Guidance Resource

Workplace Safety North

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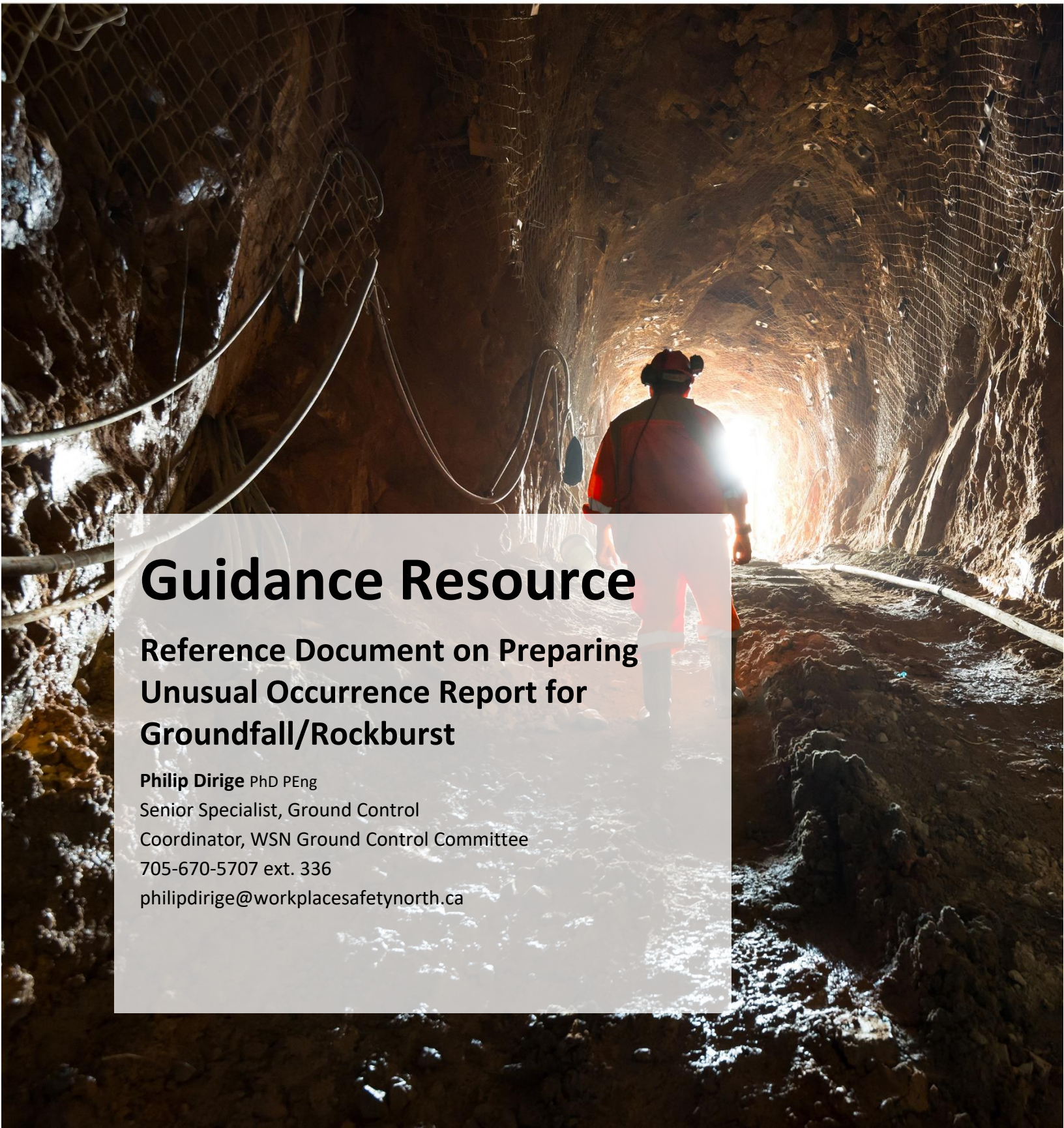

Guidance Resource

Reference Document on Preparing Unusual Occurrence Report for Groundfall/Rockburst

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Guidance Resource

Reference Document on Preparing Unusual Occurrence Report for Groundfall/Rockburst

2023

Workplace Safety North

ONTARIO MINE RESCUE

Reference Document for Preparing Unusual Occurrence Report for Groundfall/Rockburst

The information contained in this material is provided as a guide only. WSN recognizes that individual companies must develop health and safety policies and programs which apply to their workplaces and comply with appropriate legislation. It is generally current to the best of our knowledge, having been compiled from sources believed to be reliable.

This material does not constitute legal advice. While the information provided, including references to legislation and established practice, is current at the time of printing, it may become out-of-date or incomplete with the passage of time.

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Workplace Safety North (WSN) is the health and safety association serving underground and surface mines, pits, tunneling, smelters, refineries and related sectors in Ontario. We provide auditing and consulting services, training and information to help our member companies meet our shared vision of an industry where every worker comes home safe and healthy, every day. The information contained in this publication is for general educational and informative purposes only. WSN makes no representation, expressed or implied, with regard to the accuracy, reliability or completeness of this information, and cannot accept any legal responsibility or liability for any errors or omissions.

For additional copies of this material or for further information please contact:

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Forward

The purpose of the Unusual Occurrence Report for Groundfall/Rockburst is to provide Ontario mining operations with a standard means of collecting and reporting pertinent information on these types of occurrences. The report was originally developed in 1988 and revised in 1994, 2000, and 2009 (with the addition of the Workplace Safety North, or WSN, logo in 2010). The present document updated in 2023, includes a report form for use in surface and underground mines.

The following is excerpted from Section 4 of Regulation 420/21 (Notices and Reports Under Sections 51 to 53.1 of the Act - Fatalities, Critical Injuries, Occupational Illnesses and Other Incidents) under the Occupational Health and Safety Act of Ontario:

> (3) 3 Where Regulation 854 of the Revised Regulations of Ontario, 1990 (Mines and Mining Plants) made under the Act applies,
>
> v. a rockburst occurs causing damage to equipment or the displacement of more than five tonnes of material,
>
> vi. an uncontrolled fall of ground occurs causing damage to equipment or the displacement of more than 50 tonnes of material.

The report should be forwarded to the Ontario Ministry of Labour, Immigration, Training, and Skills Development (MLITSD) and WSN only after all pertinent information has been collected. Mining operations are also encouraged to use the report for internal communication and documentation of all rockbursts and falls of ground, in addition to those required under Section 4 of Regulation 420/21.

For reportable incidents, please call the MLITSD call centre at 1-877-202-0008.

