRECAUTIONS FOR INSPECTORS INVOLVED IN REMOVING LEAD-BASE PAINT FROM BRIDGES

After the April 1991 MATES article on the new blast cleaning technology appeared, concern for the health of our inspectors came into the picture. What risk will these new contracts pose for MDOT employees? If the contractor's employees are wearing protective clothing and gear, should our inspectors wear the same? What should the project offices be aware of concerning protection options and monitoring procedures to ensure a low exposure risk? These questions will be addressed in this article.

Hazards of Lead

There are three ways that hazardous materials can enter the blood stream; absorption through the skin, ingesting through the mouth, and breathing the hazardous substance. These are the only routes for such materials to enter our bodies and affect our health. Lead enters only through extended exposure resulting in ingestion and inhalation that will increase the blood lead level in a worker.

Elevated lead levels in a person's blood (in excess of 40 micrograms/deciliter) can result in the following health problems: anemia, disorders of the central nervous system, mental retardation in children under 6 years of age, hyperactivity, irritability, stupor, coma, convulsions, reproductive abnormalities, fetal damage, and kidney damage. Thus, lead poisoning is a very serious condition and all necessary precautions should be taken to prevent human exposure. The human body does purge lead from the blood in time; therefore, persons with a continuous exposure sustain the greatest health risk.

MDOT inspectors assigned to bridge painting projects should contact the construction office or their office managers to arrange for an initial background lead level test of their blood. This initial test will provide a reference with which to compare any additional tests taken at the end of the season or job. The MDOT maintenance bridge paint crews have already implemented a monitoring program of blood lead levels for the individuals on their painting crews.

Protection of Blast Cleaning Operators

Our current specification for the removal of lead-based paint includes a new total containment technology. As described in the April 1991 MATES article, the blasting operators within the total containment enclosure wear fresh-air-fed hoods to protect them from inhaling the abrasive/lead dust. They also wear protective clothing and gloves. The protective clothing primarily guards them from accumulating lead dust in their clothing and from high pressure abrasives ricocheting off the steel. Since solid metal particles cannot be absorbed through the skin, the worker can only be contaminated by inhaling or ingesting the lead. The contractor must protect against these exposures in accordance with current OSHA requirements. The contract states that the contractor is also required to have documentation verifying that hazardous waste training has been completed by each worker. He is also required to have a hazardous waste spill contingency plan and equipment that his workers are familiar with.

Protection of the Inspector

Inspectors at a bridge cleaning/painting job site should never be exposed to the ingestion and inhalation risks the blasting operators experience, and thus should not experience an increase in blood lead levels. The inspector should enter the work area only after all blasting operations have ceased and the air is clear of dust. Inspection duties do not require exposure to the lead bearing dust. Inspectors may be equipped with various types of respirators if they desire additional protection against breathing any dust that may be stirred-up while they are in the enclosed areas. A combination of safe work practices, protective clothing and equipment, and common sense will keep all inspectors safe and healthy.

Protective Equipment

Although not specifically aimed at our inspectors, the following paraphrase of pertinent parts of the "Bridge Painting Inspection," Participant Manual, U. S. Department of Transportation, Federal Highway Administration represents a good guide to safety protection measures available to persons working in a blast-cleaning area.

1) Respiratory Protective Equipment

When hazards of exposure to harmful vapors, gasses, dusts, mists, or fumes exist, the work areas should be enclosed or well ventilated to eliminate or minimize the hazards. Even when the area is enclosed or well ventilated, a supply of appropriate respiratory protection equipment should be readily available for emergency work or repairs under unusual conditions.

The American Standard Safety Code for Head, Eye, and Respiratory Protection, ASA Z2.1-1959 suggests in broad terms where protection is needed. A complete listing of all situations requiring respiratory protection is not practical here, but every process which generates air contaminants should be investigated to determine the degree of possible hazard.

At the present time, the United States Bureau of Mines approves respiratory protective devices in the following categories:

Self-Contained Breathing Apparatus - This apparatus supplies clean air to a face mask or hood from the compressed oxygen clyinder and the compressed air cylinder, usually carried on the back.

Supplied Air Respirators - This apparatus includes hose masks with blower (Type A); special hose masks without blower (Type B); air line respirator (Type C); and, abrasive blasting helmet (Type CE). Non-supplied respirators, such as dispersoid (dust, fume, and mist) respirators, and non-emergency gas respirators (chemical cartridge respirators), are sometimes used.

It is essential that the user of a respirator be properly instructed in its selection, use, and maintenance. Competent personnel should give such instruction to the supervisors of all groups who may be required to wear respirators. These supervisors will instruct their workers. Nobody should be allowed to wear a respirator of any type until they have

received such instruction, and have taken a pulmonary function test.

