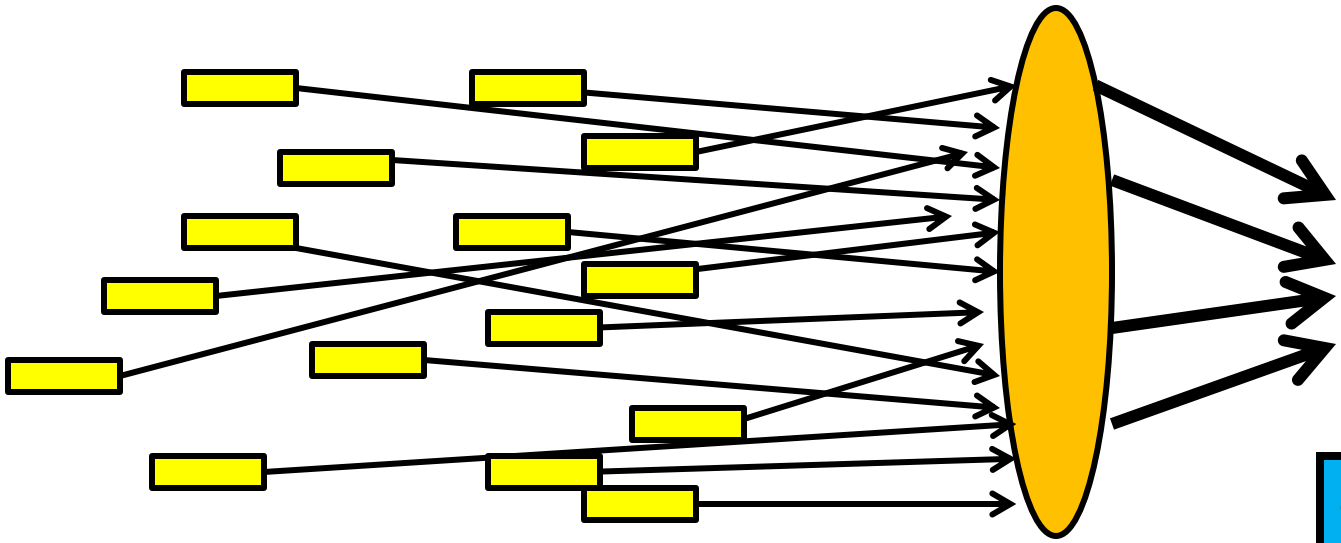
Perspectives on Safety and Risk Management....

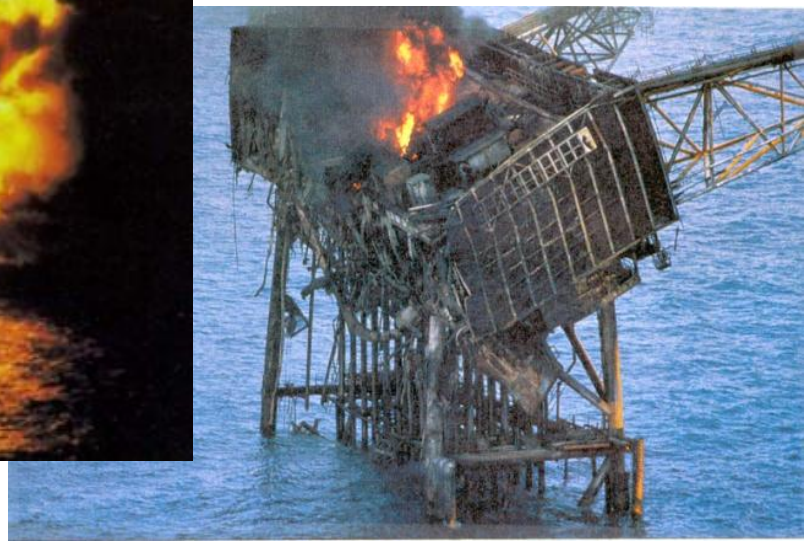
The Leadership Imperative for Safety

An Opportunity for Our University

A Focus Area for Consideration



Major Stuff Happens….and it's All Preventable



Prevention Requires Risk Management

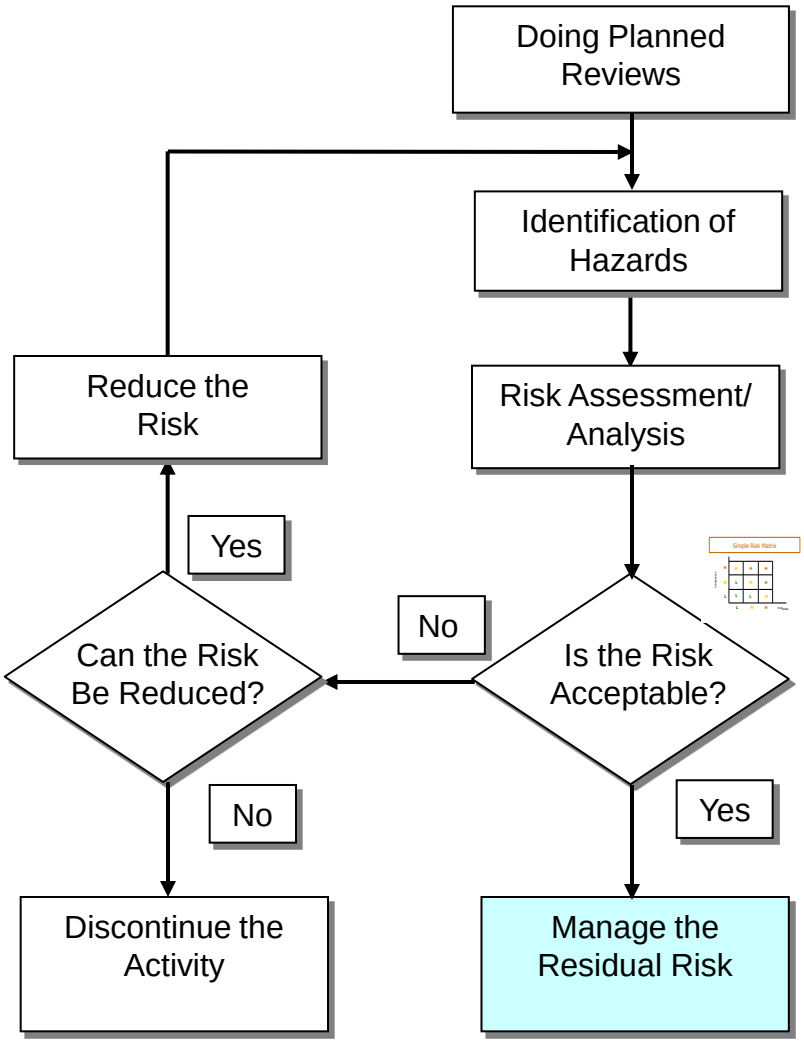
Engineering carries with it a responsibility for safe, reliable & expected end-product performance.

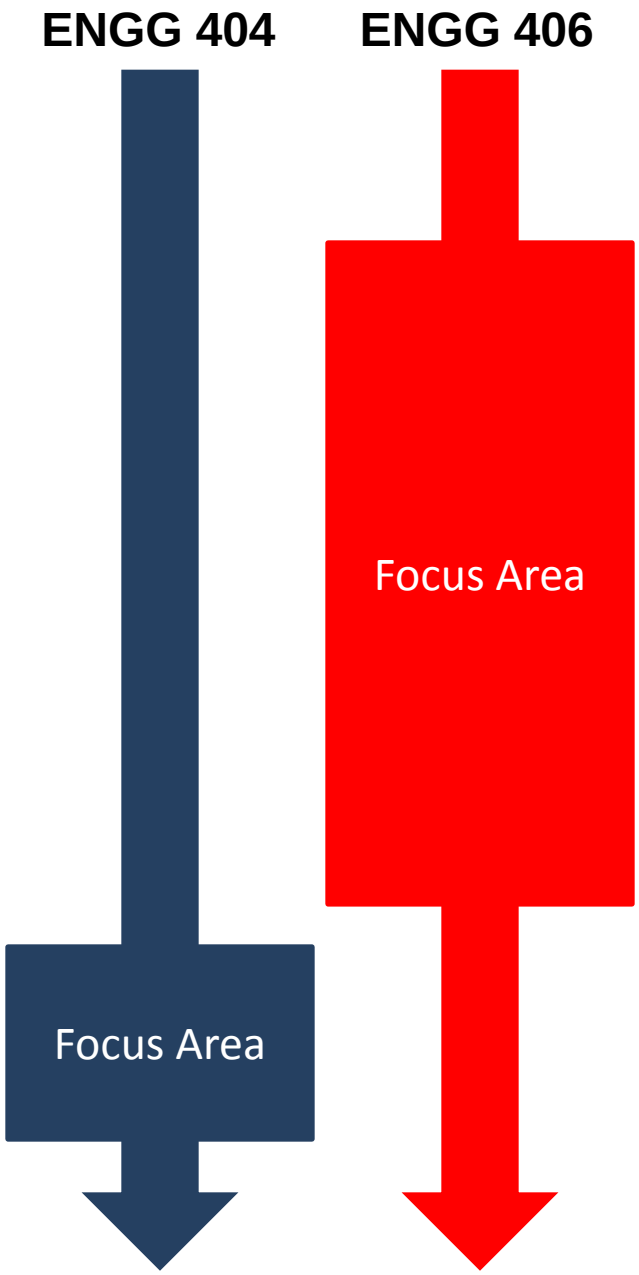
Engineering has associated risks.

Risk cannot be eliminated.

Risk can be managed.

It is our responsibility to mange risk in the Engineering Profession.


Doing Planned Reviews
Identification of Hazards
Risk Assessment/ Analysis
Is the Risk Acceptable?
Yes
Manage the Residual Risk
No
Can the Risk Be Reduced?
Yes
Reduce the Risk
No
Discontinue the Activity


ENGG 404
ENGG 406
Focus Area
Focus Area

UNIVERSITY OF ALBERTA

Engineering Safety and Risk Management Program

ChE 464*
Risk Management
Inherently Safe
Design

Year 1 | Year 2 | Year 3 | Year 4 | Grad Studies

ENGG 101*
Risk Management
101 (Primer)

ENGG 299*
Safety and Risk
to CO-OP Engineers

ENGG 400*
Safety , Ethics and
Risk Management

ENGG 600*
Safety and Risk
Management
Overview

ENGG 404
Risk Management
Implementation

Year 1 | Year 2 | Year 3 | Year 4 | Grad Studies

ENGG 406
Risk Management
Analysis/Assessment

* Denotes single lecture

MINERVA
Safety Management Education

Year 1

- Fire hazards, dust explosions
- Electrical safety and hazardous energy

Year 2

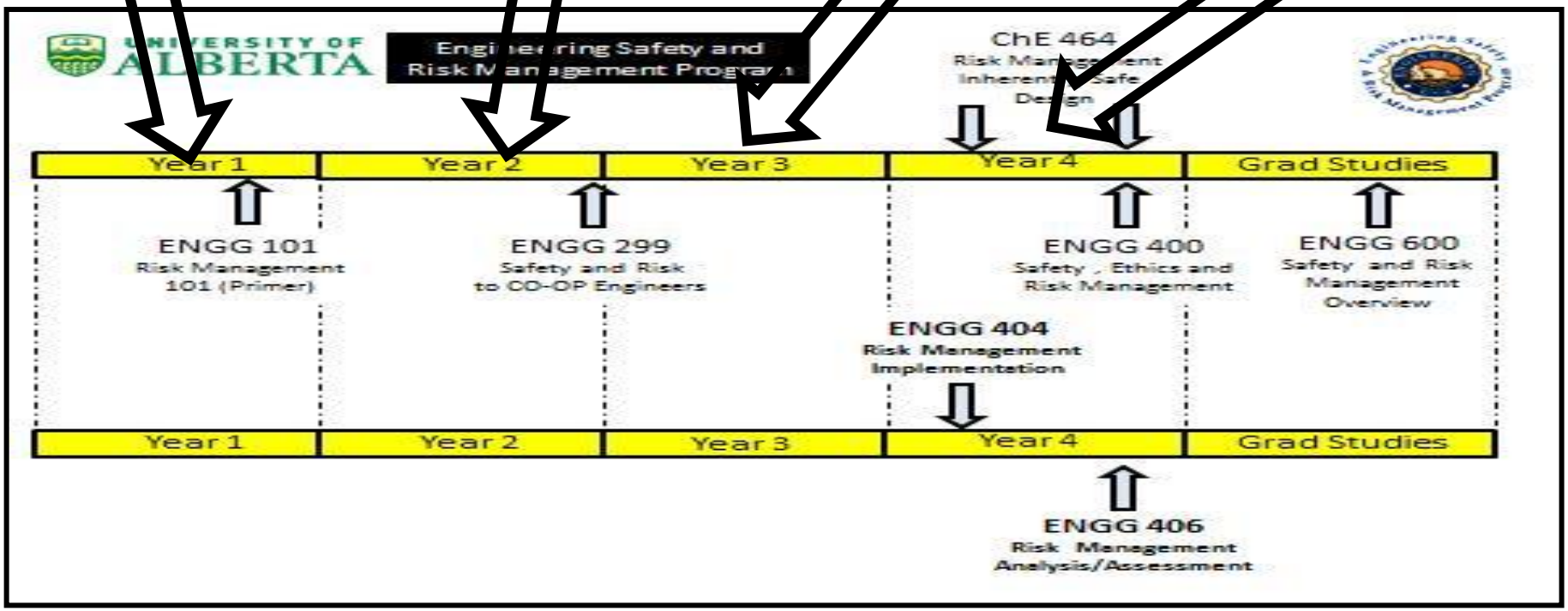
- Hazard and risk identification
- Radiation safety
- Codes, standards, regulations

Year 3

- Nanotechnology safety
- Robotics safety
- Risk management

Year 4

- Process safety management
- Ethics, public safety and professional responsibility



MINERVA
Safety Management Education

Indicates topics covered in ENGG 404 and ENGG 406

Year 1

- Fire hazards, dust explosions
- Electrical safety and hazardous energy

Year 2

- Hazard and risk identification
- Radiation safety
- Codes, standards, regulations

