Hazard Identification

Think About It !

Instructors Manual

Version 7.7.1

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CONTENTS

Instructor Preface

These notes will help the instructor shape the approach he or she will take to suit the audience. Depending on the audience make up, and the desired outcome, the instructor may find it beneficial to spend a little more time on the theory behind the use of the tools that are included in this training.

The ABC Model

The ABC model presents a framework for understanding human behavior. It provides the "rules of the game" whereby it is possible to explain why an individual would fail to look for hazards that may well cause personal injury. The material on the ABC model is included in this package in an abbreviated form. Again, depending on the audience the presentation of this material may either help or hinder our efforts to encourage people to take the time, and follow the thought process required to mitigate hazards that may result in personal injury.

How can it hinder?

The terminology that best describes the ABC model is not familiar to a large percentage of the population. From a presentation point of view, if participants in the training "turn off" because they are intimidated by the terminology we will loose them and they will likely be confused when it comes to using the hazard identification tools.

How can it help?

For some people it is very important to understand the "whys of human behavior" as opposed to only knowing the "whats that are expected". In fact, knowing why one performs a particular behavior is often linked with the repeated, consistent performance of that behavior. In everyday conversation one often hears the question "do you understand?" The common assumption made is that if one understands then the person will be motivated to act in a way that supports the expectation of some behavior.

How deep do I go?

The single most influential factor in determining the time and approach you will take on the ABC model is the audience. Of course other factors must also be considered, such as the time allotted for the training and whether or not there will be additional training provided in the future. The material provided in this course is designed as an introduction only to the use of the ABC model and the participant manual does not contain any of the theoretical terms associated with the classic model. The assumption is therefore made that the instructor will use the material in the instructors manual to develop their own teaching notes and participant manual if they feel the audience requires this depth of understanding.

COURSE DESCRIPTION

Purpose

To improve the knowledge and skills required in executing a task analysis, hazard identification and risk assessment as part of the preparation required before any work begins in the field or shop. This training also provides the rationale for the Pre Job Task/Risk analysis.

Objectives

After completing this training you will be able to:

1. Describe why the Task/Risk Analysis is needed to improve Environmental Health and Safety performance.

2. Describe what the Task/Risk Analysis is, when it is done, and who does it.

3. Describe the process steps for doing the Task/Risk Analysis.

4. Identify the steps of a job

5. Describe the method used to identify hazards associated with each job step.

6. Demonstrate the method used to assess risk using the Risk Assessment Matrix.

7. List the appropriate controls that can be used to reduce risk to an acceptable level.

About This Course

This course is divided into five sections. Each section begins with a Learning Objective. The Learning Objective will tell you what the class participant is expected to know or be able to do at the end of the section. There are also questions at the end of each section. These questions relate to the learning objective and provide the participant with the opportunity to demonstrate how well they have learned the section content.

The questions have been designed to provide a balance between identifying the right answers, identifying the "most appropriate" answers and using the theory material in the section to develop an informed opinion.

There are also skill practice exercises contained in several of the sections. These practice sessions are designed to allow each participant to acquire a base level of expertise in the associated skill set.

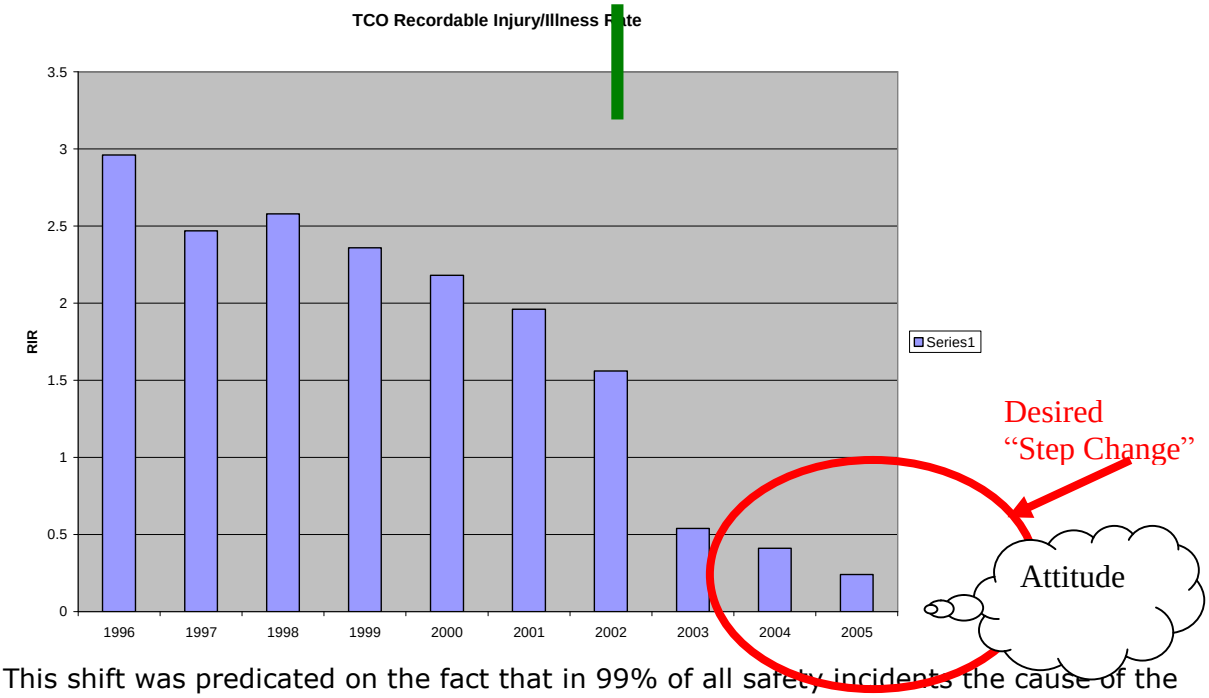
SECTION 1: THE PROBLEM

Learning Objective

At the end of this section the participant will be able to describe why the Task Risk Assessment Process is needed to improve EH&S performance and protect the employee from injury.

Introduction

Over the years TCO - Dow has seen several "step" changes in EH&S performance. Major changes in the approach to Safety have been introduced and there have been significant improvements in the results achieved. The most recent change in approach (circa 2002) was an increased emphasis on personal behaviors as the most critical factor in reducing injuries in the work place.



This shift was predicated on the fact that in 99% of all safety incidents the cause of the incident involved individual behavior. "Things", such as vehicles, pumps, electrical motors, and process equipment may be involved in incidents but it is people's behaviors that cause these incidents. The focus on behaviors means that we need to understand something about why people behave the way they do. The framework for this understanding is performance management.

Note: Hazard Identification is behavioral even though we are unable to observe the act. It is a mental behavior that we may assume took place if some action or mitigation follows. That is, we can say with a reasonable degree of certainty that if a person acts to mitigate a hazard, then, they likely identified the hazard. It must also be acknowledged that if a person were simply "following orders" or following the steps of a procedure it is possible that the person mitigates the hazard without making any cognitive connection between hazard and mitigation. The key point that we need to make to the workshop participants is that our focus on hazard identification follows a logical progression. Simply stated: 1) Desire to see the hazard, 2) identify the hazard and then 3) do something about it

HAMMER IT HOME –

This exercise helps illustrate the point – With hammer, nails and a short 2X4 in hand ask for someone from the audience to help you complete a simple task – You need to drive a nail but ask the volunteer to hold the nail for you. You won't see them ID the hazard but their actions will tell you they did!

