



Guidelines for Working Safely Around Stockpiles

Technical Report

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Guidelines for Working Safely Around Stockpiles

1. Objective

This guideline has been developed to assist companies who regularly create inventories of stockpiled materials, to create their own effective written working procedures to enhance employee awareness of hazards around stockpiles and to comply with current health and safety legislation.

2. Definitions

The following are generally accepted technical terms dealing with stockpiled material in the mining industry.

Stockpile Definitions

Angle of repose:

The angle at which material in a stockpile tends to remain at rest. Variables affecting the angle of repose include; material size, material consistency, water content, temperature, design and construction of the stockpile pad.

Barrier/ barricade:

An enclosure or wood, concrete, steel pipe or other material constructed to limit access by people or vehicles to designated areas.

Berm:

A hump of material built to limit travel of wheeled vehicles especially when backing up to dump over an edge.

Communication:

A system to enable workers, supervisors and others to talk with each other in the workplace. Radio is the most common technology for the purpose. Pedestrians may use hand signals to communicate with a vehicle operator or others.

Competent Person According to the OHSA:

A competent person means a person who is qualified because of knowledge, training and experience to organize the work and its performance, is familiar with the Act and the Regulations that apply to work and has knowledge of any potential or actual danger to health or safety in the workplace.

Consolidated Material:

Loose, soft, or liquid earth material that has become firm and coherent through drying, compaction and cementation.

Contractor:

A person (not an employee of the contracting company) or a company engaged under contract to perform specific work. Note: Under the Ontario OHSA, the contracting company is responsible for the health and safety of a contractor and its workers.

Conveyor:

A powered machine used to move and/or lift or lower loose material such as crushed stone or sand from one location to another.

Draw Hole:

A ground-level opening through which material is pushed or dumped to feed an underground conveyor. When not in use, draw holes must be guarded.

Emergency Procedure:

A written set of instructions for dealing with a critical situation. Both management and workers should be trained in the actions to be taken in the event of an emergency involving equipment or personnel or both. Outside agencies (police, fire, ambulance) should be contacted and aware of the procedure if required.

Excavation:

A cavity in a stockpile created by mechanically removing a quantity of material.

Frost Overhang:

Frozen material on the side or top of a stockpile may create a dangerous ledge when material below it is excavated. It may break off and create a run-of-material if disturbed or warmed. Falling or sliding chunks of frozen material have caused equipment damage and worker injury. On upper surfaces, frost overhangs may be mistaken for solid and secure footing for workers and vehicles.

Geotechnical Assessment:

The application of soil and rock mechanics principles to the assessment of ground stability for stockpiles.

Hopper:

A large elevated container, usually made of steel, holding a quantity of material. Usually incorporating a means of stopping or controlling the flow of material through a funnel in the bottom. Often used for loading trucks.

Inspection:

The act of visually and physically examining aspects of a workplace. Workplace inspections and their frequencies are prescribed under the Occupational Health and Safety Act and Regulations.

Loader:

A wheeled vehicle with a hydraulically-operated scoop bucket which can push, lift, transport and dump material such as sand or crushed stone. Available in various sizes and configurations.

Operator:

A person who has received specific training to drive a vehicle or run a machine.

PPE (Personal Protective Equipment):

Items to be worn by employees for the protection of head, ear, eye, hand and foot from injury. Fall restraint and fall arrest equipment may also be required in certain conditions. The provision, training, maintenance and use of PPE is a legislated requirement.

Procedure:

A standardized, written set of instructions for safely performing a specific task, also known as "standard operating procedures." To be reviewed and revised as required on a regular basis.

Run of material:

An unexpected collapse and flow of material such as crushed stone or sand such as may be experienced in the working face of a stockpile whose angle exceeds the material's "angle of repose."

Sample:

A portion of material from a stockpile taken to analyze particle size and consistency, moisture content or other factors.

Sampling Procedure:

A prescribed method for collecting samples from stockpiles. The safety of the worker should be the foremost consideration in developing a sampling procedure.