Year 3

- Nanotechnology safety
- Robotics safety
- Risk management

Year 4

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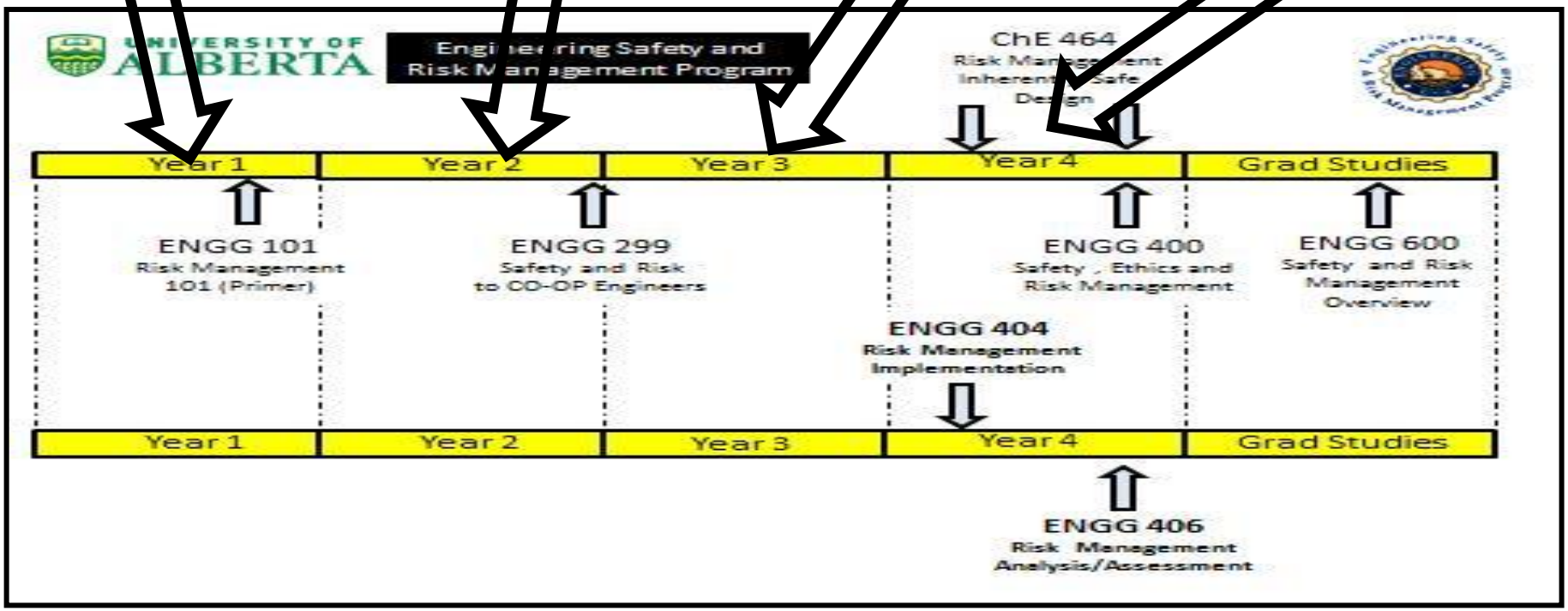
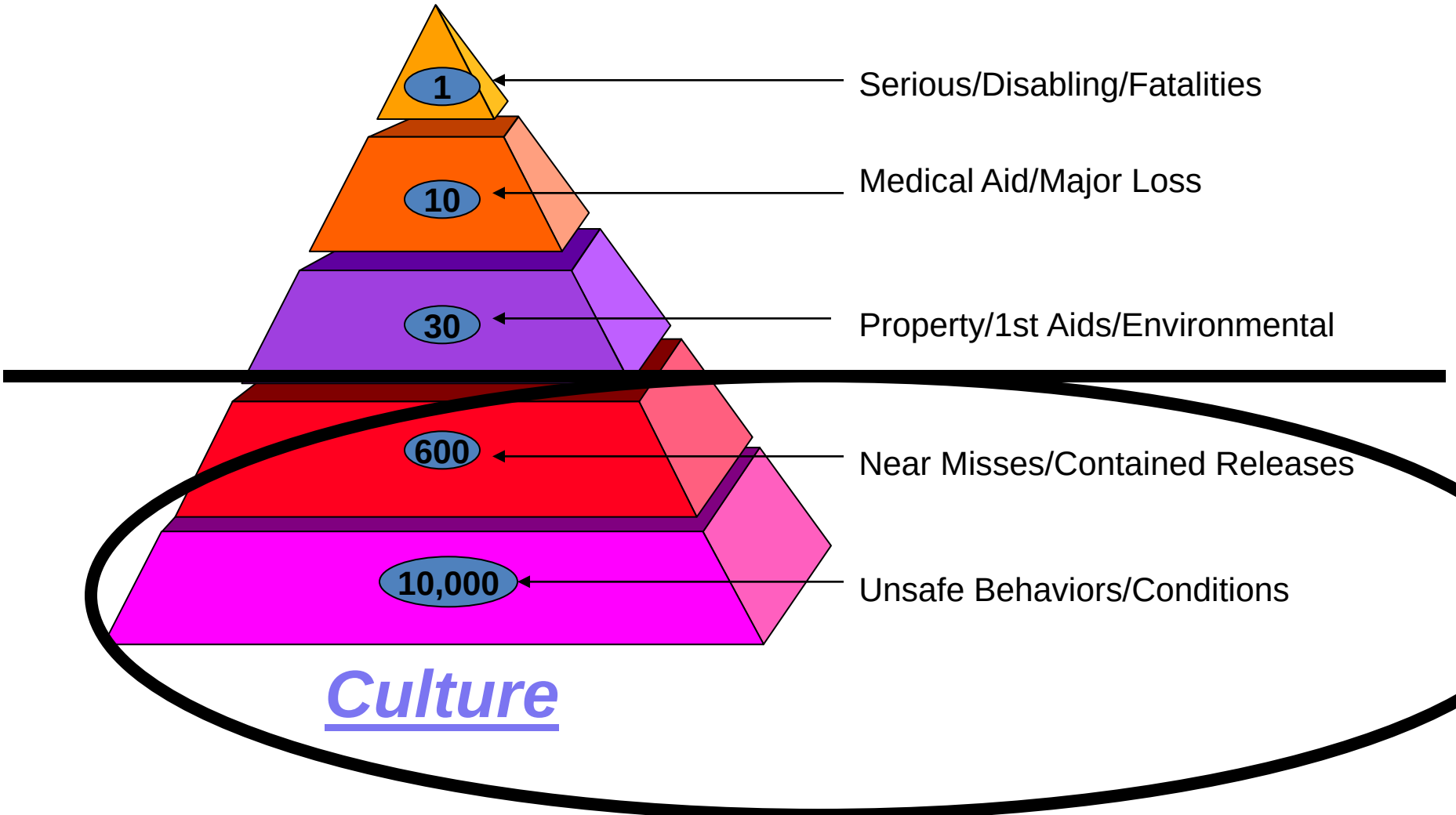


Incident Pyramid



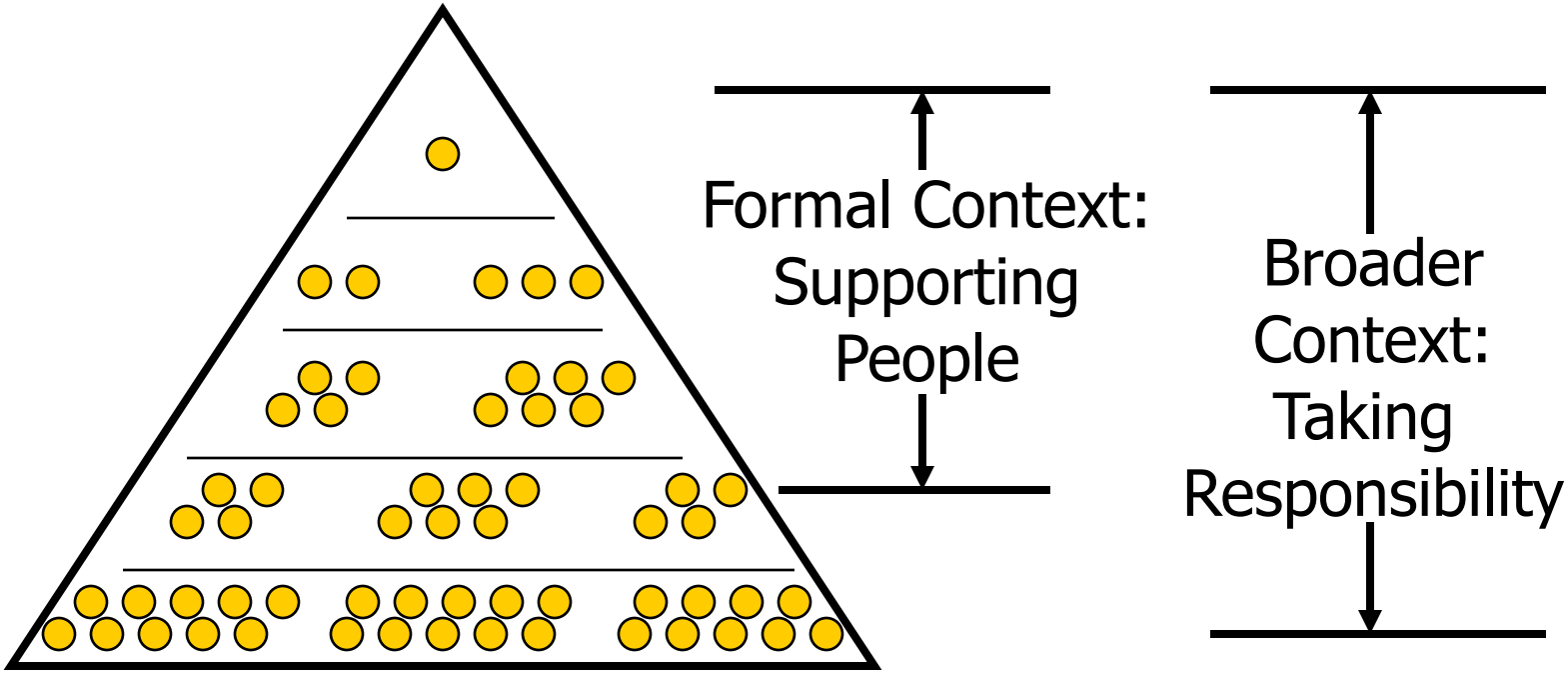
The Leadership Imperative….

- Valuing and caring about people
- A genuine belief in peoples' capacity to contribute

