

Rank	Primary Root-Cause	Controls
1	<b>Existing procedures not based on a formal risk assessment process</b>	<ul style="list-style-type: none"> <li>a. Have a formal risk management framework for the development of operational procedures (E.g. Job safety analysis, FMEA, etc.)</li> <li>b. Formal framework to review old/outdated procedures using risk management process in consultation with JHSC or worker health and safety rep</li> <li>c. Convince leadership and workers (everyone) for the need to get older procedures into the risk management fold</li> <li>d. HSAs to provide risk assessment facilitation training</li> </ul>
2	<b>Acceptance to operate poorly maintained equipment</b>	<ul style="list-style-type: none"> <li>a. Build in a safety factor into all incentive (money) programs</li> <li>b. Education/awareness of risks of using sub-standard equipment vs a good one</li> <li>c. Sharing and learning of past examples/incidents to account for "it cannot happen to me" attitudes</li> <li>d. Role of the HSAs to bring lessons/lessons learned to industry (it should not take MOL blitz plans to stir HSA proactive action)</li> <li>e. Sharing maintenance requirements on tolerance on equipment standards</li> <li>f. Having requirements for line management on job observations</li> <li>g. Senior leadership should drive safety culture ("Culture starts at the top")</li> <li>h. Having all personnel understand cost implications on poorly operated/maintained equipment</li> <li>i. Ensure maintenance programs exist in all workplaces</li> </ul>
3	<b>Lack of a mature risk management culture at the workplace</b>	<ul style="list-style-type: none"> <li>a. Educate and involve all workplace parties in the power and the fundamentals of risk assessment and management</li> <li>b. Train people on risk management facilitation</li> <li>c. Provide risk assessment guidelines</li> <li>d. Better capability of HSAs to provide support on risk assessments</li> <li>e. Make task risk assessment routine work considering the hierarchy of controls</li> <li>f. Proper lineups allow the task hazards and controls to be identified</li> <li>g. Work permit controlling traffic flow to minimize risk of motor vehicle contacting worker</li> <li>h. Senior leadership action should drive safety culture through employee engagement and buy-in</li> </ul>
4	<b>People tampering with safety devices (E.g. Bypass whisker switch)</b>	<ul style="list-style-type: none"> <li>a. Engineering out ability to tamper (make it tamper-proof)</li> <li>b. Zero-tolerance on such activities by worker or supervisor (everyone)</li> <li>c. Tampered device should warrant investigation as to why there was a need to "tamper"</li> <li>d. Proper training and lockout training as pertains to mobile equipment</li> <li>e. MOL enforcement: add ticket to tampering of safety devices</li> <li>f. Safety devices should be included in equipment maintenance schedule</li> <li>g. Post-op of the equipment</li> <li>h. Formal reporting system that identifies defective safety devices</li> </ul>

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5	Insufficient line of sight	<ul style="list-style-type: none"> <li>a. Consider "line of sight" in mine design/road design/building design</li> <li>b. Consider optimal line of sight during procurement of equipment</li> <li>c. Encourage OEMs to interactively consider line of sight in their products</li> <li>d. Integrate proximity detection technologies (e.g. Using artificial intelligence)</li> <li>e. Management of Change (MOC) process for adding anything to equipment that could impact line of sight</li> <li>f. Risk assessment of operating environment/changes to the operating environment</li> <li>g. Review line of sight evaluation on equipment ensuring it is incorporated in operator training</li> <li>h. Maintenance personnel should be cognizant of line of sight issues</li> <li>i. Line of sight education/training to everybody (not just the operator)</li> <li>j. HSAs to be more proactive for line of sight issues</li> <li>k. Increase the visibility of smaller vehicles through the use of light shining at the back (e.g. blue lights adopted in Sudbury)</li> <li>l. Use of personal strobes</li> <li>m. Restricting access to work area</li> <li>n. Signage should be standardized and durable</li> </ul>
6	Lack of noise (electric or battery equipment)	<ul style="list-style-type: none"> <li>a. Traffic management program should take into consideration hazards associated with equipment that do not generate a lot of noise</li> <li>b. Risk assessment should include hazards associated with equipment that do not generate a lot of noise</li> <li>c. Consider engineering strobe lights on such vehicles/equipment</li> <li>d. Proximity detection in specific areas</li> <li>e. Encourage OEMs to work with each other to factor in hazards associated with equipment that do not generate a lot of noise</li> </ul>
