



Technical REPORT

Unusual Occurrence Report For Groundfall/Rockburst

2010





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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.

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Foreword

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 and 2000. The present document (prepared in 2009, with the addition of the WSN logo in 2010) includes a new report for use in surface mines, and minor revisions to the report for underground mines.

The following is excerpted from Sect. 21 of Regulation 854 (Mines and Mining Plants) under the Occupational Health and Safety Act of Ontario:

- (5) *In addition to the occurrences referred to in section 53 of the Act, a notice in writing shall be given where,*
- (e) *a rockburst occurs causing damage to equipment or the displacement of more than five tonnes of material;*
 - (f) *an uncontrolled fall of ground occurs causing damage to equipment or the displacement of more than fifty tonnes of material;*

The report should be forwarded to the Ontario Ministry of Labour 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 Sect. 21 of Regulation 854.


The report was prepared by WSN's 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 June 2009

Dave Counter	Xstrata Copper (Chair)
Dean Switzer	FNX Mining Corp.
Luc Beauchamp	MASHA
Rob DesRivieres	Williams Mine Operating Corp.
Grant Corey	Goldcorp Inc.
Chantale Doucet	CANMET
John Henning	Goldcorp Inc.
Mike Kat	Ontario Ministry of Labour
James Kellestine	Goldcorp Inc.
Cliff Lafleur	First Nickel Inc.
Greg Maybee	Xstrata Nickel
Steve McKinnon	Queen's University
Cy Monahan	Sifto Canada
Michael Pahkala	Kirkland Lake Gold
Alun Price Jones	Cementation Ltd.
Mike Yao	Vale Inco Ltd.

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

Page 1

		UNUSUAL OCCURRENCE REPORT FOR GROUND FALL/ROCKBURST (UNDERGROUND MINE)	
THIS REPORT IS FOR: <input type="checkbox"/> FALL OF GROUND <input type="checkbox"/> ROCKBURST			
GENERAL			
Company Incident Code: <input type="checkbox"/> Internal Report <input type="checkbox"/> Reportable Incident (Sect. 21 of Ontario Regulations for Mines and Mining Plants)			
Company: Mine: Address:			
Date: <input type="checkbox"/> Unknown Time of Occurrence: a.m. / p.m. <input type="checkbox"/> Unknown			
General description of occurrence:			
WORKERS			
At time of Incident Workers were: <input type="checkbox"/> U/G <input type="checkbox"/> Surface <input type="checkbox"/> No one Working <input type="checkbox"/> Unknown			
Were workers in Immediate Area: <input type="checkbox"/> Yes <input type="checkbox"/> No		To Within What Distance of the Incident were Workers Present: <input type="checkbox"/> ft <input type="checkbox"/> m	
Workers Normally Required in Area: <input type="checkbox"/> Yes <input type="checkbox"/> No		Was access to the area restricted? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Were there any injuries: <input type="checkbox"/> Yes <input type="checkbox"/> No		Nature of Injuries:	
DESCRIPTION OF OCCURRENCE			
Location:		<input type="checkbox"/> Single Location <input type="checkbox"/> Multiple Locations	
Damage Sustained to: <input type="checkbox"/> Excavation <input type="checkbox"/> Ground Support <input type="checkbox"/> Equipment <input type="checkbox"/> Unknown		Depth Below Surface: <input type="checkbox"/> ft <input type="checkbox"/> m	
Area is in: <input type="checkbox"/> F/W Rock <input type="checkbox"/> H/W Rock <input type="checkbox"/> Ore		This Area is: <input type="checkbox"/> Active <input type="checkbox"/> Inactive <input type="checkbox"/> Abandoned	
Incident Occurred in: <input type="checkbox"/> Raise <input type="checkbox"/> Drift/C/C <input type="checkbox"/> Shaft <input type="checkbox"/> Ore/waste pass <input type="checkbox"/> Pillar <input type="checkbox"/> Stope <input type="checkbox"/> Other:			
Opening Dimensions: Height: Width: Length: Span: <input type="checkbox"/> ft <input type="checkbox"/> m			
Mining Method: <input type="checkbox"/> None <input type="checkbox"/> VRM <input type="checkbox"/> Blasthole <input type="checkbox"/> Cut & Fill <input type="checkbox"/> Post Pillar Cut & Fill <input type="checkbox"/> Sublevel Caving <input type="checkbox"/> Shrinkage <input type="checkbox"/> Slot and Slab <input type="checkbox"/> Upper Retreat <input type="checkbox"/> Undercut & Fill <input type="checkbox"/> Other:			
If Pillar Sustained Damage: Type: <input type="checkbox"/> Rib <input type="checkbox"/> Post <input type="checkbox"/> Sill <input type="checkbox"/> Crown <input type="checkbox"/> Other:			
Dimensions: Height: Width: Length: <input type="checkbox"/> ft <input type="checkbox"/> m			
Ore Recovery in Immediate Area: <input type="checkbox"/> None <input type="checkbox"/> Primary Recovery <input type="checkbox"/> Pillar or Secondary Recovery			
Material Displaced From: <input type="checkbox"/> Face <input type="checkbox"/> Back <input type="checkbox"/> Wall <input type="checkbox"/> Floor <input type="checkbox"/> Brow <input type="checkbox"/> Unknown <input type="checkbox"/> Other:			
Total Material Displaced: <input type="checkbox"/> Unknown <input type="checkbox"/> Amount: tons/tonnes Maximum depth of failure: <input type="checkbox"/> ft <input type="checkbox"/> m			
Comments:			
Rock types:			
Displaced Material Description: (choose one only)		<input type="checkbox"/> Wedge <input type="checkbox"/> Tabular <input type="checkbox"/> Block <input type="checkbox"/> Irregular <input type="checkbox"/> Thin/Slabbing <input type="checkbox"/> Unknown	
Rock Mat Characteristics:		<input type="checkbox"/> Massive <input type="checkbox"/> Blocky/Cracks <input type="checkbox"/> Bedded <input type="checkbox"/> Fractured <input type="checkbox"/> Slabbing <input type="checkbox"/> Unknown	

