



Provincial Corrugating Sector Risk Assessment
Workshops Results – A focused approach to improving
workplace health & safety

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Risk Assessment: Introduction

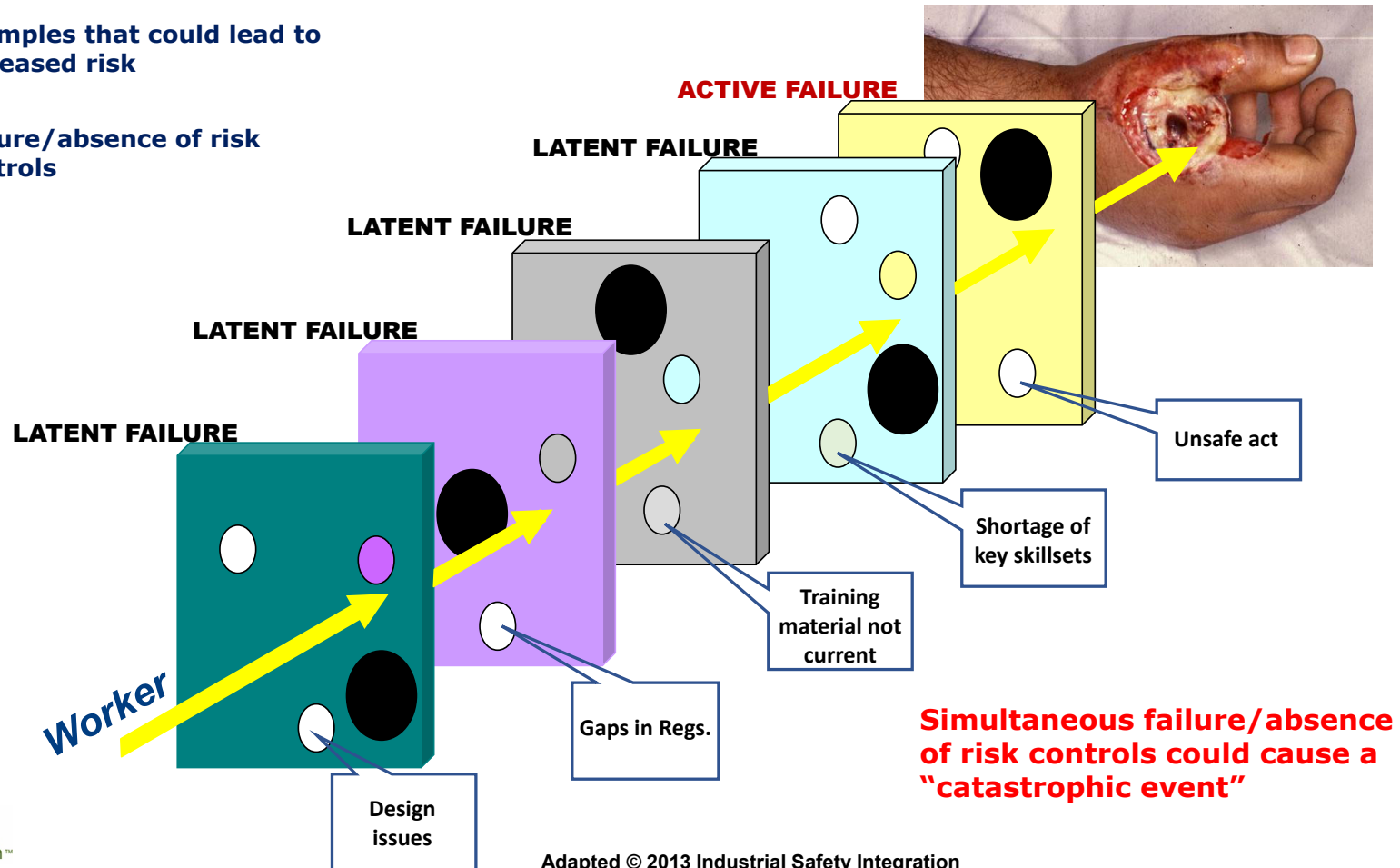
- **2013: MLTSD launched project to put in place an integrated risk assessment methodology to:**
 - identify risks to worker health and safety & work with employers and workers on reducing those risks
 - provide more information to employers, workers & their representatives about risks at the **SECTOR** level