Signage:

A system of graphic symbols and/or words to inform or warn pedestrians or vehicle operators of unusual, specific or hazardous conditions in the workplace.

Site plan:

A graphic scaled depiction of a working site including explanatory notes. To be reviewed and revised as required.

Stockpile:

A man-made pile of loose natural or processed material (crushed stone, sand, etc.). Usually built in either a conical or linear format.

Stockpile pad:

A prepared surface on which a stockpile is built. Concrete and asphalt pavement are two common options. A solid, level pad is one critical element in maintaining stockpile stability.

Stockpile toe:

The lowest edge of a stockpile at the stockpile pad level.

Stockpile crest:

The highest extremity of a stockpile. This may be the point of a conical stockpile or the edge of the top surface of a flat stockpile.

Supervisor:

An employee who has authority over workers. The OHSA requires that a supervisor be "competent."

Surge pile:

A man-made collection of material built directly over a powered feeder or draw hole.

Unconsolidated material:

Earth material consisting of loosely coherent or uncemented particles.

Void:

A hole or opening inside a stockpile or surge pile usually occurring under some consolidated bridged material. Voids represent a major hazard for workers and equipment.

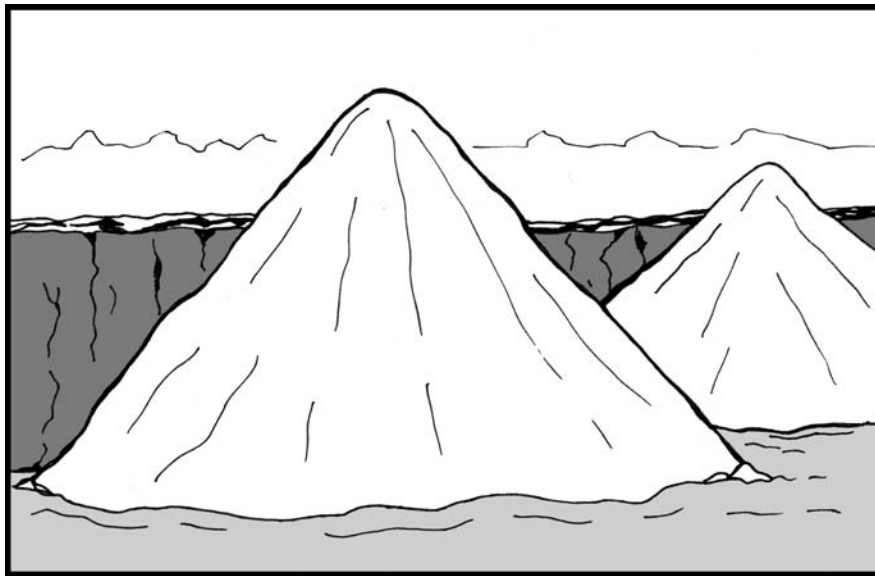
Working face:

The wall remaining after a loader has removed material from a stockpile. The angle of the working face may be greater than the material's "angle of repose." A "run of material" may occur if the working face breaks loose or is disturbed.

3. Angle of repose...the Golden Rule

A stockpile is said to be stable when the angle of its sides, relative to the pad on which it sits, matches the "angle of repose" for the material in the pile. The "angle of repose" depends on several conditions:

- the size and shape of the pieces of material in the stockpile (each type of sand or size of crushed stone has a different "angle of repose")
- the water content of the material
- the flatness and stability of the stockpile pad
- temperature (frozen stockpiles present exceptional hazards)
- snow and/or ice cover on stockpiles
- degree of compaction



4. Stockpiles as working hazards

Every year, workers are injured or killed when working on or around stockpiles. Large quantities of heavy material may suddenly be released from stockpiles when least expected and the energy generated in such a slide has the potential to seriously injure or kill workers and destroy equipment. Slides are most often released from stockpiles when the material remaining after an excavation is left at an angle greater than the "angle of repose" for that material. Heavy rain, freeze/thaw conditions and other factors may also increase the probability for a run-of-material.