7	Risk Assessment did not capture unwanted risks	<ul style="list-style-type: none"> <li>a. "Real-life" validation of residual risk and controls by the end-user</li> <li>b. Training in risk assessment and hazard identification</li> <li>c. Ensure the right people are involved in the process</li> <li>d. Training in risk facilitation</li> <li>e. Report near-miss data to incorporate into risk assessment analysis</li> <li>f. Tangible results on operations based on risk assessments (closing the loop on the risk management cycle)</li> <li>g. Better analytics to feed into risk assessments</li> <li>h. Better data and analytics to reduce subjectivity</li> <li>i. Better capability of HSAs to provide support on risk assessments</li> <li>j. Maintain an active "risk register" (constantly being updated)</li> <li>k. Integrate risk assessment analysis into a functional system (e.g. Intalex) where people can access the information and act accordingly</li> <li>l. MOC process includes updating the risk register</li> </ul>
	Personnel not adhering to traffic	<ul style="list-style-type: none"> <li>a. Develop a risk-based traffic management plan</li> <li>b. Communication and monitoring of the traffic management plan to personnel</li> <li>c. Awareness on the requirements of the traffic management plan and how it specifically impacts the worker</li> </ul>

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8	Personnel not adhering to traffic management rules	<ul style="list-style-type: none"> <li>d. Monitor and ensure compliance with the traffic management plan</li> <li>e. Understand protocols when working close to rail lines</li> <li>f. Proper orientation of external personnel (e.g. contractors) with respect to the traffic management plan</li> <li>g. Workplaces enforce non-compliance to traffic management rules</li> </ul>
9	Personnel not reporting workplace conditions (i.e. hazards & near-misses)	<ul style="list-style-type: none"> <li>a. Functioning IRS that encourages reporting</li> <li>b. Proper training in hazard/near-miss identification</li> <li>c. Develop a "stop and correct" program</li> <li>d. Create a culture to "stop and correct/report" unsafe conditions as part of the "stop and correct/report" program</li> <li>e. Opportunity with the HSAs to show examples of an empowered workplace</li> <li>f. Ensure a simple process for reporting is in place.</li> <li>g. Build in a safety factor into all incentive (money) programs</li> </ul>
10	Lack of traffic management policies & procedures	<ul style="list-style-type: none"> <li>a. Have a formal risk management framework for the development of traffic management policies &amp; procedures</li> <li>b. Get the HSAs to provide training to help industry develop traffic management policies &amp; procedures</li> <li>c. Understand the expectations of a traffic management program (e.g. MOL guideline)</li> </ul>
11	Lack of controls preventing interaction of worker & motor vehicle	<ul style="list-style-type: none"> <li>a. Conduct a risk assessment on the interactions of workers &amp; motor vehicles</li> <li>b. Improve controls to account for residual risks</li> <li>c. Monitoring of controls for adequacy</li> <li>d. Proximity detection system</li> <li>e. Restricted access protocols</li> <li>f. Lineups to include information related to traffic management</li> <li>g. Proper orientation of existing controls to personnel (not knowing about the control can mean absence of control to the worker)</li> <li>h. Work planning to minimize interaction of motor vehicle with worker</li> </ul>
12	Inability to measure compliance with traffic management program	<ul style="list-style-type: none"> <li>a. Clarity on definition of what a traffic management program is (MOL guidance)</li> <li>b. Recommend monitoring through MOL guideline development on traffic management</li> <li>c. Conduct risk assessments to identify workplace hazards and corresponding measureable controls (compliance with Reg. 854: 5.1, 5.2, 5.3)</li> <li>d. Consider how to measure effectiveness when developing controls</li> <li>e. Guidance from HSA</li> <li>f. Audit of traffic management program</li> <li>g. Scheduled inspections and observations</li> <li>h. Review of traffic management plan (alignment with MOL requirements)</li> </ul>