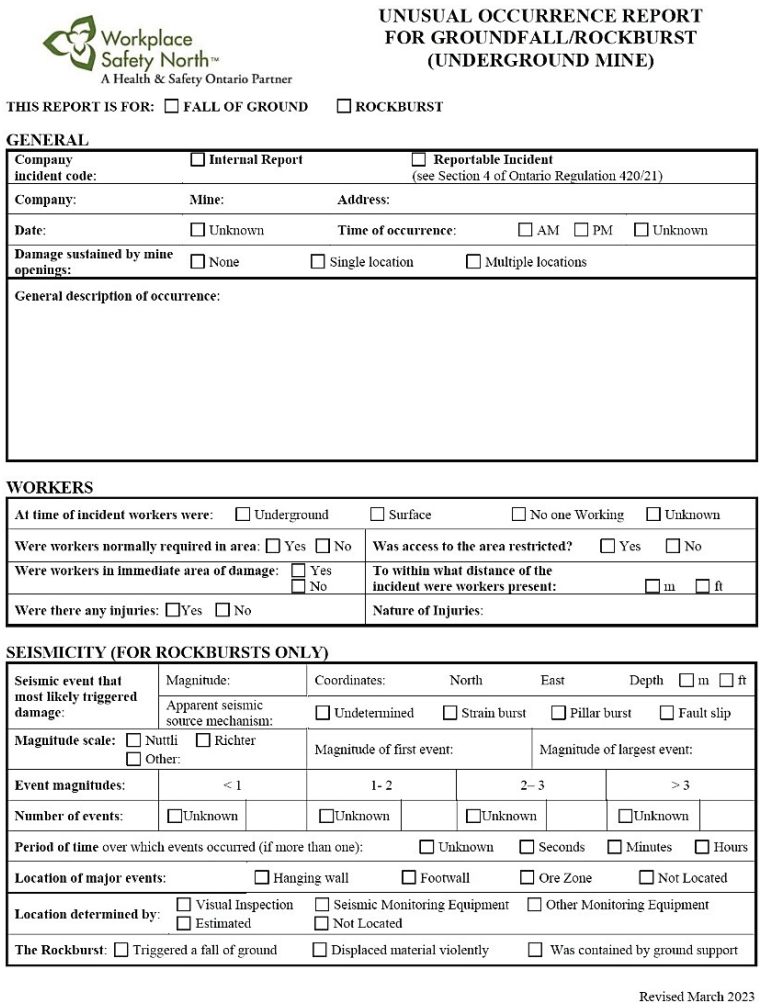
Using the Unusual Occurrence Report for Groundfall/Rockburst (Underground and Surface Mines) information, complete the MLITSD Form: Report of a workplace fatality, injury, illness or incident (https://forms.mgcs.gov.on.ca/en/dataset/on00276).

The report was prepared by the WSN Technical Advisory Committee on Ground Control. WSN gratefully acknowledges the contributions of all members.

WSN (formerly MASHA) Ground Control Technical Advisory Committee Membership as of March 2023

Dave Counter (Chair)	Glencore, Kidd Operations
Brad Simser (Vice Chair)	Glencore, Sudbury Integrated Nickel Operations
Mike Yao	Vale - Corporate
Anneta Forsythe	Vale -Sudbury Operations
Siavash Taghipoor	KGHM - Sudbury Operations
Ryan Lyle	Cementation Canada
Jerry Ran	Kinross Gold Corp.
Roger Wang	Alamos Gold Inc., Island Gold Mine
Felicity-Jayne Borysenko	Kirkland Lake Gold Corp., Macassa Mine Complex
Fred Davenport-Jones	Compass Minerals - Goderich Mine
Michel Kioya	Barrisk Hemlo - Williams Mine
Jacob Francoeur	Alamos Gold Inc. - Young Davidson Mine
Michael Smit	Newmont - Porcupine Gold Mines
Reza Nooraniasi	Impala Canada Ltd. Lac Des Iles Mine
Garett Snell	New Gold - Rainy River Mine
Maximiliano Moraga	Pan American Silver - Bell Creek Mine
John Hadjigeorgiou (Technical Advisor)	University of Toronto, Mining Department
Steven Gaines	CANMET
Philip Dirige	Workplace Safety North

Guidelines for Completing the Unusual Occurrence Report for Groundfall/Rockburst – Underground Mine



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UNUSUAL OCCURRENCE REPORT FOR GROUNDFALL/ROCKBURST (UNDERGROUND MINE)

THIS REPORT IS FOR: ☐ FALL OF GROUND ☐ ROCKBURST

GENERAL

Company incident code:	☐ **Internal Report**	☐ **Reportable Incident** (see Section 4 of Ontario Regulation 420/21)	
Company:	**Mine:**	**Address:**	
Date:	☐ Unknown	**Time of occurrence:**	☐ AM ☐ PM ☐ Unknown
Damage sustained by mine openings:	☐ None	☐ Single location	☐ Multiple locations
General description of occurrence:			

WORKERS

At time of incident workers were:	☐ Underground	☐ Surface	☐ No one Working ☐ Unknown
Were workers normally required in area: ☐ Yes ☐ No		**Was access to the area restricted?**	☐ Yes ☐ No
Were workers in immediate area of damage:	☐ Yes ☐ No	**To within what distance of the incident were workers present:**	☐ m ☐ ft
Were there any injuries: ☐ Yes ☐ No		**Nature of Injuries:**	

SEISMICITY (FOR ROCKBURSTS ONLY)

Seismic event that most likely triggered damage:	Magnitude:	Coordinates:	North	East	Depth ☐ m ☐ ft		
	Apparent seismic source mechanism:	☐ Undetermined	☐ Strain burst	☐ Pillar burst	☐ Fault slip		
Magnitude scale: ☐ Nuttli ☐ Richter ☐ Other:		Magnitude of first event:		Magnitude of largest event:			
Event magnitudes:	< 1		1- 2		2– 3		> 3
Number of events:	☐Unknown		☐Unknown		☐Unknown		☐Unknown
Period of time over which events occurred (if more than one):	☐ Unknown	☐ Seconds	☐ Minutes	☐ Hours			
Location of major events:	☐ Hanging wall	☐ Footwall	☐ Ore Zone	☐ Not Located			
Location determined by:	☐ Visual Inspection ☐ Estimated	☐ Seismic Monitoring Equipment ☐ Not Located	☐ Other Monitoring Equipment				
The Rockburst: ☐ Triggered a fall of ground	☐ Displaced material violently	☐ Was contained by ground support					

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GENERAL - The intent of this section is to identify the mine site where the incident occurred, and the date and time of the incident.

Incident Code - A mine-specific code can be used to keep track of groundfall and rockburst incidents.

Report Type - Classifies the report as either Reportable to the Ministry of Labour, Immigration, Training and Skills Development (MLITSD) or an Internal Report used to document a rock movement as required under Section 72 of Regulation 854. Section 4 of Regulation 420/21 requires that falls of ground displacing at least 50 tonnes and rockbursts displacing at least 5 tonnes be reported to the Ministry of Labour, in addition to occurrences causing equipment damage. Note that distinct occurrences in open stopes must be reported.

