

Strategies for Understanding and Addressing

Risk Tolerance

Dave Fennell

Director, Dave Fennell Safety Inc.



Risk Tolerance

Overview

- · Insights into Risk Tolerance
- 10 Influencing Factors
- · Application in the work place





Risk Tolerance

- Risk tolerance involves weighing a number of factors that influence a decision to either accept or reduce risk
- How these factors are perceived and weighed in the mind of the worker and the work group affects safety behavior

Dave francii Safirty Inc.

Fennell Safety Inc

Risk Tolerance

Dave Fennell and the ExxonMobil Human Factors COE Task Force explored:

- Relationship between Hazard Recognition, Risk Perception and Risk Tolerance
- · Factors that influence decisions to take chances
- · How we can influence the choices others make



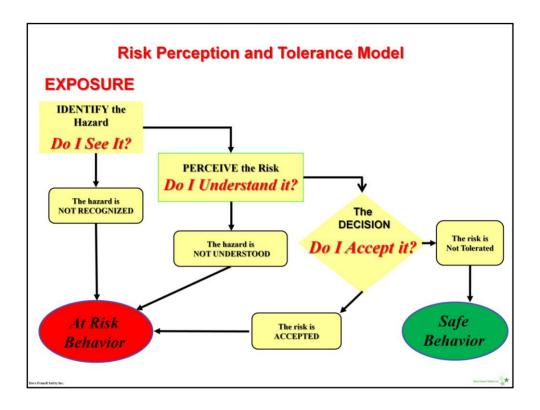




Why Do Workers Take Risks?

ve Fennell Safety Inc.

Dave Senard Saliety Inc.





There are three key components involved in Risk Tolerance, specifically:

- 1. Hazard Identification "Did we see it?"
- 2. Risk Perception "Did we understand that it was a risk?"
- 3. Risk Tolerance "Did we accept or reject the risk that we perceived?"

In general (this may vary by various work groups), the systems in place for *Hazard Identification* are mature in our company. We have systems in place reporting (Hazard ID's), we have training in place to help workers recognize hazards, we have tools in place that help identify potential hazards in our tasks (permits, JSA's, inspections).

Our workers usually have the ability to understand how the hazard could result in an incident ... **Risk Perception.** They may need additional assistance in this area through review of incidents and safety alerts that show how the hazard has resulted in an incident. This helps them understand it. Systems are in place for this (safety meetings, incident reviews, hazard ID reviews, near miss reports)

The greatest issue that remains is the **Risk Tolerance**. Generally, we (either individuals, work groups and even company departments) may have an acceptance of risk that is too high. It is this area that is the focus of this presentation.



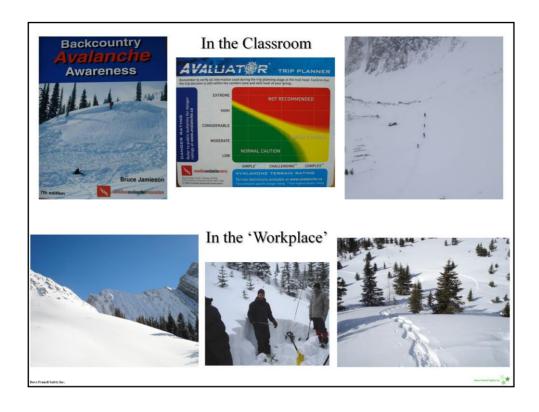
Hazard Identification **#** Risk Tolerance



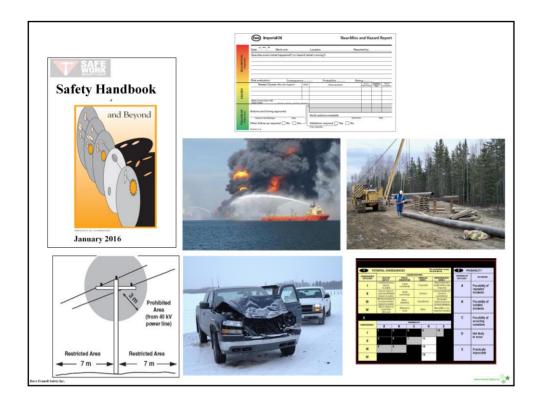








He described the training he received from the premier experts in this field of safety (the University of Calgary) as excellent training on hazard recognition and he made note of how similar it was to our Hazard Recognition training in ExxonMobil. The university provided a reference book and handbook with all the rules and knowledge, similar to our own handbooks. They provided lots of examples and stories to help the participants related to previous incidents on mountains. They even provided a risk matrix card to help with risk assessment and decisions, not unlike our own risk matrix cards.