13	Not fit for duty	<ul style="list-style-type: none"> <li>a. Establish "fit-for-duty" requirements (e.g. Cognitive Ability Testing such as Occupational safety Performance Assessment Test – OSPAT)</li> <li>b. Task rotation</li> <li>c. Having a comprehensive Employee Assistance Program</li> <li>d. Training program to raise awareness of signs of fatigue and drug and alcohol intoxication, and appropriate responses/control</li> </ul>

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13	Not fit for duty	<ul style="list-style-type: none"> <li>e. Training of the workforce in life style programs for fatigue, misuse and abuse of alcohol and other drugs, stress, depression, etc.</li> <li>f. Mental health first-aid awareness training</li> <li>g. Fatigue management program (e.g. tests like rapid eye movement test, sleep test, rest, wakefulness assessment, sleep apnoea test)</li> <li>h. Case management: managing worker restrictions, accommodations, return-to-work program</li> </ul>
14	Dysfunctional I.R.S.	<ul style="list-style-type: none"> <li>a. Clear definition and understanding of IRS</li> <li>b. Management and worker commitment to IRS</li> <li>c. Identify indicators to monitor IRS (e.g. closure of worker concerns)</li> <li>d. HSA support (e.g. climate assessment and audit tool)</li> <li>e. Health and safety training for worker and supervisor including ongoing training and training for new workers</li> <li>f. JHSC and worker health and safety representative "health and safety training"</li> <li>g. Senior leadership action should drive safety culture through employee engagement and buy-in</li> <li>h. Supervisor getting core skills to support building healthy workplace relationships (e.g. mentoring, coaching, inclusion into common core, etc.)</li> </ul>
15	Lack of MOL targeted enforcement	<ul style="list-style-type: none"> <li>a. Mining inspectors trained in the fundamentals of risk assessment</li> <li>b. Sector-based risk assessment should feed into the SAWO and Prevention strategies</li> <li>c. MOL proactive enforcement should be targeted and based on risk</li> </ul>
16	Not following traffic management policies & procedures	<ul style="list-style-type: none"> <li>a. Auditing of policies &amp; procedures including effectiveness, "readability"</li> <li>b. Formal job observations to verify policies &amp; procedures</li> <li>c. Appropriate &amp; effective training on polices &amp; procedures. Tracking of this training required</li> <li>d. Regular requirement for the procedures to be reviewed by the workforce including contractors</li> <li>e. Tracking of review of the procedures at the worker and supervisor level</li> <li>f. A guideline from MOL on TM program (being completed now)</li> <li>g. Better understanding of a "management program" (see MOL guideline). Just a bunch of criteria does not help</li> <li>h. Better communication on material available through MOL and HSAs</li> <li>i. Awareness programs available through CROSH</li> <li>j. Alternative procedures for non-routine event (E.g. Blue light broken, so what is the alternative control or process to put the new control in place?)</li> </ul>
17	Non-reporting of near-misses	<ul style="list-style-type: none"> <li>a. Clarity on what a near-miss is at the worksite</li> <li>b. Clarity on what a high-potential incident is (often confused with near-misses)</li> <li>c. More understanding on the value of root-cause analysis of near-miss incidents, especially those that don't result in fatalities</li> <li>d. Feedback on the results of the root-cause analysis</li> <li>e. Appropriate response so that it is not undue discipline (E.g. Better reconciliation between drug-testing and reporting of near-miss incidents)</li> <li>f. Good training on policies &amp; procedures on high-risk tasks</li> <li>g. Zero-tolerance and education on bullying and harassment</li> </ul>
		<ul style="list-style-type: none"> <li>a. Collision avoidance systems</li> </ul>

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18	<b>Poor operator visibility</b>	<ul style="list-style-type: none"> <li>b. Traffic management plan</li> <li>c. Proper risk assessment</li> <li>d. Training the general workforce on line-of-sight through interactive training (live or simulated)</li> <li>e. Equipment (E.g. Cab) maintenance</li> <li>f. Good maintenance program for high-visibility equipment/clothing</li> <li>g. Procurement of equipment to ensure operator visibility is taken into consideration</li> <li>h. Vendor education and collaboration (E.g. Equipment design)</li> <li>i. Management of Change (MOC) processes to avoid visibility issues</li> <li>j. Operator visibility/equipment clearances factored into mine designs</li> </ul>