Company - Owner of the mine where the incident occurred.

Mine - Name of operation where the incident occurred.

Address - Mailing address of minesite.

Date - When the reportable incident occurred, if known. If the failure occurred over several days, please enter the date when the failure began. If the rock movement was discovered to have occurred at some time in the past, please check the Unknown box, and indicate the time when the occurrence was discovered.

Time - Approximate time of the incident, if known. If the time of incident cannot be determined reliably then enter the approximate time when the incident happened.

WORKERS - The intent of this section is to provide information about the location of workers, and any injuries suffered.

At Time of Incident Workers Were - Specify the general location (underground or surface) of workers at the time of the incident. If the date and time of the incident are not reliably known, then enter the likely location of workers or leave this box blank.

Were Workers in The Immediate Area - Check the Yes box if workers were in the immediate vicinity of the groundfall or rockburst.

To Within What Distance of The Incident Were Workers Present - If workers were normally required to be in the incident area or if workers could have been affected by the rock movement incident, enter the minimum distance between their location and the incident/ damaged areas. Specify units used.

Workers Normally Required to be in Area - Check the Yes box if workers were not in the immediate area of the damage caused by the rock movement, but could have been in or close to this area. For example, a scoop operator might be dumping a bucket of material at the orepass, when a rockburst occurs in the drawpoint being mucked out. Given the circumstances of the incident, if workers do not normally enter the incident area, check the No box.

Was Access to The Area Restricted - Check the Yes box if the access to the incident location had been restricted prior to the incident, or if measures were taken to prevent worker access to the incident/damage location.

Were There Any Injuries - Check the Yes box if one or more workers suffered injuries as result of the rock movement incident.

Nature of Injuries - Briefly describe the injuries suffered and parts of the body affected (e.g., broken right leg).

SEISMICITY (FOR ROCKBURSTS ONLY) - The intent of this section is to provide additional information concerning rockburst incidents.

Seismic Event that Most Likely Triggered Damage - Specify the magnitude, coordinates and depth of event and the apparent source mechanisms (undetermined, strain burst, pillar burst, or fault slip).

Magnitude Scale - Specify the magnitude scale used (Nuttli, Richter, other), and the magnitude of the first and largest events, if known.

Event Magnitudes - Specify the magnitude of the events (<1, 1-2, 2-3, 3> Mn).

Number of Events - Specify the number of events within each range of event magnitudes (<1, 1-2, 2-3, 3> Mn), if known.

Period of Time Over Which Events Occurred - Specify the duration of the seismic activity resulting from the rockburst(s).

Location of Major Events - Specify where the rockburst is believed to have occurred.

Location Determined by - Specify the method or equipment used to determine the rockburst location.

The Rockburst - Specify if the event triggered a fall of ground, displaced material violently, and was displaced materials contained by the ground support system, including the method or equipment used to determine the rockburst location.

DESCRIPTION OF OCCURRENCE - The intent of this section is to provide information about the location of the occurrence, the damage sustained, rock mass characteristics and the failure mode.

Mine Level/Location - Specify the mine level, coordinates, and depth below surface at which the incident happened or where damage was sustained. If damage was sustained on several levels, indicate the range. Specify units used.

This Area was - Active refers to a location where workers are regularly working. Inactive refers to a location that is no longer in use; workers never enter this location.

Geological Zone - specify the geological zone (H/W, F/W, or Ore) where the incident happened.

Rock Types - Identify the main rock types found in the incident location and surrounding areas. For improved clarity, avoid using abbreviations.

Incident Occurred in – Specify the type of underground opening where incident happened (raise, drift/XC, pillar, shaft, ore/waste pass, stope, others).

Opening Dimensions - Specify the heading dimension where the incident occurred, and the units used.

DESCRIPTION OF OCCURRENCE

Mine level:	**Location:**						
This area was: ☐ Active ☐ Inactive ☐ Abandoned	Coordinates:	North	East	Depth	☐ m	☐ ft	
Geological zone: ☐ H/W ☐ F/W ☐ Ore	**Rock type:**						
The incident occurred in: ☐ Raise ☐ Drift/XC ☐ Pillar ☐ Shaft ☐ Ore/waste pass ☐ Stope ☐ Other:							
Opening dimensions: Width:	Length:	Span:	Height:	☐ ft	☐ m		
Damage sustained to: ☐ Excavation ☐ Ground Support ☐ Equipment ☐ Unknown							
Associated mining activity: ☐ Nothing apparent ☐ Backfilling ☐ Blasting ☐ Bolting ☐ Drilling ☐ Mucking ☐ Scaling							
Ore Recovery in Immediate Area: ☐ None ☐ Primary Recovery ☐ Pillar or Secondary Recovery							
Mining Method: ☐ None ☐ Shrinkage ☐ Cut & Fill ☐ Post Pillar Cut & Fill ☐ Undercut & Fill ☐ Blasthole ☐ VRM ☐ Slot & Slash ☐ Uppers Retreat ☐ Sublevel Caving ☐ Block Caving ☐ Other:							
If pillar sustained damage: Type: ☐ Rib ☐ Post ☐ Sill ☐ Crown ☐ Other:							
Pillar dimensions: Height:	Width:	Length:	☐ m	☐ ft			
Material displaced from: ☐ Face ☐ Back ☐ Wall ☐ Floor ☐ Shoulder ☐ Brow ☐ Unknown ☐ Other:							
Material displaced: ☐ tonnes ☐ tons	From behind support (uncontained):	From unsupported ground:	Contained by support:	Total:			
Damage dimensions: Length:	Width:	Max. depth:	☐ m	☐ ft			
Displaced material: ☐ Wedge ☐ Tabular ☐ Blocky ☐ Thin/slabbing ☐ Irregular ☐ Shotcrete ☐ Unknown							
Rockburst damage mechanism: ☐ Rock bulking due to fracturing ☐ Rock ejection due to seismic energy transfer ☐ Rock fall due to seismic shaking ☐ Unknown ☐ Not applicable							
Comments:							
Rock mass characteristics: (choose one only) ☐ Massive ☐ Bedded ☐ Blocky/Chunks ☐ Fractured ☐ Slabbing ☐ Unknown							
Structural geology and water: ☐ Dyke ☐ Fault/shear ☐ Contacts ☐ Steeply dipping joints ☐ Flat lying joints ☐ Joint alteration/infilling ☐ Water							
Fault/dyke description: Orientation: ☐ trend/plunge ☐ dip/dip direction	Thickness: ☐ m ☐ ft						
Comments:							

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Damage Sustained to - Specify what was damaged as a result of the rock movement incident.