5. Equipment for building stockpiles

The company typically uses truck dumping, dozers, loaders, conveyors or stackers to build stockpiles.

Loaders are most often used for filling trucks, although hoppers and conveyors may be used in some situations.

6. Training

Workers must be trained to recognize, assess and control workplace hazards. Legislated training programs provide the minimum standard. All production workers, employees of the company and contractors alike, must have successfully completed the Surface Miner Common Core program. They will also complete specialty training modules according to the type of work they do. Additional training should be provided as needed for equipment operators and other trades. The company's training program should use trainers qualified according to the Ministry of Training, Colleges and Universities, and the company must have a signing authority to keep training records and audit the program.

7. Postings, barriers and notices

Impending weather conditions (heavy rain, frost, snow, etc.) may affect the stability of stockpiles. The employer should ensure that all employees are made aware of how current weather conditions could affect the stability of stockpiles.

Copies of the company's official Health and Safety Policy along with copies of the Ontario Occupational Health and Safety Act, Regulation 854 (Mines and Mining Plants), Regulation 851 (Industrial Establishments), Regulation 213 (Construction Projects) and Regulation 1101 (First Aid) shall be posted.

Safety notices should be posted and should be maintained in a clean and readable condition at all times.

Barriers and berms are to be in place to prohibit entry of personnel or vehicles into restricted or hazardous areas. These are not to be breached, moved or modified in any way unless under the direct authority of a supervisor. Drivers of all vehicles must obey and follow all traffic procedures in the stockpile area.

"Where motor vehicles that restrict the view of the operator because of size or design are used, procedures to control and govern the movement of such vehicles, other vehicles and pedestrians shall be established." Regulation 854, Mines and Mining Plants, S.105(6)

8. The site plan

Where practical, a plan view drawing for the entire site should be posted and up-dated whenever any major change is made to structures, stockpiles or roadways. Aerial photographs may be used to identify characteristics of the site.

9. Laying out stockpiles

All stockpiles should be located in designated areas according to the site plan.

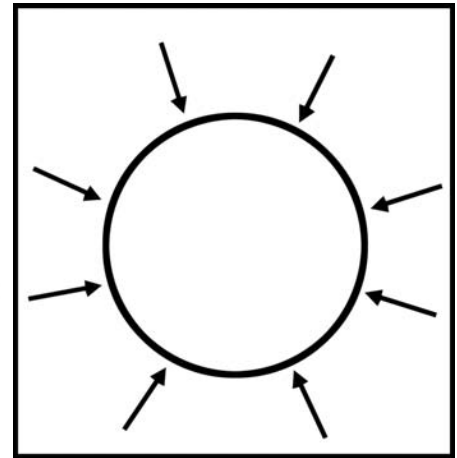
Pads for stockpiles should be prepared on level ground. Pads may be constructed of compacted earth, asphalt-paving or concrete according to the type and amount of material to be stored. Pads should be constructed to provide maximum drainage of rainwater.

Stockpiles should be situated to provide safe loading operations with access to all sides of conical piles and the full face of horizontal piles. Stockpiles should be maintained to prevent any flow of material onto roadways. Material dropped or spilled onto roadway surfaces should be removed immediately.

The maximum height of any stockpile should not exceed a specified height to be determined by a geotechnical assessment as performed by a qualified professional engineer.

As per S.61, Regulation 854, Mines and Mining Plants, stockpiles of unconsolidated material shall be inspected for hazardous conditions regularly by a competent person and made safe before a worker is allowed to work close to or on top of the stockpile. Bulk or packaged material shall be piled or stacked in a manner to prevent accidental movement or collapse.

When a tunnel is used under a stockpile for the purpose of reclaiming the material from the stockpile, at least two exits shall be provided for the tunnel.



10. Loading

Excavation of a linear stockpile will proceed along the working face.
Excavation of a conical stockpile shall proceed progressively around the toe of the pile.

The following Regulation speaks to mining from banks and faces. Though it does not apply directly to aggregate stockpiles, it does represent "best practice" for this work.