With support of the MLTSD & WSN planned & facilitated the Corrugating Sector Risk Assessment
- Harness collective wisdom across the sector in a tripartite process to focus the industry, health & safety associations (HSAs), and regulator on highest risks to health and safety
- Approach draws on industry, worker, HSA, & Ministry knowledge of risk and recognizes that one-size approach does not fit all
- Approach draws on empirical insights of risk management & operations research/decision science

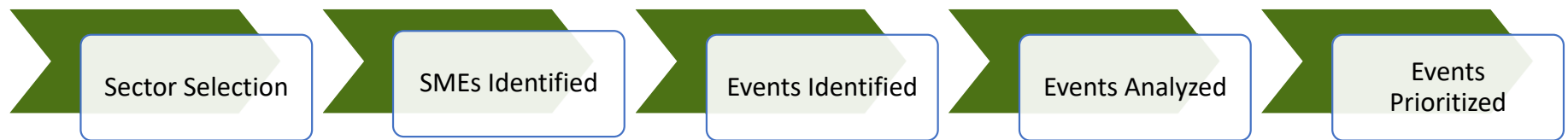
Risk Assessment: Introduction

○ Examples that could lead to increased risk

● Failure/absence of risk controls



Workshop: A Bipartite and Collective Process



Workshop: A Bipartite and Collective Process

- Workshop process is open, transparent, and collaborative:
 - Ensured any perspective or viewpoint was heard
 - Each response received was respected and not freely edited
 - Final list shared with workshop participants before the workshop
 - Final workshop results reviewed/validated by industry participants
- Finding acceptable solutions that all members can support:
 - Ranking/prioritization of workplace risk factors is done using *Worker* and *Employer* votes only.
 - Process was NOT about consensus, although the results demonstrate a significant degree of convergence



Risk Assessment Workshop: Attendees

Subject Matter Experts (SME)		
#	Name	Company/Representative
1	Joe Beckett	Cascades CP - Vaughan
2	Doug Rajah	Moore Packaging Barrie
3	Maggie Barber	Cascades CP - Guelph
4	Norman Antonio	Atlantic Packaging Brampton
5	Peter Stamcos	Atlantic Packaging Midwest
6	Mike Fitzpatrick	Cascades CP – Vaughan
7	Chris Dale	Atlantic Packaging – Brampton
8	Darrell Hamlyn	Atlantic Packing - Corporate

Workshop Participants		
#	Name	Company/Representative
1	Tom Welton	Workplace Safety North
2	Jerry Traer	Workplace Safety North Facilitator
3	Tiana Larocque	Workplace Safety North Tech Support
4	Tricia Valentim	Workplace Safety North Tech Support

Worker Representative

Employer Representative

Risk Assessment Workshop: Event Categories

1. Lockout/Tagout
2. Struck by Equipment
3. Ergonomics
4. Guarding
5. Improper Storage
6. Training
7. Occupational Illness
8. Employee Turnover

Risk Assessment: Likelihood

LIKELIHOOD	DESCRIPTION
Almost Certain [5]	Unwanted event is almost certain to happen in the next year [or 90% or greater chance of occurrence]
Very Likely [4]	High probability for unwanted event to occur in the next year [or between 50%-90% chance of occurrence]
Likely [3]	It is possible for unwanted event to occur in the next year [or between 20%-50% chance of occurrence]
Unlikely [2]	Low probability for unwanted event to occur in the next year [or between 5%-20% chance of occurrence]
Rare [1]	Very low probability for unwanted event to occur in the next year [or less than 5% chance of occurrence]

Risk Assessment: Consequence

CONSEQUENCE	DESCRIPTION
Extreme [5]	Fatality or Permanent Disability [or extreme impact/importance]
Major [4]	Serious Event/ Critical Injury or Critical Illness [or major impact/importance]
Moderate [3]	Temporary Disability (Lost Time): Injury/Illness [or moderate impact/importance]
Minor [2]	First Aid Treatment (No Lost Time) [or minor impact/importance]
Low [1]	No injury or Illness [or negligible impact/importance]