Associated Mining Activity - Specify what, if any, mining-related activities could be directly associated with the circumstance of this incident. Provide additional comments in the space provided.

Ore Recovery in Immediate Area - Specify ore recovery process used in the area (primary, pillar or secondary recovery, or none).

Mining Method - Specify mining methods used in or surrounding the areas of damage caused by the incident. If there are no mining methods in use, check the N/A box.

If Pillar Sustained Damage - If damage was sustained to a pillar, specify the type of damage and pillar dimensions. Specify units used.

Ore Recovery in Immediate Area - Specify the type of ore recovery in or surrounding the incident/damage location. Primary Recovery refers to ore extraction of primary stopes or when pillarless mining methods are employed. Pillar Recovery or Secondary Recovery refers to recovery of stopes in a staggered extraction sequence or extraction of pillars remaining after the first pass mining sequence has been completed.

Material Displaced From - Specify original location from which material was displaced.

Material Displaced - Specify the total weight of all material displaced as a result of the incident. This total includes any material that may have been contained by the ground support installed. The amount contained by ground support is entered in the Ground Support Systems Section. This total is intended to reflect the maximum amount of displaced material. In addition, please indicate whether the weight of material displaced was estimated, calculated or both. Provide additional comments in the space provided.

Damage Dimensions - Specify the dimensions (length, width and depth) of the damaged area, if known. Specify units used.

Displaced Material - Check off the box that best characterizes the material displaced by the incident. Provide additional comments in the space provided.

Rockburst Damage Mechanism - Specify the damage mechanism that could be directly associated with the circumstances of the event. Provide additional comments in the space provided including description of the triggering mechanism, such as drilling and blasting, stress or structural, others).

Rock Mass Characteristics - Check off the box that best characterizes the rock mass in or surrounding the incident/damaged areas.

Structural Geology and Water - Check off those boxes that best reflect the structural geology present in or surrounding the incident/damage location(s). Provide additional comments in the space provided.

Fault/Dyke Description - If a dyke or fault was identified under Structural Geology, describe its orientation, thickness, presence of gouge, signs of movement, composition or rock quality of dyke, etc. Provide additional comments in the space provided.

ROCK SUPPORT SYSTEM - The intent of this section is to provide information concerning ground support systems used in or surrounding the incident or damaged areas.

Reinforcing Element - Identify tendon or dowel types of ground support. Specify where the device was installed, the length and pattern of installation (specify units used), whether the tendon or dowel failed as a result of the incident, or if the rock movement reached beyond the length of the support.

Surface Support - Identify the type of mine screen used (e.g., 9 ga. chainlink, 7 ga. WWM), shotcrete, and other devices applied to the surface of the opening (e.g., mesh straps, steel straps). Specify the location of installation, the length or depth of the device (as appropriate) and its condition as a result of the damage caused by the incident.

Other Support System - Identify other support types, such as timber support, steel arches, corrugated culverts, etc. Indicate the condition of these devices as a result of the displacement caused by the incident.

Backfill Type - Specify the type(s) of backfill used in or surrounding the incident/damaged areas. Also indicate the backfilled area or location, the type of binder used, if any, and the percentage of the excavation that has filled.

ROCK SUPPORT SYSTEM

Reinforcement	Type	Location		Length	Pattern		Performance	
		Back	Walls		Wide	Long	Failed	Beyond
Mechanical bolts								
Resin rebars								
Friction stabilizers								
Expandable bolts								
Dynamic bolts								
Cable bolts								

Surface support	Type	Location		Dimension or thickness	Performance		
		Back	Walls		Cracked or bulged	Broken	Failed
Wire-mesh							
Shotcrete							
Straps							

Other system	Used to support		Performance		
	Back	Walls	Deformed	Broken	Failed

Backfill Type	Location or Opening Backfilled	Binder Type and Content	Percentage Filled

Comments Regarding Effectiveness of Support Systems:

Follow-up Action:

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SIGN-OFF

Date Report Completed	Name of Person Completing Report	Title
Phone: ( )	Fax: ( )	E-Mail:

Title	Name	Signature	Date

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Comments Regarding Effectiveness of Support Systems - Provide comments describing the effectiveness of the support systems in use during the rock movement.

Follow-up Action - Describe the follow-up action developed in response to this incident, and its current implementation status.

ATTACHEMENTS - Provide the list of attached documents on the report (e.g., photos, mine plans, etc.), if applicable.

Number of Events - Indicate the magnitude (Nuttli, Richter, Moment Magnitude, etc.) of the first and largest events, if known.

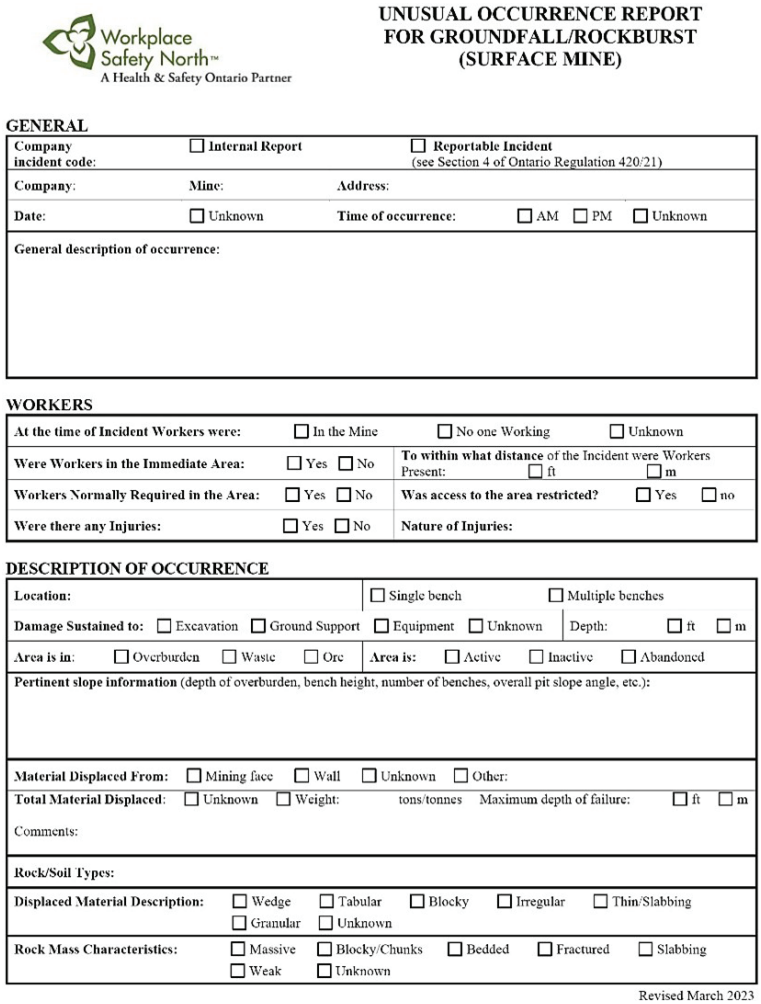
SIGN-OFF

The report should be reviewed by appropriate mine personnel. If this is a reportable incident, it should be filed online at report of a workplace fatality, injury, illness or incident (https://forms.mgcs.gov.on.ca/en/dataset/on00276).