19	<b>No management of change (M.O.C) process</b>	<ul style="list-style-type: none"> <li>a. Understand what triggers a MOC</li> <li>b. Recognize what a change is, do a risk assessment to evaluate the complexity</li> <li>c. Add in a requirement for a MOC process in regulation</li> <li>d. Develop a guideline (MOL &amp; HSAs) to assist stakeholders to understand MOC process</li> <li>e. Have the HSAs provide assistance in establishing and evaluating an MOC process</li> </ul>
20	<b>Not accustomed to new technology</b>	<ul style="list-style-type: none"> <li>a. Establish a MOC process to acquaint people of the new technology, hazards and the risks</li> <li>b. Appropriate training and information for workers on the new technology</li> <li>c. Review process/feedback/back analysis on any new technology being used</li> <li>d. Proper integration into the plant or process</li> </ul>
21	<b>Lack of information from MOL (E.g. Incident reports, hazards)</b>	<ul style="list-style-type: none"> <li>a. Sector-based information that may provide information to reduce injury should be treated differently than general public-facing information</li> <li>b. Developing and dissemination quickly information on criticals, fatalities and serious incidents</li> <li>c. Centralized database providing more information</li> <li>d. Best practices on accident/incident alerts</li> <li>e. Developing a process within the mining program in MOL to establish and disseminate information expeditiously</li> </ul>
22	<b>No management of change (M.O.C) process</b>	<ul style="list-style-type: none"> <li>a. Understand what triggers a MOC</li> <li>b. Recognize what a change is, do a risk assessment to evaluate the complexity</li> <li>c. Add in a requirement for a MOC process in regulation</li> <li>d. Develop a guideline (MOL &amp; HSAs) to assist stakeholders to understand MOC process</li> <li>e. Have the HSAs provide assistance in establishing and evaluating an MOC process</li> </ul>
23	<b>Lack of clarity of Regulation 854</b>	<ul style="list-style-type: none"> <li>a. Ensure guideline for TM program developed and approved and made available</li> <li>b. Providing adequate training to the inspectors with respect to the intention of the Reg.</li> <li>c. Review of the applicable mobile equipment sections by MOL and Section 21 (for possible updating and development of guidance)</li> <li>d. Explore additional webinars and collaboration with MOL/WSN to provide information outside of the blitz process; prioritize towards high risk hazards and enforcement activities</li> <li>e. Inform stakeholders of the process related to webOHS responses</li> </ul>

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24	<b>Lack of worksite-specific traffic management program</b>	<ul style="list-style-type: none"> <li>a. Ensuring TM program is operationalized to each site as applicable</li> <li>b. Providing instruction where required</li> <li>c. Site orientation policies and programs should take into consideration aspects of the TM program</li> </ul>
25	<b>Inability to compare local mobile incidents to mining sector in Ontario</b>	<ul style="list-style-type: none"> <li>a. WSN mobile equipment TAC and other HSAs look at identifying trends for mobile incidents and disseminating the information (E.g. near-misses, tire failures, vehicles going out of control, remote incidents, etc.)</li> <li>b. Developing and dissemination quickly information on mobile incidents</li> <li>c. HSAs develop centralized database providing more information related to mobile incidents</li> <li>d. Best practices on accident/incident alerts related to mobile incidents</li> </ul>
		<ul style="list-style-type: none"> <li>a. Reliance on MOC to determine appropriateness (correct equipment, correct design) of the equipment</li> <li>b. Procurement of equipment to ensure operator input is taken into consideration</li> <li>c. Vendor/OEM education and collaboration (E.g. Equipment design)</li> </ul>

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26	<b>Poor equipment design</b>	<ul style="list-style-type: none"> <li>d. Developing a protocol for commissioning and pre-commissioning reviews with the equipment manufacturers</li> <li>e. Having manufacturers provide a higher consideration for health and safety in the design of the equipment in consultation with industry</li> <li>f. Consider after-market OEM/other OEM options to improve upon recognition of poor design (i.e. camera)</li> <li>g. Perform standard job tasks/job observations or assessments with a focus on the operator to identify design issues</li> <li>h. Use OMA mobile committee to focus on design issues and relay information back to OEMs</li> <li>i. Adapt the workplace to account for poor equipment design (E.g. Use of candy canes, flags, whips for greater visibility) and ensuring the effectiveness of the control</li> </ul>
