

Concrete Cleaning, Inc. Centrifugal Shot Blaster: Baseline Report; Summary

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CONCRETE CLEANING, INC. - CENTRIFUGAL SHOT BLASTER

HUMAN FACTORS ASSESSMENT - BASELINE

SECTION 1 - SUMMARY

Technology Description

The centrifugal shot blaster is an electronically operated shot-blast machine that removes layers of concrete of varying depths. Hardened steel shot propelled at a high rate of speed abrades the surface of the concrete. The depth of material removed is determined by the rate of speed the machine is traveling and the volume of shot being fired into the blast chamber. The steel shot is reused until it is pulverized to dust, which is deposited in the waste container with the concrete being removed. Debris is continually vacuumed by a large dust collection system attached to the shot blaster.

Key Results

The safety and health evaluation during the testing demonstration focused on two main areas of exposure: dust and noise. Dust exposure was minimal, but noise exposure was potentially significant. Further testing for each of these exposures is recommended, because the outdoor environment where the testing demonstration took place may cause the results to be inapplicable to enclosed work areas. It is feasible that the dust and noise levels will be higher in an enclosed operating environment. Other safety and health issues found were ergonomics, heat stress, tripping hazards, electrical hazards, and lockout/tagout.

SECTION 2 - HEALTH AND SAFETY EVALUATION

General Safety and Health Concerns

Safety and health issues of concern with the concrete cleaning shot blast technology included tripping hazards, electrical hazards, rotating machinery, lockout/tagout, heat stress, ergonomics, noise, dust, and communication.

Industrial Hygiene Monitoring

During the testing demonstration, sampling was conducted for dust and noise. The wet-bulb globe temperature was monitored. Observational evaluation was conducted for ergonomics and arm-hand vibration and whole-body vibration.

Ergonomically there is potential for muscle/back stress and/or injury to the knees. Of particular concern was the need to manually shovel the dust from the dust pan. This increases back stress and causes an increase in exposure to the contaminant.

Heat stress was monitored using wet-bulb globe measurements and worker physiological measurements such as blood pressure, pulse, and temperature and work/rest regimen recommendations were made in accordance with ACGIH recommendations.

Personal air sampling was conducted on the equipment operator and the assistant. Personal dust sampling results were below allowable levels. Noise monitoring resulted in a dose of 17.36% or an 8-hour TWA of 77.4 dBA and a dose of 47.37% or an 8-hour TWA of 84.6 dBA for the operator, and 6.30% or an 8-hour TWA of 70.1 dBA for the assistant. This does not exceed the OSHA action level of 85 dBA and the permissible exposure of 90 dBA for the amount of time sampled. An overexposure may occur for a full 8-hour work shift. A hearing conservation program may be necessary for anyone working with or around this equipment.

Human Factors Interface

The technology was evaluated for operator interface with Anti-C PPE including a full face air-purifying respirator. Operators wearing the PPE experienced some visibility problems due to the full face respirator, and some loss of tactile sensation and dexterity during maintenance activities. In addition, there was an increase in

heat stress associated with the protective ensemble.

SECTION 3 - TECHNOLOGY APPLICABILITY

On observation, the technology did not deposit much visible dust into the atmosphere. Air monitoring did not evidence an excessive dust level. There was some larger debris left on the surface at the sides of the scabbling head.

The shot blaster will need to be torn down to be decontaminated. This will not necessarily guarantee that decontamination for alpha radiation will be complete. It will be difficult to survey for alpha contamination due to all of the small spaces in the equipment that are hard to reach with a probe. According to the technology representative, many parts, such as the hoses and brushes, may be considered consumables.

SECTION 4 - REGULATORY/POLICY ISSUES

The site safety and health personnel where the centrifugal shot blaster technology is being used need to be concerned with safety and health regulations applicable to the issues discussed

above. Regulations that will apply may include but not be limited to the following areas: housekeeping, electrical, machine guarding, lockout/tagout, ionizing radiation, toxic and hazardous substances, noise, respiratory protection, PPE, HAZCOM, and HAZWOPER.

SECTION 5 - OPERATIONAL CONSIDERATIONS & RECOMMENDATIONS

Recommendations for improved worker safety and health include good housekeeping, ergonomic training and awareness, a system to increase operator visibility in the front of the equipment, a dead man switch, relocation of the E-stop, assuring proper vacuum adjustment for adequate air flow, using a HEPA vacuum system, and engineering, administrative, and/or hearing protection be used for compliance with the OSHA noise standard.

Due to the windy outdoor testing conditions, it is recommended that the noise and dust monitoring be conducted while the technology is in use in an enclosed environment. Since Level A or Level B PPE may be required for contaminants other than alpha radiation, it is recommended that a human factors interface for these levels of protection be conducted.

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