The following script may be used to set up the scenario. However it is always preferable to use your own words:

" OK, let's see if I can illustrate the point. First I'll need a couple of props – a hammer and a 2x4. Next I'll need some help from someone who has a lot of experience using a hammer – say a carpenter or even someone who does a lot of wood working at home. Who can help me? (Note: *It will usually take a few moments for someone to volunteer – it is best not to ask someone directly to help out because this changes the dynamics of the role playing. Be comfortable in the silence as you wait for a volunteer*)

"Great thanks *BOB*. Now here's what we need to do. (When *BOB* comes up hand him the hammer) We need one more thing – a nail. Now if you'll just hold the nail for a moment and let me see the hammer for a second. (*Usually the participant will hand over the hammer as soon as you reach for it but if he/she seems reluctant you can justify the request by saying something like "I just want to confirm the weight"*) You know *Bob* I used to pretty handy with a hammer – mind you it's been quite a few years since I've used one regularly but still…. Let me give this a try. All you need to do *Bob* is hold the nail on the 2x4 and I'll hammer it in – In fact I should be able to do this in one shot if my skill with a hammer isn't too rusty."

At this point the participant will likely begin to realize that all his expertise with a hammer will be worth nothing since he has lost all control of the situation. And usually he will refuse to hold the nail for you – Thank the participant for volunteering but before you ask him to return to his place ask him why he refused to hold the nail. His answer will provide the perfect launch into the discussion on why people do the things they do.

If, and this has happened, the participant actually does hold the nail for you take advantage of this situation and ask him why he would do this? You can rest assured that most of the workshop participants will be thinking that this guy is crazy. But his answer will likely be just as revealing as in the case where he refused to hold the nail. Maybe he felt he could trust you, maybe he felt he had to because "you were the boss" or maybe he felt pressured by the rest of the workshop participants to demonstrate that he was no coward. You can see how it doesn't really matter what response the participant gives or whether he holds the nail or not – In both cases there is the perfect launch into the "teach" on why people do the things that they do.

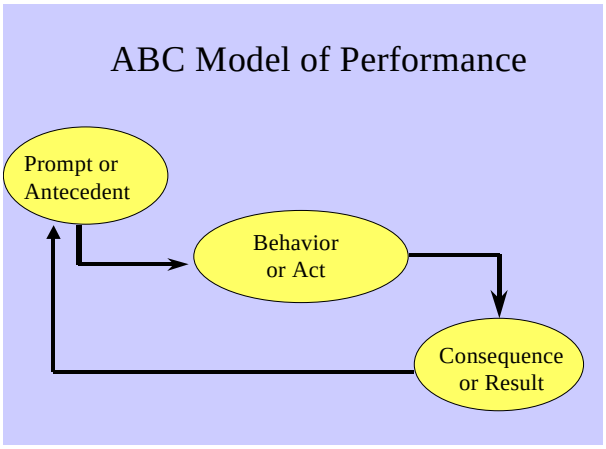
Note: Have a group discussion about how to mitigate the potential hazard of this exercise.

Performance Management

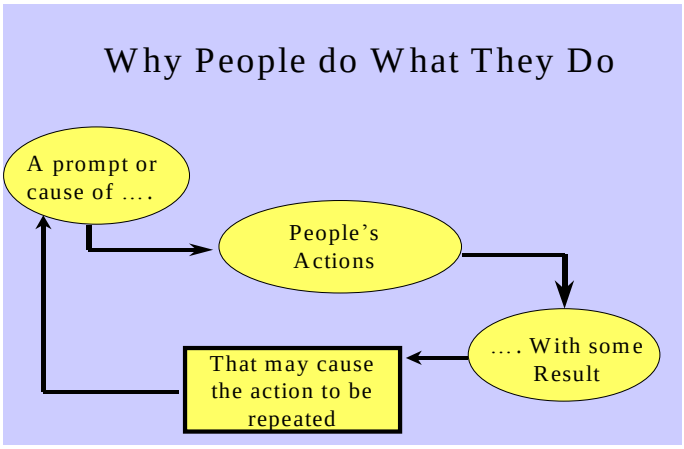
Any discussion about human behavior includes three components that are intrinsically connected:

1. The Behavior – an observable act.
2. The Prompt (or cause)– an event or state of mind that triggered the behavior.
3. The Consequence (or result) – something that happens as a result of the behavior.

ABC Model



Based on ABC Model



People generally act a certain way (or behave) in order to either experience a positive feeling[1] (pleasure) or to avoid a negative feeling[2] (pain). Understanding this principle is extremely useful in gaining an appreciation for why Hazard Identification is so important to the reduction of injuries in the workplace.

A key point to be made here is that in the ABC model or the "why people do what they do" model, the consequence, or the memory of the consequence of some behavior often becomes a prompt for the repetition of that behavior.

A good example of this is where a person does something that they were told not to do and there was no negative consequence and maybe even a very encouraging consequence. Such is the case where a person works above six feet without fall protection. If no one sees this there is no negative consequence and in fact the person gets the job done quicker.

[1] For Example: People generally seek approval or recognition from their peers or supervisors. "It feels good when the boss praises my work."

[2] For Example: People generally seek to avoid a reprimand from their peers or supervisors. "It is embarrassing when the boss tells me that I have failed to meet Company expectations or a peer ridicules my performance in front of my other peers."

A Case in Point

In March of 2003 an employee was turning a valve while standing on a wooden platform. He had been instructed to exercise valve in an attempt to completely shut it (this was a continuing effort to seal valve). The valve broke causing the valve wheel to free spin and the employee lost balance, fell backward onto handrail which broke. The employee fell to the ground, striking knee on concrete. Knee injury resulting in a Recordable Injury and work restrictions.

From the Investigation, that followed this incident, two causes were identified:

- LTA Hazard Recognition for Body Positioning
- LTA Hazard Recognition for High Force Used

Employee states that culture and prior oil field experience (15 yrs.) have driven him to use excessive force. Although it is well known that older valves can break under excessive force, it is common practice to use large valve wrenches and body weight to operate valves. However, this particular individual decided to "take that chance" and in this instance he was lucky that he didn't sustain greater injury (broken rib from breaking handrail). Why would he take that risk, would he take it if he were 100 ft. off the ground rather than 3 feet? Our ABC behavioral model provides some insight.

First we need to know that this operator was an experienced hand and that he had been operating valves for over 15 years. He also knew that several other operators had attempted to close this valve but were not successful. Because of his size and strength, he was asked to close this valve.