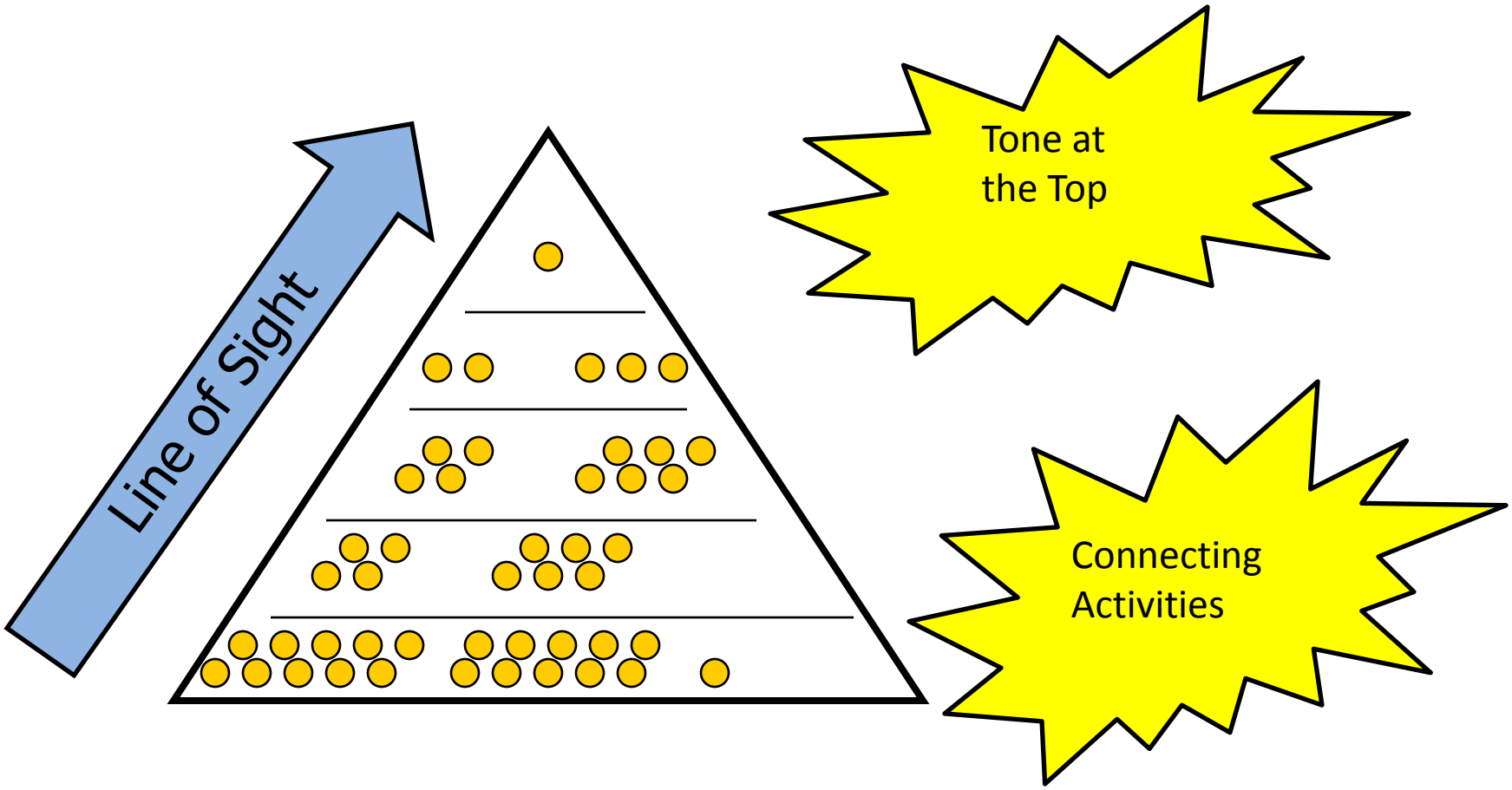
People are What's Important

Participation & Commitment

Safety Leadership….Values

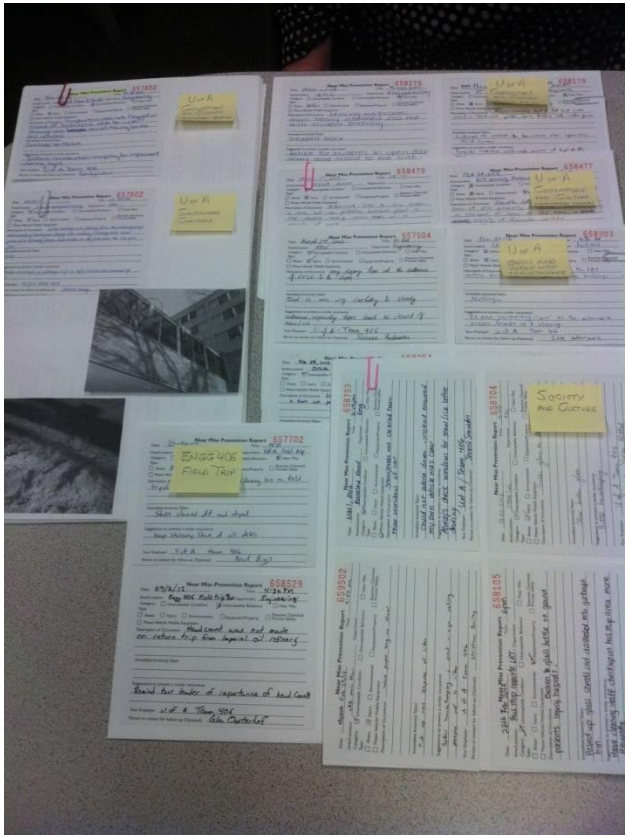


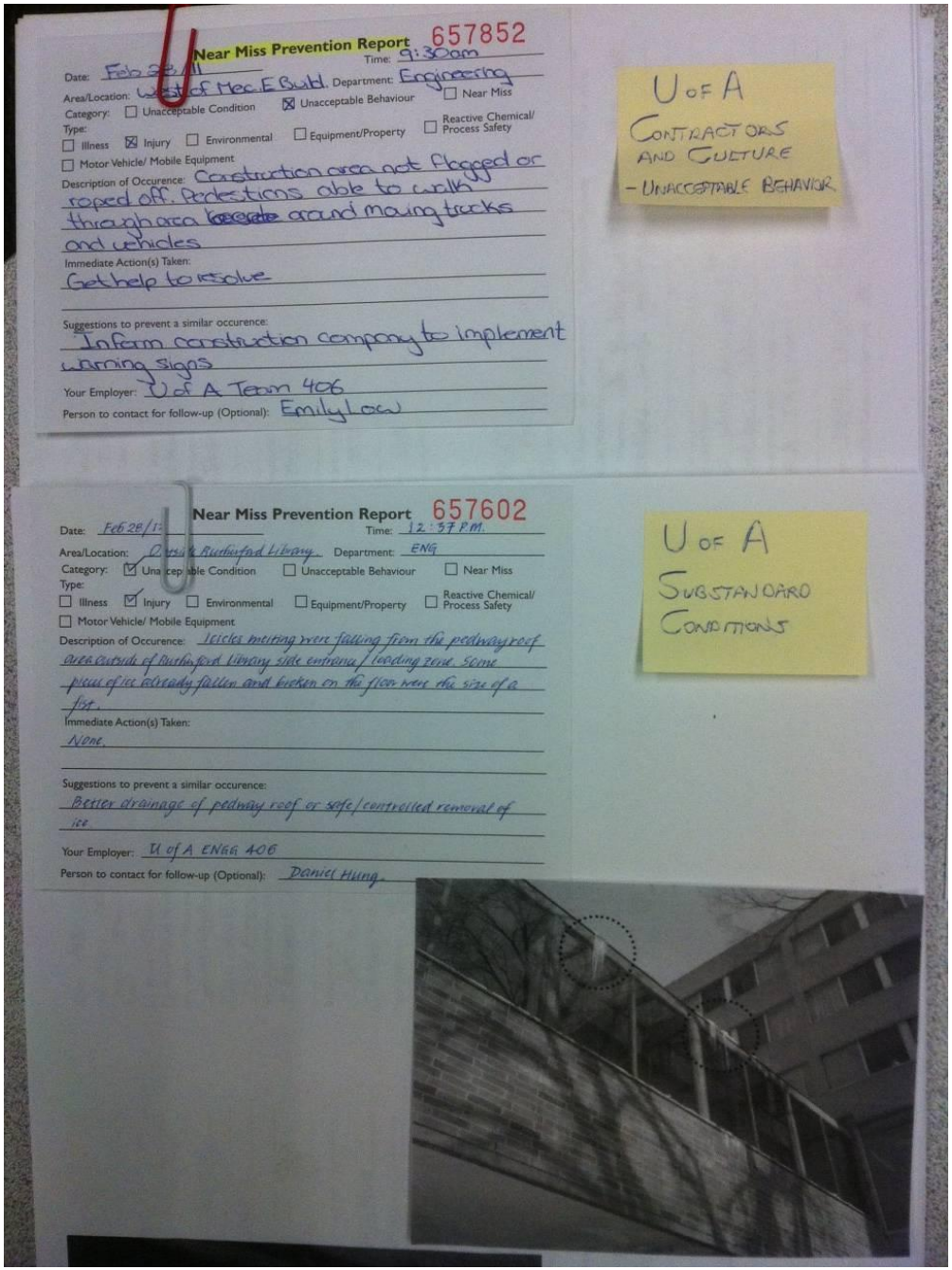
The Leadership Imperative at Work



Reduce Risk Tolerance

Process Safety…. Culture





Near Miss Prevention Report 657852

Date: Feb 28/11 Time: 9:30am

Area/Location: West of Mec. E Build. Department: Engineering

Category: ☐ Unacceptable Condition ☒ Unacceptable Behaviour ☐ Near Miss

Type: ☐ Illness ☒ Injury ☐ Environmental ☐ Equipment/Property ☐ Reactive Chemical/ Process Safety ☐ Motor Vehicle/ Mobile Equipment

Description of Occurence: Construction area not flagged or roped off. Pedestrians able to walk through area ~~beside~~ around moving trucks and vehicles

Immediate Action(s) Taken: Get help to resolve

Suggestions to prevent a similar occurence: Inform construction company to implement warning signs

Your Employer: U of A Team 406

Person to contact for follow-up (Optional): Emily Low

U OF A CONTRACTORS AND CULTURE - UNACCEPTABLE BEHAVIOR

Near Miss Prevention Report 657602

Date: Feb 28/11 Time: 12:37 P.M.

Area/Location: Outside Rutherford Library Department: ENG

Category: ☑ Unacceptable Condition ☐ Unacceptable Behaviour ☐ Near Miss

Type: ☐ Illness ☑ Injury ☐ Environmental ☐ Equipment/Property ☐ Reactive Chemical/ Process Safety ☐ Motor Vehicle/ Mobile Equipment

Description of Occurence: Icicles melting were falling from the pedway roof area outside of Rutherford Library side entrance / loading zone. Some piece of ice already fallen and broken on the floor were the size of a fist.

Immediate Action(s) Taken: None.

Suggestions to prevent a similar occurence: Better drainage of pedway roof or safe/controlled removal of ice

Your Employer: U of A ENEG 406

Person to contact for follow-up (Optional): Daniel Hung

U OF A SUBSTANDARD CONDITIONS

Injury Reduction Benefits

Process Safety….Culture

One dies in manlift tipover

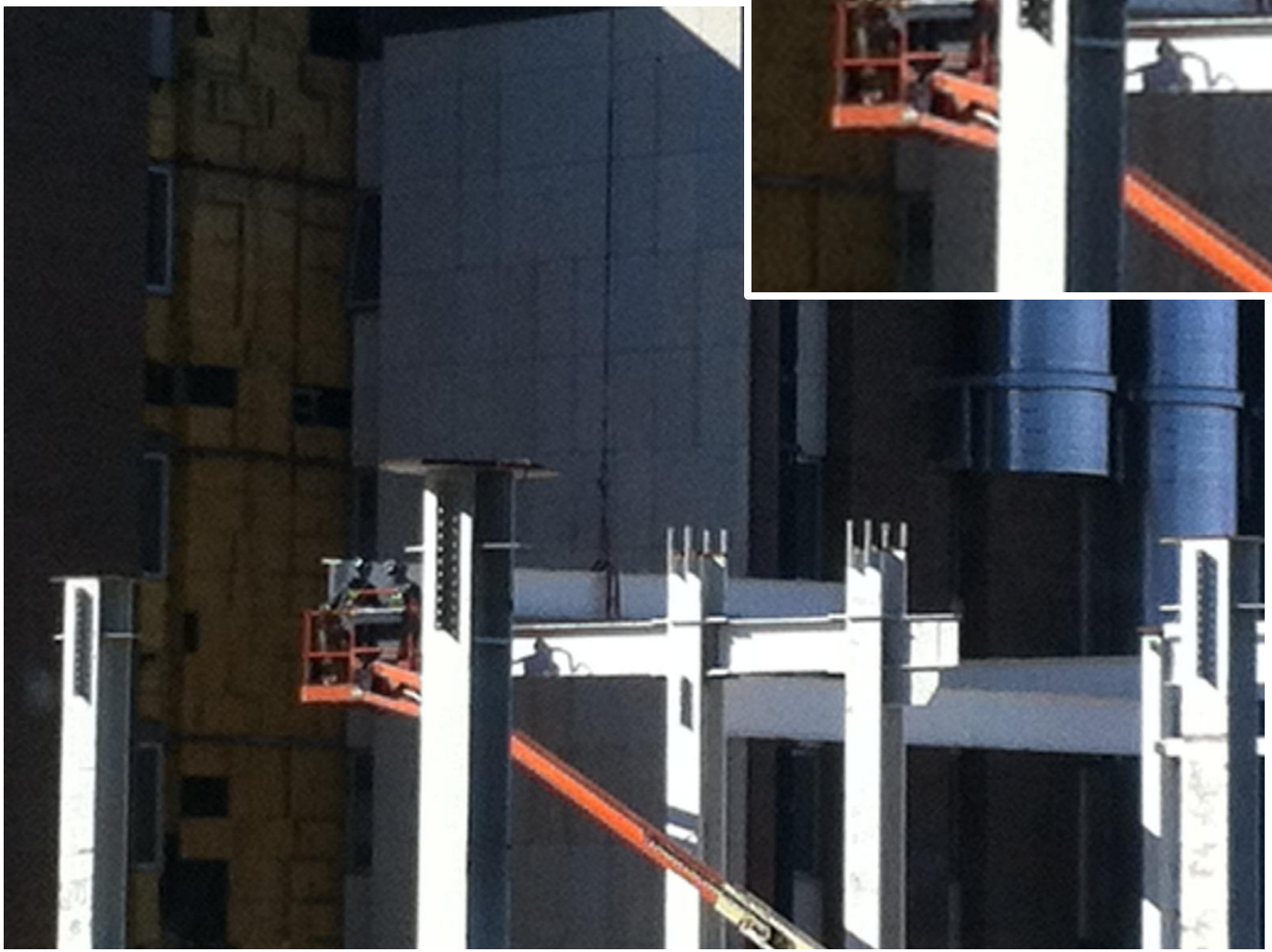
EDMONTON — An Alberta worker is dead following an incident in which the manlift he was operating at an Edmonton construction site tipped over after being struck by a piece of structural steel.

At about 2:30 pm on October 18, two ironworkers were using their respective manlifts to place I-beams on the skeletal structure of a warehouse being built, says Barrie Harrison, an Alberta Human Services spokesperson in Edmonton.

“For reasons unknown, this very large I-beam fell and it struck one of the lifts,” Harrison says. The contact caused the lift to tip over and both the machine and the 28-year-old employee of Spartan Steel fell 15 metres to the ground, he adds.

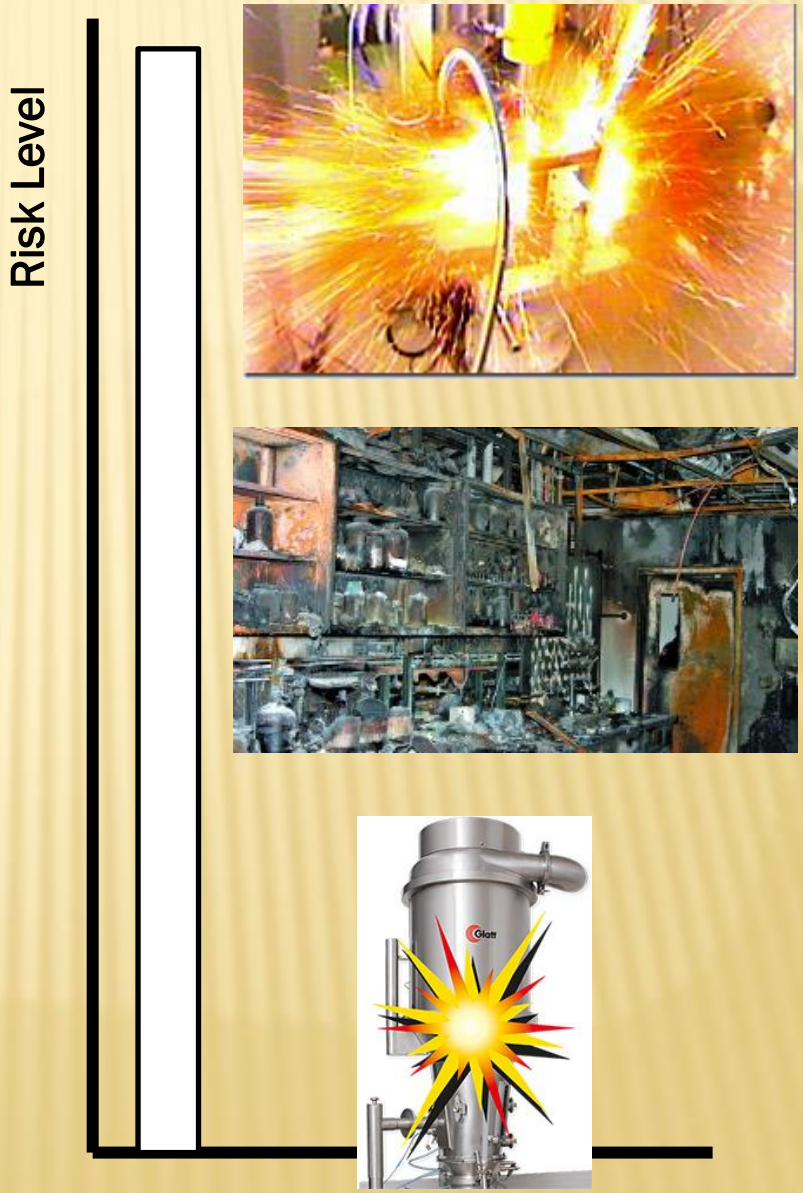
A stop-work order was issued for the site, the prime contractor for which is Dawson Wallace Construction Ltd.