27	<b>Inability to measure effectiveness of controls in traffic management program</b>	<ul style="list-style-type: none"> <li>a. Develop a process for review of the effectiveness of controls within TM program (E.g. Speed limits, traffic control signage, right of way, ramp protocols, barricades, etc.)</li> <li>b. Define person/s (process owner) responsible for implementation of controls within the TM program</li> <li>c. Define person/s (process owner) responsible to measure the effectiveness of controls within the TM program</li> </ul>
28	<b>Infrastructure is intrusive to the operation of equipment (E.g. Air, water, electrical services, operation of vent doors)</b>	<ul style="list-style-type: none"> <li>a. Identify possible incompatibilities between infrastructure and equipment at the design stage</li> <li>b. Re-establish appropriate equipment to meet existing mine design</li> <li>c. Eliminate or modify existing intrusive infrastructure to accommodate the equipment</li> <li>d. Using MOC process to avoid environmental operational issues (level of complexity should be a function of the level of risk)</li> </ul>
29	<b>Lack of reporting near-miss or non-reportable events</b>	<ul style="list-style-type: none"> <li>a. Providing clarity on what a near-miss is at the worksite</li> <li>b. Providing clarity on what a high-potential incident is (often confused with near-misses)</li> <li>c. More understanding on the value of root-cause analysis of near-miss incidents, especially those that don't result in fatalities</li> <li>d. Feedback on the results of the root-cause analysis</li> <li>e. Appropriate response so that it is not undue discipline (E.g. Better reconciliation between drug-testing and reporting of near-miss incidents)</li> <li>f. Good training on policies &amp; procedures on high-risk tasks</li> <li>g. Zero-tolerance and education on bullying and harassment</li> </ul>
30	<b>Wrong tool for the job (E.g. Inadequate equipment)</b>	<ul style="list-style-type: none"> <li>a. Reliance on MOC to determine appropriateness (correct equipment, correct design) of the tool</li> <li>b. Procurement of equipment to ensure operator input is taken into consideration</li> <li>c. Vendor/OEM education and collaboration (E.g. Equipment design)</li> <li>d. Developing a protocol for commissioning and pre-commissioning reviews with the equipment manufacturers</li> <li>e. Having manufacturers provide a higher consideration for health and safety in the design of the equipment in consultation with industry</li> <li>f. Consider after-market OEM/other OEM options to improve upon recognition of poor design (i.e. camera)</li> <li>g. Perform standard job tasks/job observations or assessments with a focus on the operator to identify design issues</li> <li>h. Use OMA mobile committee to focus on design issues and relay information back to OEMs</li> <li>i. Greater emphasis on research &amp; development programs</li> </ul>
		<ul style="list-style-type: none"> <li>a. Make sure that roads are properly designed for the purpose of the application (E.g. grade, width, safety bays, berms, open pit situations, turning radius, traffic volume)</li> </ul>

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31	<b>Poor road conditions</b>	<ul style="list-style-type: none"> <li>b. Make sure the roads are properly maintained to avoid creating other hazards (E.g. overuse of water or calcium/dust suppressants, slippery conditions, washboarding)</li> <li>c. Road ballasts have the right size to remain effective</li> <li>d. Operating procedures (E.g. placement of stop signs/intersections, speed limits) to limit road damage</li> <li>e. Optimize the equipment to the size of the operation (E.g. One grader vs. Two)</li> </ul>
32	<b>High volume of traffic</b>	<ul style="list-style-type: none"> <li>a. Properly sizing the equipment to the operational requirements of the mine (E.g. tonnage, extraction rates)</li> <li>b. Optimizing traffic flow through a TM program</li> <li>c. Proper mine design to alleviate bottleneck situations/optimize materials handling systems</li> <li>d. Use of traffic monitoring technology to optimize flow</li> </ul>