It is important to understand that all of this "decision making process" was not executed consciously. The employee likely did not understand that the prompt for his behavior was "acceptance of a physical challenge based on his job experience". Never the less, from our understanding of performance management it is reasonable to infer that this is what happened. In fact, the hazard of closing a stubborn valve became a "non-hazard" in light of his success with previous valves.[3]

[3] It is also reasonable to assume that after the employee experienced the valve bushing break, he was unlikely to miscalculate the risk of that particular hazard in the future.

SECTION 1: Skill Practice

In this skill practice we will have the opportunity to identify the three components of performance management. Through the exercise we will set the groundwork for the methods that can be used to increase our ability to identify and mitigate hazards in our workplace.

The following is a description taken from a real incident. Take a few minutes study the picture.. What hazards were present?

Review each of the additional pictures for additional discussion.

Study each of the pictures and have a group discussion. Need to discuss and agree on the answers to the following questions:

1. What hazard’s were present?

Allowing 10 minutes for discussion.

Review the following points/concepts with the large group:

Instructors Note: Keeping the audience in mind it is important to recognize that the use of terms like "Antecedent" may only serve to shut down the communication. Consider using alternate terms such as "cause", "prompt" or even "trigger" to emphasize the point that behaviors do not occur in isolation.

1. Antecedents
   - One of the most powerful antecedents or prompts is a person's past experience performing the same or similar tasks. If the person has successfully completed a task a number of times (*and the influence of this prompt increases with each time the task is completed* ***quickly and without incident***) this is likely to overshadow a plant rule or standard. All too often in investigations we hear the words; " I know what I was supposed to do – I don't know why I didn't".

2. Behaviors
   - Remember that the behaviors we are talking about are those acts that we can see. It is impossible to observe a person making a decision (although you can sometimes watch a person "thinking" about something). The result of that decision making however is observable and that is the behavior we need to focus on in order to improve our EH&S performance. For example, a decision made to follow a procedure will result in a behavior that will minimize the risk associated with specific tasks within that procedure.

3. Consequences
   - After a behavior there is always a consequence. Sometimes the consequence is positive and sometimes it is negative. More important however, is the fact that some consequences are natural and others are created within the organization. Both types can have the effect of either increasing or decreasing the likelihood of a behavior to occur.

Hazards

In order to see an existing hazard, there must first exist a desire to look for the hazard. While the desire to look for hazards does not guarantee that you will identify 100% of all hazards it does increase the likelihood of "seeing" it. The next step of course is to do something about the hazard but that we will discuss in Section 2 of this training.

Another way to think about this desire to look for hazards is in terms of prompts or antecedents. If we ask the question; "What makes people want to look for hazards?" there are at least four possible answers:

1. The fear of getting hurt when the risk of doing a job is not minimized by mitigating the hazards.
2. The pressure applied by the Company to identify the hazards of a job and the thought that failing to do this will result in a negative performance review.
3. The desire to meet behavioral expectations because of consistent positive reinforcement by the Company when the desired behavior was demonstrated
4. Personal Integrity or the personal pride that one has in doing the job right.

In the first case this fear is often reduced in the presence of the significant number of times the task was performed without getting hurt – even without identifying the hazards – and it was done much quicker too.

In the second case this pressure is sufficient to prompt the correct behavior only when the person believes that there is a strong possibility that the Company will know that they did not look for the hazards. If there is no reason to believe that this will happen (e.g. an intense audit schedule) then, it is much less likely to prompt the correct behavior.

In the third case the prompt has developed over time in light of a repeated favorable consequence. This occurs when the desire for positive recognition previously reinforced by a positive consequence becomes the prompt for the desired behavior

The fourth case has the potential for the greatest impact on achieving a new "step change". If every person would be motivated to look for and mitigate hazards simply because "it is the right thing to do" the EH&S results would definitely improve.

While all four possible causes exist there isn't one that appears consistently. The desire to look for hazards can be caused by one or a combination of all four. Regardless of the cause, one thing remains certain – before you can do something about a hazard you must see the hazard and the chances of seeing the hazard are greatly increased if you are committed to looking for the hazards.

SECTION 1: Questions/Answers

(Do not use the first question if the ABC Model was not discussed in the teach.)

1. List the three components of the ABC Model?

Antecedant_____

Behavior_____

Consequence_____

2. What might prompt a person to identify the hazards associated with the job?

Answer:

1. The fear of getting hurt when the risk of doing a job is not minimized by mitigating the hazards.
2. The pressure applied by the Company to identify the hazards of a job and the thought that failing to do this will result in a negative performance review.
3. The desire to meet behavioral expectations because of consistent positive reinforcement by the Company when the desired behavior was demonstrated
4. Personal Integrity or the personal pride that one has in doing the job right.

3. What might prompt a person to do the job without identifying the hazards?

Answer:

1. Getting the job done “quicker” = pleasure
2. Peer Pressure = fear of ridicule
3. Past Performance without injury = not worried about getting hurt
4. Pressure from the company to get the job done = fear of getting fired for poor performance
5. Pressure from the foreman to get the job done faster = fear of getting fired or being known as a “slacker”
6. Overconfidence, feeling that all hazards are known = taking the extra time to identify what I already know is punishing
7. Frustrated with the company, the job, or some off the job influence = tendency to get what needs to be done finished so that you can move on to more pleasurable pursuits

SECTION 2: TASK/RISK ANALYSIS

The value of identifying task hazards diminishes significantly if the hazards are only identified after an injury occurs. Although it often seems easier to see the hazards when analyzing the causes of an injury (Root Cause Investigation) the fact of the matter is that at this point it is too late to prevent the employee from being hurt. It may help some other employee from getting hurt but even that is debatable in the presence of the all too well know axiom – "It won't happen to me".

As illustrated in the chart below the most pro-active action that one can take to prevent an injury is to identify the hazard and then immediately do something to mitigate that hazard. The Intervention/Near Miss reporting is designed to help employees do just that. If you think about it, in terms of performance management, an act of mitigation in the presence of a hazard is prompted by the need to reduce the risk of injury. If this is self-initiated or self motivated it has the most positive influence on eliminating workplace injuries. As you move from left to right on the declining impact diagram you move from those activities that are effective over the long term because of your desire to take mitigating action and ends with those activities that have only a marginal short term effect because someone else is telling you what to do.