Revised July 21, 2010

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 or an Internal Report used to document a rock movement as required under Sect. 72 of Reg. 854. Sect. 21 of Reg. 854 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 mine site.

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 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).

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, indicate the most severely damaged locations. Indicate if damage was confined to a single location or if damage was sustained in more than one location.

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

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

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

This Area is - 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.

Incident Occurred in - Type of underground opening where incident happened.

Opening Dimensions - Dimensions of the opening where incident happened. Specify units used.

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, indicate the type of damage and pillar dimensions. Specify units used.

Ore Recovery in Immediate Area - Indicate 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 - 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 Types - Identify the main rock 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:	<input type="checkbox"/> Dyke	<input type="checkbox"/> Fault/Slip	<input type="checkbox"/> Contacts	<input type="checkbox"/> Steeply dipping joints	<input type="checkbox"/> Flat lying joints	<input type="checkbox"/> Water
Comments:						
Fault/Dyke Description: _____ (Orientation, thickness, etc.)						
Failure Mode:	<input type="checkbox"/> Unknown	<input type="checkbox"/> Stress	<input type="checkbox"/> Structure			
Comments:						
Associated Mining Activity:	<input type="checkbox"/> Nothing Apparent	<input type="checkbox"/> Blasting	<input type="checkbox"/> Mucking	<input type="checkbox"/> Drilling	<input type="checkbox"/> Scaling	<input type="checkbox"/> Bolting
Comments:						

Structural Geology - 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.

GROUND SUPPORT								
Backfill Type		Location or Opening Backfilled			Binder Type and Content		Percentage Filled	
Tendon/Dowel	Type	Location		Length	Pattern		Failed	Beyond
		Walls	Back		Wide	Long		
Mechanical rockbolts								
Rein rebar								
Friction stabilizers								
Swallex								
Cable bolts								
Opening Liner	Type	Location		Depth or Length	Cracked or Bulged	Broken	Failed	
		Walls	Back					
Mine screen								
Shotcrete								
Straps								
Other System		Used to Support		Deformed	Broken	Failed		
		Walls	Back					
Comments Regarding Effectiveness of Support Systems: _____								

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.

Failure Mode - Indicate the failure process or mode that resulted in the displacement of material, if known. Provide additional comments in the space provided.

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

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

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.

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.

Opening Liner - 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 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.