Process Safety….
Culture



Board Safety, Health and Environment Committee

Managing Safety and Risk in the University Engineering Faculty



Board Safety, Health and Environment Committee

Stuff Happens…. and It's All Preventable

Laboratory fires -

March,2010 - Laboratory fire destroys an entire lab - potential to spread to other labs in the building

November 2010 - Small fire while preparing for a classroom demonstration

September,2011 - Fire at the Meanook research station destroys a small laboratory building

April,2012 - Small fire during a classroom demonstration

Board Safety, Health and Environment Committee

Stuff Happens…. and It's All Preventable

Over-pressure events -

October,2010 and July, 2011 - Chemical waste bottles burst due to inadvertent mixing

December, 2011 - Bursting disc prematurely activates on a high pressure, small volume reactor.

August, 2012 - Autoclave was holding pressure and released steam when opened

December,2012 - A high pressure vessel failed at a threaded joint at an operating pressure of 4000 psi

Board Safety, Health and Environment Committee

Stuff Happens…. and It's All Preventable

Leaks and Spills

November, 2009 - Significant nitrogen leak from an overfilled dewar

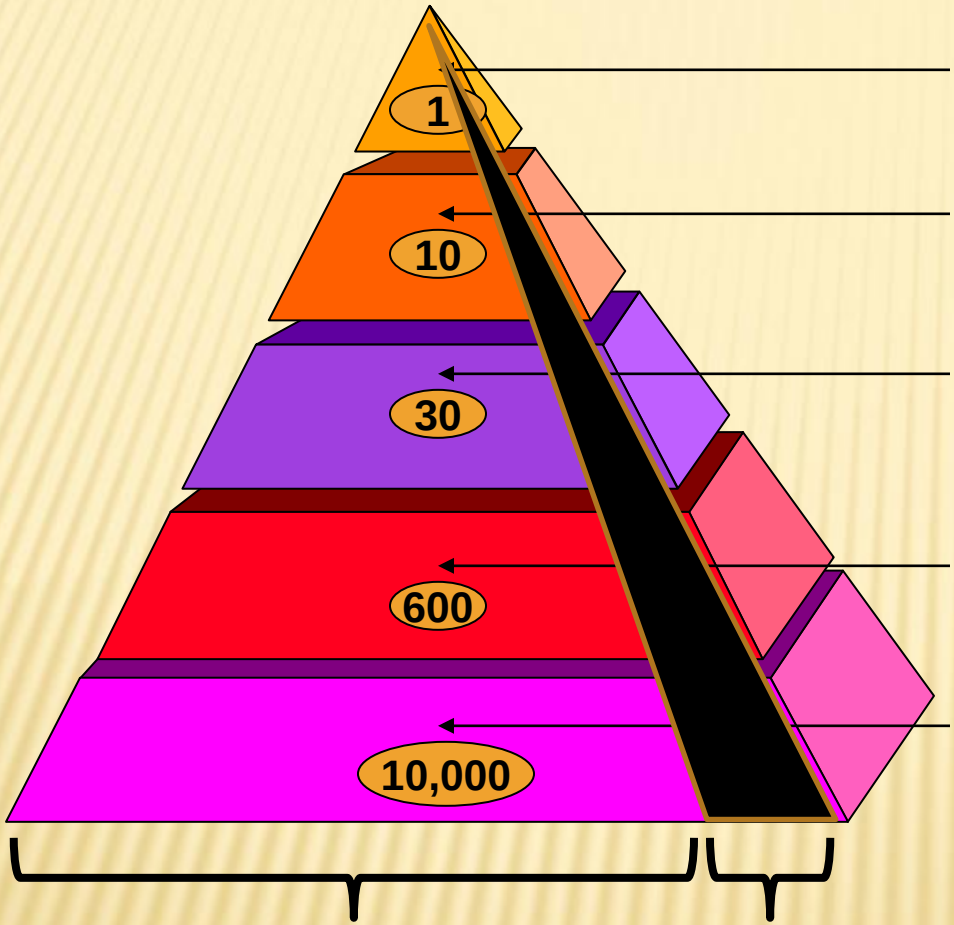
November, 2009 - Cholorform spill in an enclosed environment

July, 2010 - Large tailings leak. Product covered an employee who was responding to the leak

August,2010 - Hydrocholric acid spill on a graduate student

12 Serious Incidents:

- 5-10% of actual serious incidents
- 100-250 actual serious incidents



Serious/Disabling/Fatalities

Medical Aid

Property/1st Aids

Near Misses

Unsafe Behaviors/Conditions

One misstep from fatality:

- Fires/Explosions
- High Pressure Failure
- Toxic Releases

Board Safety, Health and Environment Committee

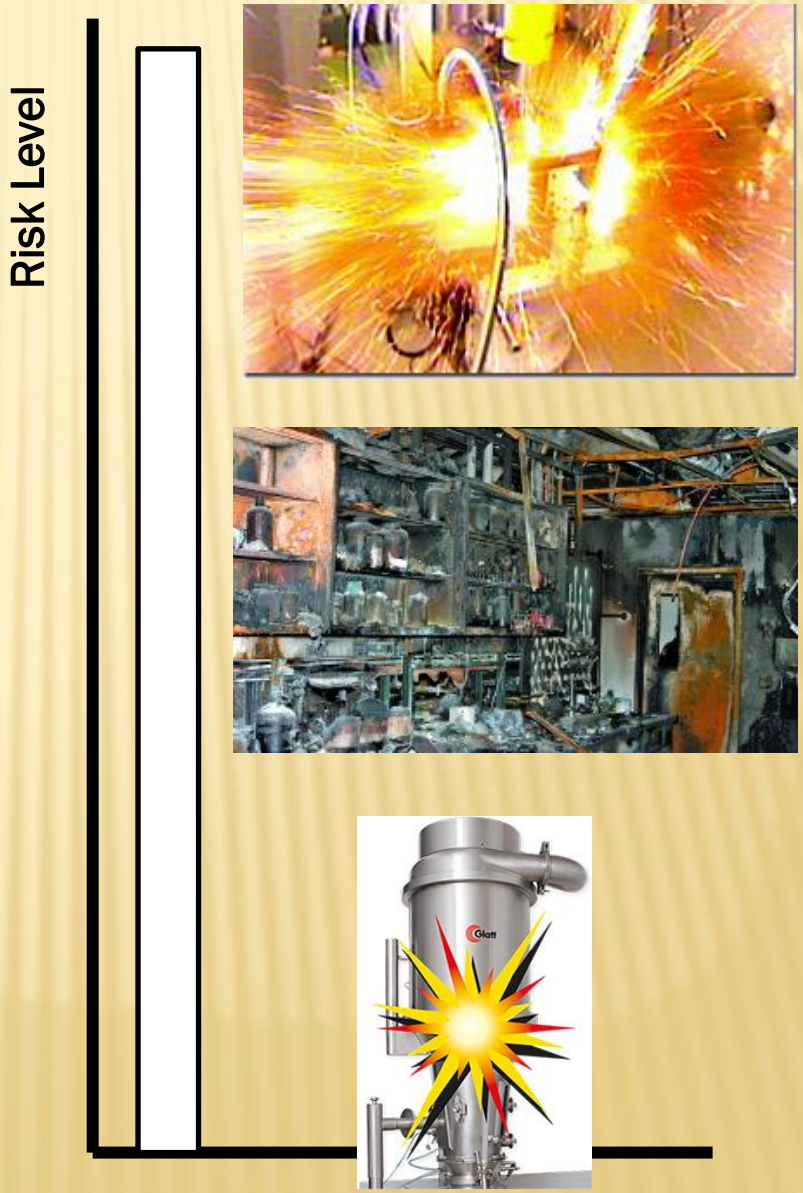
First and foremost, providing a robust safety culture is a moral imperative, it's simply the right thing to do.

Due diligence also requires employers to take every reasonable precaution to provide a safe and healthy workplace and protect workers from known and foreseeable risks.

- provincial and national standards;
- industry practices;
- manufacturers specifications

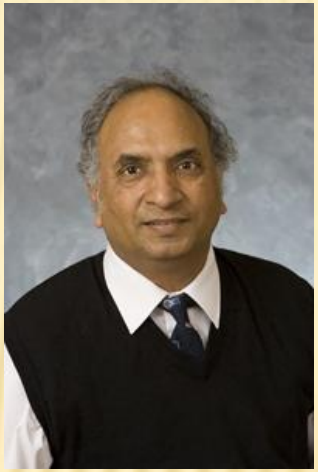
In other words: <u>if it can be done, it must be done with the technology of today.</u>

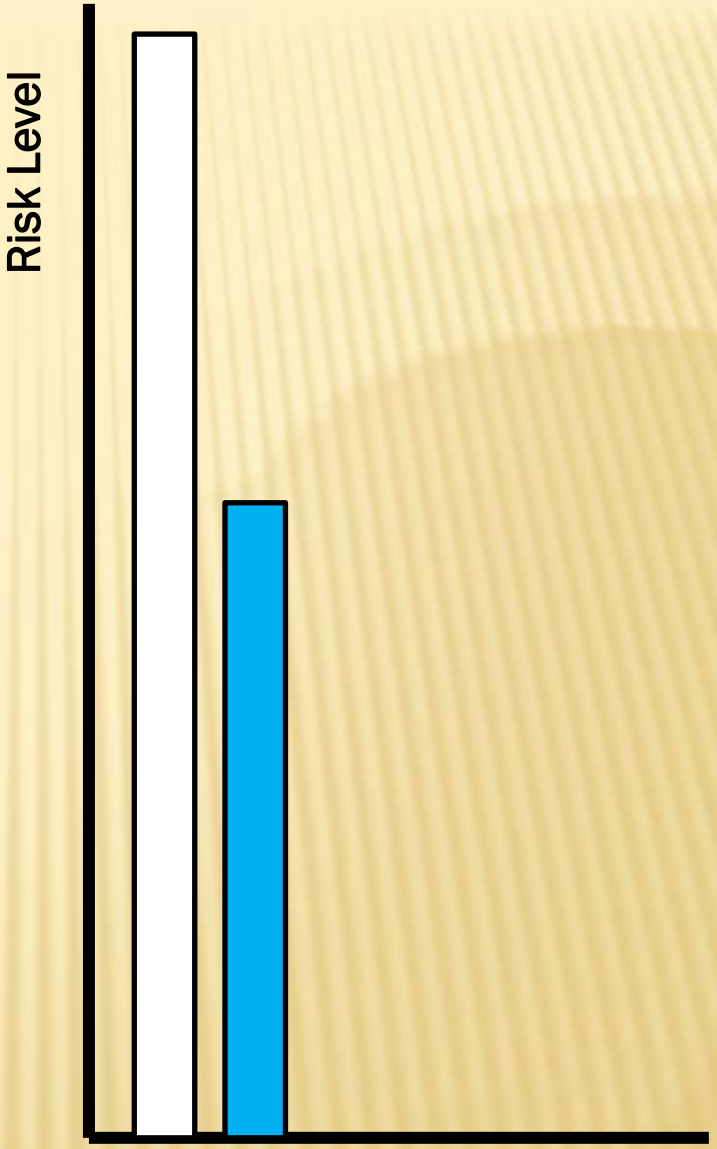
Currently we have access to best practices for implementing a highly effective safety and risk management program to advance our safety culture.



The CME Laboratory Safety Journey

- Leadership Commitment to Safety
- Planned Inspections – MSDS, Storage, Exits, Emergency Response(Splash/Spill/Fire), Housekeeping and Hazards
- Personal Protective Equipment





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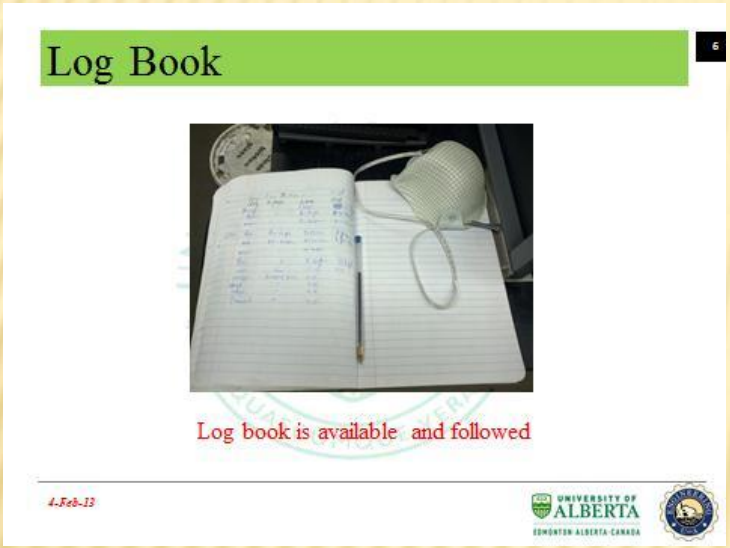