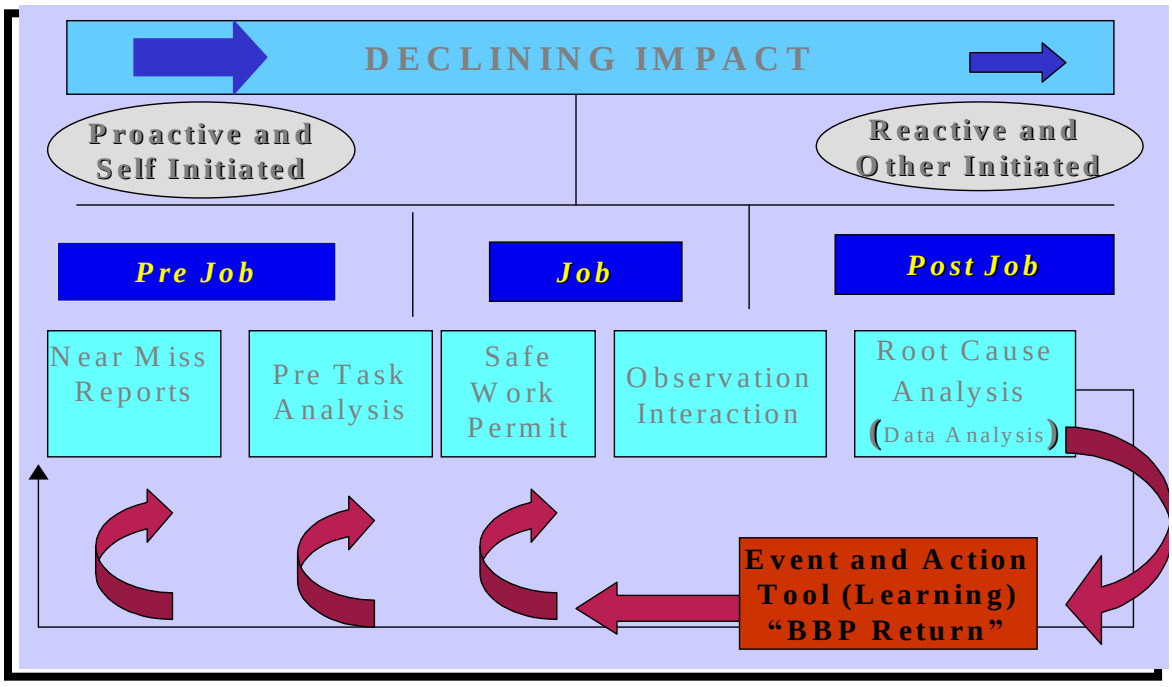


Figure 1

TASK/RISK ANALYSIS

Any effective risk analysis must start with a list of "tasks" or steps that make up the job to be done. The more detailed we are in our breakdown of tasks the greater the opportunity is to identify all the hazards that are associated with each task.

TASK BREAKDOWN EXERCISE – this needs to be developed to suit the class – If the class is made up of several disciplines it may be best to use the "home example" below. The principles of the exercise remain the same and it would be made up of three parts:

1. Describe a job of medium to low complexity
2. Ask participants to break the job into tasks – What's involved in doing the job?
3. Review the job showing how many tasks there really are in the job.

EXAMPLE FROM HOME:

The Job – Hanging Christmas Lights on the house.
For this exercise the following conditions apply:

I. It is mid December with an ambient temperature of 35 Degrees F.
II. There is ice on the ground and house.
III. This is the first year that Christmas Lights will be on the house

Possible Task List

1. Drive to store to purchase lights, hooks, extension cords
2. Traverse Parking lot to enter store
3. Select and purchase material
4. Return to vehicle
5. Drive home
6. Gather required tools
7. Get ladder
8. Position/secure ladder
9. Climb ladder
10. Attached light hooks
11. Repeat 8,9,10 until all hooks are attached
12. Carry light string up the ladder
13. Hang the lights on the hooks
14. Connect electrical cords to the lights and electrical outlet
15. Secure electrical cords
16. Return ladder
17. Clean up

Review Tasks:

Remember, the purpose of this exercise is simply to reinforce the fact that there are often many more tasks associated with a job than we normally think of. With each task there are inherent hazards. The list above is only a sample of tasks to guide the discussion.

Knowing the value of performing a risk analysis on each of the tasks associated with the job from the declining impact chart, it is reasonable to place a significant emphasis on the Pre-Task Analysis in order to help in our efforts to improve EH&S performance. It is for this reason that a separate tool has been developed to assist employees in their task/risk analysis. Again, in terms of impact it is absolutely critical that this analysis is performed before the job begins.

Section 2 - Summary

Although this section does not have a set of quiz questions, it should be concluded by discussing the following points that set the backdrop for the next two sections:

1. There is a direct relationship between detail and risk reduction: The greater the detail the higher the likelihood of reducing all hazard risk. This may well beg the question from the workshop participants as to how far do you go? The answer is - we need to go far enough to ensure no one gets hurt.
2. Reinforce the value of doing the PTA in a workgroup – as was shown in the Christmas light exercise we invariably identify more tasks when there are a number of people supplying input
3. The most powerful impact on incident elimination happens when we are pro-active. The opportunity to be pro active is most prevalent when we are in control of what we do as opposed to having others tell us what to do. With today's increasing emphasis on Safety by the company and by society at large, there are very few areas that present a greater opportunity for individual control. Hence it is up to the individual to decide to take that control – and once that decision is made the rest can be easy.

The STAC is two sided. One side of the card is designed to allow for the identification of the tasks as well as a two-stage risk analysis for each of the hazards that are associated with the tasks of the job.

