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## Construction News Sense

FACILITIES Management and Operations Center

### Lessons Learned – Silica Exposure During Floor Grinding

Construction contractors at Sandia National Laboratories commonly resurface floors as part of their work activities, often not thinking much about hazard evaluation and control for a task that has been performed the same way for many years. In recent years, however, the hazard of exposure to airborne silica has come under increased scrutiny and the importance of performing a pre-job hazard analysis has been recognized. Industrial Hygiene (IH) is being consulted for small, more routine activities. In this example case, the prime contractor contacted IH to review pre-job activity specific safety plans.

A contractor for a floor refinishing project worked with its subcontractor to develop and submit a task-specific safety plan for review of the application procedures and hazards of an epoxy sealant. During the review, the potential hazard of airborne silica dust resulting from floor roughening and preparation was also identified. An engineered control in the form of a vacuum boot attachment on the hand grinder was identified in the task-specific safety plan. In addition to the vacuum system, a determination was made that respiratory protection (half-face air purifying respirators) would be worn during the floor grinding activities. A SNL industrial hygienist would perform air monitoring to determine if the controls (vacuum system and respiratory protection) were effective in controlling worker exposure to airborne silica.



As a result of the oversight compliance air monitoring for this floor resurfacing project, the industrial hygienist supporting Facilities operations reported three of four subcontractor workers were exposed to respirable silica dust exceeding the assigned protection factor of the half-face air purifying respirators. The subcontractor for this project had a written respiratory

protection program, employees had been trained in the use of respirators, and medical evaluations and fit testing were current for the employees who performed the work. During the air monitoring, several sources of potential exposure that had not been addressed in the pre-job planning were identified. The sources of the overexposure were associated with cleaning and maintenance of the equipment. Engineered controls were not in place as workers removed and shook filters and dumped the vacuum reservoir.

Lessons learned during this activity include:

- Clean-up and maintenance activities are often not identified as potential sources of exposure when pre-job hazard analysis and controls are being developed.
- The entire scope of activities necessary to complete an assigned job must be considered and planned for to ensure adequate hazard evaluation and control, from job mobilization and set-up to job closure and demobilization.
- Changes in the way work is performed may increase the risk of exposure to hazards. Normally, hand grinding is used only to roughen edges or to work around obstructions on a floor surface, and a bead blasting unit is used on open floor areas. In this case, the entire floor was hand ground because of the difficulty in lifting the bead blaster to the mezzanine level on the job site. Hand grinding increased the time necessary to roughen the floor (consequently, a longer exposure time) and resulted in increased airborne silica concentrations.



See page 2 for a BBS Safety Refresher as a result of the recent BBS contractor survey.



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# Behavior Based Safety (BBS) Refresher

This BBS program refresher is being provided to address feedback received during a recent June survey sent to all contractors. This refresher is intended serve as a reminder of the BBS program goals and requirements and the differences between Behavioral Based Safety and Traditional Safety practices. Within the next month, a pamphlet outlining BBS requirements will be distributed to all field personnel.

To date, organizations have been generally successful in reducing accidents/injuries in the workplace by using traditional approaches such as safety training, engineering controls, OSHA requirements, awards, and other interventions; however, the results usually level, and most organizations have not been able to attain zero accidents/injuries through current methods.

BBS is the latest approach for preventing workplace accidents/injuries. BBS is a systematic approach that does not replace traditional safety practices which focus on accident reduction, rather it supplements those practices to reduce the risk of construction accidents/injuries. BBS identifies behaviors that could possibly lead to accidents. The program redirects dangerous behaviors and reinforces safe behaviors through workplace observations and immediate positive feedback until safe behaviors are firmly established. BBS Steering Committee members measure the use of these behaviors and the reasons for their use (or lack of use) to possibly predict and prevent accidents/injuries.

## Behavior-Based Safety Compared to a Traditional Safety Program

BBS Program	Traditional Safety Program
Employee Driven Program	Management Driven Program
Measures Worker Behaviors	Measures Failure Rates
Proactive Approach	Reactive Approach
Seeks Workforce Involvement	OSHA Compliance
Positive Reinforcement	Punitive Consequences

Much of the effort in traditional safety program practices occurs after an incident has taken place. For example, after someone falls off a ladder, actions are taken to prevent similar accidents/injuries in the future. This is a reactive safety measure, and it is not an ideal resolution. A BBS program is an effort to measure and change at-risk behaviors before they become accidents/injuries.

The BBS process identifies worker-controlled personal behaviors that can prevent accidents/injuries and reinforces these behaviors. BBS principles identify and remove system flaws, conditional and behavioral barriers that make safely performing required tasks difficult. To determine the at-risk behaviors for construction workers, the Facilities BBS Construction Steering Committee reviewed and analyzed construction accident data for the past four years at the Sandia/NM site to determine behaviors that could have pre-

vented an accident/injury in each case. The compiled data identified behaviors that placed contractors at the most risk, and a checklist was developed to focus on those behaviors. The list below identifies safe behaviors that can possibly prevent accidents/injuries at the Sandia/NM site.

- Pre-Job Inspection
- Proper Tools for Job
- Alignment
- Get Help
- Eyes on Path/Task
- Footing
- Housekeeping
- PPE Fall/Anchor Point
- Other Behaviors

## BBS Data Categorization

The observation data will be collected for data gathering purposes only and will not be used for punitive purposes. The behavior data will be provided to all to help prevent accidents/injuries. The information gathered will help track the formation of safe habits among workers and organizational influences that either support safe habits or lead workers to take risks. Safety behaviors are placed into three process categories:

**Perception** (Conscious Choice) – A worker's typical answer might be one of the following: In my opinion / In my experience / I've done it before and not gotten hurt

**Habit** (Sub-Conscious Choice) – A worker's typical answer might be one of the following: I did not think about it / That is the way I always do it / I do not know

**Barriers** (Limited Choice) – A worker's typical answer might be one of the following: I cannot do it any other way because... / If I do it that way, this would happen

Collected data is compiled and grouped by worker behaviors in the field. The BBS steering committee member's breakdown the data and looks for behavior trends in the workplace. The behavior with the highest amount of safety concerns becomes a focal point for training.

## BBS Creates a Safer Workplace

Since its inception in June of 2005, the BBS program has proven to be valuable in lowering the overall rate of accidents/injuries at Sandia/NM. BBS programs in conjunction with traditional safety practices increase safety awareness in the workplace and could possibly lead to safer work practices off the site. New Partnership contracts will soon require contractors performing work at Sandia National Laboratories to have an implemented BBS program. Please start thinking about how to implement such a program in your company.



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