33	<b>Lack of maintenance procedures for roads/ramps</b>	<ul style="list-style-type: none"> <li>a. Develop a road maintenance program to avoid creating hazards on your roads and ramps (including summer/winter maintenance programs)</li> <li>b. Make sure the roads are properly maintained to avoid creating other hazards (E.g. overuse of water or calcium/dust suppressants, slippery conditions, washboarding)</li> <li>c. Procuring and applying road ballasts that are sized to remain effective</li> <li>d. Proactive road inspections and ownership of maintenance</li> </ul>

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		<ul style="list-style-type: none"> <li>e. Developing operating procedures (E.g. placement of stop signs/intersections, speed limits) to limit road damage</li> <li>f. Procurement of equipment to the size of the operation (E.g. One grader vs. Two)</li> </ul>
34	Distracted driving	<ul style="list-style-type: none"> <li>a. Policy and enforcement programs prohibiting distracted driving</li> <li>b. Understanding relative severity of the different types of distractions</li> <li>c. Technology that assists in determining the level of operator alertness</li> <li>d. Understanding how technology (E.g. cab cameras, load meters) negatively affects the awareness of the operator</li> </ul>
35	Distracted worker on foot	<ul style="list-style-type: none"> <li>a. Limit the interaction of workers and equipment through traffic management</li> <li>b. Policy and enforcement programs prohibiting inappropriate use of cell phones, tablets</li> <li>c. Understanding relative severity of the different types of distractions</li> <li>d. Use of proximity detection equipment to alert workers of incoming danger</li> <li>e. Use of broadband backup alarms to alert workers of danger</li> <li>f. Requiring the establishment of safe zones for the use of cell phones, tablets, surveying equipment</li> </ul>
36	Not using equipment as per design, manufacturer's specifications or training	<ul style="list-style-type: none"> <li>a. Reliance on MOC to determine appropriateness (correct equipment, correct design) of the equipment and operational limits</li> <li>b. Emphasis on research &amp; development programs to engineer out unintended applications</li> <li>c. Procurement of equipment to ensure it is appropriate for its intended use</li> <li>d. Vendor/OEM provide education and limitations for proper use</li> <li>e. Developing policies, procedures and training for workers as per design and specification</li> <li>f. Perform standard job tasks/job observations or assessments with a focus on the operator use</li> <li>g. Design equipment such that it cannot be used for unintended applications (E.g. Caterpillar engine overspeed)</li> </ul>

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37	<b>Lack of equipment availability</b>	<ul style="list-style-type: none"> <li>a. Maintenance programs developed to maximize equipment reliability</li> <li>b. Adherence to the maintenance schedule</li> <li>c. Reliance on MOC to determine appropriateness (correct equipment, correct design) of the equipment</li> <li>d. Determine and ensure availability of critical spare parts</li> <li>e. Perform standard job tasks/job observations or assessments with a focus on the operator to identify proper use</li> </ul>
38	<b>Insufficient lighting</b>	<ul style="list-style-type: none"> <li>a. Reporting of poor lighting conditions, broken equipment (pre and post operational checks)</li> <li>b. Maintenance programs developed to ensure maintenance of lighting</li> <li>c. Adherence to the maintenance schedule</li> <li>d. Reliance on MOC to determine appropriateness and placement (correct equipment, correct design) of the lighting equipment</li> <li>e. Do a risk assessment to determine optimal lighting sources (E.g. Underground mine blue lights vs. strobe lights)</li> <li>f. Determine and ensure availability of critical spare parts</li> <li>g. Perform standard job tasks/job observations or assessments with a focus on the operator to identify proper use</li> <li>h. Encourage use of more LED lighting</li> <li>i. Determine areas where you may need supplemental lighting</li> <li>j. Light surveys for the adequacy of light</li> </ul>
39	<b>Lack of fatigue management</b>	<ul style="list-style-type: none"> <li>a. Develop Fatigue and Wellness programs (E.g. including mental health)</li> <li>b. Develop EAP</li> <li>c. Look at technological advances and fatigue monitoring (E.g. headband tracker, iPad cognitive testing, eye-tracking glasses)</li> <li>d. Tracking overtime work</li> <li>e. Optimize shift schedule</li> </ul>