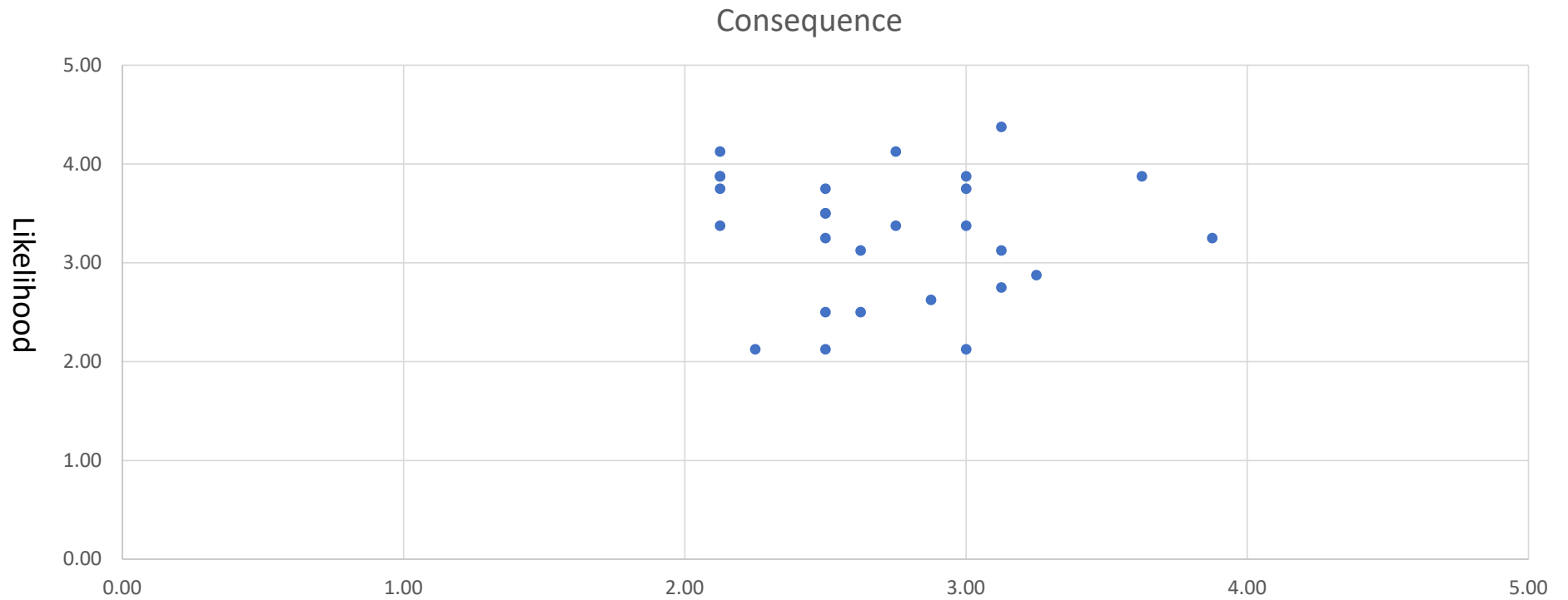
Risk Assessment: Prioritize Risks

- The purpose of this stage is to assess the level of risk and establish risk priorities
- Risk, which is the average Likelihood (L) multiplied by the average Consequence (C) for each event, then categories with respective risk rankings using the Risk Matrix(Heat Map)

	Almost Certain (5)	5	10	15	20	25
	Very Likely (4)	4	8	12	16	20
	Likely (3)	3	6	9	12	15
	Unlikely (2)	2	4	6	8	10
	Rare (1)	1	2	3	4	5
		Low (1)	Minor (2)	Moderate (3)	Major (4)	Extreme (5)
		Consequence				
Likelihood						

Risk Matrix Result	Risk Rating
20 to 25	Critical
12 to 16	High
5 to 10	Moderate
1 to 4	Low