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

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Follow-up Action:	_____

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

THIS SECTION FOR ROCKBURSTS ONLY				
Number of Events:	Magnitude of First Event:	Mn <input type="checkbox"/> Unknown <input type="checkbox"/>	Magnitude of Largest Event:	Mn <input type="checkbox"/> Unknown <input type="checkbox"/>
Event Magnitudes	<1 Mn	1-2 Mn	2-3 Mn	3 > Mn
Number of Events:	<input type="checkbox"/> Unknown	<input type="checkbox"/> Unknown	<input type="checkbox"/> Unknown	<input type="checkbox"/> Unknown
Period of Time Over which Events Occurred (if more than one):			<input type="checkbox"/> Unknown	<input type="checkbox"/> Seconds <input type="checkbox"/> Minutes <input type="checkbox"/> Hours
Location of Major Events: <input type="checkbox"/> HW <input type="checkbox"/> FW <input type="checkbox"/> Ore Zone <input type="checkbox"/> Not Located				
Location Determined By: <input type="checkbox"/> Visual Inspection <input type="checkbox"/> Seismic Monitoring Equipment <input type="checkbox"/> Other Monitoring Equipment <input type="checkbox"/> Estimated <input type="checkbox"/> Not Located				
Damage Sustained by Mine Openings: <input type="checkbox"/> Unknown <input type="checkbox"/> None <input type="checkbox"/> Confined to Single Location on Single Level <input type="checkbox"/> Many Locations on One Level <input type="checkbox"/> Many Locations over Many Levels				
The Rockburst: <input type="checkbox"/> Triggered a Fall of Ground <input type="checkbox"/> Displaced Material Violently <input type="checkbox"/> Contained by Ground Support				
Apparent Rockburst Mechanism: <input type="checkbox"/> Undetermined <input type="checkbox"/> Strain Burst <input type="checkbox"/> Pillar Burst <input type="checkbox"/> Fault Slip Mechanism				
Comments:				

ROCKBURST SECTION – The intent of this section is to provide additional information concerning rockburst incidents.

Number of Events - Indicate the Nuttli magnitude of the first and largest events, if known.

SIGN-OFF			
Date Report Completed	Name of Person Completing Report	Title	
Phone: ()	Fax: ()	E-Mail:	
Reviewed by	Title/Department	Reviewed by	Title/Department

Event Magnitude/Number of events - Indicate the number of events within each range of event magnitudes (<1, 1-2, 2-3, 3 > Mn). When event magnitudes cannot be determined by the available detection methods, check the Unknown box.

If this is a reportable incident, please send report to:
 • District Office, Mining Health and Safety Program, Ontario Ministry of Labour
 • Ground Control Specialist, Workplace Safety North, 690 McKeown Avenue, PO Box 2050, North Bay, Ont. P1B 9P1 gcg@masha.on.ca
 FAX (705) 472-5800
 To obtain a copy of the *Guidelines for completing the Unusual Occurrence Report for Groundfall/Rockburst*, or for additional information, please contact WSN's Ground Control Specialist, (705) 474-7233 gcg@masha.on.ca
 Revised July 21, 2010

Period of time over which events occurred - Indicate the duration of the seismic activity resulting from the rockburst(s).

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

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

Damage Sustained to Mine Openings - Indicate the extent of the damage caused by the rockburst.

Apparent Rockburst Mechanism - Indicate the apparent rockburst mechanism, if known.

Comments - Include additional comments that will assist in providing a better understanding of the rockburst.

SIGN-OFF

The report should be reviewed by appropriate mine personnel. If this is a reportable incident, the report should be sent to the Ontario Ministry of Labour and WSN. WSN's copy should be e-mailed to the Ground Control Specialist at gcs@masha.on.ca
(Alternate address: lucbeauchamp@workplacesafetynorth.ca)

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

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UNUSUAL OCCURRENCE REPORT FOR GROUND FALL/ROCKBURST (SURFACE MINE)