This slide shows samples of our safety programs that we use for hazard recognition training ... reference material, handbooks, stories of incidents, safety alerts, tools for hazard identification and a risk matrix to help with decisions on risk ... all meant to address hazards, but like the U of C training, not getting at the individual and group decisions on how much risk is acceptable.



- JSA often identifies the hazard
- Hazard is discounted or no mitigation







e Fennell Safety Inc

Sunnel Saliny Inc.

10 Factors That Influence Risk Tole	rance
1. Overestimating Capability/Experience	↑
2. Familiarity with the Task	↑
3. Seriousness of Outcome	1
4. Voluntary Actions and Being in Control	†
5. Personal Experience with an Outcome	↓
6. Cost of Non-Compliance	1
7. Confidence in the Equipment	↑
8. Confidence in Protection and Rescue	↑
9. Potential Profit & Gain from Actions	↑
10. Role Models Accepting Risk	↑

Here is the list of the **10 Factors That Influence Risk Tolerance**. The arrows next to each factor indicate whether this factor increases risk tolerance (a negative influence) or helps reduce it (a positive influence). This presentation will go into the details of each to show you exactly how they impact the acceptance or rejection of risk. The supplemental workshop packages will take the discussion to a more in depth level again.

1) Overestimating Capability/Experience

"I can lift 75 kg in the gym ... I can lift this nitrogen bottle"

"I have driven in worse conditions than this and did just fine"







Strategies for Reducing Tolerance

- Reflect on your role as a mentor
- Acknowledge that despite your ability, the **exposure** is still there.
- Acknowledge that the capability or skill may be sufficient and then reinforce the way that it should be done.

Fennell Safety Inc

Dave Senaral Sality to:

Factor # 1 relates to a belief that ones physical ability, strength, agility, reaction time and reflexes can be utilized to prevent an incident. This is over estimating capability. This factor also relates to situations where an experienced worker will rely on their years of experience and their knowledge of the task as justification for doing the work a certain way ... a way that may in fact have higher risk.

Over estimating physical capability is the belief that incidents and injuries won't occur because the worker has the physical capacity to exert extreme forces and their body is in good enough shape and conditioning to withstand them. This can be a characteristic of a younger worker who is in good physical condition and has had situations where they have indeed exert extreme forces without injury ... possibly in a gym, in a sports activity or in another job. It may involve lifting loads beyond the recommend guide (see later in the presentation), pulling on tools or exerting forces on equipment.

It may involve situations where reflexes, speed, reaction time and agility are viewed as the ways to prevent an incident.

Here's an excerpt from a near miss. Obviously in jest but a good example of this factor ...

"NW Field. EMS. IRT Hall Entrance. Ice build up in front of the door

caused slippery conditions. As I walked in my foot slipped calling upon my superior agility and cat like reflexes to spring into action probably saving my life. A lesser man could have been killed".

Over estimating experience can evolve over time, in many cases, years. Past experience with a task or in a situation is relied upon as the method for preventing incidents. The believe is that the task won't go wrong or result in an incident due to the experience of the individual to prevent it from going wrong or knowing exactly what to do if it does go wrong. For example, a worker may feel comfortable (safe) over pressuring a piece of equipment (tank, hose, etc) because they know the equipment has been pressure tested above the working pressure and previous occasions where working pressure was exceeded did not result in an incident.

Similarly, years of driving experience can build confidence in ones driving skills, but then when a worker is exposed to something that is slightly difference, the skill may not be there in that situation. For example, years of experience driving on pavement does not provide the experience needed for driving on gravel. Also, the past experience may not be exactly related to the current conditions.

2) Familiarity with the Task - Complacency



"He had done this task 500 times without hurting himself"



"We had stack about 200 of them when ..."



"You get used to it after a while"

Strategies for Reducing Tolerance

- 'Situational Awareness' Every time like the first time 'Stop and Think'
- 'What could go wrong this time?'
- 'How would I teach a new person to do this?'

e Fennell Safety In

ner franci Saliety Inc.

Complacency occurs when a worker completes a task successfully many times and has the skill to complete it successfully without thinking.

The worker may become unaware of the potential hazards of the task due to the multiple successful completions without the hazard being an issue.