S.88, Regulation 854, Mines and Mining Plants states:
Where earth, clay sand or gravel is being removed from a surface mine by means of powered equipment the working face shall be sloped

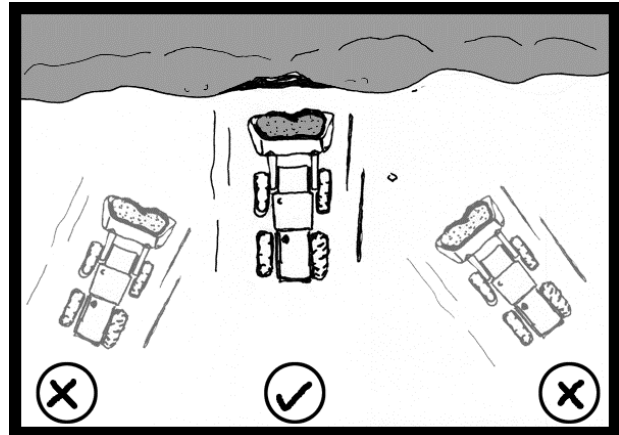
at the angle of repose or the vertical height of the working face shall not be more than 1.5 metres above the maximum reach of the equipment.

Where earth, clay, sand or gravel is being removed from a surface mine by means other than powered equipment, the working face shall be sloped at its angle of repose or the vertical height of the working face shall not be more than three metres.

No undercutting of the working face shall be permitted or done.

Except when mining operations are being actively pursued, benches and walls shall be sloped to less than the angle of repose.

When the maximum height of the excavation has been reached, the loading area and the top of the pile shall be cleared of all other vehicles. The loader will approach the working face at a right angle and excavate a vertical face allowing the material to run to the toe of the stockpile.





Excavations shall not undercut or leave a concave hollow in the material. Operators will not cut trenches or tunnels into the slope or leave any overhangs in frozen material.

No person is permitted to enter, on foot or in a vehicle, the loading area adjacent to the working face of a stockpile. Only the loader operator, who will remain in the cab of the machine at all times, may work in this area.

No loader operator or truck driver should leave the cab of their vehicle while loading is in

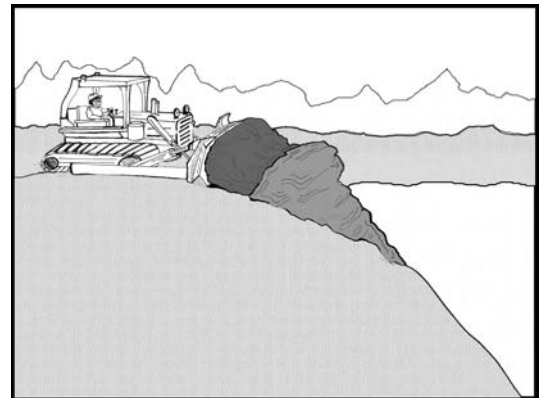
progress. Pedestrians are not permitted anywhere within an active loading area. Warning signs and barricades are to be used at all times to protect active loading areas.

11. Operations on top of a stockpile

Safe stockpile and dump techniques vary depending on the type of material handled and the type of equipment available.

Safe dumping methods include:

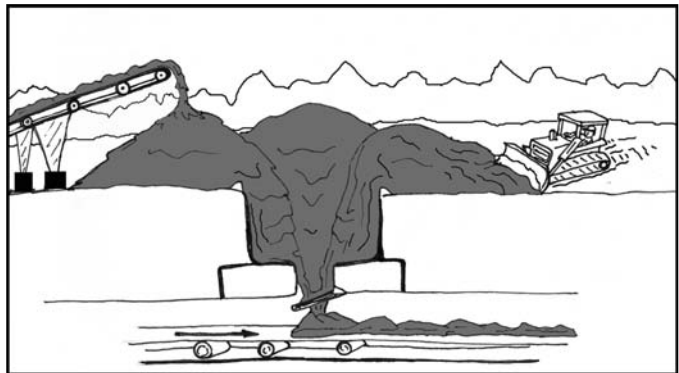
- Material must be dumped back from the crest of the pile since the edge may not support a loaded haul truck. Material should be pushed over the edge by a bulldozer or front-end loader using a "bumper" of material to keep the equipment at a safe distance from the edge.