For more information refer to reporting incidents and illnesses webpage (https://www.ontario.ca/page/reporting-workplace-incidents-and-illnesses#section-6).

A copy of the report should be emailed to: **Senior Specialist Ground Control, Workplace Safety North,** GCS@workplacesafetynorth.ca (Alternate address: PhilipDirige@workplacesafetynorth.ca), with address at **690 McKeown Avenue, PO Box 2050, North Bay, Ont. P1B 9P1.**

Guidelines for Completing the Unusual Occurrence Report for Groundfall/Rockbust - Surface Mine



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UNUSUAL OCCURRENCE REPORT FOR GROUNDFALL/ROCKBURST (SURFACE MINE)

GENERAL

Company incident code:	☐ **Internal Report**	☐ **Reportable Incident** (see Section 4 of Ontario Regulation 420/21)
Company:	**Mine:**	**Address:**
Date:	☐ Unknown	**Time of occurrence:** ☐ AM ☐ PM ☐ Unknown
General description of occurrence:		

WORKERS

At the time of Incident Workers were:	☐ In the Mine	☐ No one Working	☐ Unknown
Were Workers in the Immediate Area:	☐ Yes ☐ No	**To within what distance** of the Incident were Workers Present:	☐ ft ☐ m
Workers Normally Required in the Area:	☐ Yes ☐ No	**Was access to the area restricted?**	☐ Yes ☐ no
Were there any Injuries:	☐ Yes ☐ No	**Nature of Injuries:**	

DESCRIPTION OF OCCURRENCE

Location:	☐ Single bench	☐ Multiple benches	
Damage Sustained to: ☐ Excavation ☐ Ground Support ☐ Equipment ☐ Unknown		Depth:	☐ ft ☐ m
Area is in: ☐ Overburden ☐ Waste ☐ Ore	**Area is:** ☐ Active ☐ Inactive ☐ Abandoned		
Pertinent slope information (depth of overburden, bench height, number of benches, overall pit slope angle, etc.):			
Material Displaced From: ☐ Mining face ☐ Wall ☐ Unknown ☐ Other:			
Total Material Displaced: ☐ Unknown ☐ Weight: tons/tonnes	Maximum depth of failure:		☐ ft ☐ m
Comments:			
Rock/Soil Types:			
Displaced Material Description: ☐ Wedge ☐ Tabular ☐ Blocky ☐ Irregular ☐ Thin/Slabbing ☐ Granular ☐ Unknown			
Rock Mass Characteristics: ☐ Massive ☐ Blocky/Chunks ☐ Bedded ☐ Fractured ☐ Slabbing ☐ Weak ☐ Unknown			

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Page 1

GENERAL - The intent of this section is to identify the mine site where the incident occurred, and the date and time of the incident.

Company Incident Code - A mine-specific code can be used to keep track of incidents.

Report Type - Classifies the report as either Reportable to the Ministry of Labour, Immigration, Training and Skills Development (MLITSD) or an Internal Report used to document a rock movement as required under Section 72 of Regulation 854. Section 4 of Regulation 420/21 requires that falls of ground displacing at least 50 tonnes and rockbursts displacing at least 5 tonnes be reported to the Ministry of Labour, in addition to occurrences causing equipment damage.

Company - Owner of the mine where the incident occurred.

Mine -Name of operation where the incident occurred.

Address - Mailing address of minesite.

Date - When the reportable incident occurred, if known. If the failure occurred over several days, please enter the date when the failure began. If the rock movement was discovered to have occurred at some time in the past, please check the Unknown box.

Time - Approximate time of the incident, if known. If the time of incident cannot be determined reliably then enter the approximate time when the incident happened.

General description of occurrence - Provide a brief summary, including location and type of occurrence, any injuries, tonnage displaced, etc.

WORKERS - The intent of this section is to provide information about the location of workers, and any injuries suffered.

At time of Incident Workers were - Specify whether workers were in the mine at the time of the incident. If the date and time of the incident are not reliably known, then enter the likely location of workers or leave this box blank.

Were Workers in the Immediate Area - Check the Yes box if workers were in the immediate vicinity of the incident.

Within What Distance of the Incident were Workers Present - If workers were normally required to be in the incident area or if workers could have been affected by the rock movement incident, enter the minimum distance between their location and the incident/ damaged areas. Specify units used.

Workers Normally Required to be in Area - Check the Yes box if workers were not in the immediate area of the damage caused by the rock movement, but could have been in or close to this area. For example, a truck operator might be transporting a load to the crusher, when a slope failure occurred at the face. Check the No box if workers do not normally enter the incident area.

Was Access to The Area Restricted - Check the Yes box if the access to the incident location had been restricted prior to the incident, or if measures were taken to prevent worker access to the incident/damage location.

Were there any injuries - Check the Yes box if one or more workers suffered injuries as result of the rock movement incident.

Nature of Injuries - Briefly describe the injuries suffered and parts of the body affected (e.g., broken right leg).

DESCRIPTION OF OCCURRENCE - The intent of this section is to provide information about the location of the occurrence, the damage sustained, rock mass characteristics and the failure mode.

Location - Where damage was sustained in several locations, specify the most severely damaged locations. Specify if damage was confined to a single location or if damage was sustained in more than one location.

Damage Sustained to - Specify what was damaged as a result of the rock movement incident.

Depth - Specify the depth below surface at which the incident happened. If damage was sustained on several levels, specify the range. Specify units used.

Area is in - General location of incident within the mine infrastructure.

This Area is - An Active Area is a location where workers are regularly working. An Inactive Area is no longer in use; workers never enter this location.

Pertinent slope information - Provide details on all relevant slope parameters.

Material Displaced From - Original location from which material was displaced.

Total Material Displaced - This is the total weight of all material displaced as a result of the incident. This total includes any material that may have been contained by the ground support installed. The amount contained by ground support is entered in the Ground Support Systems Section. This total is intended to reflect the maximum amount of displaced material. In addition, please indicate whether the weight of material displaced was estimated, calculated or both. Provide additional comments in the space provided.

Rock/Soil Types - Identify the main rock and soil types found in the incident location and surrounding areas. For improved clarity, avoid using abbreviations.

Displaced Material Description - Check off the box that best characterizes the material displaced by the incident. Provide additional comments in the space provided.