The worker has developed enough skill to complete the task without being fully focused on the task

The potential for work execution without having to refocus or refresh can create a blindness to the hazards and risks, thereby increasing risk tolerance due to familiarity.

Complacency is **not** laziness or lack of interest in job or **not** caring about results.

Complacency occurs when the skill level is achieved where the task can be completed without the worker being fully focused on the task.

The task can be completed based on habit and experience. (repetitive and completed correctly numerous times)

EXAMPLES:

- The operator who runs 20 to 30 pigs a day.
 He opens and close similar valve assemblies in a shift.
 The opening and closing sequence is identical, no focus required due to repetitive process and no incidents have occurred.
- 2) The heavy equipment operator who climbs up and down his equipment several times a day. It's the same task each time and is not the main part of the job (i.e. operating the equipment). Having never fallen off the ladder, he may get lulled into a sense of security where the three point contact on the ladder no longer seems to be important.

3) Seriousness of the Outcome

'Pinch Point' ... what about 'Crush' or 'Amputation' point





"Sweet gas" ??

"Hot Water" ??

Strategies for Reducing Tolerance

• Stop and Think "How bad could it be? Really ... How bad could it be?"

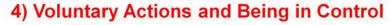
e Fennell Safet

Dave Fewerit Safety to:

This risk tolerance factor deals with the question ... "How bad could it be?" It is based on the premise that something could go wrong but we under estimate or discount how bad or serious the outcome could be. We may believe a 'scratch' or bruise could be the worst thing to happen where in fact it could actually be an amputation or broken bone.

When the question "How bad could it be?" is asked, the true consequences may not be realized due to a couple of factors. It may be because there have been similar incidents in the past but the resulting damages have always been minor. We may have seen several 'Low Speed Vehicle Incidents' where the results were minor scratches to vehicles. A history of these 'minor scratches' may lead us to believe that's as bad as it could be in a low speed vehicle incident. Could the outcome be worse given a different piece of equipment? A history of minor H2S leaks may lead to complacency on how serious the outcome actually could be. A serious of over pressure events where the protective devices have worked properly could lead to a belief that a vessel failure would not be possible.

The second aspect of this factor is the language we use that may trivialize how serious a consequence could actually be. Does a 'pinch point' sound serious? What about 'sweet gas'? 'Hot water'?



Key factor in off the job risk -28 times more likely to be hurt off the job







Strategies for Reducing Tolerance

Integrate 'Stop and Think' into your personal activities



The risk of an activity or task is viewed as less risky when we engage in it voluntarily or when we feel we have complete control of the activity

As we go through this risk tolerance factor we will use some off the job and recreational examples as this is where we most often have the choice on what we do and how we do it. As we go through these we need to constantly relate back to our work place and consider the work place tasks where we feel we have full control. These will be the ones where we could be in jeopardy of accepting or tolerating too much risk.

To reinforce the message on voluntary activities, relay the fact that.

There are three components to this risk tolerance factor.

First, we will have already done a conscious or even subconscious assessment of the risk of the activity or task and will have come to our own conclusion (whether right or wrong) that the risk is at an acceptable level before making our decision to progress. Once we have established our perception of the risk, we will subconsciously justify our decision with any additional information that is provided. The justification may come from one of the other risk tolerance factors ... most commonly #1 Over estimating capability or experience, #3 Seriousness of the Outcome and #8 Confidence in Protection and Rescue.

Second, when there is something we really want to do (for the personal gain, for the adrenalin rush, for the experience) we will discount the risks associated with the activity to justify our participation.

Third, when we feel we have 100% control of a task, we under estimate the risk. This is usually combined with risk tolerance factor #1 Over estimating capability and experience. For example, many people will make a decision to drive to a location rather than take a plane because they feel they have full control over the driving where as they are dependent on others when flying.

5) Personal Experience with an Outcome

If you have seen a serious outcome, you will be less tolerant of the risk

Challenge: As Incident Rates improve, fewer people will have had personal experience and leads to **Scepticism**







Strategies for Reducing Tolerance

- 'Expert observers', supervisors, 'keepers of the corporate memory' have the obligation to ensure workers know:
 - a) Incidents **have** occurred because of not following that standard
 - b) Demonstrate that there **have** been serious consequences

Fennell Safety Inc

Dave Senaral Sality to:

A personal experience with a serious or traumatic outcome will stick with an individual for a long time ... sometimes a life time. It will impact their decisions on similar tasks and usually results in the individual being very intolerant and not accepting of any risk associated with the task. This will obviously reduce their tolerance for the risk and make the task safer. This is a good thing.