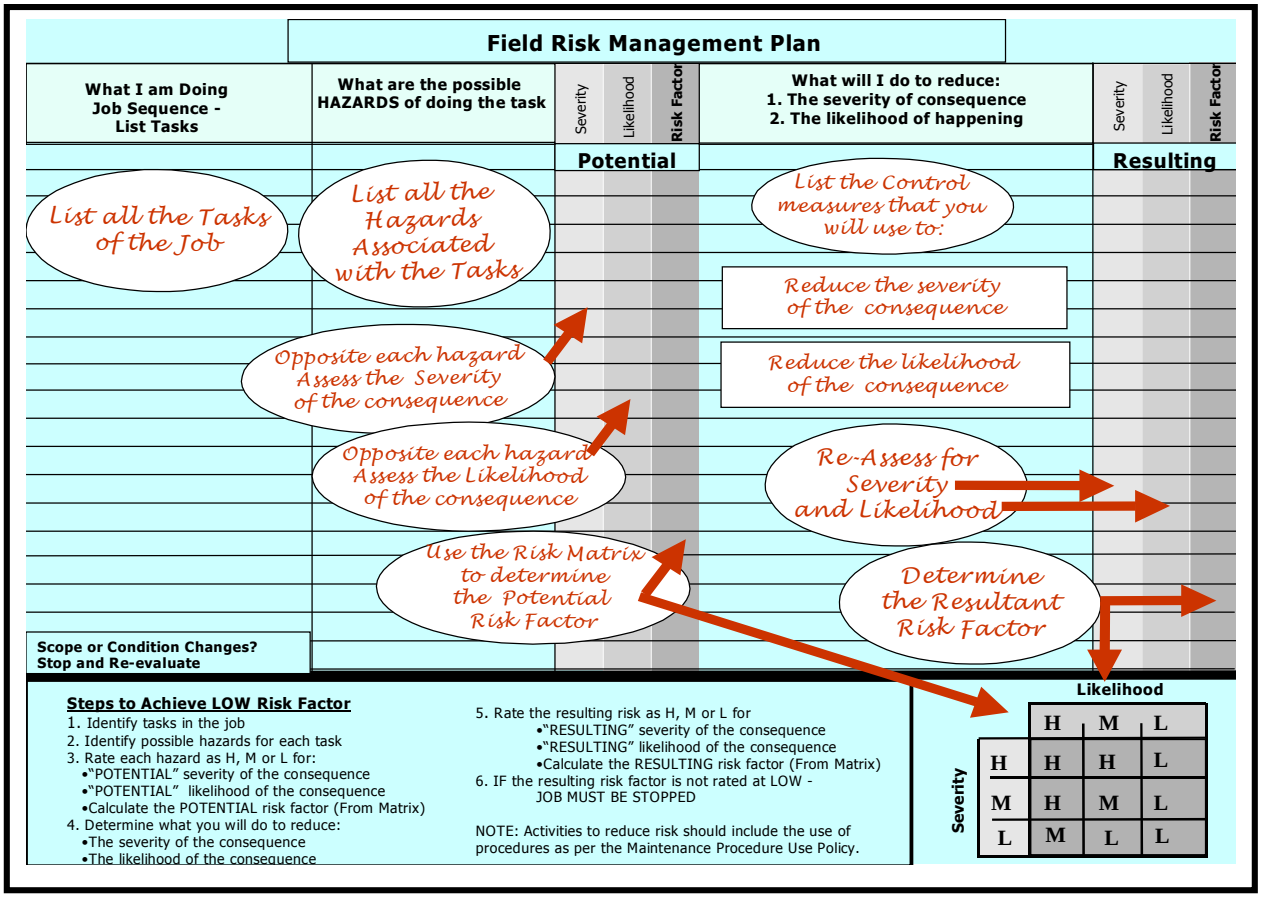


Figure 2

SECTION 3: HOW TO IDENTIFY HAZARDS

Learning Objective

At the end of this section the participant will be able to list the steps that are required to Identify the hazards associated with the task steps of a job.

Introduction

Since, by definition, hazards are the potential for an adverse effect, it is important to understand that the process of identifying hazards is one that always involves the anticipation of things that have not yet happened but could happen.

If you think about the number of possibilities that exist with the variety of different tasks included in the vast number of jobs in the workplace combined with the almost infinite number of variations that occur in different locations under different environmental conditions, one quickly gains an appreciation for the magnitude and difficulty of the first principle of injury prevention.

Because of this it is impossible to teach participants all the hazards that exist and then expect them to remember these every time they perform a task. Having said that, it is also important to recognize that some hazards present themselves more frequently than others. These we could call the common hazards and these are more easily managed to a low risk. When exposed to these common hazards people generally know what to do to manage them because they have been repeatedly exposed. (This does not necessarily mean that people will always mitigate these risks – in fact in many cases the familiarity of these hazards themselves pose an even subtler and perhaps dangerous hazard in the form of complacency.)

We can break hazards into two basic types. There are physical hazards and there are behavioral hazards. The Physical/Environmental type are usually the hazards we see first. On the other hand, the Attitude/Behavioral hazards are often more subtle and harder to actually "see"; these are associated with the acts, attitudes or habits of people.

Physical/Environmental – the potential for a physical adverse affect such as an injury resulting from pinching a finger when the wrench slips while tightening a nut. This might include such things as a nail sticking out of a piece of wood or the sharp edge of a piece of stainless cladding.

Attitudinal/Behavioral – the potential for a mental lapse in concentration or a conscious decision to "take a shortcut" motivated by a desire to complete a task sooner. Attitudes often drive behaviors that create hazards.
Consideration shall be taken for:

- physical capabilities (medication, past injuries, weight bearing limitation, etc.)
- level of skill or knowledge limitations (fork lift training, driver's license, etc.)
- individuals' capabilities (not fit tested to use respirator, afraid of heights, etc

Regardless of the method is used to identify hazards, it must provide the necessary triggers to include both primary and secondary hazards.

Hazard identification is clearly a mental activity. It is the disciplined thought process that must be rigorously applied if we are to achieve a Zero Injury culture.

This presents a new challenge for the "hands on" employee who has essentially been hired to apply physical skills to making a transfer, change out a pump or terminate an electrical installation. This is not meant to imply that our craft people do not *think* about their work. They absolutely have to think in very concrete terms seeking ways to successfully satisfy the requirements of a professional craftperson. However, it is likely that many if not most of the people in the crafts are not schooled in the scientific study of human behavior. The challenge is not to develop psychologists but rather to pass on a basic level of understanding in the area of performance management as well as create a motivation to use the same visioning skills that are used in the craft and apply those to hazard identification.

The TAIL-R Method

1. **T**hink about the task (not the job) you are about to perform.
2. **A**sk "What could happen" that would cause me to get hurt?
3. **I**magine how this could happen.
4. **L**ist all the things that could cause this to happen (both physical and mental)
5. **R**epeat steps 1-4 for each task.

These causes, as you have mentally identified them are in fact the hazards that are associated with the task. Let's take a moment and consider each step in the Tail-r method in a little more detail.

Think about the Task

Use the information from your job package, safe work procedures and your previous experience performing the task to get a mental picture of you performing the task without incident.
This is similar to the approach that Gary Player used in golf. Before every shot, before he would even approach the ball, Player used to imagine hitting the perfect shot. Only after seeing himself make that perfect shot would he approach and hit the ball. It is important to realize that Player, a successful PGA tour player did not think about the next shot or his previous shot or what it would be like to win the tournament – he focused on one shot at a time. And by doing this he was able to put together many winning rounds of golf. It is similar with hazard identification – any successful job is made up of a series of successful tasks. Each task requires focus and concentration.

Instructors Note: Gary Player is only one example from sports – Another example is the competitive diver before they execute a dive, or in the area of track and field a high jumper runs through the jump mentally before they approach the bar. The difference between what an athlete does and what we are asking the craft person to do is that we are asking the crafts person to envision what could go wrong in the attempt to "plan for the unexpected". This is picked up in the next step.

Ask “What could happen”

In this step there are no boundaries in terms of what could go wrong. Experience has shown that there are a large number of possibilities. Most of the possibilities exist because we do not consider the “unexpected”. For example – When someone starts the task of tightening a nut on a stud they typically do not expect the wrench to slip. But everyone who has done this task soon comes to accept that this is a very real possibility. It could happen!

Another example is when a crew is working above you in the Plant. When working below there is a definite possibility that a tool or a piece of material such as a clamp could very likely fall.

While these two examples are quite obvious there are other more subtle possibilities that exist as well. A case in point is taken from an incident that occurred on this Site in 2003:

A contractor was checking out a tool he had not been trained on;. The cutting tool of choice was an approved safety utility knife. He thought he could figure it out on his own and ended up with a recordable injury needing stitches on hand..

The possibility of slicing his hand on the open blade was never taken seriously because there was a guard and the result is clearly not desirable. (avoid pain) However, as the investigation later revealed, the possibility of getting cut by an approved safety knife and having a body part in the direct “line of fire” was also never considered. The contractor fell into the trap of thinking that because he was using a common tool i.e. utility knife, which he used regularly without negative consequence that “nothing could go wrong, he didn’t need explanation about how to use it” In fact, as the incident demonstrates nothing could have been farther from the truth. These types of possibilities where things can go wrong can often be picked up in step 3 of this method.