Rock Mass characteristics - Check off the box that best characterizes the rock mass in or surrounding the incident/damaged areas.

Structural Geology and Water: ☐ Dyke ☐ Fault/Slip ☐ Contact ☐ Steeply dipping joints ☐ Flat lying joints ☐ water

Comments:

Fault/Dyke Description:
(Orientation, thickness, etc.)

Failure Mode: ☐ Plane ☐ Wedge ☐ Toppling ☐ Circular ☐ Other

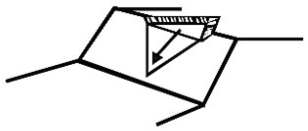
Comments:

Associated Mining Activity: ☐ Blasting ☐ Mucking ☐ Drilling ☐ Scaling ☐ Installing reinforcement/support ☐ Nothing Apparent

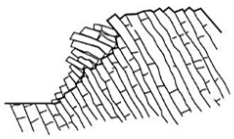
Comments:

Other Comments (e.g., weather at time of incident, slope drainage, slope monitoring, etc.):

Plane failure



Wedge failure



Toppling failure

Circular failure

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Structural Geology and Water - Check off those boxes that best reflect the structural geology present in the vicinity of the incident location(s). Provide additional comments in the space provided.

Fault/Dyke Description - If a dyke or fault was identified under Structural Geology, describe its orientation, thick- ness, presence of gouge, signs of movement, composition or rock quality of dyke, etc. Provide additional comments in the space provided.

Failure Mode - Specify the failure process or mode that resulted in the displacement of material, if known (refer to illustrations). Provide additional comments in the space provided.

Associated Mining Activity - Specify what, if any, mining related activities could be directly associated with the circumstance of this incident. Provide additional comments in the space provided.

Other Comments - Provide any relevant comments concerning weather, slope drainage, monitoring data, etc.

ROCK SUPPORT SYSTEM

Reinforcing Element	Type	Location	Length	Pattern		Performance	
				Wide	Long	Failed	Beyond
Cable bolts							
Resin rebars							

Surface support	Type	Location	Dimension or thickness	Performance		
				Cracked or bulged	Broken	Failed
Wire-mesh						
Shotcrete						
Straps						

Comments Regarding Effectiveness of Support Systems:

Follow-up Action:

ATTACHEMENTS

Please, provide a list of attached documents (e.g., photos, mine plans, etc.) if applicable.

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ROCK SUPPORT SYSTEM - The intent of this section is to provide information concerning ground support systems used in or surrounding the incident or damaged areas.

Tendon/Dowel - Identify tendon or dowel types of ground support. Indicate where the device was installed, the length and pattern of installation (specify units used), whether the tendon or dowel failed as a result of the incident, or if the rock movement reached beyond the length of the support.

Surface Support - Identify the type of mine screen used (e.g., 9 ga. chainlink, 7 ga. WWM), shotcrete, and other devices applied to the slope surface (e.g., mesh straps). Specify the location of the surface support, its dimensions and condition following the incident.

Comments Regarding Effectiveness of Support Systems - Provide comments describing the effectiveness of the reinforcement and support systems.

Follow-up Action - Describe the follow-up action developed in response to this incident, and its current implementation status.

ATTACHMENTS - Provide the list of attached documents on the report (e.g., photos, mine plans, etc.), if applicable.

SIGN-OFF

Date Report Completed	Name of Person Completing Report	Title
Phone: ( )	Fax: ( )	E-Mail:

Title	Name	Signature	Date

Sign-Off

The report should be reviewed by appropriate mine personnel. If this is a reportable incident, it should be filed online at report of a workplace fatality, injury, illness or incident (https://forms.mgcs. gov.on.ca/en/dataset/on00276). For more information refer to reporting incidents and illnesses webpage (https://www.ontario.ca/page/reporting-workplace-incidents-and-illnesses#section-6).

A copy of the report should be emailed to: **Senior Specialist Ground Control, Workplace Safety North,** GCS@workplacesafetynorth.ca (Alternate address: PhilipDirige@workplacesafetynorth. ca), with address at **690 McKeown Avenue, PO Box 2050, North Bay, Ont. P1B 9P1.**

Workplace Safety North™
A Health & Safety Ontario Partner

UNUSUAL OCCURRENCE REPORT FOR GROUNDFALL/ROCKBURST (UNDERGROUND MINE)

THIS REPORT IS FOR: ☐ **FALL OF GROUND** ☐ **ROCKBURST**

GENERAL

Company incident code:	☐ **Internal Report**	☐ **Reportable Incident** (see Section 4 of Ontario Regulation 420/21)
Company:	**Mine**:	**Address**:
Date:	☐ Unknown	**Time discovered**: ☐ AM ☐ PM ☐ Unknown
	Time of occurrence: ☐ AM ☐ PM ☐ Unknown	
Damage sustained by mine openings:	☐ None ☐ Single location ☐ Multiple locations	
General description of occurrence:		

WORKERS

At time of incident workers were: ☐ Underground ☐ Surface ☐ No one Working ☐ Unknown	
Were workers normally required in area: ☐ Yes ☐ No	**Was access to the area restricted?** ☐ Yes ☐ No
Were workers in immediate area of damage: ☐ Yes ☐ No	**To within what distance of the incident were workers present:** ☐ m ☐ ft
Were there any injuries: ☐ Yes ☐ No	**Nature of Injuries**:

SEISMICITY (FOR ROCKBURSTS ONLY)

Seismic event that most likely triggered damage:	Magnitude:	Coordinates: North East Depth ☐ m ☐ ft		
	Apparent seismic source mechanism:	☐ Undetermined ☐ Strain burst ☐ Pillar burst ☐ Fault slip		
Magnitude scale: ☐ Nuttli ☐ Richter ☐ Other:		Magnitude of first event:	Magnitude of largest event:	
Event magnitudes:	< 1	1- 2	2– 3	> 3
Number of events:	☐ Unknown	☐ Unknown	☐ Unknown	☐ Unknown
Period of time over which events occurred (if more than one): ☐ Unknown ☐ Seconds ☐ Minutes ☐ Hours				
Location of major events: ☐ Hanging wall ☐ Footwall ☐ Ore Zone ☐ Not Located				
Location determined by: ☐ Visual Inspection ☐ Seismic Monitoring Equipment ☐ Other Monitoring Equipment ☐ Estimated ☐ Not Located				
The Rockburst: ☐ Was contained by ground support ☐ Triggered a fall of ground ☐ Displaced material violently				

