

This chapter deals with costs of non-injury accidents, as well as injury accidents. Therefore the term "accident" is used in its broadest sense to cover occurrences, and their causes, which may lead to property damage and work injuries.

Accident Investigation and Analysis

Successful accident prevention requires a minimum of four fundamental activities:

1. A study of all working areas to detect and eliminate or control physical or environmental hazards which contribute to accidents
2. A study of all operating methods and practices
3. Education, instruction, training, and discipline to minimize human factors which contribute to accidents
4. For cause analyses, a thorough investigation of at least every accident which results in a disabling injury (under ANSI Z16.1) or OSHA lost workdays to determine contributing circumstances. Accidents that do not result in personal injury (so-called "near-accidents" or "near-misses") are warnings. They should not be ignored.

This fourth activity, accident investigation and analysis, is a defense against hazards that are overlooked in the first three activities, those that are not obvious, or hazards that are the result of combinations of circumstances that are difficult to foresee.

Accident investigation and analysis is one of the means used to prevent accidents. As such, the investigation or analysis must produce information that leads to countermeasures which prevent or reduce the number of accidents. The more complete the information, the easier it will be for the safety professional to design effective countermeasures. For example, knowing that 40 percent of a plant's accidents involve ladders is not as useful as knowing that 80 percent of the plant's ladder accidents involve broken rungs.

A good recordkeeping system, as discussed in Chapter 6, is essential to accident investigation in that it allows the basic facts about an

accident to be recorded quickly, efficiently, and uniformly. An investigation of at least every ANSI Z16.1 disabling injury or every OSHA lost workday case should be made. Accidents resulting in nondisabling injuries, or no injuries, and also "near-accidents," should be investigated if time and facilities permit, especially if there is frequent recurrence of certain types of nondisabling injuries, or if the frequency of accidents is high in certain areas or operations.

For purposes of accident prevention, investigations must be for fact-finding, not fault-finding, otherwise, they may do more harm than good. This is not to say that responsibility may not be fixed where personal failure has caused injury, or that such persons should be excused from the consequences of their actions. What this does mean is that the investigation itself should be concerned only with facts. The investigating individual, board, or committee is best kept free from involvement with the punitive aspects of their investigation.

Types of investigation and analysis

There are a variety of accident investigation and analysis techniques available to the investigator. Some of these techniques are more complicated than others. The choice of a particular method will depend upon the purpose and orientation of the investigation. The Failure Mode and Effect approach discussed in Chapter 4 could be very useful for investigating situations where large complex and interrelated machinery and procedures are involved, but may be of limited value in the investigation of accidents involving hand tools. If management procedures and communications and their relationship to accidents are of great interest, the Management Oversight and Risk Tree analysis (MORT, see references at the end of Chapter 4) could prove to be very helpful.

The accident investigation and analysis procedure explored in this chapter is based upon the ANSI Z16.2 Standard, and focuses primarily on unsafe acts and unsafe conditions, and is the most often used technique. Other similar techniques involve investigation within the framework of defects in man, machine, media, and management (the "4 M's"), or education, enforcement, and engineering (the "3 E's"). For analysis purposes, these techniques involve