Imagine how this could happen

This step of hazard identification requires the person to draw a mental picture of the possibilities identified in step two. In the cut hand example above the person needs to imagine all the ways that the knife blade, though protected, could contact his hand. The person should also realized that they were not trained or knowledgeable about how the new tool operated. Since very few people would ever intentionally put a body part in the line of fire it is hard to miss the reason of losing focus. From this point it is a short mental step to identify the reason for losing focus as the nature of exploring a new tool, is considered a low repetitive activity.
Once a person can see himself or herself "getting hurt", whether that results from a sharp knife slicing into your body, wrapping your knuckles when the wrench slips or "seeing" a pinchbar fall from twelve feet above and land on your neck, it is relatively simple to think about the things that might cause this to happen.

We have often heard the expression 20/20 hindsight. The expression refers to the fact that it is easy to see what happened after the event. Step 3 of this hazard identification method is an attempt to use the "hindsight" of your imagination to advantage even though the incident has not occurred.

List the things that could cause this to happen

Remember that we are considering the task. It is usually a single step in a series of steps required to complete a job. In step 5 this exercise (steps 1-4) is repeated for each task.

By listing the things that could cause the imagined event to happen on your STAC you are identifying the hazards associated with the task. Hazards are nothing more or nothing less than possible scenarios where the potential exists to cause damage or harm to people, property, materials, or the environment.

SECTION 3: HOW TO IDENTIFY HAZARDS - QUESTIONS

1) List the five steps of the TAIL-R Method of Hazard Identification.

2) What is a hazard?

List some EXAMPLES of a hazard?

3) Use the following scenario to answer this question.

" You are part of a crew that is unloading cable reels from a truck flatbed. You require the cable to be on the third level of a building that is in the early stages of construction. There are three people on your crew: a crane operator, a rigger and yourself. There are other workers on site, some of whom are using noisy power tools. Another group is involved in trenching activities nearby."

Complete the following table:

(a) Job Steps (List five)	(b) Hazards Associated with each task or step
1.	
2.	
3.	
4.	
5.	

SECTION 3: HOW TO IDENTIFY HAZARDS - Answers

1) List the five steps of the TAIL-R Method of Hazard Identification.

1. **T**hink about the task (not the job) you are about to perform.
2. **A**sk "What could happen" that would cause me to get hurt?
3. **I**magine how this could happen.
4. **L**ist all the things that could cause this to happen (both physical and mental)
5. **R**epeat steps 1-4 for each task.

2) What is a hazard?

Hazards are the potential for an adverse effect causing harm to people, property, materials, or the environment.

EXAMPLES:

Environmental/Physical	Attitudinal/Behavioral
- Falling from height - Falling on same level - body parts being caught in under or between - body parts in line of fire	- taking a shortcut - loosing focus on the task - placing inappropriate priority on working without injury - underestimating risk - the decision to exert excessive force - the decision to over extend one's reach

3) Complete the table below:

(a) Job Steps	(b) Hazards
1. Position the truck	• Uneven Ground • Traffic congestion • Swing angles restricted given the location of trenching and the structure itself • Backing up
2. Attach the cable reels to the sling	• Pinch points • Cuts from handling the cable • Noise interrupting communication between operator and rigger • Excessive use of human force • Placing body position that stresses joints or muscle groups
3. Connect the tag line	• Pinch points
4. Lift the reels to the third level	• Pinch points • Cuts from handling the cable • Noise interrupting communication between operator and rigger • Failure of the sling cable • Load falling due to improper use of sling • Material or equipment falling from above
5. Remove the reels from the sling	• Cuts from the cable • Slipping/ rolling of reels • Excessive use of human force • Placing body position that stresses joints or muscle groups • Pinch Points

SECTION 4: HOW TO ASSESS RISKS

Learning Objective

After this Section the participant will be able to demonstrate the use of the Task Risk Assessment Matrix.

Risk

Before considering risk assessment it is important to have a common understanding of risk as it specifically relates to EH&S hazards. From this perspective risk almost always refers to the chances of something harmful happening, such as injury, loss of containment or environmental damage. If the potential loss or harm is considered very serious or the chances of the harm are great then the risk is high.

Whether we are talking about Safety, financial planning or playing the horses there are always two parts that determine risk; the size of the potential loss and the chance of the loss occurring.

Risk Assessment

Factors in Risk Assessment

For each hazard an assessment is needed to determine the level of risk. An assessment of any kind always includes some degree of personal judgment. Does this mean that two people could judge the risks associated with a particular hazard differently and end up with a different result? Consider the following example to illustrate this point:

The Same Old Grind

In the crafts, such as Boilermakers, Pipefitters and Welders, the use of grinders is an integral skill set required to work in the craft. The degree of proficiency that an individual demonstrates while using a grinder is variable depending on several factors including experience with the tool and of course aptitude. This degree of proficiency contributes to variances in the risk assessment as was illustrated in a recent Observation/Interaction on this Site.

The Observer (not in the craft) was surprised to find that a Boilermaker with more than 15 years of experience in the craft had assessed the risk in grinding as LOW RISK. When the Observer questioned this assessment the Boilermaker looked at him as though he was "from another planet" and then answered: " I have been using a grinder for more than 15 years and have never had a problem."

In this case the personal experience of the Boilermaker and in fact his success in using a grinder had a very strong influence on the result of his risk determination. In the Boilermaker's judgment the likelihood or chance of getting hurt while using the grinder seemed very small. After all, in all his years of experience using the tool he had never had a mishap.

The problem of course is that the Boilermaker only used one half of the equation when evaluating risk - probability. On the other hand, the Observer, who happened to be an EH&S professional had recently been involved in a number of Incident Investigations where people were seriously hurt. In one case, the grinder "jumped" from the surface of the material the craft's person was grinding and landed on the unprotected leg of the user. In another case the grinder (being used with only one hand) jumped and seriously cut the hand of the user. The Observer was very much influenced by his knowledge of the serious potential consequence that occurs when there is a mishap.

Two judgments, two very different assessments, both correct in their own right.

However, the method used to determine risk requires that both consequence and probability be considered before the final assessment is made. It is equally important that the hazard is correctly identified before the assessment is made. In the example above, the hazard is not "using a grinder". The controlled use of a grinder (or any tool for that matter) does not pose a high risk for the craft's person. If the hazard however, is identified as loosing control of the grinder - this results in a much higher risk assessment.