GENERAL	
Company Incident Code:	<input type="checkbox"/> Internal Report <input type="checkbox"/> Reportable Incident (see Sect. 21 of Ontario Regulations for Mines and Mining Plants)
Company:	Mine: Address:
Date: <input type="checkbox"/> Unknown	Time of Occurrence: a.m. / p.m. <input type="checkbox"/> Unknown
General description of occurrence:	
WORKERS	
At time of Incident Workers were:	<input type="checkbox"/> In the mine <input type="checkbox"/> No one Working <input type="checkbox"/> Unknown
Were workers in Immediate Area: <input type="checkbox"/> Yes <input type="checkbox"/> No	To Within What Distance of the Incident were Workers Present: <input type="checkbox"/> ft <input type="checkbox"/> m
Workers Normally Required in Area: <input type="checkbox"/> Yes <input type="checkbox"/> No	Was access to the area restricted? <input type="checkbox"/> Yes <input type="checkbox"/> No
Were there any injuries: <input type="checkbox"/> Yes <input type="checkbox"/> No	Nature of Injuries:
DESCRIPTION OF OCCURRENCE	
Location:	<input type="checkbox"/> Single bench <input type="checkbox"/> Multiple benches
Damage Sustained to: <input type="checkbox"/> Excavation <input type="checkbox"/> Ground Support <input type="checkbox"/> Equipment <input type="checkbox"/> Unknown	Depth: <input type="checkbox"/> ft <input type="checkbox"/> m
Area is in: <input type="checkbox"/> Overburden <input type="checkbox"/> Waste <input type="checkbox"/> Ore	Area is: <input type="checkbox"/> Active <input type="checkbox"/> Inactive <input type="checkbox"/> Abandoned
Pertinent slope information (depth of overburden, bench height, number of benches, overall pit slope angle, etc.)	
Material Displaced From: <input type="checkbox"/> Mining face <input type="checkbox"/> Wall <input type="checkbox"/> Unknown <input type="checkbox"/> Other:	
Total Material Displaced: <input type="checkbox"/> Unknown <input type="checkbox"/> Weight: tons/tonnes	Maximum depth of failure: <input type="checkbox"/> ft <input type="checkbox"/> m
Comments:	
Rock/Soil Type:	
Displaced Material Description: <input type="checkbox"/> Wedge <input type="checkbox"/> Tabular <input type="checkbox"/> Blocky <input type="checkbox"/> Irregular <input type="checkbox"/> Thin Slabbing	
<input type="checkbox"/> Granular <input type="checkbox"/> Unknown	
Rock Mass Characteristic: <input type="checkbox"/> Massive <input type="checkbox"/> Blocky/Clumpy <input type="checkbox"/> Bedded <input type="checkbox"/> Fractured <input type="checkbox"/> Slabbing	
<input type="checkbox"/> Weak <input type="checkbox"/> Unknown	

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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 incidents.

Report Type - Classifies the report as either Reportable to the Ministry of Labour or an Internal Report used to document a rock movement as required under Sect. 72 of Reg. 854. Sect. 21 of Reg. 854 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 mine site.

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, indicate the most severely damaged locations. Indicate if damage was confined to a single location or if damage was sustained in more than one location.

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

Depth - Indicate the depth below surface at which the incident happened. If damage was sustained on several levels, indicate 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:	<input type="checkbox"/> Dyke	<input type="checkbox"/> Fault/Slip	<input type="checkbox"/> Contacts	<input type="checkbox"/> Steeply dipping joints	<input type="checkbox"/> Flat lying joints	<input type="checkbox"/> Water
Comments:						
Fault/Dyke Description: (Orientation, thickness, etc.)						
Failure Mode:	<input type="checkbox"/> Plane	<input type="checkbox"/> Wedge	<input type="checkbox"/> Toppling	<input type="checkbox"/> Circular	<input type="checkbox"/> Other	
Comments:						
Associated Mining Activity:	<input type="checkbox"/> Blasting	<input type="checkbox"/> Mucking	<input type="checkbox"/> Drilling	<input type="checkbox"/> Scaling	<input type="checkbox"/> Installing reinforcement/support	
<input type="checkbox"/> Nothing Apparent						
Comments:						
Other Comments: (e.g. weather at time of incident, slope drainage, slope monitoring, etc.)						

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, thickness, presence of gouge, signs of movement, composition or rock quality of dyke, etc. Provide additional comments in the space provided.

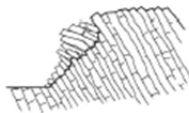
Failure Mode - Indicate the failure process or mode that resulted in the displacement of material, if known (refer to illustrations). Provide additional comments in the space provided.



Plane failure



Wedge failure



Toppling failure



Circular failure

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Associated Mining Activity - Indicate 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.