- Loaders and bulldozers should always operate perpendicular (90 degrees) to the top edge of the stockpile or dump.
- Well-maintained berms should be placed along the edges of stockpile and dumps. The presence of a berm does not necessarily signify the edge is stable. Material may have been removed from the base of the pile or other movements of material may have occurred.
- Dumpsites should be inspected frequently for signs of slope instability (cracks, slumping on the slope, bulging at the toe). Supervisors should inspect on foot, to supplement the equipment operators' constant vigilance.
- Dump only in designated areas. If in doubt, drivers should contact their supervisor before dumping in any area or over the edge of a stockpile.
- Trucks must not dump at the top of the pile where the toe has been removed.

12. Surge piles

Surge piles are located directly over draw holes feeding material to underground powered feeders or conveyors. They can be particularly hazardous due to unstable material around the draw hole and the possibility of hidden voids under consolidated bridged material.



Mobile equipment shall not be operated directly over a draw hole.

Operators of bulldozers or loaders shall not push material directly into a draw hole. Material shall be bumped into place with a buffer of other material to keep the vehicle a safe distance back from the draw hole.

No pedestrian shall approach a draw hole or surge pile.
Unused draw holes and surge piles must be guarded.

If problems are encountered with a surge pile or draw hole (e.g. bridged material), the operator should park his vehicle a safe distance from the draw hole, remain in the cab and notify the supervisor for instructions or to have a supervisor visit the site for an inspection. No work shall take place at a draw hole until the underground equipment has been de-energized and lockout/tagout procedures instigated.

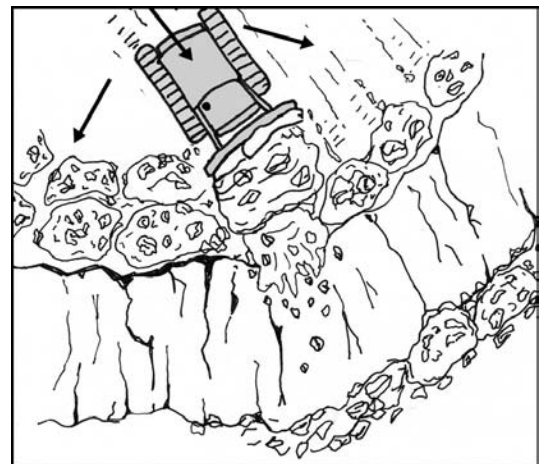
13. Dumping

Dump trucks must deposit materials at a safe distance from the crest of a stockpile. The material is then to be pushed over the crest with a bulldozer or loader using a bumper of material to avoid approaching too close to the crest.

Loaders and bulldozers must always approach the crest at 90 degrees to the edge.

Safety berms must be maintained along the edge of all stockpiles.

Dump locations must be inspected daily for signs of instability at the crest, runs of material, cracks on the slope or bulging at the toe of the stockpile.



Dump only in designated areas.

Do not dump onto part of a stockpile where the toe has been removed. Do not dump where another vehicle is loading from the toe.

14. Communication

All mobile equipment shall be provided with an installed communication system. All operators shall be trained in the use of the company's communication system and communication protocol. Refer to the company's policy and procedures for site communications.

15. Visibility

Visibility around large equipment is usually restricted and results in significant risks to workers. The Mining regulation s.263 (1) states that "effective illumination appropriate for the task shall be provided at all workplaces on surface, including, (a) in those adjacent to the workplace where workers are required to travel, and (b) in those circumstances where the nature of the equipment or the operation may create a hazard to a worker due to insufficient lighting.