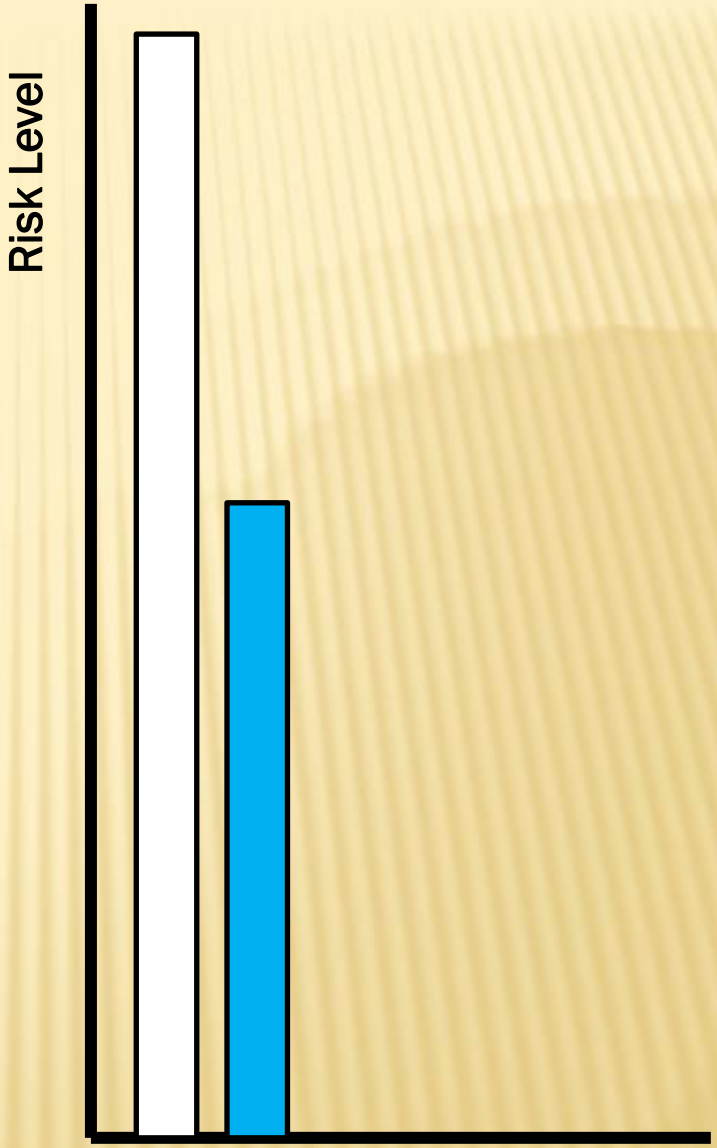

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Log Book

6

Emergency & Safety Equipment

7

Above Units were tested regularly as per work design

4-Feb-13

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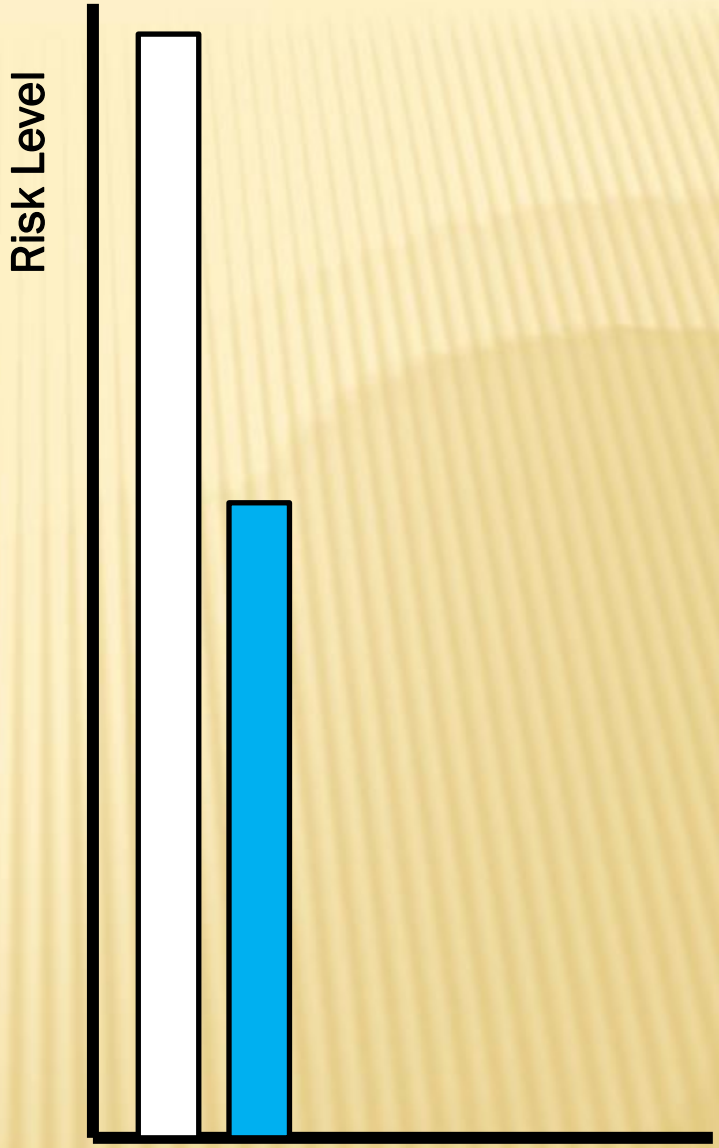
EDMONTON · ALBERTA · CANADA



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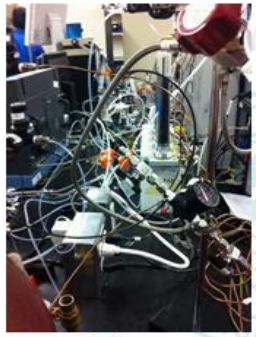
Log Book

Emergency & Safety Equipment

Tubes & Cables

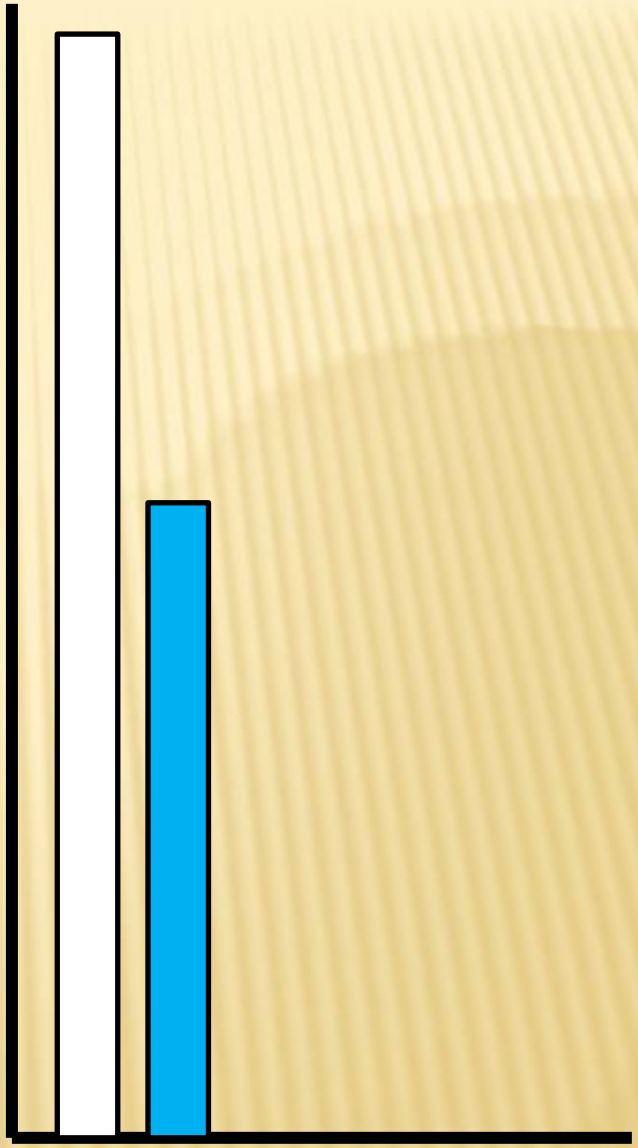


Before

After

4-Feb-13

UNIVERSITY OF ALBERTA
EDMONTON ALBERTA CANADA



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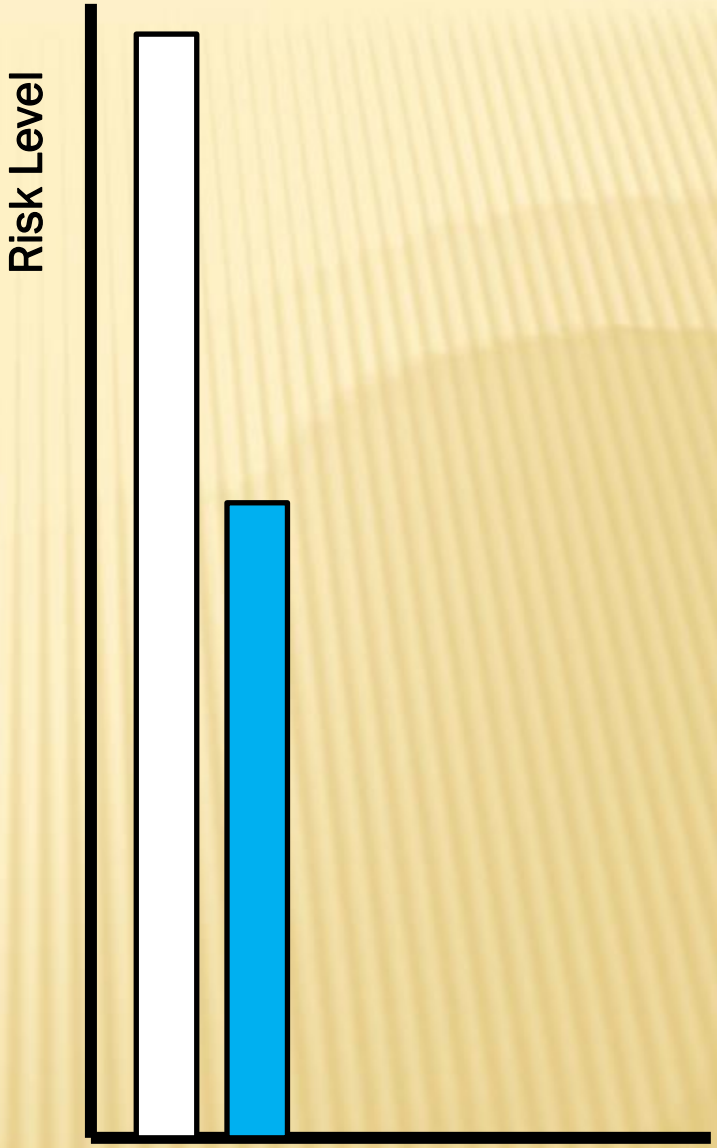

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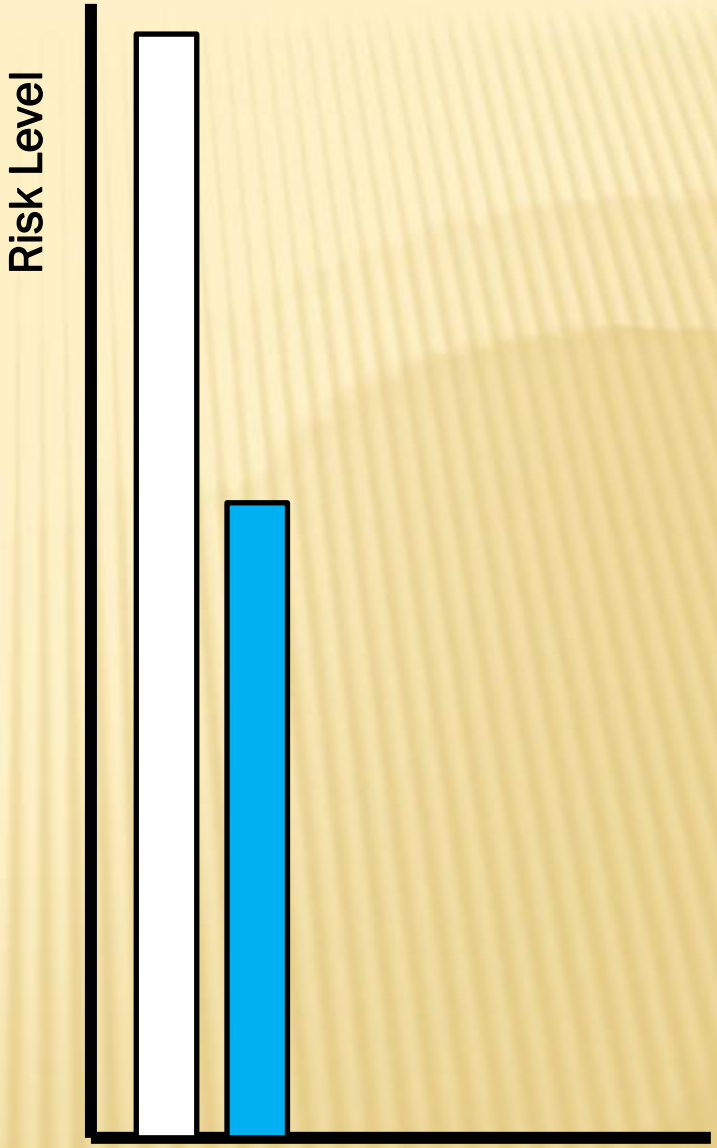

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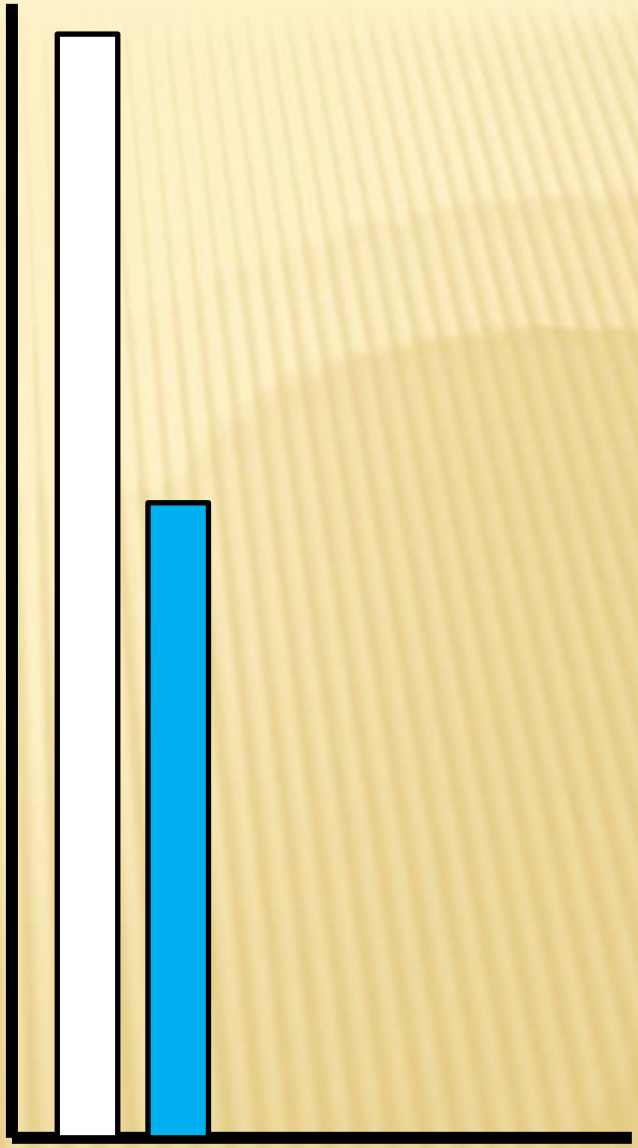