Risk Assessment: Heat Map



Corrugated Sector Risk Assessment: Top 10 of 27 Identified Risks

Rank	Category	Event (Situation/Condition) that could result in Injury or Illness OR What could keep you up at night?	Risk				Risk
			L	sd-L	C	sd-C	
1	Lockout/tag-out	INADEQUATE LOCK-OUT/TAG-OUT RESULTING IN INJURY	3.63	1.06	3.88	0.35	14.05
2	Struck by equipment	PEDESTRIAN STRUCK BY MOBILE EQUIPMENT	3.13	0.99	4.38	0.52	13.67
3	Ergonomics	ERGONOMICS – INJURIES TO EMPLOYEES	3.88	0.83	3.25	0.46	12.59
4	Guarding	Inadequate guarding (equipment that's older with outdated guarding)	3.00	1.07	3.88	0.64	11.63
5	Struck by equipment	IMPROPER PEDESTRIAN/MOBILE EQUIPMENT INTERACTION	2.75	0.46	4.13	0.99	11.34
6	Improper storage	PAPER ROLL & INVENTORY STORAGE (WOOD PALLETS, FINISHED GOODS)	3.00	0.76	3.75	0.89	11.25
7	Struck by equipment	CAUGHT IN OR STRUCK BY STATIONARY EQUIPMENT (LEADING TO FALLS AND CRUSH)	3.00	0.53	3.38	0.74	10.13
8	Training	CONTRACTOR PROGRAM TRAINING AND INADEQUATE COMPLIANCE	3.13	0.99	3.13	0.35	9.77
9	Lockout/tag-out	Incomplete due to design constraints (equipment issues and process issues)	2.50	0.53	3.75	0.46	9.38
10	Occupational illness	OCCUPATIONAL ILLNESS (REPETITIVE STRAIN INJURY)	3.25	0.89	2.88	0.35	9.34