All surface workers must wear high visibility material such as retro reflective or combined fluorescent and retro reflective materials that enables them to be seen. This material must be worn between sundown and sunup unless the area is provided with fixed lighting that allows the worker to be seen or the worker remains in a booth, vehicle cab or other protective enclosure.

Workers inside a cab or enclosure need not wear high visibility markings. However, workers who leave the confines of a protected booth, building or other protective structure during darkness and enter an area where mobile equipment is operating should wear reflective or fluorescent material at all times.

Operators should review the Mining regulation s.262(2) and 263(2)(3).

Pickup trucks and other small vehicles are often used by supervisors, surveyors and other personnel. These vehicles are not always easy to spot by operators of heavy equipment. Drivers shall notify heavy equipment operators to expect small vehicle traffic. Small vehicles, when stopped, must activate their emergency four-way flashers. Drivers are to remain in their vehicles until they have contacted and been seen by equipment operators.

Where appropriate, small vehicles should be painted in a distinctive, highly visible body colour. Retro reflective tape, signs, lights or other devices should be used to increase visibility especially under low light, night or adverse weather conditions. The use of "buggy-whips" with lights and/or flags at the top is recommended.



16. Stockpile sampling

Samples of stockpiled crushed rock material should only be taken by a loader or a backhoe using approved procedures.

Wherever possible, samples are to be taken using automatic sampling equipment.

No worker is permitted to climb stockpiles for any purpose. All employees shall wear high-visibility clothing provided for the purpose at all times.

Samples of sand may only be taken by hand from stockpiles whose slopes are less than the angle of repose. Samples must not be taken by hand from any working face. Samples taken from the top of a horizontal stockpile shall only be taken from a test pit located at a safe distance from the stockpile crest.

Samples shall only be taken from the excavator equipment and not from the excavated pit. Once sampling is completed, the test pit shall be filled to be level with the surface of the stockpile. Excavations made for the purpose of taking material samples must comply with Part III, Excavations, of Ontario Regulation 213/91, Regulations for Construction Projects.

17. Emergency procedures

Procedures for handling emergencies, included in the company's Emergency Preparedness Plan, shall be communicated to all employees.

All injuries to personnel, runs of material or equipment damage must be reported to the plant office immediately. An incident investigation shall be undertaken and a report filed for every instance.

In the event that a worker is caught in or buried by a run of material, the slope shall be stabilized with available equipment before rescue begins. The protection of rescue workers is a prime consideration.

In the event that equipment is caught or buried in a run of material, the slope of the material must be stabilized to its angle of repose or less before excavation for recovery of the equipment is begun.

Personnel are to call 911 or other designated numbers for emergency medical assistance in the event of serious personal injury as per the company's emergency preparedness plan.

18. Obligations, duties and rights

The company is responsible for the health and safety of all employees while on the job.

All operations shall be undertaken in compliance with the Ontario Occupational Health and Safety Act and Regulation 854, Mines and Mining Plants as well as other regulations which apply.

Under the Act, all workers have the right to refuse unsafe work and a duty to report hazardous or unsafe working conditions.

No worker shall perform a task or operate any equipment for which he has not received training.

Worker representatives or members of the Joint Health and Safety Committee shall conduct monthly health and safety inspections of the work site. Any hazards or unsafe working conditions they find must be assessed and controlled immediately if necessary. Other issues should be included in a written report of the inspection, with responsibilities and timelines assigned. This report must be given to company managers.

Incidents Related to Stockpiles of Aggregate Materials

A customer truck driver drove his vehicle to the weigh scales to find the truck had been overloaded. He was instructed to return to the stockpile and off-load the excess material. Some time later he was found at the rear of his raised dump bed, buried in aggregate. The loader operator who had been working the stockpile earlier had left a working face estimated to be between 70 and 90 degrees which collapsed as the driver attempted to shovel material from his truck.

A dozer operator attempted to clear bridged material plugging a draw hole. Unable to determine the exact location of the draw hole, he inadvertently drove the dozer onto the bridge which collapsed, drawing the dozer backwards into the hole with the operator in the cab, secured by a seat belt. Under the pressure of the material, the windows of the cab gave way and the cab filled with material. The driver suffocated before rescuers were able to reach the cab and remove the material.