Our challenge however is that not every worker on our site will have had a personal experience with a serious outcome related to the task and therefore will not have been impacted and may be prepared to take more risks. As we get a safer operation, even the corporate memory of past lessons from significant incidents may fade and make us more vulnerable to tolerating risks.

Our challenge is to ensure that all workers know that a bad outcome could still happen ...even though they may not have seen it personally and even though this work site has been safe and not seen it.

This is especially challenging where new workers ('green' workers, new to site workers, new to our industry workers) may never have seen nor understand how serious the outcomes could be. We need to take extra time with the newer workers to ensure they understand how the precautions we take have come from lessons learned in the past. .

Our 'corporate memory' of the lessons learned from past events must be kept alive and relayed to the newer workers. This can be done in formal way through occasional safety meeting topics using the formal communication reports from those events. It can also be done in a less formal and ad hoc manner when a particular opportunity arises ... for example, during a behaviour observation on a related task, during instruction on a task, from a prompt in media article, or from a prompt on a recent industry incident. The purpose is to ensure that workers who may not have seen such an incident are aware that it could happen here if not for our procedures, pre-job planning, management systems, etc. This ad hoc process can be used by anyone doing a behaviour observation, a supervisor, an 'expert observer', management or even a worker within the work group who may have had a personal experience with a serious outcome.

6) Cost of Non Compliance

Greater cost for non-compliance can lower risk tolerance

Effective when used selectively







Strategies for Reducing Tolerance

- Identify the cost of non compliance and increase it where necessary
- Remove barriers and increase reward for compliance

Fennell Safety In

Dave Senard Saliety Inc.

A person's decision to accept risk can be influenced by how high the cost of non-compliance will be. If the cost of non-compliance (e.g. taking a risk) is going to be very high, the person may decide to conduct themselves in the manner that will not result in the cost or penalty. As we go through this discussion on using the Cost of Non-Compliance as a method for reducing the acceptance of risk, it is very important to note that this factor is only one of the ten and must be used in conjunction with the others. It is not acceptable to chose this factor as a 'favorite' and to resort to punishment as the sole tool for reducing risk tolerance. This factor must be used selectively and must be used with an understanding of how to identify and classify performance issues (see Managing Personnel Performance Issues EMFOS Module # 5).

As the cost of non-compliance increases, the willingness to take the chance may decrease.

For Example:

If the cost of a speeding ticket is \$200, a driver may accept that as a reasonable cost and be willing to accept that penalty for achieving the goal of getting there faster, for the 'rush' of driving at a high speed or simply to 'get the job done'.

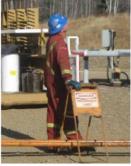
If the cost of a speeding ticket is increased to \$10,000 and the penalty also includes the impoundment of the vehicle, the willingness to take that chance will be greatly reduced. This is an actually example from Ontario where signs are posted on the highways that state "Drivers exceeding the speed limit by more than 50 kmph are subject to a fine of \$10,000 and confiscation of the vehicle".

7) Confidence in the Equipment

"Ladder is twice as stable, therefore ... "

- 1995 US Study Drivers of vehicles with ABS and airbags have more accidents
- Parachuting 'Failure to deploy' replaced with 'late deployment'







Strategies for Reducing Tolerance

- Training on limitations of the equipment and engineering
- Stop and Think ... What will happen if it does fail?

e Fennell Safety In

Dave femned Saliety Inc.

Factor #7,overconfidence in the equipment, occurs when we have placed excessive and some times unwarranted trust that the equipment or tool we are using will always perform exactly as designed. The possibility that the equipment could in fact fail is not considered, discounted or minimized

When we become familiar with particular tools and equipment and have not experienced any failures when we have used them, we can become overly trusting that the equipment or tool will never fail. This factor can be linked to Influencing Factor #2 (Familiarity with the Task) except in this situation we have become **familiar** with the equipment or tool.

- 1) When we hear a statement such as "It has never failed as long as I have been using it" this is reflective that we may becoming complacent with the particular tool.
- 2) This factor can also be identified where we hear that a particular piece of equipment is 'fail safe', meaning that if something does go wrong, we expect the equipment will be a 'safe' failure and nobody will be burt
- 3), A **brand new** piece of equipment or tool can be perceived as been fail proof. It is new, shiny and clean and this can portray a message that the possibility of it failing is remote.
- 4) Process equipment often comes with built in safety systems that are designed for safe start up, safe shut down and warning systems and programs that will detect problems and then **automatically take care** of them. As sophisticated as the devices may be, failures have occurred.