Worker vs. Workshop Results: Top 10 comparison

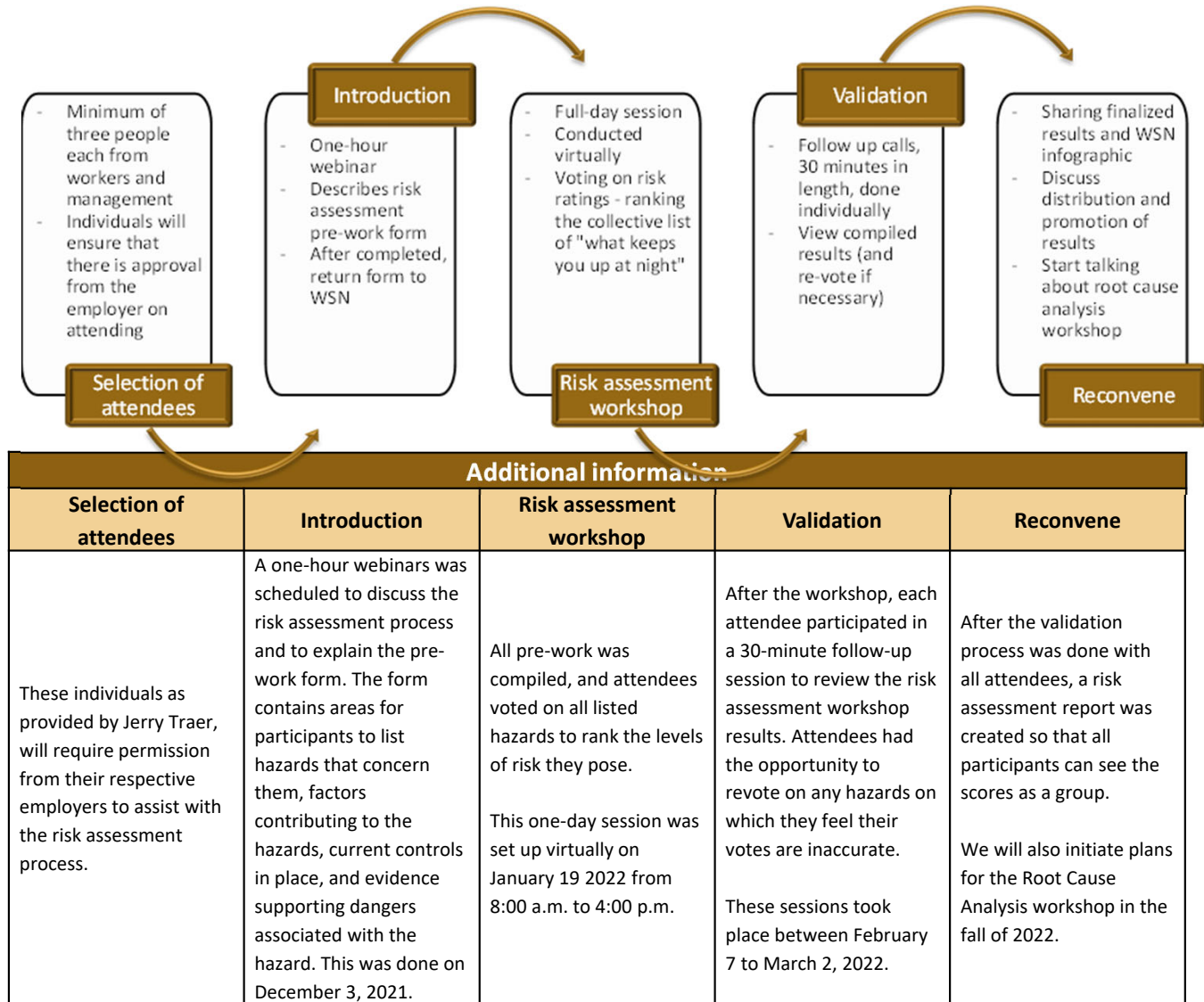
Worker top 10				Workshop results			
#	Category	Event (Situation/Condition) that could result in Injury or Illness OR What could keep you up at night?	RISK	#	Category	Event (Situation/Condition) that could result in Injury or Illness OR What could keep you up at night?	RISK
1	Struck by equipment	PEDESTRIAN STRUCK BY MOBILE EQUIPMENT	13.68	1	Lockout/tag-out	INADEQUATE LOCK-OUT/TAG-OUT RESULTING IN INJURY	14.05
2	Lockout/tag-out	INADEQUATE LOCK-OUT/TAG-OUT RESULTING IN INJURY	13.60	2	Struck by equipment	PEDESTRIAN STRUCK BY MOBILE EQUIPMENT	13.67
3	Ergonomics	ERGONOMICS – INJURIES TO EMPLOYEES	12.92	3	Ergonomics	ERGONOMICS – INJURIES TO EMPLOYEES	12.59
4	Guarding	Inadequate guarding (equipment that's older with outdated guarding)	12.32	4	Guarding	Inadequate guarding (equipment that's older with outdated guarding)	11.63
5	Improper storage	PAPER ROLL & INVENTORY STORAGE (WOOD PALLETS, FINISHED GOODS)	12.32	5	Struck by equipment	IMPROPER PEDESTRIAN/MOBILE EQUIPMENT INTERACTION	11.34
6	Struck by equipment	IMPROPER PEDESTRIAN/MOBILE EQUIPMENT INTERACTION	10.88	6	Improper storage	PAPER ROLL & INVENTORY STORAGE (WOOD PALLETS, FINISHED GOODS)	11.25
7	Struck by equipment	CAUGHT IN OR STRUCK BY STATIONARY EQUIPMENT (LEADING TO FALLS AND CRUSH)	10.20	7	Struck by equipment	CAUGHT IN OR STRUCK BY STATIONARY EQUIPMENT (LEADING TO FALLS AND CRUSH)	10.13
8	Training	LACK OF TRAINING (NEW WORKERS)	10.08	8	Training	CONTRACTOR PROGRAM TRAINING AND INADEQUATE COMPLIANCE	9.77
9	Training	CONTRACTOR PROGRAM TRAINING AND INADEQUATE COMPLIANCE	9.60	9	Lockout/tag-out	Incomplete due to design constraints (equipment issues and process issues)	9.38
10	Lockout/tag-out	Not jogging/testing (not following alternate safe work practices - ASWPs - allowing for operator interactions without full lockout - intermediate energy state)	9.60	10	Occupational illness	OCCUPATIONAL ILLNESS (REPETITIVE STRAIN INJURY)	9.34

