Perspectives on Safety and Risk Management....

The Leadership Imperative for Safety

An Opportunity for Our University
A Focus Area for Consideration

Theme Areas

Safety and Risk Management
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 manage risk in the Engineering Profession.
Doing Planned Reviews

Identification of Hazards

Risk Assessment/Analysis

Is the Risk Acceptable?

Yes

Reduce the Risk

Yes

Can the Risk Be Reduced?

No

No

Discontinue the Activity

Manage the Residual Risk

Focus Area

ENGG 404

ENGG 406
Year 1
- ENGG 101*
  Risk Management 101 (Primer)

Year 2
- ENGG 299*
  Safety and Risk to CO-OP Engineers

Year 3
- ENGG 400*
  Safety, Ethics and Risk Management

Year 4
- ENGG 600*
  Safety and Risk Management Overview

Grad Studies
- ChE 464*
  Risk Management Inherently Safe Design

- ENGG 404
  Risk Management Implementation

* Denotes single lecture
Fire hazards, dust explosions
Electrical safety and hazardous energy

Hazard and risk identification
Radiation safety
Codes, standards, regulations

Nanotechnology safety
Robotics safety
Risk management

Process safety management
Ethics, public safety and professional responsibility
- 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

Indicates topics covered in ENGG 404 and ENGG 406
Incident Pyramid

Culture

- Serious/Disabling/Fatalities: 1
- Medical Aid/Major Loss: 10
- Property/1st Aids/Environmental: 30
- Near Misses/Contained Releases: 600
- Unsafe Behaviors/Conditions: 10,000
The Leadership Imperative....

- Valuing and caring about people
- A genuine belief in peoples’ capacity to contribute
Safety Leadership… Values

Formal Context: Supporting People

Broader Context: Taking Responsibility
The Leadership Imperative at Work

Line of Sight

Tone at the Top

Connecting Activities
Reduce Risk Tolerance
Process Safety....

Culture

Injury Reduction Benefits
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
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
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.
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

One misstep from fatality:
- Fires/Explosions
- High Pressure Failure
- Toxic Releases
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: if it can be done, it must be done with the technology of today.

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

Risk Level
The CME Laboratory Safety Journey

Leadership Commitment to Safety

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Personal Protective Equipment

Log Book

Log book is available and followed
The CME Laboratory Safety Journey

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Personal Protective Equipment

Log Book

Emergency & Safety Equipment

Above Units were tested regularly as per work design
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

Log Book

Emergency & Safety Equipment

Tubes & Cables
The CME Laboratory Safety Journey

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Personal Protective Equipment

Log Book

Emergency & Safety Equipment

Tubes & Cables

Flammable Storage Cabinet
The CME Laboratory Safety Journey

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

Personal Protective Equipment

Log Book

Emergency & Safety Equipment

Tubes & Cables

Flammable Storage Cabinet

House Keeping

Great Work!
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- Personal Protective Equipment
  - Standard Operating Procedures
  - Risk Assessment Method
  - Flowchart for Experimental Procedures
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Standard Operating Procedures

Risk Assessment Method

Flowchart for Experimental Procedures
The CME Laboratory Safety Journey

Leadership Commitment to Safety

Specified Task

Hazard Identification & Risk Assessment?

Yes

No

Review Risk Assessment

Refer to Applicable Standard Operating Procedure (SOP)

Work Guided by the Risk Assessment & SOP

Change OR Non-Standard Condition

Yes

No

Complete Work SAFETY

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**Hazard Identification & Risk Assessment Form**

<table>
<thead>
<tr>
<th>Individual Hazard, Work Process or Location</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td></td>
</tr>
<tr>
<td>Name of employees and students conducting the assessment</td>
<td></td>
</tr>
<tr>
<td>List of hazards, name (score)</td>
<td></td>
</tr>
<tr>
<td>Possible resulting injury/illness from this hazard</td>
<td></td>
</tr>
<tr>
<td>Manual Handling Hazards</td>
<td>YES or NO</td>
</tr>
<tr>
<td>Hazardous Materials Hazards</td>
<td>YES or NO</td>
</tr>
<tr>
<td>Monitoring is Required</td>
<td>YES or NO</td>
</tr>
<tr>
<td>Standard Method Required</td>
<td>YES or NO</td>
</tr>
</tbody>
</table>

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 ( ).

<table>
<thead>
<tr>
<th>1. How severely could it hurt someone or how ill could it make someone?</th>
<th>2. How likely is it to be that bad?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very likely: Could happen at any time</td>
<td>Likely: Could happen sometime</td>
</tr>
<tr>
<td>Likely: Could happen, but very rarely</td>
<td>Unlikely: Could happen, but probably never will</td>
</tr>
<tr>
<td>Fatality or cause permanent disability or ill health</td>
<td>1</td>
</tr>
<tr>
<td>Long term illness or serious injury</td>
<td>1</td>
</tr>
<tr>
<td>Medical attention and several days off work</td>
<td>2</td>
</tr>
<tr>
<td>First aid needed</td>
<td>3</td>
</tr>
</tbody>
</table>

1 = Urgent: Notify supervisor immediately  
2 = High Priority: Act Now  
3 = Medium Priority: Action required this week  
4 = Low Priority: Hazard may not need immediate attention  
5 = Monitor Risk: If hazard increases in risk, take action.
The CME Laboratory Safety Journey

- Leadership Commitment to Safety
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- Personal Protective Equipment
- Standard Operating Procedures
- Risk Assessment Method
- Flowchart for Experimental Procedures

Training
- WHMIS
- Chemical Handling
- Swagelock
- Cylinder Handling

Orientations
- Working Alone Procedures
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

Swagelok Training

Training Dates:
Feb 2012
Sep 2012
Nov 2012

Orientations
• Working Alone Procedures

Risk Level
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

Swagelok Training

WHIMIS Training

Risk Level

Working Alone Procedures
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

Swagelok Training

WHIMIS Training

Training on Gas Cylinder Handling

Risk Level
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

Swagelok Training

WHIMIS Training

Training on Gas Cylinder Handling

Trainee: December 2012
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Standard Operating Procedures

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Flowchart for Experimental Procedures

Training
• WHMIS
• Chemical Handling
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• Cylinder Handling

Orientations
• Working Alone Procedures

Field Level Risk Assessment

Incident Reporting and Learning
The CME Laboratory Safety Journey

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  • WHMIS
  • Chemical Handling
  • Swagelock
  • Cylinder Handling

Orientations
  • Working Alone Procedures

Field Level Risk Assessment

Incident Reporting and Learning

C5MPT Lab Work Assessment Form

Activity and Location:

Date:

Name of team member(s) conducting the observation:

Consider the following items for the planned activity:

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

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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Orientations
  • Working Alone Procedures

Field Level Risk Assessment

Incident Reporting and Learning
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