Factor #7, Over confidence in Equipment, is reinforced through studies done in the US and in Britain. The 1995 study on drivers using vehicles with anti-lock braking systems (ABS) and air-bags showed that drivers were more confident that they could stop faster with ABS and therefore tended to drive faster. There was no net gain in the reduction of incidents where braking was a factor.

The British study on sky diving revealed that in the early 80's most of the deaths in the sport were attributed to a parachute not deploying ... essentially a flaw with the equipment. 25 years later, with great improvements to the technology of parachutes, the sport was seeing the same number of fatalities. The cause however had changed and it was rare to find a chute that failed to open. The cause now was that sky divers were so confident that the equipment would deploy that they were deploying the chute as late and the chute did not have sufficient time to deploy. Equipment failures had been replaced with late deployment due to the confidence in the equipment.

The left hand and centre photos are re-enactments of work place injuries. The right hand photo was staged to demonstrate over confidence that the lines will not fail. The bungee cord hook slipped off the anchor and hit the worker in the mouth.

8) Confidence in Protection and Rescue

Excellent PPE can result in over confidence in it's ability to protect







Strategies for Reducing Tolerance

- Understand the limitations of protection & rescue measures
- See them as 'last lines of defence', or 'not to be relied upon'?
- "Every job should be able to be done safely by a 65 year old with a bad back and ..." Howie Dingle

e Fennell Safety Inc

Dave francii Sajirey Inc.

This factor specifically deals with over confidence in the safety and personal protective equipment we use and the belief that if something does go wrong, our PPE will protect us from harm. This factor also extends to an over confidence that we will be effectively rescued by our peers, emergency services or even ourselves if we get ourselves into a bind or risk situation.

In this case the worker knows what the hazard is, understands what could go wrong but is so confident in being rescued that they pursue the task anyway.

Several formal studies and work place observations have shown that people are prepared to accept more risk when they believe their protective equipment will save them if something goes wrong. The British study on back belts revealed that when workers viewed their back support belts as protective equipment, they believed they could safely lift greater weights ... a greater acceptance of risk. Similar behaviour has been observed within the company. When the company went to full time use of Fire Retardant Work Wear, workers were seen to take greater risks in potential explosive and flammable situations. Incidents occurred when workers would bypass a flame arrestor on a burner, knowing full well that a flash back could occur but believing that their FRC would protect them from burns when that occurred.

Current studies are under way on PPE that has 'armour' type properties, specially impact resistant gloves. Workers have stated that there is certain jobs they can now do with the impact gloves that they would not have felt safe doing with no gloves or general purpose gloves (i.e. holding a post or hammer wrench for someone else to strike with a hammer).

The quote on the end can be used to reinforce point 4. A previous VP of Production in IOR made the statement that "Every job should be able to be done safely by a 65 year old with a bad back (he was reinforcing the principle to not over exert the body and to find ways of prevent stress on the body) and stark naked!" The point he was making was to consider how you would make the job safe if you were standing there with no PPE on. Would you touch the same things with no glove on your hand? Would you by pass a flame arrestor if you had no PPE on? Would you handle the chemical differently with no gloves or rain suit?

9) Potential Profit and Gain from Action

- US Highways Study deaths on highways tracks directly with the economy
- Alberta WHS fatalities and lost time incidents in the oil patch increase and decrease with the price of oil.





Strategies for Reducing Tolerance

- · Remove rewards for risk taking
- Eliminate barriers to doing it the 'right way'

e Fennell Safety Inc.

Dave femned Saliety Inc.

This risk tolerance factor stems from the desire for profit, gain, and even recognition. This can occur at an individual level where a person may profit from their own action or it can occur at the corporate level where a company or business can profit from taking higher risks.

Companies and corporations (management) are prepared to take more risks when there is more to gain. If a company can make more profit by having more equipment in the field, selling more product, and getting more clients, most companies will be willing to do what ever it takes to take advantage of that. This could mean using equipment that has not been maintained, send out workers who have not been trained and stretching their capabilities to safely deliver their products and services.