Employer vs. Workshop Results: Top 10 comparison

Employer top 10				Workshop results			
#	Category	Event (Situation/Condition) that could result in Injury or Illness OR <i>What could keep you up at night?</i>	RISK	#	Category	Event (Situation/Condition) that could result in Injury or Illness OR <i>What could keep you up at night?</i>	RISK
1	Lockout/tag-out	INADEQUATE LOCK-OUT/TAG-OUT RESULTING IN INJURY	15.89	1	Lockout/tag-out	INADEQUATE LOCK-OUT/TAG-OUT RESULTING IN INJURY	14.05
2	Struck by equipment	PEDESTRIAN STRUCK BY MOBILE EQUIPMENT	14.67	2	Struck by equipment	PEDESTRIAN STRUCK BY MOBILE EQUIPMENT	13.67
3	Ergonomics	ERGONOMICS – INJURIES TO EMPLOYEES	14.44	3	Ergonomics	ERGONOMICS – INJURIES TO EMPLOYEES	12.59
4	Struck by equipment	IMPROPER PEDESTRIAN/MOBILE EQUIPMENT INTERACTION	11.00	4	Guarding	Inadequate guarding (equipment that's older with outdated guarding)	11.63
5	Occupational illness	OCCUPATIONAL ILLNESS (REPETITIVE STRAIN INJURY)	10.00	5	Struck by equipment	IMPROPER PEDESTRIAN/MOBILE EQUIPMENT INTERACTION	11.34
6	Guarding	Inadequate guarding (equipment that's older with outdated guarding)	9.78	6	Improper storage	PAPER ROLL & INVENTORY STORAGE (WOOD PALLETS, FINISHED GOODS)	11.25
7	Improper storage	PAPER ROLL & INVENTORY STORAGE (WOOD PALLETS, FINISHED GOODS)	9.78	7	Struck by equipment	CAUGHT IN OR STRUCK BY STATIONARY EQUIPMENT (LEADING TO FALLS AND CRUSH)	10.13
8	Training	CONTRACTOR PROGRAM TRAINING AND INADEQUATE COMPLIANCE	9.33	8	Training	CONTRACTOR PROGRAM TRAINING AND INADEQUATE COMPLIANCE	9.77
9	Struck by equipment	CAUGHT IN OR STRUCK BY STATIONARY EQUIPMENT (LEADING TO FALLS AND CRUSH)	8.89	9	Lockout/tag-out	Incomplete due to design constraints (equipment issues and process issues)	9.38
10	Occupational illness	OCCUPATIONAL ILLNESS (HEARING LOSS)	8.89	10	Occupational illness	OCCUPATIONAL ILLNESS (REPETITIVE STRAIN INJURY)	9.34

Appendix A

The Risk Assessment Process



Appendix B: Risk Assessment Processes/Standards

1. Bayesian Analysis
2. Bow-tie analysis
3. Brainstorming (e.g. what-if)
4. Business impact analysis
5. Cause and effect analysis
6. Checklists
7. Computer Hazard and Operability Studies (CHAZOP)
8. Consequence Analysis (also called Cause-Consequence Analysis)
9. Likelihood/Consequence matrix
10. Construction Hazard Assessment and Implication Review (CHAIR)
11. Decision tree
12. Delphi technique
13. Energy Barrier Analysis (or Energy Trace Barrier Analysis)
14. Environmental risk assessment
15. Event tree analysis
16. Failure Mode and Effect Analysis (FMEA)
17. Failure mode, effect and criticality analysis
18. Fault Tree Analysis
19. Fishbone (Ishikawa) Analysis

Risk Management Standards:

1. Risk Management Principles and Guidelines (ISO 31000:2009)
2. Risk Assessment Techniques (ISO/IEC 31010:2009)
3. OH&S Hazard Identification and Elimination and Risk Assessment and Control (CSAZ1002)
4. Process Safety Management (CSA Z767-17)
5. Enterprise Risk Management (COSO 2004)



20. Hazard analysis and critical control points
21. Hazard and Operability studies (HAZOP)
22. Human reliability analysis
23. Job Safety Analysis (JSA)
24. Level of Protection Analysis (LOPA)
25. Markov analysis
26. Monte Carlo
27. Preliminary Hazard Analysis (PHA)
28. Reliability centered maintenance
29. Scenario analysis
30. Sneak circuit analysis
31. Structured/semi-structured interviews
32. SWIFT (i.e. structured what-if)
33. Systemic Cause Analysis Technique (SCAT)
34. Human Error Analysis (HEA)
35. Workplace Risk Assessment and Control (WRAC)

6. Global Minerals Industry Risk Management (GMIRM)
7. International Council on Mining & Metals (ICMM)

* Not an exhaustive list

Appendix C: Contacts

For additional information or questions, please contact:

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