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DESCRIPTION OF OCCURRENCE

Mine level:	**Location**:			
This area was: ☐ Active ☐ Inactive ☐ Abandoned	Coordinates:	North	East	Depth ☐ m ☐ ft
Geological zone: ☐ H/W ☐ F/W ☐ Ore	**Rock type**:			
The incident occurred in: ☐ Raise ☐ Drift/XC ☐ Pillar ☐ Shaft ☐ Ore/waste pass ☐ Stope ☐ Other:				
Opening dimensions:	Width:	Length:	Span:	Height: ☐ ft ☐ m
Damage sustained to: ☐ Excavation ☐ Ground Support ☐ Equipment ☐ Unknown				
Associated mining activity: ☐ Nothing apparent ☐ Backfilling ☐ Blasting ☐ Bolting ☐ Drilling ☐ Mucking ☐ Scaling				
Ore Recovery in Immediate Area: ☐ None ☐ Primary Recovery ☐ Pillar or Secondary Recovery				
Mining Method: ☐ None ☐ Shrinkage ☐ Cut & Fill ☐ Post Pillar Cut & Fill ☐ Undercut & Fill ☐ Blasthole ☐ VRM ☐ Slot & Slash ☐ Uppers Retreat ☐ Sublevel Caving ☐ Block Caving ☐ Other:				
If pillar sustained damage: Type: ☐ Rib ☐ Post ☐ Sill ☐ Crown ☐ Other:				
Pillar dimensions:	Height:	Width:	Length:	☐ m ☐ ft
Material displaced from: ☐ Face ☐ Back ☐ Wall ☐ Floor ☐ Shoulder ☐ Brow ☐ Unknown ☐ Other:				
Material displaced: ☐ tonnes ☐ tons	From behind support (uncontained):	From unsupported ground:	Contained by support:	Total:
Damage dimensions:	Length:	Width:	Max. depth:	☐ m ☐ ft
Displaced material:	☐ Wedge ☐ Tabular ☐ Blocky ☐ Thin/slabbing ☐ Irregular ☐ Shotcrete ☐ Unknown			
Rockburst damage mechanism:	☐ Rock bulking due to fracturing ☐ Rock ejection due to seismic energy transfer ☐ Rock fall due to seismic shaking ☐ Unknown ☐ Not applicable			
Comments (include description of the triggering mechanism such as drilling and blasting, stress or structural, others):				
Rock mass characteristics: (choose one only)	☐ Massive ☐ Bedded ☐ Blocky/Chunks ☐ Fractured ☐ Slabbing ☐ Unknown			
Structural geology and water:	☐ Dyke ☐ Fault/shear ☐ Contacts ☐ Steeply dipping joints ☐ Flat lying joints ☐ Joint alteration/infilling ☐ Water			
Fault/dyke description:	Orientation: ☐ trend/plunge ☐ dip/dip direction		Thickness: ☐ m ☐ ft	
Comments:				

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ROCK SUPPORT SYSTEM

Reinforcement	Type	Location		Length	Pattern		Performance	
		Back	Walls		Wide	Long	Failed	Beyond
Mechanical bolts								
Resin rebars								
Friction stabilizers								
Expandable bolts								
Dynamic bolts								
Cable bolts								

Surface support	Type	Location		Dimension or thickness	Performance		
		Back	Walls		Cracked or bulged	Broken	Failed
Wire-mesh							
Shotcrete							
Straps							

Other system	Used to support		Performance		
	Back	Walls	Deformed	Broken	Failed

Backfill Type	Location or Opening Backfilled	Binder Type and Content	Percentage Filled

Comments Regarding Effectiveness of Support Systems:

Follow-up Action:

ATTACHMENTS

Please, provide a list of attached documents (e.g., photos, mine plans, etc.) if applicable.

SIGN-OFF

Date Report Completed	Name of Person Completing Report	Title
Phone: ( )	**Fax: ( )**	**E-Mail:**

Title	Name	Signature	Date

Please call the Ministry of Labour, Immigration, Training and Skills Development call centre at 1-877-202-0008.

If this is a reportable incident, please report online to:

- **Using the above information, complete the Ministry of Labour, Immigration, Training and Skills Development Form: Report of a workplace fatality, injury, illness or incident** (https://forms.mgcs.gov.on.ca/en/dataset/on00276). More information available at Reporting incidents and illnesses webpage (https://www.ontario.ca/page/reporting-workplace-incidents-and-illnesses#section-6)

Please send a copy of the report to:

- **Senior Specialist Ground Control, Workplace Safety North, 690 McKeown Avenue, PO Box 2050, North Bay, Ontario P1B 9P1 GCS@workplacesafetynorth.ca (Alternate address: PhilipDirige@workplacesafetynorth.ca)**

To obtain a copy of the *Guidelines for completing the Unusual Occurrence Report for Groundfall/Rockburst*, or for additional information, please contact WSN's Senior Specialist Ground Control, (705) 474-7233 GCS@workplacesafetynorth.ca

Revised April 5, 2023

UNUSUAL OCCURRENCE REPORT FOR GROUNDFALL/ROCKBURST (SURFACE MINE)

GENERAL

Company incident code:	☐ **Internal Report**	☐ **Reportable Incident** (see Section 4 of Ontario Regulation 420/21)
Company:	**Mine**:	**Address**:
Date:	☐ Unknown **Time of occurrence**: ☐ AM ☐ PM ☐ Unknown	**Time discovered**: ☐ AM ☐ PM ☐ Unknown
General description of occurrence:		

WORKERS

At the time of Incident Workers were:	☐ In the Mine	☐ No one Working	☐ Unknown
Were Workers in the Immediate Area: ☐ Yes ☐ No		**To within what distance** of the Incident were Workers Present: ☐ ft ☐ m	
Workers Normally Required in the Area: ☐ Yes ☐ No		**Was access to the area restricted?** ☐ Yes ☐ no	
Were there any Injuries: ☐ Yes ☐ No		**Nature of Injuries:**	

DESCRIPTION OF OCCURRENCE

Location:		☐ Single bench	☐ Multiple benches
Damage Sustained to: ☐ Excavation ☐ Ground Support ☐ Equipment ☐ Unknown		Depth: ☐ ft ☐ m	
Area is in: ☐ Overburden ☐ Waste ☐ Ore		**Area is:** ☐ Active ☐ Inactive ☐ Abandoned	
Pertinent slope information (depth of overburden, bench height, number of benches, overall pit slope angle, etc.)**:**			
Material Displaced From: ☐ Mining face ☐ Wall ☐ Unknown ☐ Other:			
Total Material Displaced: ☐ Unknown ☐ Weight: tons/tonnes Maximum depth of failure: ☐ ft ☐ m Comments:			
Rock/Soil Types:			
Displaced Material Description: ☐ Wedge ☐ Tabular ☐ Blocky ☐ Irregular ☐ Thin/Slabbing ☐ Granular ☐ Unknown			
Rock Mass Characteristics: ☐ Massive ☐ Blocky/Chunks ☐ Bedded ☐ Fractured ☐ Slabbing ☐ Weak ☐ Unknown			

