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Subject: Blue Alert: Grinding Stone Disintegrates

Project Hanford Lessons Learned

Title: Near Miss when Grinding Stone Disintegrates

Date: March 23, 1999
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Lessons Learned Statement: Cup style grinding stones can produce high-speed projectiles if they disintegrate during operation. Direction and distance of travel of these potential projectiles is impossible to predict. Grinding stones must NEVER be installed on machines that can rotate faster than the rated speed of the stone. Thorough pre-use checks of equipment are essential to working safely.

Discussion of Activities:

Summary: A grinding stone disintegrated during use creating serious hazards from flying fragments. No one was injured.

Details: A pipefitter was grinding slag from the flame-cut edge of a steel plate using a large cup stone mounted on a portable pneumatic hand-held grinder. The grinder manufacturer's supplied guard was installed and the employee was wearing the appropriate protective clothing. A grinding/Ultra-Violet flash shield was in place between the grinding operation and near-by employees. A pre-use visual inspection of the stone and grinder had revealed no chipped areas, cracks or other damage. However, the guard covered the label on the stone that listed rated speed and stone composition. Inspecting the label would have required dismounting the stone. The grinder had been used on five similar plates and had about 10% of its available wear surface consumed.

The cup stone disintegrated while grinding. The guard protected the employee and deflected the broken pieces away and down toward the floor. The largest segment hit the floor, spun 15 feet across the floor, up a metal access ramp, and struck a galvanized garbage can. The segment penetrated the side of the can creating a 5-inch hole and knocking the can another 15 feet. Other fragments traveled shorter distances without causing any injuries or property damage.

Analysis: The grinder stone was rated for 6,000 maximum RPM but the grinder is rated at 7,700 RPM. No one knows who mounted that particular stone on the grinder. Apparently excessive speed caused the stone to disintegrate.

The following Guiding Principles of the Integrated Safety Management System (ISMS) may have prevented this event had they been more effectively implemented:

6. Hazard Controls Tailored to Work Being Performed

Engineering and administrative controls to prevent and mitigate hazards are tailored to the work

activity being performed.

* Operations and activities with identified hazards and environmental impacts are performed within planned and analyzed conditions. Fortunately in this case the flash barrier and the grinder guard were in place.

* Use of appropriate commercial standards and practices is encouraged. Commercial practices prohibit installing a wheel on a grinder that can rotate the wheel above its rated speed.

7. Operations Authorization

The conditions and requirements for the safe and environmentally protective execution of work are established and clearly communicated.

* The worker is the final check for work to proceed safely. Had the worker dismounted the stone during the pre-use inspection, he might have discovered the improperly rated grinder stone.

Recommended actions: Grinding stones and discs should be inspected to verify no visible damage prior to use. Any suspect items should be removed from service. Before beginning any grinding operation, special attention should be given to pre-use inspections to ensure guards are in place and secure. Personnel protective equipment should be used as prescribed to protect users.

Areas of heavy grinding operations should be restricted to prevent casual entry by non-workers. Barricades or screens should be used to prevent sparks and debris from being dispersed. Impact absorbing materials should be used for barriers around the operation wherever practicable.

Grinding stones and discs should be inspected during replacement and prior to use to verify proper ratings for the intended use.

Priority Descriptor: BLUE/Information

Functional Categories (DOE): Occupational Safety and Health

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References: Occurrence report RL--PHMC-FSS-1999-0006