The operator of a haul truck was found fatally crushed behind the vehicle which was still running with the transmission in neutral and the emergency/dump brakes and the park brakes off. Operators were trained to set the park brake and shut the engine off before leaving the cab of the machine. They were also instructed to use wheel chocks when leaving the machine for any reason.

A fatal incident occurred when the edge of a stockpile collapsed under a haul truck. The stockpile was about 350 feet long, 70 feet wide and ramped to a height of 22 feet where the incident happened. The truck had been positioned directly above a load-out. To a height of about 10 feet in the loading area the material was at a slope of about 27 to 34 degrees. Above that, the face of the pile was nearly vertical.

A waste shale overburden stockpile was about 105 feet long, 95 feet wide and 20 feet high. The top surface was almost level and the sides sloped at about 34 degrees. A safety berm was missing for about 86 feet along the crest. The operator of a Terex dump truck was backing at an angle of approximately 60 degrees to the edge when the material under the right rear tire gave way and the truck rolled down the embankment, fatally injuring the operator. The victim was not wearing the installed seat belt at the time of the incident.

A customer wanted to buy a truckload of sand. He was told the loader was busy for a while but would load his material next. When the loader operator arrived at the stockpile of sand a short while later he saw the stockpile had collapsed and the back end of the customer's truck totally engulfed in sand but there was no sign of the driver. When the truck was pulled away from the stockpile they found the driver, who had been shoveling sand into the vehicle by hand.

The Occupational Health and Safety Act and Regulations for Mines and Mining Plants (Regulation 854 Pertaining to Stockpiles)

The Act Pertaining to Runs of Material

- 25 (1)(e) An employer shall ensure that a floor, roof wall, pillar, support or other part of a workplace is capable of supporting all loads to which it may be subjected without causing the materials therein to be stressed beyond the allowable unit stresses established under the Building Code Act.
- 25 (2)(a)(h) Without limiting the strict duty employed by subsection (1) an employer shall provide information, instruction and supervision to a worker to protect the health or safety of a worker and take every precaution reasonable in the circumstances for the protection of a worker.
- 27 (1) A supervisor shall ensure that worker,
- (a) works in a manner and with the protective devices, measures and procedures required by this Act and the regulations; and
 - (b) uses or wears the equipment, protective devices or clothing that the worker's employer requires to use or be worn.
- 27 (2) Without limiting the duty imposed by subsection (1), a supervisor shall,
- (a) advise a worker of the existence of any potential or actual danger to the health or safety of the worker of which the supervisor is aware;
 - (b) where so prescribed, provide a worker with written instructions as to the measures and procedures to be taken for the protection of the worker; and
 - (c) take every precaution reasonable in the circumstances for the protection of a worker.

Regulations Re: Runs of Material

21. Run of Material

- 21 (5) In addition to the occurrences referred to in section 53 of the Act, a notice in writing shall be given where,
- (i) an unexpected and uncontrolled run of material, water or slimes in excess of one cubic metre occurs that could have endangered a worker.

59. Guarding of openings

- 59 (1) All openings, sumps, vessels, bins, hoppers, elevated platforms or pits, other than grease pits, which constitute a hazard, shall be fenced or otherwise guarded.

- (2) Every power-operated door through which vehicles or pedestrians travel,
 - (a) shall be clearly distinguished from its surroundings; and
 - (b) shall be operated in accordance with the procedures adopted by the employer for its use.

60. Working in bins

- 60 (1) Before a worker enters any silo, bin, hopper or other container or structure containing bulk material, all further supply of material thereto shall be stopped and any removal of material there-from shall be prevented.
- (2) When working on top of bulk material in any silo, bin, hopper or other container or structure,
 - (a) a worker shall use a fall arrest system; and
 - (b) at least one other worker, who is a competent person, equipped with a suitable alarm shall be in constant attendance outside the silo, bin, hopper or other container or structure.