As the life of the wearer may depend on the proper functioning and ready availability of respirators, the following points should be kept in mind regarding the adequate care and maintenance of this equipment.

a) All respirators shall be inspected at regular intervals to make sure they are ready and suitable for use.

b) All rubber parts such as face pieces, mouthpieces, exhalation valves, breathing tubes, and headbands should be inspected carefully, and all gaskets should be present and held tightly in place. Metal parts should be checked for signs of corrosion, and plastic and glass parts for breakage.

c) When replacement of any parts is necessary, only those made specifically for the device should be used, and repair work done only by qualified personnel.

d) Respiratory protective equipment should be cleaned and disinfected after each use. The manufacturer should be consulted for the cleaning and disinfecting methods best suited to the product.

e) All types of respirators are to be stored in clean and dry compartments under conditions of moderate temperature.

2) Goggles and Safety Eyeglasses

The American Standard Safety Code for Head, Eye, and Respiratory Protection, ASA Z2.1-1959, is the code authority for devices of this type. The main requirements are that the goggles and eyeglasses fit well, are not cumbersome, provide adequate straight-ahead as well as peripheral vision, and be manufactured of tempered, unbreakable glass, or unbreakable plastic. Goggles, eyeglasses, and shields should be kept readily available.

3) Protective Clothing

Ordinary Work Clothing - Tears and rips in clothing are potential causes of accidents. Torn clothing can get caught in moving machinery or on a ladder or scaffold. Cuffs on trousers, floppy pockets, dangling ties, and similar items of clothing can catch in moving machinery, or may catch on projections and should not be worn. Clothing saturated with oil, chemical, coating materials, or other flammable material can easily lead to burns or cause painful skin irritations. Oil saturated clothing should not be worn, but should be stored loose and exposed to air until it is cleaned.

Hard Hats and Safety Shoes - Project superintendents and foremen should not permit anyone to begin work on a job until they are wearing hard hats and safety shoes.

Hearing Protection - Excessive noise can cause permanent hearing damage. Ear plugs must be worn in areas where excessive noise does or may occur. It is not difficult to identify these areas, but it should be stressed that noise damage is progressive, not immediate, and ear protectors should be worn even when job site noise does not appear excessive.

Safe Work Practices

Examples of safe work practices are:

1) Carefully vacuum off any spent abrasive dust from your clothing, shoes, etc., inside the work enclosure or at a designated clean-up area. This will prevent carrying spent abrasive dust into your vehicle or home as well.

2) Use common sense: e.g., wash your hands with soap and water after leaving the blasting enclosure, and especially before eating or smoking (don't wash them in chemicals or solvents), don't smoke in the enclosure or near paints or solvents, etc., and don't carry smoking materials where they can be contaminated.

3) Enter the enclosure only after the negative pressure equipment evacuates the dust in the air within.

4) Wear tightly woven fabrics for work clothes, or the extremely effective protective Tyvek suits. These suits prevent all solvent vapors and dust from penetrating the fabric; one drawback, however, is that they may be uncomfortable on hot days.

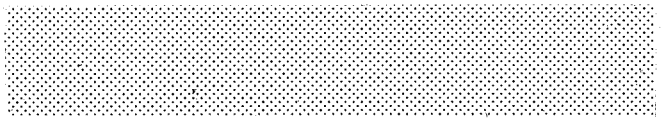
5) Wear work gloves to protect the hands, and goggles to prevent nuisance dust or accidental splashes from getting into the eyes.

A safety kit has been put together by the Department and is sent out to the bridge site with the inspection paint kit.

The use of respirators is restricted to those who have taken the preliminary pulmonary function test annually. This test determines lung capacity and is administered by a physician or medical technician. At the same time that the test is given, instruction in respirator use, and fitting the respirator properly to the individual, should be arranged. A major consideration as to the fitting and use of respirators is that moustaches or beards will probably have to be removed to provide adequate seating and sealing of the mask.

A large number of lead painted bridges still exist in Michigan. The use of certain guidelines, procedures, and specifications should virtually eliminate potential for contamination of the worker, work site, and the environment. MDOT personnel at our low risk work sites will continue to develop new, safe approaches and simple usable procedures to effectively reduce and minimize the exposure of spent abrasive dust.

-Eileen Phifer



NEW MATERIALS ACTION

The New Materials Committee recently:

Approved

Gemco Wheel Stops
Float Switch
Conseal CS-102 Joint Sealer
RV30 Butyl Joint Sealant

Approved for Trial Installation or Use

Safe-Cure 1000 Concrete Curing Compound

It should be noted that some products may have restrictions regarding use. For details please contact chairman of New Materials Committee at (517) 322-1632.

This document is disseminated as an element of MDOT's technical transfer program. It is intended primarily as a means for timely transfer of technical information to those MDOT technologists engaged in transportation design, construction, maintenance, operation, and program development. Suggestions or questions from district or central office technologists concerning MATES subjects are invited and should be directed to M&T's Technology Transfer Unit.

Technology Transfer Unit
Materials and Technology Division
Michigan DOT
P.O. Box 30049
Lansing, Michigan 48909
Telephone (517) 322-1637