40	<b>Expectation to operate poorly maintained equipment</b>	<ul style="list-style-type: none"> <li>a. I.R.S</li> <li>b. Job observation by the supervisor, line management</li> <li>c. Good maintenance programs</li> <li>d. Production targets need to be balanced based on equipment availability</li> <li>e. Design Production incentives</li> <li>f. Clarify what "poorly" actual means with respect to a Go-NoGo decision</li> <li>g. Identify the acceptance criteria for pre-op checklists</li> <li>h. Formal awareness of local culture (E.g. CAAT tool)</li> </ul>
41	<b>Lack of information from HSAs</b>	<ul style="list-style-type: none"> <li>a. Be more responsive to the needs of the industry (E.g. technical expertise)</li> <li>b. Explore additional webinars and collaboration with WSN to provide information outside of the blitz process; prioritize towards high risk hazards</li> <li>c. Proactive vision &amp; action based on risk thinking (E.g. Risk assessment, emerging hazards, control assessment &amp; development) for the sector</li> </ul>
42	<b>Inability to measure impairment (drugs &amp; alcohol)</b>	<ul style="list-style-type: none"> <li>a. Clarity on definition of "impairment"</li> <li>b. Benchmark against other sectors on impairment issues (E.g. Commercial public transportation)</li> <li>c. Clear &amp; well-communicated policies &amp; procedures on substance use (E.g. Drugs (including prescription) and alcohol</li> </ul>

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		d. Basic awareness training including how to recognize impairment
43	Lack of preventative maintenance program	a. Establish guidance on what makes up a robust maintenance program (E.g. Standards, best practices, recommendations from OEM, etc.) b. Define best practices for planning and scheduling c. Maintenance programs developed to maximize equipment reliability d. Discourage production priorities from overriding a maintenance program e. Adherence to the maintenance schedule f. Determine and ensure availability of critical spare parts g. Allocate appropriate resources for a maintenance program
44	Absence of appropriate signage	a. Proper maintenance of signs b. Proper information on the signs (no ambiguity/open to interpretation) c. Determine the genuine legitimacy of the signs (be clear on where you need a sign/no sign pollution) d. Adopt CSA standards on signs
45	Poorly maintained equipment	a. Maintenance programs developed to maximize equipment reliability b. Adherence to the maintenance schedule c. Reliance on MOC to determine appropriateness (correct equipment, correct design) of the equipment d. Determine and ensure availability of critical spare parts e. Perform standard job tasks/job observations or assessments with a focus on the operator to identify proper use f. Encourage reporting of poorly maintained equipment
46	Lack of implementation of detection technology	a. Further develop R&D to improve reliability and usability in actual worksite setting b. Advance infrastructure to help adapt to new technologies c. Transformation (e.g. Digitization) of mines should include health and safety d. Encourage collaboration of researchers with equipment manufacturers
47	Lack of information from suppliers, manufacturers	a. Explore additional webinars and collaboration with MOL/WSN to provide information outside of the blitz process; prioritize towards high risk hazards b. Establish a more inclusive Ontario roundtable to include system and industry partners (E.g. EMESRT: Earth Moving Equipment Safety Round Table as a model) c. Make available suppliers and manufacturers the results of the risk assessment and root-cause exercises & also ask for feedback
48	Breakdown in communication	a. Understanding and ability to recognize and communicate changing/changed conditions (day to day, shift to shift) b. Beginning of shift meetings (e.g. morning huddle) c. End of shift meetings d. Create the environment for communication to be optimized (e.g. at the shaft station) e. Use of technologies (e.g. tablets, Wi-Fi) to communicate f. Gain an understanding of the implications of using unauthorized communication forms (E.g. mobile phones) g. Understand the advantages and disadvantages of using radios vs mobile phones with respect to open or confidential information (availability of transcripts from radio communications)

Rank	Primary Root-Cause	Controls
49	<b>Excessive noise</b> (E.g. Fans, diesel equipment, drills, etc.)	a. Appropriate PPE
		b. Appropriate communication devices based on the noise in the workplace
		c. Use of text-based communication
		d. Proximity detection devices
		e. Increase visibility (e.g. use of candy canes, flags, whips, etc.)