61. Stockpiles

- 61 (1) Stockpiles of unconsolidated material shall be,
 - (a) inspected for hazardous conditions regularly by a competent person; and
 - (b) made safe before a worker is allowed to work close to or on top of the stockpile.
- (2) Bulk or packaged material shall be piled or stacked in a manner to prevent accidental movement or collapse.
- (2) When a tunnel is used under a stockpile for the purpose of reclaiming material from the stockpile at least two exits shall be provided from the tunnel.

62.1 Non-routine hazardous tasks

- 62.1 (1) This section applies with respect to tasks at a workplace that are determined to be non-routine hazardous tasks jointly by the employer and the joint health and safety committee or the health and safety representative, if any, for the workplace.
- (2) The employer and the joint health and safety committee or the health and safety representative shall jointly establish safe procedures for performing a non-routine hazardous task
- (3) The employer shall ensure that the safe procedures are set out in writing.
- (4) The employer shall ensure that workers are informed that a task is a non-routine hazardous task and are informed about the procedures for performing it before beginning the task.

- (5) A worker performing a non-routine hazardous task shall follow the established procedures. [O. Reg. 60/94, s. 4]

64. Record of dangerous conditions

- 64 (1) Where in an underground mine a potential or actual danger to the health or safety of a worker has not been remedied or removed at the end of a work shift, a record in writing shall be made by the supervisor of the work shift and signed by the supervisor describing,
- (a) the dangerous condition; and
 - (b) the state of corrective measures taken.
- (2) The record required by subsection (1) shall be read and countersigned by the supervisor of the next work shift before a worker on such shift does any work in the area of the dangerous condition and the workers on such shift who may be affected by the dangerous condition shall be advised of,
- (a) the dangerous condition;
 - (b) the state of corrective measures undertaken; and
 - (c) the work required to be done to remove or remedy the dangerous condition.

84. Movement of bulk material

- 84(1) If a worker may be endangered by the withdrawal, collapse, shifting or movement of bulk material such as rock, ore or other material in a stope, pass or chute or in a storage area, the employer shall ensure that written procedures for the precautions to be taken before, during and after removal of the material are established and followed.
- (2) The written procedures required by subsection (1) shall address the following matters:
- 1. The conditions under which workers are required to wear a fall arrest system.
 - 2. The communication of hazards to all persons who may be at risk.
 - 3. The identification of those locations that are not safe for workers to enter.
 - 4. The need to post warning signs that indicate the nature of the danger or hazard and the need to erect barriers to prevent inadvertent access to the area.
 - 5. Any additional protection to be provided to workers required to enter or work in the area.
- (3) No worker shall be positioned so that when the worker is pulling a chute his or her access to an exit from the area may be blocked by an uncontrolled run of material, water or slime.
- (4) A mechanical locking device shall be installed on overcut power operated chute gates, so that the gate may be locked in the open or closed position. O. Reg. 291/02, s. 3.
- (5) A power-operated safety guard or gate shall be designed and installed to minimize hazards when the power fails.

88. Surface Mining

88. (1) Where earth, clay, sand or gravel is being removed from a surface mine by means of powered equipment,
- (a) the working face shall be sloped at the angle of repose; or
 - (b) the vertical height of the working face shall not be more than 1.5 metres above the maximum reach of the equipment.
- (2) Where earth, clay, sand or gravel is being removed from a surface mine by means other than powered equipment,
- (a) the working face shall be sloped at its angle of repose; or
 - (b) the vertical height of the working face shall not be more than three metres.
- (3) No undercutting of the working face shall be permitted or done.
- (4) Except when mining operations are being actively pursued, benches and walls shall be sloped to less than the angle of repose.

89. Height of Face

89. Where metallic or non-metallic rock is being removed from a surface mine,
- (a) the vertical height of the working face shall not be more than twenty-five metres; and
 - (b) except where a tunneling method is used to remove the rock, no undercutting of the working face shall be permitted or done.