Step 3 of our TAIL-R method of Hazard ID will help to correctly identify the hazard as the craft's person envisions a grinder cutting into a body part. It will also help to correctly assess the risk when, with the "image" in mind, two questions are asked:

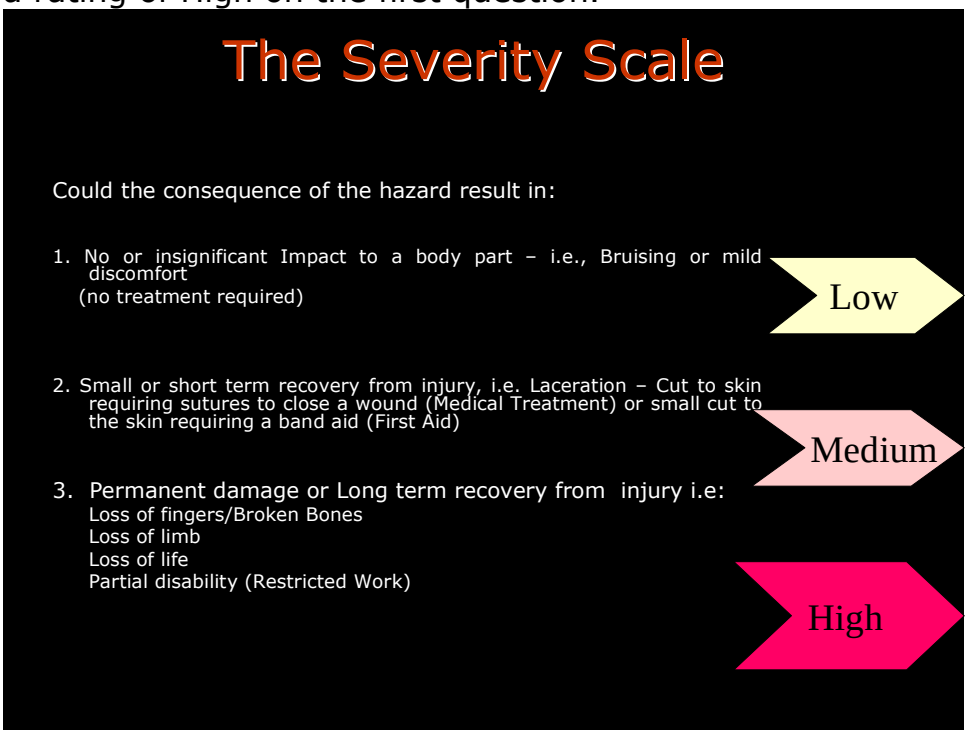
(1) How serious would the consequences of this hazard be? and
(2) How likely is this hazard to occur?

Once again it is important to understand that while you may have agreement on the consequence there may be a difference in the interpretation of the word **serious.**

For the Boilermaker "serious" might mean the loss of a body part – for the EH&S professional "serious" might mean a stitch. Each comes to understand the term based on their individual (very personal) frame of reference. In order, then, to attain a consistent level of evaluation it is helpful if each person suspends his or her pre-conceptions and agree to use the following scale to determine how serious a consequence could be.

"Serious" Consequence Scale[4]

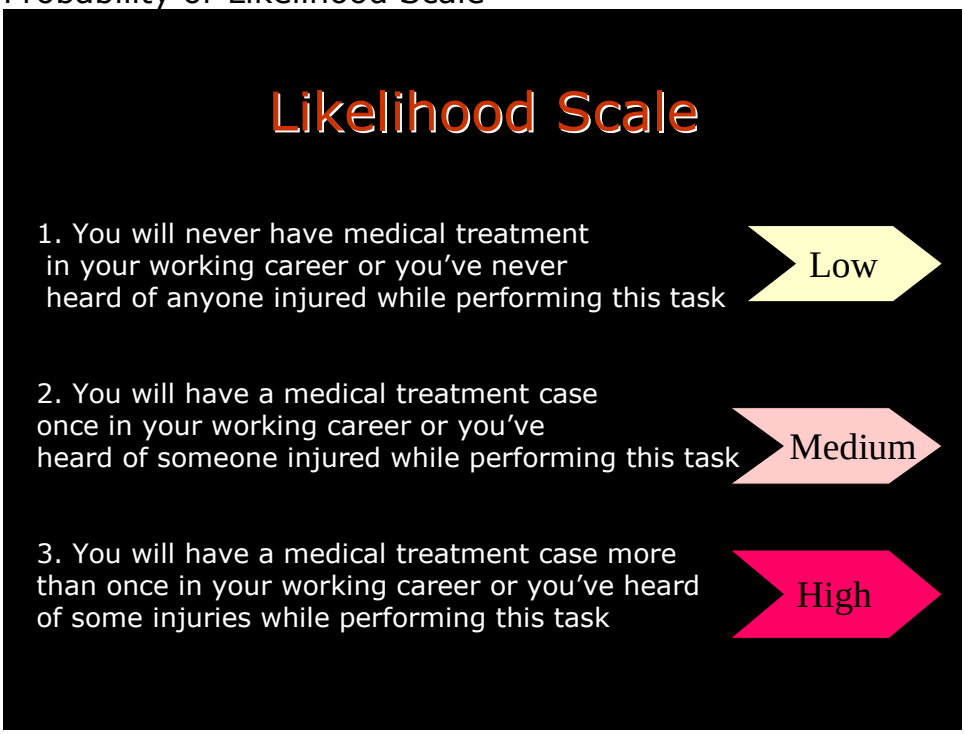
From our grinding example, given the ease at which a grinding disk can cut though flesh, the consequence from loosing control of the grinder could easily result in the loss of a finger or the loss of a hand. Therefore you would have to place the severity of the consequence in category 4 or 5. This means a rating of High on the first question.



[4] See examples in the Appendix (To be added after review)

In the same way a scale can be used for the second question, How likely is this hazard to occur:

Probability or Likelihood Scale



Here it is important to acknowledge the role experience will play in this analysis. Our history of Injuries has shown that both the inexperienced crafts' person and the "seasoned" craft's person (complacency) will have a higher likelihood of the hazard occurring as they are working.

Task Risk Assessment Matrix

The **TASK RISK ASSESSMENT MATRIX** will help you assess the level of risk. The "Severity" side of the Matrix represents the seriousness of the consequences. The "Likelihood " in this Matrix refers to the probability of a hazard.

In all cases, for all tasks the desired outcome is a task performed with LOW risk.

RISK = Severity of Consequence X Probability

SEVERITY \ LIKELIHOOD	H	M	L
H	H	H	L
M	H	M	L
L	M	L	L

How to Use the Risk Assessment Matrix

1. Think about the identified hazard and using the Severity Scale judge the severity
2. Find the appropriate rating (High, Medium or Low) for the consequence along the left side
3. Think about the identified hazard and using the Probability Scale judge the likelihood
4. Find the appropriate rating (High, Medium or Low) for the probability along top of the Matrix.
5. Draw a mental line across the diagram from the Severity Side and down the diagram from the probability rating.
6. The point where they meet is your assessment of the risk associated with the hazard.