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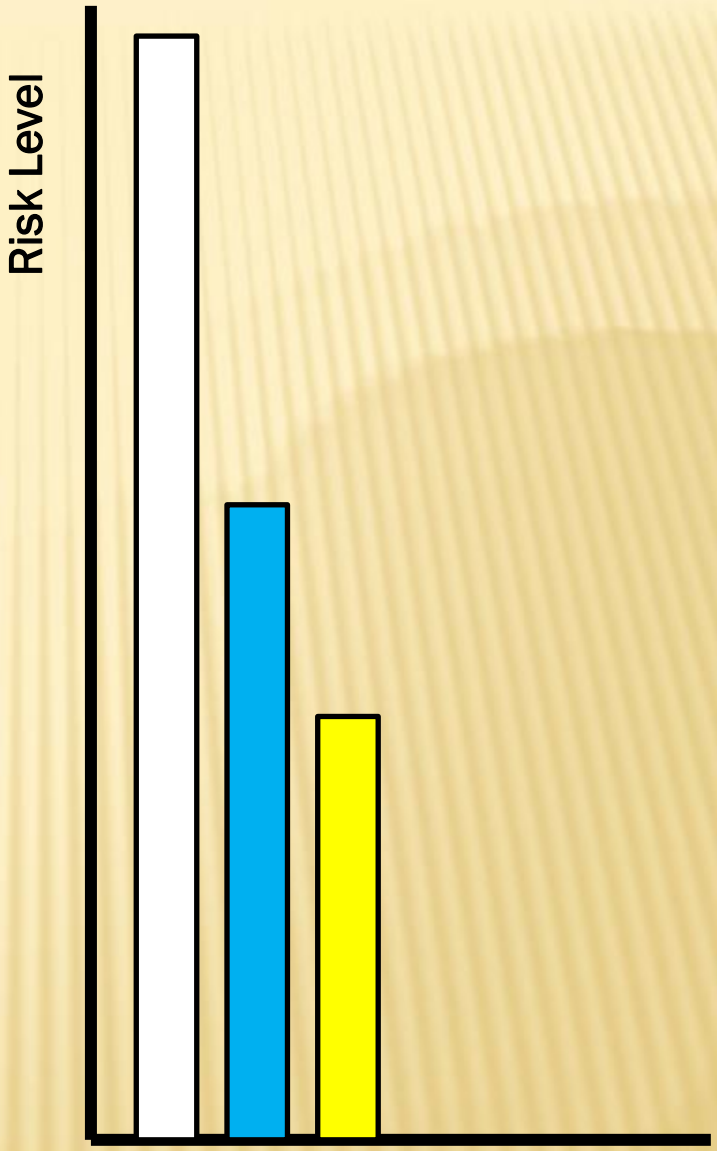
- Standard Operating Procedures
- Risk Assessment Method
- Flowchart for Experimental Procedures



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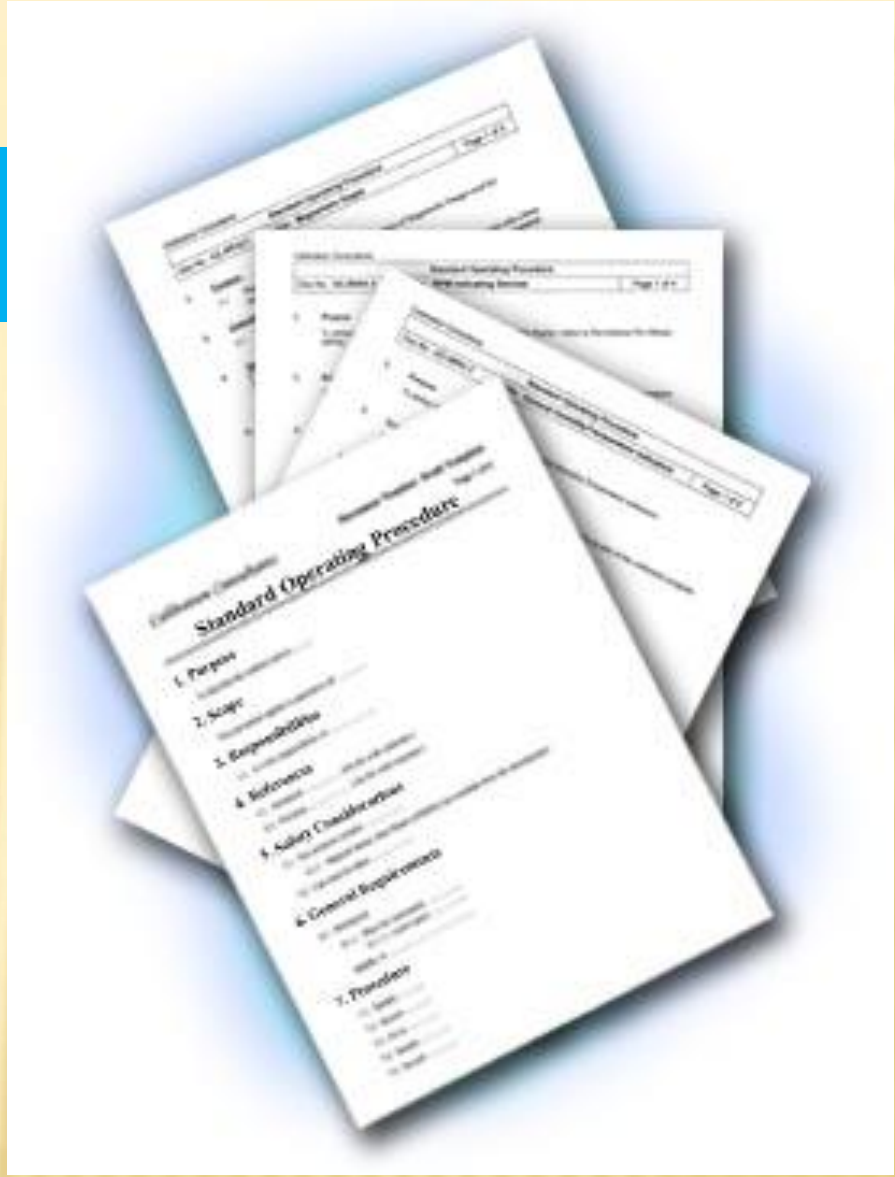
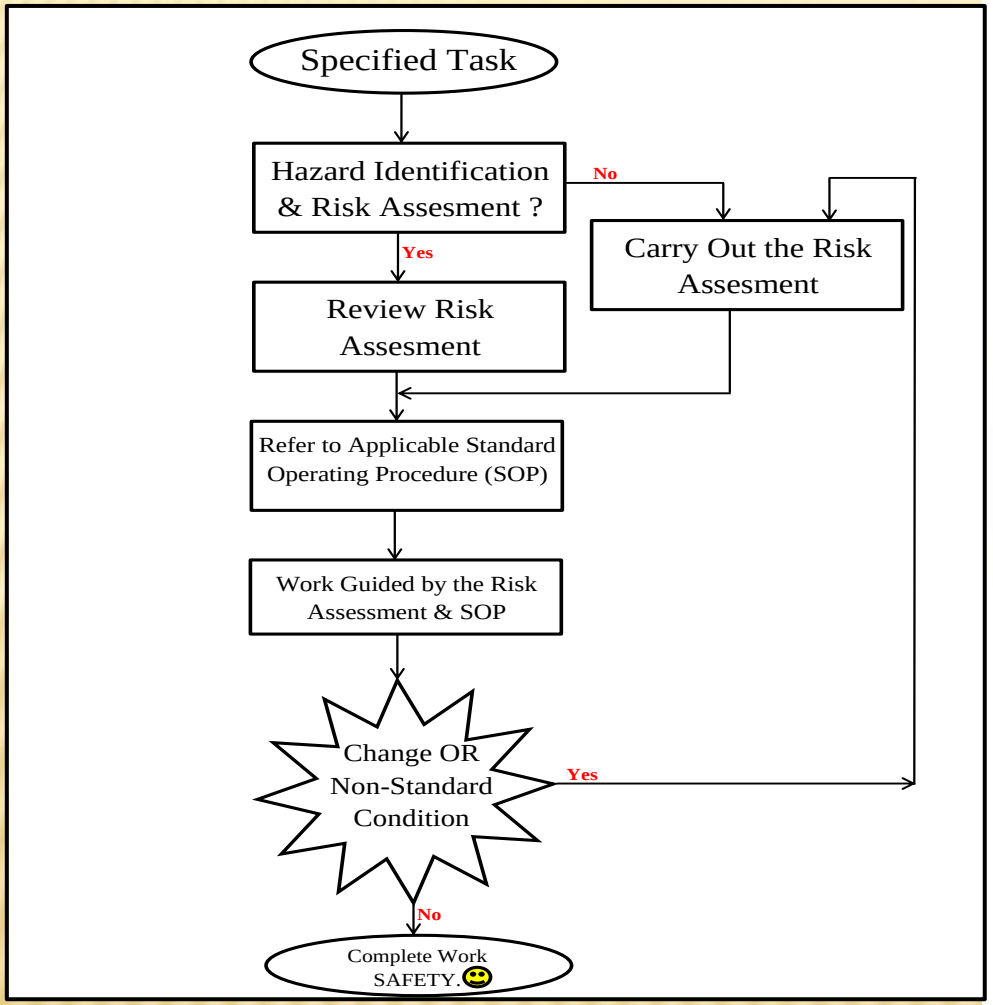
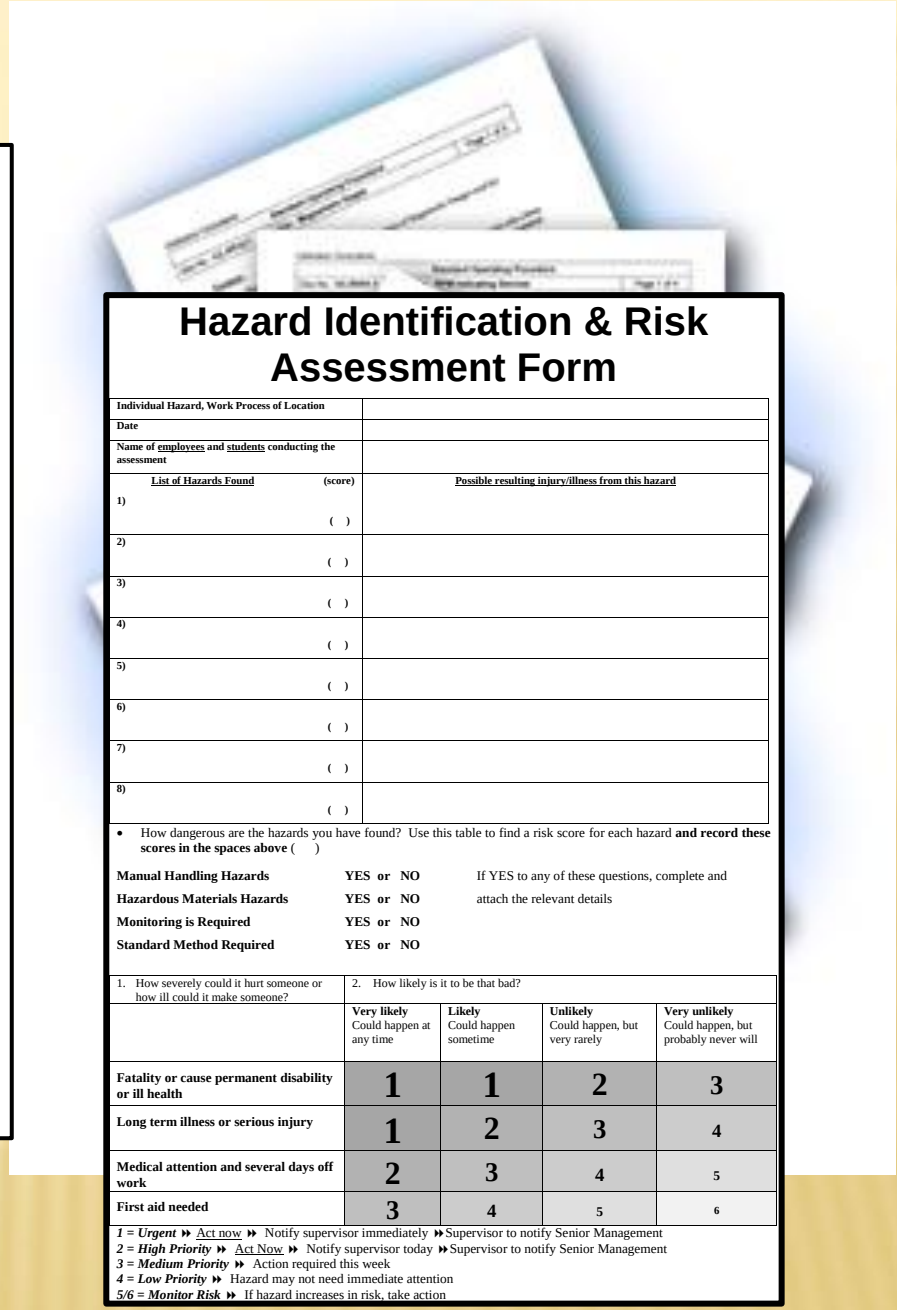


The CME Laboratory Safety Journey

Leadership Commitment to Safety





Hazard Identification & Risk Assessment Form

Individual Hazard, Work Process of Location	
Date	
Name of employees and students conducting the assessment	
List of Hazards Found (score)	**Possible resulting injury/illness from this hazard**
1) ( )	
2) ( )	
3) ( )	
4) ( )	
5) ( )	
6) ( )	
7) ( )	
8) ( )	

- How dangerous are the hazards you have found? Use this table to find a risk score for each hazard **and record these scores in the spaces above** ( )

Manual Handling Hazards	**YES or NO**	If YES to any of these questions, complete and
Hazardous Materials Hazards	**YES or NO**	attach the relevant details
Monitoring is Required	**YES or NO**	
Standard Method Required	**YES or NO**	

1. How severely could it hurt someone or how ill could it make someone?	2. How likely is it to be that bad?			
	Very likely Could happen at any time	**Likely** Could happen sometime	**Unlikely** Could happen, but very rarely	**Very unlikely** Could happen, but probably never will
Fatality or cause permanent disability or ill health	**1**	**1**	**2**	**3**
Long term illness or serious injury	**1**	**2**	**3**	**4**
Medium attention and several days off work	**2**	**3**	**4**	**5**
First aid needed	**3**	**4**	**5**	**6**