REINFORCEMENT/SUPPORT

Tendon /Dowel	Type	Location	Length	Pattern		Failed	Failure Beyond
				Wide	Long		
Cable bolts							
Resin rebar							
Surface Support	Type	Location	Depth or Length	Cracked or Bulged	Broken	Failed	
Mesh							
Shotcrete							
Straps							

Comment: Regarding Effectiveness of Support Systems: _____

Follow-up Action: _____

SIGN-OFF

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

Reviewed by	Title/Department

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

- District Office, Mining Health and Safety Program, Ontario Ministry of Labour
- Ground Control Specialist, Workplace Safety North, 690 McKeown Avenue, PO Box 2050, North Bay, Ont. P1B 9P1 gcs@masha.on.ca
- FAX: 705-472-5800

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REINFORCEMENT & SUPPORT -

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.

SIGN-OFF

The report should be reviewed by appropriate mine personnel. If this is a reportable incident, the report should be sent to the Ontario Ministry of Labour and WSN. WSN's copy should be e-mailed to the Ground Control Specialist at gcs@masha.on.ca (Alternate address: lucbeauchamp@workplacesafetynorth.ca)

UNUSUAL OCCURRENCE REPORT FOR GROUNDFAIL/ROCKBURST (UNDERGROUND MINE)

THIS REPORT IS FOR: FALL OF GROUND ROCKBURST
GENERAL

Company Incident Code:	<input type="checkbox"/> Internal Report	<input type="checkbox"/> Reportable Incident (Sect. 21 of Ontario Regulations for Mines and Mining Plants)
Company:	Mine:	Address:
Date: Unknown <input type="checkbox"/>	Time of Occurrence:	a.m. / p.m. <input type="checkbox"/> Unknown
General description of occurrence:		

WORKERS

At time of Incident Workers were:	<input type="checkbox"/> U/G	<input type="checkbox"/> Surface	<input type="checkbox"/> No one Working	<input type="checkbox"/> Unknown
Were workers in Immediate Area:	<input type="checkbox"/> Yes <input type="checkbox"/> No	To Within What Distance of the Incident were Workers Present:		
		<input type="checkbox"/> ft	<input type="checkbox"/> m	
Workers Normally Required in Area:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Was access to the area restricted? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Were there any injuries: <input type="checkbox"/> Yes <input type="checkbox"/> No	Nature of Injuries:			

DESCRIPTION OF OCCURRENCE

Location:	<input type="checkbox"/> Single Location <input type="checkbox"/> Multiple Locations
Damage Sustained to: <input type="checkbox"/> Excavation <input type="checkbox"/> Ground Support <input type="checkbox"/> Equipment <input type="checkbox"/> Unknown	Depth Below Surface: <input type="checkbox"/> ft <input type="checkbox"/> m
Area is in: <input type="checkbox"/> F/W Rock <input type="checkbox"/> H/W Rock <input type="checkbox"/> Ore	This Area is: <input type="checkbox"/> Active <input type="checkbox"/> Inactive <input type="checkbox"/> Abandoned
Incident Occurred in: <input type="checkbox"/> Raise <input type="checkbox"/> Drift/XC <input type="checkbox"/> Shaft <input type="checkbox"/> ore/waste pass <input type="checkbox"/> Pillar <input type="checkbox"/> Stope <input type="checkbox"/> Other:	
Opening Dimensions:	Height: Width: Length: Span: <input type="checkbox"/> ft <input type="checkbox"/> m
Mining Method: <input type="checkbox"/> None <input type="checkbox"/> VRM <input type="checkbox"/> Blasthole <input type="checkbox"/> Cut & Fill <input type="checkbox"/> Post Pillar Cut & Fill <input type="checkbox"/> Sublevel Caving <input type="checkbox"/> Shrinkage <input type="checkbox"/> Slot and Slash <input type="checkbox"/> Uppers Retreat <input type="checkbox"/> Undercut & Fill <input type="checkbox"/> Other:	
If Pillar Sustained Damage:	Type: <input type="checkbox"/> Rib <input type="checkbox"/> Post <input type="checkbox"/> Sill <input type="checkbox"/> Crown <input type="checkbox"/> Other:
Dimensions:	Height: Width: Length: <input type="checkbox"/> ft <input type="checkbox"/> m
Ore Recovery in Immediate Area: <input type="checkbox"/> None <input type="checkbox"/> Primary Recovery <input type="checkbox"/> Pillar or Secondary Recovery	
Material Displaced From: <input type="checkbox"/> Face <input type="checkbox"/> Back <input type="checkbox"/> Wall <input type="checkbox"/> Floor <input type="checkbox"/> Brow <input type="checkbox"/> Unknown <input type="checkbox"/> Other:	
Total Material Displaced: <input type="checkbox"/> Unknown <input type="checkbox"/> Amount: tons/tonnes Maximum depth of failure: <input type="checkbox"/> ft <input type="checkbox"/> m	
Comments:	
Rock types:	
Displaced Material Description: (choose one only)	<input type="checkbox"/> Wedge <input type="checkbox"/> Tabular <input type="checkbox"/> Block <input type="checkbox"/> Irregular <input type="checkbox"/> Thin/Slabbing <input type="checkbox"/> Unknown
Rock Mass Characteristics:	<input type="checkbox"/> Massive <input type="checkbox"/> Blocky/Chunks <input type="checkbox"/> Bedded <input type="checkbox"/> Fractured <input type="checkbox"/> Slabbing <input type="checkbox"/> Unknown