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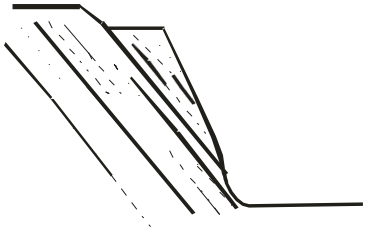
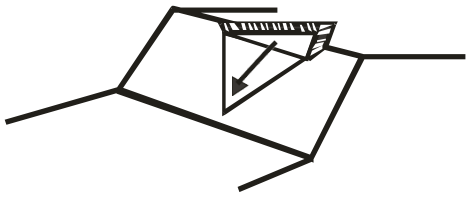
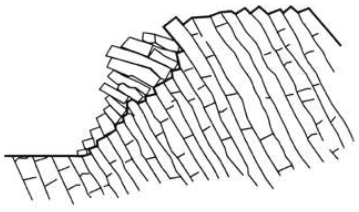
Structural Geology and Water: ☐ Dyke ☐ Fault/Slip ☐ Contact ☐ Steeply dipping joints ☐ Flat lying joints ☐ water Comments:
Fault/Dyke Description: (Orientation, thickness, etc.)
Failure Mode: ☐ Plane ☐ Wedge ☐ Toppling ☐ Circular ☐ Other Comments:
Associated Mining Activity: ☐ Blasting ☐ Mucking ☐ Drilling ☐ Scaling ☐ Installing reinforcement/support ☐ Nothing Apparent Comments:
Other Comments (e.g., weather at time of incident, slope drainage, slope monitoring, etc.)**:**



Plane failure



Wedge failure



Toppling failure

Circular failure

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ROCK SUPPORT SYSTEM

Reinforcing Element	Type	Location	Length	Pattern		Performance	
				Wide	Long	Failed	Beyond
Cable bolts							
Resin rebars							

Surface support	Type	Location	Dimension or thickness	Performance		
				Cracked or bulged	Broken	Failed
Wire-mesh						
Shotcrete						
Straps						

Comments Regarding Effectiveness of Support Systems:

Follow-up Action:

ATTACHMENTS

Please, provide a list of attached documents (e.g., photos, mine plans, etc.) if applicable.

SIGN-OFF

Date Report Completed	Name of Person Completing Report	Title
Phone: ( )	**Fax: ( )**	**E-Mail:**

Title	Name	Signature	Date

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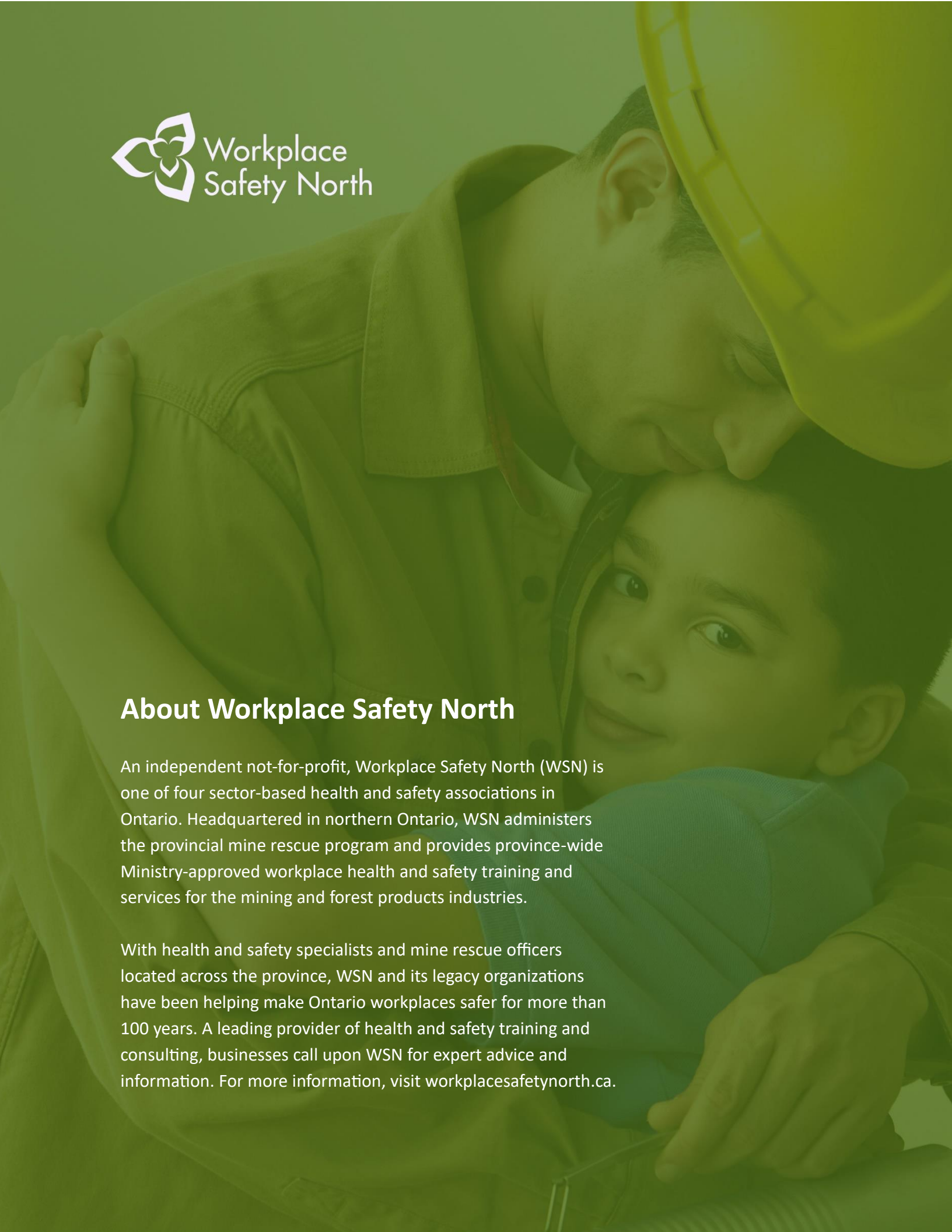

Workplace Safety North

About Workplace Safety North

An independent not-for-profit, Workplace Safety North (WSN) is one of four sector-based health and safety associations in Ontario. Headquartered in northern Ontario, WSN administers the provincial mine rescue program and provides province-wide Ministry-approved workplace health and safety training and services for the mining and forest products industries.

With health and safety specialists and mine rescue officers located across the province, WSN and its legacy organizations have been helping make Ontario workplaces safer for more than 100 years. A leading provider of health and safety training and consulting, businesses call upon WSN for expert advice and information. For more information, visit workplacesafetynorth.ca.