		f. Engineering controls (e.g. silencers on fans)
50	<b>No appetite of change</b>	a. Better understanding of risk tolerances (E.g. risk assessments)
		b. Better education and training (understand the positive impacts of the change)
51	<b>Lack of worker buy-in on rules &amp; procedures</b>	a. Review those rules & procedures that have a lack of buy-in
		b. Provide context for the application of rules & procedures
		c. Better understanding of risk tolerances (E.g. risk assessments)
		d. Better education and training (understand the positive impacts of the rules & procedures)
52	<b>Loss of institutional knowledge</b>	a. Provide context for the application of rules & procedures (e.g. history of why rules are in place, past worker experience)
		b. MOC for capturing and documentation of change
		c. Having overlap between experience leaving and new recruits to maintain continuity
		d. Better education and training (understand the positive impacts of the rules & procedures)
53	<b>Lack of compatibility of equipment to changes/variability in mine design</b>	a. Forecasting when and where significant changes in mine design may be required (maintain your mine exploration program to the fullest extent possible)
		b. Reliance on MOC to determine appropriateness (correct equipment, correct design) of the equipment (e.g. gap analysis)
		c. Procurement of equipment to ensure compatibility to change of mine design
		d. Perform standard job tasks/job observations or assessments with a focus on the suitability of equipment to the environment
54	<b>Excessive lighting</b>	a. Reporting of excessive/inappropriate lighting conditions
		b. Light surveys for the adequacy of light
		c. Reliance on MOC to determine appropriateness and placement (correct equipment, correct design) of the lighting equipment
		d. Do a risk assessment to determine optimal lighting conditions
		e. Perform standard job tasks/job observations or assessments with a focus on the operator to identify proper use
55	<b>Manufacturers lack innovation</b>	a. Collective approach when dealing with manufacturers (E.g. mine operators approach manufacturers)
		b. Sharing amongst mining companies on ideas on innovation
		c. Involving manufacturers in risk assessments (E.g. "prevention through design")
56	<b>Not following maintenance procedures</b>	a. I.R.S
		b. Job observation by the supervisor, line management
		c. Good maintenance programs
		d. Better accessibility to maintenance procedures
		e. Production targets need to be balanced based on equipment availability
		f. Design production incentives

Rank	Primary Root-Cause	Controls
		g. Identify the acceptance criteria for pre-op checklists
57	<b>Inappropriate/inadequate procurement of equipment</b>	a. Reliance on MOC to determine correct equipment, correct design of the equipment b. Ensuring a procurement specialist is available to specify equipment to the mine design c. Forecasting procurement of equipment (types, specifications) based on life of mines and mine design d. Develop specific procedures for selecting proper equipment by the mine (E.g. Ensuring staff at various levels are consulted)
58	<b>Lack of high visibility clothing</b>	a. Ensure compliance to the regulation b. Proactive and reactive enforcement by MOL c. Procurement of clothing to ensure operator visibility and compliance d. Perform standard job tasks/job observations or assessments focusing on high visibility clothing e. Proper maintenance of high visibility clothing (E.g. bright orange is not bright after few washes, wear and tear, etc.) f. Education/training on maintaining high visibility clothing
59	<b>Inadequate budget for tools &amp; machines</b>	a. Budget in funds for health and safety aspects of mobile equipment