Structural Geology and Water:	<input type="checkbox"/> Dyke <input type="checkbox"/> Fault/Slip <input type="checkbox"/> Contacts <input type="checkbox"/> Steeply dipping joints <input type="checkbox"/> Flat lying joints <input type="checkbox"/> Water
Comments: _____	
Fault/Dyke Description: _____	
(Orientation, thickness, etc.)	
Failure Mode:	<input type="checkbox"/> Unknown <input type="checkbox"/> Stress <input type="checkbox"/> Structure
Comments: _____	
Associated Mining Activity:	<input type="checkbox"/> Nothing Apparent <input type="checkbox"/> Blasting <input type="checkbox"/> Mucking <input type="checkbox"/> Drilling <input type="checkbox"/> Scaling <input type="checkbox"/> Bolting <input type="checkbox"/> Backfilling
Comments: _____	

GROUND SUPPORT

Backfill Type	Location or Opening Backfilled	Binder Type and Content	Percentage Filled					
Tendon /Dowel	Type	Location		Length	Pattern		Failed	Beyond
		Walls	Back		Wide	Long		
Mechanical rockbolts								
Resin rebar								
Friction stabilizers								
Swellex								
Cable bolts								
Opening Liner	Type	Location		Depth or Length	Cracked or Bulged	Broken	Failed	
		Walls	Back					
Mine screen								
Shotcrete								
Straps								
Other System		Used to Support		Deformed	Broken	Failed		
		Walls	Back					

Comments Regarding Effectiveness of Support Systems: _____

Follow-up Action:	<hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black;"/>
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THIS SECTION FOR ROCKBURSTS ONLY								
Number of Events:	Magnitude of First Event: Mn <input type="checkbox"/> Unknown			Magnitude of Largest Event: Mn <input type="checkbox"/> Unknown				
Event Magnitudes	< 1 Mn		1 – 2 Mn		2 – 3 Mn		3 > Mn	
Number of Events	<input type="checkbox"/> Unknown		<input type="checkbox"/> Unknown		<input type="checkbox"/> Unknown		<input type="checkbox"/> Unknown	
Period of Time Over which Events Occurred (if more than one):					<input type="checkbox"/> Unknown	<input type="checkbox"/> Seconds <input type="checkbox"/> Minutes <input type="checkbox"/> Hours		
Location of Major Events: <input type="checkbox"/> H/W <input type="checkbox"/> F/W <input type="checkbox"/> Ore Zone <input type="checkbox"/> Not Located								
Location Determined By: <input type="checkbox"/> Visual Inspection <input type="checkbox"/> Seismic Monitoring Equipment <input type="checkbox"/> Other Monitoring Equipment <input type="checkbox"/> Estimated <input type="checkbox"/> Not Located								
Damage Sustained by Mine Openings: <input type="checkbox"/> Unknown <input type="checkbox"/> None <input type="checkbox"/> Confined to Single Location on Single Level <input type="checkbox"/> Many Locations on One Level <input type="checkbox"/> Many Locations over Many Levels								
The Rockburst: <input type="checkbox"/> Triggered a Fall of Ground <input type="checkbox"/> Displaced Material Violently <input type="checkbox"/> Contained by Ground Support								
Apparent Rockburst Mechanism: <input type="checkbox"/> Undetermined <input type="checkbox"/> Strain Burst <input type="checkbox"/> Pillar Burst <input type="checkbox"/> Fault/Slip Mechanism								
Comments:								