SECTION 4: HOW TO ASSESS RISKS - QUESTIONS

1. What are the two questions would you ask in order to determine the risk associated with a particular hazard?

1
2

2. If you were to loose a finger while performing a task the severity would be:
High_____Medium_____Low_____

If the chance of losing a finger while performing the task was once in your working career the likelihood would be:
High_____Medium_____Low_____

Based on your assessment above what is the risk? _____

3. Using the identified hazards in the table below complete the last three columns of the table. Remember to use the Matrix to obtain the answers for the last column:

Hazards	**Severity**	**Likelihood**	**Risk**
Loosing control while performing a grinding task			
Loosing focus or concentration while cutting Styrofoam with a utility knife			
Slipping on an icy surface while approaching a job site			
Wrench slipping while tightening up the studs on a flange plate			
Exerting excessive force loosen a threaded fitting			
Over reaching while dismantling scaffold sections			
Tripping over material while working in a congested area			

SECTION 4: HOW TO ASSESS RISKS - ANSWERS

1. What are the two questions would you ask in order to determine the risk associated with a particular hazard?

1. How serious would the consequences of this hazard be?
2. How likely is this hazard to occur?

2. If you were to loose a finger while performing a task the severity would be:
High_____Medium_____Low_____

If the chance of losing a finger while performing the task was once in your working career the likelihood would be:
High_____Medium_____Low_____

Based on your assessment above what is the risk? ____**High**_____

3. Using the identified hazards in the table below complete the last three columns of the table. Remember to use the Matrix to obtain the answers for the last column:

Hazards	**Severity**	**Probability**	**Risk**
Loosing control while performing a grinding task	High	Low	Low
Loosing focus or concentration while cutting Styrofoam with a utility knife	Medium	Medium	Medium
Slipping on an icy surface while approaching a job site	High	Medium	High
Wrench slipping while tightening up the studs on a flange plate	Low	Medium	Low
Exerting excessive force loosen a threaded fitting	High	Medium	High
Over reaching while dismantling scaffold sections	Medium	High	High
Tripping over material while working in a congested area	Low	High	Medium

SECTION 5: HOW TO CONTROL RISKS

Learning Objective

At the end of this section the participant will be able to list three control methods and demonstrate their understanding of these methods as they are identified in the Pre Task Analysis.

Identify Appropriate Controls

1. Hazard controls need to be appropriate to the level of risk. High risk tasks need very tight controls.
2. All the appropriate controls must be in place **before** any work can proceed.
3. There are some hazards that require specific expertise to identify or apply the appropriate controls. In these situations, employees need to stop the task until the required expertise is applied. For example an air quality test must be done by an occupational hygienist, or the designated Site Representative must perform process equipment isolation.

Four types of controls:

- **Engineering controls**
  Examples: Elimination, Substitution, Guards, Process Enclosures, Automatic Shutdown Devices, Ventilation, and Communication Devices.

- **Administrative controls**
  Examples: Safe Work Permits, Procedures, Maintenance Safe Work Practices, Global and Site Safety Standards, Communication, Training and Work Scheduling to minimize the number of workers exposed.

- **Personal Action**
  Examples: taking a path around a pool of material, notifying fellow employees working above that you will be working in the area, getting a piece of lifting equipment to help with moving heavy pieces of pipe not performing a particular task until the risk can be mitigated to low

- **Personal Protective Equipment**
  Examples: Fall Protection, Hearing Protection, Chemical Resistant Clothing (Break In Gear) and Eye Protection.

NOTE: If the risk can not be controlled by any of the methods identified above, to an acceptable level (LOW) the task must not proceed. If the resultant risk is Medium stop and seek help from your supervisor.

Questions to ask:

1. **Are permits, written practices, procedures, or work scheduling to reduce the number of workers exposed required?**

2. **What can be done to control the Hazard?**
   - Do I know all the required steps in the procedure, code of practice, permit, or job plan?
   - Do I know what method to use to control this hazard?
   - Are there other controls that I think are needed and are not already in place? For example; personal protective equipment such as fall protection, hearing protection, eye protection, hand protection or process controls such as guards, automatic shutdown devices, enclosures, barriers, ventilation?
   - Do I need mechanical assistance (hoist/crane/forklift) to control the hazard?
   - Do I need additional resources to execute the job at Low Risk?
   - Do I need to have access platforms built to avoid putting my body in an ergonomically compromising position?

3. **Will the controls affect any other part of the job being done?**
   - Does the control introduce a new hazard? For example, does the exhaust from a compressor introduce a new hazard by exposing employees to exhaust fumes in a confined space?

4. **Is training required?**
   - Is everyone working on the job trained on the correct use of the tools and equipment involved in the job?
   - Is this the first time the job is done or has the employee done this task before?

5. **Do I need to tell anyone else?**
   - Is there anyone else who could be affected by these controls?
   - Is there a need to coordinate the work being done by more than one person?
   - Are there more than a single craft working on the same job?
   - Is a formal communication plan required?
   - Is a pre-job meeting required?

6. **Are emergency plans needed?**
   - Have emergency plans been communicated with all employees?

7. **Is there someone that I could call for help?**
   - Who has the knowledge and skill to help me?

Example: Replacing a Fluorescent Bulb

Hazard	Severity	Probability	Risk
Falls from elevation	Moderate to serious (medium to high)	Sometimes (medium)	High
Dust inhalation or in eyes	Minor (low)	Often (high)	Medium
Electrical Shock	Serious (high)	Rarely (low)	Medium
Cuts from broken glass	Moderate (Medium)	Sometimes (medium)	Medium
Traffic bumping ladder	Serious (high)	Sometimes (medium)	High
Eye and muscle strain	Moderate (medium)	Often (high)	High

Controls to address risk:

- Second person on job to steady ladders, control traffic and hand tools
- Housekeeping (clean up dust)
- Electrical isolation of light fixture
- PPE...Hard-hat, gloves, goggles, dust mask if necessary
- Warning signs or traffic pylons
- Portable light source

Note that the last control may create additional hazards that must be controlled. Every control measure has to be thought about to figure out if it might cause an additional hazard.

SECTION 5: HOW TO CONTROL RISKS - QUESTIONS

1. Name the four kinds of controls and give an example of each.

_____

_____

_____

_____

2. What level of risk requires controls?

_____

_____

_____

3. What drives Personal Action?

---

4. If your task was to loosen a nut on a flange what hazards would you identify?

_____

_____

_____

5. Based on the hazards you have identified what control measures would you take?

_____

_____

_____

_____

Section 5 Answers

1.

- **Engineering controls.** These are such things as guards, substitution, elimination, process enclosures, automatic shutdown devices and ventilation and communication devices.

- **Administrative controls.** These are such things as permits, procedures, and work scheduling to minimize the number of workers exposed.

- **Personal Protective Equipment.** These are items such as fall protection, ear plugs and safety goggles.

- **Personal Action**
  Examples: taking a path around an icy patch, notifying fellow employees working above that you will be working in the area, getting a piece of lifting equipment to help with moving heavy pieces of pipe not performing a particular task until the risk can be mitigated to low

2. All risks need to be controlled. The higher the risk the greater the need for controls. Hazards

6. What drives Personal Action?

   Attitude – the commitment to do all that is required to prevent injury

7. If your task was to loosen a nut on a flange what hazards would you identify?

   1. Use of excessive force – unexpected release of energy – loose balance – strain muscle
   2. Wrench slipping and fingers pinched between the wrench and pipe

8. Based on the hazards you have identified what control measures would you take?

   1. Use correct tools including an approved snipe or impact wrench in order to reduce the amount of force required
   2. Wear gloves