1 = Urgent ⏩ Act now ⏩ Notify supervisor immediately ⏩Supervisor to notify Senior Management
2 = High Priority ⏩ Act Now ⏩ Notify supervisor today ⏩Supervisor to notify Senior Management
3 = Medium Priority ⏩ Action required this week
4 = Low Priority ⏩ Hazard may not need immediate attention
5/6 = Monitor Risk ⏩ If hazard increases in risk, take action

The CME Laboratory Safety Journey

Leadership Commitment to Safety

Planned Inspections – MSDS, Storage, Exits, Emergency Response(Splash/Spill/Fire), Housekeeping and Hazards

Personal Protective Equipment

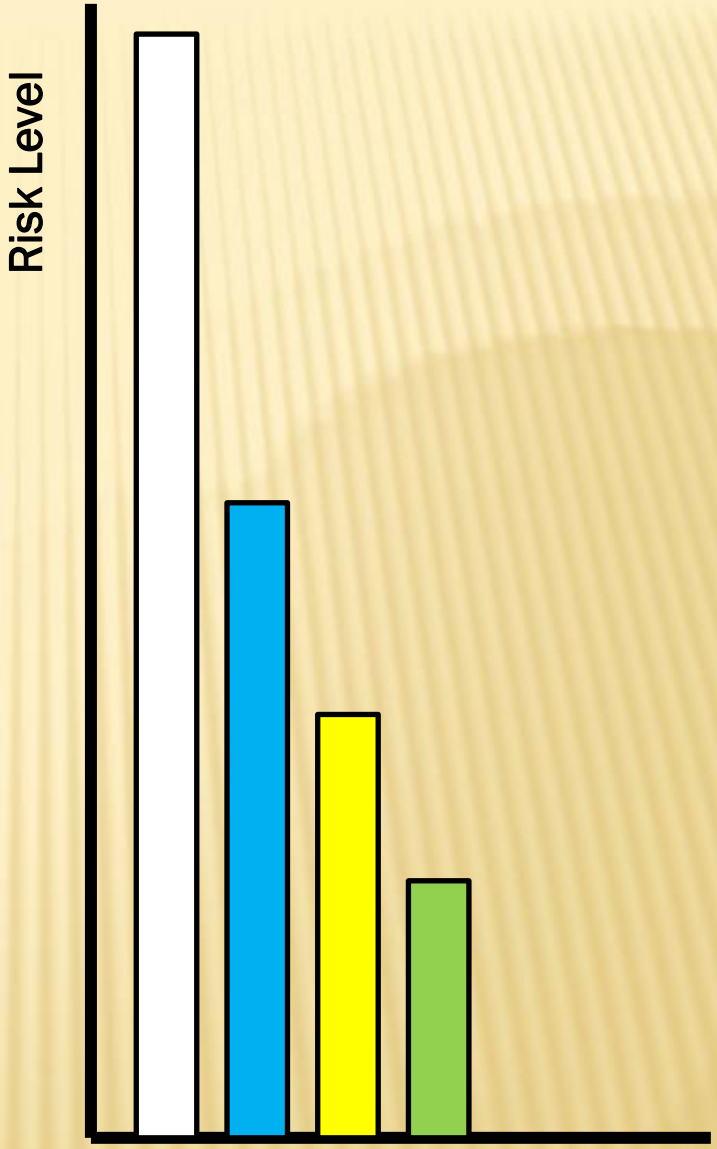
Standard Operating Procedures

Risk Assessment Method

Flowchart for Experimental Procedures

Training
- •WHMIS
- •Chemical Handling
- •Swagelock
- •Cylinder Handling

Orientations
- •Working Alone Procedures



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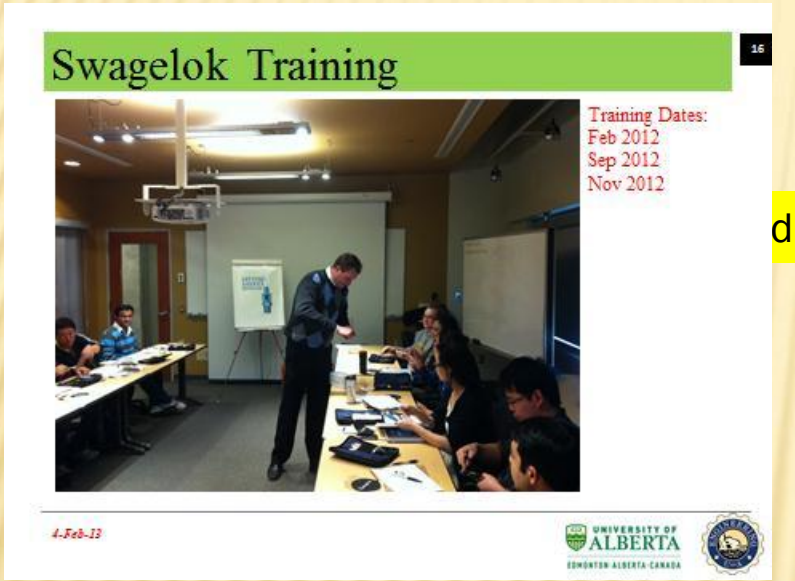

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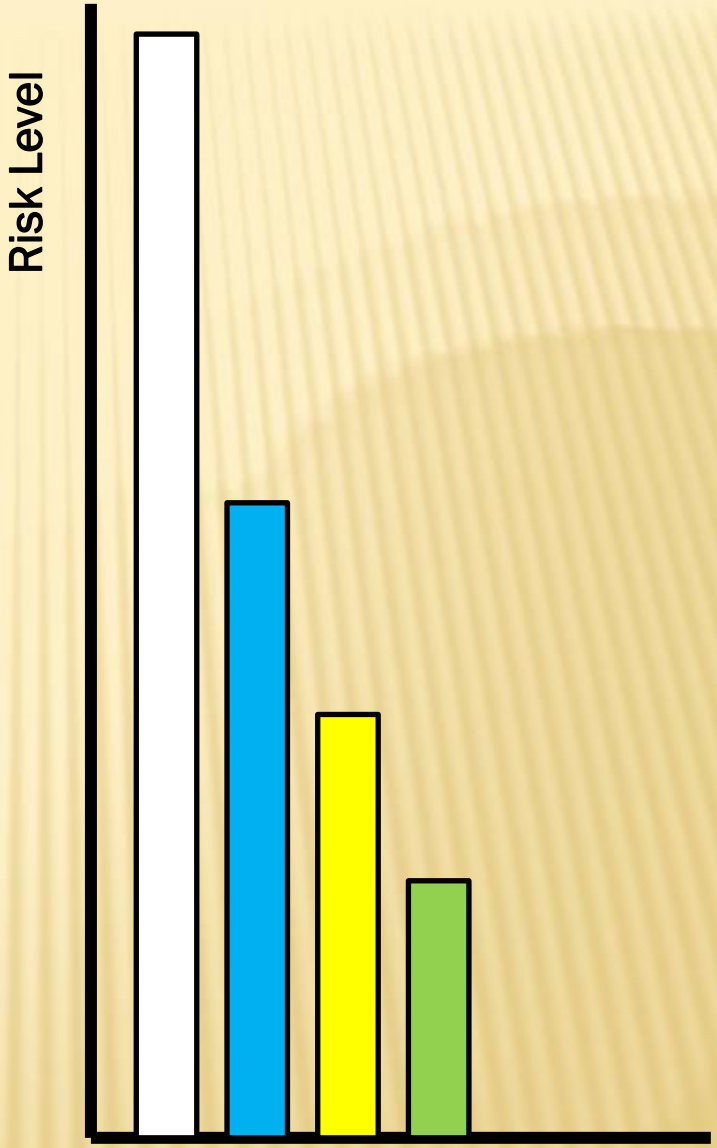
Orientations

•Working Alone Procedures



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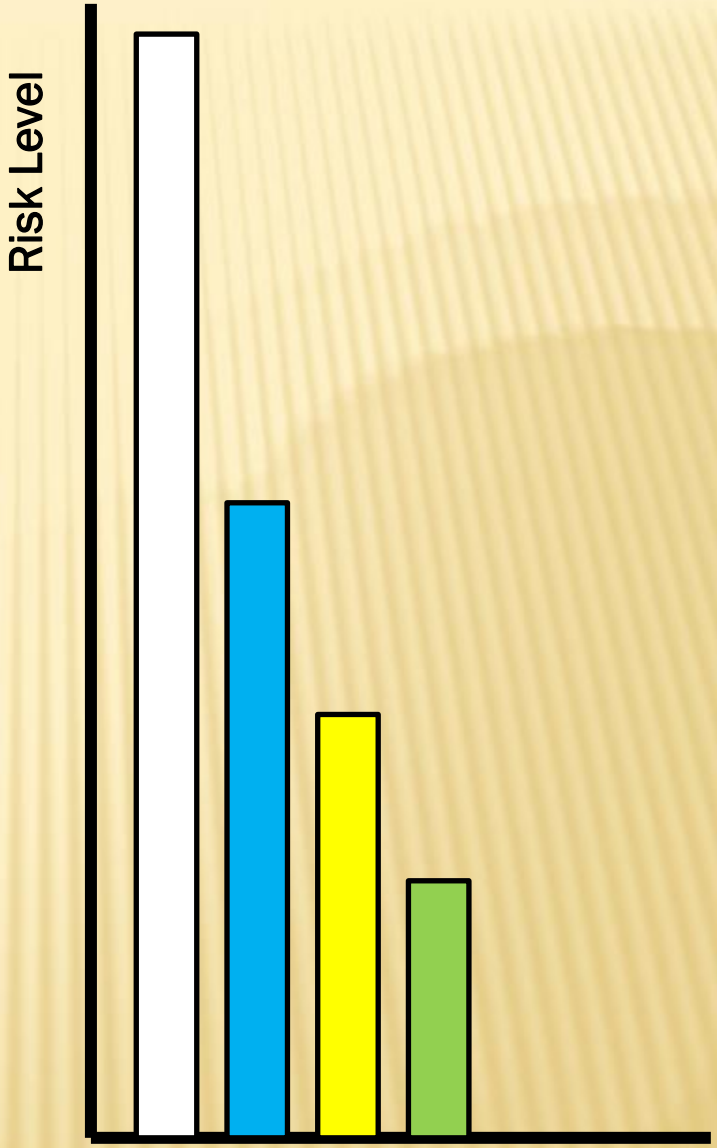

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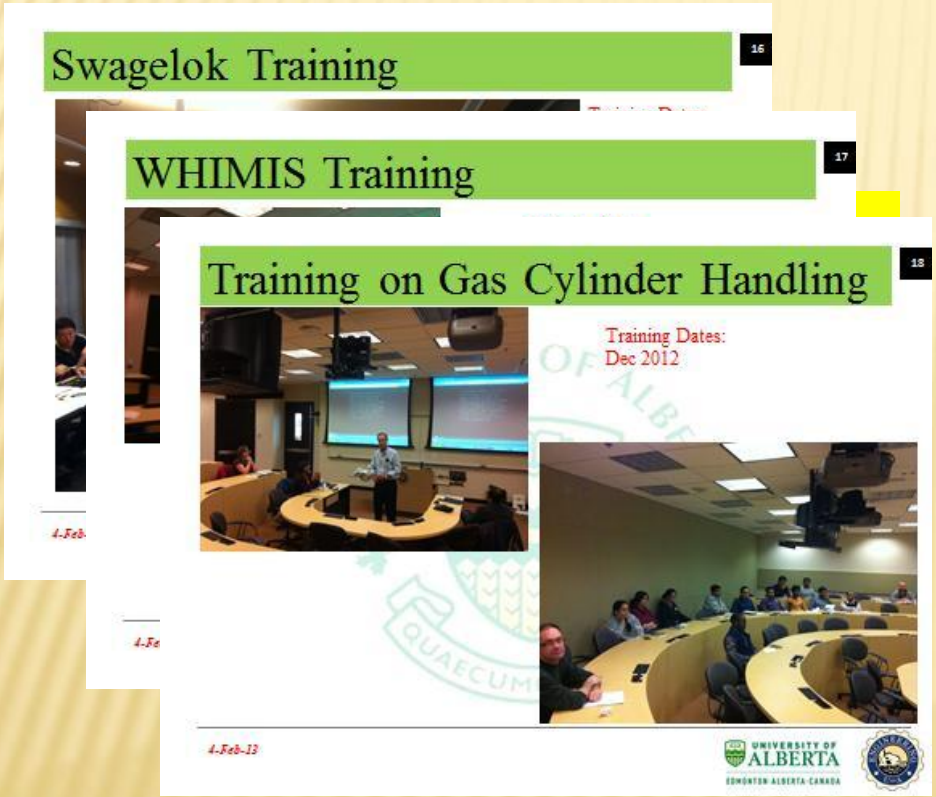