SIGN-OFF

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

Reviewed by	Title/Department	Reviewed by	Title/Department

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

- District Office, Mining Health and Safety Program, Ontario Ministry of Labour
- Ground Control Specialist, Workplace Safety North, 690 McKeown Avenue, PO Box 2050, North Bay, Ont. P1B 9P1 gcs@masha.on.ca
FAX (705) 472-5800

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

UNUSUAL OCCURRENCE REPORT FOR GROUNDFAIL/ROCKBURST (SURFACE MINE)

GENERAL

Company Incident Code:	<input type="checkbox"/> Internal Report	<input type="checkbox"/> Reportable Incident (see Sect. 21 of Ontario Regulations for Mines and Mining Plants)
Company:	Mine:	Address:
Date:	<input type="checkbox"/> Unknown	Time of Occurrence: a.m. / p.m. <input type="checkbox"/> Unknown
General description of occurrence:		

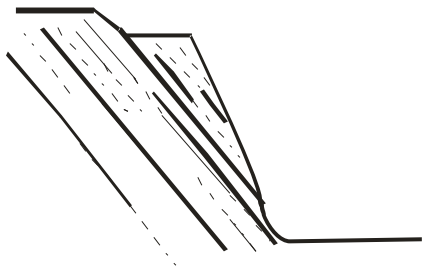
WORKERS

At time of Incident Workers were:	<input type="checkbox"/> In the mine	<input type="checkbox"/> No one Working	<input type="checkbox"/> Unknown
Were workers in Immediate Area:	<input type="checkbox"/> Yes <input type="checkbox"/> No	To Within What Distance of the Incident were Workers Present: <input type="checkbox"/> ft <input type="checkbox"/> m	
Workers Normally Required in Area:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Was access to the area restricted? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Were there any injuries: <input type="checkbox"/> Yes <input type="checkbox"/> No	Nature of Injuries:		

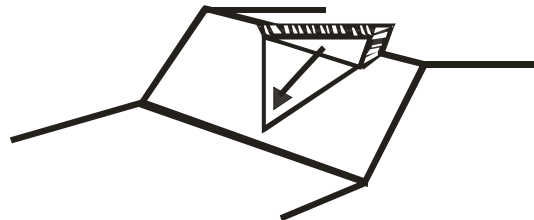
DESCRIPTION OF OCCURRENCE

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

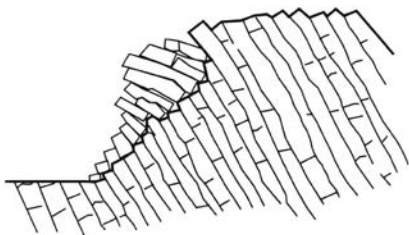
Structural Geology and Water:	<input type="checkbox"/> Dyke <input type="checkbox"/> Fault/Slip <input type="checkbox"/> Contacts <input type="checkbox"/> Steeply dipping joints <input type="checkbox"/> Flat lying joints <input type="checkbox"/> Water
Comments:	
Fault/Dyke Description: (Orientation,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



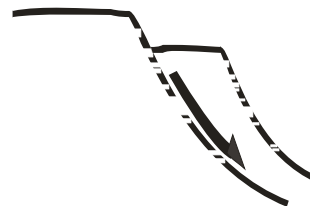
Plane failure



Wedge failure



Toppling failure



Circular failure

REINFORCEMENT/SUPPORT

Tendon /Dowel	Type	Location	Length	Pattern		Failed	Failure Beyond
				Wide	Long		
Cable bolts							
Resin rebar							

Surface Support	Type	Location	Depth or Length	Cracked or Bulged	Broken	Failed
Mesh						
Shotcrete						
Straps						

Comments Regarding Effectiveness of Support Systems: _____

Follow-up Action: _____

SIGN-OFF

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

Reviewed by	Title/Department

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

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