For Example:

Studies of the deaths on US Highways have shown that the fatality rates on the highways tracks directly with the health of the economy. When there is more to gain from a robust economy, transportation companies have been seen to use more less experienced drivers, get trucks on the road that may have deficiencies and bypass time consuming maintenance in order to get the load through.

Similar observations have been made in the oil and gas industry by Alberta Workplace Health and Safety. As the price of oil rises and there is more money to be made, Alberta WHS reported that the fatality and lost time rates increase. They have attributed this to companies putting equipment into service that may not be ready or inspected, assembling crews of new workers who may not have the training or experience to safely operate the equipment and to the demands on schedule 'to get it done'. WHS also noted that the incident rates increase at a rate that is higher than the rate of activity increase.

10) Role Models Accepting Risk

• When Role Models in a work group accept a certain level of risk, they influence the decisions to accept risk by other members of the group.





Strategies for Reducing Tolerance

- Identify and address the risk takers (including yourself where are you on the 'risk-taking' scale?)
- Recognize 'Erosion of Standards' and address immediately



Francii Safety in

Factor #10 – The level of risk accepted by our role models and mentors will directly impact the level of risk we as individuals are prepared to accept. The actions and risk acceptance of the role models can impact an entire work group's acceptance of risk.

This risk tolerance factor impacts safety on two levels.

First, the way a role model conducts themselves and does a task can be viewed as the way the task should be done with no thought and no conscious decision made about the risk. It is just 'accepted' as the 'norm' and not questioned. This can happen over time and leads to 'erosion of standards' (see EMFOS –Module 5 Managing Personnel Performance Issues for details on Erosion of Standards). The actions of the role model become the group 'norm' and 'the way it is done around here' with no thought to the risk associated with it.

Second, even in those situations where the risk of doing a task may be questionable, once a role model has done the task in that particular manner and no incident has occurred, that now becomes the accepted level of risk. The justification is "If he or she can do it that way and no incident occurred, the rest of us can do it that way and will not have an incident either". There may have been no incident from 'luck', slightly different circumstances or the causal factors just have not yet lined up. (See EMFOS Module 1 for an explanation of the Safety Filters model of incident causation).

The picture on the left related back to example of the decision by people in the avalanche training example used earlier. When the role models (the 'cool' people) in the group indicated that they were prepared to take the risk, others in the group followed. The purpose of the example and this slide is to get supervisors thinking about who are the role models in their work group and what is their level of risk acceptance.



Conversations about Risk Tolerance

... during Behaviour Observations

... during Stop and Think moments

... at Safety Meetings

... refresh the 'corporate memory'

... which Influencing Factor could be impacting our decisions?

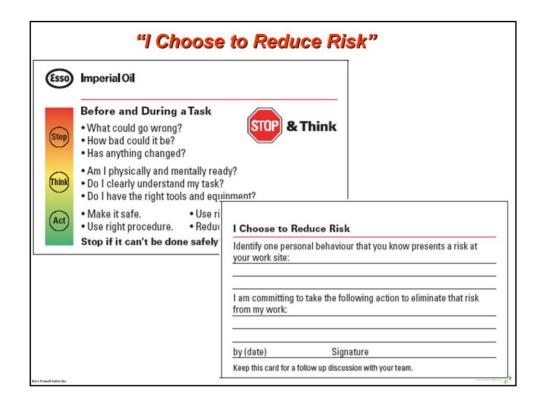








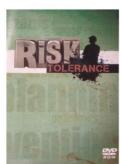




A tool that can be used to introduce a work group to concepts of risk tolerance is this "I Choose To Reduce Risk" card. To address risk tolerance, we need workers (and supervisors) to acknowledge that we all accept risks of one type or another. The purpose of this card is to support an exercise where each individual acknowledges and writes down a risk they knowingly accept and then make a personal commitment to do something about that risk. This simple exercise opens the discussion to talk about other risks that we may take. For each of these risks, the question can be asked ... "Which of the risk tolerance factors influenced by decision on this specific issue?".

Strategies and Resources

- 1. Risk Tolerance Awareness presentations as introduction to the topic
- 2. Risk Tolerance Facilitators Guide to establish an implementation strategy
- 3. Engage the workforce through workshops on each of the 10 Factors
- 4. Reinforce worker participation by using the worksheets







Fennell Safety Inc

Resources to Get You Started







We can create a culture that lowers Risk Tolerance

Dave Fennell

Director, Dave Fennell Safety Inc.

<u>difsafe1@telus.net</u>

403-651-5485

http://davefennellsafety.com