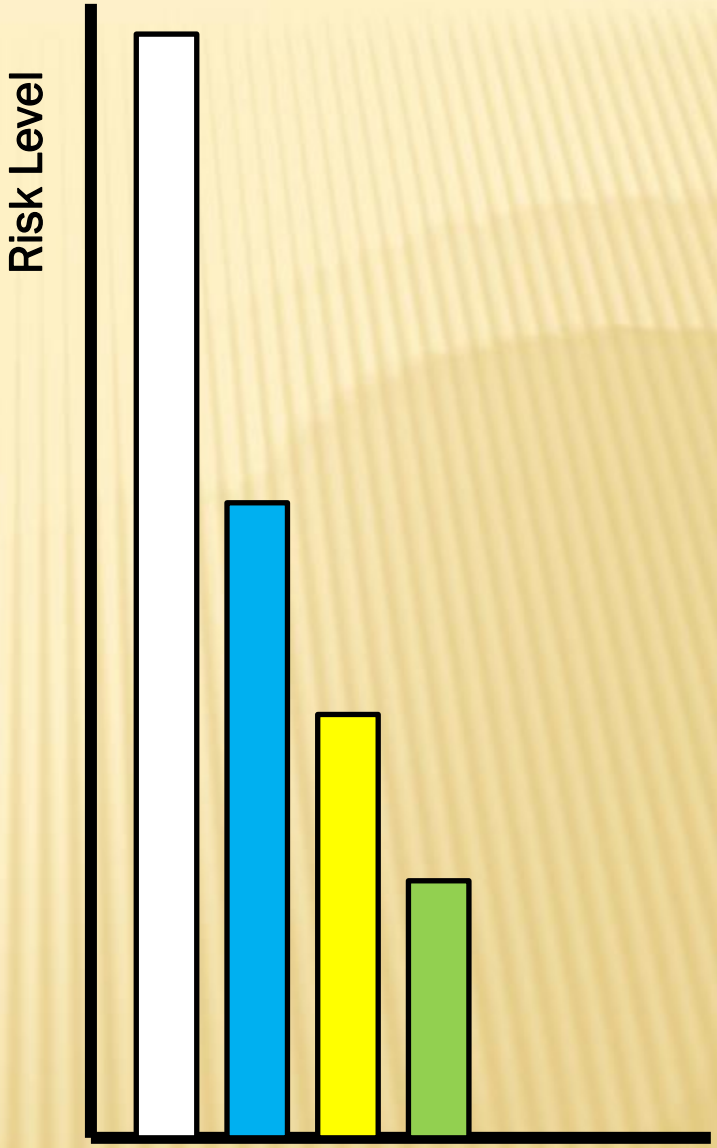

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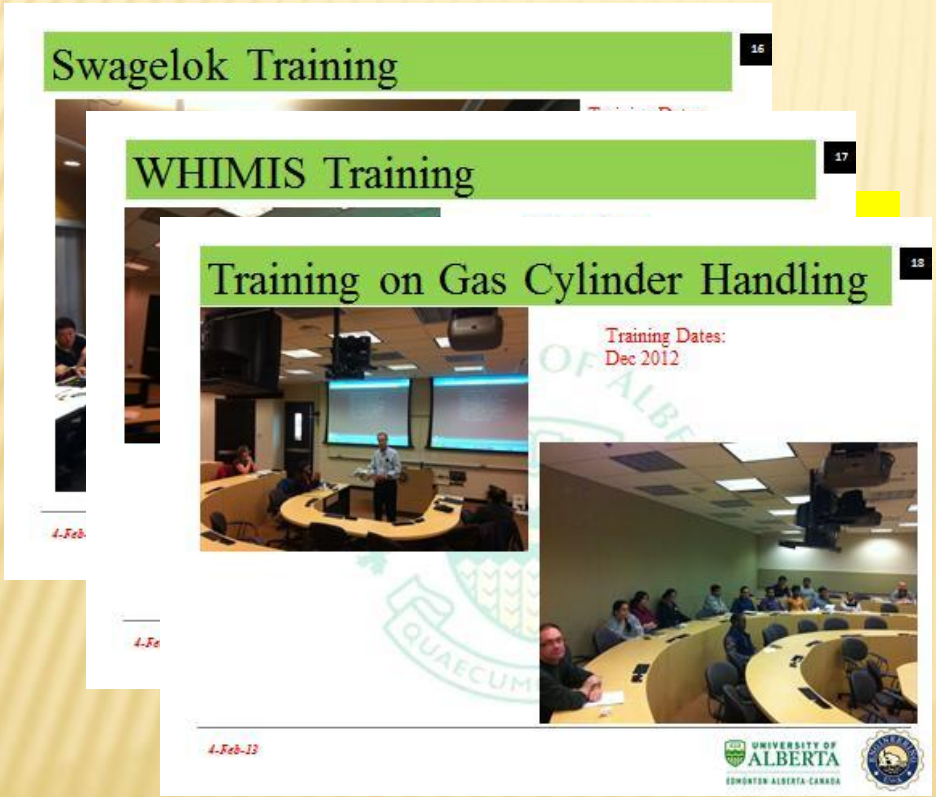
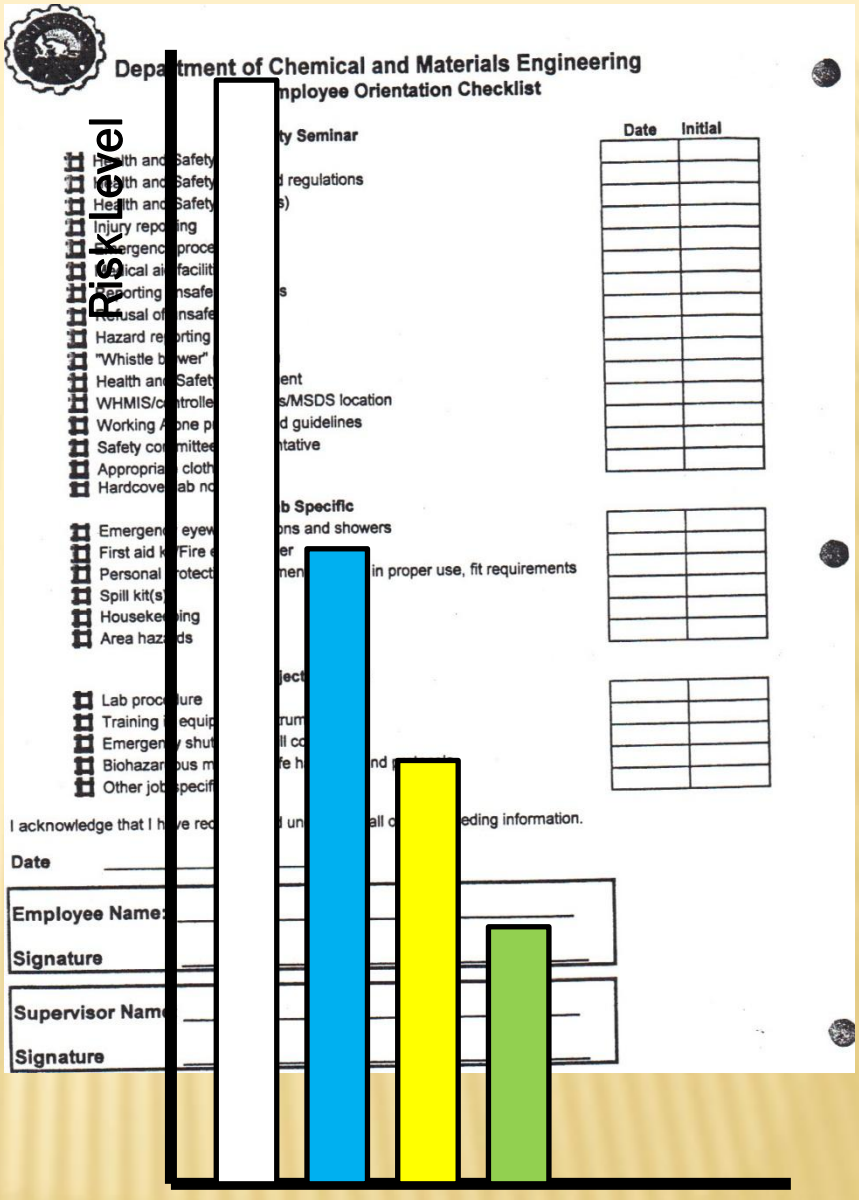




The CME Laboratory Safety Journey

Leadership Commitment to Safety

Planned Inspections – MSDS, Storage, Exits, Emergency Response(Splash/Spill/Fire), Housekeeping and Hazards

Personal Protective Equipment

Standard Operating Procedures

Risk Assessment Method

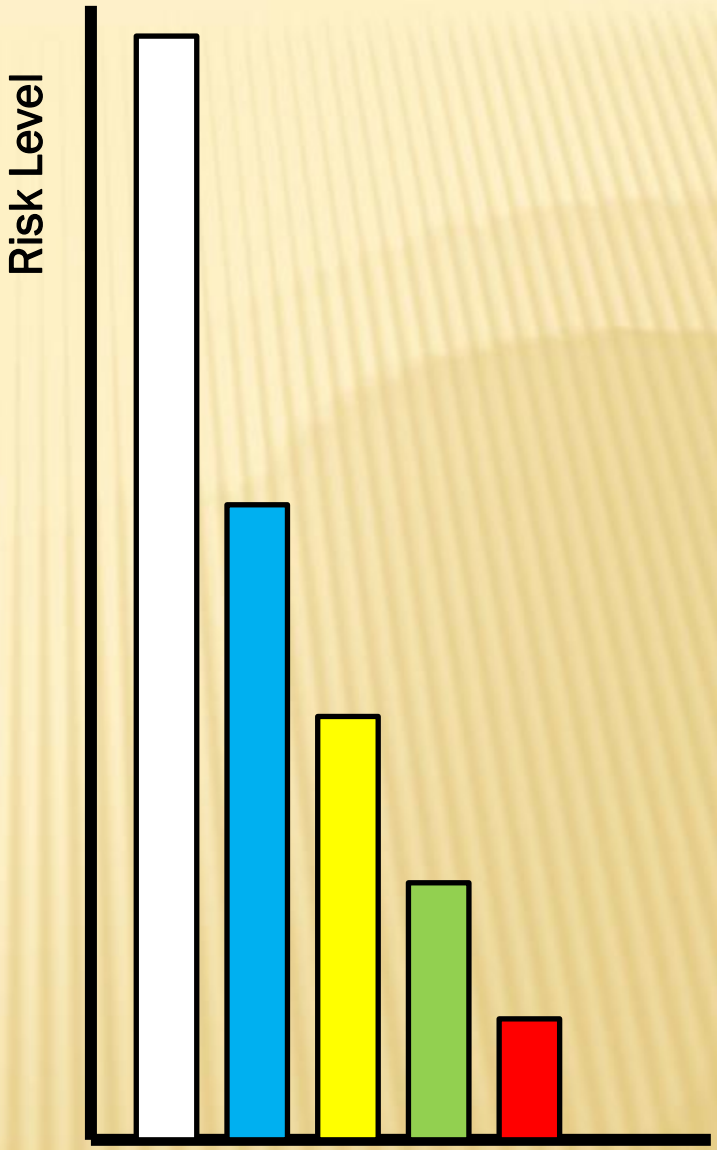
Flowchart for Experimental Procedures

Training
- •WHMIS
- •Chemical Handling
- •Swagelock
- •Cylinder Handling

Orientations
- •Working Alone Procedures

Field Level Risk Assessment

Incident Reporting and Learning



The CME Laboratory Safety Journey

Leadership Commitment to Safety

Planned Inspections – MSDS, Storage, Exits, Emergency Response(Splash/Spill/Fire), Housekeeping and Hazards

Personal Protective Equipment

Standard Operating Procedures

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UNIVERSITY OF ALBERTA

C^{5}MPT Lab Work Assessment Form

Activity and Location:

Date:

Name of team member(s) conducting the observation:

***Consider the following items for the planned activity*:**

Items	Safe	At Risk	Comments
Personal Protective Equipment (Appropriate for task, in good condition)	☐	☐	
Risk Assessment/ SOP (Use standard operating procedures and carry out risk assessments for experiments)	☐	☐	
Material Handling (Follow standards in handling chemicals and other specialized/hazardous substances)	☐	☐	
Screens/ Guards (Protective equipment in place and in good condition, lockout/isolation where required)	☐	☐	
Access and Egress (Clear path to move to and from work area, easy access to equipment)	☐	☐	
Line of fire (Safe positioning, pinch points)	☐	☐	
Use of Tools and Equipment (Right tool/ equipment for job, safety devices and guards in place)	☐	☐	
Balanced Grip, Position, and Traction (Not in danger of overreaching, falling sliding, etc.)	☐	☐	
Focused on Job at Hand (Eyes and mind on task, good view of work)	☐	☐	
Housekeeping (Area free of debris, material, tripping hazards)	☐	☐	

Substandard Condition, Job Observation, Near Miss or Incident Report and Follow-up:

What Did You Observe? (Identify Hazards)

What Action Did You Take?(Initiate Controls/Response)

Thank you for your work to support a safe workplace.

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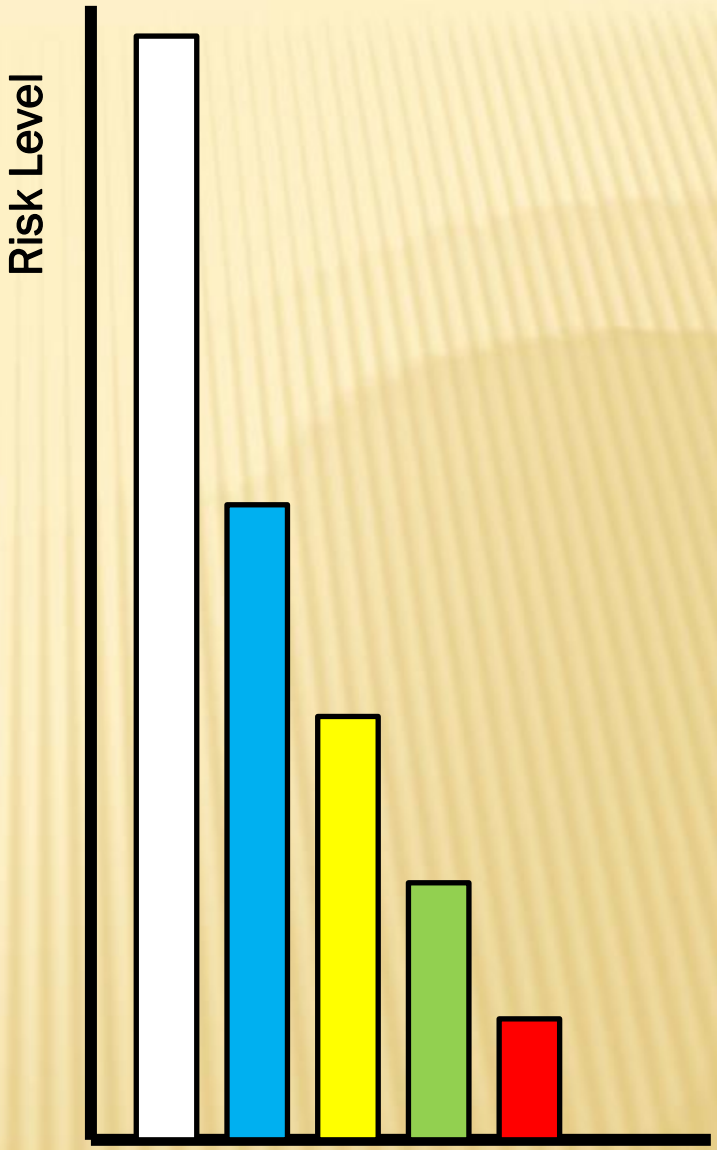

Hi Professor Winkel

Just wanted to say that your class, EngM 404 "Safety and Risk Management" had the largest impact on me and my life than any other course I have ever taken. I really enjoyed it, and it was a real eye opener to what safety really is, why we have it, and how to implement it.

Thanks for offering it,

Derek P.

The best investment for lowering risk exposure in Alberta is the teaching of this course to graduating engineers.

Mary Metz
Section Head (A), Risk Mgmt & Evaluation
Alberta Environment & Sustainable Resource Development