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Focus on Prevention

Conducting a Fire Risk Assessment

Risk Analysis

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

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1 Mining Division

Focus on Prevention: Conducting a Fire Risk Assessment

The first step to emergency preparedness is defining and analyzing hazards. Although all hazards should be addressed, resource limitations usually do not allow this to happen all at once. Risk assessments are used to establish priorities so that the most dangerous situations are addressed first and those least likely to occur and least likely to cause major problems can be considered later. While the examples provided in this training package are specific to mine fires, the concepts and tools can be applied to any mine hazard.

Purpose: This training package was developed to assist instructors, as they: 1) determine how to use risk assessment to improve preparedness for mine fire emergencies and 2) present risk assessment concepts and tools to trainees.

Audience: This package is appropriate for workers/trainees from all types of mines. A risk analysis can be conducted by anyone familiar with the location(s) being studied.

Why Conduct a Fire Risk Assessment?

During a risk assessment, hazards are evaluated in terms of the likelihood that a problem may occur and the damage it might cause. Mine fire preparedness requires consideration of all possible fires that could occur. However, at a given mine some fires are more likely than others and some would result in greater damage than would others. Conducting a risk analysis identifies these differences. The results can be used to target resources at the types of fires that are most likely and/or are most destructive. Hazards that are very likely to result in fires that would do considerable damage to people and property should be targeted first for remediation and/or effective response if remediation isn't possible. Potential fires that are less likely or that would have less severe consequences are identified for attention later, after the more serious situations have been addressed.

Conducting a Risk Assessment in Six Steps

What is the First Step?

Step 1: Choose the group that will conduct the analysis.

The people involved in this activity should be knowledgeable about the area of the mine that is being assessed. For example, at one mine, fire brigade members conducted a fire risk assessment of the entire property. Alternatively, each crew could analyze their work areas for hazards. Other groups, like mine rescue teams, fire bosses, safety committee representatives, safety professionals, and/or supervisors, may be included. If many are people conducting analyses, each should be assigned to areas he or she knows well. The findings from various sources can be combined for a detailed mine site analysis.

Where Should the Analyses be Conducted?

Step 2: Define the geographic area to be included.

Some examples of areas that could be selected for analysis include a mining section, specific underground areas, the pit, a maintenance shop, or all of the mine property.

If a large area is selected, it is best to subdivide it into smaller parts and, then, combine the results later. One way to choose the areas to be included is to ask the group where they think a fire would cause the most problems. Conduct an analysis of each Aproblem@ area identified and combine these results to assess the hazards in the larger area.

What Should Be Included in the Analysis?

Step 3: Identify all of the possible fire hazards that exist in the area selected for study.

Start by determining all of the sources of ignition in the study area and organize them with the help of the attached form called APotential Fires@. Notice across the top of this form are labels for general types of fire like electrical and frictional. Under each general label, trainees should list all of the specific sources of ignition of this type that can be found in the geographic area being analyzed. For example, under the label Aelectrical@ list power centers, fan motors, etc. and under the Africtional@ label belt rollers or the belt on a motor may be identified. Be as specific as possible when listing fire hazards.

How Are Hazards Analyzed?

Step 4: Evaluate the Risks

While there might be many ways of assessing risk, recent literature suggests using two concepts, that is, probability of occurrence, and severity of effects (DeVaul, 1992; Hau, 1993). For each fire hazard identified in Step 3, a judgement about the probability of a fire being caused by that ignition source and the severity of the consequences should be made.

The attached AFire Hazard Risk Matrix@ can be used to record a risk rating for each fire hazard identified in the terms high, medium, or low. To use this assessment, several concepts must be understood:

Hazard - any situation that has fire potential. (Take these from the APotential Fires@ form.)

Probability - likelihood that the particular hazard will result in a fire.

Severity - an estimation of how serious the potential problem might be in terms of harm to people and/or damage to property.

Remember when rating to consider secondary incidents that can occur as a result of the initial incident.

For example, a small fire on the surface at an underground coal mine may cause electric power interruption to one mine fan in a multiple fan ventilation system. This may, in turn, cause major changes in ventilation underground and result in accumulations of methane in areas of the mine where it is commonly not found. An explosion hazard now exists.

In summary, to assess risk: (a) identify a source of ignition; (b) determine whether the probability is high, medium, or low that this source will actually cause a fire; and (c) determine if the risk of the severity to life, property, and the environment is high, medium, or low.

What Is Done with the Results?

Step 5: Use Hazard Ratings During Resource Allocation

According to this risk matrix, those hazards deemed to have the greatest probability for occurring and the greatest severity to the operation should be considered as high/high risk hazards. They should be the top priority for future training, mitigation, and/or response preparation efforts.

One way to organize the findings is to take the completed AFire Hazard Risk Matrix@ forms, organize them from high/high risk to low/low risk, and put them in a notebook. Once a hazard is addressed, the corresponding form can be moved to the back of the notebook, and then the focus should turn to the next hazard. This process should continue until all identified hazards have been addressed.

When is Risk Assessment Finished?

Step 6: The task of risk assessment is an on-going activity. Any time the work environment changes, update the risk assessment and re-evaluate the priorities. A risk assessment is most useful if it is never considered finished. Instead, think of it as a draft document that needs to be up-dated as things change.

Sources for More Information

1. DeVaul, R. E. (1992). AEmergency Response Plan Formulation and Implementation.@ Proceedings: Twenty-Third Annual Institute on Mining Health, Safety and Research, pp. 67-74.

2. Hau, M. L. (1993). ACoordinating Your Facility=s Emergency Response.@ M. L. Hau & Assoc., Inc., Port Clinton, OH, 17 pp.

Potential Fires

Planned	SponCom	Machinery	Electrical	Frictional	Other
ex: welding	ex: gob - coal	ex: shuttle car	ex: power centers	ex: belt line	ex: lightning

1. Mine Section or Area _____

2. Date _____

Fire Hazard Risk Matrix

1. Hazard: _____

2. Potential Location(s): _____

_____

_____

_____

RISK ANALYSIS				
Probability	**HIGH**			
	MEDIUM			
	LOW			
		LOW	**MEDIUM**	**HIGH**
		Severity		

NOTES:

3. Mine Section or Area _____

4. Date _____

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